Data Management Plan

Department of Energy (DOE):
Office of Energy Efficiency and Renewable Energy (EERE)

Notice of Restriction on Disclosure and Use of Data:
All Pages of this document contain trade secrets, confidential, proprietary, or privileged information that 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.

[Data types and sources

ICL-IP America, Inc. (Company) wishes to apply for the grant under the DE-FOA-0002678 to build a factory to domestically produce high quality Lithium Iron Phosphate (LFP) Cathode Powder for the Global Lithium Battery Industry. The Company, based in St Louis, MO has several specialty chemical production factories in the US and generates over $1.5 billion of annual revenue in worldwide sales out of the domestic production.

Leveraging on the existing internal IP and process know-how, and acquiring an external piece of IP, the Company plans on strengthening and protecting the intellectual property of the process.

In the first phase, the Company will commission a 15,000 metric tonnes/year plant as an expansion to its existing facility at Carondelet, in St. Louis, MO. In the second phase, the company will commission an additional 15,000 metric tonnes/year plant.

As part of the grant application, ICL desires to build an R&D team to pursue next generation LFP Cathode materials through further research and development. Data will be generated in lab books and analysis with appropriate instrumentation. This data is generated by wet chemical processing and analysis with instrumentation such as a Battery Test System Analyzer. Data generated will be in handwritten lab books for experimental results, excel spreadsheets generated by instrumentation and analysis results in digital format. Power point presentations of the work generated are to be expected as well as Word documents in Quarterly reports.

We do not anticipate that any deliverables related to such research will be specified in the award. The recipient does not intend to publish the results of this research except in connection with any resulting patent applications.

In an instance where a publication includes results of research funded by the project, the underlying research data will be made available according to the policies of the publishing media. Where no such policy exists, ICL will 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.

Content and format

Data and reports will be in MS Office format, including PowerPoint, Word, and Excel. Reports from some instrumentation might be exported in PDF format as well.

Sharing and preservation

(b) (4)

Protection

(b) (4)

Rationale

We do not anticipate that any deliverables related to research will be specified in the award. All applicable data management, privacy, and export control requirements will be complied with.]

[ICL Global Procedure

Technology Control Plan

(b) (4)

This document is intended for internal use only. This document or any part of it may not be transferred to other parties without written approval from the Global Trade Compliance.]

(b) (4)

(b) (4)

[redacted]

(b) (4)

[redacted]

(b) (4)

[redacted]

(b) (4)

[redacted]

(b) (4)

(b) (4)

[redacted]

(b) (4)

[redacted]

(b) (4)

[redacted]

(b) (4)

[redacted]

(b) (4)

[redacted]

SUMMARY:

Our Equity Plan is detailed with milestones/measurables for each budget period regarding Quality Jobs and Community Benefits. The highlights include the creation of over 150 permanent high paying union and professional positions along with 800-900 union construction positions. The St. Louis Metro area is in high need for investment to offset the auto manufacturing loss from the past decades, which is evident in the data showing the lack of economic growth. The local community will benefit not only through good paying union and professional jobs but also by ICL taking an active role in developing the next generation of ICL employees.

CONFIDENTIALITY STATEMENT

NOTICE OF RESTRICTION ON DISCLOSURE AND USE OF DATA:

Page 3 of this document may contain trade secrets, confidential, proprietary, or privileged information that 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.

EQUITY PLAN

QUALITY JOBS & COMMUNITY BENEFITS

Primary Submitter: ICL-IP America Inc.
Vendor: McCarthy Building Companies, Inc. (Construction)
DE-FOA-0002678-1875

ICL has a commitment to always working towards a more sustainable and secure future for our employees and the communities where we are located. The Bipartisan Infrastructure Law (BIL) Battery Materials Processing and Battery Manufacturing funding opportunity will allow ICL to grow jobs and build wealth in the historically disadvantaged community where we work and live.

The St. Louis metro region has experienced decades of economic underperformance, population stagnation, and racial inequity. ICL has joined with other businesses and civic leaders to commit to creating jobs, diversifying the economy, closing racial and spatial disparities, and demonstrating for others that we can achieve inclusive economic growth.

ICL continues its efforts within the company and the community to make strategic investments to advance these goals. Our proactive approach of past years towards society's sustainable development goals, and our culture of innovation are now fueling our current efforts. The Bipartisan Infrastructure Law (BIL) Battery Materials Processing and Battery Manufacturing funding opportunity complements our efforts to not only create a more sustainable future but also create over 150 permanent good paying jobs that benefit our community.

ICL seeks to maintain a positive impact on local communities by supporting their economic development, social innovation, and local entrepreneurship. This is done by sharing knowledge and resources to empowering the members of our communities. Our mission is to develop long-term lasting relationships and collaboration with our communities, built on common shared values and trust. A good example is partnering with Black Girls Do STEM, a local community-based organization dedicated to reaching young women of color to encourage them to explore science and engineering careers.

We support social entrepreneurs from all fields to establish their ideas by sponsoring, guiding, and training. We encourage entrepreneurs from different communities to share ideas, cooperate, and expand successful projects to additional communities, hence creating a network of communities. We focus on local needs including empowerment, economic growth, equality, inclusion, and sustainability. ICL is a top 25 finalists for the St. Louis Business Journal's 2022 Corporate Philanthropy and Innovation Awards. The award recognizes the top 75 companies, which provided the most in charitable contributions in 2021 based on total cash and in-kind giving.

As part of the company's commitment to sustainability – including supporting the communities where it operates – ICL proudly made donations to organizations such as the St. Louis Area Foodbank, United Way and the St. Jude Children's Research Hospital in 2021. The St. Louis-based team also volunteered support at local organizations, such as Forest ReLeaf of Missouri and Rebuilding Together St. Louis. Our Equity Plan is detailed below to show our commitment to quality jobs and community benefit.

ICL Employees volunteering at St. Louis Area Foodbank

QUALITY JOBS

MANUFACTURING – WORKFORCE

Our Carondelet facility located in St. Louis, Missouri has been in continuous operation since 1876 as part of Monsanto-Solutia-Astaris and since 2005 as ICL Group, Inc. As an established production facility, handling over 100,000 metric ton of phosphate materials per year, ICL has been integrated into the local community for decades of equitable workforce employment practices.

