Location(s) of Work Documentation

DE-FOA-0002678

Control Number: 2678-XXXX

Prime Applicant/ Team Member	Address	City	State	Nine Digit Zip Code (ZIP+4)
Amprius technologies	1180 Page Ave	Fremont	CA	94538
Amprius technologies	(b) (4)	[redacted]	[redacted]	
NREL		Golden	CO	
ANL		Argonne	IL	

Instructions and Summary

Award Number: 2678-1709
Award Recipient: Amprius Technologies

Date of Submission: 7/1/2022
Form submitted by: Amprius Technologies
(May be award recipient or sub-recipient)

Please read the instructions on each worksheet tab before starting. If you have any questions, please ask your EERE contact!
Do not modify this template or any cells or formulas!

1. If using this form for award application, negotiation, or budget revision, fill out the blank white cells in workbook tabs a. through j. with total project costs. If using this form for invoice submission, fill out tabs a. through j. wi h total costs for just the proposed invoice and fill out tab k. per the instructions on that tab.
2. Blue colored cells contain instructions, headers, or summary calculations and should not be modified. Only blank white cells should be populated.
3. Enter detailed support for the project costs identified for each Category line item within each worksheet tab to autopopulate the summary tab.
4. The total budget presented on tabs a. through i. must include both Federal (DOE) and Non-Federal (cost share) portions.
5. All costs incurred by the preparer's sub-recipients, vendors, and Federal Research and Development Centers (FFRDCs), should be entered only in section f. Contractual. All other sections are for the costs of the preparer only.
6. Ensure all entered costs are allowable, allocable, and reasonable in accordance with the administrative requirements prescribed in 2 CFR 200, and the applicable cost principles for each entity type: FAR Part 31 for For-Profit entities; and 2 CFR Part 200 Subpart E - Cost Principles for all o her non-federal en ities.
7. Add rows as needed throughout tabs a. through j. If rows are added, formulas/calcula ions may need to be adjusted by the preparer. Do not add rows to the Instructions and Summary tab. If your project contains more han five budget periods, consult your EERE contact before adding additional budget period rows or columns.
8. ALL budget period cost categories are rounded to the nearest dollar.

BURDEN DISCLOSURE STATEMENT
Public reporting burden for this collection of information is estimated to average 24 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Office of Information Resources Management Policy, Plans, and Oversight, AD-241-2 - GTN, Paperwork Reduction Project (1910-5162), U.S. Department of Energy 1000 Independence Avenue, S.W., Washington, DC 20585; and to the Office of Management and Budget, Paperwork Reduction Project (1910-5162), Washington, DC 20503.

SUMMARY OF BUDGET CATEGORY COSTS PROPOSED

The values in this summary table are from entries made in subsequent tabs, only blank white cells require data entry

Section A - Budget Summary

	Federal	Cost Share			Total Costs	Cost Share %	Proposed Budget Period Dates
Budget Period 1	$22,545,821	$63,175,144			$85,720,965	73.70%	[redacted]
Budget Period 2	$23,616,017	$66,173,918			$89,789,935	73.70%	(b) (4)
Budget Period 3	$3,838,162	$10,754,828			$14,592,990	73.70%	
Budget Period 4	$0	$0			$0	0.00%	
Budget Period 5	$0	$0			$0	0.00%	
Total	$50,000,001	$140,103,890			$190,103,891	73.70%	

Section B - Budget Categories

CATEGORY	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Total Costs	% of Project	Comments (as needed)
a. Personnel	[redacted]							
b. Fringe Benefits								
c. Travel								
d. Equipment								
e. Supplies								
f. Contractual								
Sub-recipient								
Vendor								
FFRDC								
Total Contractual								
g. Construction								
h. Other Direct Costs								
Total Direct Costs								
i. Indirect Charges								
Total Costs								

(b) (4)

Additional Explanation (as needed):

Detailed Budget Justification

a. Personnel

INSTRUCTIONS - PLEASE READ!!!

1. List project costs solely for employees of the entity completing this form. All personnel costs for subrecipients and vendors must be included under f. Contractual.

2. All personnel should be identified by position title and not employee name. Enter the amount of time (e.g., hours or % of time) and the base pay rate and the total direct personnel compensation will automatically calculate. Rate basis (e.g., actual salary, labor distribution report, state civil service rates, etc.) must also be identified.

3. If loaded labor rates are utilized, a description of the costs the loaded rate is comprised of must be included in the Additional Explanation section below. DOE must review all components of the loaded labor rate for reasonableness and unallowable costs (e.g. fee or profit).

4. If a position and hours are attributed to multiple employees (e.g. Technician working 4000 hours) the number of employees for that position title must be identified.

5. Each budget period is rounded to the nearest dollar.

SOPO Task #	Position Title	Budget Period 1			Budget Period 2			Budget Period 3			Budget Period 4			Budget Period 5			Project Total Hours	Project Total Dollars	Rate Basis
		Time (Hrs)	Pay Rate ($/Hr)	Total Budget Period 1	Time (Hrs)	Pay Rate ($/Hr)	Total Budget Period 2	Time (Hrs)	Pay Rate ($/Hr)	Total Budget Period 3	Time (Hrs)	Pay Rate ($/Hr)	Total Budget Period 4	Time (Hrs)	Pay Rate ($/Hr)	Total Budget Period 5			
1	Sr. Engineer **(EXAMPLE!!!)**	2000	$85.00	$170,000	200	$50.00	$10,000	200	$50.00	$10,000	200	$50.00	$10,000	200	$50.00	$10,000	2400	$190,000	Actual Salary
2	Technicians (2)	4000	$20.00	$80,000	0	$0.00	$0	0	$0.00	$0	0	$0.00	$0	0	$0.00	$0	4000	$80,000	Actual Salary

(b) (4)

Additional Explanation (as needed):

b. Fringe Benefits

INSTRUCTIONS - PLEASE READ

1. Fill out the table below by position title. If all employees receive the same fringe benefits, you can show "Total Personnel" in the Labor Type column instead of listing out all position titles.
2. The rates and how they are applied should not be averaged to get one fringe cost percentage. Complex calculations should be described/provided in the Additional Explanation section below.
3. The fringe benefit rates should be applied to all positions, regardless of whether those funds will be supported by Federal Share or Recipient Cost Share.
4. Each budget period is rounded to the nearest dollar.

Labor Type	Budget Period 1			Budget Period 2			Budget Period 3			Budget Period 4			Budget Period 5			Total Project
	Personnel Costs	Rate	Total	Personnel Costs	Rate	Total	Personnel Costs	Rate	Total	Personnel Costs	Rate	Total	Personnel Costs	Rate	Total	
EXAMPLE Sr. Engineer	$170 000	20%	$34 000	$10 000	20%	$2 000	$10 000	20%	$2 000	$10 000	20%	$2 000	$10 000	20%	$2 000	$38 000

[redacted]

(b) (4)

A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required at the time of award negotiation if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information if not previously submitted.

A fringe benefit rate has been negotiated with, or approved by, a federal government agency. A copy of the latest rate agreement is/was included with the project application.*

There is not a current federally approved rate agreement negotiated and available.**

*Unless the organization has submitted an indirect rate proposal which encompasses the fringe pool of costs, please provide the organization's benefit package and/or a list of the components/elements that comprise the fringe pool and the cost or percentage of each component/element allocated to the labor costs identified in the Budget Justification (Form EERE 335.1).

**When this option is checked, the entity preparing this form shall submit an indirect rate proposal in the format provided in the Sample Rate Proposal at https://www.energy gov/eere/funding/downloads/sample-indirect-rate-proposal-and-profit-compliance-audit, or a format that provides the same level of information and which will support the rates being proposed for use in the performance of the proposed project.

Additional Explanation (as necessary): Please use this box (or an attachment) to list the elements that comprise your fringe benefits and how they are applied to your base (e.g. Personnel) to arrive at your fringe benefit rate.

c. Travel

INSTRUCTIONS - PLEASE READ

1. Identify Foreign and Domestic Travel as separate items. Examples of Purpose of Travel are subrecipient site visits, DOE meetings, project mgmt. meetings, etc. Examples of Basis for Estimating Costs are past trips, travel quotes, GSA rates, etc.
2. All listed travel must be necessary for performance of the Statement of Project Objectives.
3. Only travel that is directly associated with this award should be included as a direct travel cost to the award.
4. Federal travel regulations are contained within the applicable cost principles for all entity types.
5. Travel costs should remain consistent with travel costs incurred by an organization during normal business operations as a result of the organizations written travel policy. In absence of a written travel policy, organizations must follow the regulations prescribed by the General Services Administration.
6. Columns E, F, G, H, I, J, and K are per trip.
7. The number of days is inclusive of day of departure and day of return.
8. Recipients should enter City and State (or City and Country for International travel) in the Depart from and Destination fields.
9. Each budget period is rounded to the nearest dollar.

SOPO Task #	Purpose of Travel	Depart From	Destination	No. of Days	No. of Travelers	Lodging per Traveler	Flight per Traveler	Vehicle per Traveler	Per Diem Per Traveler	Cost per Trip	Basis for Estimating Costs
	Domestic Travel	Budget Period 1									
1	EXAMPLE Visit to PV manufacturer			2	2	$250	$500	$100	$160	$2,020	Current GSA rates
	(b) (4)										
	International Travel										
										$0	
	Budget Period 1 Total										
	Domestic Travel	Budget Period 2									
	International Travel										
										$0	
	Budget Period 2 Total										
	Domestic Travel	Budget Period 3									
										$0	
	International Travel										
										$0	
	Budget Period 3 Total										
	Domestic Travel	Budget Period 4									
										$0	
										$0	
										$0	
										$0	
	International Travel										
										$0	
	Budget Period 4 Total									$0	
	Domestic Travel	Budget Period 5									
										$0	
										$0	
										$0	
										$0	
	International Travel										
										$0	
	Budget Period 5 Total									$0	
	PROJECT TOTAL										

Additional Explanation (as needed):

d. Equipment

INSTRUCTIONS - PLEASE READ!!!

1. Equipment is generally defined as an item with an acquisition cost greater than $5,000 and a useful life expectancy of more than one year. Please refer to the applicable Federal regulations in 2 CFR 200 for specific equipment definitions and treatment.

2. List all equipment below, providing a basis of cost (e.g. vendor quotes, catalog prices, prior invoices, etc.). Briefly justify items as they apply to the Statement of Project Objectives. If it is existing equipment, provide logical support for the estimated value shown.

3. During award negotiations, provide a vendor quote for all equipment items over $50,000 in price. If the vendor quote is not an exact price match, provide an explanation in the additional explanation section below. If a vendor quote is not practical, such as for a piece of equipment that is purpose-built, first of its kind, or otherwise not available off the shelf, provide a detailed engineering estimate for how the cost estimate was derived.

4. Each budget period is rounded to the nearest dollar.

SOPO Task #	Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
				Budget Period 1		
3,4,5	**EXAMPLE!!!** Thermal shock chamber	2	$70,000	$140,000	Vendor Quote - Attached	Reliability testing of PV modules- Task 4.3
	Budget Period 1 Total					
				Budget Period 2		
	Budget Period 2 Total					
				Budget Period 3		
	Budget Period 3 Total					
				Budget Period 4		
	Budget Period 4 Total					
				Budget Period 5		
	Budget Period 5 Total					
	PROJECT TOTAL					

(b) (4)

Additional Explanation (as needed):

e. Supplies

INSTRUCTIONS - PLEASE READ

1. Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Please refer to the applicable Federal regulations in 2 CFR 200 for specific supplies definitions and treatment.

2. List all proposed supplies below, providing a basis of costs (e g. vendor quotes, catalog prices, prior invoices, etc.). Briefly justify the need for the Supplies as they apply to the Statement of Project Objectives. Note that Supply items must be direct costs to the project at this budget category, and not duplicative of supply costs included in the indirect pool that is the basis of the indirect rate applied for this project.

3. Multiple supply items valued at $5,000 or less used to assemble an equipment item with a value greater than $5,000 with a useful life of more than one year should be included on the equipment tab. If supply items and costs are ambiguous in nature, contact your DOE representative for proper categorization.

4. Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

5. Each budget period is rounded to the nearest dollar

SOPO Task #	General Category of Supplies	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
				Budget Period 1		
4,6	EXAMPLE Wireless DAS components	10	$360 00	$3,600	Catalog price	For Alpha prototype - Task 2.4
	Budget Period 1 Total					
				Budget Period 2		
	Budget Period 2 Total					
				Budget Period 3		
	Budget Period 3 Total					
				Budget Period 4		
	Budget Period 4 Total					
				Budget Period 5		
	Budget Period 5 Total					
	PROJECT TOTAL					

(b) (4)

Additional Explanation (as needed):

f. Contractual

INSTRUCTIONS - PLEASE READ!!!

1. The entity completing this form must provide all costs related to sub-recipients, vendors, and FFRDC partners in the applicable boxes below.

2. Sub-recipients (partners, sub-awardees): Subrecipients shall submit a Budget Justification describing all project costs and calculations when their total proposed budget exceeds either (1) $250,000 or (2) 25% of total award costs. These sub-recipient forms may be completed by ei her the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient's forms must match the sub-recipient entries below. A subrecipient is a legal entity to which a subaward is made, who has performance measured against whether he objectives of the Federal program are met, is responsible for programmatic decision making, must adhere to applicable Federal program compliance requirements, and uses the Federal funds to carry out a program of the organization. All characteristics may not be present and judgment must be used to determine subrecipient vs. vendor status.

3. Vendors (including contractors): List all vendors and contractors supplying commercial supplies or services used to support the project. For each Vendor cost with total project costs of $250,000 or more, a Vendor quote must be provided. A vendor is a legal entity contracted to provide goods and services within normal business operations, provides similar goods or services to many different purchasers, operates in a competitive environment, provides goods or services that are ancillary to the operation of the Federal program, and is not subject to compliance requirements of the Federal program. All characteris ics may not be present and judgment must be used to determine subrecipient vs. vendor status.

4. Federal Funded Research and Development Centers (FFRDCs): FFRDCs must submit a signed Field Work Proposal during award application. The award recipient may allow the FFRDC to provide his information directly to DOE, however project costs must also be provided below.

5. Each budget period is rounded to the nearest dollar.

SOPO Task #	Sub-Recipient Name/Organization	Purpose and Basis of Cost	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Project Total
2,4	EXAMPLE!!! XYZ Corp.	Partner to develop optimal lens for Gen 2 product. Cost estimate based on personnel hours.	$48,000	$32,000	$16,000	$8,000	$4,000	$108,000
								$0
								$0
								$0
								$0
								$0
								$0
								$0
								$0
								$0
								$0
		Sub-total	$0	$0	$0	$0	$0	$0

SOPO Task #	Vendor Name/Organization	Purpose and Basis of Cost	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Project Total
6	EXAMPLE!!! ABC Corp.	Vendor for developing robotics to perform lens inspection. Estimate provided by vendor.	$0	$32,900	$86,500	$0	$0	$119,400
[redacted]								
		Sub-total						

SOPO Task #	FFRDC Name/Organization	Purpose and Basis of Cost	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Project Total
[redacted]								
		Sub-total						

	Total Contractual	[redacted]

Additional Explanation (as needed):

g. Construction

PLEASE READ!!!

1. Construction, for the purpose of budgeting, is defined as all types of work done on a particular building, including erecting, altering, or remodeling. Construction conducted by the award recipient is entered on this page. Any construction work that is performed by a vendor or subrecipient should be entered under f. Contractual.

2. List all proposed construction below, providing a basis of cost such as engineering estimates, prior construction, etc., and briefly justify its need as it applies to the Statement of Project Objectives.

3. Each budget period is rounded to the nearest dollar.

Overall description of construction activities: **Example Only!!! - Build wind turbine platform**

SOPO Task #	General Description	Cost	Basis of Cost	Justification of need
	Budget Period 1			
3	EXAMPLE ONLY!!! Three days of excavation for platform site	$28,000	Engineering estimate	Site must be prepared for construction of platform.
	(b) (4) [redacted]			
	Budget Period 1 Total			
	Budget Period 2			
	[redacted]			
	Budget Period 2 Total			
	Budget Period 3			
	[redacted]			
	Budget Period 3 Total			
	Budget Period 4			
	[redacted]			
	Budget Period 4 Total			
	Budget Period 5			
	[redacted]			
	Budget Period 5 Total			
	PROJECT TOTAL			

Additional Explanation (as needed):

h. Other Direct Costs

INSTRUCTIONS - PLEASE READ!!!

1. Other direct costs are direct cost items required for the project which do not fit clearly into other categories. These direct costs must not be included in the indirect costs (for which the indirect rate is being applied for this project). Examples are: tuition, printing costs, etc. which can be directly charged to the project and are not duplicated in indirect costs (overhead costs).

2. Basis of cost are items such as vendor quotes, prior purchases of similar or like items, published price list, etc.

3. Each budget period is rounded to the nearest dollar.

SOPO Task #	General Description and SOPO Task #	Cost	Basis of Cost	Justification of need
			Budget Period 1	
5	**EXAMPLE!!!** Grad student tuition - tasks 1-3	$16,000	Established UCD costs	Support of graduate students working on project
			(b) (4)	
	Budget Period 1 Total			
			Budget Period 2	
	Budget Period 2 Total			
			Budget Period 3	
	Budget Period 3 Total			
			Budget Period 4	
	Budget Period 4 Total			
			Budget Period 5	
	Budget Period 5 Total			
	PROJECT TOTAL			

Additional Explanation (as needed):

i. Indirect Costs

INSTRUCTIONS - PLEASE READ

1. Fill out the table below to indicate how your indirect costs are calculated. Use the box below to provide additional explanation regarding your indirect rate calculation.

2. The rates and how they are applied should not be averaged to get one indirect cost percentage. Complex calculations or rates that do not do not correspond to the below categories should be described/provided in the Additional Explanation section below. If questions exist, consult with your DOE contact before filling out this section.

3. The indirect rate should be applied to both the Federal Share and Recipient Cost Share.

4. Each budget period is rounded to the nearest dollar.

	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Total	Explanation of BASE
Provide ONLY Applicable Rates:							
[redacted]							
Indirect Costs (As Applicable):							
[redacted]							
Total indirect costs requested:							

(b) (4)

A federally approved indirect rate agreement, or rate proposed (supported and agreed upon by DOE for estimating purposes) is required if reimbursement of indirect costs is requested. Please check (X) one of the options below and provide the requested information if it has not already been provided as requested, or has changed.

An indirect rate has been approved or negotiated with a federal government agency. A copy of the latest rate agreement is included with this application, and will be provided electronically to the Contracting Officer for this project.

There is not a current, federally approved rate agreement negotiated and available*.

***When this option is checked, the entity preparing this form shall submit an indirect rate proposal in the format provided by your DOE contact, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Additionally, any non-Federal entity that has never received a negotiated indirect cost rate, except for those non-Federal entities described in Appendix VII to Part 200—States and Local Government and Indian Tribe Indirect Cost Proposals, paragraph D.1.b, may elect to charge a de minimis rate of 10% of modified total direct costs (MTDC) which may be used indefinitely.As described in §200.403 Factors affecting allowability of costs, costs must be consistently charged as either indirect or direct costs, but may not be double charged or inconsistently charged as both. If chosen, this methodology once elected must be used consistently for all Federal awards until such time as a non-Federal entity chooses to negotiate for a rate, which the non-Federal entity may apply to do at any time.**

You must provide an explanation (below or in a separate attachment) and show how your indirect cost rate was applied to this budget in order to come up with the indirect costs shown.

Additional Explanation (as needed): *IMPORTANT: Please use this box (or an attachment) to further explain how your total indirect costs were calculated. If the total indirect costs are a cumulative amount of more than one calculation or rate application, the explanation and calculations should identify all rates used, along with the base they were applied to (and how the base was derived), and a total for each (along with grand total).

Cost Share

PLEASE READ

1. A detailed presentation of the cash or cash value of all cost share proposed must be provided in the table below. All items in the chart below must be identified within the applicable cost category tabs a. through i. in addition to the detailed presentation of the cash or cash value of all cost share proposed provided in the table below. Identify the source organization & amount of each cost share item proposed in the award.

2. Cash Cost Share - encompasses all contributions to the project made by the recipient, subrecipient, or third party (an entity that does not have a role in performing the scope of work) for costs incurred and paid for during the project. This includes when an organization pays for personnel, supplies, equipment, etc. for their own company with organizational resources. If the item or service is reimbursed for, it is cash cost share. All cost share items must be necessary to the performance of the project. **Vendors may not provide cost share.** Any partial donation of goods or services is considered a discount and is not allowable.

3. In Kind Cost Share - encompasses all contributions to the project made by the recipient, subrecipient, or third party (an entity that does not have a role in performing the scope of work) where a value of the contribution can be readily determined, verified and justified but where no actual cash is transacted in securing the good or service comprising the contribution. In Kind cost share items include volunteer personnel hours, the donation of space or use of equipment, etc. The cash value and calculations thereof for all In Kind cost share items must be justified and explained in the Cost Share Item section below. All cost share items must be necessary to the performance of the project. If questions exist, consult your DOE contact before filling out In Kind cost share in this section. Vendors may not provide cost share. Any partial donation of goods or services is considered a discount and is not allowable.

4. Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include any source not originally derived from Federal funds. Cost sharing commitment letters from subrecipients and third parties must be provided with the original application.

5. Fee or profit, including foregone fee or profit, **are not allowable** as project costs (including cost share) under any resulting award. The project may only incur those costs that are allowable and allocable to the project (including cost share) as determined in accordance with the applicable cost principles prescribed in FAR Part 31 for For-Profit entities and 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.

6. NOTE A Recipient who elects to employ the 10% de minimis Indirect Cost rate **cannot claim the resulting indirect costs as a Cost Share contribution.**

7. NOTE A Recipient **cannot claim "unrecovered indirect costs"** as a Cost Share contribution, **without prior approval.**

8. Each budget period is rounded to the nearest dollar.

Recipient Provided Cost Share	Organization/Source	Type (Cash or In Kind)	Cost Share Item	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Total
[redacted]									

(b) (4)

f. Subrecipient (3rd Party) Provided Cost Share	Organization/Source	Type (Cash or In Kind)	Cost Share Item For simple cost share contributions from a partner provide the detail below; for complex contributions provide a separate budget justification (if required) or a supplementary detailed explanation	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Total
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Total subrecipient provided cost share				$0	$0	$0	$0	$0	$0

Total Project Cost: $190,103,891 **Cost Share Percent of Award: 73.7%**

Additional Explanation (as needed):

*PI/co-PI/Senior Personnel Name: Ionel Stefan

***Required fields**

Note: NSF has provided 15 project/proposal and 10 in-kind contribution entries for users to populate. Please leave any unused entries blank.

Project/Proposal Section:

Current and Pending Support includes all resources made available to an individual in support of and/or related to all of his/her research efforts, regardless of whether or not they have monetary value.[1] Information must be provided about all current and pending support, including this project, for ongoing projects, and for any proposals currently under consideration from whatever source, irrespective of whether such support is provided through the proposing organization or is provided directly to the individual. This includes, for example, Federal, State, local, foreign, public or private foundations, non-profit organizations, industrial or other commercial organizations, or internal funds allocated toward specific projects. Concurrent submission of a proposal to other organizations will not prejudice its review by NSF, if disclosed.[2]

[1] If the time commitment or dollar value is not readily ascertainable, reasonable estimates should be provided.
[2] The Biological Sciences Directorate exception to this policy is delineated in PAPPG Chapter II.D.2.

Projects/Proposals

1. *Project/Proposal Title : Silicon Anode Cell Manufacturing Cost Reduction

*Status of Support : ◉ Current ○ Pending ○ Submission Planned ○ Transfer of Support

Proposal/Award Number (if available): DOTC-19-04-INIT4589

*Source of Support: US Army

*Primary Place of Performance : Fremont, California

Project/Proposal Start Date (MM/YYYY) (if available) : 04/2021

Project/Proposal End Date (MM/YYYY) (if available) :

*Total Award Amount (including Indirect Costs): $ [redacted] (b) (4)

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1. 2021	1.80	4.	
2. 2022	2.40	5.	
3. 2023	1.80		

*Overall Objectives : Develop and demonstrate a low-cost method for scalable prelithiation for silicon nanowire anode

*Statement of Potential Overlap : No overlap; complementary step in cell manufacturing

Projects/Proposals

2. *Project/Proposal Title : Double nano-UAS Endurance with Silicon Nanowire Lithium-ion Battery Cells

*Status of Support : ◉ Current ○ Pending ○ Submission Planned ○ Transfer of Support

Proposal/Award Number (if available): W50RAJ2190046

*Source of Support: ARMY RAPID CAPABILITIES AND CRITICAL TECHNOLOGIES OFFICE

*Primary Place of Performance : Fremont, California

Project/Proposal Start Date (MM/YYYY) (if available) : 09/2021

Project/Proposal End Date (MM/YYYY) (if available) :

*Total Award Amount (including Indirect Costs): $ [redacted] (b) (4)

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1. 2021	0.60	4.	
2. 2022	2.40	5.	
3. 2023	0.60		

*Overall Objectives : Develop a replacement battery for the Black Hornet 3 Unmanned Aerial System that will double flight time

*Statement of Potential Overlap : No overlap

Projects/Proposals

3. *Project/Proposal Title : Low cost, fast charging silicon nanowire cell technology

*Status of Support : ◉ Current ○ Pending ○ Submission Planned ○ Transfer of Support

Proposal/Award Number (if available): DE-EE0006250 / 22-2285-ABC

*Source of Support: USABC

*Primary Place of Performance : Fremont, California

Project/Proposal Start Date (MM/YYYY) (if available) : 03/2022

Project/Proposal End Date (MM/YYYY) (if available) : 08/2024

*Total Award Amount (including Indirect Costs): $ 1,499,520

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1. 2022	2.00	4.	
2. 2023	2.40	5.	
3. 2024	2.00		

*Overall Objectives : Develop an 80 Ah pouch cell for EV applications, including cycle life and calendar life performance metrics

*Statement of Potential Overlap : No overlap; complementary; improvement in cell performance

Projects/Proposals

4. *Project/Proposal Title : Large scale manufacturing of silicon nanowire anode by direct gas-to-electrode manufacturing

*Status of Support : ○ Current ○ Pending ⊙ Submission Planned ○ Transfer of Support

Proposal/Award Number (if available):

*Source of Support: DOE BIL-DE

*Primary Place of Performance : San Antonio, TX; Fremont, CA

Project/Proposal Start Date (MM/YYYY) (if available) :

Project/Proposal End Date (MM/YYYY) (if available) :

*Total Award Amount (including Indirect Costs): $ 50,000,000

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1. 2023	2.40	4.	
2. 2024	2.40	5.	
3. 2025	2.40		

*Overall Objectives : Develop a source-less plasma deposition method for high-throughput silicon nanowire anode manufacturing

*Statement of Potential Overlap :

Projects/Proposals

5. *Project/Proposal Title :

*Status of Support : ○ Current ○ Pending ○ Submission Planned ○ Transfer of Support

Proposal/Award Number (if available):

*Source of Support:

*Primary Place of Performance :

Project/Proposal Start Date (MM/YYYY) (if available) :

Project/Proposal End Date (MM/YYYY) (if available) :

*Total Award Amount (including Indirect Costs): $

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Overall Objectives :

*Statement of
Potential Overlap :

Projects/Proposals

6. *Project/Proposal Title :

*Status of Support : ○ Current ○ Pending ○ Submission Planned ○ Transfer of Support

Proposal/Award Number (if available):

*Source of Support:

*Primary Place of Performance :

Project/Proposal Start Date (MM/YYYY) (if available) :

Project/Proposal End Date (MM/YYYY) (if available) :

*Total Award Amount (including Indirect Costs): $

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Overall Objectives :

*Statement of
Potential Overlap :

Projects/Proposals

7.*Project/Proposal Title :

*Status of Support : ○ Current ○ Pending ○ Submission Planned ○ Transfer of Support

Proposal/Award Number (if available):

*Source of Support:

*Primary Place of Performance :

Project/Proposal Start Date (MM/YYYY) (if available) :

Project/Proposal End Date (MM/YYYY) (if available) :

*Total Award Amount (including Indirect Costs): $

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Overall Objectives :

*Statement of
Potential Overlap :

Projects/Proposals

8. *Project/Proposal Title :

*Status of Support : ○ Current ○ Pending ○ Submission Planned ○ Transfer of Support

Proposal/Award Number (if available):

*Source of Support:

*Primary Place of Performance :

Project/Proposal Start Date (MM/YYYY) (if available) :

Project/Proposal End Date (MM/YYYY) (if available) :

*Total Award Amount (including Indirect Costs): $

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Overall Objectives :

*Statement of
Potential Overlap :

Projects/Proposals

9. *Project/Proposal Title :

*Status of Support : ○ Current ○ Pending ○ Submission Planned ○ Transfer of Support

Proposal/Award Number (if available):

*Source of Support:

*Primary Place of Performance :

Project/Proposal Start Date (MM/YYYY) (if available) :

Project/Proposal End Date (MM/YYYY) (if available) :

*Total Award Amount (including Indirect Costs): $

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Overall Objectives :

*Statement of
Potential Overlap :

Projects/Proposals

10. *Project/Proposal Title :

*Status of Support : ○ Current ○ Pending ○ Submission Planned ○ Transfer of Support

Proposal/Award Number (if available):

*Source of Support:

*Primary Place of Performance :

Project/Proposal Start Date (MM/YYYY) (if available) :

Project/Proposal End Date (MM/YYYY) (if available) :

*Total Award Amount (including Indirect Costs): $

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Overall Objectives :

*Statement of
Potential Overlap :

Projects/Proposals

11. *Project/Proposal Title :

*Status of Support : ○ Current ○ Pending ○ Submission Planned ○ Transfer of Support

Proposal/Award Number (if available):

*Source of Support:

*Primary Place of Performance :

Project/Proposal Start Date (MM/YYYY) (if available) :

Project/Proposal End Date (MM/YYYY) (if available) :

*Total Award Amount (including Indirect Costs): $

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Overall Objectives :

*Statement of
Potential Overlap :

Projects/Proposals

12. *Project/Proposal Title :

*Status of Support : ○ Current ○ Pending ○ Submission Planned ○ Transfer of Support

Proposal/Award Number (if available):

*Source of Support:

*Primary Place of Performance :

Project/Proposal Start Date (MM/YYYY) (if available) :

Project/Proposal End Date (MM/YYYY) (if available) :

*Total Award Amount (including Indirect Costs): $

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Overall Objectives :

*Statement of
Potential Overlap :

Projects/Proposals

13. *Project/Proposal Title :

*Status of Support : ○ Current ○ Pending ○ Submission Planned ○ Transfer of Support

Proposal/Award Number (if available):

*Source of Support:

*Primary Place of Performance :

Project/Proposal Start Date (MM/YYYY) (if available) :

Project/Proposal End Date (MM/YYYY) (if available) :

*Total Award Amount (including Indirect Costs): $

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Overall Objectives :

*Statement of
Potential Overlap :

Projects/Proposals

14. *Project/Proposal Title :

*Status of Support : ○ Current ○ Pending ○ Submission Planned ○ Transfer of Support

Proposal/Award Number (if available):

*Source of Support:

*Primary Place of Performance :

Project/Proposal Start Date (MM/YYYY) (if available) :

Project/Proposal End Date (MM/YYYY) (if available) :

*Total Award Amount (including Indirect Costs): $

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Overall Objectives :

*Statement of
Potential Overlap :

Projects/Proposals

15. *Project/Proposal Title :

*Status of Support : ○ Current ○ Pending ○ Submission Planned ○ Transfer of Support

Proposal/Award Number (if available):

*Source of Support:

*Primary Place of Performance :

Project/Proposal Start Date (MM/YYYY) (if available) :

Project/Proposal End Date (MM/YYYY) (if available) :

*Total Award Amount (including Indirect Costs): $

*Person-Month(s) (or Partial Person-Months) Per Year Committed to the Project

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Overall Objectives :

*Statement of
Potential Overlap :

In Kind Contributions

*Required fields

In-Kind Contribution Section:

Current and Pending Support also includes in-kind contributions (such as office/laboratory space, equipment, supplies, employees, students). If the in-kind contributions are intended for use on the project being proposed to NSF, the information must be included as part of the Facilities, Equipment and Other Resources section of the proposal and need not be replicated in the individual's Current and Pending Support submission. In-kind contributions not intended for use on the project/proposal being proposed that have associated time obligations must be reported below. If the time commitment or dollar value is not readily ascertainable, reasonable estimates should be provided.

Please enter your support entries so they are grouped together based on the "Status of Support" and are in the order of Current to Pending from top to bottom

In Kind Contributions

1.*Status of Support : ○ Current ○ Pending

*Source of Support :

*Primary Place of Performance :

*Summary of In-Kind Contributions :

Time Commitment - Month(s) (or Partial Person-Months) Committed Per Year

If the time commitment is not readily ascertainable, reasonable estimates should be provided.

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Dollar Value of In-Kind Contribution: $

*Overall Objectives :

*Statement of
Potential Overlap :

In Kind Contributions

2.*Status of Support : ○ Current ○ Pending

*Source of Support :

*Primary Place of Performance :

*Summary of In-Kind Contributions :

Time Commitment - Month(s) (or Partial Person-Months) Committed Per Year

If the time commitment is not readily ascertainable, reasonable estimates should be provided.

*Year (YYYY)	*Person Months (##.##)
1.	
2.	
3.	

Year (YYYY)	Person Months (##.##)
4.	
5.	

*Dollar Value of In-Kind Contribution: $

*Overall Objectives :

*Statement of
Potential Overlap :

In Kind Contributions

3.*Status of Support : ○ Current ○ Pending

*Source of Support :

*Primary Place of Performance :

*Summary of In-Kind Contributions :

Time Commitment - Month(s) (or Partial Person-Months) Committed Per Year

If the time commitment is not readily ascertainable, reasonable estimates should be provided.

*Year (YYYY)	*Person Months (##.##)
1.	
2.	
3.	

Year (YYYY)	Person Months (##.##)
4.	
5.	

*Dollar Value of In-Kind Contribution: $

*Overall Objectives :

*Statement of
Potential Overlap :

In Kind Contributions

4.*Status of Support : ○ Current ○ Pending

*Source of Support :

*Primary Place of Performance :

*Summary of In-Kind Contributions :

Time Commitment - Month(s) (or Partial Person-Months) Committed Per Year

If the time commitment is not readily ascertainable, reasonable estimates should be provided.

*Year (YYYY)	*Person Months (##.##)
1.	
2.	
3.	

Year (YYYY)	Person Months (##.##)
4.	
5.	

*Dollar Value of In-Kind Contribution: $

*Overall Objectives :

*Statement of
Potential Overlap :

In Kind Contributions

5.*Status of Support : ○ Current ○ Pending

*Source of Support :

*Primary Place of Performance :

*Summary of In-Kind Contributions :

Time Commitment - Month(s) (or Partial Person-Months) Committed Per Year

If the time commitment is not readily ascertainable, reasonable estimates should be provided.

*Year (YYYY)	*Person Months (##.##)
1.	
2.	
3.	

Year (YYYY)	Person Months (##.##)
4.	
5.	

*Dollar Value of In-Kind Contribution: $

*Overall Objectives :

*Statement of
Potential Overlap :

In Kind Contributions

6.*Status of Support : ○ Current ○ Pending

*Source of Support :

*Primary Place of Performance :

*Summary of In-Kind Contributions :

Time Commitment - Month(s) (or Partial Person-Months) Committed Per Year

If the time commitment is not readily ascertainable, reasonable estimates should be provided.

*Year (YYYY)	*Person Months (##.##)
1.	
2.	
3.	

Year (YYYY)	Person Months (##.##)
4.	
5.	

*Dollar Value of In-Kind Contribution: $

*Overall Objectives :

*Statement of
Potential Overlap :

In Kind Contributions

7.*Status of Support : ○ Current ○ Pending

*Source of Support :

*Primary Place of Performance :

*Summary of In-Kind Contributions :

Time Commitment - Month(s) (or Partial Person-Months) Committed Per Year

If the time commitment is not readily ascertainable, reasonable estimates should be provided.

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Dollar Value of In-Kind Contribution: $

*Overall Objectives :

*Statement of
Potential Overlap :

In Kind Contributions

8.*Status of Support : ○ Current ○ Pending

*Source of Support :

*Primary Place of Performance :

*Summary of In-Kind Contributions :

Time Commitment - Month(s) (or Partial Person-Months) Committed Per Year

If the time commitment is not readily ascertainable, reasonable estimates should be provided.

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Dollar Value of In-Kind Contribution: $

*Overall Objectives :

*Statement of
Potential Overlap :

In Kind Contributions

9.*Status of Support : ○ Current ○ Pending

*Source of Support :

*Primary Place of Performance :

*Summary of In-Kind Contributions :

Time Commitment - Month(s) (or Partial Person-Months) Committed Per Year

If the time commitment is not readily ascertainable, reasonable estimates should be provided.

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Dollar Value of In-Kind Contribution: $

*Overall Objectives :

*Statement of
Potential Overlap :

In Kind Contributions

10.*Status of Support : ○ Current ○ Pending

*Source of Support :

*Primary Place of Performance :

*Summary of In-Kind Contributions :

Time Commitment - Month(s) (or Partial Person-Months) Committed Per Year

If the time commitment is not readily ascertainable, reasonable estimates should be provided.

*Year (YYYY)	*Person Months (##.##)	Year (YYYY)	Person Months (##.##)
1.		4.	
2.		5.	
3.			

*Dollar Value of In-Kind Contribution: $

*Overall Objectives :

*Statement of
Potential Overlap :

Data Management Plan

For the deliverables under the award, the recipient does not plan on making the underlying research data supporting the findings in the deliverables publicly-available for up to five (5) years after the data were first produced because such data will be considered protected under the award. The results from the DOE deliverables can be validated by DOE who will have access, upon request, to the research data. Other than providing deliverables as specified in the award, the recipient does not intend to publish the results from the project. However, in an instance where a publication includes results of the project, the underlying research data will be made available according to the policies of the publishing media. Where no such policy exists, the recipient must indicate on the publication a means for requesting and digitally obtaining the underlying research data. This includes the research data necessary to validate any results, conclusions, charts, figures, images in the publications.

Date: 07/01/2022

Name: Jon Bornstein

Title: COO and President

U.S. DEPARTMENT OF ENERGY

PREPARATION OF ENVIRONMENTAL VOLUME

NETL F 451.1-1/6
Revised: 11/1/2010
Reviewed: 12/9/2014
(Previous Editions Obsolete)

U.S. DEPARTMENT OF ENERGY

PREPARATION OF ENVIRONMENTAL VOLUME

I. GENERAL

This volume shall be submitted with the original proposal and must be found acceptable prior to contract negotiations and award. The Environmental Volume shall provide, in detail, all information as outlined in the following sections.

II. CONTENT

A. ENVIRONMENTAL INFORMATION DESCRIBING THE PROJECT AND THE PROJECT SITE(S).

This section of the Environmental Volume shall contain a detailed, self-contained description that summarizes the proposed action, its alternatives, and, most importantly, the existing environment. It shall be prepared in the following format:

1. Summary

This section shall contain a succinct summary of the proposed project and its potential environmental, safety, health, and socioeconomic impacts. A brief description of any construction and operation activities, including the duration and schedule shall also be provided. The summary shall focus on both beneficial and detrimental impacts, as well as any major risks associated with constructing, operating, maintaining, and dismantling/disposing of the proposed test facility, if applicable.

(b) (4) [redacted]

The proposed project is to build and operate a demonstration factory to produce lithium-ion battery cells based on Amprius Technologies' 100% silicon nanowire anode with a nameplate production capacity of about 500 MWh per year. Amprius intends to select a suitable site in or around [redacted] to construct a facility of about [redacted] Search activities began in CQ1-2022 and Amprius has, so far, down-selected the location [redacted] We intend to finalize the site selection in CQ4-2022. The construction project is estimated to take approximately 18 months with an assumed commencement in January 2023 and completion by July 2024. The impact of this project falls mainly into 2 categories: a) advanced domestic manufacturing of high performance and cost-effective battery cells that promote and secure a US supply of a critical industrial component, and b) over 300 jobs that span a range of functions and will include a significant subset from a disadvantaged demographic in the [redacted] area. Environmental, safety, and health impacts associated with the construction and operation of the factory will be governed by local and state building codes along with relevant municipal, state, and federal standards, regulations, and laws. Amprius will endeavor to minimize any detrimental effects of construction such as noise, traffic, etc. to the local community and will operate a factory with a safety-first credo that is fully OSHA compliant.

2. Proposed Project and Its Alternatives

a. Proposed Project

This section shall discuss the objectives of the proposed project, and shall describe the proposed site, system, and/or process. It shall also describe the work to be performed,

the schedule, associated requirements (e.g., land, natural resources), and any changes that will be necessary to the existing site, system, or process.

The description shall include a project site plan and topographic map of the area. Any off-site facility requirements shall also be identified in this section.

(b) (4)

At this time the site location has not been selected. Due diligence is ongoing and detailed information is not yet available for all aspects of this questionnaire. The proposed project would construct an approximate [redacted] foot facility occupying several buildings over a 20-to-25-acre site that would include administration buildings, production buildings, parking, and other ancillary structures. [redacted]

b. Alternatives to Proposed Project

A complete description of likely alternatives to the project, including a "no action" alternative, shall be provided. The description shall address technology-specific aspects of the action, such as process design configurations, and site-specific considerations, such as alternative waste disposal sites, etc.

Alternative sites continue to be investigated [redacted]. Various environmental factors would help determine the primary site for development

3. Existing Environment

This section shall discuss the existing environment at the project location(s). The principal proposer and all proposed subcontractors shall discuss the following:

a. Land Use

This section shall provide a description of the affected land area and its dimensions; a discussion of current land usage (e.g., farming, industrial, etc.); and descriptions of nearby pipelines and transmission lines, as well as transportation access (rail, road, barge, etc.).

The selected site would ideally be zoned as industrial and undeveloped or vacant land. Transportation to and from the facility would be via truck. No railways would be utilized for this project. A site located near a major highway would be preferred to reduce truck congestion on surface streets. No pipeline connections are anticipated as silane gas would be brought into the facility via truck and stored on site. Natural gas is not proposed for use at the site. The facility would focus on being electric to reduce emissions and a site with sufficient access to the requirement power would be preferred.

The selected site would be located near needed utilities such as water, sanitary sewer, and communications. Connections to these public and private sources would be either on the site already or immediately adjacent to the site.

b. Atmospheric Conditions/Air Quality

This section shall identify the air quality control regions where the project is located; and describe the local climate and existing air quality conditions in the immediate vicinity of the proposed site.

(b) (4) [redacted]

Currently, [redacted] is nonattainment for the National Ambient Air Quality Standard criteria pollutant ozone which leads to smog conditions. All other criteria pollutants are in attainment. [redacted] is in a region of the US with hot and humid summers and mild winters. Temperatures typically vary between 43 degrees Fahrenheit in the winter to 96 degrees Fahrenheit in the summer and is rarely below 31°F or above 101°F. A chance of wet weather days varies throughout the year. The month with the most days of rain alone in [redacted] is May, with an average of 9.2 days.

c. Hydrologic Conditions/Water Quality

This section shall identify any watersheds and downstream drainage, surface and groundwater quality (nearby aquifers and the depth of groundwater) in the project area, existing floodplains, unique aquatic habitats, recreational areas, public water supplies; describe any constraints on water availability imposed by treaties, court decree, state and Federal water laws; and identify existing wastewater treatment and/or disposal facilities.

[redacted] Jurisdictional water features may be present on the site location including wetlands and tributaries [redacted] Once a site is selected, further investigation would be required to determine the presence and jurisdiction status of water features.

Floodplains associated with nearby streams may be present on a site. A site with limited to no water features and floodplains would be preferred.

If the site is currently developed, there may be existing wastewater or stormwater facilities present on site. Recreational areas or public water supplies may be located on the site or adjacent properties, however further investigation would be required once a site is selected.

d. Geologic/Soil Conditions

This section shall describe the topographic stability (e.g., formations and/or faulting), the productivity of soil, any unique soil species, and the soil's susceptibility to erosion.

[redacted] is mainly composed of two main geologic formations:

- Quaternary terrace deposits (QT), and
- Uvalde Gravel (T-Qu)

[redacted] geologic formations include:

- [redacted]
- [redacted]

Further geotechnical investigations would be conducted to provide additional information regarding soils on the site.

e. Vegetation and Wildlife Resources

This section shall describe any indigenous flora and fauna, state and Federally listed endangered or threatened species and their habitats, and sensitive habitats such as wetlands, floodplains, or other ecologically sensitive terrain.

[redacted] is composed of two ecoregions, [redacted] ecoregion is known for its abundant freshwater springs, rocky hills and canyons. This ecoregion supports a variety of unique plants and animals. The soils are often very thin and overlay limestone with numerous cracks, holes, caverns and caves. Plant communities were historically open grasslands and savannahs with denser shrubs and trees present within canyons and riparian areas. Today, the vegetation consists primarily of juniper-oak woodlands, grasslands, and Plateau live oak or Mesquite savannahs.

(b) (4) [redacted]

The [redacted] ecoregion is characterized by deep, black clay soils that historically supported tallgrass prairie plants and animals. Much of the fertile soils have been converted to agriculture or other land uses. Prairie remnants still remain and can be identified by unique plants such as Big bluestem (*Andropogon gerardii*), Indian grass (*Sorghastrum nutans*), Texas Gayfeather (*Liatris punctate var. mucronata*) and Prairie penstemon (*Penstemon cobaea*).

According to the U.S Fish and Wildlife Service Information and Planning Consultation (IPAC) twenty-two endangered species and eight migratory birds may be present [redacted] Critical habitat for the species listed above may be located within the proposed project location. Further site investigations are needed to determine if suitable habitat for these species is present on site The species that may be present are listed below:

- Birds
  - Golden-cheeked Warbler (*Setophaga chrysoparia*) (Endangered)
  - Whooping Crane (*Grus americana*) (Endangered)
  - Piping Plover (*Charadrius melodus*) (Threatened)
  - Red Knot (*Calidris canutus rufa*) (Threatened)
- Amphibians
  - Texas Blind Salamander (*Eurycea rathbuni*) (Endangered)
  - San Marcos Salamander (*Eurycea nana*) (Threatened)
- Fish
  - Fountain Darter (*Etheostoma fonticola*) (Endangered)
- Insects
  - [no Common Name] Beetle (*Rhadine exilis*) (Endangered)
  - [no Common Name] Beetle (*Rhadine infernalis*) (Endangered)
  - Comal Springs Dryopid Beetle (*Stygoparnus comalensis*) (Endangered)
  - Comal Springs Riffle Beetle (*Heterelmis comalensis*) (Endangered)
  - Helotes Mold Beetle (*Batrisodes venyivi*) (Endangered)
  - Monarch Butterfly (*Danaus plexippus*) (Candidate)
- Arachnids
  - Braken Bat Cave Meshweaver (*Cicurina venii*) (Endangered)
  - Cokendolpher Cave Harvestman (*Texella cokendolpheri*) (Endangered)
  - Government Canyon Bat Cave *Meshweaver (Cicurina vespera*) (Endangered)
  - Government Canyon Bat Cave Spider (*Tayshaneta microps*) (Endangered)
  - Madla Cave Meshweaver (*Cicurina madla*) (Endangered)
  - Robber Baron Cave Meshweaver (*Cicurina baronia*) (Endangered)
- Crustaceans
  - Peck's Cave Amphipod (*Stygobromus (=Stygonectes) pecki*) (Endangered)
- Flowering Plants
  - Bracted Twistflower (*Streptanthus bracteatus*) (Proposed Threatened)
  - Texas Wild-rice (*Zizania texana*) (Endangered)

f. Socioeconomic Conditions

This section shall discuss the population in the project area and shall describe the employment and labor mix.

(b) (4)

The current metro area population [redacted] a 1.2% increase from 2020. The median age of the population is 34.4 years old. The three largest ethnic groups [redacted] are as follows:

- White (Hispanic) 58% of the population
- White (Non-Hispanic) 25% of the population
- Black or African American (Non-Hispanic) 7% of the population

In 2020, the median household income was $53,420 with 17.6% of the population in poverty.

g. Historic/Cultural Resources

The section shall describe any historic and/or cultural places in the project area, as well as archeological sites.

Additional surveys would be required prior to site construction to determine the presence of historic and cultural resources. Structures on site, and possible within the viewshed, that are older than 50 years may require evaluation for eligibility on the National Register of Historic Places. Subsurface archeological resources may be present if the site has had no previous disturbance or is in a high probability area. A review of the State Historic Preservation Office records would be necessary to identify known cultural resources on or near the site.

h. Visual Resources

This section shall describe any scenic vistas or existing aesthetic landscaping in the project area.

The project would likely be in an area with other industrial or commercial facilities. It is not expected that scenic vistas would be present at the site.

i. Health and Safety Factors

This section shall discuss **current** emissions (toxic and non-toxic), effluents, and noise levels at the project area.

No current emissions or effluents are anticipated but would be confirmed once a site is selected. As the project would likely be in an area with other industrial or commercial facilities, existing noise levels would be moderate.

B. ENVIRONMENTAL IMPACTS OF THE WORK TO BE PERFORMED.

This section of the Environmental Volume shall describe the anticipated environmental impacts from the project. It shall describe all impacts and consequences of the project (at the selected site[s] and the alternative site[s], if appropriate). The existing environment (described in Section A.3) shall be evaluated in terms of the potential impacts from any construction, operation/testing, and disposition activities. Any mitigative measures that would address these impacts shall also be identified.

The description shall address the environmental categories listed below. Please ensure that all direct, indirect, short-term, and long-term impacts resulting from project activities are identified clearly.

PREPARATION OF ENVIRONMENTAL VOLUME

1. Land Use

This section shall describe land use impacts from any construction and operation activities; waste disposal problems (for non-toxic, toxic, and/or hazardous substances); and effluent discharges requiring the development of settling ponds.

The project would follow the overall industrial zoning requirements for the site. Construction would require additional truck trips on local roads but with major highways nearby, it is expected that the impact from these additional trips would be minimal to surrounding residences and businesses.

Waste generated during construction and operation of the project would be minimal and would be containerized and disposed of offsite or in the case of operational wastewater, discharged to the sanitary sewer system. More discussion on waste handling is in Section B.9 and B.10. Currently, no settling ponds are anticipated for the project for process wastewater. Stormwater design for the site is still in development and may require a retention or detention pond onsite for non-contact stormwater treatment.

2. Atmospheric Conditions/Air Quality

This section shall discuss projections in air quality changes; estimated process emissions (e.g., stack emissions); construction emissions from land disturbance or the operation of machinery/equipment, solid waste disposal operations, coal handling, etc.; and the source, emission rate, duration, and frequency of all emissions.

Dust emissions would be generated during site clearing and construction of the project. These emissions would be controlled through temporary erosion and sediment control Best Management Practices (BMPs) such as water trucks, minimization of ground disturbance, temporary seeding and the use of stabilized construction roadways.

Particulate emissions from diesel powered construction equipment would occur and could be minimized by reducing idling times for engine use and selecting equipment with low emissions engines. The project would utilize electric based equipment to the extent possible, supplied by temporary construction power from the utility to avoid onsite generation where possible.

It is expected that during normal operations that the following emissions sources would occur: particulate matter emissions from material transfer activities; CO2 and NOX emissions from furnaces and boilers; and combustion emissions from testing of standby generators. Detailed emission calculations from the project would be included with the air quality permit. Emissions are expected to be minimal and fall below Prevention of Significant Deterioration thresholds. Best Available Control Technology (BACT) would be incorporated into the project for all project emission sources, including the use of fabric filter-type dust collectors for materials handling operations and high-efficiency HVAC appliances.

3. Hydrologic Conditions/Water Quality

This section shall describe any changes in groundwater/surface water quality and quantity, stream diversion resulting from construction, runoff from storage piles (source, discharge rate, discharge frequency and duration), leachates from waste disposal sites; and wastewater treatment and discharges.

As previously described, wastewater is anticipated to be discharged to the sanitary sewer system and non-contact stormwater would be routed to a stormwater facility onsite. The details of either system would require further design.

It is not expected that changes to groundwater quality or quantity would occur because of the project, but further analysis is necessary to determine the extent of the underlying aquifer and groundwater sources.

Given the potential of the streams and wetlands on the site, these features may be affected by the project and permanent loss to most of these resources may occur from the project. Wetlands and streams could also be indirectly affected if changes to the hydrologic regime occur. Compensatory mitigation would be required to offset the loss of wetlands and streams. Mitigation and the authorization to impact these resources would be negotiated during the Clean Water Act Section 404/401 permit process with the US Army Corps of Engineers.

4. Geologic/Soil Conditions

This section shall describe any subsidence that might be caused by construction; any possible erosion, stream diversion, floodplain and wetland intrusion, and any increase or decreases in soil permeability and filtration.

Further geotechnical investigations are necessary to determine if ground improvements may be necessary to support the building foundations on the site. It is not expected that construction or operation of the project would result in an increase or decrease in soil permeability and filtration.

Erosion and sediment control BMPs would be used during construction to reduce and control stormwater runoff impacts. These BMPs would be selected in accordance with applicable local and state stormwater management requirements under a Clean Water Act Section 402 construction stormwater permit. BMPs for construction activities may include:

- Development, implementation, and maintenance of a Stormwater Pollution Prevention Plan (SWPPP) to minimize erosion of sediments due to rainfall runoff at construction sites, and to reduce, eliminate, and prevent the pollution of stormwater during construction.
- Installation of filter fabric fences around disturbed areas.
- Installation of silt traps in storm drain inlets.
- Installation of gravel construction entrances and use of appropriate means to minimize tracking of sediment onto public roadways by construction vehicles.
- Stabilization of temporary soil stockpiles and exposed soils.
- Regular street cleaning for mud and dust control.
- Permanent stabilization of disturbed areas after construction is completed.
- Designation of personnel to inspect and maintain temporary erosion and sediment control measures.
- Development, implementation, and maintenance of a Spill Prevention Control and Countermeasures Plan (SPCCP) to manage toxic materials associated with construction activities (e.g., equipment leakage, disposal of oily wastes, cleanup of any spills, storage of petroleum products and chemicals in contained areas away from streams and wetlands).
- Establishment of a communication protocol for handling spills. Applicable spill response equipment and material designated in the SPCCP would be maintained at the job site.
- Refueling of construction equipment and vehicles away from surface waters whenever practical.
- Containment of equipment and vehicle wash water associated with construction and keeping it from draining to surface waters.
- Storing fuels and other potential contaminants away from excavation sites and surface waters in secured containment areas.

- No oil, fuels, or chemicals would be discharged to surface waters or onto land where there is a potential for entry into surface waters.
- Conducting regular inspections, maintenance, and repairs of fuel hoses, hydraulically operated equipment, lubrication equipment, and chemical and petroleum storage containers.
- Restoring temporarily disturbed areas by establishing grass or other vegetative cover on the construction site as soon as possible after disturbance is complete.

5. Vegetation and Wildlife Resources

This section shall describe any impacts to indigenous flora and fauna, state and Federally listed endangered species and their habitats, and sensitive habitats such as wetlands, floodplains, or other ecologically sensitive terrain.

There is potential for suitable and critical habitat to be located on site to support listed species, therefore further site investigations are needed for verification.

Vegetation and thus potential habitat on the site would be removed and the site paved for development. Landscaping would be provided as required by the City code. No indirect habitat impacts would result from soil erosion and subsequent sedimentation during construction through implementation of BMPs.

Terrestrial species could be affected by construction noise. Individuals are unlikely to remain during construction should they happen to pass through the project area due to human activity. Noise-related effects within and immediately adjacent to the project site would be limited to occasional transients and are not anticipated to result in measurable changes to sensitive life histories or behaviors.

6. Socioeconomic Conditions

This section shall describe any increases/decreases in labor requirements or changes in labor mix.

The project is anticipated to employ approximately 500 employees full time. The facility would operate 24 hours a day with most employees working during the day shift. The project would bring middle income wages to the city and would draw on both the local and regional labor force to meet the employment needs for the facility. As a growing metro area, this project would continue to support socioeconomic goals and objections of the region by providing living wage jobs and contributing to a green economy.

7. Historic/Cultural Resources

This section shall describe any disturbance to historical or archaeological sites caused by construction, interference with Native American tribal or other religious practices or sites; impacts on local community character.

Historic and cultural resources are unknown currently due to lack of site location. Further investigation is necessary to verify but unless a resource is present onsite or is within the viewshed (for historic properties), no adverse impacts to cultural resources are anticipated from the project. Consultation with the tribes would be necessary during the permitting phase of the project.

In the event unknown archaeological or historic materials are encountered during project activities, work in the immediate area of the discovery would be halted and the following actions taken: 1) implement reasonable measures to protect the discovery site, including appropriate stabilization or covering; 2) take reasonable steps to confirm the confidentiality of the discovery

site; and 3) take reasonable steps to restrict access to the site of discovery. Should a discovery occur, a professional archaeologist would be called in to assess the significance of the find, and the State Historic Preservation Office and concerned tribes would be notified so a course of action can be implemented.

8. Visual Resources

This section shall describe any impacts to scenic vistas or existing aesthetic landscaping.

Temporary changes to the visual setting would occur during construction because of construction workers, equipment, and vehicles. Dust and emissions generated by construction activities could cause temporary visual impacts. These would be avoided or minimized with BMPs, such as applying water to limit dust and minimizing idling time to reduce particulate emissions.

The project may be visible from the adjacent properties. If the final site location is predominantly industrial and commercial development, the project would not alter the overall viewshed.

9. Health and Safety Factors

This section shall discuss occupational hazards of project activities; exposure to toxic/hazardous substances; and increases in ambient noise, odor, and heat.

Occupational hazards present during construction would include work around heavy, mobile equipment; seasonal weather conditions; work around water; exposure to electrical, mechanical, fall, and noise hazards; and hazardous materials. These safety risks to construction workers would be managed and reduced through the implementation of safety and emergency plans.

Construction activities would involve the use of hazardous materials that could be released to the environment or result in exposure to workers. These materials include small volumes of fuels, paints, adhesives, lubricants, and solvents stored temporarily onsite. Exposure or releases could occur if materials are used in a manner not originally intended by the manufacturer; if wastes are not stored or handled properly; if materials leak from mobile construction equipment; or if fuel was spilled during refueling. The risk of these releases to the environment would be reduced by adherence to site-specific plans and BMPs.

Safety practices during operation would meet or exceed industry operating standards. Company personnel and contract employees would undergo safety training on a routine basis, including training in emergency response. Proper installation of safety showers or other personnel safety facilities would be incorporated into the facility. A fire water system would also be installed to meet current code requirements.

The project would be designed to minimize the potential for spills. A Spill Prevention Containment and Countermeasures Plan (SPCCP) would be developed in compliance with state and federal requirements and coordinated with regulatory agencies, local emergency services, and spill response contractors. No specific odors are expected to be generated that would be released to the atmosphere.

During construction, noise from construction equipment and activities is expected to occur during daytime hours. Nighttime construction, if it occurs, would comply with noise regulations. There would be a variety of construction equipment and activities used throughout the construction process, and construction activities and equipment would vary in time and location throughout the project site. These activities would be temporary in nature and construction noise is typically exempt from volume limitations.

Most operations related noise would occur inside the various buildings. Trucks would be used onsite for the transport of materials to and from the site. Stationary noise sources located outdoors likely include mechanical systems for ventilation and climate control. Mobile noise sources located outdoors likely include occasional truck movements and employee vehicles. Project-related noise from stationary and mobile sources is expected to be comparable to noise from existing industrial activities in the general area. Operation of the proposed project does not include unusually loud noise outdoors.

10. Solid and Hazardous Wastes

This section shall describe any and all waste material that is generated from project activities. This description shall include the source/type of any and all wastes produced (e.g., fly ash, bottom ash, scrubber sludge, etc.), and the approximate weight, density, and volume of the waste, and its method of disposal, location, and any permitting requirements necessary.

Wastes generated from construction would be typical of construction activities and would be disposed of at an approved location. Storage onsite during construction would follow the construction stormwater permit and associated BMPs and SPCCP.

During operation of the facility, no discharge of waste materials would occur to the ground or surface waters. The process produces minimal waste that would be captured during the process. Solid wastes would be containerized and disposed of at an approved offsite location. Liquid wastes would be discharged to the sanitary sewer system. Any required pre-treatment would occur prior to discharge and be incorporated into the facility design. Further analysis would be necessary to determine if pre-treatment is necessary for the proposed sanitary sewer discharges. The process involves several materials that are classified as hazardous wastes. These would be handled, stored, and disposed of per manufacturer and regulatory standards requirements. An operational SPCCP as well as emergency and safety plans would be in place prior to the start of operation to avoid and minimize accidental releases of waste materials.

11. Impacts on Regional or Local Plans

This section shall describe any impacts to regional or local plans for fuel, water resources, solid waste, land, air quality, and labor force; commitment of resources and opportunities to reuse and recycle resources (wastes, water).

Continuing to build on a green economy, this project would bring 500 new, living wage jobs to the region, as well as hundreds of construction jobs during project buildout. The project and site selected would be consistent with regional and local plans and energy needs would not exceed existing resources nor affect other users. The project would have minimal to negligible impacts to environmental resources.

C. POTENTIAL LIABILITY TO DOE OF EXISTING CONDITIONS AT THE SITE(S).

This section shall discuss any potential conditions for exposing the DOE to previous liability. It should detail any previous research, development, construction, and/or demonstration testing that could potentially have impacts on the existing project site(s) and therefore, the proposed project.

Known existing concerns at the site or previous liabilities at the site that would be an exposure for the DOE are currently unknown. An ASTM Phase 1 Environmental Site Assessment would be completed to establish baseline conditions as part of any legal property transaction. The project would mimic existing facilities currently operating with no significant issues or liabilities encountered to date.

D. ABILITY TO MEET COMPLIANCE REQUIREMENTS AT THE SITE(S).

PREPARATION OF ENVIRONMENTAL VOLUME

This section shall identify all of the environmental laws and regulations (Federal, state, and local) for which compliance would be necessary. It should include, but should not be limited to the Resource Conservation and Recovery Act, the Comprehensive Environmental Response, Compensation, and Liability Act, Toxic Substance Control Act, Water Pollution Control Act, Clean Air Act, and Occupational Safety and Health Act. Any necessary permits, manifest, etc., shall be discussed.

The proposer's strategy for meeting all compliance requirements shall be discussed in detail. Identify the best available control technology and feasible practices for compliance with Federal air, land use, and water quality statutes. In addition, whether the proposed site is in attainment or non-attainment with current standards shall be discussed.

The proposed project would comply with requirements and be in attainment with current standards. The following are the expected environmental laws and regulations that would be triggered because of the project. This list is based on the information known to date about the project and could be modified as the project progresses.

- Clean Water Act Section 404 – impacts to the streams and wetlands onsite would require authorization from the US Army Corps of Engineers. A discussion of the project impacts, alternatives to avoid impacts, delineation of resources and propose mitigation would be required. As part of this permit process the following additional regulations would be triggered.
- Clean Water Act Section 401 Water Quality Certification – as previously stated, the BMPs and minimization of impacts to wetlands and streams would be incorporated into the design and construction of the project.
- Endangered Species Act Section 7 Consultation – a records review and field reconnaissance would be conducted to determine if suitable or critical habitat is present onsite.
- National Historic Preservation Act Section 106 Consultation – as previously stated a records review and field reconnaissance would be conducted.
- Clean Water Act Section 402 Construction Stormwater Permit – ground disturbance of more than 1 acre would require compliance with this permit in the form of a SWPPP and SPCCP. Anticipated BMPs were described previously.
- Clean Water Act Section 402 Operational Stormwater Permit – non-contact stormwater from the site would require containment and treatment onsite. A SWPPP and SPCCP would be required. Anticipated BMPs were described previously.
- Clean Air Act Minor Source Review Permit – project emissions are anticipated to be minimal and not trigger PSD thresholds. BACT would be incorporated into the design of the project to further reduce emissions.
- National Environmental Policy Act (NEPA) – compliance with NEPA would be necessary for grant funding and/or permit approvals from the US Army Corps of Engineers. Analysis included in this document would be expanded as design progresses to complete a NEPA document as required.
- City Development/Conditional Use Permit – compliance with the land use and zoning would be necessary to obtain the approval for the project from the City.
- City Building Permits – compliance with the applicable codes would be required to obtain the necessary building, engineering, mechanical, electrical, plumbing, and fire permits.
- City Road Encroachment/Right of Way Permit – ingress and egress to the site from the adjacent City roads would require authorization from the City. All road standards from city code would be incorporated. Traffic studies are anticipated to verify that increased traffic from operations does not elicit traffic related mitigation measures.

E. EXPERIENCE AND APPROACH TO THE IDENTIFICATION AND RESOLUTION OF ENVIRONMENTAL ISSUES.

This section of the Environmental Volume shall consist of a discussion of the following areas:

U.S. DEPARTMENT OF ENERGY

PREPARATION OF ENVIRONMENTAL VOLUME

1. All directly related education/experience of key project members in each of the following areas:

   - □ Air quality management
   - □ Surface water and ground water management
   - □ Solid and liquid waste management and disposal practices
   - □ Noise, land use, ecological resources, archaeological, cultural, and historical resources management
   - □ Environmental permit applications, amendments, and renewals

2. The offeror's experience in addressing and resolving environmental concerns during the performance of past projects of similar size and complexity including the obtaining of necessary permits.

3. Any of the offeror's existing written environmental policies, procedures, or plans currently in place and considered essential to the conduct of the offeror's commercial business operation.

Amprius will employ the services of [redacted] a glo (b) (4) multidisciplinary consulting firm with over 11,000 employees to support all of its EHS requirements.

DOE F 540
(04-2017)

OMB Number 1910-5175
Exp. 11/30/2020

OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY

ENVIRONMENTAL QUESTIONNAIRE

SECTION I. PROJECT SUMMARY	
Control Number:	2678-1709
Project Title:	Large Scale Manufacturing of Silicon Nanowire Anode by Direct Gas-to-Electrode Manufacturing
Applicant:	Amprius Technologies, Inc.
Other Participants (Subrecipients, Contractors, etc.):	
FOA Number:	DE-FOA-0002678
FOA Title: Bipartisan Infrastructure Law (BIL) Battery Materials Processing and Battery Manufacturing .	

SECTION II. BACKGROUND AND INSTRUCTIONS

Pursuant to the U.S. Department of Energy's National Environmental Policy Act (NEPA) implementing regulations (10 C.F.R. Part 1021), the Office of Energy Efficiency and Renewable Energy (EERE) is required to evaluate the potential environmental impact of projects that it is considering for funding. EERE must determine at the earliest possible time whether any proposed project qualifies for a categorical exclusion under 10 C.F.R.§ 1021.410 or will require further environmental review within an environmental assessment or an environmental impact statement.

You are required to answer the questions below for the project as a whole, including all work to be performed by the Recipient, its subrecipients and contractors, including any work outside of the United States. You may not limit your responses to work performed by the Recipient only unless instructed to do so by EERE. In completing this questionnaire, you must provide specific information regarding the nature of your proposed project, including information on its size, operations, and the types and quantities of air emissions, wastewater discharges, solid wastes, land disturbances, etc. You should identify the location(s) of the proposed project and describe the activities that would occur at each location.

The form should be completed and signed by the Principal Investigator for the project or another member of your organization who has sufficient knowledge of the project to answer the questions truthfully and accurately.

Failure to fully and adequately complete this form will delay EERE's environmental review of your proposed project. Please note that false statements or misrepresentations may result in civil and/or criminal penalties under 18 U.S.C. § 1001.

BURDEN DISCLOSURE STATEMENT
Public reporting burden for this collection of information is estimated to average 60 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Office of Information Resources Management Policy, Plans, and Oversight, AD-241-2-GTN, Paperwork Reduction Project (1910-1800), U.S. Department of Energy, 1000 Independence Avenue S.W., Washington, D.C. 20585; and to the Office of Management and Budget (OMB), Paperwork Reduction Project (1910-1800), Washington, D.C. 20503.

SECTION III. PROJECT EVALUATION

1a. In the box below, please provide a brief summary of the proposed project activities. Describe physical activities, not goals and objectives. Specify if this project is part of a larger project or connected to another project.

Example: The proposed project activities include the design, development, fabrication, and field testing of advanced biomass harvesting equipment. Design, development, and fabrication activities would occur at our research and development facility adjacent to our manufacturing plant in Dearborn, Michigan. Equipment testing would occur in various agricultural fields in the surrounding area over a two-year period.

Explanation:

The proposed project activities include the design, construction, and operation of a demonstration factory to produce lithium-ion battery cells based on Amprius Technologies' 100% silicon nanowire anode. The design activities will be undertaken at Amprius' current headquarters in Fremont, CA. The factory is intended to be constructed and operated in or around the XXXXXXXXX area. The overall project timeline will be 3 years with construction estimated to take approximately 18 months and manufacturing development and demonstration over the balance of 18 months.

1b. Is there other Federal government involvement outside of EERE in any aspect of this project (e.g., funding, permitting, technical assistance, project located on Federally administered land)?

Yes ☐ | **No** ■

If you checked "Yes," please list the agency, describe the nature of its involvement, and provide a point of contact at the agency, if known.

Explanation:

1c. Is the proposed project limited exclusively to intellectual, academic, or analytical activities?

Intellectual, academic, and analytical activities include, but are not limited to:

- Literature searches and information gathering
- Data analysis
- Computer modeling
- Analytical reviews
- Conceptual design
- Feasibility studies
- Document preparation
- Data dissemination
- Paper studies

You must answer "No" to this question if the proposed project involves any laboratory research and/or development, physical experiments, pilot-scale projects, demonstration projects, field tests, land-disturbance, construction, or similar activities.

Yes ☐ **| No** ☒

If you checked "Yes," proceed directly to Section IV (Certification) and complete the information and signatures as requested. If you checkned "NO" you must complete the entire questionnaire.

Explanation:

If you checked "Yes," proceed directly to Section IV (Certification) and complete the information and signatures as requested. If you checked "No," you must complete the entire questionnaire.

2a. Is the project fully defined at this point (i.e., all sites and activities are known)?

Yes ☐ | **No** ☒

If you checked "No," please describe those sites and/or activities/tasks that are yet to be defined and complete the remainder of the questionnaire to the best of your knowledge.

Explanation:

With regard to the project location, Amprius has selected the area in or around xxxxxxxx but the exact site of the proposed demonstration factory has not yet been determined. The scope of activities have been detailed but the actual work - including factory design, for example - have not yet been undertaken.

2b. In the chart below, please describe the following four types of identifying information concerning project activities to be performed:

(1) each location where work would be performed, including address or coordinates, names of facilities, and whether this is a Recipient, Subrecipient, or Contractor location;
(2) the nature of the location (e.g., urban, industrial, suburban, agricultural, university campus, manufacturing facility) and the current condition and/or use of the site;
(3) the types of activities to be conducted at that location;
(4) land administration (e.g., BLM, USFWS, DOD, state, private).

(1) ***List all Locations Where Project Activities Would Occur (Facility Name and Address or Coordinates) and Indicate Recipient, Subrecipient, or Contractor***	*(2)* ***Nature of Location and Current Condition/Use***	*(3)* ***Activities to be Performed at Each Location***	*(4)* ***Land Administration***
1180 Page Ave., Fremont, CA	Industrial, Amprius' current facility and headquarters	Planning and design of demonstration mass production facility for manufacturing a silicon nanowire anode lithium-ion battery cell	private
XXXXXXXXXXXXX	Industrial, future site of Amprius' mass production facility	Contruction and operation of a factory to produce up to 500 MWh per year of silicon nanowire anode lithium-ion battery cells. Operation includes entire manufacturing and testing processes to produce pouch cells	private
Example 1: Smith Laboratory (recipient) 1234 College Lane Baltimore, MD XYZ Corporation (subrecipient) 1232 Industrial Drive Golden, CO	Smith Laboratory – Dedicated University Laboratory Facility XYZ Corporation – Manufacturing Facility in Industrial Park	Activities would include design and fabrication of a gallium-nitrate battery at XYZ Corporation's battery manufacturing facility using existing equipment. The battery would then undergo testing including battery charge/discharge cycling at Smith Laboratory. Data analysis would also occur at Smith Laboratory.	Smith Laboratory – State property XYZ Corporation – Private property
Example 2: Capital High School (recipient) 1234 Eagle Lane Golden, CO	High school property in a suburban environment that has been previously disturbed and is owned by the City.	Activities would include the installation of a 50 kW wind turbine adjacent to the football stadium. The final height for the turbine would not exceed 140 feet (hub height) or 170.6 feet (maximum blade height) with a blade radius of 31.5 feet. There is an airport 15 miles away from project site location.	City

2c. In the box below, please identify and describe: (1) any known or potential health and safety hazards to the public or project workers that may result from or are associated with your proposed project; and (2) any efforts that would be taken to mitigate these hazards. <u>Describe individually for each site discussed in Question 2b.</u>

Example (Hazards): The project would involve the use and handling of various hazardous materials, including metals and industrial solvents. All such handling would occur in-lab, and our organization is dedicated to proper hazardous material handling and disposal practices, so the project activities that involve these materials would pose no risk to the public. All hazardous materials would be managed in accordance with Federal, state, and local environmental regulations.

Example (Mitigation): Existing corporate health and safety policies and procedures would be followed, including employee training, proper protective equipment, engineering controls, monitoring, and internal assessments. Additional policies and procedures would be implemented as necessary as new health and safety risks are identified. This would help ensure compliance with applicable health and safety regulations, and minimize health and safety risks to employees and the public.

Explanation:

At the XXXXXXXXXXX facility hazardous materials including silane gas, organic solvents, and lithium metal will be used in industrial manufacturing processes. The storage and use of these materials will be controlled within the facility and our organization is dedicated to proper hazardous material handling and disposal practices, such that the project activities that involves these materials would pose no risk to the public. All hazardous materials would be managed in accordance with Federal, state, and local environmental and safety regulations.
Corporate EH&S policies and procedures would be followed, including proper training, use of PPE, engineering controls, monitoring, and internal assessments and audits. Additional policies and procedures would be implemented as necessary as new health and safety risks are identified. This would help ensure compliance with applicable health and safety regulations, and minimize health and safety risks to employees and the public.

2d. In the box below, please identify and describe any of the following that would be associated with the proposed project. <u>Describe individually for each site discussed in Question 2b.</u>

(1) any physical modification of existing facilities or construction of new facilities (this does NOT include modification to equipment, only facilities);
(2) ground disturbing activities;
(3) any change in the use, mission, or operation of existing facilities;
(4) installation or deployment of equipment outdoors including the area of disturbance, what currently exists at the site, the dimensions of the installation, any associated infrastructure, etc.

Example 1: Physical modification of existing facilities and ground disturbing activities -To accommodate testing facilities necessary for the project, the current testing facility would have to be expanded by approximately 4,500 square feet.

Example 2: Change in use of existing facility - A room within our facility that has served as a dedicated wind tunnel would be modified to serve as an environmental test chamber. This would require the adaptation of the chamber's construction to partition off part of the room and seal it to allow generated environmental fluctuations within.

Example 3: Installation of equipment outdoors and ground disturbing activities - The proposed turbine location is on school property located in a previously disturbed area south of the existing school building and near the high school athletic facilities and fields. East of the school are two golf courses; south and north are single family residential neighborhoods; and to the west are two public park properties. There are wooded areas located on the school property to the south and west. The foundation of the wind turbine would be approximately 25 square feet with an additional 5 square feet of disturbance during construction. The foundation would be approximately 10-15 feet in depth. There would be a minor, temporary land disturbance adjacent to the proposed site for crane work and the tower staging area. Existing roads would be used to access the project location.

Explanation:

Contruction of a new manufacturing facility in an industrial zone in XXXXXXXXXXX. While the exact site and facility design have not yet been selected and undertaken, respectively, the general impact of an approx XXXXXX sq.ft. construction project will have temporary disturbances that include dust, noise, traffic, and ground vibration.

2e. In the box below, please identify and describe any existing, modifications to, or new permits, licenses, or authorizations that would be required to perform project activities (such as environmental permits, operating permits, or drilling permits). <u>Describe individually for each site discussed in Question 2b.</u>

Example 1: The project would generate small amounts of effluent waste which will be discharged into the Potomac River, requiring our organization to secure the requisite discharge permit pursuant to state and Federal regulations.

Example 2: The project activities would be conducted for the next three years. We would be required to replace our current solid waste disposal permit with an updated permit that may alter the nature of what and how we are permitted to dispose of solid waste.

Example 3: The project activities would take place in marine navigable waters and would require permits from the U.S. Coast Guard and the U.S. Army Corps of Engineers.

Explanation:

Since the factory demonstration project in XXXXXXXXX entails construction and operation of lithium-ion factory it will require construction permits, occupancy permit, fire control permit, hazardous material business plan, and enviromental permits (e.g., effluent and waste disposal).

2f. In the box below, please list the estimated quantities of materials to be used (e.g., feedstock, chemicals, water) and produced by the project (e.g., biofuel). <u>Describe individually for each site discussed in Question 2b.</u>

Explanation:

To produce approx 500 MWh per year of lithium ion cells based on a silicon nanowire anode in the XXXXXXXXXX factory will require approx:
xxxx metric tons of silane
xxxx metric tons of cathode materials (actives and inactives)
xxxx metric tons of electrolytes (organic solvents and additives)

2g. In the box below, please quantify, to the extent possible, all emissions into the ambient air resulting from project activities. Indicate if the project site is within an attainment or non-attainment area. <u>Describe air emissions individually for each site discussed in Question 2b.</u>

Note: Potential emissions include, but are not limited to, greenhouse gas emissions, particulate matter, and airborne pollutants. Sources of emissions can include stationary sources, such as boilers, process heaters, generators, and/or solvent usage, or mobile sources such as vehicles. It is presumed that every project would result in some emissions being released into the ambient air, so applicants answering "none" must explain why no emissions would be released. Non-attainment areas are designated parts of the country where air pollution levels persistently exceed the national ambient air quality standards. See <u>42 U.S.C. 7501(2)</u>.

Explanation:

Emissions will be limited to very small quantities of inert particulates (silicon oxide) that escape abatement/scrubber equipment associated with silane gas processing. By design, the vast majority of the particulates will be captured and sequestered by the abatement/scrubber equipment. Such particulate emissions will be well within regulated limits.

2h. In the box below, please describe: (1) all non-hazardous wastes that would be generated by the proposed project including recycled materials, and (2) the method of their disposal. Describe individually for each site discussed in Question 2b.

Note: It is presumed that every project would generate solid wastes, so applicants answering "none" must explain why no waste would be generated. Non-hazardous waste is any garbage, refuse or trash, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities. See 40 C.F.R. § 261.2.

Explanation:

In the XXXXXXXXXXX facility, non-hazardous solid waste will be segrated. Packaging materials, paper, aluminium, cetain plastics, and other reyclables will be disposed by solid waste recylers. Food waste will be disposed through municipal garbage service. Inert manufacturing byproducts will be disposed by contract waste disposal services.

3. Is the proposed project near, or does it involve, any of the following resources? Please indicate below any and all resources that could be affected by any project activities. (See Attachment 1 to the Environmental Questionnaire for resource definitions.)

- ☐ a. Historical, archeological, or cultural resources (includes listed and eligible resources over 50 years old or of cultural significance)
- ☐ b. Threatened or endangered species (whether proposed or listed by state or Federal governments), including their habitat
- ☐ c. Marine mammals or essential fish habitat
- ☐ d. Floodplains or wetlands
- ☐ e. Tribal lands or resources of Tribal interest/sensitivity
- ☐ f. Ocean resources (e.g., coral reefs)
- ☐ g. Land resources (e.g., tundra, rainforests)
- ☐ h. Coastal zones
- ☐ i. Migratory birds, or Golden or Bald Eagles
- ☐ j. Areas having a special designation (e.g., Federal and state designated wilderness areas, national parks, national natural landmarks, wild and scenic rivers, state and Federal wildlife refuges, and marine sanctuaries)
- ☐ k. Prime farmland, unique farmland, or other farmland of statewide or local importance
- ☐ l. Special sources of water (e.g., sole source aquifers)

If you checked any boxes above, provide a detailed description of: (1) the resources that could be affected, and (2) how project activities may affect those resources.

Explanation:

4. Does the proposed project involve any of the following activities or areas of concern? Please indicate below any and all activities or areas of concern that exist in the vicinity of your project, are required for your project, or could affect your project. (See Attachment 1 for definitions of each activity or area of concern.)

- ☒ a. Clearing or excavation
- ☐ b. Dredge and/or fill
- ☐ c. Pre-existing contamination
- ☐ d. Pesticide use
- ☐ e. Asbestos or lead-based paint
- ☐ f. Polychlorinated biphenyls (PCBs)
- ☐ g. Navigable air space
- ☐ h. Underground storage tanks
- ☐ i. Underground extraction/injection
- ☒ j. Use of a non-renewable resource

If you checked any boxes above, provide a detailed description of: (1) each activity or area of concern, and (2) the effects of each activity or area of concern on your project and/or the surrounding area.

Explanation:
The XXXXXXXX demonstration factory is envision to be a "greenfield" project which means that there will inevitably be clearing or excavation of land for the building site. Because the building site will be in an area zoned for new industrial construction, such activity will have limited impact, if any, on the surrounding area. The use of non-renewable resources will be almost entirely associated with fuels to operate equipment and vehicles for construction.

5. Would the proposed project have the potential to result in impacts to the surrounding community? Please indicate below all areas of concern that exist in the vicinity of your project, are required for your project, or could affect your project.

- ☐ a. Visual impacts
- ☐ b. Populations of low income or minorities (Environmental Justice)
- ☒ c. Changes in local employment
- ☐ d. Changes in local traffic patterns or density
- ☐ e. New transportation access
- ☐ f. New utility lines or right-of-ways
- ☐ g. Other impacts

If you checked any boxes above, please provide a detailed description of: (1) the communities affected, and (2) what effects the project would have.

Explanation:
The XXXXXXXXXX demonstration factory will bring over 300 jobs to the area.

6. Would the proposed project use, result in, or require the management, storage, transport, or disposal of radioactive, toxic, or hazardous chemicals, waste, or other materials that require special handling?

Note: Hazardous chemicals and materials include those which, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may increase the risk of mortality or pose a substantial threat to human health or the environment when improperly stored, transported, disposed of, or otherwise managed.

Yes ☒ | **No** ☐

If you checked "Yes," please provide a detailed description of: (1) the materials; (2) approximate quantity of each; (3) their role in the project; and (4) storage, transport, and disposal procedures for each material.

Explanation:

The XXXXXXXXXXX factory will use the following hazardous materials:
1) Silane gas for manufacturing the silicon nanowire anode. Approx xxxx metric tons per year. Stored in specially designed bunkers. Byproduct is inert solid waste in abatement equipment that will be disposed by licensed contractor.
2) Lithium metal for anode prelithiation. Approx xxxx tons per year. Stored in dry containers. Waste disposed after oxidation to lithium oxide and/or lithium carbonate by licensed contractor.
3) Organic electrolytes. Approx xxxx tons per year. Excess disposed by licensed contractor.

7. Would the proposed project involve the use or development of recombinant DNA or genetically engineered microorganisms, plants, animals, or similar technologies?

Yes ☐ | **No** ■

If you checked "Yes," please provide a detailed description of: (1) the genetic modifications, (2) the safety procedures in place for their handling and use over the course of the project, and (3) how they would be disposed of at the project's conclusion.

Explanation:

8. Does the project involve the use of any nanoscale materials or nanotechnology?

Note: Nanotechnology is defined as research and technology development at the atomic, molecular, or macromolecular levels using a length scale of approximately one to one hundred nanometers in any dimension; the creation and use of structures, devices and systems that have novel properties and functions because of their small size; or the ability to control or manipulate matter on an atomic scale.

Yes ☒ | **No** ☐

If you checked "Yes," please describe: (1) the nanoscale materials used, (2) potential risks those materials may pose, and (3) how they would be disposed of.

Explanation:
The silicon nanowire anode comprises a filimentary core (template) that is grown from and metalurgically bonded or "rooted" to a metal foil substrate. The template is coated with a thick layer of silicon. Because the template is rooted to the substrate and coated with silicon it has been shown to pose no detectable risk of inhalation.

9. Is there any public opposition concerning any of the project activities?

Yes ☐ | **No** ☒

If you checked "Yes," please describe the nature of the opposition and any actions you may have taken or plan to take to address it.

Explanation:

10. Would the project involve activities or deployments into marine/freshwater aquatic environments?

Yes ☐ | **No** ☒

If you checked "Yes," please provide a detailed description of: (1) the proposed activities or deployment, (2) where and when these activities would occur, and (3) what permit/authorizations have been or would be acquired for this activity.

Explanation:

11. Would the proposed project result in a discharge of any type of wastewater, pollutant, or contaminant, including thermal discharges, to a sewer system, stormwater system, soils, retention ponds, or any water resources (e.g., surface water, including lakes, rivers, creeks, and wetlands; and ground water)?