(b) (4)

The Carondelet facility employees have been represented by **United Food & Commercial Workers International Union, AFL-CIO/International Chemical Workers Union Council** since 1944. This proposal is strongly supported by the largest private sector Union in the nation. Anthony Perrone, International President of the UFCW stated ***"We believe … assistance from the federal government would leverage private sector financing for investment in ICL's lithium iron phosphate cathode active material (CAM) manufacturing facility in St. Louis, Missouri and help grow the region into the epicenter of electric vehicle (EV) battery and ESS manufacturing in the Midwest."***

These future jobs all include an attractive full benefit package including health care insurance, life and disability, paid vacation and many other components. Plant operation will be 24/7 so these positions will include flexibility to employees desiring day, evening or night positions as per our shift work policy. Shown in the table below is the expected employment positions created per this proposal. Operator positions are represented by

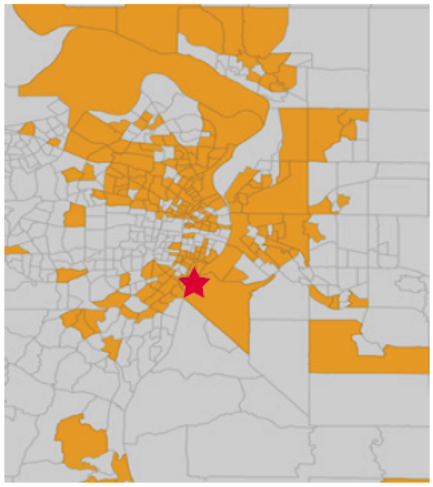
(b) (4)

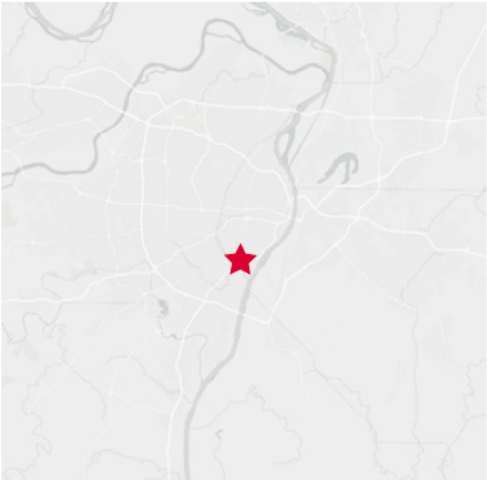
Operator positions which are above prevailing range. In Q4 of 2021 according to JobsEQ®, our employee geographic area salary is only $57,000.

In addition to these manufacturing positions, there are an additional **6 full-time permanent R&D positions (STEM)** created by this program with an expected growth to 12-16 positions. These positions will be distributed between Webster Groves Technical Center and Tarrytown NY.

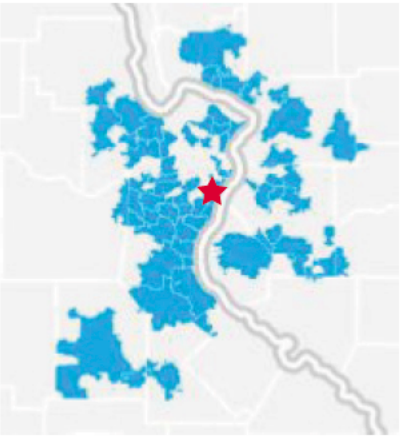
ICL is committed to providing to all its employees and contractors a working environment that is safe, productive, respectful, and free from discrimination. In keeping with this commitment, harassment of any kind of any employee or contractor will not be tolerated. Any words or actions that create an intimidating, hostile or offensive working environment for any ICL employee or contractor will not be tolerated. We are all responsible for ensuring that harassment does not occur.

Shown in the map below is the Department of Transportation census track designation of Historically Disadvantaged Communities within the St. Louis area. Our Carondelet facility ★ is located in the center of communities in need of significant investment.





Our current plant demographics of employee residences is highlighted in the map below. We recruit and retain a significant number of employees from communities of need and our proposal will provide additional workforce opportunities as well.



CONSTRUCTION – DIVERSE WORKFORCE PARTICIPATION

McCarthy Building Companies, Inc. is the oldest privately held national construction company in the country – with more than 150 years spent collaborating with partners to solve complex building challenges on behalf of its clients.

Repeatedly honored as a Best Place to Work, McCarthy is ranked the 9th largest domestic builder (Engineering News-Record, May 2020) – and is 100% owned by its employees. In 2019, McCarthy was recognized as a **Forbes Best Employer for Diversity** for the firm's commitment to a diverse and inclusive workplace. In 2020, McCarthy became one of the first large national general contractors to formally commit to the Associated General Contractors of America Culture of Care pledge, which creates a framework for creating a **safe, supportive work environment** for all employees.

As we examine proven strategies for engaging, hiring, retaining, and promoting diverse businesses and workers, we will cite portions of McCarthy's established Diversity, Equity, Inclusion, and Accessibility ("DEIA") Standard Operating Procedures. When we use the term "disadvantaged communities" throughout this Equity Plan, we intend this reference broadly to encompass marginalized, underserved, and minority groups (African American, Native American, Hispanic American, Asian-Pacific American, or Subcontinent-Asian American). We will provide evidence to show how our approach has led to successful results on McCarthy construction projects, and how it will be applied to achieve specific results on this project. In addition to the general usage of the term "disadvantaged communities," we also acknowledge and support the specific requirements of the **Justice40 Initiative Plan** to accrue quantifiable, measurable, and trackable benefits to "DACs" – disadvantaged census tracts where annual median household income ("MHI") is less than eighty percent (80%) of the statewide annual median household income.

In addition to working alongside industry groups such as the Associated General Contractors of Missouri, the St. Louis Council of Construction Consumers (SLC3), and the Construction Forum, **McCarthy collaborates with construction trade unions, union apprenticeship training programs, and employment assistance centers like Better Family Life and Worknet** (for SSDI disability benefit recipients) as we seek businesses and candidates for hiring.

National Geospatial Intelligence Agency West (N2W) campus in St. Louis, MO

Preconstruction directors, project managers, field superintendents, and executive leaders – all lead and participate in outreach events in our efforts toward guiding historically underrepresented diverse workers and business owners to gain exposure, pursue, and succeed in construction jobs and careers.

Let's look at a project where we are employing intentional efforts to expand opportunities to disadvantaged communities to positive effect: the Next National Geospatial Intelligence Agency West ("N2W") campus, an ongoing federal project with a contract value of approximately $740M that McCarthy HITT-A Joint Venture is constructing in north St. Louis City. We will return to this case study throughout this Equity Plan because of its relevance to the proposed ICL project in terms of its location, significant size, lengthy construction duration, and union-based workforce, where a project labor agreement is in effect. Located amidst disadvantaged communities in the zip code 63106, this project is **exceeding goals established for both diverse business enterprise and workforce participation**.

Above – McCarthy hosting outreach events; Below – McCarthy hosting a women in construction event

Prior to our contract award and throughout active ongoing construction to date, McCarthy has sponsored and participated in significant **community engagement** practices that include:

- Expansive bid solicitation through in-person and virtual subcontracting outreach events targeting businesses owned by minorities, women, and veterans, and those located in historically underrepresented business zones
- Federal contracting education events, in collaboration with MO and IL Procurement Technical Assistance Centers ("PTACs") and the Small Business Administration
- Public notices and bid opportunity advertising through civic partner networks including small business development centers, local newspapers including The St. Louis American and the St. Louis Post-Dispatch, and SAM.gov (previously FBO.gov)
- Community round-table discussions with business and civic organization leaders to share project progress, hear from residents, and respond to expressed concerns
- Job fair events held in partnership with the U.S. Army Corps of Engineers and the National Geospatial Agency within majority-minority neighborhoods
- Communication regarding construction progress, workforce metrics, and diverse business subcontracting milestones shared with local, municipal, state, and federal government elected officials and offices (St. Louis Development Corporation, St. Louis City Mayor's and St. Louis County Executive's administrations, Chambers of Commerce, state legislators and congressional representatives for MO and IL)
- Sponsorship and hiring from pre-apprentice construction programs that include the St. Louis Building Union Diversity (BUD) program (part of the Missouri Works Initiative) and MOKAN Construction Contractors Assistance Center
- Participation in extracurricular STEM programming, and paid co-ops and internships for high school and college students, including a focus on St. Louis Public School students

As a point of reference for gauging job creation attributable to our proposed facility expansion, let's use the N2W project again. Field project labor hours have surpassed one million, in addition to the hundreds of salaried design professionals and management staff, and total project hours for craft professionals alone are projected to exceed three million over four years – a significant economic contribution. We anticipate that the battery storage facility construction will contribute between 800-900 construction jobs both on-site and off-site over the 5-year design, construction, and manufacturing project duration. In addition to focusing on spending money with subcontractors and suppliers located in disadvantaged communities, we would also give preference to businesses who employ significant numbers of people residing in DACs, regardless of the company's physical plant location.

Our Equity Plan for this project includes community engagement measures that replicate and build on the actions and practices described above, such as the following commitments:

- Our team will host and participate in quarterly job fairs and interview sessions (a minimum of 4-8 events) during the bid solicitation periods of this ICL facility project. We will continue partnering with secondary and vocational schools, as well as **actively supporting pre-apprenticeship programs** such as St. Louis Building Union Diversity (BUD) program (part of the Missouri Works Initiative); MOKAN Construction Contractors Assistance Center; and individual union pre-apprenticeship programs. We are also exploring ways to provide support services to workers that address gaps in access to reliable transportation and other assistance like identifying dependent care resources.

Taking part in outreach events always forms an integral part of McCarthy's effective subcontracting strategy. Networking and educational presentations related to our contracting process leads to new and strengthening relationships with a wide range of diverse trade partners. Over the past 36 months, McCarthy has participated in numerous outreach events across the St. Louis region.

- Recognizing that accurate recordkeeping is elemental to tracking and improving diverse workforce participation, McCarthy utilizes LCPTracker software for certified payroll on both federal projects (including N2W) and privately funded projects. This product captures on-site labor hours worked by non-salaried craft workers, and it offers numerous reports to facilitate goal setting and workforce composition monitoring for every company performing on the job. We anticipate implementing this method or a similar software for tracking, monitoring, and reporting on the ICL project.
- On the N2W project, McCarthy has engaged an independent, minority-owned, local firm to assist in developing and reviewing **inclusive, detailed workforce hiring plans for individual subcontractors.** We collect data on each prime subcontractor's regional workforce demographics, projected cumulative labor hours, and anticipated peak labor month(s). These data are used to estimate the number of labor hours that must be worked by women, members of minority groups, apprentices, and residents of the City of St. Louis, in order to achieve established project goals. In conjunction with our workforce diversity consultant, we meet regularly with each subcontractor firm to review their monthly trends and offer services to assist in locating and hiring diverse workers. To date, **minority workforce participation stands at 19%** of total labor hours (surpassing the federal goal of 14.7%).
- We would implement similar programming on the ICL project to collect workforce demographics, build workforce hiring plans, and monitor progress for subcontractors on the battery storage project. While we do not currently track labor hours performed by residents of DACs, we will track this metric for this particular project.

MANUFACTURING – SAFETY AND HEALTH

ICL will ensure the safety and health of our employees, protect the environment in which we operate and will ensure compliance with all regulatory requirements, by taking a proactive approach that empowers employees to identify risky conditions and behaviors, learn from them, and subsequently eliminate hazards and minimize risks.

ICL's Environment Health Safety & Security (ESH&S) policy is correlated with ICL's sustainability vision for 2030. Our vision includes ambitious environmental targets, designated to enhance ICL's contribution to global sustainable development. These targets include: a 3% YOY (year-on-year) reduction in ICL's global greenhouse gas emissions; a 20% YOY increase in total renewable energy consumption (replacing direct and indirect fossil fuel usage); and a 30% YOY increase in our global circular economy initiatives focused on re-usage of main waste streams. Site-specific targets are determined based on materiality analysis of the company's global operations footprint, with each site acting to reduce its relevant impacts.

It is written in global corporate policy that ICL will maintain and verify compliance with all applicable laws, regulations, regulatory agreements and other ESH&S requirements to which the company subscribes. We will ensure that our operations, products and distribution systems are safe and secure for our employees, our site contractors and guests, distributors, customers and communities. Safety and health performance are a core value of ICL. Culture at ICL involves placing employee safety as the company's top priority and making every effort to achieve top tier safety results. To manage risks, ICL has implemented EHS&S management systems that facilitate and empower learning, in order to drive continual improvement and position ICL as a global leader.

ICL is committed to creating opportunities to facilitate operational learning. All employees are empowered to notify ICL management of anything that is not consistent with this policy so that we can learn and improve by strengthening our safety, health, security and environmental systems.

ICL will keep our operations accessible to our communities and reach out through open communications to identify interested parties, including our employees, and where appropriate, employee representatives. We will work as partners with emergency response and security agencies to protect people, property and information by securing our sites, our operational and IT systems and product value chains.

ICL will follow the Guiding Principles of the Responsible Care® framework and sustainability directives such as GRI & CDP, and will use these as part of the materiality analysis for ESH&S issues. ICL has established 5 Principles to govern the integration of EHS into its business. The 5 Principles are: EHS Management Systems, Risk Management, Learning Organization, Engagement & Commitment, and Organizational Competence. These principles and initiatives will be enabled through management leadership, allocation of necessary resources, corporate standards and establishment of specific targets in our working plans.

CONSTRUCTION – SAFETY AND HEALTH

McCarthy's industry-leading safety program creates the foundation for every project that we build. As we do for every project, we will implement a **project-specific site safety plan** that lays out company-wide safety and quality policies for our employees and all trade partners working on our project, while considering any hazards and circumstances related to this project alone. Consistent training, monitoring, and enforcement of safety practices have led to numbers that speak for themselves:

McCarthy Safety Data	2021	2020	Industry Average
Recordable Incident Rate	0.44	0.36	3.00
Lost Time Incident Rate	0.03	0.05	1.20
EMR	0.49	0.45	1.0

As the prime contractor, we control the project site and set requirements for all subcontractors working under us. Our message to our trade partners reflects the value we place on protecting every worker on the job – whether that person works for us directly or for a subcontractor. To underscore this view that every individual contributes to overall team success, **we track a Total Project RIR that includes all subcontractor and self-performed labor hours** worked on the entire job. For 2021, that TPRIR was 0.54.

But safety and health policy extend beyond training in proper technical skills and OSHA policy. We recognize the powerful impact that a **healthy, inclusive, harassment-free environment** plays in building morale and retaining workers of all backgrounds. In 2021, McCarthy worked with a small group of industry peer companies to develop programming for an annual Construction Inclusion Week, whose purpose is:

- To stand united in setting expectations and promoting consistent behavior.
- To champion inclusion that empowers us to reach our full potential, fueling innovation and connection with our employees, clients, and communities we serve.
- To harness and leverage the capabilities and global reach of the construction industry and its affiliates, to cultivate and perpetuate diversity, equity, and inclusion.