Note: Under Federal law, the term "pollutant" means dredged spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. See 33 U.S.C. § 1362(6). The term "contaminant" means any physical, chemical, biological, or radiological substance or matter in water. See 42 U.S.C. § 300f(6).

Yes ☐ | **No** ☒

If you checked "Yes", please quantify and characterize the wastewater or pollutants and provide a detailed description of the: (1) wastewater, pollutants, or contaminants to be released; and (2) the water resources that may be affected.

Explanation:

12. Would the proposed project have the potential to generate noise impacts to adjacent communities, employees working at the project site, wildlife, and/or sensitive receptors including hospitals, schools, daycare facilities, and elderly housing?

Yes ☒ | **No** ☐

If you checked "Yes", please provide a description of: (1) the receptors that may be impacted and their estimated distance from the project activities, (2) the level of noise generated (in A-weighted decibels (dbA)) to each receptor, and (3) anticipated duration.

Explanation:

During the construction phase of the demonstration factory XXXXXXXXXXXX construction noise may be a temporary and minor disturbance to the local community.

13. Please provide a detailed description of how the project would be decommissioned, including the disposition of equipment and materials.

Explanation: There is no plan to decomission the demonstration factory.

SECTION IV. CERTIFICATION	
I hereby certify that I am authorized to submit, and I do so hereby submit, the information in this questionnaire on behalf of the Recipient named below. I certify that the information provided herein is accurate and complete as of the date shown below. I understand that false statements or misrepresentations may result in civil and/or criminal penalties under 18 U.S.C. § 1001. If I receive any information that would indicate that any of the above-referenced answers are no longer correct or complete, I agree to notify EERE immediately. If it is necessary for EERE to modify the information I provide, EERE will request that I recertify the revised form.	
Name	Jon Bornstein
Title	Chief Operating Officer
Applicant	Amprius Technologies, Inc.
Signature	
Date	July 1st 2022

EERE ENVIRONMENTAL QUESTIONNAIRE
ATTACHMENT 1

Definitions for Question 3 –Resources*

Historical, Archeological, or Cultural Resources. The National Historic Preservation Act; the Historic Sites, Buildings and Antiquities Act; the American Indian Religious Freedom Act; and the Archeological Recovery Act provide for the preservation of sites, buildings, structures, or objects of historic, archeological, or architectural significance designated by Indian, Federal, state, or local governments or listed or eligible for listing on the National Register of Historic Places. The Archeological Resources Protection Act, Antiquities Act, and Native American Graves Protection and Repatriation Act also apply if the proposed project is on Federal and tribal land. This item should be checked "yes" if a proposed project is in an area that meets any of the above, or if an archeological survey has not been performed. Provide documentation of any consultation or State Historic Preservation Officer determination letters if available. If this information is not available or a survey has not been conducted recently, DOE may require such a survey to be conducted prior to any proposed project implementation.

Threatened/Endangered (T/E) Species and/or Critical Habitat. The Endangered Species Act provides for protection of animals, birds, fish, plants, and other living organisms that are in danger of extinction. A list of T/E species is provided in 50 C.F.R. Part 17. Consultations with the U.S. Department of Interior Fish and Wildlife Service (FWS), National Marine Fisheries Services (NMFS), and the corresponding state agency should be documented. This item should be checked "yes" if any state- or Federally-listed or proposed threatened or endangered species or critical habitat is located in the proposed project area, or could be indirectly affected by the proposed project. If the status of T/E species at the proposed project location is unknown, please contact the local or state office of the FWS or NMFS to obtain a listing of potential species and habitats found in the area.

Floodplains. Floodplains are lowlands adjoining inland and coastal waters with a 1 percent or greater chance of inundation in any given year. Indicate "yes" if the proposed project location is in or adjacent to a floodplain area. If documentation is available noting the floodplain boundaries, please provide a copy. Appropriate documentation of the 100 year floodplain [or 500 year floodplain for critical actions**] boundaries include: Flood Insurance Rate Maps or Flood Hazard Boundary Maps prepared by the Federal Emergency Management Agency (FEMA) of the U.S. Department of Homeland Security. Executive Order 11988 Floodplain Management requires Federal agencies to avoid incompatible development in floodplains, and consider the conformance of the proposed project to floodplain standards, potential effects of the proposed projects on floodplains, and potential effects of floodplain modifications on other local properties and improvements.

** Critical actions as defined in the Implementing Guidelines to Executive Order 11988 are activities for which chance of flooding is too great.

Wetlands. Wetlands are areas inundated by surface or groundwater with a frequency sufficient to support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction, [10 C.F.R. 1022.4]. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflow, mudflats, and natural ponds. Man-made ponds can qualify as wetlands if invasion of appropriate flora or fauna has occurred. Appropriate documentation of presence or absence of wetlands within the area of project effect includes: FWS National Wetlands Inventory; U.S. Department of Agriculture Soil Conservation Service Local Identification Maps; U.S. Geological Service (USGS) Local Identification Maps; USGS Topographic Maps; state wetland inventories; and regional or local government sponsored wetland and land use inventories. Executive Order 11990 Protection of Wetlands requires Federal agencies to consider the effects of proposed projects on wetlands, and to avoid, to the extent possible, destruction and modification of wetlands. If the status of land in or around the proposed project location is unknown, please contact the state or local U.S. Army Corps of Engineer's office.

Coastal Zones. Coastal zones are the coastal waters and adjacent shore lands of the Great Lakes, and the Atlantic, Pacific, and Arctic Oceans, Gulf of Mexico, and Long Island Sound. The term "coastal state" includes the states bordering on those bodies, plus Puerto Rico, the Virgin Islands, Guam, the Commonwealth of Northern Mariana Islands, and the Trust Territories of the Pacific Islands and American Samoa. Coastal states have authority regarding actions, which directly affect coastal zones, in accordance with the Department of Commerce regulations promulgated under the Coastal Zone Management Act. Federal activities and Federal development projects must be consistent with state coastal zone management (CZM) programs to the maximum extent possible. Federal activities are those performed by or on behalf of a Federal agency in the exercise of its statutory responsibilities. Indicate "yes" if the proposed project is located in a coastal zone State or is in the vicinity of a coastal zone State. If a consistency determination has been obtained, or a written "negative determination" (indicating that a consistency determination is not required) please provide a copy. See 15 C.F.R. 930.

Migratory Birds, Golden or Bald Eagles. Other Federal and state laws that protect wildlife species include the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Examples of protected migratory birds include Canadian geese and great blue herons. This item should be checked "yes" if the proposed project may directly or indirectly impact any of these species or their habitats. If the status of other protected species is unknown in the proposed project location, please contact the local or state office of the FWS to obtain a listing of potential species and habitats found in the area.

Areas Having a Special Designation. Various Federal laws restrict the ability of Federal agencies to aid developments affecting national wilderness areas, national memorial parks, national parks, national monuments, national primitive areas, national preserves, national recreational areas, national wild and scenic rivers, national grasslands, national wildlife refuges, national forests, national lakeshore or seashore, and national trails. Indicate "yes" if any of these areas of special environmental or natural significance is located in close proximity to the proposed project location and describe the specific special designation.

Prime Farmland, Unique Farmland, or Other Farmland of Statewide or Local Importance. The Farmland Protection Policy Act requires Federal agencies to consider ways to lessen the effects of proposed projects that convert or adversely affect prime farmland which is not currently classified or designated for future urban development or water storage. Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion. Prime farmland also includes land that possesses the above characteristics, but is being used currently to produce livestock and timber. Prime farmland does not include lands designated for future urban development, such as land that has been identified for commercial, industrial, or residential development by zoning code, ordinance, or a comprehensive land use plan [7 U.S.C. 4201(c)(1)]. The U.S. Department of Agriculture Natural Resource Conservation Service (NRCS) field office serving the area can provide assistance in determining whether a proposed location or site meets the definition of prime farmland. Form AD 1006, the Farmland Conversion Impact Rating Form, available at NRCS offices, should be used for this purpose.

Special Sources of Water. Through the Safe Drinking Water Act, EPA and states designate Critical Aquifer Protection Areas and Sole or Principal Source Aquifers, and State-Designated Wellhead Protection Areas in accordance with 42 U.S.C. 300h-6(b), 42 U.S.C. 300h-3(e), and 42 U.S.C. 300h-7(e), respectively. Such areas are accorded special protection to assure the quality and availability of public water supplies. Indicate "yes" if the proposed project is located in an area designated for protection (e.g., is included in an area wide groundwater quality protection plan), or would constitute a potential source of contamination within an existing or expected wellhead protection area serving a public water supply. If aquifer designations are not known for the proposed project area, contact the environmental protection office for the State.

* Definitions and requirements are subject to regulatory changes.

Definitions for Question 4 – Activities or Areas of Concern*

Clearing or Excavation. Clearing or excavation refers to the removal of vegetation, soil, sediments, or disturbance of land surfaces and subsurface including cutting, burning, digging, grading, filling, or blasting. Provide the estimated area to be affected, the quantity of material to be added or removed, and the planned disposition of spoils. Describe the potential for runoff or erosion, any control techniques to be employed, and the distance to nearby surface water bodies, including wetlands.

Dredge and/or Fill. Dredge and/or fill are the excavation of material from waters of the United States. Filling is the discharge of material into waters of the United States to change the bottom elevation. Waters of the United States are all interstate waters, and intrastate lakes, rivers, streams, mudflats, wetlands, sloughs, plays, or natural ponds. These activities include "ocean dumping" as regulated under Sections 102 and 103 of the Clean Water Act, construction of dams, dikes, piers, or others that could alter the course of waters of the United States. Also included is any shore activity with the potential for runoff to waters of the United States. If available, include documentation of appropriate consultation(s), e.g., with the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act or Sections 9 and 10 of the Rivers and Harbors Act; and with EPA [40 C.F.R. Parts 220-233].

Pre-Existing Contamination. Indicate if the proposed project will disturb hazardous substances, pollutants, contaminants, or Comprehensive Environmental Response and Liability Act (CERCLA)-excluded petroleum and natural gas products that pre-exist in the environment. Quantify and characterize such pre-existing substances, including whether they are present above background or regulatory levels. Also quantify the volume of contaminated materials (e.g. soil, sediment, groundwater, debris, etc.) which would require transport to a properly permitted treatment, storage, or disposal facility as the result of the proposed project.

Pesticide Use. A pesticide is a substance intended for preventing, destroying, repelling, or mitigating any type of pest including insects, rodent, nematode, fungus, or weed, and any substance intended for use as a plant regulator, defoliant, or desiccant. While the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) imposes no requirements on private applicators, commercial pesticide applicators must be certified by the state or U.S. EPA. Additionally, FIFRA requires that certain pesticides known as “restricted use pesticides” (listed in 40 C.F.R. 152.175) to only be applied by certified applicators. If either commercial or private pesticide application or the utilization of restricted use pesticides is anticipated, indicate "yes". If a private application is anticipated, document measures to be undertaken to assure safe storage, use, and disposal.

Asbestos. If the proposed project includes demolition or renovation of an existing building, you must determine if asbestos is present. Common asbestos-containing building materials may include but are not limited to floor tile, mastics, wall board, joint compound, acoustic ceiling tiles, thermal insulation, spray-on fire proofing, glazing, caulking, roof flashing, and felts. Demolition and renovation activities that may impact asbestos containing building materials are regulated by the U.S. Occupational Health and Safety Administration (OSHA) through the Asbestos in Construction Standard and asbestos air emissions from asbestos abatements are regulated by the EPA as a hazardous air pollutant under the Clean Air Act (CAA). Include a description of measures to be undertaken to comply with asbestos removal requirements of 29 C.F.R. 1926.1100 and 40 C.F.R. 61 (Subpart M).

Polychlorinated Biphenyls (PCBs). PCBs are a family of man-made organic chemicals that were domestically manufactured from 1929 until banned in 1979 due to their toxicity and persistence in the environment. Given their non-flammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were largely used as dielectric and coolant fluids in transformers, capacitors, electric motors, etc. Manufacture, processing, transport, use, marking, storage, and disposal of PCBs are regulated by EPA [40 C.F.R. Part 761] in accordance with the Toxic Substances Control Act. Some states also regulate PCBs as hazardous waste. If the proposed project involves replacement or removal of capacitors, transformers, voltage regulators, circuit breakers, switches, cables, electromagnets, or other electrical equipment, presence or absence of PCBs should be ascertained. A "yes" indication

should be supported with information on the anticipated concentration and quantity of PCB oil, and the intended method/location of disposal.

Navigable Air Space. The U.S. Department of Transportation Federal Aviation Administration (FAA) regulates objects which invade navigable air space or otherwise constitute an obstruction to air navigation, and determines whether such activities constitute a navigation hazard. Indicate "yes" if the proposed project involves construction or alteration more than 200 feet above ground level, any construction or alteration in instrument approach areas, and other construction or alteration identified in 14 C.F.R. 77.13. Document notification of the appropriate Manager, Air Traffic Division, of the FAA Regional Office for the area within which the construction or alteration will be located. Copies of FAA Form 7460-1 Notice of Proposed Construction or Alteration may be obtained from the regional FAA office or electronically through FAA's website.

Underground Storage Tanks. Indicate "yes" if 10 percent or more of tank volume (including the volume of underground pipes) will be beneath surface of the ground. Indicate if installation, use, or removal of underground storage tanks is anticipated, and whether tank use is/was for storage/collection of hazardous waste, heating oil, other petroleum or petroleum-based substances, stormwater, or wastewater. Describe any leak detection/monitoring methods to be used for storage of hazardous waste or regulated petroleum products like gasoline or diesel.

Underground Extraction/Injection. Underground extraction/injection is the subsurface emplacement of fluids through a bored, drilled, or driven well, or through a dug well where the depth of the well is greater than the largest surface dimension. If the proposed project involves construction or use of an injection well, indicate "yes," and describe the class of the well as defined in 40 C.F.R. 146.5, the type and quantity of contaminants (e.g., waste disposal, hydrocarbon or mineral extraction) and whether the injection involves an exempt aquifer as defined in 40 C.F.R. 146.4.

Use of a Non-Renewable Resource. Non-renewable resources are naturally occurring substances (e.g., metals, minerals, fossil fuels) that are in limited supply and cannot be replaced or regenerated. The exhaustion or threatened exhaustion of such resources could have significant ramifications. Indicate "yes" if the proposed project would involve a resource that is in limited supply.

* Definitions and requirements are subject to regulatory changes.

Community Engagement Plan

Amprius is dedicated not only to community engagement, but community empowerment and inclusion. Our plan for our new pilot plant location and our ultimate production facilities includes considerable state, local, and community engagement before any action is to be taken.

At Amprius, we believe in addressing the entire spectrum of community engagement, as indicated below, from informing to empowering local stakeholders.

Community Engagement Prior to Project Commencement

Identifying Stakeholders

Our immediate task will be to identify and clarify the key stakeholders for such a large undertaking. Communities take many different forms, with different sizes, cultural norms, and communication styles. Our Community Engagement Plan includes a clear process to identify and address the needs of varying populations with varying age, access, cultures, ethnicities, and economic status.

For this project, the following populations are identified as likely populations who would be most impacted by a potential plant operation:

- Local residents and landowners
- Local business owners, particularly manufacturers and suppliers
- Community and civic institutions, including:
  - Universities and community colleges
  - Primary and secondary education facilities
- Infrastructure partners, including:
  - Rail operators
  - Steet and highway departments
  - Local aviation authorities
  - Utility partners, including electricity, water, wastewater, and natural gas

We have identified the following groups specific to [redacted] to engage:

- National Association for Latino Community Asset Builders

(b) (4) [redacted]

- Greater [redacted] Builders' Association
- [redacted] AFL-CIO
- [redacted] City Council
- [redacted] Manufacturers Association
- [redacted] Business Coalition

As a key part of our Plan, we anticipate dedicating considerable time to those groups which may be impacted by our project, but who may have historically been excluded from such engagement processes. These may include:

- Persons with disabilities
- Low-income populations
- People of color
- Older adults or children and youth

Our Community Engagement Plan will include significant outreach to such groups with tools and techniques which are specifically tailored to engage with diverse populations.

Outreach Plan

In order to inform and engage with a broad range of key stakeholders, Amprius intends to facilitate community outreach by two primary methods:

1. In-person information and listening sessions, including events and public sessions
2. Online surveys and information gathering, enabled by technology for those who choose not to engage in person

In-Person Engagement

For the in-person information and listening sessions, the following table summarizes our approach to engaging stakeholders and objective of discussion topics.

Guiding Principles	Description
Make it convenient	Host sessions where all stakeholders have equal access
Harness existing relationships	Strengthen relationships through regular meetings and communication
Foster Peer to Peer Conversations	Participants learn from each other; share with their peers as representatives of the plan
Review and evaluate	Incorporate necessary stakeholder feedback into revised plan

Stakeholder Engagement Level	Description
Inform	Inform about project progress
Consult	Allow members of the community to review/react to ideas from the project team

Involve	Provide feedback and direction to project team
Collaborate	Work together to build ideas and solutions to community concerns, strengthen relationships
Empower	Provide engagement tools to stakeholders to increase engagement with their contacts

Key Topics to Address with Stakeholders	Discussion Objectives
Measure Support	Communicate the importance of the plan, share with their contacts and stakeholders
Education	Provide plan details, need for, and benefits of the project
What works	What people like/don't like in the built environment
What needs to happen	What they/their contacts and stakeholders face
Empower	How to get involved; how they'd like to be involved (in plan, in other decisions), relationship-building

Up to four events shall be attended around the region of the proposed site, such as open streets, listening sessions, community festivals, county fairs, etc. as identified below.

- Farmers markets, festivals, fairs
- Parks, transit stations, retail areas
- Schools, libraries, places of worship

These events shall include pedestrian groups and agencies. The staff and partners attending/facilitating the events will share raw information from event as well as summarize the themes, sentiments, and other results of engaging with the community.

Online Engagement

Social media is a useful tool for sharing information and engaging in dialogue about new projects. It is also an important component of the Outreach Plan and can be used to promote engagement events. Amprius will establish statewide, district and locally specific social media accounts, which shall be used throughout the process to inform the public as outreach activities take place in real time.

The social media presence will be leveraged to garner community comments as well, to understand local sentiment and issues of concern.

Community Engagement During the Project

During any significant construction project, issues impacting the community may arise. For this reason, Amprius will maintain transparency with the community through the duration of the project construction using the guiding principles of the Outreach Plan. The project social media account will remain open and will serve as a tool for posting status updates, milestone dates, any local road closures or infrastructure impacts, etc.

Community Engagement After Initial Project Construction

Upon completion of the initial development phase, ongoing operations will commence. Amprius seeks to be not only an operator within the community but a meaningful contributor to the local economy and civic spirit. We plan to continually engage with the community, including providing educational opportunities at local schools to inform students of career paths in STEM roles, particularly related to innovative energy solutions. These efforts are outlined in the DEIA plan below. Amprius is committed to long-term engagement in every community where we operate.

Community Benefits Agreement

Amprius understands the need for the proposed project to have a net positive impact on the surrounding community. For this reason, a Community Benefits Agreement (CBA) shall be created with the following guiding principles:

- Responsible Hiring
    - A “local first” hiring mindset
    - Job training for local residents to provide up-skilling
    - Wages to meet or exceed the prevailing market rate, by experience level
- Responsible Construction
    - Construction practices to minimize community impact
    - Project specifications to ensure environmental protection
- Responsible Management
    - Efficient operations
    - Limitation of harmful emissions, for sound, light and exhaust

These principles will be further codified as the project commences and as community feedback is gathered.

Quality Jobs and Skilled Workforce

Job Quality

Defining What Makes a Quality Job

Amprius will create a framework to provide quality jobs to the [redacted] community, with position at the prospective site having the following baseline attributes:

Workplace Standard	Description of Goals
Living Wage	• Pay a fair wage that can sustain employees and their dependents
Safe Working Conditions	• Provide a safe and healthy work environment that prevents hazards and minimizes risk of injury or other harm
Appropriate Job Classifications	• Classification of jobs allows organizations to identify the specific skills and knowledge required for a particular position, as well as the level of responsibility and authority associated with the job. It also helps to ensure that employees are compensated fairly for the work they perform. By evaluating each position and assigning it to a specific job classification, organizations can develop a pay scale that is equitable and fair. Additionally, job classification can be used to identify training and development needs, as well as to create a career path for employees.
HR Infrastructure	• Provide resources for employee training, success, and professional growth • Maintain channels of communication for work related concerns and feedback
Stable Scheduling	• Communicate shift timing and expectations to employees as soon as they are known to management • Minimize the need for unexpected or sudden shift changes
Benefits	• Medical Insurance • Paid time off • Employee Engagement

High Wages and Income Disparity

Amprius is dedicated to providing its employees a fair, living wage. As previously stated, wages at proposed site will meet or exceed the prevailing market rate, ensuring that Amprius is an attractive employer to prospective employees.

In order to meet increased demand for products manufactured at the proposed site, Amprius will not resort to hiring lower-wage workers. In addition to, Amprius intends to maintain living wage standards by hiring additional higher-wage workers and investing in capital to increase productivity.

Our plan to provide fair wages will benefit the community [redacted], and disadvantaged communities [redacted] in particular. The DEIA section of the Plan outlines efforts to increase workforce representation of women, veterans, people of color, and specifically Hispanic people, who make up a majority of the [redacted] Community. Because our hiring efforts will be specifically directed at providing members of these disadvantaged communities, they will be the beneficiaries of Amprius' high quality and fair wage jobs.

(b) (4) [redacted]

Anticipated Jobs at the Proposed Site

Job type	Description	Expected Pay Range	Positions	Timeline
Management	Provide factory management and engineering leadership	[redacted]	15	Q2
Engineering	Responsible for engineering support for battery design, manufacturing, mechanical, electrical, facilities, and IT	[redacted]	35	Q4
Business support personnel	Supports accounting, finance, purchasing and procurement, shipping/receiving and logistics, sales, marketing	[redacted]	22	Q5
Technicians, Operators, Maintenance	Direct labor spans skilled technicians in mechanical, electrical, and chemical applications to unskilled operators.	[redacted]	260	~20/month starting in second year

(b) (4) [redacted]

Benefits at the Proposed Site

Amprius is committed to providing its employees with comprehensive benefits to support their health and well-being both at and outside of their place of work. In addition to fair wages, Amprius intends to provide benefits to all full-time employees. Part-time employees may also qualify for some benefits. Our benefits packages will help us stay competitive with other employers in the area and set a standard for job quality in the [redacted] area.

- Medical Insurance
- Dental Insurance
- Vision Insurance
- HSA & FSA
- Critical Illness, Accident, Hospital Indemnity Insurance
- Equity Incentive Plans
- 401(k) Savings Plan
- Employee Referral Program
- Paid Time Off
- Medical and Family Leave
- Employee Assistance Programs

Neutrality with Respect to Union Organizing

Amprius intends to remain neutral towards employees at the proposed site(s) in the event that employees participate in an organizing campaign and if the employees ultimately choose to be represented by a union. Amprius will pursue a Union Neutrality Agreement which will include provisions:

- The employer will inform its employees that it has a constructive and positive relationship with the union.

- The employer will provide the union, upon request, with the employees' names, job classifications, and contact information.
- The employer will permit union agents access to company premises to meet with employees on non-work time in non-work areas.
- A no-strike and no-lockout clause will be in effect prior to the recognition of the union.
- The employer and the union will not pursue unfair labor practice charges against the other arising from the neutrality agreement (this cannot and does not preclude employees from pursuing charges at the NLRB).

Workplace Safety

Amprius is committed to maintaining a safe working environment for all employees, visitors, subcontractors, and vendors. Our approach is focused on the following general policies and procedures:

- Establishing clear policies and goals for all employees to adopt and follow.
- Creating a list of responsible persons with clear accountability.
- Identifying potential hazards in standard operations.
- Establishing hazard controls and best practices for ensuring safety.
- Determining emergency and accident response protocols.
- Maintaining clear employee training and communications.
- Maintaining record keeping and logs of all safety activities.

Key employees of Amprius, from a range of multidisciplinary backgrounds and experience levels, will be instrumental in forming our workplace safety committee.

Standards of Conduct

Amprius maintains a strong code of conduct to reflect the shared needs of the many team members working together at the company, including clarifying our expectations regarding conduct including but not limited to security, personal safety, employee welfare and the Company's interests.

Equal Employment Practices

Amprius is an equal opportunity employer and the Company makes employment decisions on the basis of merit. In accordance with applicable law, the Company prohibits discrimination based on race, color, religion, creed, sec marital status, age, national origin or ancestry, physical or mental disability, pregnancy, childbirth, medical condition, veteran status, sexual orientation, genetic discrimination, or any other consideration protested by local, state or federal law.

Unlawful Discrimination and Anti-harassment Policy

Amprius is committed to maintaining a work environment in which people are treated with dignity, decency and respect. The work environment of our company is represented by the mutual trust of employees and the absence of intimidation, harassment, discrimination and is essential to our Company. For that reason, Amprius will not tolerate unlawful discrimination or harassment of any kind. Through the enforcement of our policies and by education of our employees, we seek to prevent,

correct and discipline any behavior that violates our policies. Prohibited conduct includes but is not limited to:

- Discrimination in employment opportunities, work conditions or evaluation criteria
- Harassment including both verbal and nonverbal harassment including derogatory comments based on racial, ethnic or physical characteristics, religious beliefs, age, gender identity or expression, or sexual orientation; or distribution, display or discussion of any written or graphic material that includes offensive or unwelcome material.
- Sexual harassment including unsolicited and unwelcome sexual advances, requests for sexual favors, or other verbal or physical conduct of a sexual nature.

Our company provides various education and training sessions to make sure that all employees including consultants, temporary and part time employees are aware of our policies.

Workplace Violence

Threats or acts of violence or physical intimidation are absolutely prohibited. Employees will be strongly encouraged to report any conduct that they themselves or others uncomfortable, particularly harassment or threatening behavior.

"Open Door" Culture

Amprius is committed to maintaining a workplace that is transparent, equitable, and compliant with applicable laws. We will encourage those who have witnessed or experienced activity they believe to be unethical or illegal to report those activities. We have adopted a non-retaliation policy and provide multiple reporting channels to ensure protection from adverse consequences.

Diversity Equity Inclusion and Accessibility

Increased Representation in Amprius Workforce

We are intent on embedding diversity, equity and inclusion as a core part of our business practices, from recruiting and onboarding, to proactively identifying and preparing a diverse pipeline of future leaders. To that end, Amprius plans to partner with organizations that encourage and support diverse talent, which will also include apprenticeship programs that boost recruitment of employees from backgrounds that are traditionally underrepresented. Example of programs that Amprius will partner with include:

- [redacted]
- [redacted]
- [redacted]
- [redacted]
- [redacted]

(b) (4) [redacted]

In addition to recruiting effort, Amprius will provide annual unconscious bias and microaggressions training for employees as part of our ongoing commitment to retention and inclusion of diverse employees.

Responsible Procurement and Supplier Diversity

Our sourcing strategy seeks to ensure the appropriate management and mitigation of supply chain risks, which include a broad range of environmental, social and governance risk factors including health and safety, diversity and inclusion, governance, labor practices and the environment. The extent of these risks is influenced by the type of product or service procured, supplier location, the maturity of a supplier's own sustainability program, and the presence of complex multi-tiered supply chains. Amprius intends to draft a vendor policy that will require that all Amprius vendors seek to maintain the highest ethical standards and prevent incidents related to forced labor and child labor, unacceptable working conditions and safety risks, discrimination and prejudice against individuals and vulnerable groups.

Ongoing Initiatives and Goals for DEIA

Developing a diversity, equitable, and inclusive work environment requires continuous efforts that are measurable and trackable. Below are SMART goals that Amprius will work to attain along with metrics to assess viability and completion of the goals.

Goal	DEI / Business Objective
At least 30% of all hires must be members of a DAC	• Increase representation of DACs in the workforce • Reduce barriers to employment for under-represented individuals
At least 50% of all Manufacturing Technician hires must be members of a DAC	• Increase representation of DACs in fair-paying, blue-collar jobs • Reduce barriers to employment for under-represented individuals
Provide at least 4 upskilling / training opportunities per calendar year to all employees	• Increase job knowledge, expertise and safety • Contribute to community workforce development
Form at least 2 Employee Resource Groups to address the needs of employees	• Maintain an inclusive and transparent environment that is attractive to workers who are under-represented
Establish internship programs with local high schools and higher education institutions	• Engagement of students in the community provides real-world experience that enables them to put everything they've learned into action, gain confidence in abilities, and determine what industry/job is the right fit. An internship can help students gain skills that can be applied to future jobs. There are also many benefits for the company including identifying a pipeline of potential talent, enhanced perspective, and providing leadership opportunities for current employees through mentoring or supervisory responsibilities.

Justice40 Plan

Identification of priority populations the program is intended to benefit

According to population estimates provided by the U.S. Census Bureau, approximately 64.7%[1] of the population [redacted] is Hispanic, a population identified by the EPA to be more exposed to the highest impacts of climate change[2]. [redacted] is at a higher risk for air pollution and has a higher rate of asthmatic people than the rest of Texas, a potential indicator that pollution is having health effects on the residents [redacted]

(b) (4) [redacted]

Additionally, the poverty rate [redacted] is 19.6%[1], which is significantly higher than the national poverty rate of 11.4%[4]. The community [redacted] is comprised of multiple demographics defined by the Justice40 initiative to be high priority beneficiaries[5] for the funding opportunity.

Identification of Applicable Benefits

With the shift away from fossil fuel and toward renewable energy systems, well-paying and even lower-wage jobs for blue-collar workers are also being lost. This has impacted various cities [redacted]. Concerns about job availability and job quality have been raised with regard to the transition to renewable energy.

Amprius' investment in the [redacted] plant will

1. increase in job creation, the clean energy job pipeline, job training for individuals, and re-training for workers displaced by fossil fuel disinvestment
2. increase in contracting to minority-owned and other diverse business enterprises

<u>Job Creation and Training</u>

As mentioned in the DEIA section, Amprius intends to partner with programs that serve many disadvantaged communities, including communities that

- are low income/high poverty
- have unemployment higher than the national average
- experience disproportionately high impacts of climate change

in addition to institutions that serve the Hispanic community and women in particular. By partnering with these organizations and preferentially recruiting from them, Amprius will increase in high quality job availability for these communities. These communities will directly receive the benefits of increased employment.

Amprius will also provide mandatory safety training and professional development training to our employees to increase job knowledge.

<u>Increased Contracting of Minority Owned Businesses</u>

[redacted] maintains a database of vendors based [redacted] that are certified as Small, Minority Woman and/or Veteran owned Business Enterprises (SMWVBE) by the

---

[1] https://www.census.gov/quickfacts/[redacted]

[2] https://www.epa.gov/newsreleases/epa-report-shows-disproportionate-impacts-climate-change-socially-vulnerable

[3] universityhealthsystem.com/blog/air-pollution-and-lung-health

[4] https://www.census.gov/newsroom/stories/poverty-awareness-month.html

[5] https://www.whitehouse.gov/wp-content/uploads/2021/07/M-21-28.pdf pg. 2-3; high priority beneficiaries are those that are members of a disadvantaged community defined by the Interim Implementation Guidance provided by the Executive Office of the President

[6] https://grist.org/climate-energy/[redacted]

[redacted] Amprius plans to leverage this database to source supplies and provide services to the proposed manufacturing site.

Anticipated Negative Impacts on DACs

As with most manufacturing operations, there is a significant energy demand. While Amprius does intend to use renewable energy sources where possible, electricity delivered to Amprius' prospective manufacturing site does come from fossil fuels.
Mitigation of Negative Impacts
In order to reduce the impact of the energy demand required by the Amprius site, Amprius will prioritize obtaining LEED certification for the building the manufacturing operations will occupy. LEED-certified buildings are more energy efficient and, therefore will lessen the energy demand of the site. Amprius also intends to install renewable energy sources on site such as solar panels to reduce demand of fossil fuel energy.

[redacted]

Concluding Comments

Community Engagement Implementation

Implementation of the Amprius plan will require leadership from more than just the project team.
It will be up to the project management team to communicate roles, responsibilities, and expectations to their partners to share in engagement activity strategies.
Successful implementation will also require excellent communication. Amprius will work closely with the local community for guidance on language, notification strategies and internal project team responsibilities.
Finally, documentation of the process and progress will be essential to developing a high-quality community engagement process. Listening to input from stakeholders and responding quickly to advice and feedback ensures that each engagement strategy, message, or notification strategy can be improved during the process. Documentation is also critical to a well-functioning project team so that all members are aware of new issues, ideas, improvements, or nuances.

This plan will be a living document. In order to respond to stakeholders' needs and recommendations for successful engagement, the project team will continuously update the plan as needed.
At Amprius, we look forward to building sustainable new technologies to improve our world. In the process, we are excited to implement a project that also improves our local community. Thank you for the opportunity.

Department of Energy
Argonne Site Office
9800 South Cass Avenue
Argonne, Illinois 60439

June 29, 2022

Diane M. Hart
Manager, Sponsored Research and Contract Administration
Argonne National Laboratory
9700 S. Cass Avenue
Lemont, IL 60439

Dear Ms. Hart:
SUBJECT: APPROVAL FOR ARGONNE NATIONAL LABORATORY TO RESPOND

TO:
FUNDING OPPORTUNITY ANNOUNCEMENT: **DE-FOA-0002678**
CFDA NUMBER: **81.086**
TITLED: **Bipartisan Infrastructure Law (BIL)Battery Materials Processing and Battery Manufacturing**
DIVISION TRACKING NUMBER: 39525.1

Authorization is granted for the Argonne National Laboratory (Argonne) to submit or participate in a proposal in response to the subject financial assistance opportunity or other solicitation. The work proposed for Argonne is consistent with or complementary to the missions of the Laboratory and will not adversely impact execution of the current DOE assigned programs at the Argonne. This work will not place Argonne in direct competition with the private sector.

Argonne is managed and operated by UChicago Argonne, LLC for the Department of Energy (DOE) under prime contract Contract NO. DE-AC02-06CH11357. All work conducted by Argonne is subject to the terms and conditions of this contract. It must be clear that no additional terms and conditions, including any specific flow down requirements to subcontractors, are accepted by the action of the Argonne submitting a proposal or participating as a member in a proposal under the subject financial assistance opportunity or other solicitation. In rare instances, additional terms and conditions may be considered by DOE on a case-by-case basis but must be reviewed and approved by DOE before an award or funding is accepted by DOE and/or Argonne.

If Argonne is expected to receive any direct DOE program funding, the DOE sponsor must follow the requirements under DEAR 970.5211-1 Work Authorization and DOE Order 412.1A. Again, no additional terms and conditions are accepted by Argonne Laboratory under a DOE funding action.

Should you have any questions concerning this authorization please contact me at (630) 252-2193 or jacquelyn.brocker@science.doe.gov.

Sincerely,

Jacquelyn D. Brocker
Contracting Officer

Department of Energy
Golden Field Office
15013 Denver West Parkway
Golden, Colorado 80401

June 1, 2022

U.S. Department of Energy,
1000 Independence Ave, SW
Washington, D.C., 20585

SUBJECT: Office of Manufacturing and Energy Supply Chains (MESC) and Office of Energy Efficiency and Renewable Energy (EERE)
Bipartisan Infrastructure Law (BIL) Battery Materials Processing and Battery Manufacturing
Funding Opportunity Announcement (FOA) Number: DE-FOA-0002678

To Whom It May Concern,

Authorization is granted for the National Renewable Energy Laboratory (NREL), managed and operated by the Alliance for Sustainable Energy, LLC, to participate as sub recipient in the proposed project. The work proposed for the laboratory is consistent with or complementary to the missions of the laboratory, and will not adversely impact execution of the DOE assigned programs at the laboratory.

As a Federally Funded Research and Development Center, the National Renewable Energy Laboratory will be proposing subject to the guidelines identified in Section III.A.iii. Eligible Applicants – Domestic Entities, as well as III.E.i. Other Eligibility Requirements - Requirements for DOE/NNSA and non-DOE/NNSA Federally Funded Research and Development Centers Included as a Subrecipient.

Sincerely,

Peter G. Luft
Contracting Officer

cc: Kelly McIltrot
Jean Siekerka

06/24/2022

Ionel Stefan
Amprius Inc.
1180 Page Ave,
Fremont, CA 94538

SUBJECT: Letter of Commitment
Large scale manufacturing of silicon nanowire anode by direct gas-to-electrode manufacturing
Control number (2678-1709)
Bipartisan Infrastructure Law (BIL) Battery Materials Processing and Battery Manufacturing (FOA-2678)

Dear Ionel,

The National Renewable Energy Laboratory (NREL), managed and operated by the Alliance for Sustainable Energy, LLC, under U.S. Department of Energy M&O Contract No., DE-AC36-08GO28308, is pleased to support the "Large scale manufacturing of silicon nanowire anode by direct gas-to-electrode manufacturing" proposal with control number 2678-1709 led by Ionel Stefan, Amprius Inc, submitted in response to the Department of Energy (DOE) Office of Manufacturing and Energy Supply Chains (MESC) and Office of Energy Efficiency and Renewable Energy (EERE) Bipartisan Infrastructure Law (BIL) Battery Materials Processing and Battery Manufacturing Funding Opportunity Announcement (FOA-2678).

NREL's contribution to the project is to conduct advanced characterization of Amprius' materials to help achieve an optimized manufacturing process, develop high-throughput quality control techniques specific to Amprius' materials, and to develop a unique manufacturing cost-model for Amprius' silicon nano-wire anodes. NREL's primary technical contact is Donal Finegan [redacted]. The value to NREL, upon negotiation of the award shall be in the amount of [redacted] over 3 years. (b) (4) [redacted]

Upon award, NREL is prepared to provide all resources as defined in the NREL scope of work and budget for the project's duration. NREL's participation in this project will be provided through an agreement between Amprius Inc. and the Alliance for Sustainable Energy, LLC, managing and operating contractor for the National Renewable Energy Laboratory with a principal place of business at 15013 Denver West Parkway, Golden, Colorado 80401. The Department of Energy permits access to NREL's unique capabilities and services in accordance with DOE policies and regulations to support industry, state or local governments, and/or universities in response to federal agency announcements or nonfederal solicitations.

Sincerely,

Jennifer Kurtz
Center Director, Energy Conversion and Storage Systems Center,
[redacted]

cc: Donal Finegan, [redacted]

Diane M. Hart
Manager
Sponsored Research Office

Science & Technology Partnerships and Outreach
Argonne National Laboratory
9700 South Cass Avenue, Bldg. 201, Rm 243
Lemont, IL 60439

[redacted] (b) (4), (b) (6) [redacted]

June 30, 2022

Dr. Ionel Stefan
Amprius Technologies
1180 Page Ave, Fremont, CA 94538 USA
[redacted] (b) (6)

RE: Argonne National Laboratory Letter of Commitment for Proposal 2678-1709, entitled "Large scale manufacturing of silicon nanowire anode by direct gas-to-electrode manufacturing"

Dear Dr. Ionel Stefan:

Argonne National Laboratory is pleased to provide a subcontracting role for Amprius' proposal entitled "Large scale manufacturing of silicon nanowire anode by direct gas-to-electrode," under Dept. of Energy Funding Opportunity Announcement (FOA) Number: DE-FOA-0002678 - Area of Interest 12.

Silicon has a higher specific capacity than the graphite anode materials that are used in most state-of-the-art cells. Amprius has developed silicon nanowire anodes that can raise the specific energy and energy density of the cells by more than 50% relative to state-of-the-art graphite cells. Amprius has also developed the gas-to-electrode manufacturing process to deposit the silicon on the foil current collector. This process is one of the innovations that Amprius brings to its demonstration plant. This manufacturing process and its integration with the rest of cell manufacturing is new to the industry and requires a dedicated cost analysis, which would benefit from Argonne's expertise.

Argonne National Laboratory has developed the Battery Performance and Cost (BatPaC) model, a spreadsheet tool to design lithium-ion battery packs, typically for automotive propulsion, to match the specifications (power, energy, etc.). The tool uses the design information to calculate the material and the manufacturing costs to converge on an estimate of the cost of that battery.

Please note that all proposals for external support submitted by Argonne National Laboratory are subject to final review and approval of the U.S. Department of Energy (DOE). We are submitting this letter to you in advance of DOE review in order to meet

your needs and the DE-FOA-0002678 requirements. If a grant is awarded as a result of the application, Argonne National Laboratory, subject to U.S. Department of Energy approval, will provide a sub-contract to perform the work as outlined in the proposal. Personnel and facilities at the Laboratory are available under the terms and conditions of Prime Contract DE-AC02-06CH11357 with the Department of Energy and subject to full cost recovery. In the event of a conflict with the terms and conditions as stated in the grant proposal and/or award document, the provisions of this contract DE-AC02-06CH11357 will take precedence.

We look forward to participating in this endeavor and working with Amprius Technologies.

Sincerely,

Diane Hart
Manager, Sponsored Research Office

[redacted]

[redacted]

(b) (4), (b) (6)

Your contact person:

Helge Haverkamp

[redacted]

To whom it may concern

June 27, 2022

This letter should serve as an affirmation that [redacted] intends to supply Amprius Technologies with process equipment that includes [redacted] technology for the deposition of silicon in order to fabricate silicon anodes for lithium-ion cells. As part of this commercial engagement, [redacted] will provide as-needed technical assistance in support of a successful development effort. [redacted] is happy to be the vendor of record to enable Amprius' effort to develop a cost-effective and scalable manufacturing method for silicon nanowire anodes.

(b) (4)

Thermal production solutions and coating technologies are among centrotherm's core competencies. For more than 70 years we have been developing and implementing production concepts for a constantly growing international customer base. In addition to growth sectors such as the semiconductor and microelectronics industry, as well as photovoltaics, our innovative solutions are also being applied in new future-oriented fields such as fiber or battery production. As a leading, globally active technology group, we work closely with partners from industry and research. We improve existing production concepts and set new trends. In this way, we generate valuable competitive advantages for our customers. Around 600 employees worldwide are working to shape the future – GREEN | SMART | EFFICIENT.