Construction Inclusion Week activities provide a range of **DEIA engagement strategies** to assist in supporting underrepresented minority groups, including facilitated toolbox talks, project-wide lunches with educational speakers, virtual and in-person discussions, and online tools for expanding awareness and understanding of all team members on subjects related to diversity, equity, inclusion, and accessibility. We will continue developing and evolving our programs for this annual October week-long event, fostering healthy professional relationships and improving communication across diverse backgrounds throughout the project's duration.

MANUFACTURING – JOB RETENTION

The Bi-state (Missouri/Illinois) region saw its economy suffer, when Ford and Chrysler shut down assembly plants in the St. Louis area over the past two decades. It is estimated each automotive manufacturing job creates up to eight ancillary or related supplier or support jobs. As part of the BIL, this proposal supports the region's ability to provide high-paying job opportunities. The auto industry is capital-intensive and constitutes one of the most important market sectors nationwide – historically contributing 3 to 3.5 percent to the overall GDP. The EV market is expected to exceed more than $151.5 billion by 2024 and represent approximately 7 percent of the more than 250 million cars and light trucks expected to be on U.S. roads in 2030.

The Carondelet facility is located in a Missouri designated disadvantaged community. As per the 2017 St. Louis Community Health Assessment, St. Louis has 22% of its families living in poverty compared to the US average of 11%. Of counties with more than 250,000 people, St. Louis City had the 5th highest rate of asset poverty (37.1%) and 14th highest rate of liquid asset poverty (53.1%) in 2016 in the nation. Our Carondelet facility draws our employees from this region as well as Southeastern Missouri, East St. Louis and Southern Illinois region, also considered disadvantaged communities.

Carondelet Demographics	2020 Census
White	43.1%
Black	39.3%
Native American	0.5%
Asian	1.5%
Two or More Races	9.9%
Other Race	5.6%

STAGNANT POPULATION GROWTH

The St. Louis, MO-IL Metropolitan Statistical Area (MSA) has an estimated 2020 population of 2.8 million, making it the 21st largest MSA in the U.S. In 2010 the St. Louis MSA was the 18th largest U.S. metro area. In 1970, St. Louis was the 10th largest metropolis in the nation. The St. Louis MSA has struggled with stagnant population growth for years. Between 2010-20, the St. Louis MSA only added an estimated 15,369 population or 0.55% growth. During the same period the U.S. grew by 6.5% or 13 times faster. The two central counties in the metro area both lost population over the decade with St. Louis County shrinking by 4,826 or 0.48% and the City of St. Louis losing 21,722 or 6.8% of its population. Over the last 24 years, the St. Louis MSA employment has grown at a compound annual growth rate of only 0.24%, approximately one third of the U.S. growth rate of 0.72%.

STAGNANT ECONOMIC GROWTH

The St. Louis MSA was slow to recover from the Great Recession. Gross Domestic Product grew by only 5.2% between 2008-2018 much slower than the U.S. (20%) during that same time period.

ICL works hard to retain our employees. Our yearly employee engagement surveys, performed by external consultants, allow us to monitor areas of concern. Local management then has clear priority to address each area of concern with a Plan of Action that is reviewed by top management yearly. Employee engagement and satisfaction is a Key Performance Indicator for ICL globally and integrated into our ISO policy. The US Bureau of Labor Statistics shows yearly employee turnover rate of 30-40% from 2017-2021 for the manufacturing sector. ICL is proud to have a turnover rate of only 8-10% during the same time period.

Our facility has established policies and procedures regarding recruitment and employee retention. The P&P includes a training matrix which includes job function, length of training, and continued education to keep up with industry standards. ICL in 2021 also partnered with ConstructReach (constructreach.com) to do our part to attract, train and retain skilled workers. Through creating internship programs, and assessing, reimagining, and developing diversity initiatives, ConstructReach has helped organizations across the country position themselves as meaningful advocates for underrepresented populations and build a diverse and talented pipeline to keep our industry moving forward. The cooperation between ConstructReach and ICL is detailed further in the DEIA section below.

CONSTRUCTION – JOB RETENTION

Critical to the construction industry's long-term sustainability is a strong partnership among contractors and trade labor unions, a partnership that promotes careers representing a wide range of job role opportunities. McCarthy self-performs a significant portion of the labor on our projects, and we are signatory to local unions for carpenters, laborers, operators, and ironworkers. We operate in a region with strong construction trade union participation, and because our commitment to attracting top talent leads McCarthy to pay rates above union scale wages, pay for all workers on McCarthy projects exceeds prevailing wage requirements throughout the St. Louis City and County areas.

On the N2W project, our leadership team devoted significant efforts toward negotiating a Project Labor Agreement ("PLA") with multiple trade union organizations, including North America's Building Trades Union, the St. Louis-Kansas City Carpenters Regional Council, and the International Union of Operating Engineers. This PLA encourages maximum utilization of available union labor while preserving flexibility to employ women and members of minority groups for work scopes if union member businesses are unable to provide an adequate labor supply. A PLA creates an environment for construction work to proceed smoothly, without stoppage due to strikes, lockouts, or similar job disruptions; it defines mechanisms for labor-management cooperation that supports dispute resolution

with no or minimal project schedule impact. We have nurtured long-standing professional relationships with local trade union leadership over decades. We will implement a PLA for this project.

Our nationally recognized learning and development programming (inducted into the Training Top 10 Hall of Fame by Training magazine) invests in our entire workforce and includes specialized training for craft professionals. Elements of the dedicated craft training program include a national foremen development program, mentor support, and on-the-job training.

Because McCarthy is an employee-owned company, our corporate culture reflects a team mentality of ownership and collaboration (plus a best-in-class training and benefits package) that leads to high retention rates. We each have a direct stake in the company's success. Compared with a construction industry-wide attrition rate of 15.5%, McCarthy experiences an annual attrition rate of just 9.7%.

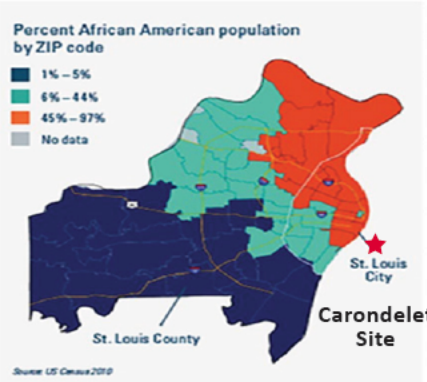
> "[St. Louis Building & Construction Trades Council] has successfully executed multiple Project Labor Agreements (PLA) with McCarthy including PLAs for the $1.7 billion federal NGA West Headquarters and the $75 million GSA Robert A. Young Seismic Retrofit Project."
>
> *– John Stiffler, Executive Secretary-Treasurer St. Louis Building & Construction Trade Council*

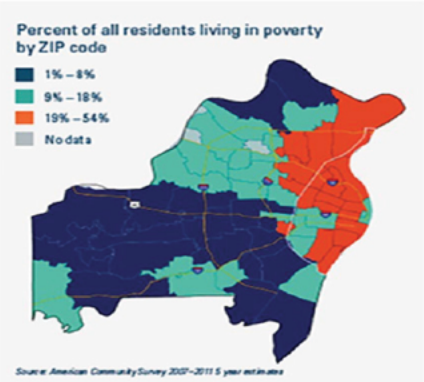
DEIA PLAN:

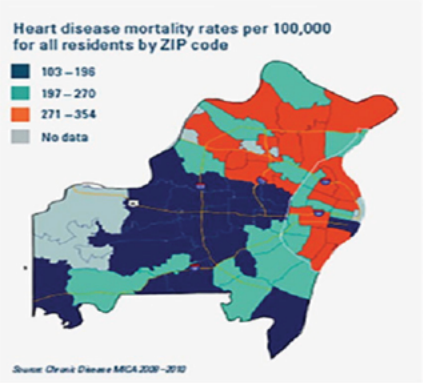
MANUFACTURING

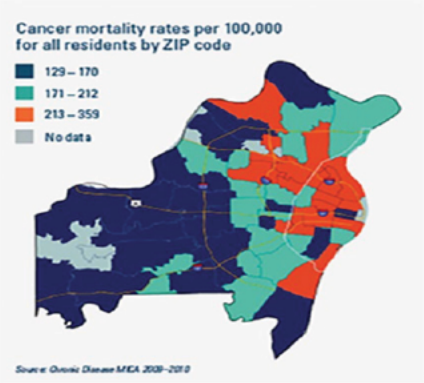
The Carondelet facility is located in a Missouri designated disadvantaged community. The graphics to the right from the 2014 American Community Survey, highlights the needs of the local community.

★ *= Cardonelet Facility*









PERSISTENT POVERTY

"The St. Louis metro ranks 42nd out of 50 large metropolitan areas on economic mobility, defined as one's ability to improve their economic status by moving up in income. In 2019, the median income was just $37,411 for Black households, compared with $75,089 for white households."

"The City of St. Louis in particular is a site of extreme income inequality along racial lines, with a Black poverty rate of 26.4 percent standing in sharp contrast to a white poverty rate of 7.9 percent." It is clear that the Metro St. Louis area is distressed and in need of economic revitalization.

OUR PLAN

Carondelet Plant Demographics	Count	% Total
Hispanic	5	4%
Black or African American	42	30%
Two or more Races (not Hispanic or Latino)	1	1%
White	92	65%
Grand Total	**140**	**100%**

The 2022 Carondelet Plant employment profile shown in the table below demonstrates that ICL is DEIA leader in the local community and our employees mirror the surrounding community. We are committed to match or exceed our current diversity, equity, inclusion and accessibility demographics shown below for future positions this program will create. ICL has a strong history of progressive employment practices and engagement in the local community. We will continue our successful efforts to recruit, train, and retain our employees in the local community. Over 35% of our employees are from traditionally underrepresented groups, which is higher percentage than the St. Louis region. Our work force is more diverse than the local region.

In 2021, ICL partnered with ConstructReach (constructreach.com) through a grant of $75,000 as an outreach to our local community. Through creating internship programs, and assessing, reimagining, and developing diversity initiatives, ConstructReach has helped organizations across the country position themselves as meaningful advocates for underrepresented populations and build a diverse and talented pipeline to keep industry moving forward. As part of the partnership, ConstructReach is assisting ICL to:

- Develop a formalized Paraprofessional and Manufacturing Internship/Co-Op program w/ Professional Development curriculum in St. Louis
- Develop program metrics
- Social media content creation for jobs
- Evaluation of ICL current recruitment and onboarding process
- Assist with education outreach
- Create framework to execute DEI/B Initiatives
- Internal Manager training
- Consult & assist with developing internal framework to assess individual & team performance regarding WFD and diversity
- Annual social responsibility report

The objective of the collaboration is defined as:

- Further position ICL Group as an advocate for underrepresented populations
- Enhance communications & goodwill with Educators
- Attract, Develop, Support & Retain a younger diverse demographic for industry
- Increase visibility and demonstrate investment in local community

ConstructReach is one example of our plan to attract and retain employees to this project. The new R&D positions created will also provide opportunities for STEM based employment.

Smart Milestones	Metric	Goal
Budget Period 1		
Underserved community permanent hires	% of total	40%
Permanent employee hires	DAC zip codes	40%
Budget Period 2		
Underserved community permanent hires	% of total	40%
Permanent employee hires	DAC zip codes	40%
Budget Period 3		
Underserved community permanent hires	% of total	40%
Permanent employee hires	DAC zip codes	40%
Budget Period 4		
Underserved community permanent hires	% of total	40%
Permanent employee hires	DAC zip codes	40%
Budget Period 5		
Employee Retention	% Job Retention at 3 yrs	< 20% turnover
Employee training matrix	% Completion	95%
Permanent employee hires	DAC zip codes	40%
Underserved community permanent hires	% of total	40%
Construction Milestones – Across Project Duration (All Budget Periods)		
Construction spend - underserved community business enterprises and DAC trade labor (includes MBE, WBE, & other DBE)	% of total dollars spent (all tiers)	40%

JUSTICE40 INITIATIVE PLAN:

MANUFACTURING

Justice40 is a whole-of-government effort to ensure that Federal agencies work with states and local communities to make good on President Biden's promise to deliver at least 40 percent of the overall benefits from Federal investments in climate and clean energy to disadvantaged communities. This application seeks to comply with the Justice40 initiative as detailed below. Using the interim guidance, our proposal seeks to build a cathode active material plant in St. Louis, MO within a designated disadvantaged community. The workforce at our existing ICL facility already draw significantly from regions listed as DAC. Our intent is to achieve 40% participation from disadvantaged communities. This will be tracked by future employee zip code identification and percentage of total from DAC.

This plant will be an integral part of the government's plan to transition to a clean energy job pipeline. All jobs created by this proposal will be supporting the goal of clean energy and away from fossil fuel economy but another aspect of this proposal will be transitioning the Carondelet facility to carbon neutrality.

Our Lawrence KS plant has already achieved carbon neutrality and by 2050 ICL looks to be carbon neutral globally.

Similar to the whole-of-government approach to Justice40, ICL is committed to tracking and increasing their share of minority/diverse owned vendors they do business with as well as vendors from DAC areas.