Very truly yours,

[redacted]

[redacted]

[redacted]

[redacted] (b) (4), (b) (6)

June 30, 2022

Ionel Stefan, PhD
Chief Technology Officer
Amprius Technologies, Inc.
1180 Page Ave. Fremont, CA 94538
[redacted]

RE: Services Subcontractor for Amprius Battery Manufacturing Project

Dear Mr. Stefan,

We appreciate your consideration of [redacted] to assist with your Battery Materials Manufacturing Project at a yet to be selected site. This letter us to express [redacted] interest in supporting Amprius on this project with a wide range of services as needed, from environmental, site selection, permitting, FEED, design and engineering, to procurement support, construction management and commissioning support. HDR believes [redacted] following key characteristics of our team will ensure the successful completion of this work:

(b) (4)

Right Blend of Expertise: The [redacted] is made up of professionals with extensive environmental and permitting experience, site selection experience, experience evaluating and selecting optimal contracting approaches, and managing the design, permitting and construction of manufacturing and heavy industrial process facilities, both in greenfield and brownfield settings. Our team has first-hand experience leading the Owner's Engineer team on industrial facility development and working with contractors, designers, and owners.

- **Deep Knowledge of Manufacturing:** Our project team can comprehensively capture the technical project requirements and efficiently navigate the regulatory and construction requirements. Our team can provide valuable input and guidance to manage the overarching technical, financial, and schedule criteria required to achieve project success.
- **Thorough Understanding of Manufacturing Facility Development:** [redacted] is committed to assigning key personnel with proven track records of consistently achieving project success on manufacturing and heavy industrial work across the country. HDR will proactively coordinate with the Amprius team and other project stakeholders to ensure project goals are established, monitored, and achieved in a clear and efficient manner.

The [redacted] is fully committed and vested in the success of this project and looks forward to swift completion of this task and becoming a trusted partner to Amprius.

Regards,
[redacted]

[redacted]

Qualifications of Respondent

Firm Composition and Management Structure

[redacted] is an employee-owned, multidisciplinary engineering, architectural, and consulting firm specializing in meeting the infrastructure needs of clients across the United States and globally. Our professionals represent hundreds of disciplines and work on diverse teams to provide solutions well beyond the scope of most traditional (b) (4) E firms. We have partnered with our clients to push the boundaries of what's possible since 1917. We specialize strategic integrated engineering, regulatory, construction and support services for the development and eration of industrial infrastructure. [redacted] approach to consulting is through a matrix delivery model, with a local fice closest to the corporate office or site as the location and division charged with responding. Our core team will made up of experienced professionals spanning [redacted] reach. Our Principal in Charge, [redacted], Commercial Manager, [redacted], and Project Controls and Procurement Lead, [redacted], will round out our team with their more than 70 years of collective professional experience.

Whether you manufacture, process, or manage resources or goods, we know that in today's competitive landscape that efficiency, reliability, and sustainability are essential for businesses to succeed. That's why we partner with clients across industries to optimize their processes and operation, producing results that speak for themselves. We've been at the forefront of helping industry push new boundaries, applying our technical expertise that spans the project life cycle from up-front evaluation and planning studies through design and into construction monitoring and operations. Whether the goal is to optimize resource usage to combat scarcity issues, modernize a facility to meet future production demands, or find the best approach to safely move natural resources to world markets, we can help.

Safety Record

Our Corporate Health and Safety Program encompasses aspects of safety, including office safety, field safety, remote site safety, roadside safety, and construction site safety. Our behavior-based safety approach is implemented throughout these work locations and tailored to accommodate task-specific hazard management. The program includes corporate safety policies and specifically crafted procedures and trainings to address the unique hazards and nature of our varied business classes and assignments across the globe. Employees are involved in program development, implementation, and improvement. Project managers and site supervisors provide oversight and verify compliance.

Safety Certifications

The strength and commitment of our safety program has been verified through certifications by the following third-party review programs: ISNetworld®, PEC/Premier, PICS, Browz and COR (Certificate of Recognition, Alberta Construction Safety Association).

Safety Statistics

Our commitment to safety is evidenced by our low experience modification rating (EMR) and injury incident rates. Our EMR is one of the lowest achievable and our OSHA recordable incident and lost time injury rates are consistently lower than the industry average for our NAICS code (5413–Architectural, Engineering and Related Services).

Capacity and Current Workload

Our goal is to engage the best minds and resources to deliver the right solution. We will select staff that have the experience and capacity to support this effort. Depending on specific project needs, the local HDR team will collaborate with our expert staff across the nation to provide any needed support to successfully deliver the scope of services needed by Amprius.

As a full-service company, our professionals are equipped to help you navigate the lifecycle of a project from scoping and planning to delivery. Backed by close to 11,000 professionals company wide, [redacted] has a deep bench of experts to pull from for nearly any project need. Depending on specific project needs, the [redacted] team on this project will collaborate with our expert staff across the state and nation, if needed, to provide the support and expertise required to successfully deliver the scope of services for this project.

EPC and EPCM Experience

(b) (4)

Engineering, procurement, and construction are the key project delivery elements integral to one another. The way these three primary elements are integrated is driven by which project delivery method is utilized. Amprius' level of involvement and control over design and procurement will vary depending on which project delivery method is selected. Regardless of which project delivery method is selected, FEED or pre-FEED work will typically be performed by an engineer under a contract directly to the Owner. During this initial work, the engineer will perform the upfront engineering and due diligence work to determine a project's viability or adjust design to maintain viability in regard to cost and schedule. In addition, key project execution decisions such as whether to initiate procurement of long lead equipment and materials or defer procurement to the prime construction contractor will be made. Which project delivery method is optimal varies from project to project and depends on several factors, and our team has experience working within the various delivery methods.

[redacted] project personnel will have extensive experience navigating and delivering EPC and EPCM projects. This experience is further supplemented by [redacted] Commercial Manager, [redacted], 36-years in the industry. Dave's focus is on guiding clients to the best project delivery model to suit their needs and Dave will work alongside the project team to help Amprius navigate the complexities of construction and professional services contracts, focusing on the risks and rewards of the varying levels of control corresponding to contract type. This navigation will include attention to detail on procurement method and contractor performance guarantees to give Amprius confidence that the engineering to construction to production process will be expedient and will meet Amprius' process requirements and quality standards.

Alternatively, [redacted] can also partner with one of our several preferred contractors to support a Design-Build approach to contacting if preferred.

[redacted]

(b) (4), (b) (6)

June 30, 2022

Mr. Jon Bornstein
Chief Operating Officer
Amprius Technologies
1180 Page Avenue
Fremont, CA 94538

Subject: Amprius Department of Energy Grant Proposal

Dear Mr. Bornstein,

In recent months, [redacted] has been providing scope and pricing counsel to Amprius as it works toward design and construction of Lithium-ion battery manufacturing facility in the United States. The silicon anode technology that Amprius employs will improve battery performance over graphite. The prospect of a U.S. cell supplier producing high performance and safe batteries is a welcome addition to the supply chain in your industry. As such [redacted] is happy to provide this Letter of Commitment for Amprius regarding our interest in supporting you program.

In this Letter of Commitment, [redacted] is verifying that it is a leading US-based contractor for construction of Lithium-ion battery facilities and has been working with Amprius to scope facility designs and budgets for their battery production facility. Through this process, we have come to appreciate the differentiating product Amprius produces for the battery market, and we are confident this project can deliver the desired result of expanding and growing battery technology in the United States.

We wish you every success in this proposal and look forward to partnering with you.

Sincerely,

[redacted]

(b) (4), (b) (6)

CONSTANTIN IONEL STEFAN

[redacted] [redacted]

EXPERIENCE

Chief Technology Officer — Aug 2015 - Present

Director of Battery Technology, Chief Scientific Officer — Nov 2012 – Aug 2015

Principal Scientist, Manager of Battery and Electrochemistry — Dec 2010 – Nov 2012

Senior Scientist — Nov 2009 – Dec 2010

Amprius, Inc. — *Sunnyvale, CA*

- Lead company's development of engineering prototypes, battery platform and electrochemistry for high energy density Li-ion pouch cells (1000Wh/l, 400Wh/kg) for consumer electronics, electric vehicle and unmanned drone applications.
- Principal Investigator on grants under DOE's Vehicle Technologies Program, Army's Rapid Innovation Fund, NASA's Game Changing Technology and USABC electric vehicles program.
- Create and manage partner and customer relationships.

Electrochemist/Materials Scientist — May 2005 – Nov2009

Nanosys, Inc. — *Palo Alto, CA*

- Proposed and tested a new type anode for Li-ion cells based on silicon nanowires.
- Responsible with the fabrication and testing of membrane electrodes assemblies (MEAs) for hydrogen and direct methanol fuel cells, as leader of a team of 4 people.

Postdoctoral Fellow — Sep 2002 – May 2005

Lawrence Berkeley National Laboratory — *Berkeley, CA*

- Started and developed a new project to produce a micropower generator based on single-chamber solid oxide fuel cell concept, and improved manufacturing and catalytic properties of component ceramic materials.
- Developed cathode supported ceramic structures for high rate, high purity generation of oxygen.
- Designed and built a solid-state fluorine electrolyzer for high-rate, high-purity fluorine separation (patented).

Research Assistant — September 1997 – August 2002

Case Western Reserve University — *Cleveland, OH*

- Studied Li^+ intercalation process into a single λ-MnO_2 microparticle by analysis of surface enhanced Raman spectra as a function of potential, for advanced Li-ion battery electrodes.
- Modeled and analyzed by computational methods surface processes at neural stimulating electrodes and their operation for safe electrical stimulation.
- Collaborated in projects involving ultrafast spectroelectrochemistry using pulsed lasers, second-harmonic generation at single crystal electrode surfaces, and X-ray spectroscopy of cathode materials for lithium batteries.

EDUCATION

- Ph.D. Chemistry, Case Western Reserve University, Cleveland, OH, January 2003
- M.S. Analytical Chemistry, Babes-Bolyai University, Romania, June 1997
- B.S. Chemistry, Babes-Bolyai University, Romania, June 1995

PROFESSIONAL AFFILIATIONS

- Member of the Electrochemical Society, since 1999
- Member of the Solid State Ionic Society, since 2003

(b) (6)

Jon Bornstein

Phone: [redacted] Email: [redacted]

EXPERIENCE

Chief Operating Officer — Mar. 2013 – Present
Amprius, Inc. — *Sunnyvale, CA*

- Responsible for R&D, engineering, production, and P&L
- Supervise product performance improvement progress
- Supervise product fabrication schedule
- Responsible for customer development and contracting
- Responsible for manufacturing scale-up and development

V.P. Engineering — Nov. 2009 – Jan. 2013
Ampulse, Corp. — *Golden, CO*

- Directed all engineering activities for thin film solar cell
- Responsible for technology development and schedule
- Lead the team of scientists and engineers

Sr. Director Technology — Aug. 2006 – Feb. 2010
Unity Semiconductor — *City, State*

- Directed development of 3-D memory cell

EDUCATION

- M.S. Materials Science, Stanford University
- B.S. Chemistry, Antioch College

Weijie Wang, PhD

[redacted] (b) (6)

PERSONAL PROFILE

- Currently Amprius Technologies Fellow and chief scientist responsible for Si-NWA technology scale-up aiming at throughput increase and cost reduction
- Outstanding process engineer in manufacturing industry with extensive R&D experience on PVD, CVD, and PECVD technologies, and with sound condensed matter physics background
- Hands-on process design of experiment expertise for various coatings (SiOx, SiN, a-Si, SiOxNy) used in FPD and LiBs industries
- 40+ publications, 1 translated textbook (from English to Chinese), 3 research awards, 5 patents

SELECTED ACHIEVEMENTS

Amprius Inc,

- Invented processes and a unique structure of Si-NWA for high energy density LiBs
- Further developed a R2R pilot tool with vendor (Meyer Burger) to manufacture the Si-NWA

Applied Materials Inc.

- Reached record R2R coating uniformity (0.9% vs previous 3~7%) for TEOS-based gate insulator by HW modification and process optimization on AKT 5500PX LTPS tool
- Successful HW and process scale-up of AKT LTPS systems from 5500PX to 25KPX

UT Austin

- Designed and built a UHV PVD system with deposition functions of nanoparticles by laser ablation, and of thin films by dual-ion beam sputtering

Lanzhou University

- One of a few youngest full-time professors at age of 32

EMPLOYMENT HISTORY

- **Amprius, Inc.**, Fremont, CA, USA (2011-present)
  - ❖ Amprius Technologies Fellow, Chief Scientist (2017)
  - ❖ Senior Director of Technology Development (2015)
  - ❖ Senior Principal Engineer, Principal Engineer
- **Applied Materials Inc.**, Santa Clara, CA, USA (2005-2011)
  - ❖ Senior Process Engineer IV, III
- **UT Austin**, Austin, Texas, USA (1998-2005)
  - ❖ Research fellow, research associate
- **Lanzhou University**, Lanzhou, China (1987-1998)
  - ❖ Professor (1996), associated professor (1992)

EDUCATION

- June 1997 PhD, Condensed Matter Physics, Lanzhou University, Lanzhou, China
- June 1987 MS, Solid State Physics, Lanzhou University, Lanzhou, China
- July 1984 BS, Metal Physics, Lanzhou University, Lanzhou, China

Donal P. Finegan

Résumé

Senior Scientist,
National Renewable Energy Laboratory (NREL),
[redacted]

(b) (6)

Education and Training:

2013 - 2016 **PhD in Chemical Engineering,** University College London (UCL).

2009 - 2013: **MEng in Chemical Engineering,** University College Dublin (UCD).

Research and Professional Experience:

2013	***Research Engineer, Electrochemistry group,*** *National Physical Laboratory (NPL), Teddington, TW11 0LW, UK*
2017 - 2018	***Postdoctoral Researcher, Transportation and Hydrogen Systems Center,*** *National Renewable Energy Laboratory, Golden, Colorado, USA*
2018 - 2020	***Scientist, Energy Conversion and Storage Systems Center,*** *National Renewable Energy Laboratory, Golden, Colorado, USA*
2020 - Present	**Senior** ***Scientist, Center for Integrated Mobility Systems,*** *National Renewable Energy Laboratory, Golden, Colorado, USA*

Awards and Honors:

- 2013 The Carthy Graduate Research Project Award, UCD Engineering Graduates Association.
- 2015 The Sheelagh Campbell Award, awarded by the Royal Society of Chemistry.
- 2016 Rooke Prize for excellence in research within the UCL Chemical Engineering Department.
- 2016 Newton Prize for best PhD thesis within the UCL Chemical Engineering Department.
- 2017 The Engineer: Safety and Security Award.
- 2018 Institution of Chemical Engineers (IChemE) Global Young Researcher Award.
- 2018 Umicore Materials Technology Award.
- 2019 NASA JSC Directors Group Achievement Award.
- 2020 The European Synchrotron (ESRF) Young Researcher Award.
- 2020 NREL Directors Award.
- 2021 NREL Outstanding Mentor Award.

Publications (>80 total, H-index = 34):

1. Finegan, D. P., et al., *In-operando* high-speed tomography of lithium-ion batteries during thermal runaway. *Nature Communications* **6**, (2015).
2. Finegan, D. P., et al., Quantifying Bulk Electrode Strain and Material Displacement within Lithium Batteries via High-Speed *Operando* Tomography and Digital Volume Correlation. *Advanced Science* **3**, (2016).
3. Finegan, D. P., et al., Characterising thermal runaway within lithium-ion cells by inducing and monitoring internal short circuits, *Energy & Environmental Science*, (2017).
4. Finegan, D.P., et al., Spatial quantification of dynamic inter and intra particle crystallographic heterogeneities within operating lithium ion electrodes, *Nature Communications* **11**, (2020).
5. Finegan, D.P., et al., Spatial dynamics of lithiation and lithium plating during high-rate operation of graphite electrodes, *Energy & Environmental Science* **13**, (2020).
6. Quinn, A., et al., Electron backscatter diffraction for investigating lithium-ion electrode particle architectures, *Cell Reports Physical Science* **1**, (2020).
7. Lu, X., et al,. 3D microstructure design of lithium-ion battery electrodes assisted by X-ray nano-computed tomography and modelling, *Nature Communications* **6**, (2020).
8. Finegan, D.P., et al., The application of data-driven methods and physics-based learning for improving battery safety, *Joule* **5**, (2021).
9. Dunlap, N. et al., Laser ablation of Li-ion electrodes for fast charging: Material properties, rate capability, Li plating, and wetting, *Journal of Power Sources* **537**, (2022).
10. Tanim, T., et al., A Comprehensive Understanding of the Aging Effects of Extreme Fast Charging on High Ni NMC Cathode, *Advanced Energy Materials* **12**, (2022)

Synergistic Activities:

- Symposium Organizer for the Materials Research Society (MRS) Fall Conference 2022.
- Mentored 4 post-docs, 2 PhD students, and 13 interns at NREL.
- Reviewer of proposals for DOE VTO SBIR funding opportunities (6), Stanford Linear Accelerator (SLAC) beamtime proposals (6), US Airforce Research Laboratory funding opportunties (3), and Department of Defense (DOD) Defense Innovation Unit (DIU) bussiness-support funding opportunities (6).

NSF BIOGRAPHICAL SKETCH

NAME: Neale, Nathan

ORCID: 0000-0001-5654-1664

POSITION TITLE & INSTITUTION: Senior Scientist – Group Manager, National Renewable Energy Laboratory

(a) PROFESSIONAL PREPARATION -(see PAPPG Chapter II.C.2.f.(a))

INSTITUTION	LOCATION	MAJOR / AREA OF STUDY	DEGREE (if applicable)	YEAR YYYY
Middlebury College	Middlebury, VT	Chemistry	BA	1998
University of California, Berkely	Berkeley, CA	Chemistry	PHD	2003
National Renewable Energy Laboratory	Golden, CO	Postdoctoral Researcher	N/A	2006

(b) APPOINTMENTS -(see PAPPG Chapter II.C.2.f.(b))

2013 - present Senior Scientist – Group Manager, National Renewable Energy Laboratory, Golden, CO

2021 - present Detailee, Office of Science, SCGB, Solar Photochemistry, Germantown, MD

2020 - present Fellow, Renewable and Sustainable Energy Institute, Boulder, CO

2008 - 2013 Scientist, National Renewable Energy Laboratory, Golden, CO

2006 - 2008 Research Associate, University of Colorado, Boulder, Boulder, CO

(c) PRODUCTS -(see PAPPG Chapter II.C.2.f.(c))

Products Most Closely Related to the Proposed Project

1. Schulze M, Neale N. Half-Cell Cumulative Efficiency Forecasts Full-Cell Capacity Retention in Lithium-Ion Batteries. ACS Energy Letters. 2021 February 23; 6(3):1082-1086. Available from: https://pubs.acs.org/doi/10.1021/acsenergylett.1c00173 DOI: 10.1021/acsenergylett.1c00173
2. Seitzinger C, Sacci R, Coyle J, Apblett C, Hays K, Armstrong R, Rogers A, Armstrong B, Bennet T, Neale N, Veith G. Intrinsic Chemical Reactivity of Silicon Electrode Materials: Gas Evolution. Chemistry of Materials. 2020 March 17; 32(7):3199-3210. Available from: https://pubs.acs.org/doi/10.1021/acs.chemmater.0c00308 DOI: 10.1021/acs.chemmater.0c00308
3. Carroll G, Schulze M, Martin T, Pach G, Coyle J, Teeter G, Neale N. SiO_2 Is Wasted Space in Single-Nanometer-Scale Silicon Nanoparticle-Based Composite Anodes for Li-Ion Electrochemical Energy Storage. ACS Applied Energy Materials. 2020 November 10; 3(11):10993-11001. Available from: https://pubs.acs.org/doi/10.1021/acsaem.0c01934 DOI: 10.1021/acsaem.0c01934
4. Schulze M, Carroll G, Martin T, Sanchez-Rivera K, Urias F, Neale N. Hydrophobic versus Hydrophilic Interfacial Coatings on Silicon Nanoparticles Teach Us How to Design the Solid Electrolyte Interphase in Silicon-Based Li-Ion Battery Anodes. ACS Applied Energy Materials. 2021 February 08; 4(2):1628-1636. Available from: https://pubs.acs.org/doi/10.1021/acsaem.0c02817 DOI: 10.1021/acsaem.0c02817
5. Stetson C, Yin Y, Jiang C, DeCaluwe S, Al-Jassim M, Neale N, Ban C, Burrell A. Temperature-

Dependent Solubility of Solid Electrolyte Interphase on Silicon Electrodes. ACS Energy Letters. 2019 October 14; 4(12):2770-2775. Available from: https://pubs.acs.org/doi/10.1021/acsenergylett.9b02082 DOI: 10.1021/acsenergylett.9b02082

Other Significant Products, Whether or Not Related to the Proposed Project

1. Hopkins E, Frisco S, Pekarek R, Stetson C, Huey Z, Harvey S, Li X, Key B, Fang C, Liu G, Yang G, Teeter G, Neale N, Veith G. Examining CO_2 as an Additive for Solid Electrolyte Interphase Formation on Silicon Anodes. Journal of The Electrochemical Society. 2021 March 01; 168(3):030534. Available from: http://dx.doi.org/10.1149/1945-7111/abec66 DOI: 10.1149/1945-7111/abec66
2. Schulze M, Rodrigues M, McBrayer J, Abraham D, Apblett C, Bloom I, Chen Z, Colclasure A, Dunlop A, Fang C, Harrison K, Liu G, Minteer S, Neale N, Robertson D, Tornheim A, Trask S, Veith G, Verma A, Yang Z, Johnson C. Critical Evaluation of Potentiostatic Holds as Accelerated Predictors of Capacity Fade during Calendar Aging. Journal of The Electrochemical Society. 2022 May 01; 169(5):050531. Available from: http://dx.doi.org/10.1149/1945-7111/ac6f88 DOI: 10.1149/1945-7111/ac6f88
3. McBrayer J, Rodrigues M, Schulze M, Abraham D, Apblett C, Bloom I, Carroll G, Colclasure A, Fang C, Harrison K, Liu G, Minteer S, Neale N, Veith G, Johnson C, Vaughey J, Burrell A, Cunningham B. Calendar aging of silicon-containing batteries. Nature Energy. 2021 September 01; 6(9):866-872. Available from: https://doi.org/10.1038/s41560-021-00883-w DOI: 10.1038/s41560-021-00883-w
4. Martin T, Pekarek R, Coyle J, Schulze M, Neale N. Understanding why poly(acrylic acid) works: decarbonylation and cross-linking provide an ionically conductive passivation layer in silicon anodes. Journal of Materials Chemistry A. 2021; 9(38):21929-21938. Available from: http://xlink.rsc.org/?DOI=D1TA04319F DOI: 10.1039/D1TA04319F

(d) SYNERGISTIC ACTIVITIES -(see PAPPG Chapter II.C.2.f.(d))

1. NREL Distinguished Member of Research Staff (DMRS) 2022
2. Advisory Board member, Cell Reports Physical Science (Cell Press, 2019–present)
3. R&D 100 Award Finalist 2018 – “SwitchGlaze Dynamic PV Window”
4. Symposium co-organizer for 3 international conference sessions (2022, 2018, 2014)
5. The American Institute of Chemists Best Senior Chemist Award 1998

Shabbir Ahmed

ORCID: 0000-0003-1501-239X

Senior Chemical Engineer, Argonne National Laboratory

University of Nebraska	Lincoln, NE	Chemical Engineering	PhD
Bangladesh University of Engineering and Technology (BUET)	Dhaka	Chemical Engineering	MSc
Bangladesh University of Engineering and Technology (BUET)	Dhaka	Chemical Engineering	BSc

Appointments

- 1988-89 Postdoctoral Appointee, Chemical Sciences and Engineering Division
- 1989-Present Technical Staff, Chemical Sciences and Engineering Division

Honors and Awards

- PNGV Gold Medal 1999, Federal Laboratory Consortium Award, 2 R&D100 awards

Publications (180+ articles, reports, presentations, proceeding papers)

- Issued patents – 17, Copyrights - 2
- Peer Reviewed Journal Papers ~50; Technical Reports – 17
- Chemical Engineers Handbook, 9th Edition, Contributor+Editor for Section 24.
- Chapter 7, Direct NG Gas Conversion to Value-Added Chemicals, Taylor & Francis Group

Recent Publications

- Pathways towards managing cost and degradation risk of fast charging cells with electrical and thermal controls, Energy and Environmental Science, Vol. 14, November 2021, 6564. /10.1039/d1ee02286e
- Comparing total cost of ownership of battery electric vehicles and internal combustion engine vehicles, Energy Policy, Vol. 158, November 2021, 112564. /10.1016/j.enpol.2021.112564
- Future Battery Material Demand Analysis Based on U.S. Department of Energy R&D Targets, World Electric Vehicle Journal, 2021, 12(3), 90. /10.3390/wevj12030090 (2021)
- Modulating electrode utilization in lithium-ion cells with silicon-bearing anodes, J. Power Sources, Journal of Power Sources 477 (2020), /10.1016/j.jpowsour.2020.229029
- Impact of U.S. DOE R&D on Potential Future Battery Material Demand, EVS33, June 2020
- Estimating the cost and energy demand of producing LMO for LIB, Report ANL/CSE-20/1
- Modeling the performance and cost of lithium-ion batteries for electric-drive vehicles, Report No. ANL/CSE-19/2 (2019)
- Estimating cost and energy demand in producing lithium hexafluorophosphate for Li-ion battery electrolyte, Industrial & Engineering Chemistry Research, 2019, 58, 3754−3766
- Cost of automotive lithium-ion batteries operating at high upper cutoff voltages, Journal of Power, Sources 403 (2018) 56–65

Approved by OMB
0348-0046

Disclosure of Lobbying Activities

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352
(See reverse for public burden disclosure)

1. Type of Federal Action: a. contract _B_ b. grant c. cooperative agreement d. loan e. loan guarantee f. loan insurance	**2. Status of Federal Action:** a. bid/offer/application _A_ b. initial award c. post-award	**3. Report Type:** a. initial filing _A_ b. material change

4. Name and Address of Reporting Entity: _X_ Prime _____ Subawardee Tier_____, if Known: *Amprius Technologies, Inc.,* 1180 Page Ave., Fremont, CA 94089 **Congressional District, if known: CA-17**	**5. If Reporting Entity in No. 4 is Subawardee,** Enter Name and Address of Prime: **Congressional District, if known:**
6. Federal Department/Agency: **Office of Manufacturing and Energy Supply Chains (MESC) and Office of Energy Efficiency and Renewable Energy (EERE)**	**7. Federal Program Name/Description:** CFDA Number, *if applicable*: 81.086
7. **Federal Action Number,** *if known:* DE-FOA-0002678	**9. Award Amount**, *if known:* **$**
10. a. Name and Address of Lobbying Registrant *(if individual, last name, first name, MI):* NONE	**b. Individuals Performing Services** *(including address if different from No. 10a)* *(last name, first name, MI):* NONE
11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.	**Signature:** _____ [redacted] **Print Name: Ionel Stefan** **Title: CTO** **Telephone No.:** [redacted] **Date: July 1, 2022**
Federal Use Only	**Authorized for Local Reproduction** **Standard Form - LLL (Rev. 7-97)**

(b) (4), (b) (6) [redacted]

INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.

2. Identify the status of the covered Federal action.

3. Identify the appropriate classification of this report. If this is a followup report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.

4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.

5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.

6. Enter the name of the federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.

7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.

8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitations for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Included prefixes, e.g., "RFP-DE-90-001."

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.

10. (a) Enter the full name, address, city, State and zip code of the lobbying registrant under the Lobbying Disclosure Act of 1995 engaged by the reporting entity identified in item 4 to influence the covered Federal action.

    (b) Enter the full names of the individual(s) performing services, and include full address if different from 10(a). Enter Last Name, First Name, and Middle Initial (MI).

11. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB control Number. The valid OMB control number for this information collection is OMB No. 0348-0046. Public reporting burden for this collection of information is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, DC 20503

Statement of Project Objectives

Large scale manufacturing of silicon nanowire anode by direct gas-to-electrode manufacturing

A. OBJECTIVES

The main objective of the program is the demonstration of the manufacturing of silicon nanowire anode technology at component and cell level at a 500 MWh scale, on manufacturing lines that are comparable to those used in multi-GWh factories. The demonstration will bring to maturity the technology by installing the first of a kind manufacturing lines for the new technology and will allow a bottom-up analysis of the cost factors and product performance. The current level of performance based on low-volume pilot production indicates that Amprius will be able to deliver cells that have a specific energy and energy density that is at least 50% higher, at a [redacted] cost reduction relative to equivalent graphite cells. The project will also create about 300 jobs in [redacted] in a disadvantaged area and community, increasing the share of green energy jobs in an area supported mostly by fossil fuel industry.

(b) (4)

B. SCOPE OF WORK

The project will be conducted in 3 budget periods:

Budget Period 1: Factory preparation: Work will focus on the detailed design, permitting, site preparation for construction, and equipment sourcing. Other forward-looking activities will include workforce development, starting with recruiting the factory management and senior engineering teams (15 new leadership jobs and 35 engineering jobs), and supply base development, including silane supply agreements and cathode active material supplier development. Also starting in the first year, Amprius will supply NREL with anode material for characterization for the development of an optical in-line metrology method for silicon nanowire structure. The end of phase gating milestone will evaluate progress on each of the tasks and decide based on their respective metrics.

Budget Period 2: Factory buildup: Construction work will be completed, in parallel with equipment delivery. By the end of the second year, all equipment will be installed (rigged in and connected to electric, gases, etc.) and ready for qualification tests. In parallel, personnel related to business functions (22 new jobs) and direct labor for one shift (65 new jobs) will be recruited and hired by the end of the second year. Supplier agreements will be signed, and a supply inventory will be built, in preparation for equipment qualification runs. QMS systems will be prepared and integrated in the manufacturing flow. NREL and ANL will start the integration work of the anode and battery assembly cost models. At the end of the Phase II, the factory should be ready for the initial equipment verification.

Budget Period 3: Factory ramp-up: activities will be focused on the equipment qualification and process optimization in the first half, followed by demonstration manufacturing runs and product testing in the second half of the year. Operation parameters, equipment and process yields will be optimized, and the results will be used for the end of program cost analysis report, after a successful run of at least 10% of the installed capacity (50MWh). Cells produced in the factory

will be delivered for testing to a national laboratory selected by DOE. At the end of the program, the factory will be ready to operate at full capacity on three shifts, powered by a workforce of 300 new employees, including 260 direct labor positions hired and trained from the local pool.

C. TASKS TO BE PERFORMED

The following tasks will be conducted:

All Budget Periods

Overall Project Management and Planning
The recipient will perform project management activities to include project planning and control, subcontractor control, financial management, data management, management of supplies and/or equipment, risk management, and reporting as required to successfully achieve the overall objectives of the project.

Task 0.0 – Project Management and Planning:
The Recipient shall develop and maintain the Project Management Plan (PMP). The content, organization, and requirements for revision of the PMP are identified in the Federal Assistance Reporting Checklist and Instructions. The Recipient shall manage and implement the project in accordance with the PMP.

Task 0.1- Kick-Off Meeting:
The Recipient will participate in a project kickoff meeting with the DOE within 30 days of project initiation.

Budget Period 1: Factory preparation

Task 1.1 – Factory Construction and Infrastructure:

Subtask 1.1.1 – *Master Plan:* This subtask comprehends the entire facility and its relationship to and integration into the surrounding locale. It will serve as the high-level plan and master schedule for the entire project and be the basis for the various municipal review and approving entities.

Subtask 1.1.2 – *Civil Design:* This subtask comprehends all external services and exterior requirements. It includes connections to all utilities, road access, grade and building height, total floor area and ratio to exterior area and parking.

Subtask 1.1.3 – *Building Design*: The subtask runs in parallel with 1.2., and involves the factory's interior and exterior design – including internal and external infrastructure – and service yards, and layout of factory equipment.

Subtask 1.1.4 – *Site Work:* This subtask is the execution of the civil design. It is the first construction work beyond the design phases.

Subtask 1.1.5 – *Main Building:* This subtask is the execution of the main factory building design. Its construction commences slightly after the initiation of the site work and runs in parallel to it.

Subtask 1.1.6 – *Office and Auxiliary Buildings:* This subtask is the construction of auxiliary buildings (warehouses, testing labs, etc.) and office interiors and finishes. It commences approximately 3 months after the main building construction begins.

Task 1.2 – Equipment Sourcing:

Subtask 1.2.1 – *Anode Process Equipment Procurement:* This subtask comprehends all the steps associated with the silicon nanowire anode production equipment, from supply agreement negotiation to delivery.

Subtask 1.2.2 – *Prelithiation Equipment Procurement:* This subtask comprehends all the steps associated with the prelithiation production equipment, from supply agreement negotiation to delivery.

Subtask 1.2.3 – *Anode Handling Automation Equipment Procurement:* This subtask comprehends the equipment that enables automated anode handling and includes supply agreement negotiation to delivery.

Subtask 1.2.4 – *Cathode Line Procurement:* This subtask comprehends all the steps associated with the cathode production equipment, from supply agreement negotiation to delivery. The equipment includes powder and slurry mixing, coating, drying, calendaring, and vacuum drying.

Subtask 1.2.5 – *Cell Assembly and Testing Equipment Procurement:* This subtask comprehends all the steps associated with the assembly and test equipment, from supply agreement negotiation to delivery. The major equipment in this procurement includes stacking, pouch forming, fill and seal, tab welding, formation, and capacity grading.

Task 1.3 – Workforce Development:

Subtask 1.3.1 – *Recruit Factory Management Team:* This subtask comprehends the recruiting and hiring of the core management team of 15 positions.

Subtask 1.3.2 – *Recruit Engineering Teams:* This subtask involves recruiting and hiring the engineering teams. The engineering disciplines will include manufacturing, mechanical, electrical, electrochemical, industrial, computer and IT, and environmental, health, and safety. Recruiting will span new college grads to very senior subject matter experts.

Subtask 1.3.3 – *Recruit Business Function Personnel:* This subtask involves recruiting and hiring business function personnel, including accounting (AR, AP), finance, purchasing and procurement, shipping/receiving and logistics, sales, marketing, etc. Recruiting will span new college grads to very senior subject matter experts.

Task 1.4 – QMS, product, and cost analysis:

Subtask 1.4.1 – *Advanced anode characterization development:* The recipient will apply state-of-the-art X-ray nano CT system to quantify the distribution of morphologies of grown Si NWs, and to determine the fraction of active Si within the manufactured electrodes.

Subtask 1.4.2 – *Advanced cathode characterization development:* The recipient will apply X-ray nano-CT to quantify the microstructure of the cathode; it's particle size distribution, porosity, and tortuosity.

Subtask 1.4.3 – *Electrochemical evaluation of electrode and cell performance:* The recipient will conduct electrochemical evaluation of cells with tuned electrode architectures to

validate that the structure-performance models, to assist with improving performance of cells.

Subtask 1.4.4 – *Developing in-line optical diagnostics for defect detection:* The recipient will develop a system suitable for scanning off a high-speed linear film system both above and below the large area sample to image both sides of the current collector.

Subtask 1.4.5 – *Bottom-Up Manufacturing Cost Modeling:* The recipient will apply existing capabilities in bottom-up cost modeling to benchmark the costs for producing electrodes with the Amprius process, by merging a photovoltaic cost model with the BatPaC battery software.

Milestone	Type	Description
Equipment sourcing orders placed	Technical	Equipment supply agreements complete
Site Permit Submitted	Technical	Site permit is submitted
Preliminary anode cost model designed	Technical	Plan to adapt Photovoltaic cost model to silicon anode cost model complete.
Management and engineering teams ready	Technical	Management and engineering teams hired
Factory ready for build-up	Go/No Go	Factory design complete, site and construction permits are in place, construction started on buildings and site and 30% complete, equipment orders placed and 50% built, management and engineering teams are hired and QMS, and cost analysis tools have passed the preliminary design reviews

Continuation: The recipient is **NOT** authorized to initiate any scope in the next budget period without the DOE Contracting Officer's prior written approval in accordance with the award terms and conditions.

Budget Period 2: Factory buildup

Task 2.1 – Factory Construction and Infrastructure:

Subtask 2.1.1 – *Site Work:* The recipient will continue the execution of the civil design. It is the first construction work beyond the design phases.

Subtask 2.1.2 – *Main Building:* The recipient will continue the execution of the main factory building design. Its construction commences slightly after the initiation of the site work and runs in parallel to it.

Subtask 2.1.3 – *Office and Auxiliary Buildings:* The recipient will continue the construction of auxiliary buildings (warehouses, testing labs, etc.) and office interiors and finishes. It commences approximately 3 months after the main building construction begins.

Task 2.2 – Equipment Sourcing:

Subtask 2.2.1 – *Anode Process Equipment Procurement: A*node equipment production will continue to completion and delivery.

Subtask 2.2.2 – *Prelithiation Equipment Procurement:* Prelithiation equipment production will continue to completion and delivery.

Subtask 2.2.3 – *Anode Handling Automation Equipment Procurement:* Anode automation equipment production will continue to completion and delivery.

Subtask 2.2.4 – *Cathode Line Procurement:* Cathode equipment production will continue to completion and delivery.

Subtask 1.2.5 – *Cell Assembly and Testing Equipment Procurement:* Cell assembly and testing equipment production will continue to completion and delivery.

Task 2.3 – Factory Equipment Installation, qualification, and ramp:

Subtask 2.3.1 – *Equipment Rigging:* This subtask comprehends the placement of all the production equipment into the factory.

Subtask 2.3.2 – *Facilities Tie-in:* The recipient will perform the physical connection of production equipment to the required services, including electricity, process cooling water, process gases, exhaust, and solvent recovery systems.

Subtask 2.3.3 – *Equipment Qualification:* This subtask involves the qualification of all factory equipment. Qualification is generally defined as meeting all specifications for purpose.

Subtask 2.3.4 – *Process Optimization:* This subtask involves the initial period of production ramp. Optimization is generally defined as solving for yield limiting factors and is characterized by getting to the second inflection of a sigmoid curve of yield vs. time.

Task 2.4 – Workforce Development:

Subtask 2.4.1 – *Recruit and Train Direct Labor:* This subtask involves recruiting, hiring, and training all functions of direct labor. Direct labor spans skilled technicians in mechanical, electrical, and chemical applications to unskilled operators. Hiring will proceed at a pace of about 20 positions per month.

Task 2.5 – Supply Chain Development:

Subtask 2.5.1 – *Supplier Base Development:* This subtask involves developing the supplier base for mass production of Amprius' silicon nanowire anode lithium-ion cell. The supplier will survey global suppliers of raw materials including, process gases, electrolytes, cathode active and inactive ingredients, separators, tabs, laminates, and tapes, making every effort to secure suppliers from domestic sources. Silane, which is the main precursor gas for silicon nanowire processing, will be sourced from REC directly which has manufacturing plants in Butte, Montana and Moses Lake, Washington.

Subtask 2.5.2 – *Supplier Agreements:* This subtask involves reaching commercial agreements with suppliers that enable best cost as a function of volume and reliable delivery.

Subtask 2.5.3 – *Supply Inventory Build:* This subtask involves developing an inventory base of materials for undertaking equipment qualification, optimization, and production ramp.

Task 2.6 – QMS, product, and cost analysis:

Subtask 2.6.1 – *Cell modelling:* The recipient will apply image-based multiphysics modelling tools developed under previous DOE-supported programs to quantify rate limiting features of the cell (e.g. cathode and anode microstructure).
Subtask 2.6.2 – *Electrochemical evaluation of electrode and cell performance:* The recipient will conduct electrochemical evaluation of cells with tuned electrode architectures to validate that the structure-performance models, to assist with improving performance of cells.
Subtask 2.6.3 – *Developing in-line optical diagnostics for defect detection:* The recipient will develop a system suitable for scanning off a high-speed linear film system both above and below the large area sample to image both sides of the current collector.
Subtask 2.6.4 – *Bottom-Up Manufacturing Cost Modeling:* The recipient will apply existing capabilities in bottom-up cost modeling to benchmark the costs for producing electrodes with the Amprius process, by merging a photovoltaic cost model with the BatPaC battery software.

Milestone	Type	Description
Business function personnel complete	Technical	Business function personnel hired
Occupancy permit received	Technical	End of building and infrastructure construction, and the facility is ready for manufacturing equipment installation
Equipment delivered	Technical	All equipment received in factory
Cell modelling complete	Technical	Structure-performance model validated
Factory ready for ramp-up	Go/No Go	Factory construction complete, occupancy permit received, equipment received and installed, business support team and first shift direct labor are hired, and QMS, cell models, and cost analysis tools have passed the validation tests

Continuation: The recipient is **NOT** authorized to initiate any scope in the next budget period without the DOE Contracting Officer's prior written approval in accordance with the award terms and conditions.

Budget Period 3: Factory ramp-up

Task 3.1 – Factory Equipment Installation, qualification, and ramp:
Subtask 3.1.1 – *Process Optimization:* This subtask involves the initial period of production ramp. Optimization is generally defined as solving for yield limiting factors and is characterized by getting to the second inflection of a sigmoid curve of yield vs. time.
Subtask 3.1.2 – *Factory Ramp:* This subtask involves ramping production with the goal of achieving a run rate of nameplate capacity by the end of this period.

Task 2.4 – Workforce Development:

Subtask 2.4.1 – *Recruit and Train Direct Labor:* This subtask involves recruiting, hiring, and training all functions of direct labor. Direct labor spans skilled technicians in mechanical, electrical, and chemical applications to unskilled operators. Hiring will proceed at a pace of about 20 positions per month.

Task 3.2 – QMS, product, and cost analysis:

Subtask 3.2.1 – *Electrochemical evaluation of electrode and cell performance:* The recipient will conduct electrochemical evaluation of cells with tuned electrode architectures to validate that the structure-performance models, to assist with improving performance of cells.

Subtask 3.2.2 – *Developing in-line optical diagnostics for defect detection:* The recipient will develop a system suitable for scanning off a high-speed linear film system both above and below the large area sample to image both sides of the current collector.

Subtask 3.2.3 – *Bottom-Up Manufacturing Cost Modeling:* The recipient will apply existing capabilities in bottom-up cost modeling to benchmark the costs for producing electrodes with the Amprius process, by merging a photovoltaic cost model with the BatPaC battery software.

Milestone	Type	Description
Equipment ready for manufacturing ramp-up	Technical	All equipment was installed, qualified and process optimized
Workforce complete	Technical	All direct and indirect personnel planned is hired
Cost analysis complete	Technical	BatPaC analysis complete
Manufacturing capacity and product demonstrated	Technical	Factory able to run for 1 month a t full capacity; cell product delivered for verification

D. DELIVERABLES

In addition to the reports specified in the "Federal Assistance Reporting Checklist", the Recipient will provide the following to the DOE Project Officer (identified in Block 15 of the Assistance Agreement as the Program Manager):

- Summary of accomplishments and project work report will be prepared for inclusion in the Vehicle Technologies Office annual programmatic progress report. Report will be due by October 31 of each year.
- Cost analysis, manufacturing, and cell performance report
- 20 cells delivered for verification to test laboratory

E. BRIEFINGS AND TECHNICAL PRESENTATIONS

- A technical presentation at the Vehicle Technologies Annual Merit Review Meeting held in Washington, DC.