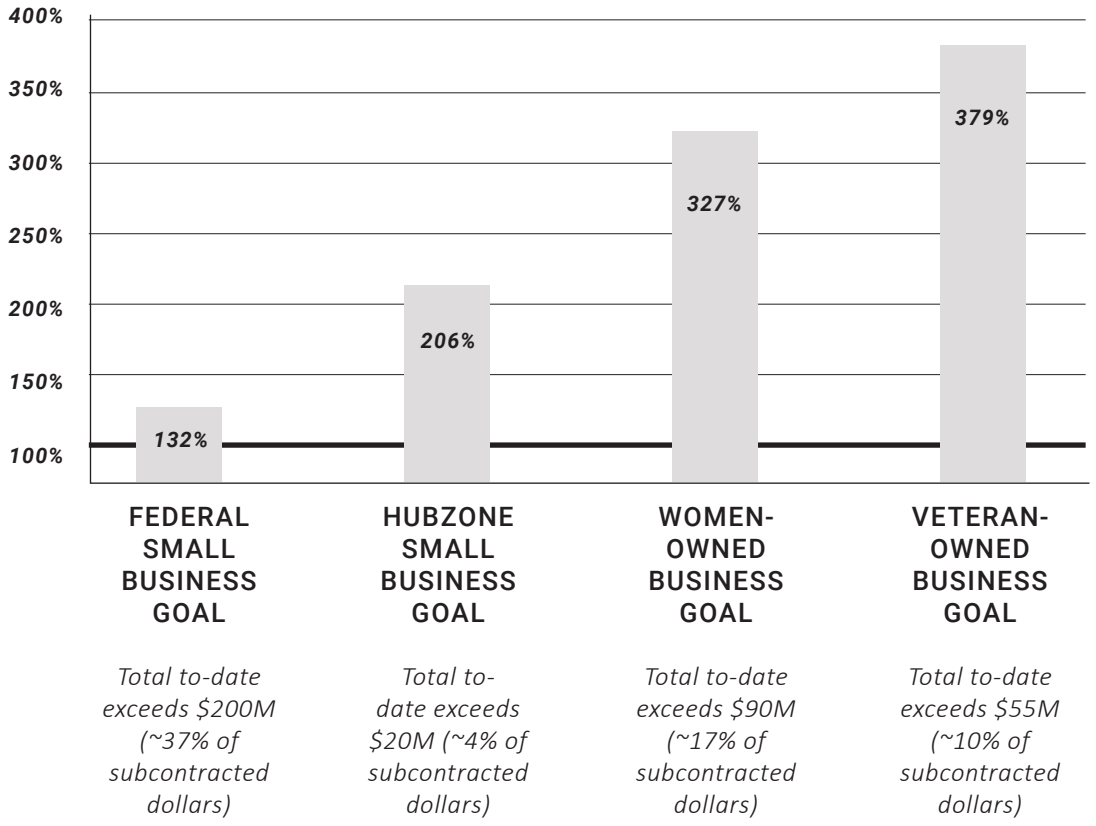
The anticipated negative impact to disadvantaged communities should be minimized. No negative impact to housing in the Carondelet area would be realized. The plant would be constructed within the current Carondelet facility in an unoccupied field in a highly industrialized neighborhood. Plant emissions would be minimal. Anticipated emissions of air, water and hazardous waste should be negligible as documented in our environmental review assessment. Nearly all waste streams are recycled. Incoming raw materials are low hazard or are similar to materials already utilized in the plant. Noise pollution will be mitigated by engineered controls to suppress any large increase in noise to the local community.

ICL Employees volunteering at Rebuilding Together St. Louis

CONSTRUCTION: DIVERSE SUBCONTRACTOR AND SUPPLIER PARTICIPATION

McCarthy takes a comprehensive approach to expanding opportunities for disadvantaged business participation throughout each project's bidding period. We grow our bid solicitation database by focusing on **intentional pre-bid networking and outreach events** designed to attract interest from local minority owned, women owned, and veteran owned businesses. We make concerted efforts to increase participation from disadvantaged businesses throughout the bid and subcontracting award process.

To demonstrate our expertise in conducting effective programs that lead to increased participation from disadvantaged businesses, we share our **proven record in conducting community-based outreach events.** Our team's efforts have yielded the following results on the N2W project:



Yet the NGA project represents just one example of how our outreach efforts translate into higher levels of diverse business participation. Yearlong, consistent presence across numerous regional and national events forms a fundamental part of McCarthy's effective subcontracting strategy. Diversity tracking tools administered by our **national Diversity, Equity, and Inclusion department** require every project to report business enterprise and workforce participation levels.

McCarthy's DEIA standard operating procedures require the creation of a **Project Specific Inclusion Plan ("PSIP")** that outlines projected budgets for each work scope and then projects participation dollars and percentages required to reach PSIP goals. Goals are based on material and labor market research. For this project, we anticipate setting the following goals:

- Construction spend – underserved community business enterprises and DAC trade labor (includes MBE, WBE, & other DBE) – 40% of total dollars spent (all tiers)

In our concerted effort to identify and utilize disadvantaged firms in all possible trades, we rely upon a **proprietary prequalification system** that collects information that helps us assess each organization's leadership credentials, bonding and insurance, relevant experience on similar scope of work, current workload, financial resources, safety and environmental records, and ethical / compliance concerns. Our prequalification database is updated regularly to keep information current and accurate, and we provide guidance on bidding practices to all interested firms. The database is organized by trade so that as a bid package is being developed the capabilities of each firm may be evaluated. We also access a variety of other resources such as:

- In-house and external source lists such as BuildingConnected
- System for Award Management (SAM) Database
- SBA's Dynamic Small Business Search Engine
- U.S. Department of Veteran Affairs–Office of Small and Disadvantaged Business Utilization
- U.S. Small Business Administration Regional Offices and Procurement Technical Assistance Centers
- Regional Small Business Development Centers
- City of St. Louis M/WBE Directory
- Minority Business Development Agency of the U.S. Department of Commerce
- Construction Industry Associations, especially those focused on DE&I efforts
- Historically Underutilized Business Zone (HUBZone) mapping database
- Local Chambers of Commerce and Minority Business Councils
- Missouri Department of Transportation Regional Certification Committee DBE Directory

McCarthy hosting STEM outreach events with school groups

- Every bidder must provide **detailed commitments outlining their planned disadvantaged business and labor force participation plans** for their bid to be considered complete and responsive.
- Post-bid interviews and bid evaluations are conducted with explicit attention directed to each bidder's contribution(s) toward increasing disadvantaged business and workforce diversity. We may implement **set-aside work scope** for disadvantaged businesses in certain work categories.
- Procurement "bid packages" are designed to permit the maximum practicable participation of disadvantaged businesses by **breaking work into manageable sizes and scopes** that fit the available pool of disadvantaged businesses' capabilities.
- We actively seek out qualified diverse firms as strategic, first-tier partners in all work scopes where their capabilities align with the project requirements.

In addition to making a good faith effort to meet diverse business goals at the first tier, we also commit to **including diverse firms at all tiers of design and construction phases**. We negotiate lower-tier subcontracting plans up front with first tier, large business subcontractors to ensure that they share our commitment to mentor and subcontract with additional small businesses and vendors.

- Every subcontract award that McCarthy negotiates and executes will include contractual language documenting the subcontractor's commitments to achieve diverse participation goals for both enterprise and workforce.
- McCarthy has established procedures to facilitate **timely payments to all subcontractors**, including disadvantaged firms. These policies are flexible, and we regularly work with these entities regarding payment terms within our subcontracts to assist with issues which would keep small businesses from competing on certain scopes of work. We also, from time to time, make special arrangements with small businesses during a project where they may be struggling financially.

In conjunction with the above examples of expanding opportunities for disadvantaged businesses, McCarthy and ICL will apply training and workforce development strategies for individuals, as described in the earlier section related to quality jobs, to ensure at least 40% of overall benefits flow to disadvantaged communities.

> "McCarthy consistently and reliably engages diverse businesses and residents of disadvantaged communities. This company has been at the forefront in creating inclusive policies for our construction industry, and their progressive practices continue to raise the bar for achieving greater diversity, equity, and inclusion across our region."
>
> *– Stephen Lewis, Vice President and Diversity & Inclusion Executive*
> *Associated General Contractors of Missouri*

COMMUNITY BENEFITS AGREEMENT:

GOOD NEIGHBOR AGREEMENT

Throughout earlier sections of this proposal, we have detailed existing and planned actions to mitigate social risk, here in Carondelet, St. Louis city, and beyond. Our companies both share extensive experience in job creation and implementing safe environmental manufacturing and construction practices; we will employ these proven methods as we ensure at least 40% of project benefits flow to disadvantaged communities. In addition to, and in support of, the approaches we described earlier it is ICL's intention to reach out within our local community (Carondelet Community Betterment Foundation (CCBF) for example) and design a Community Benefits/Good Neighbor Agreement.

This Agreement may incorporate guidance for increasing DBE participation, supporting education and internship programs, complying with Missouri Prevailing Wage Law and collective bargaining agreements, and compliance monitoring and reporting. Some potential agreement areas are:

Black Girls Do STEM is a 501c Non-profit organization based in South St. Louis headed by Cynthia Chapple. Ms. Chapple's organization is community based dedicated to empowering Black/Brown women to enter the STEM workforce through mentoring, training and empowerment by female leaders of color who have excelled in the industry. While Black Girls Do STEM is young and growing, they have already established programs with Boeing and Deloitte in the St. Louis area. Workshops are held at 2 locations in St. Louis underserved areas and an underserved location in North St. Louis County. One proposal is to offer mentoring and shadowing opportunities to BGDSTEM students at our Carondelet plant and Webster Groves Technical Center along with potential financial support.

ConstructReach will offer evaluation of ICL current recruitment and onboarding process so that they strengthen our ability to reach the local underserved community.

ICL will continue to support protection of our workers' right to organize a union in a free and fair process. A minimum wage of $20/hr will be offered for all positions created by this proposal.

We will support CCBF and Carondelet YMCA through employee volunteer service hour donations and financial assistance. We will extend our volunteer efforts toward community organizations such as Forest ReLeaf of Missouri and Rebuilding Together St. Louis.

ICL Employees volunteering at Forest ReLeaf

Notice of Restriction on Disclosure and Use of Data:
Page [2] of this document may contain trade secrets, confidential, proprietary, or privileged information that 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.

Waiver for Foreign Entity Participation as the Prime Recipient and Subrecipients

A waiver is being requested for Foreign Entity Participation as the Prime Recipient as part of DOE FOA application DE-FOA-0002678. The Applicant, ICL-IP America Inc. is an ultimate wholly owned subsidiary of ICL Group Ltd., a company organized in Israel. ICL Group Ltd. is a publicly traded company, dually listed on the New York Stock Exchange and Tel Aviv Stock Exchange. ICL Group Ltd. is Israeli majority owned at approximately 60%, and greater than 25% of its shareholders are located in the US as the second largest ownership group. ICL-IP America Inc. is incorporated in Delaware, with US Citizens comprising majority, entirety in fact, of the Board of Directors, and with operations in multiple states of the USA. ICL Group LTD DUNS number is 600014690 and point of contact would be Aya Landman, Corporate Secretary. (Aya.Landman@icl-group.com)

ICL-IP America Inc. is committed to building the foundation for developing the lithium iron phosphate cathode active material in the US. As you may know, the auto industry is capital-intensive and constitutes one of the most important market sectors nationwide – historically contributing 3 to 3.5 percent to the overall GDP. The EV market is expected to exceed more than $151.5 billion by 2024 and represents approximately 7 percent of the more than 250 million cars and light trucks expected to be on U.S. roads in 2030. LFP is expected to comprise 30-40% of the CAM market share by 2030 which equates to roughly 1000 GWh globally. Today, there is limited production of LFP outside of China (>95% of LFP production is in China). Having a domestic supply chain with domestic battery component producers are critical to US economic development. As per this proposal to develop a manufacturing facility to produce lithium iron phosphate cathode active material, this program will lead to a significant increase in employment in the US, from raw material suppliers to battery fabrication plants to electric cars, buses and trucks. ICL facilities in the US have been in operation since 1876 and it is the largest phosphate salt producer in the US. It is in the US interest to have ICL-IP America Inc. establish a manufacturing facility in the US to compete at scale with foreign producers, mainly from China. ICL-IP America Inc. has the background, infrastructure and talent to build a CAM plant that is economically competitive with imported materials from Asia. The Applicant is committed to the US market and to growing the US manufacturing base for CAM powder.

ICL-IP America Inc. has a detailed control plan in place to comply with export controls and protection of proprietary information as detailed in the Data Management Plan submission. All work will be conducted in the US other than assistance in developing our own internal resources for battery testing (FW waiver already submitted). While the focus of this application is establishing a commercial production plant, protocols are in place to ensure that any IP generated will remain within the United States. Servers to be used for this project are based in the US and controlled by the local legal entity. To get started in CAM production, ICL-IP America Inc. has licensed [redacted] (b) (4) ICL extensive experience in manufacturing and handling phosphate salts for the past 150 years is critical to building a facility that is cost efficient and highest quality as detailed in technical volume. While [redacted] (b) (4) ICL has the engineering and technical knowledge to scale their process to be competitive on the global market. This know-how is entirely US based engineering support and infrastructure.

The Carondelet production facility will provide 30,000 MT/year which will enable 12-15 GWh/year of LFP battery production. This will jump start US production of LFP with state of the art material and process provided by [redacted] (b) (4). ICL has further plans to expand LFP production to other facilities in the US, after having established a functional high performing plant. Having an established production facility will further enable ICL-IP America Inc. to invest in research, development and scaleup of next generation LFP materials. This grant will allow ICL-IP America Inc. to fully develop their own technology platform that can then be instituted in our manufacturing facility.

ICL-IP America Inc. would be happy to provide any additional information EERE deems necessary in consideration of this waiver request.

Thomas J. Murray, Ph.D.
Global Director of R&D
ICL – IP America Inc.
Program Manager
UEI KH4RMU198MC1

Notice of Restriction on Disclosure and Use of Data:
Pages [1-3] of this document may contain trade secrets, confidential, proprietary, or privileged information that 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.

Waiver for Performance of Work in the United States (Foreign Work Waiver)

A waiver is being requested for Work in the United States as part of DOE FOA application DE-FOA-0002678. Ran Elazari and Yishay Diamant are employed by Bromine Compounds, Ltd., part of ICL Group based in Israel, but are essential in building the foundation for developing the next generation of lithium iron phosphate in the US. As per this proposal to develop a manufacturing facility to produce lithium iron phosphate cathode active material, this program will lead to a significant increase in employment in the US. As you may know, the auto industry is capital-intensive and constitutes one of the most important market sectors nationwide – historically contributing 3 to 3.5 percent to the overall GDP. The EV market is expected to exceed more than $151.5 billion by 2024 and represent approximately 7 percent of the more than 250 million cars and light trucks expected to be on U.S. roads in 2030.