- Detailed project status update briefings at Washington, DC or via communication/conferencing media approximately twice per year. Briefings will explain the plans, progress, and results of the technical effort.
- Technical paper(s) and presentations as appropriate at technical society meetings, or at technical exchange meetings.

Instructions and Summary

OMB Control Number: 1910-5162
Expiration Date: 10/31/2021

Award Number: 2678-1709
Award Recipient: Alliance for Sustainable Energy,

Date of Submission: 6/24/2022
Form submitted by: NREL
(May be award recipient or sub-recipient)

Please read the instructions on each worksheet tab before starting. If you have any questions, please ask your EERE contact!
Do not modify this template or any cells or formulas!

1. If using this form for award application, negotiation, or budget revision, fill out the blank white cells in workbook tabs a. through j. with total project costs. If using this form for invoice submission, fill out tabs a. through j. with total costs for just the proposed invoice and fill out tab k. per the instructions on that tab.
2. Blue colored cells contain instructions, headers, or summary calculations and should not be modified. Only blank white cells should be populated.
3. Enter detailed support for the project costs identified for each Category line item within each worksheet tab to autopopulate the summary tab.
4. The total budget presented on tabs a. through i. must include both Federal (DOE) and Non-Federal (cost share) portions.
5. All costs incurred by the preparer's sub-recipients, vendors, and Federal Research and Development Centers (FFRDCs), should be entered only in section f. Contractual. All other sections are for the costs of the preparer only.
6. Ensure all entered costs are allowable, allocable, and reasonable in accordance with the administrative requirements prescribed in 2 CFR 200, and the applicable cost principles for each entity type: FAR Part 31 for For-Profit entities; and 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.
7. Add rows as needed throughout tabs a. through j. If rows are added, formulas/calculations may need to be adjusted by the preparer. Do not add rows to the Instructions and Summary tab. If your project contains more than five budget periods, consult your EERE contact before adding additional budget period rows or columns.
8. ALL budget period cost categories are rounded to the nearest dollar.

BURDEN DISCLOSURE STATEMENT
Public reporting burden for this collection of information is estimated to average 3 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Office of Information Resources Management Policy, Plans, and Oversight, AD-241-2 - GTN, Paperwork Reduction Project (1910-5162), U.S. Department of Energy 1000 Independence Avenue, S.W., Washington, DC 20585; and to the Office of Management and Budget, Paperwork Reduction Project (1910-5162), Washington, DC 20503.

SUMMARY OF BUDGET CATEGORY COSTS PROPOSED

The values in this summary table are from entries made in subsequent tabs, only blank white cells require data entry

Section A - Budget Summary

	Federal	Cost Share			Total Costs	Cost Share %	Proposed Budget Period Dates
Budget Period 1	$403,208	$0			$403,208	0.00%	01/01/2023 - 12/31/2023
Budget Period 2	$1,205,999	$0			$1,205,999	0.00%	01/01/2024 - 12/31/2024
Budget Period 3	$490,793	$0			$490,793	0.00%	01/01/2025 - 12/31/2025
Budget Period 4	$0	$0			$0	0.00%	
Budget Period 5	$0	$0			$0	0.00%	
Total	$2,100,000	$0			$2,100,000	0.00%	

Section B - Budget Categories

CATEGORY	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Total Costs	% of Project	Comments (as needed)
a. Personnel	[redacted]							
b. Fringe Benefits								
c. Travel								
d. Equipment								
e. Supplies								
f. Contractual								
Sub-recipient								
Vendor								
FFRDC								
Total Contractual								
g. Construction								
h. Other Direct Costs								
Total Direct Costs								
i. Indirect Charges								
Total Costs								

(b) (4)

Additional Explanation (as needed):

a. Personnel

INSTRUCTIONS - PLEASE READ

1. List project costs solely for employees of the entity completing this form. All personnel costs for subrecipients and vendors must be included under f. Contractual.
2. All personnel should be identified by position title and not employee name. Enter the amount of time (e.g., hours or % of time) and the base pay rate and the total direct personnel compensation will automatically calculate. Rate basis (e.g., actual salary, labor distribution report, state civil service rates, etc.) must also be identified.
3. If loaded labor rates are utilized, a description of the costs the loaded rate is comprised of must be included in the Additional Explanation section below. DOE must review all components of the loaded labor rate for reasonableness and unallowable costs (e.g. fee or profit).
4. If a position and hours are attributed to multiple employees (e g. Technician working 4000 hours) the number of employees for that position title must be identified.
5. Each budget period is rounded to the nearest dollar.

SOPO Task #	Position Title	Budget Period 1			Budget Period 2			Budget Period 3			Budget Period 4			Budget Period 5			Project Total Hours	Project Total Dollars	Rate Basis
		Time (Hrs)	Pay Rate ($/Hr)	Total Budget Period 1	Time (Hrs)	Pay Rate ($/Hr)	Total Budget Period 2	Time (Hrs)	Pay Rate ($/Hr)	Total Budget Period 3	Time (Hrs)	Pay Rate ($/Hr)	Total Budget Period 4	Time (Hrs)	Pay Rate ($/Hr)	Total Budget Period 5			
1	Sr. Engineer (EXAMPLE)	2000	$85.00	$170,000	200	$50.00	$10,000	200	$50 00	$10,000	200	$50 00	$10,000	200	$50 00	$10,000	2400	$190,000	Actual Salary
2	Technicians (2)	4000	$20.00	$80,000	0	$0.00	$0	0	$0 00	$0	0	$0 00	$0	0	$0 00	$0	4000	$80,000	Actual Salary
[redacted]																			
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
	Total Personnel Costs	2700		$185,388	4205		$360,145	1731		$174,628	0		$0	0		$0	8636	$720,161	

Additional Explanation (as needed):

b. Fringe Benefits

INSTRUCTIONS - PLEASE READ!!!
1. Fill out the table below by position title. If all employees receive the same fringe benefits, you can show "Total Personnel" in the Labor Type column instead of listing out all position titles.
2. The rates and how they are applied should not be averaged to get one fringe cost percentage. Complex calculations should be described/provided in the Additional Explanation section below.
3. The fringe benefit rates should be applied to all positions, regardless of whether those funds will be supported by Federal Share or Recipient Cost Share.
4. Each budget period is rounded to the nearest dollar.

Labor Type	Budget Period 1			Budget Period 2			Budget Period 3			Budget Period 4			Budget Period 5			Total Project
	Personnel Costs	Rate	Total	Personnel Costs	Rate	Total	Personnel Costs	Rate	Total	Personnel Costs	Rate	Total	Personnel Costs	Rate	Total	
EXAMPLE!!! Sr. Engineer	$170,000	20%	$34,000	$10,000	20%	$2,000	$10,000	20%	$2,000	$10,000	20%	$2,000	$10,000	20%	$2,000	$38,000
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
Total	**$0**		**$0**	**$0**		**$0**	**$0**		**$0**	**$0**		**$0**	**$0**		**$0**	**$0**

A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required at the time of award negotiation if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information if not previously submitted.

X A fringe benefit rate has been negotiated with, or approved by, a federal government agency. A copy of the latest rate agreement is/was included with the project application.*

There is not a current federally approved rate agreement negotiated and available.**

*Unless the organization has submitted an indirect rate proposal which encompasses the fringe pool of costs, please provide the organization's benefit package and/or a list of the components/elements that comprise the fringe pool and the cost or percentage of each component/element allocated to the labor costs identified in the Budget Justification (Form EERE 335.1).

**When this option is checked, the entity preparing this form shall submit an indirect rate proposal in the format provided in the Sample Rate Proposal at http://www1.eere.energy.gov/financing/resources.html, or a format that provides the same level of information and which will support the rates being proposed for use in the performance of the proposed project.

Additional Explanation (as necessary): Please use this box (or an attachment) to list the elements that comprise your fringe benefits and how they are applied to your base (e.g. Personnel) to arrive at your fringe benefit rate. *NREL's approved Standard Labor Rates includes Fringe. All rates are negotiated and approved by DOE.*

c. Travel

INSTRUCTIONS - PLEASE READ!!!

1. Iden ify Foreign and Domestic Travel as separate items. Examples of Purpose of Travel are subrecipient site visits, DOE meetings, project mgmt. meetings, etc. Examples of Basis for Estimating Costs are past trips, travel quotes, GSA rates, etc.
2. All listed travel must be necessary for performance of the Statement of Project Objectives.
3. Only travel that is directly associated wi h this award should be included as a direct travel cost to the award.
4. Federal travel regulations are contained within he applicable cost principles for all en ity types.
5. Travel costs should remain consistent with travel costs incurred by an organization during normal business operations as a result of the organizations written travel policy. In absence of a written travel policy, organizations must follow the regulations prescribed by the General Services Administration.
6. Columns E, F, G, H, I, J, and K are per trip.
7. The number of days is inclusive of day of departure and day of return.
8. Recipients should enter City and State (or City and Country for International travel) in the Depart from and Destination fields.
9. Each budget period is rounded to the nearest dollar.

SOPO Task #	Purpose of Travel	Depart From	Destination	No. of Days	No. of Travelers	Lodging per Traveler	Flight per Traveler	Vehicle per Traveler	Per Diem Per Traveler	Cost per Trip	Basis for Estimating Costs
	Domestic Travel	**Budget Period 1**									
1	**EXAMPLE!!!** Visit to PV manufacturer			2	2	$250	$500	$100	$16		urrent GSA rates
NREL	Travel	DEN	TBD	TBD	TBD						urrent GSA rates
	International Travel										
	Budget Period 1 Total										
	Domestic Travel	**Budget Period 2**									
NREL	Travel	DEN	TBD	TBD	TBD						urrent GSA rates
	International Travel										
	Budget Period 2 Total										
	Domestic Travel	**Budget Period 3**									
NREL	Travel	DEN	TBD	TBD	TBD						urrent GSA rates
	International Travel										
	Budget Period 3 Total										
	Domestic Travel	**Budget Period 4**									
	International Travel										
	Budget Period 4 Total										
	Domestic Travel	**Budget Period 5**									
	International Travel										
	Budget Period 5 Total										
	PROJECT TOTAL										

(b) (4)

Additional Explanation (as needed):

d. Equipment

INSTRUCTIONS - PLEASE READ!!!

1. Equipment is generally defined as an item with an acquisition cost greater than $5,000 and a useful life expectancy of more than one year. Please refer to the applicable Federal regulations in 2 CFR 200 for specific equipment definitions and treatment.

2. List all equipment below, providing a basis of cost (e.g. vendor quotes, catalog prices, prior invoices, etc.). Briefly justify items as they apply to the Statement of Project Objectives. If it is existing equipment, provide logical support for the estimated value shown.

3. During award negotiations, provide a vendor quote for all equipment items over $50,000 in price. If the vendor quote is not an exact price match, provide an explanation in the additional explanation section below. If a vendor quote is not practical, such as for a piece of equipment that is purpose-built, first of its kind, or otherwise not available off the shelf, provide a detailed engineering estimate for how the cost estimate was derived.

4. Each budget period is rounded to the nearest dollar.

SOPO Task #	Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1						
3,4,5	**EXAMPLE!!!** Thermal shock chamber	2	$70,000	$140,000	Vendor Quote - Attached	Reliability testing of PV modules- Task 4.3
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 1 Total			$0		
Budget Period 2						
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 2 Total			$0		
Budget Period 3						
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 3 Total			$0		
Budget Period 4						
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 4 Total			$0		
Budget Period 5						
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 5 Total			$0		
	PROJECT TOTAL			**$0**		

Additional Explanation (as needed):

e. Supplies

INSTRUCTIONS - PLEASE READ

1. Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Please refer to the applicable Federal regulations in 2 CFR 200 for specific supplies definitions and treatment.

2. List all proposed supplies below, providing a basis of costs (e.g. vendor quotes, catalog prices, prior invoices, etc.). Briefly justify the need for the Supplies as they apply to the Statement of Project Objectives. Note that Supply items must be direct costs to the project at this budget category, and not duplicative of supply costs included in the indirect pool that is the basis of the indirect rate applied for this project.

3. Multiple supply items valued at $5,000 or less used to assemble an equipment item with a value greater than $5,000 with a useful life of more than one year should be included on the equipment tab. If supply items and costs are ambiguous in nature, contact your DOE representative for proper categorization.

4. Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

5. Each budget period is rounded to the nearest dollar.

(b) (4) [redacted]

SOPO Task #	General Category of Supplies	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
				Budget Period 1		
4,6	EXAMPLE Wireless DAS components	10	$360.00	$3,600	Catalog price	For Alpha prototype - Task 2.4
NREL	Supplies	1	[redacted]	[redacted]	Catalog price	To complete agreed upon project milestones
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 1 Total			[redacted]		
				Budget Period 2		
NREL	Supplies	1	[redacted]	[redacted]	Catalog price	To complete agreed upon project milestones
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 2 Total			[redacted]		
				Budget Period 3		
NREL	Supplies	1	[redacted]	[redacted]	Catalog price	To complete agreed upon project milestones
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 3 Total			[redacted]		
				Budget Period 4		
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 4 Total			$0		
				Budget Period 5		
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 5 Total			$0		
	PROJECT TOTAL			[redacted]		

Additional Explanation (as needed):

f. Contractual

INSTRUCTIONS - PLEASE READ!!!

1. The entity completing this form must provide all costs related to sub-recipients, vendors, and FFRDC partners in the applicable boxes below.

2. Sub-recipients (partners, sub-awardees): Subrecipients shall submit a Budget Justification descr bing all project costs and calculations when their total proposed budget exceeds either (1) $250,000 or (2) 25% of total award costs. These sub-recipient forms may be completed by either the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient's forms must match the sub-recipient entries below. A subrecipient is a legal entity to which a subaward is made, who has performance measured against whether the objectives of the Federal program are met, is respons ble for programmatic decision making, must adhere to applicable Federal program compliance requirements, and uses the Federal funds to carry out a program of the organization. All characteristics may not be present and judgment must be used to determine subrecipient vs. vendor status.

3. Vendors (including contractors): List all vendors and contractors supplying commercial supplies or services used to support the project. For each Vendor cost with total project costs of $250,000 or more, a Vendor quote must be provided. A vendor is a legal entity contracted to provide goods and services within normal business operations, provides similar goods or services to many different purchasers, operates in a competitive environment, provides goods or services that are ancillary to the operation of the Federal program, and is not subject to compliance requirements of the Federal program. All characteristics may not be present and judgment must be used to determine subrecipient vs. vendor status.

4. Federal Funded Research and Development Centers (FFRDCs): FFRDCs must submit a signed Field Work Proposal during award application. The award recipient may allow the FFRDC to provide this information directly to DOE, however project costs must also be provided below.

5. Each budget period is rounded to the nearest dollar

SOPO Task #	Sub-Recipient Name/Organization	Purpose and Basis of Cost	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Project Total
2,4	**EXAMPLE!!!** XYZ Corp.	Partner to develop optimal lens for Gen 2 product. Cost estimate based on personnel hours.	$48,000	$32,000	$16,000			**$96,000**
								$0
								$0
								$0
								$0
								$0
								$0
		Sub-total	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

SOPO Task #	Vendor Name/Organization	Purpose and Basis of Cost	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Project Total
6	**EXAMPLE!!!** ABC Corp.	Vendor for developing robotics to perform lens inspection. Estimate provided by vendor.	$32,900	$86,500				**$119,400**
								$0
								$0
								$0
								$0
								$0
		Sub-total	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

SOPO Task #	FFRDC Name/Organization	Purpose and Basis of Cost	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Project Total
								$0
								$0
		Sub-total	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

	Total Contractual		**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Additional Explanation (as needed):

g. Construction

PLEASE READ!!!

1. Construction, for the purpose of budgeting, is defined as all types of work done on a particular building, including erecting, altering, or remodeling. Construction conducted by the award recipient is entered on this page. Any construction work that is performed by a vendor or subrecipient should be entered under f. Contractual.

2. List all proposed construction below, providing a basis of cost such as engineering estimates, prior construction, etc., and briefly justify its need as it applies to the Statement of Project Objectives.

3. Each budget period is rounded to the nearest dollar.

Overall description of construction activities: Example Only!!! - Build wind turbine platform

SOPO Task #	General Description	Cost	Basis of Cost	Justification of need
	Budget Period 1			
3	EXAMPLE ONLY!!! Three days of excavation for platform site	$28,000	Engineering estimate	Site must be prepared for construction of platform.
	Budget Period 1 Total	$0		
	Budget Period 2			
	Budget Period 2 Total	$0		
	Budget Period 3			
	Budget Period 3 Total	$0		
	Budget Period 4			
	Budget Period 4 Total	$0		
	Budget Period 5			
	Budget Period 5 Total	$0		
	PROJECT TOTAL	**$0**		

Additional Explanation (as needed):

h. Other Direct Costs

INSTRUCTIONS - PLEASE READ!!!

1. Other direct costs are direct cost items required for the project which do not fit clearly into other categories. These direct costs must not be included in the indirect costs (for which the indirect rate is being applied for this project). Examples are: tuition, printing costs, etc. which can be directly charged to the project and are not duplicated in indirect costs (overhead costs).

2. Basis of cost are items such as vendor quotes, prior purchases of similar or l ke items, published price list, etc.

3. Each budget period is rounded to the nearest dollar.

SOPO Task #	General Description and SOPO Task #	Cost	Basis of Cost	Justification of need
			Budget Period 1	
5	**EXAMPLE!!!** Grad student tuition - tasks 1-3	$16,000	Established UCD costs	Support of graduate students working on project
	Budget Period 1 Total	$0		
			Budget Period 2	
	Budget Period 2 Total	$0		
			Budget Period 3	
	Budget Period 3 Total	$0		
			Budget Period 4	
	Budget Period 4 Total	$0		
			Budget Period 5	
	Budget Period 5 Total	$0		
	PROJECT TOTAL	**$0**		

Additional Explanation (as needed):

i. Indirect Costs

INSTRUCTIONS - PLEASE READ

1. Fill out the table below to indicate how your indirect costs are calculated. Use the box below to provide additional explanation regarding your indirect rate calculation.
2. The rates and how they are applied should not be averaged to get one indirect cost percentage. Complex calculations or rates that do not do not correspond to the below categories should be described/provided in the Additional Explanation section below. If questions exist, consult with your DOE contact before filling out this section.
3. The indirect rate should be applied to both the Federal Share and Recipient Cost Share.
4. Each budget period is rounded to the nearest dollar

	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Total	Explanation of BASE
Provide ONLY Applicable Rates:							
Overhead Rate	0.00%	0.00%	0.00%	0.00%	0.00%		
General & Administrative (G&A)	0.00%	0.00%	0.00%	0.00%	0.00%		
FCCM Rate, if applicable	0.00%	0.00%	0.00%	0.00%	0.00%		
OTHER Indirect Rate	0.00%	0.00%	0.00%	0.00%	0.00%		
Indirect Costs (As Applicable):							
Overhead Costs						$0	
G&A Costs						$0	
FCCM Costs, if applicable						$0	
OTHER Indirect Costs	[redacted]						
Total indirect costs requested:							

(b) (4)

A federally approved indirect rate agreement, or rate proposed (supported and agreed upon by DOE for estimating purposes) is required if reimbursement of indirect costs is requested. Please check (X) one of the options below and provide the requested information if it has not already been provided as requested, or has changed.

X An indirect rate has been approved or negotiated with a federal government agency. A copy of the latest rate agreement is included with this application, and will be provided electronically to the Contracting Officer for this project.

There is not a current, federally approved rate agreement negotiated and available*.

***When this option is checked, the entity preparing this form shall submit an indirect rate proposal in the format provided by your DOE contact, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Additionally, any non-Federal entity that has never received a negotiated indirect cost rate, except for those non-Federal entities described in Appendix VII to Part 200—States and Local Government and Indian Tribe Indirect Cost Proposals, paragraph D.1.b, may elect to charge a de minimis rate of 10% of modified total direct costs (MTDC) which may be used indefinitely.As described in §200.403 Factors affecting allowability of costs, costs must be consistently charged as either indirect or direct costs, but may not be double charged or inconsistently charged as both. If chosen, this methodology once elected must be used consistently for all Federal awards until such time as a non-Federal entity chooses to negotiate for a rate, which the non-Federal entity may apply to do at any time.**

You must provide an explanation (below or in a separate attachment) and show how your indirect cost rate was applied to this budget in order to come up with the indirect costs shown.

Additional Explanation (as needed): * MPORTANT: Please use this box (or an attachment) to further explain how your total indirect costs were calculated. If the total indirect costs are a cumulative amount of more than one calculation or rate application, the explanation and calculations should identify all rates used, along with the base they were applied to (and how the base was derived), and a total for each (along with grand total). *NREL operates as a cost recovery National Laboratory according to cost accounting standards. All applied rates are negotiated and approved by DOE.*

Cost Share

PLEASE READ!!!

1. A detailed presentation of the cash or cash value of all cost share proposed must be provided in the table below. All items in the chart below must be identified within the applicable cost category tabs a. through i. in addition to the detailed presentation of the cash or cash value of all cost share proposed provided in the table below. Identify the source organization & amount of each cost share item proposed in the award.

2. Cash Cost Share - encompasses all contributions to the project made by the recipient, subrecipient, or third party (an entity that does not have a role in performing the scope of work) for costs incurred and paid for during the project. This includes when an organization pays for personnel, supplies, equipment, etc. for their own company with organizational resources. If the item or service is reimbursed for, it is cash cost share. All cost share items must be necessary to the performance of the project. **Vendors may not provide cost share.** Any partial donation of goods or services is considered a discount and is not allowable.

3. In Kind Cost Share - encompasses all contributions to the project made by the recipient, subrecipient, or third party (an entity that does not have a role in performing the scope of work) where a value of the contribution can be readily determined, verified and justified but where no actual cash is transacted in securing the good or service comprising the contribution. In Kind cost share items include volunteer personnel hours, the donation of space or use of equipment, etc. The cash value and calculations thereof for all In Kind cost share items must be justified and explained in the Cost Share Item section below. All cost share items must be necessary to the performance of the project. If questions exist, consult your DOE contact before filling out In Kind cost share in this section. Vendors may not provide cost share. Any partial donation of goods or services is considered a discount and is not allowable.

4. Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include any source not originally derived from Federal funds. Cost sharing commitment letters from subrecipients and third parties must be provided with the original application.

5. Fee or profit, including foregone fee or profit, **are not allowable** as project costs (including cost share) under any resulting award. The project may only incur those costs that are allowable and allocable to the project (including cost share) as determined in accordance with the applicable cost principles prescribed in FAR Part 31 for For-Profit entities and 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.

6. NOTE: A Recipient who elects to employ the 10% de minimis Indirect Cost rate **cannot claim the resulting indirect costs as a Cost Share contribution.**

7. NOTE: A Recipient **cannot claim "unrecovered indirect costs"** as a Cost Share contribution, **without prior approval.**

8. Each budget period is rounded to the nearest dollar.

Organization/Source	Type (Cash or In Kind)	Cost Share Item	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Total Project Cost Share
ABC Company **EXAMPLE!!!**	Cash	Project partner ABC Company will provide 20 PV modules for product development at the price of $680 per module	$13,600					**$13,600**
								$0
								$0
								$0
								$0
								$0
								$0
								$0
								$0
								$0
								$0
		Totals	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
		Cost Share Percentage per Budget Period	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	

Total Project Cost: $2,100,000 **Cost Share Percent of Award: 0.0%**

Additional Explanation (as needed):

Applicant Name: Alliance for Sustainable Energy, LLC Award Number: 2678-1709

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget			
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)		Total (g)
1. Budget Period 1				$403,208	$0		$403,208
2. Budget Period 2				$1,205,999	$0		$1,205,999
3. Budget Period 3				$490,793	$0		$490,793
4. Budget Period 4				$0	$0		$0
5. Budget Period 5				$0	$0		$0
6. Totals				$2,100,000	$0		$2,100,000

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity					Total (5)
	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	
a. Personnel	[redacted]					
b. Fringe Benefits						
c. Travel						
d. Equipment						
e. Supplies						
f. Contractual						
g. Construction						
h. Other						
i. Total Direct Charges (sum of 6a-6h)						
j. Indirect Charges						
k. **Totals** (sum of 6i-6j)						
7. Program Income						$0

(b) (4)

Previous Edition Usable

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Authorized for Local Reproduction

Applicant Name: Alliance for Sustainable Energy, LLC Award Number: 2678-1709

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget			
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)		Total (g)
1. Budget Period 1				$403,208	$0		$403,208
2. Budget Period 2				$1,205,999	$0		$1,205,999
3. Budget Period 3				$490,793	$0		$490,793
4. Budget Period 4				$0	$0		$0
5. Budget Period 5				$0	$0		$0
6. Totals				$2,100,000	$0		$2,100,000

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity					Total (5)
	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	
a. Personnel	[redacted]					
b. Fringe Benefits						
c. Travel						
d. Equipment						
e. Supplies						
f. Contractual						
g. Construction						
h. Other						
i. Total Direct Charges (sum of 6a-6h)						
j. Indirect Charges						
k. **Totals** (sum of 6i-6j)						
7. Program Income						$0

(b) (4)

Previous Edition Usable

Authorized for Local Reproduction

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Instructions and Summary

Award Number: DE-FOA-0002678
Award Recipient: Amprius

Date of Submission: 7/1/2022
Form submitted by: UChicago Argonne, LLC
(May be award recipient or sub-recipient)

Please read the instructions on each worksheet tab before starting. If you have any questions, please ask your EERE contact!
Do not modify this template or any cells or formulas!

1. If using his form for award application, negotiation, or budget revision, fill out the blank white cells in workbook tabs a. through j. with total project costs. If using this form for invoice submission, fill out tabs a. through j. with total costs for just the proposed invoice and fill out tab k. per the instructions on that tab.
2. Blue colored cells contain instructions, headers, or summary calculations and should not be modified. Only blank white cells should be populated.
3. Enter detailed support for the project costs identified for each Category line item within each worksheet tab to autopopulate the summary tab.
4. The total budget presented on tabs a. through i. must include both Federal (DOE) and Non-Federal (cost share) por ions.
5. All costs incurred by the preparer's sub-recipients, vendors, and Federal Research and Development Centers (FFRDCs), should be entered only in section f. Contractual. All other sections are for the costs of the preparer only.
6. Ensure all entered costs are allowable, allocable, and reasonable in accordance with the administrative requirements prescribed in 2 CFR 200, and the applicable cost principles for each entity type: FAR Part 31 for For-Profit entities; and 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.
7. Add rows as needed throughout tabs a. through j. If rows are added, formulas/calculations may need to be adjusted by the preparer. Do not add rows to the Instructions and Summary tab. If your project contains more han five budget periods, consult your EERE contact before adding additional budget period rows or columns.
8. ALL budget period cost categories are rounded to he nearest dollar.

BURDEN DISCLOSURE STATEMENT
Public reporting burden for this collection of information is estimated to average 24 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Office of Information Resources Management Policy, Plans, and Oversight, AD-241-2 - GTN, Paperwork Reduction Project (1910-5162), U.S. Department of Energy 1000 Independence Avenue, S.W., Washington, DC 20585; and to the Office of Management and Budget, Paperwork Reduction Project (1910-5162), Washington, DC 20503.

SUMMARY OF BUDGET CATEGORY COSTS PROPOSED

The values in this summary table are from entries made in subsequent tabs, only blank white cells require data entry

Section A - Budget Summary

	Federal	Cost Share			Total Costs	Cost Share %	Proposed Budget Period Dates
Budget Period 1	$300,000	$0			$300,000	0.00%	Example!!! 01/01/2014 - 12/31/2014
Budget Period 2	$350,000	$0			$350,000	0.00%	
Budget Period 3	$300,000	$0			$300,000	0.00%	
Budget Period 4	$0	$0			$0	0.00%	
Budget Period 5	$0	$0			$0	0.00%	
Total	$950,000	$0			$950,000	0.00%	

Section B - Budget Categories

CATEGORY	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Total Costs	% of Project	Comments (as needed)
a. Personnel								
b. Fringe Benefits								
c. Travel								
d. Equipment								
e. Supplies								
f. Contractual								
Sub-recipient								
Vendor								
FFRDC								
Total Contractual								
g. Construction								
h. Other Direct Costs								
Total Direct Costs								
i. Indirect Charges								
Total Costs								

(b) (4)

Additional Explanation (as needed):

a. Personnel

INSTRUCTIONS - PLEASE READ

1. List project costs solely for employees of the entity completing this form. All personnel costs for subrecipients and vendors must be included under f. Contractual.
2. All personnel should be identified by position title and not employee name. Enter the amount of time (e g., hours or % of time) and the base pay rate and the total direct personnel compensation will automatically calculate. Rate basis (e g., actual salary, labor distribution report, state civil service rates, etc.) must also be identified.
3. If loaded labor rates are utilized, a description of the costs the loaded rate is comprised of must be included in the Additional Explanation section below. DOE must review all components of the loaded labor rate for reasonableness and unallowable costs (e g. fee or profit).
4. If a position and hours are attributed to multiple employees (e.g. Technician working 4000 hours) the number of employees for that position title must be identified.
5. Each budget period is rounded to the nearest dollar.

SOPO Task #	Position Title	Budget Period 1			Budget Period 2			Budget Period 3			Budget Period 4			Budget Period 5			Project Total Hours	Project Total Dollars	Rate Basis
		Time (Hrs)	Pay Rate ($/Hr)	Total Budget Period 1	Time (Hrs)	Pay Rate ($/Hr)	Total Budget Period 2	Time (Hrs)	Pay Rate ($/Hr)	Total Budget Period 3	Time (Hrs)	Pay Rate ($/Hr)	Total Budget Period 4	Time (Hrs)	Pay Rate ($/Hr)	Total Budget Period 5			
1	Sr. Engineer (EXAMPLE)	2000	$85.00	$170,000	200	$50.00	$10,000	200	$50 00	$10,000	200	$50 00	$10,000	200	$50 00	$10,000	2400	$190,000	Actual Salary
2	Technicians (2)	4000	$20.00	$80,000	0	$0.00	$0	0	$0 00	$0	0	$0 00	$0	0	$0 00	$0	4000	$80,000	Actual Salary
				$0			$0									$0	0	$0	Payband Rates
	Senior Chemical Engineer																		Payband Rates
	Assistant Chemical Engineer																		Payband Rates
	Post Doc																		Payband Rates
																			Payband Rates
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
				$0			$0			$0			$0			$0	0	$0	
	Total Personnel Costs																		

(b) (4)

Additional Explanation (as needed): Pay band rates are established at the beginning of the fiscal year for the Laboratory, and are monitored and revised as necessary. All effort costs are distributed as Laboratory-wide pay band rates which are developed by the Laboratory's Budget Office for each major payroll classification. The pay bands are based on salary ranges, fringe benefits (30% for a regular staff, and 24.5% for postdoctoral appointees), plus a factor for divisional overhead and for paid absences. The fringe benefit costs include payroll-related items such as annuities, social security, and hospital and medical payments. Effort is escalated each year by a rate (~ 4% for regular staff and postdoctoral appointees) provided by the Argonne Budget Department.

b. Fringe Benefits

INSTRUCTIONS - PLEASE READ

1. Fill out the table below by position title. If all employees receive the same fringe benefits, you can show "Total Personnel" in the Labor Type column instead of listing out all position titles.
2. The rates and how they are applied should not be averaged to get one fringe cost percentage. Complex calculations should be described/provided in the Additional Explanation section below.
3. The fringe benefit rates should be applied to all positions, regardless of whether those funds will be supported by Federal Share or Recipient Cost Share.
4. Each budget period is rounded to the nearest dollar.

Labor Type	Budget Period 1			Budget Period 2			Budget Period 3			Budget Period 4			Budget Period 5			Total Project
	Personnel Costs	Rate	Total	Personnel Costs	Rate	Total	Personnel Costs	Rate	Total	Personnel Costs	Rate	Total	Personnel Costs	Rate	Total	
EXAMPLE Sr. Engineer	$170 000	20%	$34 000	$10 000	20%	$2 000	$10 000	20%	$2 000	$10 000	20%	$2 000	$10 000	20%	$2 000	$38 000
			$0			$0			$0			$0			$0	$0
Senior Chemical Engineer	[redacted]															
Assistant Chemical Engineer																
Post Doc																
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
			$0			$0			$0			$0			$0	$0
Total	[redacted]		[redacted]	[redacted]		[redacted]	[redacted]		[redacted]	[redacted]		[redacted]	[redacted]		[redacted]	[redacted]

(b) (4)

A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required at the time of award negotiation if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information if not previously submitted.

X A fringe benefit rate has been negotiated with, or approved by, a federal government agency. A copy of the latest rate agreement is/was included with the project application.*

There is not a current federally approved rate agreement negotiated and available.**

*Unless the organization has submitted an indirect rate proposal which encompasses the fringe pool of costs, please provide the organization's benefit package and/or a list of the components/elements that comprise the fringe pool and the cost or percentage of each component/element allocated to the labor costs identified in the Budget Justification (Form EERE 335.1).

**When this option is checked, the entity preparing this form shall submit an indirect rate proposal in the format provided in the Sample Rate Proposal at https //www.energy.gov/eere/funding/downloads/sample-indirect-rate-proposal-and-profit-compliance-audit, or a format that provides the same level of information and which will support the rates being proposed for use in the performance of the proposed project.

All effort costs are distributed as Laboratory-wide pay band rates which are developed by the Laboratory's Budget Office for each major payroll classification. The pay bands are based on salary ranges, fringe benefits (30% for exempt regular staff and non-exempt regular, and 24 5% for exempt temporary (postdoctoral appointees)), plus a factor for divisional overhead and for paid absences. The fringe benefit costs include payroll-related items such as annuities, social security, and hospital and medical payments.

c. Travel

INSTRUCTIONS - PLEASE READ

1. Identify Foreign and Domestic Travel as separate items. Examples of Purpose of Travel are subrecipient site visits, DOE meetings, project mgmt. meetings, etc. Examples of Basis for Estimating Costs are past trips, travel quotes, GSA rates, etc.
2. All listed travel must be necessary for performance of the Statement of Project Objectives.
3. Only travel that is directly associated with this award should be included as a direct travel cost to the award.
4. Federal travel regulations are contained within the applicable cost principles for all entity types.
5. Travel costs should remain consistent with travel costs incurred by an organization during normal business operations as a result of the organizations written travel policy. In absence of a written travel policy, organizations must follow the regulations prescribed by the General Services Administration.
6. Columns E, F, G, H, I, J, and K are per trip.
7. The number of days is inclusive of day of departure and day of return.
8. Recipients should enter City and State (or City and Country for International travel) in the Depart from and Destination fields.
9. Each budget period is rounded to the nearest dollar.

SOPO Task #	Purpose of Travel	Depart From	Destination	No. of Days	No. of Travelers	Lodging per Traveler	Flight per Traveler	Vehicle per Traveler	Per Diem Per Traveler	Cost per Trip	Basis for Estimating Costs		
	Domestic Travel	Budget Period 1											
1	EXAMPLE Visit to PV manufacturer			2	2	$250	$500	$100	$160	$2,020	Current GSA rates		
	[redacted]										Current GSA rates	$1,450	
											Current GSA rates		
												$1,250	$3,750
											Current GSA rates		
											Current GSA rates		
											Current GSA rates		
											Current GSA rates		

d. Equipment

INSTRUCTIONS - PLEASE READ!!!

1. Equipment is generally defined as an item with an acquisition cost greater than $5,000 and a useful life expectancy of more than one year. Please refer to the applicable Federal regulations in 2 CFR 200 for specific equipment definitions and treatment.

2. List all equipment below, providing a basis of cost (e.g. vendor quotes, catalog prices, prior invoices, etc.). Briefly justify items as they apply to the Statement of Project Objectives. If it is existing equipment, provide logical support for the estimated value shown.

3. During award negotiations, provide a vendor quote for all equipment items over $50,000 in price. If the vendor quote is not an exact price match, provide an explanation in the additional explanation section below. If a vendor quote is not practical, such as for a piece of equipment that is purpose-built, first of its kind, or otherwise not available off the shelf, provide a detailed engineering estimate for how the cost estimate was derived.

4. Each budget period is rounded to the nearest dollar.

SOPO Task #	Equipment Item	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
Budget Period 1						
3,4,5	**EXAMPLE!!!** Thermal shock chamber	2	$70,000	$140,000	Vendor Quote - Attached	Reliability testing of PV modules- Task 4.3
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 1 Total			$0		
Budget Period 2						
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 2 Total			$0		
Budget Period 3						
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 3 Total			$0		
Budget Period 4						
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 4 Total			$0		
Budget Period 5						
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 5 Total			$0		
	PROJECT TOTAL			**$0**		

Additional Explanation (as needed):

e. Supplies

INSTRUCTIONS - PLEASE READ

1. Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Please refer to the applicable Federal regulations in 2 CFR 200 for specific supplies definitions and treatment.

2. List all proposed supplies below, providing a basis of costs (e.g. vendor quotes, catalog prices, prior invoices, etc.). Briefly justify the need for the Supplies as they apply to the Statement of Project Objectives. Note that Supply items must be direct costs to the project at this budget category, and not duplicative of supply costs included in the indirect pool that is the basis of the indirect rate applied for this project.

3. Multiple supply items valued at $5,000 or less used to assemble an equipment item with a value greater than $5,000 with a useful life of more than one year should be included on the equipment tab. If supply items and costs are ambiguous in nature, contact your DOE representative for proper categorization.

4. Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer.

5. Each budget period is rounded to the nearest dollar.

SOPO Task #	General Category of Supplies	Qty	Unit Cost	Total Cost	Basis of Cost	Justification of need
				Budget Period 1		
4,6	EXAMPLE Wireless DAS components	10	$360 00	$3,600	Catalog price	For Alpha prototype - Task 2.4
				$0		
	Budget Period 3 Total			$10,000		
				Budget Period 4		
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 4 Total			$0		
				Budget Period 5		
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
				$0		
	Budget Period 5 Total			$0		
	PROJECT TOTAL			$35,000		

(b) (4)

Additional Explanation (as needed):

f. Contractual

INSTRUCTIONS - PLEASE READ!!!

1. The entity completing this form must provide all costs related to sub-recipients, vendors, and FFRDC partners in the applicable boxes below.

2. Sub-recipients (partners, sub-awardees): Subrecipients shall submit a Budget Justification descr bing all project costs and calculations when their total proposed budget exceeds either (1) $250,000 or (2) 25% of total award costs. These sub-recipient forms may be completed by either the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient's forms must match the sub-recipient entries below. A subrecipient is a legal entity to which a subaward is made, who has performance measured against whether the objectives of the Federal program are met, is respons ble for programmatic decision making, must adhere to applicable Federal program compliance requirements, and uses the Federal funds to carry out a program of the organization. All characteristics may not be present and judgment must be used to determine subrecipient vs. vendor status.

3. Vendors (including contractors): List all vendors and contractors supplying commercial supplies or services used to support the project. For each Vendor cost with total project costs of $250,000 or more, a Vendor quote must be provided. A vendor is a legal entity contracted to provide goods and services within normal business operations, provides similar goods or services to many different purchasers, operates in a competitive environment, provides goods or services that are ancillary to the operation of the Federal program, and is not subject to compliance requirements of the Federal program. All characteristics may not be present and judgment must be used to determine subrecipient vs. vendor status.

4. Federal Funded Research and Development Centers (FFRDCs): FFRDCs must submit a signed Field Work Proposal during award application. The award recipient may allow the FFRDC to provide this information directly to DOE, however project costs must also be provided below.

5. Each budget period is rounded to the nearest dollar

SOPO Task #	Sub-Recipient Name/Organization	Purpose and Basis of Cost	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Project Total
2,4	**EXAMPLE!!!** XYZ Corp.	Partner to develop optimal lens for Gen 2 product. Cost estimate based on personnel hours.	$48,000	$32,000	$16,000	$8,000	$4,000	**$108,000**
								$0
								$0
								$0
								$0
								$0
								$0
								$0
								$0
								$0
								$0
		Sub-total	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

SOPO Task #	Vendor Name/Organization	Purpose and Basis of Cost	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Project Total
6	**EXAMPLE!!!** ABC Corp.	Vendor for developing robotics to perform lens inspection. Estimate provided by vendor.	$0	$32,900	$86,500	$0	$0	**$119,400**
								$0
								$0
								$0
								$0
								$0
								$0
								$0
		Sub-total	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

SOPO Task #	FFRDC Name/Organization	Purpose and Basis of Cost	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Project Total
								$0
								$0
								$0
								$0
		Sub-total	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

	Total Contractual		**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Additional Explanation (as needed):

g. Construction

PLEASE READ!!!

1. Construction, for the purpose of budgeting, is defined as all types of work done on a particular building, including erecting, altering, or remodeling. Construction conducted by the award recipient is entered on this page. Any construction work that is performed by a vendor or subrecipient should be entered under f. Contractual.

2. List all proposed construction below, providing a basis of cost such as engineering estimates, prior construction, etc., and briefly justify its need as it applies to the Statement of Project Objectives.

3. Each budget period is rounded to the nearest dollar.

Overall description of construction activities: Example Only!!! - Build wind turbine platform

SOPO Task #	General Description	Cost	Basis of Cost	Justification of need
		Budget Period 1		
3	EXAMPLE ONLY!!! Three days of excavation for platform site	$28,000	Engineering estimate	Site must be prepared for construction of platform.
	Budget Period 1 Total	$0		
		Budget Period 2		
	Budget Period 2 Total	$0		
		Budget Period 3		
	Budget Period 3 Total	$0		
		Budget Period 4		
	Budget Period 4 Total	$0		
		Budget Period 5		
	Budget Period 5 Total	$0		
	PROJECT TOTAL	**$0**		

Additional Explanation (as needed):

h. Other Direct Costs

INSTRUCTIONS - PLEASE READ!!!

1. Other direct costs are direct cost items required for the project which do not fit clearly into other categories. These direct costs must not be included in the indirect costs (for which the indirect rate is being applied for this project). Examples are: tuition, printing costs, etc. which can be directly charged to the project and are not duplicated in indirect costs (overhead costs).

2. Basis of cost are items such as vendor quotes, prior purchases of similar or like items, published price list, etc.

3. Each budget period is rounded to the nearest dollar.

SOPO Task #	General Description and SOPO Task #	Cost	Basis of Cost	Justification of need
			Budget Period 1	
5	**EXAMPLE!!!** Grad student tuition - tasks 1-3	$16,000	Established UCD costs	Support of graduate students working on project
	Budget Period 1 Total	$0		
			Budget Period 2	
	Budget Period 2 Total	$0		
			Budget Period 3	
	Budget Period 3 Total	$0		
			Budget Period 4	
	Budget Period 4 Total	$0		
			Budget Period 5	
	Budget Period 5 Total	$0		
	PROJECT TOTAL	**$0**		

Additional Explanation (as needed):

i. Indirect Costs

INSTRUCTIONS - PLEASE READ

1. Fill out the table below to indicate how your indirect costs are calculated. Use the box below to provide additional explanation regarding your indirect rate calculation.

2. The rates and how they are applied should not be averaged to get one indirect cost percentage. Complex calculations or rates that do not do not correspond to the below categories should be described/provided in the Additional Explanation section below. If questions exist, consult with your DOE contact before filling out this section.

3. The indirect rate should be applied to both the Federal Share and Recipient Cost Share.

4. Each budget period is rounded to the nearest dollar.

(b) (4)

[redacted]

A federally approved indirect rate agreement, or rate proposed (supported and agreed upon by DOE for estimating purposes) is required if reimbursement of indirect costs is requested. Please check (X) one of the options below and provide the requested information if it has not already been provided as requested, or has changed.

X An indirect rate has been approved or negotiated with a federal government agency. A copy of the latest rate agreement is included with this application, and will be provided electronically to the Contracting Officer for this project.

There is not a current, federally approved rate agreement negotiated and available*.

***When this option is checked, the entity preparing this form shall submit an indirect rate proposal in the format provided by your DOE contact, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Additionally, any non-Federal entity that has never received a negotiated indirect cost rate, except for those non-Federal entities described in Appendix VII to Part 200—States and Local Government and Indian Tribe Indirect Cost Proposals, paragraph D.1.b, may elect to charge a de minimis rate of 10% of modified total direct costs (MTDC) which may be used indefinitely.As described in §200.403 Factors affecting allowability of costs, costs must be consistently charged as either indirect or direct costs, but may not be double charged or inconsistently charged as both. If chosen, this methodology once elected must be used consistently for all Federal awards until such time as a non-Federal entity chooses to negotiate for a rate, which the non-Federal entity may apply to do at any time.**

You must provide an explanation (below or in a separate attachment) and show how your indirect cost rate was applied to this budget in order to come up with the indirect costs shown.

Additional Explanation (as needed): *IMPORTANT: Please use this box (or an attachment) to further explain how your total indirect costs were calculated. If the total indirect costs are a cumulative amount of more than one calculation or rate application, the explanation and calculations should identify all rates used, along with the base they were applied to (and how the base was derived), and a total for each (along with grand total).
Standard rates are developed for Laboratory General and Administrative (G&A) expense. The procedures for distributing Laboratory G&A and program expense is applied on the basis of the total cost of the work performed. See 'Indirect Rate Memo' tab for details on Argonne's Indirect Rates (FY22).

Argonne NATIONAL LABORATORY

Intra-Laboratory Memo

September 30, 2021

TO: T. Knewitz Chief Financial Officer

FROM: S. Adamson Budget Officer

SUBJECT: **FY2022 Provisional Indirect Expense Rates**

For FY2022, the following are the indirect expense rates effective October 1, 2021:

Common Support	33.6%
LDRD	4.1%
IGPP/IGPE	2.2%
Materials & Subcontracts *	6.3%
General & Administrative	6.5%
Joint Appointment Rate	28.0%
Collaborative Research Rate	30.4%
Off-Site Rate	21.3%
Fringe Rate- Regular employee	30.00%
Fringe Rate- Exempt Temporary employee	24.50%
Fringe Rate- Non-Exempt Temporary employee	11.00%
National Security Work	1.00%
Safeguards & Security Surcharge on Non-DOE-SRO	1.25%

*Rates are reflective of the $500,000 annual cap on procurements implemented in FY2019

Approved: Tim Knewitz

T. Knewitz, Chief Financial Officer

Attachments

Cc: T. Schikora
S. Rogers
D. Mastantuono

ANL-26A (3-06)

Cost Share

PLEASE READ

1. A detailed presentation of the cash or cash value of all cost share proposed must be provided in the table below. All items in the chart below must be identified within the applicable cost category tabs a. through i. in addition to the detailed presentation of the cash or cash value of all cost share proposed provided in the table below. Identify the source organization & amount of each cost share item proposed in the award.

2. Cash Cost Share - encompasses all contributions to the project made by the recipient, subrecipient, or third party (an entity that does not have a role in performing the scope of work) for costs incurred and paid for during the project. This includes when an organization pays for personnel, supplies, equipment, etc. for their own company with organizational resources. If the item or service is reimbursed for, it is cash cost share. All cost share items must be necessary to the performance of the project. **Vendors may not provide cost share.** Any partial donation of goods or services is considered a discount and is not allowable.

3. In Kind Cost Share - encompasses all contributions to the project made by the recipient, subrecipient, or third party (an entity that does not have a role in performing the scope of work) where a value of the contribution can be readily determined, verified and justified but where no actual cash is transacted in securing the good or service comprising the contribution. In Kind cost share items include volunteer personnel hours, the donation of space or use of equipment, etc. The cash value and calculations thereof for all In Kind cost share items must be justified and explained in the Cost Share tem section below. All cost share items must be necessary to the performance of the project. If questions exist, consult your DOE contact before filling out In Kind cost share in this section. Vendors may not provide cost share. Any partial donation of goods or services is considered a discount and is not allowable.

4. Funds from other Federal sources MAY NOT be counted as cost share. This prohibition includes FFRDC sub-recipients. Non-Federal sources include any source not originally derived from Federal funds. Cost sharing commitment letters from subrecipients and third parties must be provided with the original application.

5. Fee or profit, including foregone fee or profit, **are not allowable** as project costs (including cost share) under any resulting award. The project may only incur those costs that are allowable and allocable to the project (including cost share) as determined in accordance with the applicable cost principles prescribed in FAR Part 31 for For-Profit entities and 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.

6. NOTE A Recipient who elects to employ the 10% de minimis Indirect Cost rate **cannot claim the resulting indirect costs as a Cost Share contribution.** **7. NOTE** A Recipient **cannot claim "unrecovered indirect costs"** as a Cost Share contribution, **without prior approval.**

8. Each budget period is rounded to the nearest dollar.

Recipient Provided Cost Share	Organization/Source	Type (Cash or In Kind)	Cost Share Item	Budget Period 1	Budget Period 2	Budget Period 3	Budget Period 4	Budget Period 5	Total
a. Personnel									$0
b. Fringe									$0
c. Travel									$0
d. Equipment									$0
e. Supplies									$0
f. Contractual (NOT subrecipient provided)									$0
g. Construction									$0
h. Other									$0
i. Indirect									$0
Total recipient provided cost share				$0	$0	$0	$0	$0	$0
f. Subrecipient (3rd Party) Provided Cost Share	**Organization/Source**	**Type (Cash or In Kind)**	**Cost Share Item** For simple cost share contributions from a partner provide the detail below; for complex contributions provide a separate budget justification (if required) or a supplementary detailed explanation	**Budget Period 1**	**Budget Period 2**	**Budget Period 3**	**Budget Period 4**	**Budget Period 5**	**Total**
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Sub-Recipient cost share									$0
Total subrecipient provided cost share				**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Total Contractual Cost Share (Sum of Recipient and Subrecipients)				$0	$0	$0	$0	$0	$0
Grand Total Cost Share All Sources			**Totals**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
			Cost Share Percentage per Budget Period	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	

Total Project Cost: $950,000 **Cost Share Percent of Award: 0.0%**

Additional Explanation (as needed):

Applicant Name: Amprius Award Number: DE-FOA-0002678

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget			
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)		Total (g)
1. Budget Period 1				$300,000	$0		$300,000
2. Budget Period 2				$350,000	$0		$350,000
3. Budget Period 3				$300,000	$0		$300,000
4. Budget Period 4				$0	$0		$0
5. Budget Period 5				$0	$0		$0
6. Totals				$950,000	$0		$950,000

Section B - Budget Categories

6. Object Class Categories	Grant Program, Function or Activity					
a. Personnel	[redacted]					
b. Fringe Benefits						
c. Travel						
d. Equipment						
e. Supplies						
f. Contractual						
g. Construction						
h. Other						
i. Total Direct Charges (sum of 6a-6h)						
j. Indirect Charges						
k. **Totals** (sum of 6i-6j)						
7. Program Income						$0

(b) (4)

Previous Edition Usable

Authorized for Local Reproduction

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Applicant Name: Amprius Award Number: DE-FOA-0002678

Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

Section A - Budget Summary

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget			
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)		Total (g)
1. Budget Period 1				$300,000	$0		$300,000
2. Budget Period 2				$350,000	$0		$350,000
3. Budget Period 3				$300,000	$0		$300,000
4. Budget Period 4				$0	$0		$0
5. Budget Period 5				$0	$0		$0
6. Totals				$950,000	$0		$950,000

Section B - Budget Categories

6. Object Class Categories						
a. Personnel	[redacted]					
b. Fringe Benefits						
c. Travel						
d. Equipment						
e. Supplies						
f. Contractual						
g. Construction						
h. Other						
i. Total Direct Charges (sum of 6a-6h)						
j. Indirect Charges						
k. **Totals** (sum of 6i-6j)						
7. Program Income						$0

(b) (4)

Previous Edition Usable

Authorized for Local Reproduction

SF-424A (Rev. 4-92)
Prescribed by OMB Circular A-102

Control #
2678-1709

Large scale manufacturing of silicon nanowire anode by direct gas-to-electrode manufacturing

T **Specific FOA Area of Interest Addressed**

AOI 12: Demonstration projects for advanced battery component manufacturing, advanced battery manufacturing, and recycling

Amprius Technologies, Inc., 1180 Page Ave., Fremont, CA 94089
Principal Investigator: Dr. Ionel Stefan, Amprius, Chief Technology Officer

Amprius is a pioneer and a leader in silicon anode and has developed a technology that mitigates many problems that silicon materials face in lithium-ion cells. The company's core technologies are patented and patent pending silicon anodes, silicon-enabling electrolytes, and silicon anode-based battery systems. Amprius' technologies enable >50% increases in the energy per unit of weight and volume of electric vehicle batteries and its cells were tested and performance confirmed by national laboratories and commercial entities. The complete set of manufacturing processes was integrated in 2018 into a continuous roll-to-roll (R2R) pilot scale anode fabrication line.

The main objective of the program is the demonstration of the manufacturing of silicon nanowire anode technology at component and cell level at a 500 MWh scale, on manufacturing lines that are comparable to those used in multi-GWh factories. The demonstration will bring to maturity the technology by installing the first of a kind manufacturing lines for the new technology and will allow a bottom-up analysis of the cost factors and product performance. The current level of performance based on low-volume pilot production indicates that Amprius will be able to deliver cells that have a specific energy and energy density that is at least 50% higher, [redacted] (b) (4) [redacted]. The silicon anode manufacturing uses US based [redacted] aterials inputs, mainly silane, produced at large scale in US, enough for anode production equivalent to hundreds of GWh of batteries. The scale-up of silicon nanowire anode and cell fabrication for high volume production is one of the most important steps needed for maturing this technology, and to bring its benefits to the electrification of transportation and to society in general.

Project Title

Large scale manufacturing of silicon nanowire anode by direct gas-to-electrode manufacturing

Specific FOA Area of Interest Addressed

AOI 12: Demonstration projects for advanced battery component manufacturing, advanced battery manufacturing, and recycling

Technical Point of Contact
Dr. Ionel Stefan,
Amprius Technologies, Inc.
Chief Technology Officer
(b) (6) [redacted]

Business Point of Contact
Jon Bornstein, Amprius
Amprius Technologies, Inc.
Chief Operating Officer
[redacted]

Team Member Organizations

Prime recipient:
Amprius Technologies, Inc., 1180 Page Ave, Fremont, CA 94538

Sub-recipients:
National Renewable Energy Laboratory (NREL)
Argonne National Laboratory (ANL)

Subcontractors:
(b) (4), (b) (6) [redacted]

Statement Regarding Confidentiality

Notice of Restriction on Disclosure and Use of Data

Pages 2-50 of this document may contain trade secrets or commercial or financial information that is privileged or confidential and is exempt from public disclosure. Such information shall be used or disclosed only for evaluation purposes or in accordance with a financial assistance or loan agreement between the submitter and the Government. The Government may use or disclose any information that is not appropriately marked or otherwise restricted, regardless of source.

1. PROJECT OVERVIEW

1.1. Background

Amprius is a privately held, US based developer and manufacturer of high energy density lithium-ion cells for electric mobility, aerospace, and defense applications. The company's core technologies are patented and patent pending silicon anodes, silicon-enabling electrolytes, and silicon anode-based battery systems. Amprius' products enable >50% increases in the energy per unit of weight and volume of electric vehicle batteries and its cells were tested and performance confirmed by Idaho and Sandia National Laboratories under previous DOE and USABC contracts. Amprius is currently executing its scale-up to manufacturing plan, including anode manufacturing equipment development and large-scale cell manufacturing installation.

Amprius and Kensington Capital Acquisition Corp. IV announced on May 12, 2022 an agreement that would result in Amprius becoming a publicly traded company. [redacted] (b) (4) funding brought by Kensington, as well as additional equity financing will enable Amprius to scale production capabilities to meet the demand for high energy density silicon nanowire anode batteries. Amprius' plans to build manufacturing plants in USA and the use of products for electric mobility (ground and air) as well as for defense applications align perfectly with the DOE's direction to fund investments within the electric vehicle battery supply chain, increase domestic battery manufacturing, and create good-paying clean energy jobs. DOE funding will have a [redacted] financial and schedule impact on the manufacturing path.

History: Amprius was incorporated in 2008 and began operations in 2009. The company was founded to develop silicon anode technology from Stanford University. The innovation was focused on an anode made completely of silicon, a silicon nanowire (Si NW) anode. With both private and public funding, Amprius continues to make progress toward the commercialization of a silicon nanowire anode. The complete set of manufacturing processes was integrated by 2016 into a continuous roll-to-roll (R2R) pilot scale anode fabrication line. This proof-of-concept line demonstrated that consecutive chemical vapor deposition (CVD) and plasma enhanced CVD (PECVD) processes with different operating environments can be integrated in a continuous R2R process and the product, the silicon nanowire anode with simultaneous double sided nanowire growth, performs to the specifications set by the static, batch processes. Two pilot lines and associated cell production line are operated currently in Fremont, California.

The manufacturing demonstration scale proposed here is the next step toward commercialization and the realization of the silicon nanowire technology potential for energy storage and electric mobility. Although the 500 MWh scale proposed here is low relative to EV market demand, further manufacturing capability can be added by replication of the first demonstration line, which will prove the manufacturing capability, functionality, and cost of the technology. Moreover, current customers in other markets, such as aerospace and defense, will be able to use Amprius' high-performance lithium-ion cells to the full requirements of these markets.

Private Funding: World-leading private investors, including EV and aerospace strategic partners, have recognized and supported Amprius' technical and commercial progress. [redacted] On May 12, 2022, Amprius and Kensington Capital Acquisition Corp. IV announced a merger agreement that would

result in Amprius becoming a publicly traded company. [redacted] funding brought by Kensington, as well as additional equity financing will be allocated to silicon nanowire technology industrialization and commercialization.

(b) (4) [redacted]

Public Support: Amprius has a strong track record of government-funded R&D. The Departments of Energy, Defense, and Commerce, as well as NASA, have recognized the potential of Amprius' technology and supported the company's growth with a series of projects.

- *DOE* (Office of Energy Efficiency and Renewable Energy) selected Amprius for a three-year project to develop high-energy, silicon anode-based cells. This project ended in 2015. Additional funds were awarded in 2015 for prelithiation development, and in 2022 for silicon deposition scale-up.
- *NASA* (Game Changing Technology program) selected Amprius for a two-year project in 2015 that demonstrated that silicon anodes enable high energy even at the low temperatures NASA missions require.
- *DOD* (US Army, multiple offices) selected Amprius to deliver high-energy and lightweight conformal batteries that will increase soldier mobility on the battlefield. A first prototype was delivered in 2017. Amprius' cells have been integrated in a conformal wearable battery that doubles the energy content, in the same weight and volume. Subsequent funding was awarded for safety improvement and manufacturing development. In 2021, Army's Mantech office started funding the scale-up of silicon nanowire prelithiation. In parallel, in 2021, The Army Rapid Capabilities and Critical Technologies Office (RCCTO) selected Amprius to develop batteries that double the endurance of small Unmanned Aerial Systems (UAS) for reconnaissance missions.
- *USABC* (United States Advanced Battery Consortium) awarded Amprius a three-year program to develop silicon cells for EV applications. The cells delivered at the end of the project, in September 2018, were tested by Idaho National Laboratory (INL) and confirmed that the technology meets most 2020 targets and improved 10 fold in Calendar Life from the beginning of the program, to over 1.5 year Calendar Life at 50°C. A second program focused on cycle life and calendar life improvement started in March 2022.

Successes: Government-supported projects have been a significant accelerator on the development of silicon nanowires anode technology. Amprius successfully completed projects for NIST, NASA, DOE, USABC and US Army. Since 2017, Amprius started selling cells with a specific energy of over 400Wh/kg to commercial aerospace customers, enabling endurance.

Customers: The silicon nanowire anode products currently address premium, high-performance applications, where high energy density is a must, and low production volumes at high cost are not major obstacles. These customers, in general, are developing new markets, such as high altitude pseudo-satellite (HAPS) solar electric drones, vertical take-off vehicles (eVTOL), long range drones and other commercial or military applications. A significant share of Amprius' current silicon nanowire anode production is allocated to contracts with the US military branches

or with defense contractors, for performance and mission critical applications that see major benefits from higher energy density and specific energy batteries.

[redacted] In its previous contracts with DOE and USABC, Amprius has demonstrated that silicon nanowire cells can significantly exceed graphite cells in multiple performance metrics, including energy density and charging rates, and gaps can be mitigated with development and manufacturing focus. Recent equipment development and tests have demonstrated high throughput and utilization of precursor materials, key conditions for achieving low cost in manufacturing for transportation and energy storage markets.

Baseline Technology: Silicon has significant potential as a new anode material because it offers nearly 10X the theoretical lithium storage capacity of graphite. However, when charged with lithium, silicon swells up to 4X its volume, causing capacity fade and mechanical failure. Because of swelling, conventional approaches to silicon have been slow to produce cells with the cycle life required for practical uses, including EV applications.

Amprius has developed a 100% silicon nanowire anode for lithium-ion cells that are in commercial use for very high-performance applications. The silicon nanowire anode is a patented structure that is formed by growing a conductive nanowire (template) directly from the metal foil substrate and then coating that template with amorphous silicon. A microscopic image and schematic of the anode are shown in Figure 1. Amprius' silicon anode is unlike any other silicon-containing anode in commercial production because it is 100% silicon in a nanowire form as opposed to silicon particles mixed in a powder composite. Its "rooted" structure in the current collector has a much higher mechanical stability during cycling, and the porous nature of the deposited silicon, plus the space between silicon wires, reduce overall cell swelling to less than 10%. Additional manufacturing steps reduce surface area and increase first cycle efficiency. Combined, these properties enable superior results compared to particle type silicon solutions, including a specific capacity of 3400 mAh/g and a first cycle efficiency of 94% in half cell.

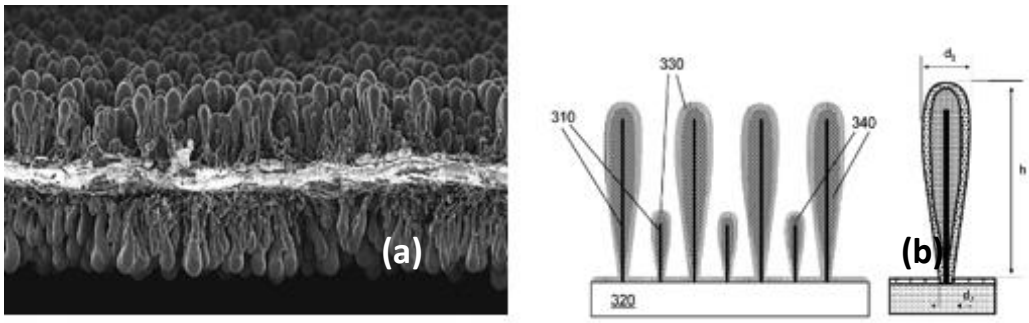


Figure 1. (a) Cross-section of silicon nanowire anode. (b) Schematic of patented structure.

In full cells, the energy density and specific energy reaches over [redacted] Wh/liter and 450 Wh/kg, respectively, in small form factors (3-10Ah), [redacted] These performance levels were believed to be possible

only with Li-metal and/or high-capacity cathode materials, such as sulfur or conversion cathodes, but, Amprius has demonstrated, and its customers confirmed over the last few years, that a pure silicon anode can exceed Li-metal targets. These performance levels make the nanowire technology unique among other silicon anode materials.

Recent Si/NMC811 cells with 410 Wh/kg specific energy have demonstrated capability of 15-minute charge, following USABC protocols, while DST cycle life (USABC cycling protocol) exceeds 600 cycles. The energy and power densities (gravimetric and volumetric) exceed the current state of the art graphite cells by more than 50%, making the pure silicon nanowire anode a unique combination of power and energy, including charging power.

The silicon nanowire manufacturing is also relatively unique compared to typical manufacturing methods for battery materials. A major advantage of Amprius' silicon technology is that the manufacturing process uses silane as precursor material and produces coated anodes ready to be used in cell assembly. This gas-to-electrode manufacturing process, although slower than conventional slurry coating, is [redacted] more efficient in material, energy, and labor use because it comprises much fewer steps. Conventionally, silicon, silicon composites, or silicon monoxide powders are made from silane or silicon, and silicon manufacturing, in general, uses silane as a precursor or intermediary step. Only in the second step, electrode coating, particle type silicon materials can be coated using conventional slurry manufacturing, including processes such as slurry mixing, coating, drying, and calendaring. Amprius' manufacturing skips all these steps, producing a coated electrode from gas and foil input materials. Amprius has already proven the manufacturing of silicon nanowire anodes in a pilot scale (100s of kWh per year) system. Amprius' pilot-scale tool for silicon nanowire anode production is the first-of-a-kind system for in-line, multi-step fabrication of a three-dimensional structure (nanowire) on a R2R web. This system, as shown in Figure 2, represents the current state-of-the-art (SOA) for silicon anode.

[redacted]

Figure 2. Pilot-scale R2R tool for silicon nanowire anode manufacturing

Amprius products are lithium-ion cells enabled by the silicon nanowire technology described above, as well as by related innovations that complement the silicon anode and enhance its properties at cell level, such as prelithiation, proprietary electrolyte formulations, cell design and formation protocols. To date, Amprius has produced tens of thousands of cells for R&D and

commercial purposes, in cell sizes ranging from a few hundreds of mAh to over 45 Ah, with main product lines in formats of 50x55mm (width x length) and 54 x 65 mm, used in electric flight and defense applications.

Amprius is currently developing large size pouch cells with support from USABC [redacted] The energy and power densities already exceed the USABC targets by about 50% margins, and smaller cells also have demonstrated fast charge capability of 80% charging in less than 15 minutes. Remaining gaps in cycle life and calendar life are addressed by dedicated tasks in the USABC program, with program completion scheduled for Q2 2024.

(b) (4)

The anode manufacturing equipment is also under development with equipment vendors, [redacted] The development started in 2021, and part of its development is supported by a recently awarded DOE AMO grant [redacted]

Thus, all new equipment pieces are in relatively advanced stages of design and development or ready to be produced. All equipment has a similar throughput target and is designed for manufacturing and with competitive cost targets. The demonstration scale manufacturing scale-up proposed here will allow not only to demonstrate products at costs and performance compatible with EV markets, but will also enable products that can fully address the demand of smaller markets, critical for national competitiveness and security, such as electric flight and defense applications.

1.2. Project Goal

The scale-up of silicon nanowire anode and cell fabrication for high volume production is one of the most important steps needed for maturing this technology, and to bring its benefits to the electrification of transportation and to society in general. Amprius has already proven that the manufacturing of silicon nanowire anodes can be integrated in an in-line, R2R system in small pilot scale (100s of kWh per year). Two pilot-scale lines are currently being used for sampling and small commercial production in Fremont, California. A much higher production volume is needed to achieve manufacturing cost effectiveness and industry benefits. Amprius started the design and development of larger scale manufacturing lines for silicon nanowire anode [redacted], in the first half of 2021 [redacted] after the initial validation of capability and performance, construction of larger, commercial scale manufacturing can be done by replication of these production lines. Amprius plans and proposes for this demonstration program to build the support infrastructure, including the cell assembly capability that matches or exceeds the throughput of two anode manufacturing lines, i.e., about 500 MWh. The scale will allow automation and cell assembly efficiency that is comparable to that of low GWh manufacturing, enabling a robust cost analysis and demonstration of manufacturing feasibility.

A main objective of the demonstration scale silicon nanowire Amprius proposes is to integrate the custom designed silicon nanowire anode manufacturing equipment in a relatively large-scale cell manufacturing environment. Although individual pieces of equipment have been tested in the proposed scale or in scaled down versions, the rest of the cell assembly tested to date relied on mostly manual or semi-automated equipment, which allowed a high degree of flexibility in the use of the silicon anode for cell assembly. For example, due to its reduced thickness, the highly porous structure of silicon nanowires on [redacted] foil results in a very flexible anode sheet relative to graphite anodes, and the handling of such foils for automatic stacking needed small modifications to the handling arm. Testing and integrating the silicon nanowire anode handling in standard factory equipment will be a main focus of the proposed work, in parallel with the factory construction. Higher automation level in cell assembly will include automation of handling steps between cell assembly processes, which are currently done manually. Demonstrating the technology at the proposed manufacturing scale is key to its commercialization, increasing customer confidence in its implementation as well as in establishing partnerships for even higher manufacturing scale for EV an energy storage markets.

To achieve the demonstration goal, the success factors include the anode equipment integration at scale, prelithiation step integration, automating anode handling, and cell assembly on automated lines. In addition, the success of the of the project depends also on the timely construction of the factory supporting infrastructure, including silane gas supply, and the associated workforce training and qualification. Each of these factors have separated metrics, and all are integrated in the final metric, the cost of cells produced. For this purpose, Amprius has teamed up with NREL and ANL groups that have developed cost modeling and analysis software packages for solar industry (NREL) and lithium-ion batteries (ANL, BatPac). Because the silicon anode manufacturing resembles more the manufacturing of solar panels than that of slurry coated graphite electrodes, NREL's solar panel cost analysis software will be modified for the direct gas-to-electrode silicon anode manufacturing. The output will be then passed as input to a modified BatPaC model that eliminates the graphite anode materials and manufacturing costs. Thus, the objectives and metrics can be also separated by functional groups.

A major task for anode manufacturing includes the assembly of an automated system for loading parallel metal foils and silicon coated development for uniform and stable deposition for anode fabrication into modified equipment from solar industry. Key specifications objectives for the anode deposition process and equipment throughput are shown in Table 1.

Table 1. Objective specifications for anode manufacturing line system and anode performance

[redacted]

(b) (4)

(b) (4) [redacted].

The lithium-ion cell performance of the anode produced will be monitored and compared to the baseline manufacturing method in pilot scale. Amprius is continuously improving the cycle and calendar life of its cells, and recent experiments with optimized anode structure and cell design and parameters exceeded 1000 cycles with 80% depth of discharged and 750 cycles with full voltage range. Amprius plans to install cell assembly equipment for pouch cells with flexibility in cell dimensions, to be able to serve a variety of customers and markets. For EV cell demonstration and cost analysis, the form factor will follow the development of the EV cell in the USABC program, [redacted] Depending on the evolution of metal prices, especially nickel, it is expected that the silicon anode cell could offer a cost saving [redacted] at the cell level, due to the direct silane to coated anode manufacturing. The target cell level attributes and metrics are shown in Table 3.

Table 3. Attributes of cell technology proposed for end of program demonstration

[redacted]

The scaled-up manufacturing anode line will produce anodes that target a material capacity of over 2000mAh/g, as well as cycle life and other cell performance aligned with DOE and USABC goals, including a specific energy of over 400 Wh/kg and a cycle life of over 1000 cycles in cells with NMC811 cathode. Amprius will deliver cells for evaluation by INL or other testing laboratories. The total installed annual cell manufacturing capacity of 500 MWh will be the

"elemental unit" of larger, multi-GWh manufacturing plants, and will allow the demonstration of cost and performance at scale.

In addition to the technical targets, Amprius also plans to develop a skilled and diverse workforce, creating at least 300 well-paid jobs by the end of the program, with at least 30% coming from the neighboring disadvantaged communities.

1.3. DOE Impact

Amprius' differentiating technology – an anode made of silicon nanowires – is meeting the DOE specific energy, energy density and fast charging performance targets already, and is close to meeting the cycle and calendar life targets. According to presented DOE studies[1] silicon anodes will be necessary for cell price reduction to under $100/kg, thus making it an important outcome for the economy in general. A highly performant manufacturing plant for cells with silicon anode as outcome of the project will unlock silicon's potential for many important transportation and energy storage markets. The performance level of Amprius' silicon nanowire cells is already far superior to other lithium-ion silicon solutions.

The realization of Amprius' R2R pilot-scale system was funded exclusively by Amprius in the 2016-2018 timeframe. Based on this success, Amprius has already started the next level of manufacturing equipment scale-up with initial and partial funding to date available from investors and strategic partners, as well as with pending DOE support. Due to the much higher capital costs required for scaling at the next level (sub-GWh, but still large enough for many commercial markets), Amprius plans to use public market funding to support this phase. On May 12, 2022, Amprius and Kensington Capital Acquisition Corp. IV announced an agreement that will result in Amprius becoming a publicly traded company. However, due to the high risk and cost of developing advanced battery technologies, such an innovative and large endeavor will be significantly accelerated with DOE funding by bringing together the team and resources needed to support it. DOE funding will enable high volume manufacturing at reduced cost of a high performance and unique technology on an accelerated timeline. Demonstrating the functionality and cost effectiveness of a manufacturing worthy technology will significantly reduce the risk of future investments in manufacturing facilities of multi-GWh required for electric vehicles and energy storage. Amprius' plans to build manufacturing plants in USA and the use of products for electric mobility (ground and air) as well as for defense applications align perfectly with the DOE's direction to fund investments within the electric vehicle battery supply chain, increase domestic battery manufacturing, and create good-paying clean energy jobs.

1.4. Equity Plan

Amprius is dedicated not only to community engagement, but community empowerment and inclusion. Our plan for the new pilot plant location and our ultimate production facilities includes considerable state, local, and community engagement before any action is to be taken.

(b) (4) [redacted]

According to population estimates provided by the U.S. Census Bureau, approximately 64.7% of the population in [redacted] is Hispanic, a population identified by the EPA to be more exposed to the highest impacts of climate change. [redacted] is at a higher risk for air pollution and

[1] Cunningham, B., AMR VTO 2022

has a higher rate of asthmatic people than the rest of Texas, a potential indicator that pollution is having health effects on the residents of [redacted].

Additionally, the poverty rate in [redacted] is 19.6%[2], which is significantly higher than the national poverty rate of 11.4%. The community in [redacted] is comprised of multiple demographics defined by the Justice40 initiative to be high priority beneficiaries for the funding opportunity.

(b) (4) [redacted]

Amprius embeds diversity, equity, and inclusion as a core part of our business practices, from recruiting and onboarding, to proactively identifying and preparing a diverse pipeline of future leaders. To that end, Amprius plans to partner with organizations that encourage and support diverse talent, which will also include apprenticeship programs that boost recruitment of employees from backgrounds that are traditionally underrepresented.

Developing a diversity, equitable, and inclusive work environment requires continuous efforts that are measurable and trackable. Below are SMART goals that Amprius will work to attain along with metrics to assess viability and completion of the goals, by the end of the program and manufacturing demonstration. The metrics presented below will be monitored and evaluated quarterly during the workforce development task (Task 4).

Table 4. DEI Goals, Metrics and Objectives

Goals and Metrics	DEI / Business Objective
At least 30% of all hires must be members of a DAC	• Increase representation of DACs in the workforce • Reduce barriers to employment for under-represented individuals
At least 50% of all Manufacturing Technician hires must be members of a DAC	• Increase representation of DACs in high-paying, blue-collar jobs • Reduce barriers to employment for under-represented individuals
Provide at least 4 upskilling / training opportunities per calendar year to all employees	• Increase job knowledge, expertise and safety • Contribute to community workforce development
Form at least 2 Employee Resource Groups to address the needs of employees	• Maintain an inclusive and transparent environment that is attractive to workers who are under-represented

Our plan to provide high wages that will benefit the community in [redacted], and disadvantaged communities in [redacted] in particular. The DEIA section of the Plan outlines efforts to increase workforce representation of women, veterans, people of color, and specifically Hispanic people, who make up a majority of the [redacted] Community. Because our hiring efforts will be specifically directed at providing members of these disadvantaged communities, they will be the beneficiaries of Amprius' high quality and high wage jobs.

[2] https://www.census.gov/quickfacts/sanantoniocitytexas

Table 5. Anticipated Jobs Milestones at the Proposed Site

Job type	Description	Expected Pay Range	Positions	Timeline
Management	Provide factory management and engineering leadership	[redacted]	15	Q2
Engineering	Responsible for engineering support for battery design, manufacturing, mechanical, electrical, facilities, and IT		35	Q4
Business support personnel	Supports accounting, finance, purchasing and procurement, shipping/receiving and logistics, sales, marketing		22	Q5
Technicians, Operators, Maintenance	Direct labor spans skilled technicians in mechanical, electrical, and chemical applications to unskilled operators.		260	~20/month starting in second year

2. TECHNICAL DESCRIPTION, INNOVATION, AND IMPACT

2.1. Relevance and Outcomes

The silicon nanowire anode technology is highly relevant to the DOE goals for electrification of transportation

Pure silicon nanowire anode material. As previously described in the Baseline Technology section, Amprius developed a silicon anode technology that mitigates many problems that silicon materials face in lithium-ion cells. The nanowire growth mechanism directly attaches each nanowire entity to the current collector by a very strong connection ("metallurgical connection"), making the anode structure very stable mechanically during cycling. The nanowires, with an areal density of millions per square centimeter, [redacted] behave as conducting current collector during changing and discharging. The spacing between coated nanowires and the nano-dimensional voids inside the silicon makes the structure stable even in the case of total lithiation of the silicon material.

The mechanical stability of the electrode is the first and one of the most important properties that an electrode must have, and a major drawback of electrodes that include silicon particles. Due to its mechanical stability, even at total lithiation (over 3200mAh/g in half cell to 10mV vs. Li/Li+, see Figure 3), the swell of the material is under 25% at the electrode level (compare to about 8%) for graphite) and under 10% at the cell level (about 3% for graphite).

The multi-step nanowire fabrication process also addresses the first cycle efficiency, material stability and electrolyte consumption problems that silicon materials have. [redacted] reduces first cycle lithium loss to values comparable to graphite (8% vs. 6% for graphite).

To increase initial conductivity and maximize the energy density advantage, Amprius performs a prelithiation process [redacted] The first cycle efficiency of the silicon nanowire anode of about 94% is comparable to that of graphite and significantly higher than that of nanostructured silicon anodes or silicon monoxide materials, and can be matched with comparable first cycle efficiency cathodes, such as NMC materials, without a need for prelithiation. However, a prelithiation [redacted] keeps the anode voltage [redacted] at full discharge and compensates all electroactive lithium loss during SEI formation, optimizing the use of active materials for maximum energy density and specific energy purpose. Amprius chooses the anode/cathode (or N/P) ratio so that the silicon specific capacity utilization is in the 1,500 - 2,500mAh/g range, depending on the energy density and cycle life targets for the cell application, and, thus, has enough unused capacity that can be used to store additional lithium. In general, lower cycling capacity results in longer cycle life.

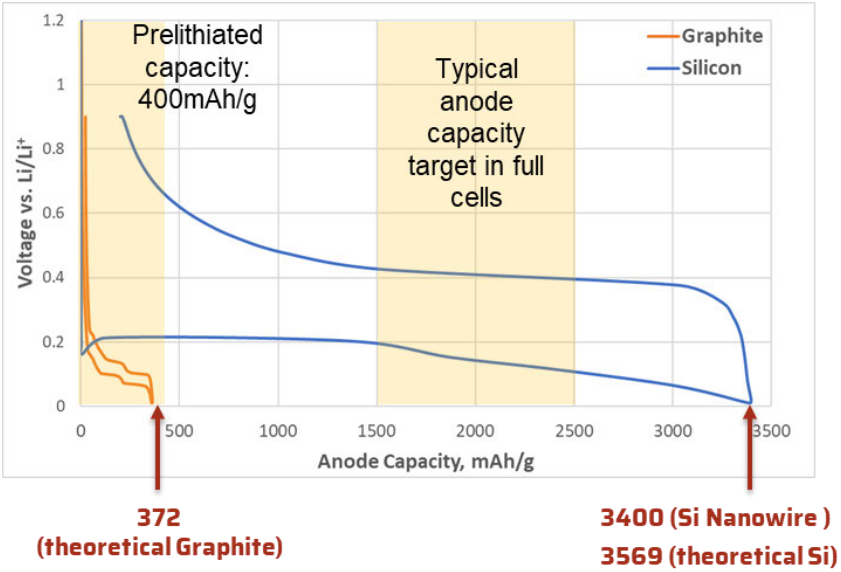


Figure 3. Capacity vs. voltage to 10mV at C/20 rate for Amprius silicon nanowire anode vs. Li/Li+

High performance chemistry and cells: Following the successful development of multi-Ah cells, Amprius' cell development for electric vehicles was supported and directed by USABC goals, within a project from 2015 through 2018. Annual verification tests by INL confirmed significant progress toward USABC 2020 goals and especially a significant increase in Calendar Life from a few months to about 1.5 years at 50°C, stored at full charge. The cell technology was also developed from small 2Ah cells with LCO cathode to 10Ah and 45Ah cells with NMC cathodes with different Ni content up to an 811 ratio.

Energy and Power. Since 2018, the industry and Amprius have focused on the selection of cathode active materials with lower cobalt contents and higher energy density. NMC811 and NMC materials with more than 80% Ni (Ni-rich NMC) have been developed or are in different

stages of manufacturing maturity. Amprius has developed a Si/NMC811 chemistry and cells in its existing form factors (50 mm x 56 mm and 54 mm x 66 mm), with capacities of 3 Ah and 5.4 Ah, respectively. Moreover, Ni-rich NMC cathode materials are also currently under evaluation and cell development. The silicon nanowire cells meet or exceed the USABC 2023 and DOE target goals for EV cells for most criteria by significant margins, as shown in Table 2. The remaining gaps - Cycle Life and Calendar Life - are addressed in Amprius' R&D efforts and other parallel projects.

Table 6. Comparison: USABC 2023 goals for EV cell vs. Amprius cell performance

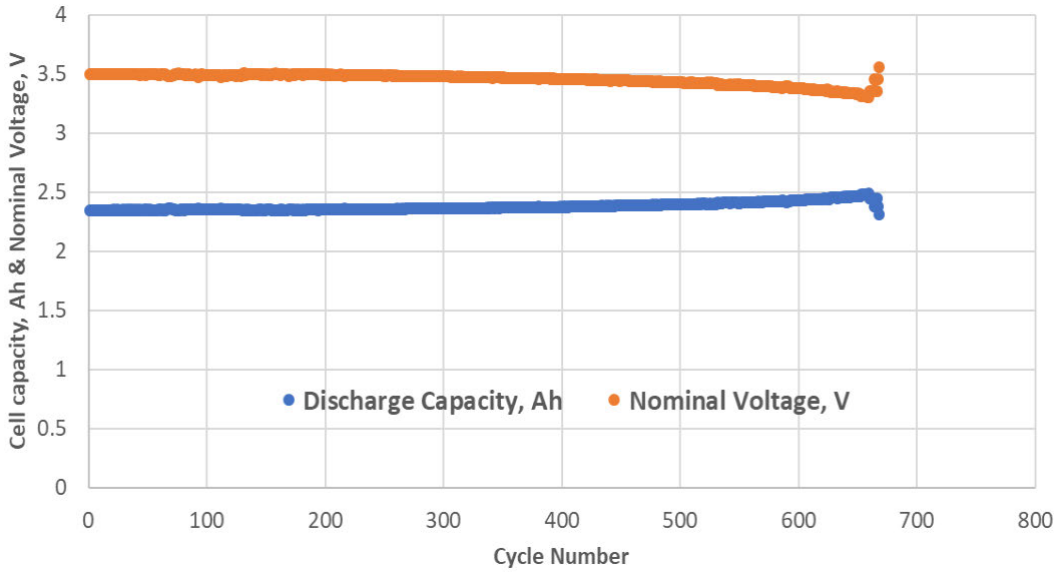
[redacted]

(b) (4)

Cycle Life. Figure 4 below shows the cycle life of a recently demonstrated cell with a specific energy of 410Wh/kg with NCM-811 cathode. The current performance status is significantly better than any published data for multi-Ah full cells at over 400Wh/kg specific energy, reaching values that were believed possible only with lithium metal anode. The progress of Amprius silicon nanowire technology was monitored and made possible by significant support from DOE, USABC and other government agencies.

Due to the continuous changing SEI and surface properties of silicon during cycling, charge transfer reaction overpotentials, as well as concentration gradients, vary during the cycle life of a silicon cells. The result is an apparent loss of material capacity in a fixed voltage window, or a drift of the voltage profile. Thus, the capacity loss may appear higher than it is, especially when

the silicon anode is matched with a flat voltage profile cathode (LFP, Ni-spinel, or even LCO), and appear as longer cycle life with cathodes with more tilted/sloped voltage profiles, such as NMC or NCA materials. A second outcome of this property is that cycling with constant capacity or energy limits, as in the case of DST tests, results in much higher cycle life. Moreover, even at the end of DST cycling, the capacity loss is less than 20% (typically in the 10-15% range), and the cycling ends because of loss of power capability. Thus, it is expected that the DST cycle life would be typically double relative to full depth of discharge, constant current cycling. The comparison in **Error! Reference source not found.** shows this relationship for a Si/NMC811 cells. Cycling and cell details are listed in the caption.



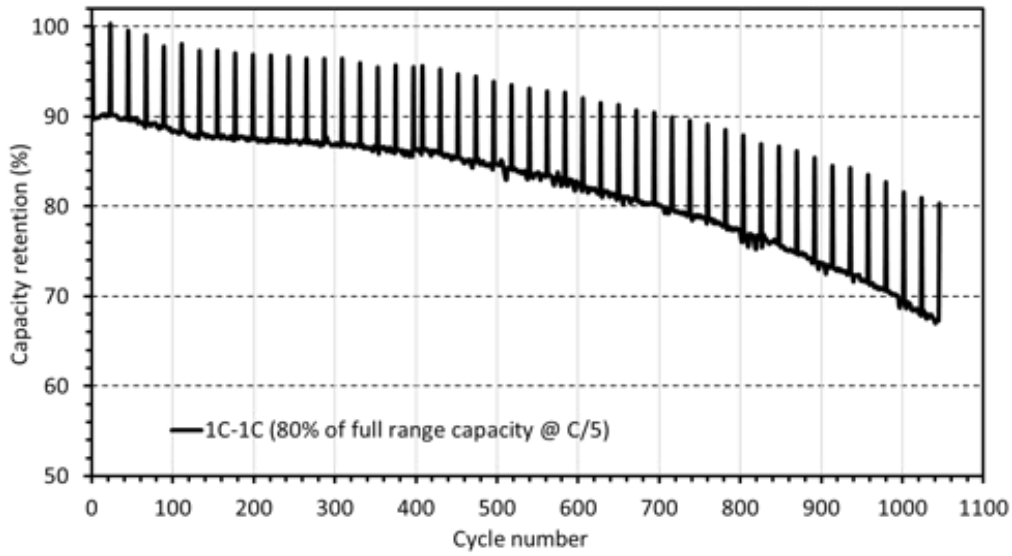


Figure 4. (upper panel) DST cycle life at 30 °C of Si/NMC811 cell [redacted] *(lower panel) +1C/-1C cycling with 80% depth of discharge and +0.2C/-0.2C capacity check every 20 cycles*

(b) (4) [redacted]

Calendar Life. Electrolyte formulation development during the previous USABC program showed that Calendar Life can be significantly extended by reducing side reactions on the anode and cathode through rational and empirical selection of electrolyte solvents, salts, and additives. Although these studies are inherently slow, Amprius made constant progress during the 3 years of the program and increased the calendar life from about 2-3 months at the beginning to over 1 year at 50 °C at the end of the program, as reported by Idaho National Laboratory in the evaluation of the cells (**Error! Reference source not found.**). Calendar life is a main focus of current Amprius' USABC program and internal R&D efforts.

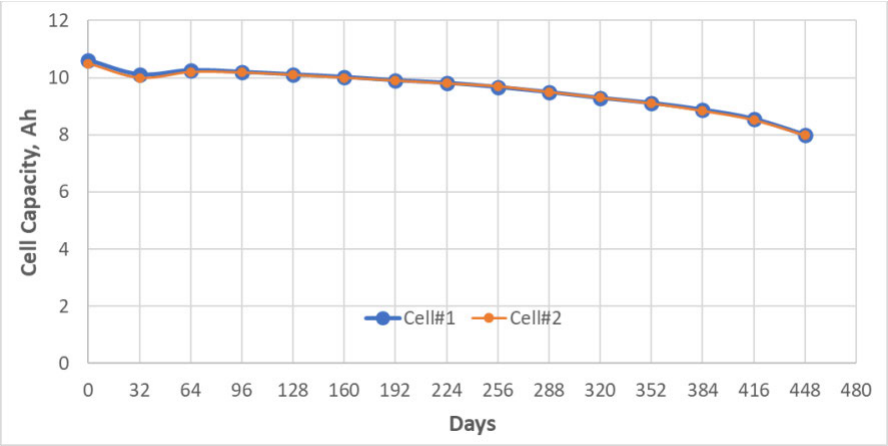


Figure 5. Calendar life at 50°C for Si/NMC721 cells charged to 4.1V. Data reported by INL

Fast Charge. One of the most important metrics for EV cells, the fast charge capability, is the one that benefits from the properties of silicon anodes – much lower thickness of the anode intrinsically enables fast charge capabilities. This benefit is maximized in anodes with the silicon nanowire structure because the electrode porosity is high and the pores are relatively straight (low tortuosity), and the active material is directly connected to the current collector (no particle-to-particle contact is needed). With no changes to the anode structure, the rate capability (charging and discharging) of silicon nanowire cells depends largely on the design of the cathode electrode (thickness, porosity). Amprius has developed products that can charge and discharge at up to 10 C rates and still have specific energy of over 370 Wh/kg (Figure 6). The recently developed cell with lower loading cathode can be charged to 80% in 6 minutes, with maximum cell temperature of 55 ℃, reaching full charge in about 20 minutes. Cycling the cell with extreme fast charge of 6 minutes and C/5 discharge shows a very stable cycling, and dV/dt data during relaxation after fast charge confirms a stable cycling with no lithium plating.

In the previous USABC program, cells with NMC721 cathode were tested by the high rate charging test following the USABC protocol, with 3.2 C charge rate for 15 minutes or taper if maximum operating voltage Vmax100 was reached. Measurements at Amprius and INL confirmed that the USABC fast charge protocol can restore about 85% of charge capacity in 15 minutes. Recent Si/NMC811 cells with the chemistry and cell construction described earlier also charged over 80% in 15 minutes (~88%).

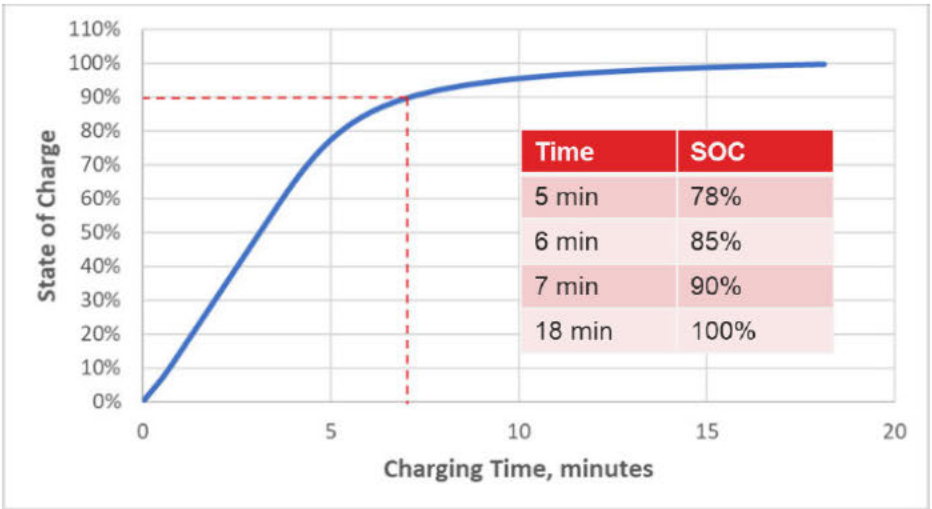


Figure 6. Extreme fast charging protocol applied to a 370 Wh/kg Si/NCM811 cell [redacted]

(b) (4)

Wide operating temperature range. For Si/NMC811 cells with 410 Wh/kg specific energy, the available energy at -20°C is about 75%, and meets the USABC target targets of this program. Pouch cells are relatively sensitive to high temperature operation and should be limited to about 55°C, exceeding USABC operation limits. Amprius has also demonstrated that exposure to temperature as high as 66°C does not affect cycle life or power capability.

Safety. Amprius cells have similar safety profile to graphite cells. A few cell products commercialized to date have been certified for air cargo shipping (UN38.3). Recently, a 5.4 Ah cell was developed with support from US Army for increased safety, including nail and bullet penetration. In general, due to its higher voltage compared to graphite, silicon materials used at partial capacity are less prone to lithium plating, even at high rates or charging at low temperature, and are much more tolerant to overcharge due to intrinsically high N/P ratio.

Low Cost. Silicon is the second most abundant element on earth [redacted] The current market price for polysilicon is $8.73/kg. (energytrend.com). Silane, a precursor gas to polysilicon, is also available at single digit $/kg costs. Moreover, due to its much higher gravimetric capacity, less active material per Ah or Wh is needed in silicon cells. Thus, it is indeed estimated that silicon anode can further reduce the cost of EV batteries compared to graphite and this direction is emphasized in the last years by DOE support. There are many cost driver factors related to silicon implementation, however, which make its cost equation somewhat more complicated than that of graphite cells, mostly because silicon cannot be used in its raw form.

Amprius has thoroughly analyzed its anode manufacturing process and costs based on the roll-to-roll line operation, as well as cost inputs from the GWh scale cell factory in Wuxi. For the nanowire silicon anode, the current status and target goals for different factors at GWh level are shown in Table 4. As discussed before, the silicon nanowire anode is fabricated in a single production line, and the input material precursors are in the gas form. To make it compatible with cost models for graphite cells, it can be understood as the input material gases are "coated" on the foil, similar to a graphite slurry being coated on a foil. This is a main advantage compared

to other silicon technologies that similarly use silane gas as silicon precursor and CVD methods to produce silicon-carbon composite powders that, in addition to their lower silicon content and capacity, still have to be coated on foils, sometimes in more restricted conditions than graphite, resulting in a more complex and lower manufacturing efficiency path from silane to electrode. The comparison is schematically illustrated in Figure 7.

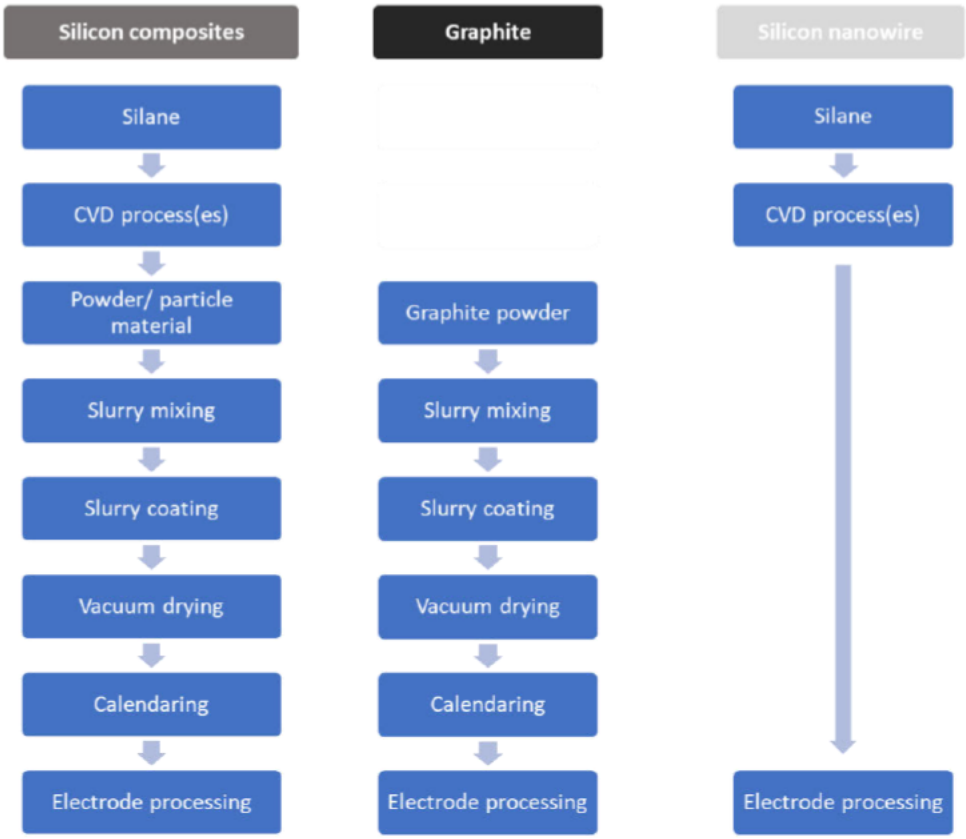


Figure 7. Comparison of coated anode manufacturing steps from raw materials

The silicon nanowire R2R line replaces all anode fabrication equipment (powder mixing, slurry mixing, coating, drying, calendaring) and eliminates all handling and associated labor for all these steps. However, the low pressure, high temperature processes consume more energy, and the equipment capex is higher than for graphite anode fabrication, which is a very mature technology. Although priced similarly on a per kg basis to graphite, and of much higher capacity as active materials, silicon gas precursors have a lower conversion or utilization in the plasma processing steps due to escaped gaseous and solid byproducts. The solid byproducts need to be eventually cleaned, requiring periodical maintenance downtime. Thus, the gas utilization is a critical cost factor because it affects most other aspects of anode fabrication. [redacted] This latter geometry is particularly attractive, because it enables a very high foil density in the chamber, and thus, a massively parallel process with high throughput in a

low chamber volume and low energy consumption. [redacted]

Table 7. Cost drivers for the silicon nanowire anode.

(b) (4) [redacted]

The GWh scale assumed in the second column results in much lower labor and overhead costs relative to pilot scale, and would be representative of the demonstration scale of 500 MWh, when running at target throughput, because it relies on the same size manufacturing lines. [redacted]

Based on the numbers in the comparison, it is expected that the coated anode cost will be [redacted] lower than that of graphite anode. Moreover, even though the rest of bill of materials for the cell is similar to graphite, other cost savings at the cell level are due to the higher electrode loadings, possible only with silicon anodes. [redacted] This cell design aspect results in less current collector foil and separator used in the cell, and additional cost savings.

(b) (4)

Figure 8. Comparison of nanowire silicon and graphite anodes cost structures.

At the battery level, the increase in energy density of the cells not only make the cost of the resulting cells cheaper but make an electric vehicle utilizing Amprius' cells less expensive since it requires a lower amount of overall cells (kg and liters) to achieve the same distance. Because the difference between a vehicle with Amprius' cells and traditional Li-ion cells would be the vehicle weight, the main benefit of utilizing Amprius cells would be a vehicle with longer range since the rolling resistance of a lighter vehicle is lower, thus enabling a compounding effect on cell energy density, vehicle weight, and driving range. DOE analysis indicates that a 10% vehicle mass reduction results in 6-8% energy efficiency or range increase (Joost, W. J. Reducing vehicle weight and improving U.S. energy efficiency using integrated computational materials engineering. JOM 64, 1032–1038 (2012).). Amprius estimates that a typical 100kWh battery with Amprius cells will result in 15% vehicle mass reduction relative to a vehicle with graphite cells, and about 10% range increase. Moreover, the battery will be smaller and require less packaging and cooling materials, further reducing the battery costs (manufacturing efficiency).

Proposed project outcomes

The distinctive innovation, performance, and cost levels possible with Amprius' silicon nanowire anode technology are compelling and warrant the investment in the next level of manufacturing scale. Amprius' business plan includes a commercial scale ramp up that starts with an initial pair of anode manufacturing lines, complemented by a larger scale cell assembly capacity, [redacted]

Thus, Amprius proposes a scale of 500 MWh of silicon nanowire cell capacity for demonstration purposes, to include two 250 MWh lines for anode manufacturing and the matching cell assembly equipment. For that purpose, based on an initial factory layout, a factory with a surface area of about [redacted] will be built, including silane gas handling for anode fabrication, cathode coating and cell assembly.

About 1/3rd of the project funding will be spent on construction and infrastructure, with about 1/3rd of that estimated to be spent on labor expenses. Amprius' subcontractor and its subcontractors have a mandated target to hire local subcontractors and labor for construction and development work. Once operation, it is expected that the demonstration scale cell factory will hire over 300 people from local communities. Overall, including local labor expenses and locally sourced materials, it is expected that about 50% of the project funds will be spent in [redacted] area.

Based on the technology status, including commercial sales for premium applications, and the project goals, Amprius considers that the work proposed here will advance the TRL for the silicon nanowire technology from 6-7 to 8, and should enable a high-performance cell technology that can be deployed in multi-GWh factories in the future years.

The silicon nanowire cell manufacturing process flow is shown in Figure 9. The main input materials for the anode are [redacted] foils, silane and other process gases for silicon nanowire [redacted]ode fabrication, and [redacted] prelithiation. The cathode inputs include the active materials [redacted] MC811 or other), binder, conductive carbon and solvent, as typically done in the graphite cell [redacted]anufacturing. The cathode manufacturing line will include solvent recovery. Amprius selected [redacted] cathode coating line with zebra coating capability, which allows electrode punching and clean [redacted]b area, so that no further material removing is necessary, reducing cathode material waste. [redacted]

(b) (4)

The electrodes will be stacked by automatic stackers with the Z-fold method for separator. Tab welding is done ultrasonically, by automated equipment following stacking. The stacks will be pouched in pre-formed pouches, sealed at top and side, and passed automatically to electrolyte filling. The electrolyte filling is done in vacuum and soaking can be done at controlled temperature. Formation is done automatically in temperature-controlled chambers, under directional pressure. After formation, the side pouch is punctured, cell degassed under vacuum, and the pouch is resealed automatically. The equipment selected also includes pouch trimming and side folding functions. Multiple quality control points are set on the process flow, at different points in cell fabrication, including X-ray cell verification after cell fabrication, following battery industry best practices.

For anode manufacturing metrology, Amprius has teamed up with NREL to introduce in-line process and product control. Scaling up the unique advanced anode manufacturing processes will require evaluation of electrode material properties and an understanding of process control. The development will be done in parallel with the anode tool modifications.

Based and the process flow and particularities specific to the silicon nanowire cell assembly processes, [redacted] have selected manufacturing equipment for cathode coating and the rest of the cell assembly and, with [redacted] support, selected a preliminary building partitioning that allows an estimate of construction costs. Because Amprius has not selected yet the exact location of the factory, a detailed factory design is not possible. However, the preliminary plan targets a single-story design, with a main building for production floor and office space. The target material and process flow will be similar to that of graphite cell manufacturing.

(b) (4)

Figure 9. Silicon nanowire cell manufacturing process flow

The full building will include warehouse space for input materials and cell product storage, as well as office space. Based on the equipment footprint, both the anode and cathode lines need [redacted] as part of the cell production floor. Because Amprius plans to use Ni-rich cathode materials in its cells, the cathode coating area will be a dry-room with -30°C dew point. The anode prelithiation, ablation and cutting, cell stacking, sealing, electrolyte fill, and degas steps are done in dry-rooms with -45°C dew point controlled humidity. At high level, the planned surface area [redacted]f different manufacturing partitions is listed in Table 8. The area listed under office space [redacted]cludes corridors, breakroom and restroom areas, which will be more precisely defined at the [redacted]esign phase. Exterior building facilities will include about 100 parking spaces, access roads and [redacted]reen areas, as well as other features to be added at the design stage, after the exact site is [redacted]lected.

(b) (4)

[redacted]*ble 8. Approximative space partitioning needed in the factory based on equipment footprint*

[redacted]

An important expected outcome of the demonstration program is a thorough understanding and analysis of the silicon nanowire anode and cell manufacturing cost factors. Anticipated manufacturing costs for the Amprius anode will be characterized by application of NREL's web interactive bottom-up manufacturing cost modelling software suite. The cost modeling effort will benchmark current costs, projected costs following a technology roadmap, and sensitivity analyses by Monte Carlo techniques. Argonne will provide the anode layer material distribution, across the cell area and electrode thickness, to enable the NREL model to estimate the anode layer mass, volume, and cost. Argonne will use these results as input in the cell-pack design and calculate the cost of the cells and packs in the battery manufacturing plant. The outcome will be a fully integrated BatPaC based cost model with material input from silane to battery.

Anode manufacturing. The silicon nanowire anode manufacturing at scale will be the most important outcome of the project, as the core technology proposed for demonstration. Amprius has proven the manufacturing of the patented silicon-based nanowire anode for Li-ion battery application at low-volume pilot scale. In this innovative anode design, three processes are needed:

[redacted]

[redacted]

(b) (4) [redacted] The major focus in process development is not fundamental science development but engineering and design - to get a high deposition rate, high gas utilization and good coating uniformity across the large area of the metal foils. [redacted]

For the 2nd process [redacted] Silane decomposes and then silicon condenses on both foil electrode surfaces.

Amprius performed already feasibility tests [redacted] with silane gas precursor and has proven a high utilization of silicon [redacted] Equipment and process modifications are underway to adapt the existing equipment to silicon nanowire deposition, and will be ready in parallel with the factory construction.

A main engineering design and development effort is underway currently to automate the foil handling during anode processes, including transfer between process chambers. [redacted]

Similarly, Amprius has subcontracted the design of a chamber [redacted]

(b) (4) [redacted]

2.2. Feasibility

Based on the proven success of the technology, it is imperative to scale up the technology to commercialize the silicon nanowire anode-based battery in a wide area of applications. In more established, large markets, such as electric mobility or stationary energy storage, availability of cells at GWh scale and low-cost is a critical requirement. This in turn translates to manufacturing capacity increase and cost reduction in silicon anode manufacturing, which is, inevitably, achieved only with new equipment and process innovations.

It needs to be emphasized that the innovations that have to be made in this proposal are not of fundamental science in nature, but more engineering-wise: the major manufacturing step, i.e., the bulk porous silicon coating process, is scaled [redacted] to use anode substrate foils, consequently increasing the throughput of anode production significantly and reducing the manufacturing cost of the anode. This technology application has high silane utilization and energy efficiency by reducing the equipment volume relative to manufactured anode area and produces a ready to use coated electrode. The prelithiation step also uses an already verified process and equipment [redacted] The rest of the cell assembly processes are identical to graphite cell manufacturing and use off-the-shelf equipment, with minimal design changes for cell form factor or specific cell component properties.

For quality control, metrology and cost analysis, Amprius has teamed up with NREL and ANL, two leaders in solar and battery technology, respectively, who will monitor, model and integrate the

process analysis of the anode manufacturing with the BatPaC battery cost model to provide a thorough cost analysis and model for the silicon nanowire technology based on the factory demonstration factors and outputs.

Amprius has teamed [redacted] for factory design and construction, and their previous experience in the battery industry, including in the construction and operations of multi-GWh factories, will be key to the execution of the project on a timely matter, including cell assembly equipment selection and validation.

(b) (4)

For site selection, Amprius has already been working for the last year with [redacted] a global commercial real estate services company, [redacted] a US company specialized in engineering, architecture, environmental and construction services. A key criterion for the site selection is the workforce availability. Amprius has engaged [redacted], a global leader in contingent staffing and permanent recruitment, with a focus on workforce diversity, community involvement, and workforce development. Based on the team members input and Amprius' goals, the team has selected [redacted] for the construction of the demonstration factory and planned future expansion to multi-GWh scale.

According to the feasibility test results and engineering experience of Amprius and its team members, the proposed work and technology are all feasible, achievable, and cost effective at the proposed scale, as detailed in the descriptions below.

Anode manufacturing line feasibility

Amprius successfully built a roll-to-roll prototype manufacturing tool which produces the silicon nanowire anode that Amprius designed and patented. Batteries produced with the tool have very high specific energy and since 2018 have already been sold to customers for high-end applications. After this successful demonstration, interest in Amprius batteries was high and, to fulfill the development and commercial interest of customers, especially in premium defense applications, Amprius sourced and installed a 2nd roll-to-roll pilot tool in 2020. As of 2022, the total yielded annual capacity of the two pilot tools is [redacted]. This capacity is still far from meeting our customers' needs and it can only address demonstration projects or sampling for larger markets, such as electric vehicles.

Since early 2021, Amprius has started feasibility tests on mass production of our silicon nanowire anode technology. The projects focused on all the process steps [redacted]

Among all these studies, the capabilities of mass production and cost-effective approaches of silicon nanowire anode manufacturing are the major focus.

As stated above, our current pilot tools are roll-to-roll design: [redacted] key process steps [redacted] are integrated in one roll-to-roll tool. [redacted]

[redacted]

(b) (4)

[redacted] engineering team proposed to modify their existing [redacted] equipment for solar wafers. [redacted] This also increases the process control flexibility [redacted]

[redacted]

The great advantage of the configuration is that the foil substrates, to be coated with silicon on their both sides, [redacted]

[redacted]

Amprius has already tested the setup [redacted] and was able to successfully deposit silicon on the foils. [redacted] The lower gas waste should also increase uptime (less maintenance to clean by-products) and foil utilization (less edges). Design of experiments will be done to optimize foil placement, process conditions, including gas flows, chamber pressure, temperature, RF settings etc.

(b) (4)

[redacted]

Figure 10. (a) Graphite boat for loading silicon wafers in a commercial PECVD tool. (b) Schematic of the PECVD process when coating silicon on templated foils.

Thus, the source-less PECVD process is the best approach for silicon nanowire anode manufacturing because of the following advantages:

- [redacted] very mature and has been in mass production for solar cells for many years and uniquely combines high throughput, high material efficiency, and low total cost of ownership as evidenced by solar cell manufacturing.
- Spacing between the substrates (foils) can be as low as [redacted] thus enabling high loading and throughput.
- Low volume footprint of equipment, enabled by the point above, reduces pumping requirements and thus, significantly reduces energy use.
- Minimal particle generation or coating on the chamber walls and in pumping lines which minimizes downtime for system maintenance.

[redacted]

[redacted]

The main hardware modification necessary to adapt [redacted] is a foil handling system [redacted]

[redacted]

In summary, when choosing a method for bulk silicon coating, factors including deposition rate, silicon precursor gas (silane) utilization efficiency, particle generation and consequent downtime associated with system cleaning, substrate loading capacity, and lastly and the most importantly system capital cost must all be thoroughly considered. Amprius performed feasibility tests with many plasma sources in various configurations. The initial results, weighed against all these factors, suggest that [redacted] is the most suitable and scalable approach for bulk silicon coating in the fabrication of silicon nanowire anodes.

Anode prelithiation step feasibility

Amprius utilizes prelithiation as a discrete step after anode manufacturing to create an initial Li inventory in order overcome first cycle loses commonly associated with silicon-based anodes and to increase the Li inventory in the cell for cycle longevity. Prelithiation is commonly utilized for silicon-based anodes and two broad strategies are utilized for prelithiation. The first strategy is to combine the discrete lithium charge to be incorporated into the silicon with the lithium activation process, such as is commonly accomplished for electrochemical prelithiation whereby utilizing the silicon anode as the substrate during the lithium electrodeposition process, the lithium is incorporated into the anode during deposition. The second strategy is to separate the deposition of a discrete charge of Li by controlling the amount of Li put on top of the Si anode by controlling the Li thickness on top and then incorporate the Li through a secondary step. [redacted] Since Amprius accomplishes a formation step during cell production it allows Amprius to be able to separate the lithium deposition and lithium activation step. After investigating several different processes, it was determined that prelithiation [redacted] is compliant with our anode production, our anode material, and is readily scalable to GWh scale.

(b) (4) [redacted]

[redacted]

(b) (4)

Figure 13. Cross section of envisioned [redacted] toolset.

With the installation of the pilot scale toolset Amprius will be able to investigate and optimize these processes as well as the design accordingly. With the amount of customized features that will need to be included in the generation 1 tool, the initial toolset needed to deliver 500MWh/year of annual production will be relatively expensive, with over ½ of the cost of prelithiation being attributed to amortization, mostly because the installed capacity of a tool is about [redacted] With further factory capacity installation and higher tool utilization, the cost of the prelithiation toolset capex can be reduced due to scale and determining inefficiencies in the first-generation toolset. [redacted].

Cell assembly

Amprius proposes to build a cell assembly line capable of at least 500 MWh annual cell assembly capability. Except for the anode manufacturing equipment described above, the equipment required for the rest of the cell assembly is similar to that used in graphite cell assembly. Amprius has already used similar equipment, including automated stacking machine and pouch formation

for the last three years in its low volume pilot manufacturing. Because most of Amprius' customers as well as the EV cells under development for USABC program are of the pouch type, Amprius selected this cell type for scale-up and will source equipment for pouch cells. The electrodes will be assembled by stacking, a standard method for pouch EV cell assembly, and the current method used by Amprius in its pilot line.

(b) (4)

Amprius has teamed up with [redacted] expertise in large volume manufacturing for electric vehicle and grid storage will be key to factory design, cell assembly equipment sourcing and supply chain development.

A preliminary equipment inquiry for budgeting purposes has identified the criteria for selection of different manufacturing equipment pieces, their infrastructure requirements, and operational parameters. The equipment list will be revised and updated as necessary in the factory design phase, including a focus on sourcing equipment from American vendors or with American presence, to ensure installation and maintenance support, as well as to further support the American economy.

One coating and cathode processing line with a minimum capacity of 500 MWh throughput was selected, to maximize the capacity and efficiency in operation. The 500MWh capable cathode coating line includes one of each: Slurry Mixing, Electrode Coating Machine, Calendaring Machine, Slitting Machine.

Two laser cutting machines for each of the electrodes will be needed for the target capacity. Electrode drying will require 4 ovens per electrode type. For the target cell throughput, 8 stacking machines are planned to be installed. Stacking will be inspected by an X-ray scanning machine. 2 tab welding machines will be used per tab type. 4 automatic pouch forming machines will be used for pouch forming and stack packing, including top and side sealing. 4 electrolyte filling machines, under vacuum, include pouch sealing function. Formation and capacity check will be done in 4 machines with 2048 channels each. 4 degas and reseal machines, including side trimming and folding functions will finish cell assembly. A final OCV and DCIR check and X-ray inspection will be performed on 8 inspections machines and one X-ray scanner, respectively.

Quality control

Amprius is certified to the ISO-9001-2015 in its current low-volume production in Fremont, and will transfer its high-quality standards to the new manufacturing location. Quality is assured through the Quality Management System, which is well organized and easily accessible through a configurable process flow and database software [redacted]. There are more than 30 individual processes and over 100 active documents that are at the core of the Quality Management System. Inspection is done at various stages of production from receiving inspection of components, through anode production, at various steps in assembly, and then extensive testing is performed once the cell is complete. Inspection points, marked with diamond symbols on the diagram in Figure 9.

For the new manufacturing area of silicon anode, Amprius and NREL will develop in-line control methods anode manufacturing metrology. NREL will also explore techniques for real-time inspection of Amprius' anode during manufacturing. Manufacturing large area silicon nanowire anodes requires precise control of silicon growth conditions to achieve the desired nanostructures for high battery performance. NREL propose an optical system that will (1) accelerate the scale-up process through rapid characterization of Si NW anode quality during lab-scale to manufacturing-scale development and (2) enable quality control (QC) during the final anode manufacturing process.

2.3. Innovation and Impacts

Today's state-of-the-art automotive battery cells use graphite as the active material in the anode. The graphite anode materials have a reversible capacity of ~350 mAh/g and a reversible voltage for lithium intercalation that is close to that of lithium metal, which ensures a high voltage when paired with metal oxide cathodes. These properties combined with the fact that graphitic based systems have been able to form stable SEI between the electrolyte and graphite particles have resulted in cells capable of achieving greater than 10 years of calendar life and thousands of cycles.

The silicon material can theoretically store >3500 mAh/g of lithium-ion charge, an order of magnitude more than graphite, and has a similarly low operational voltage. The 3D structure of the silicon nanowire anode is 100% pure silicon in a nanowire form as opposed to silicon particles mixed in a powder composite. Amprius' silicon nanowire technology is one of the few if not only technology that, by its structure, enables the operation of silicon in its pure form, at the highest capacity per gram. Indeed, as shown in Figure 3, its capacity is close to the theoretical limit. Most other silicon materials use silicon as an additive only or a "dominant" component of the anode, resulting in substantially lower anode capacity. Moreover, the deleterious chemical reactions between the electrolyte solution and the reducing environment of the low potential intermetallic alloy which prevented the wide-spread adoption of silicon-based anodes are significantly reduced in the practical use of silicon nanowire anode due to the partial use of its theoretical capacity and its high internal porosity coupled with a low surface area. These characteristics of the rooted silicon nanowire anodes have reduced the rate of reactions that typically result in cycle and calendar life that are too short for automotive applications. Moreover, the infamous volume changes experienced upon lithiation and delithiation by silicon are reduced to values comparable to those of graphite materials in silicon nanowire anodes. Combined, these remarkable properties of the silicon nanowire anode allowed Amprius to produce cells that have an energy density and specific energy that exceed those of state-of-the-art cells by 50% or more, while simultaneously improving the power density and fast charge abilities. Cells built with these anodes exceed USABC and DOE targets by more than 50% in most metrics and are close to meeting the cycle and calendar life goals. This important set of properties is, to our knowledge, unmatched by other material structures, with or without silicon.

Amprius' low-volume pilot-scale tool for silicon nanowire anode production is the first-of-a-kind system for in-line, multi-step fabrication of a three-dimensional structure (nanowire) on a R2R web. This system represents the state-of-the-art for silicon anode fabrication. The objective of the project is to apply the source-less plasma deposition and associated equipment and technology to mass production of Amprius patented silicon nanowire-based lithium-ion battery

anode, to enable massive throughput for silicon anode production. A successful outcome will overcome a major bottleneck in silicon anode and cell manufacturing. [redacted] The demonstration of a commercially scalable high-volume silicon manufacturing line will unlock silicon's potential for many important transportation and energy storage markets. High throughput and high efficiency equipment will enable the commercialization of this high-performance solution for many low-cost energy storage applications. At the same time, having a US based company achieve these goals in the context of this project places it in an advantageous position and enables it to lead in these important markets, with a high energy density silicon anode battery manufacturing. Although a demonstration scale for EV markets, the manufacturing capacity proposed will be enough for many other markets, such as defense and aerospace, where many customers develop applications with Amprius cells, of national security interest.

(b) (4) [redacted]

The major innovations that Amprius will bring to manufacturing, described in previous sections, include:

- **System Configuration:** A system for substrate handling so that metal foils can be loaded and provide a stable plasma for uniform coatings.
- **Silicon coating process:** A bulk silicon coating processes to meet the required anode performance while promoting the highest SiH_4 utilization efficiency, high deposition rate, and minimal particle generation.
- **Prelithiation:** Low-cost [redacted] process with minimal material inputs and high utilization.
- **Cell assembly:** Optimized manufacturing process, assembly and equipment for thin silicon nanowire anodes.

In addition to the technology impact that a pure silicon anode can have by replacing graphite, the project will have a significant impact at the local level, accelerating the deployment of private capital in a disadvantaged area, and by creating over 300 well-paid green energy jobs in an area that relies on oil industry for jobs generation.

3. Workplan and Market Transformation Plan

3.1. Project Objectives

The main objective of the program is the demonstration of the manufacturing of silicon nanowire anode technology at component and cell level at a 500 MWh scale, on manufacturing lines that are comparable to those used in multi-GWh factories. The demonstration will bring to maturity the technology by installing the first of a kind manufacturing lines for the new technology and will allow a bottom-up analysis of the cost factors and product performance. The current level of performance based on low-volume pilot production indicates that Amprius will be able to deliver cells that have a specific energy and energy density that is at least 50% higher [redacted] The silicon anode manufacturing uses US based materials inputs, mainly silane, produced at large scale in US, enough for anode production

equivalent to hundreds of GWh of batteries. The scale-up of silicon nanowire anode and cell fabrication for high volume production is one of the most important steps needed for maturing this technology, and to bring its benefits to the electrification of transportation and to society in general.

The project will also create about 300 well-paid jobs [redacted], in a disadvantaged area and community, increasing the share of green energy jobs in an area supported mostly by fossil fuel industry.

Amprius plans and proposes for this demonstration program to build the support infrastructure, including the cell assembly capability that matches or exceeds the throughput of two anode manufacturing lines, i.e., about 500 MWh. The design, permitting, construction and equipment installation phases of the project, which comprise about 50% of the budget, will be spent locally at the factory site, using local labor and benefitting the community.

A main objective of the demonstration scale silicon nanowire Amprius proposes is to integrate the custom designed silicon nanowire anode manufacturing equipment in a relatively large-scale cell manufacturing environment. Although individual pieces of equipment have been tested in the proposed scale or in scaled down versions, the rest of the cell assembly tested to date relied on mostly manual or semi-automated equipment, which allowed a high degree of flexibility in the use of the silicon anode for cell assembly. Testing and integrating the silicon nanowire anode handling in standard factory equipment will be a main focus of the proposed work, in parallel with the factory construction. Higher automation level in cell assembly will include automation of handling steps between cell assembly processes, which are currently done manually. Demonstrating the technology at the proposed manufacturing scale is key to its commercialization, increasing customer confidence in its implementation as well as in establishing partnerships for even higher manufacturing scale for EV an energy storage markets.

For the cost demonstration objective, Amprius has teamed up with NREL and ANL groups that have developed cost modeling and analysis software packages for solar industry (NREL) and lithium-ion batteries (ANL, BatPac). Because the silicon anode manufacturing resembles more the manufacturing of solar panels than that of slurry coated graphite electrodes, NREL's solar panel cost analysis software will be modified for the direct gas-to-electrode silicon anode manufacturing. The output will be then passed as input to a modified BatPaC model that eliminates the graphite anode materials and manufacturing costs. Thus, the objectives and metrics can be also separated by functional groups.

3.2. Technical Scope Summary

The overall scope of the project is the realization of a high-volume manufacturing demonstration for the silicon nanowire anode and cell technologies, and cost reduction relative to the graphite state-of-the-art technology. The project includes the design and construction of the supporting building and infrastructure, installation of equipment and demonstration in manufacturing operation. [redacted]

The project will be split into three main phases of about [redacted] each in duration. In each of the phases (budget periods), parallel tasks will address different project development components, such as construction, equipment, workforce, supply chain etc., as described below.

Phase I will focus on the detailed design, permitting and site preparation for construction. Amprius is in process of selecting a site [redacted] and it is likely that the site selection and leasing agreement will be already completed by the time the project will start, if selected for funding. Similarly, Amprius is in process of performing a thorough review of cell assembly equipment for acquisition, including site visits to suppliers and equipment tests. If (b) (4) selected, Amprius will be ready to issue purchase orders soon after the start of the program. This is important for schedule risk mitigation because equipment lead times in the battery industry have increased to about 12 months. Other forward-looking activities will include workforce development, starting with recruiting the factory management and senior engineering teams (15 new leadership jobs and 35 engineering jobs), and supply base development, including silane supply agreements and cathode active material supplier development. Also starting in the first year, Amprius will supply NREL with anode material for characterization for the development of an optical in-line metrology method for silicon nanowire structure. The end of phase gating milestone will evaluate progress on each of the tasks and decide based on their respective metrics.

Phase II, after a successful Phase I, will continue work on all parallel tasks, starting to converge on the factory buildup. Most of the construction work will be ready by [redacted], with only inside tie-ins for equipment remaining. All equipment is scheduled to be delivered immediately after the construction is done, staggered over a few months period around [redacted]. [redacted], all equipment will be installed (rigged in and connected to electric, gases, etc.) and ready for qualification tests. In parallel, personnel related to business functions (22 new jobs) and direct labor for one shift (65 new jobs) will be recruited and hired [redacted] Supplier agreements will be signed, and a supply inventory will be built, in preparation for equipment qualification runs. QMS systems will be prepared and integrated in the manufacturing flow. NREL and ANL will start the integration work of the anode and battery assembly cost models. At the end of the Phase II, the factory should be ready for the initial equipment verification.

Phase III activities will be focused on the equipment qualification and process optimization [redacted], followed by demonstration manufacturing runs and product testing [redacted] Operation parameters, equipment and process yields will be optimized, and the results will be used for the end of program cost analysis report, after a successful run of at least 10% of the installed capacity (50MWh). Cells produced in the factory will be delivered for testing to a national laboratory selected by DOE. At the end of the program, the factory will be ready to operate at full capacity on three shifts, powered by a workforce of 300 new employees, including 260 direct labor positions hired and trained from the local pool.

3.3. Work Breakdown Structure and Task Description

The project is structured in seven work packages, focused on construction and infrastructure, equipment sourcing, workforce, supply chain, QMS and cost analysis, and program management. These work packages are relatively independent for the first two budget periods, when all will be

active. [redacted], factory qualification, ramp-up, manufacturing and product demonstration, and cost analysis will bring together the results from each of the previous tasks.

(b) (4) [redacted]

The work breakdown structure described, and associated objectives are shown in Table 9.

Table 9. Project work breakdown and work package objectives

Work Package	Objectives	Corresponding Tasks
1. Construction and infrastructure	Design and build the supporting facility for the battery factory	1
2. Equipment	Source and acquire anode and cell assembly equipment	2
3. Workforce	Recruit, hire and train the people that run the factory	3
4. Supply chain	Develop and sign agreements with material suppliers	4
5. Factory ramp-up	Install equipment, qualify, and optimize processes, ramp up production	5
6. QMS, demonstration and cost analysis	Develop quality control processes, metrology; demonstrate production performance and cost	6
7. Program management	Manage task progress, team communication; prepare reports and meetings	7

Task 1. Factory Construction and Infrastructure [redacted])

Task Description: The purpose of this task is to plan, design, and execute the construction of the buildings and associated exteriors for Amprius' silicon nanowire anode-based lithium-ion battery factory. This task also involves the buildout of the required infrastructure, which includes mechanical, electrical, solvent recovery, hazmat and fire safety systems, waste management, material conveyance, IT systems and other factory-specific infrastructure requirements. The factory will be designed and built to enable a nameplate capacity of approximately 500 MWh per year. Because Amprius' innovation is effectively an anode replacement solution, the factory will leverage established tooling for everything except anode manufacturing. Among the critical success factors for this task is the selection of a reputable general contractor. To that end, Amprius engaged [redacted], a nationally recognized advanced manufacturing design-build company. This task represents the longest lead item and – given current and foreseeable supply constraints in both construction materials and labor – poses the highest schedule risk.

Subtask 1.1. *Master Plan* ([redacted])

This subtask comprehends the entire facility and its relationship to and integration into the surrounding locale. It will serve as the high-level plan and master schedule for the entire project and be the basis for the various municipal review and approving entities.

Subtask 1.2. *Civil Design* ([redacted])

This subtask comprehends all external services and exterior requirements. It includes connections to all utilities, road access, grade and building height, total floor area and ratio to exterior area and parking.

Milestone M1: Site permit is submitted. ([redacted])

Subtask 1.3. *Building Design* ([redacted])

The subtask runs in parallel with 1.2., and involves the factory's interior and exterior design – including internal and external infrastructure – and service yards, and layout of factory equipment.

Milestone M2: Construction permit submitted. ([redacted])

Subtask 1.4. *Site Work* ([redacted])

(b) (4) [redacted]

This subtask is the execution of the civil design. It is the first construction work beyond the design phases.

Subtask 1.5. *Main Building* ([redacted])

This subtask is the execution of the main factory building design. Its construction commences slightly after the initiation of the site work and runs in parallel to it.

Subtask 1.6. *Office and Auxiliary Buildings* ([redacted])

This subtask is the construction of auxiliary buildings (warehouses, testing labs, etc.) and office interiors and finishes. It commences approximately 3 months after the main building construction begins.

Milestone M3: Occupancy Permit ([redacted])

This milestone marks the end of building and infrastructure construction, and the facility is ready for manufacturing equipment installation.

Task 2. Equipment Sourcing ([redacted])

Task Description: The sourcing of equipment for end-to-end mass production of the silicon nanowire anode lithium-ion cell will commence at project initiation. When factoring in equipment construction, factory acceptance and shipping, the overall lead times are anticipated to be equivalent to facility construction time. The cell assembly line will be based on stacked electrode configuration and, since the silicon nanowire anode is effectively a drop-in replacement of a graphite electrode, the assembly equipment will be very derivative of standard lithium-ion stacked pouch cell assembly lines.

Tasks 2.1-2.5 are similar for each equipment type and will not be repeated for space reasons.

Task 3. Factory Equipment Installation, qualification, and ramp ([redacted])

Task Description: Upon receiving the all the manufacturing equipment the respective tooling will be rigged in place, tied-in to facilities (which have already been roughed in during the construction phase), qualified for purpose, and optimized for performance and initial yield. This is a parallel effort wherein all the production equipment will be installed in a nearly simultaneous timeframe. Completion will be dependent on the specific area and complexity of installation requirements and will be followed by manufacturing ramp-up to 24/7 production.

Subtask 3.1. *Equipment Rigging* ([redacted])

This subtask comprehends the placement of all the production equipment into the factory.

Subtask 3.2. *Facilities Tie-in* ([redacted])

This subtask involves the physical connection of production equipment to the required services, including electricity, process cooling water, process gases, exhaust, and solvent recovery systems.

Subtask 3.3. *Equipment Qualification* ([redacted])

This subtask involves the qualification of all factory equipment. Qualification is generally defined as meeting all specifications for purpose and it characterized by getting to the first inflection of a sigmoid curve of yield vs. time.

Subtask 3.4. *Process Optimization* ([redacted])
This subtask involves the initial period of production ramp. Optimization is generally defined as solving for yield limiting factors and is characterized by getting to the second inflection of a sigmoid curve of yield vs. time.
Milestone 19: Factory Equipment Optimized for Production Yield ([redacted])
This milestone marks the realization of production yield and the point at which the factory will begin ramping operations. Prior to this point, it will not be operating with a full complement of personnel or full operational time. The output will be roughly 10% of nameplate capacity or up to 50 MWh run rate on an annualized basis.

(b) (4) [redacted]

Subtask 3.5. *Factory Ramp* ([redacted])
This subtask involves ramping production with the goal of achieving a run rate of nameplate capacity by the end of this period. To achieve this, the full complement of direct labor will be brought up and 24/7 operation will commence. In addition, raw materials will be secured, and the production areas will be coordinated to enable operational efficiency
Milestone 20: Manufacturing scale demonstrated ([redacted])
This milestone marks the realization of production scale at annualized rate of 500 MWh capacity.
Task 4. Workforce Development ([redacted])
Task Description: Developing the workforce is a multistep process that will be supported by 3rd party recruiters. At a high level, the workforce consists of a) the management team; b) the engineering team; c) all business functions (e.g., accounting, procurement, etc.); and d) direct labor (technicians and operators). The recruiting of engineering and direct labor will have a substantial focus on drawing from the local community, as detailed and described in our Equity plan. For direct labor recruiting Amprius will engage [redacted]. This task will be executed in 4 phases.
Subtask 4.1. *Recruit Factory Management Team* ([redacted])
This subtask comprehends the recruiting and hiring of the core management team. In advance of this period Amprius plans to have already hired a VP of Facilities in CQ3-2022 to lead site selection and manage the general contractor. The rest of the management team will be recruited and hired during the [redacted] period of this subtask.
Milestone 21: Management and engineering leadership complete ([redacted])
The key management and leadership hires are complete. 15 new jobs created.
Subtask 4.2. *Recruit Engineering Teams* ([redacted])
This subtask involves recruiting and hiring the engineering teams. The engineering disciplines will include manufacturing, mechanical, electrical, electrochemical, industrial, computer and IT, and environmental, health, and safety. Recruiting will span new college grads to very senior subject matter experts.
Milestone 22: Engineering teams complete ([redacted])
The engineering team members are hired. 35 new jobs created.
Subtask 4.3. *Recruit Business Function Personnel* ([redacted])
This subtask involves recruiting and hiring business function personnel, including accounting (AR, AP), finance, purchasing and procurement, shipping/receiving and logistics, sales, marketing, etc. Recruiting will span new college grads to very senior subject matter experts.
Milestone 23: Business Personnel complete ([redacted])
The business functions supporting personnel are hired. 22 new jobs created.

Subtask 4.4. *Recruit and Train Direct Labor* ([redacted])

This subtask involves recruiting, hiring, and training all functions of direct labor. Direct labor spans skilled technicians in mechanical, electrical, and chemical applications to unskilled operators. Recruiting will draw from underserved communities [redacted] (as described in the Equity plan), trade schools, junior colleges, among other resources for talent. Experienced trainers will be brought in and together with manufacturing and quality engineering will develop the training curriculum for direct labor across all areas. These training curricula will then be used to train and certify incoming workers and, thereby, develop a workforce ready for manufacturing. Hiring will be done in stages, starting with teams for one shift, and ending with a full complement of labor for 24/7 operations.

Milestone 24: Direct labor teams complete ([redacted])

The direct labor employees are hired. 260 new jobs created.

(b) (4) [redacted]

Task 5. *Supply Chain Development* ([redacted])

Task Description: A key aspect of manufacturing readiness is the development of the supply chain for raw materials – including all components in the product's bill of materials, spare parts, and other essential consumables and nonconsumables for manufacturing.

Subtask 5.1. *Supplier Base Development* ([redacted])

This subtask involves developing the supplier base for mass production of Amprius' silicon nanowire anode lithium-ion cell. Amprius will survey global suppliers of raw materials including, process gases, electrolytes, cathode active and inactive ingredients, separators, tabs, laminates, and tapes. Much of the supplier base that Amprius has already established in low volume production will be used for mass production. Amprius will make every effort to secure suppliers domestically. Wherever possible, competitive bidding will be solicited. [redacted]

Milestone 25: All materials and supplies available ([redacted])

Materials and supplies are ready for the start of equipment tests.

Task 6. QMS, product, and cost analysis ([redacted])

Task Description: NREL will apply advanced characterization and modelling techniques to quantify the microstructure of Amprius' electrodes and identify feasible paths to improve cell performance by tuning manufacturing conditions. NREL will also explore techniques for real-time inspection of Amprius' anode during manufacturing. NREL will develop an optical system that will (1) accelerate the scale-up process through rapid characterization of Si NW anode quality during lab-scale to manufacturing-scale development and (2) enable quality control (QC) during the final anode manufacturing process. Anticipated manufacturing costs for the Amprius anode will also be characterized by application of NREL's web interactive bottom-up manufacturing cost modelling software suite. The cost modeling effort will benchmark current costs, projected costs following a technology roadmap, and sensitivity analyses by Monte Carlo techniques. ANL will update BatPaC model and input manufacturing cost data with data obtained from Amprius plant, and track cost of cells as the cost data gets firmed.

Subtask 6.1. *Advanced anode characterization development* ([redacted])

Amprius' superior cell capabilities rely on manufacturing Si NWs with a high degree of morphological uniformity. NREL will apply their state-of-the-art X-ray nano CT system to quantify the distribution of morphologies of Amprius' grown Si NWs. Furthermore, NREL will use in-situ X-

ray nano-CT during the first lithiation of the Si-nanowire electrode to quantify the fraction of NWs that respond to lithiation, and therefore determine the fraction of active Si within the manufactured electrodes.

Subtask 6.2. *Advanced cathode characterization development* ([redacted])

Similarly, NREL will apply X-ray nano-CT to quantify the microstructure of the cathode; it's particle size distribution, porosity, and tortuosity.

Milestone 27: Complete microstructural characterization ([redacted])

Complete microstructural characterization objectives and summarize findings on Amprius electrode microstructural features. Provide a link between differing electrode microstructural features and electrochemical performance.

(b) (4) **Subtask 6.3**. *Cell modelling* ([redacted])

Using data from X-ray nano-CT, NREL will apply image-based multiphysics modelling tools developed under previous DOE-supported programs to quantify rate limiting features of the cell (e.g. cathode and anode microstructure).

Milestone 28: Multiphysics model complete ([redacted])

NREL will build multiphysics models based on the electrode microstructures acquired using X-ray nano-CT.

Subtask 6.4. *Electrochemical evaluation of electrode and cell performance* ([redacted])

Confirming that the materials manufactured in the pilot facility meet the targeted performance metrics, and confirming that changes to pilot manufacturing conditions lead to the modelled benefits at the cell level is important to ensure that the scaled-up manufacturing conditions are optimal to maximize cell performance and manufacturing consistency.

Milestone 29: Spectroscopy-electrochemical correlation complete ([redacted])

Optical spectroscopy characterization of different Amprius Si NW anodes (manufacturing-scale) with different full cell performance characteristics correlated to spectroscopic signatures.

Subtask 6.5. *Developing in-line optical diagnostics for defect detection* ([redacted])

NREL has decades of experience in optical spectroscopy of similar large area semiconductor samples for photovoltaics applications, and we will apply this expertise to designing a system applicable for measuring optical properties on Amprius Si NW anodes. NREL will:(1) Develop a system suitable for scanning off a high-speed linear film system both above and below the large area sample to image both sides of the current collector. (2) Modify the incident light wavelength and power to optimize imaging for the Amprius samples. (3) Consider other designs that minimize electrode manipulation following their batch production.

Milestone 30: Optical diagnostic system designed ([redacted])

Optical diagnostic system designed, hardware assembled, and component operation validated.

Subtask 6.6. *Bottom-Up Manufacturing Cost Modeling ([redacted])*

In this task, Amprius, NREL and ANL will collaborate to apply existing capabilities in bottom-up cost modeling to benchmark the costs for producing electrodes with the Amprius process. During the period of performance, the benchmark cost model results and projections by technology road mapping will be used to inform the inputs for the total costs calculation deployed within BatPac. ANL will adapt BatPaC to accept NREL results and other Amprius process changes and provide guidance as appropriate. After manufacturing ramp, BatPaC input manufacturing cost data will be updated with data obtained from Amprius plant, and track cost of cells as the cost data gets firmed.

Milestone 31: Preliminary anode cost model designed ([redacted])
Have met with contractors involved in designing and building the manufacturing equipment for Amprius' anode to understand the tuning needed for applying NREL's photovoltaic cost model to Amprius' anode cost model.
Milestone 32: Anode cost model complete ([redacted])
Complete the cost model for Amprius' anode production and have it integrated with the BatPac model for full cell manufacturing cost estimation.
Milestone 33: Cell cost model complete ([redacted])
(b) (4) [redacted]
Complete the cost model for Amprius' cell production in updated BatPac model.
Task 7: Project management, communication, and reporting ([redacted])
Task Description: This task consists of the project management as well as the communication, information dissemination activities to maximize collaboration and impact of the project results. Project management includes monitoring and alignment of tasks and milestones according to work plan, collation of official project reports, administrative and financial management, conflict resolution, IP and innovation monitoring. Decision gates are scheduled at the end of the first two budget periods, evaluating the program progress on all task metrics running in parallel.
Milestone M0: Kick-Off Meeting (Month 1) - Project kickoff meeting with the DOE within 30 days of project initiation.
Budget period 1 Go/No Go Gate G1: Factory ready for build-up
Factory design complete, site and construction permits are in place, construction started on buildings and site and 30% complete, equipment orders placed and 50% built, management and engineering teams are hired and QMS, and cost analysis tools have passed the preliminary design reviews.
Budget period 2 Go/No Go Gate G2: Factory ready for ramp-up
Factory construction complete, occupancy permit received, equipment received and installed, business support team and first shift direct labor are hired, and QMS, cell models, and cost analysis tools have passed the validation tests.
Final deliverables milestone D1: Manufacturing and product verification
Cost analysis, manufacturing, and cell performance report; 20 cells delivered for verification to test laboratory.

3.4. Milestone Summary

The number of milestones in the table was reduced to those listed din the SOPO. The project plan includes more, typically at the end of each task.

Table 4: List of milestones

#	Name	Type	Q	Verification
M0	Kick-off meeting	Progress	[redacted]	Report
M1	Equipment sourcing orders placed	Progress	[redacted]	Report
M2	Site Permit Submitted	Progress	[redacted]	Report
M3	Preliminary anode cost model designed	Progress	[redacted]	Meeting & Report
M4	Management and engineering teams ready	Progress	[redacted]	Report
G1	Go/No Go Factory ready for build-up	Go/No Go	[redacted]	Meeting & Report
M5	Business function personnel complete	Progress	[redacted]	Report

M6	Occupancy permit received	Progress	[redacted]	Report
M7	Equipment delivered	Progress	[redacted]	Report
M8	Cell modelling complete	Progress	[redacted]	Meeting & Report
G2	Go/No Go Factory ready for ramp-up	Go/No Go	[redacted]	Meeting & Report
M9	Equipment ready for manufacturing ramp-up	Progress	[redacted]	Report
M10	Workforce complete	Progress	[redacted]	Report
M11	Cost analysis complete	Progress	[redacted]	Meeting & Report
M12	Manufacturing and product demonstrated	Progress	[redacted]	Meeting & Report
D1	Final report and 20 cells delivered	Deliverable	[redacted]	Report & Test

3.5. Go/No Go Decision Points:

Two Go/No Go decision points (G1 and G2) are scheduled at end of each budget period. At G1, factory design should be complete, site and construction permits received, construction started on buildings and site is ~30% complete, equipment orders placed and 50% built, management and engineering teams are hired and QMS, and cost analysis tools have passed the preliminary design reviews. At G2, factory construction should be complete, occupancy permit received, equipment received and installed, business support team and first shift direct labor hired, and QMS, cell models, and cost analysis tools have passed the validation tests.

(b) (4) [redacted]

3.6. End of Project Goal:

At the end of the project, the manufacturing plant should be operational and have demonstrated the nameplate capacity for 1 month. Critical manufacturing processes, such as anode manufacturing and prelithiation should meet Table 1 and 2 criteria, directly or implied by input to larger scale models (e.g., for cost in multi-GWh scale). The end of project goal is defined by the performance of the cells produced with silicon anode materials from the high-volume manufacturing line, relative to EV goals (USABC performance goal metrics, see Table 3). [redacted]

3.7. Project Schedule Gantt Chart

The Gantt chart schedule is shown in Figure 6. [redacted]

(b) (4)

[redacted]

Figure 14. Program Gantt chart

3.8. Buy American Requirements for Infrastructure Projects

Although it is anticipated that an exact factory site will be selected in the next two months, before the project, if funded, is supposed to start, Amprius has not selected yet the final site before proposal submission. Thus, before building and infrastructure design is ready, it is not entirely clear if public infrastructure work is required. However, Amprius and its subcontractors will make all efforts to source all construction materials domestically, including construction equipment and, as much as possible, manufacturing equipment.

3.9. Project Management

A proactive and transparent approach to project management will ensure that Amprius meets and exceeds the project's goals and the DOE's objectives within the time and budget proposed and/or awarded. The following text describes the approach Amprius recently took to execute on its previous DOE and USABC projects – which is also the approach Amprius will continue to take if selected for the currently proposed project.

(b) (4)

Overall Approach: The management of the project team will be handled by Amprius, who will drive and be the beneficiary of the pursued silicon anode manufacturing line. Amprius has assembled a team of 11 members, including Amprius, to bring in the expertise required for construction and environmental aspects [redacted] anode equipment [redacted] cell equipment and factory design and supply chain [redacted] workforce development and community interaction [redacted] and metrology and cost analysis [redacted] This project will leverage pre-existing commercial relationships held by Amprius with [redacted], who is a manufacturer of capacitive coupled plasma equipment for semiconductor and solar industries, and [redacted] Amprius will provide overall *Project Coordination*, and brings the anode technology expertise and process development know-how. Amprius shall carry, on behalf of the team members, the responsibility for the overall coordination of the project activities, including maintaining close contacts with the various task leaders. This includes the overall coordination of the technical activities as well as the legal, contractual, ethical, financial and administrative management. Furthermore, a representative from one of the team partners will be designated to identify IP and know-how arising from the project activities and also monitor adoption and market opportunities in relevant areas. A decision-making body including the Principal Investigator and company representatives/leaders from each partner, will have the main roles of monitoring the technical implementation of the project, periodically assessing the strategic direction and risks, propose amendments to the implementation if necessary, and approving potential changes within the team or related to the budget.

Communication: Amprius will remain in close contact with sub-recipients, sub-contractors and vendors, as well as with DOE project managers, via email, phone or web conferencing. Such meetings or discussions will be organized weekly, monthly or on a case-by-case basis, depending on the task, responsibilities, and amount of work allocated. A face-to-face meeting is however foreseen for milestones identified in the Milestone Table, or about 6 months during the bi-annual project meetings. Overall, the project is managed towards the achievements of the milestones summarized in Tables 1-3 to facilitate its review and progress monitoring.

Project Team Member Roles: Amprius will be the end user of the anode and cell manufacturing factory and has the expertise and facilities for evaluating anode materials and cell performance. During the project, Amprius will evaluate and give feedback to all equipment implementations, from equipment assembly phase to actual manufacturing implementation. Amprius will also evaluate the milestone metrics, qualify, and validate the performance of the resulted materials, ultimately deciding if the performance meets the metrics and warrants the advancement to next phase at different Go/No Go points.

(b) (4)

[redacted]

Critical handoffs/interdependencies: Amprius will handle the external communications with vendors and will give feedback on the technology performance in each step of the development. Amprius will qualify, validate, and give feedback relative to the performance of the anode and cell manufacturing equipment. During the construction and equipment sourcing and workforce development phase, Amprius and its subcontractors will communicate weekly to check the advance of the task work as well as the facility preparation for tool installation. This communication is already established and ongoing for anode equipment, the most critical part of the technology, due to currently existing relationship [redacted]

Financial Management: Amprius staff will submit weekly time sheets that detail the number of hours spent each day on each project task. Amprius' CFO, and/or Project Manager will review these time sheets before they are processed (and work is invoiced to the DOE). In addition, Amprius' CFO and Project Manager will regularly review the project expenditures, including invoices and supporting documents submitted by team members, to make sure that the project remains on budget.

Risk Management: Management of the critical risks for implementation forms an integral and recurring part of the project. It entails monitoring of the project progress, risk assessment, and risk control. Risk monitoring and assessment can take place at any time during the project and will be brought up in team meetings and calls. Amprius' project will minimize risk by evaluating early in the project the gap to target metrics. Go/No Go decisions gate transition to next steps, limiting investment to initial design and evaluation phases in case of negative outcomes.

Project Changes: Amprius will propose all potential project changes to the DOE – as early as Amprius foresees the need to make changes, submitting them for approval.

3.10. Market Transformation Plan

Target market: Amprius' 100% Silicon anode battery cells can be used in most major industries, spanning from the highly commoditized Electric Vehicle industry to the emerging electric Aerospace industry. Amprius plans to eventually engage all available markets; however, engagement timing is largely dependent on how quickly battery production will scale. Once

multi-MWh scale has been reached, proper production support of the Aerospace and Defense industry, including UAS, UAV, eVTOL, and space applications will begin. As Amprius continues to scale manufacturing into the GWh production levels, economies of scale will allow other more price sensitive industries to engage, including Electric Vehicles.

Competitors: There are two categories of competitors for Amprius Technologies, incumbent conventional lithium-ion batteries and advanced battery technologies.

Conventional lithium-ion is by far the most widely used type of battery today. With graphite as the anode material, these batteries have an extremely wide range of applications, from consumer electronics to Electric Vehicles. Conventional lithium-ion batteries have a gravimetric energy density of approximately 200Wh/kg to 310Wh/kg, depending on the form factor (cylindrical, prismatic, pouch), manufacturer, and power capability. Tier 1 [redacted] typically have the highest available gravimetric energy density, while lower tier suppliers offer lower gravimetric energy density cells at a lower cost. This technology is very mature and stands as the plan of record for most products in development today. The main issue is the anode material has reached its theoretical maximum and meaningful advancement in energy density is not possible. Therefore, advancements in energy density cannot be achieved using conventional lithium-ion batteries.

Advanced battery technologies is the catch term for all the different ways to improve a battery cell's performance beyond what is achievable from conventional lithium ion batteries. While there are many novel concepts currently being investigated (i.e. Lithium Air, etc.), there are two advanced battery technologies generally accepted as closer to commercialization, Silicon Carbon or Monoxide Composites and Lithium Metal/Solid State batteries.

(b) (4) [redacted]

Silicon carbon and/or oxide composite solutions aim to take advantage of the properties of silicon by using varying percentages of silicon in their anode material, thus increasing the energy density of cells beyond conventional cells. Silicon carbon composites is a much more mature advanced technology, with lower percentage silicon anode batteries already commercially available. However, increased silicon content remains difficult to scale and thus energy densities are only nominally higher than conventional batteries. [redacted] In real applications, mixtures with graphite further dilute the silicon content.

Lithium Metal/Solid State batteries aim to completely redo the entire battery manufacturing process, and take advantage of the properties of fully lithiated metal to dramatically increase the available energy density of a battery cell. While theoretically this technology looks very appealing, commercializing this technology remains elusive. [redacted]

Distribution Channels: Amprius will be a direct B2B enterprise.

Barriers to Market Entry: Barriers to enter the highly competitive battery market exist in every industry. For the battery industry, barriers are either technology (is your product advanced enough for customers to want it) or cost (is your product cost low enough to integrate). Amprius' industry leading energy density allows Amprius to penetrate each target market organically, serving the highest energy density requirement industries first (Aerospace), of which Amprius

has no existing competitors, and engaging each remaining market as product prices decrease as the company scales production (wearables, consumer electronics, and electric vehicles).

Commercialization timeline: Amprius was founded to commercialize the rooted silicon anode concept from Stanford University. Its current anode structure and manufacturing processes are well covered by over 50 Amprius patents, issued over the last 10 years.

Today, Amprius operates out of a 25,000 square foot research and pilot production facility in Fremont, California, which houses all the equipment necessary to produce anodes at pilot scale and build pouch cells. With millions of dollars in private funding, and with public and customer support, Amprius plans to further scale the silicon nanowire production equipment to multi-MWh capacities per line, thus enabling real manufacturing scale.

Due to the relatively low production volume (sub-MWh pilot line) but extremely high-performance (much higher specific energy and specific power compared to graphite cells), Amprius' current target markets are aerospace and military, supporting premium, high performance demanding applications. The 50-100% specific energy and power advantage over graphite and even silicon composite cells limit competition in these applications to less mature technologies, such as lithium metal.

Currently, the main barriers to further market penetration include limited manufacturing capacity, which translates to high cell costs, thus inadequate for large markets, such as electric transportation and energy storage. The scale-up plan presented in this proposal seeks to address both manufacturing and cost constraints. A well rounded performance profile (energy, cycle, calendar, safety) would make the technology feasible for these large markets and open investments into manufacturing of MWh to GWh factories.

(b) (4) [redacted]

4. Technical Qualifications and Resources

4.1. Project Team:

The team consists of a diverse and well-balanced group of organizations to bring in the expertise required for such a large project. The partners have been carefully selected to include a wide range of complementary competences in construction, cell manufacturing, workforce development, supply chain, and manufacturing analysis and evaluation that are necessary for the success of the project. Because Amprius is the sole provider of cost-share and the only beneficiary of the manufacturing capability resulted from the project, with the exception of NREL and ANL, who are included as sub-recipients, the rest of the team members contribute to the project as sub-contractors.

The team members, which are all at the forefront in their respective specializations, enable access to the state-of-the-art fabrication facilities and complementary technologies and competences required to bring the silicon anode and cell manufacturing technology and

associated key supply chain actors all the way from pilot production level to full high volume manufacturing level.

Amprius has invented the nanowire growth method and the overall anode nanowire structure and, over the last 10 years has developed expertise in pouch cell fabrication, including cell for electrical vehicles. Its anode manufacturing protocol has been scaled up in collaboration with external vendors [redacted] from a multi-step, sequential batch method using lab scale furnaces to a continuous, R2R pilot line that was the proof of concept that multiple CVD steps with different environmental conditions can be integrated into a R2R system.

(b) (4) [redacted]

National Renewable Energy Laboratory (NREL) is a world leader in quality control and rigorous measurement methods and is an ISO 17025 accredited institution in the world for solar PV measurements, and regularly work under ISO 9001 certification. These are industry-recognized standards that have allowed acceleration of PV into the market through an accepted, objective

performance assessment that gives developers and manufacturers 3rd-party validation recognized around the world.

Argonne National Laboratory (ANL) has worked on electrochemical energy storage for several decades. The focus on lithium-ion chemistries started in the early 1990s, developing new materials, synthesis methods, and performance characterizations. Sponsored by the U.S. Department of Energy, Energy Efficiency and Renewable Energy, Vehicle Technologies Office (DOE-EERE-VTO), Argonne has led with many advances. The experimental activities were complemented with multi-scale modeling that ranged from the atomic to the system (manufacturing processes and automobiles) level.

4.2. Project Resources – Equipment and Facilities:

Amprius' 25,000 square foot California headquarters houses the low-volume R2R silicon nanowire anodes lines and laboratory scale equipment to build and test batteries – including all the equipment the company used to achieve its results to date.

• Amprius' facility has the machines required for building and testing cells: multiple gloveboxes, a dry room, full capability for cell assembly equipment, and >1000 channels for battery cycling.

• Amprius owns the tools necessary for non-destructive diagnostics and quality control: SEM, XRF, FTIR, and microbalances.

• Amprius purchased and currently operates in California two pilot R2R lines for silicon nanowire anodes.

The demonstration manufacturing plant is of much higher capacity than the current low-volume pilot scale that Amprius operates and will requires a larger facility. [redacted] Additional space will be allocated to auxiliary buildings and parking space, not included in the project cost.

(b) (4) [redacted]

For anode and cell characterization, NREL is equipped with a suite of materials characterization techniques including a Zeiss Xradia Ultra 810 X-ray nano CT system, JOEL cross sectional polisher, and a FEI Nova 200 Nanolab SEM system. NREL is equipped with over 300 coin cell cycling channels and over 70 pouch cell cycling channels for electrochemical evaluation of cells.

ANL's BatPaC model is supported by a number of detailed models that include cell electrochemical models, fast charge, etc. The group also has access to advanced computers available through Argonne's Laboratory's Computing Resource Center (LCRC, https://www.lcrc.anl.gov/systems/resources/bebop/).

The rest of the team's members will contribute with know-how and expertise, [redacted] leading global in design, manufacture and supply of customized thermal equipment and processes for high-volume manufacturing. [redacted] core competences include deposition processes using thermal evaporation, PECVD and ALD for both rigid and flexible substrates, both roll-to-roll and sheet-to-sheet, with constant innovation.

4.3. Relevant Team Work:

[redacted] Initial results proved promising, with successful plasma initiation and high gas utilization. However, tests were limited by the small sample size and a test setup designed for rigid silicon wafers. Amprius is currently working [redacted] to modify and automate [redacted] equipment for Si NW fabrication. Amprius is also in process of modifying and testing a [redacted] system for Si NW prelithiation. The rest of the equipment will be off the shelf.

(b) (4)

4.4. Key Project Team Members:

Dr. Ionel Stefan, Amprius' Chief Technology Officer, will be the PI. Dr. Stefan has over 15 years of experience in silicon electrochemistry and lithium-ion cell development, and has been PI in other DOE, USABC, NASA and Army projects. He will dedicate 25% of his time to the project.

Mr. Jon Bornstein, Amprius' Chief Operations Officer, has an experience of over 20 years in developing and scaling new manufacturing processes for silicon-derived technologies. In the past years, he has led Amprius' successful development of a new manufacturing process for silicon nanowire anodes. Jon will dedicate 25% of his time to the project.

Dr. Weijie Wang, Amprius Technologies Fellow, Chief Scientist, will help to integrate the new high rate deposition process with Amprius' nanowire growth process. Dr. Wang is a former Professor of Physics with more than 15 years of industry experience developing various deposition techniques. He will dedicate 50% of his time to the project.

Dr. Donal Finegan: Senior scientist at NREL. >9 years experience in Li-ion battery research and development. Co-leads an Advanced Manufacturing Office (AMO) program on scaling laser-ablation to roll-to-roll battery manufacturing. Leads NREL X-ray CT laboratory and specializes in advanced characterization of energy storage materials. Over 100 publications and 3 patents related to Li-ion batteries.

Dr. Nathan Neale: Senior Scientist, Group Manager, and Distinguished Member of Research Staff at NREL. Designed and build a plasma-enhanced chemical vapor deposition (PECVD) system for growing mg- to gram-scale quantities of silicon nanoparticles. Expert in surface chemistry and optical properties of both bulk and nanoscopic silicon. Over six years-experience in Li-ion battery research and development using silicon nanoparticles. NREL Lab Lead for Vehicles Technology Office (VTO) Silicon Consortium Program (SCP) on understanding the mechanisms leading to calendar life fade in silicon-based anodes.

Dr. Shabbir Ahmed: Senior Chemical Engineer at Department of Energy - Argonne National Laboratory, has led the development of the Battery Performance and Cost (BatPaC) model since 2007.

[redacted]

Amprius thanks reviewers for carefully examining the silicon anode demonstration manufacturing proposal and for the largely positive feedback regarding its innovative technology and its impact on the battery technology industry progress and applications. The following paragraphs will respond mostly to noted weaknesses under the corresponding criteria, by weakness noted.

Criterion 1: Technical Merit, Project Management, and Impact (40%)

Weakness: **Technical performance**

"the reviewer has some concerns the packing density of nanowire anodes, which is relative to the volumetric energy density of cells""Proposal suggests OEM could utilize less cells in the vehicle due to cell higher energy density but what about power requirements? The proposal provides some electrochemical data for the Si nanowire material. The reviewer would like to see more data as it pertains to the rate or resistance of cells made since these metrics are highly dependent on manufacturing process and electrode characteristics.""In spite of recent progress, calendar life of Si-based anode cells still needs to be improved to meet EV applications. The technology still has not addressed the inherent show stoppers of silicon base-anode due to their limited cycle and calendar life. The application reported that their cell cycle life is about 600 cycles, and the calendar life is projected for about a year. These cells are simply cannot be used for EV applications."

Response: Amprius' silicon nanowire structure (Figure 1 in proposal) includes porosity in the amorphous silicon structure [redacted] and porosity between silicon wires, for a total porosity [redacted] based on anode thickness measurements and crystalline silicon density. This porosity is needed to accommodate cycling without wire and electrode destructive material expansion during lithiation [redacted]. The "coating" thickness is still only about 35 µm, much thinner (about 1/3rd) than that of graphite electrodes. This insures the high volumetric energy density of silicon nanowire cells, typically by a 50-80% advantage.

(b) (4)

Cells designed for higher power capability (thinner cathode, the same anode) exceed 2500 W/kg at energy density of over 900 Wh/L and 370 Wh/kg. Depending on the goals of EV OEMs, silicon nanowire cells give the choice of using a battery pack with the same weight and more energy, resulting in longer range, or a battery pack with the same energy and lower weight, using fewer cells and having a smaller volume, i.e., a more efficient EV.

The reviewers are correct that gaps in performance for EV applications remain relative to graphite cells or USABC goals, but performance has continuously improved and Amprius is working (ongoing USABC program) to close the remaining gaps. The calendar life test mentioned in the proposal (measured at INL in 2018) of over 1 year (15 months, more precisely) was measured at [redacted] Recently, baselining of the current technology started at Amprius and cells will be delivered in September 2022 to INL for a new evaluation.

Similarly, although the last DST cycle life test of ~650 cycles is more recent (~2020), progress has been made and recently a new baseline evaluation started as part of the USABC program. A more representative recent test was shown in Figure 4 in the proposal, showing about ~1050 cycles to 80% capacity retention with a depth of discharge of 80% and 1C charge and discharge rates (accelerated compared to the C/3 USABC standard rates). [redacted]

[redacted] The goal of the USABC project is to close these gaps by early 2024 and design EV cell form factors. These tasks are not duplicated in the proposed manufacturing demonstration project.

(b) (4) [redacted]

Except for nominal peak power data, as measured by HPPC method, no other rate or resistance data was included in the proposal due to space constrains. The plots below complement that data and are representative of the Si/NMC technology, as measured in a 3.6Ah cell. In general, the resistance curves are relatively flat versus voltage or SOC range compared to graphite cells, especially at high SOC and, only at SOC <20% increase significantly, probably due to the increase of the silicon material electric resistance at low lithium content. Thus, depending on the operational voltage range, the cell internal resistance could be relatively constant.

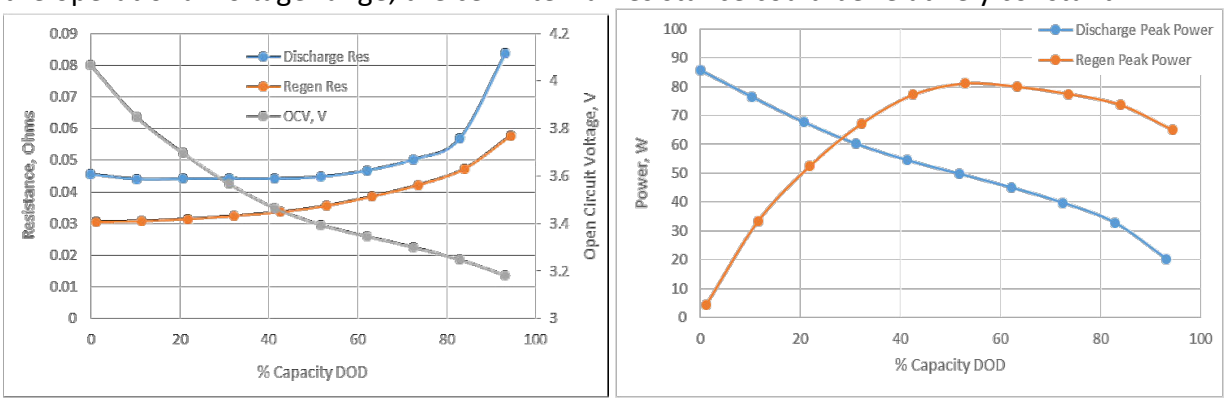


Figure 1. Discharge and Regenerative cell resistance, and power curves relative to the depth of discharge (DOD).

Weakness: **Prelithiation**

"in order to extend the cycling life of silicon-based cell, electrochemical prelithiation is needed in this project. Li metal coating on silicon anode surfaces should be prepared, which would increase the materials cost and processing cost. Comparing with Li metal batteries, silicon-based batteries would not show obvious advantage due to the addition of prelithiation."

Response: The prelithiation amount used in silicon cells is much lower than the amount of lithium used in Li-metal cells (except for the "anodeless" designs). [redacted]

Weakness: **Manufacturing maturity (Capex, cost)**

"Amprius needs to provide a CAPEX cost comparison of their anode CVD equipment vs. conventional equipment needed to make anode (e.g. mixer, coater, calendaring)."'The application as written still has lot of elements of research and development because key processes for scaling up are still not in place. For example, the equipment for roll to roll manufacturing of silicon wires and the prelithiation equipment are still under development."

"Amprius has demonstrated the feasibility of mass-producing silicon nanofiber anode at a cost effective manner. The proposed gas-to-electrode manufacturing process is new to the battery material industry and the resultant anode product behaves differently with the anode sheets."

Response: Amprius has continuously reduced the risks of developing and installing new manufacturing equipment, its main focus over the last 3-5 years. However, the initial deployment of a new equipment is always a higher risk than duplicating existing technology, thus, the reason why the demonstration manufacturing scale was proposed, and not a full commercial (>1GWh) scale. [redacted]

(b) (4)

[redacted] Amprius has already tested many of the cell assembly steps in semi-automated equipment and, will perform tests at vendor site before ordering the new manufacturing equipment.

Weakness: **Supply chain**
"The supply chain was not described in the proposal. It was not clear what materials could or would be sourced domestically""There is no discussion whether the plant will purchase silane of make their own at the facility."
Response: Amprius' current pilot scale is producing cells for customers since 2018. Although the production volume is low, Amprius has established a supply chain for this volume and is ISO 9001-2015 certified, a certification that includes handling of incoming materials and qualification of suppliers. For the demonstration manufacturing scale Amprius will continue to source from the some of its suppliers, [redacted] and will develop new supply sources. Task 5, Supply Chain Development, includes the signing of new supply agreements and establishing a supply inventory, and will run in parallel with construction and equipment sourcing. [redacted] Amprius will make all efforts to source domestically if available [redacted]

Criterion 2: Commercialization and Market Acceptance (20%)
Weakness: **Supply chain**
"While the proposal aims to develop a domestic supply chain, no information was given on the supply chain and %s or amounts of which could be sourced domestically. The supply chain was not clearly described beyond stating that circular will provide tracking of supply chain and GHG emissions for the supply chain."
Response: See Criterion 1 responses. All silane necessary for tens of GWh is available domestically, removing the need for imports from Asia.

Weakness: **Business plan/Commercialization**
"An adequate mitigation plan was not presented as it relates to barriers to commercialization including market, regulatory, intellectual property, and any other barriers. It was not clear that the team demonstrated offtake interest, supply contracts, government support, and other forms of support for manufacturing and/or recycling." "The applicant does not show commercial market viability in detail. And the business plan are not clearly displayed. The barriers to commercialization, including market, regulatory, intellectual property, and any other barriers and

the soundness of plans to overcome these barriers, are not discussed in this proposal.”“Amprius has letters of commitment (LOC) from its sub-contractors but no LOC from any major OEMs.”
Response: The main barrier to commercialization for Amprius’ products are manufacturing scale and cost. The Market Transformation Plan section in the proposal (pages 45-47) include a discussion of barriers, competitors, and commercialization timeline. Since starting pilot production, Amprius’ cell products have been sold out years in advance and preliminary orders and MoU are in place for anticipated 2024 and 2025 scale. The proposed scale, however, is of “demonstration” for EV and, thus, still not capable of serving the EV market commercially. LOCs were not required for this topic and Amprius has not requested one from its OEM partners.

Weakness: **IP protection**
“The reviewer did not see any mention of how IP or data resulting from the project will be shared or disseminated over the course of the project. Is there a plan to present these results at conferences (other than the AMR), in the literature, etc.?.” “It is not clear if there is a firewall protecting Amprius SiNW technology from its Chinese Amprius Wuxi division. If Amprius is funded, need to make sure that the unique technology is not transferred to its Chinese division.”
Response: New IP will be discussed with the team members and decided on a case by case basis. Amprius expects to present new data at conferences, with DOE approval, and some results are expected to be published by NREL and ANL team members, after Amprius approval. The resulted BatPac cost model with silane processing integration will become part of the BatPac package and available under the same terms.
Since February 2022, Amprius’ divisions were spun off and currently Amprius has only the USA presence. Even before spun off, no IP or silicon nanowire anode or cell were transferred to any Amprius Chinese division.

Criterion 3: Cost Share (10%)
Weakness: **Rate basis**
“There is no rate basis supplied by the applicant for the personnel hourly or period rates. The reviewer would like this information to see how the salaries were dictated. The role of an Engineer, Journeyman is budgeted for 12,480 hrs - is this correct? The applicant states there are Fringe benefits necessary - please provide justification for the benefits.”
(b) (4)
Response: The rate basis is actual for some positions [redacted] The hours include multiple FTE for the same category (e.g, 12480 hrs is 6 FTE). Fringe benefits consist of medical/dental/vision employee insurance plans, payroll taxes and workers compensation insurance.

Criterion 4: Qualifications and Resources (10%)
Weakness: **Team expertise**
“It was unclear that the team had DEI or community engagement expertise.” “ The reviewer would like to see more clarity for the stakeholder responsibilities. Specifically, which members of the applicant personnel will be responsible for handling specific tasks in the project? Is there a clearly defined organizational chart for involvement in the project?” “Amprius team does not have internal expertise in scaling up to multi-MWh battery facility producing the SiNW anode.”
Response: Amprius’ current team size is adequate for the pilot production scale and will increase significantly for the manufacturing scale-up to demonstration scale and further. For

the initial stages of the program, Amprius will rely of its team members and contractors for some of the expertise. Dr. Kang Sun, Amprius CEO, although not listed as Personnel in the proposal, has the experience of building factories (Amprius Wuxi) of GWh size and is directly involved in site and equipment negotiations. In addition, for initial equipment/vendor selection, [redacted] expertise ([redacted]) will be employed. A VP of Manufacturing with experience in large scale cell manufacturing in a major world manufacturer will join Amprius in September 2022 (name cannot be disclosed until start date). The rest of the team is scheduled to be built in parallel with the factory construction and equipment sourcing. For DEI and community engagement, Amprius has retained [redacted] a large American firm specialized in sustainable professional services, including DEI objectives.

(b) (4) [redacted]

Criterion 5: Equity Plan: Quality Jobs & Community Benefits (20%)

Weakness: **DEI goals (milestone timing)**

"The application did not provide specific information on the timing element of its SMART goals." "Technical volume GANTT chart and milestones lacked coordination with the DEI goals; there were no DEI SMART milestones integrated into the main project workplan."

Response: Amprius focused its DEI goals on creating jobs in the area, including DAC area. One task (Task 4) and associated milestones are dedicated to workforce development and community outreach. Further objectives and milestones can be added after the actual site is selected.

Weakness: **Job Quality & Skilled Work Force**

"the proposal does not put this into perspective related to wages in the area or DAC. ... does not articulate how any proposed workforce development activities will support broad occupational training leading to industry-recognized credentials and career-track employment." "While the team plans to hire 30% from DAC, 50% of the lower paying jobs will be from DACs. It is unclear why the applicant is funneling DAC members into lower paying jobs rather than higher paying jobs, and how this contributes to DEI as opposed to increasing wealth and income gaps. It was not clear how the team will partner with URM businesses & partners."

Response: Amprius expects that jobs that require skills that can be acquired on site by training (technicians, operators, shift supervisors etc.) will be hired locally, including local DACs. However, it is expected that some engineering positions may not be filled with local talent, even after collaborating with local colleges and universities, resulting in the proposed percentages in jobs and pay distribution. In time, the local workforce will become more qualified, and it is expected that these percentages will change.

Weakness: **Justice 40 uncertainty**

"Justice 40 the benefits to Disadvantaged communities (DAC) were limited. The proposal did not describe how they determined DACs (e.g. use CEJST) to clarify if they would actually be serving and manufacturing in DACs. It was not clear that 40% of project benefits would be to DACs."

Response: Amprius' subcontractor, [redacted], performed an analysis of the local communities and resources, including stakeholders' identification, demographics, and poverty rates. Amprius will rely initially on contactors [redacted] to perform this analysis until it will develop its own team dedicated to human resource recruiting and community outreach.