[redacted] While ICL has extensive experience in manufacturing and handling phosphate salts for the past 150 years, our US division does not have much local experience in battery material research and testing. Ran has extensive experience in establishing and leading a battery development and testing facility in Israel. As part of the DOE grant application, we anticipate building up our knowledge base in the US with US based researchers. However, Ran allows us to bridge the knowledge gap while actively recruiting established researchers in the US. Ran will assist us in setting up the battery test lab and materials development programs. Equipment qualification and validation needs will also be covered by Ran's knowledge and expertise. Ran will specify equipment needed for quality control and R&D purposes. Ran will also help us in qualification of materials produced from our new production facility and training of QC analyst on coating and test methods. Ran's experience and knowledge will accelerate our production qualification of materials and also our development of future materials here in the US. Ran will assist us in hiring qualified US researchers and their development programs.

[redacted] will be assisting Ran in developing test methods and qualification of equipment to be used in the US for this program. [redacted] In the US we do not have this level of experience and look to hire researchers for this purpose and [redacted]

(b) (4)

Both Ran [redacted] are part of the ICL Group based in Israel. It is expected that the combined man days contribution will be 4 trips to the US and 60 days of active participation for a total cost of approximately $100,000. All IP generated by this program will be solely owned by ICL-IP America, Inc., a US company. The role of Ran [redacted] are to help ICL-IP America establish an R&D and test capabilities lab in the US and then will no longer be involved in the project. All technical information regarding future R&D developments will be held in our Tarrytown Battery research center and Webster Groves Technical Center in St. Louis. Each R&D center has their own server for storage of information that is not accessible from other facilities within ICL.

Thomas J. Murray, Ph.D.
Global Director of R&D
ICL – IP America Inc.
Program Manager
UEI KH4RMU198MC1

Waiver for Performance of Work in the United States (Foreign Work Waiver)

A waiver is being requested for Work in the United States as part of DOE FOA application DE-FOA-0002678. ICL-IP is licensing the intellectual property for a specific cutting-edge LFP [redacted] (b) (4) [redacted] R&D and production of superior LFP powders for the last 17 years and holds over 200 patents in [redacted] Energy Storage Systems (ESS) have been built and are being sold by these Japanese and Korean companies.

[redacted]

Efficacy and quality of the manufactured LFP powder needs to be verified on a continuous basis. Such verification is done by electrochemical characterization of actual batteries in full-cell and half-cell configurations. As the project moves along, R&D will be performed on the processes to improve the efficacy of the LFP powders, and therefore a close-loop feedback system between the manufacturing, R&D and characterization will need to be established. There is therefore a need to retain deep and practical electrochemistry expertise for the project.

While ICL has extensive experience in manufacturing and handling phosphate salts for the past 150 years, our US division does not have much local experience in battery material research [redacted] (b) (4) [redacted] process and propel ICL into the LFP marketplace.

Thomas J. Murray, Ph.D.
Global Director of R&D
ICL – IP America Inc.
Program Manager
UEI KH4RMU198MC1

COVER PAGE

TITLE: Letters of Commitment

(b) (4)

[redacted]

Notice of Restriction on Disclosure and Use of Data:
All pages of this document contain trade secrets, confidential, proprietary, or privileged information that 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.

Notice of Restriction on Disclosure and Use of Data:

Highlighted parts of this document may contain trade secrets, confidential, proprietary, or privileged information that 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.

Effective 5/30/2022	Resume
NAME	Thomas James Murray
POSITION, TITLE & INSTITUTION	Global Director R&D Phosphate Specialties ICL Group
1. CONTACT INFORMATION:	Tom.Murray@icl-group.com 314-918-4980

2. EDUCATION AND TRAINING

INSTITUTION	LOCATION	MAJOR	DEGREE	YEAR
University of Illinois, Urbana-Champaign	Champaign IL	Chemistry	PhD	1994
University of Missouri, Columbia	Columbia MO	Chemistry	BS	1989
`				

3. RESEARCH AND PROFESSIONAL EXPERIENCE

FROM - TO	POSITION	TITLE	ORGANIZATION	LOCATION
1/22 - Present	R&D	Global Director	ICL-Group	ST LOUIS, MO
1/21 - 12/21	R&D	Technical Director	CRC	COLUMBUS OH
1/02 - 12/20	R&D	Director	ELANTAS	ST LOUIS, MO
5/99 - 10/01	Management	Director-Analytical Scier	Chemir/Polytech Labs	ST LOUIS, MO
4/94 - 5/99	R&D	Senior Research Special	3M-Imation	ST PAUL, MN

PRODUCTS & RESEARCH CLOSELY OR DIRECTLY RELEATED TO PROPOSED PROJECT

Lead a global team in developing phosphate materials for use in industrial applications

Lead team to develop thermally conductive materials for e-Mobility market including adhesives, gap fillers and pastes

Project management of diverse team of engineers, chemists, material scientists and technicians (35 reports)

Responsible for multidisciplinary functions ranging from R&D, analytical, technical service, and production support

Design and implementation of scale-up process for the introduction of over 40 new products including the launch of each into the marketplace.

Over 15 years experience is developing materials for the e-Mobility market including patented materials for magnet wire coatings to improve partial discharge, thermal load management in

battery systems, and electrically insulating films.
Led international research projects for ELANTAS and facilitated the technology transfer of established processes from Asia/Europe to the US and technology flow from the US to Europe/Asia as we
Analytical method development for in-process monitoring of reactions including NIR and viscometry
Conversion of batch processes to continuous production through chemistry and engineering redesign
Successfully managed over 100 research projects to completion in career
Capital project management experience of over 20 years

SIGNIFICANT PRODUCTS & RESEARCH NOT DIRECTLY RELATED TO PROPOSED PROJECT

Formulation and product development of medical and graphic art photothermographic media.
Invention of novel high contrast co-developers which was developed into a new dry imagesetting film.
Buisness development and market research into agricultural coatings and construction chemicals.
Cost reduction through raw material substitution and process changes.
Research and development of evanescent wave coupled biosensor.
Extensive formulation and design experiment experience.

4. AWARDS & HONORS

ALTANA Innovation Award 2018
3M Circle of Technical Excellence

5. PUBLICATIONS CLOSELY RELATED TO THE PROPOSED PROJECT

Thomas J. Murray, Bharathi Balagam U.S. Patent 10,340,055 (2019)
Thomas J. Murray, Heta Raval, Mark Winkeler U.S. Patent 10,253,211. (2019)
Thomas J. Murray, Heta Raval U.S. Patent 9,593,173 (2017)
Thomas J. Murray, Dave Vines U.S. Patent 8,674,041 (2014)
Thomas J. Murray, Philip R. Meister U.S. Patent 7,763,312. (2009)

6. SYNERGISTIC PROFESSIONAL AND SCHOLARLY ACTIVITIES RELATED TO PROPOSED PROJECT

NEMA Tag 13 Nanomaterials member
American Chemical Society
IEEE member

Effective 5/30/2022	Resume
NAME	Larry W Anderson
POSITION, TITLE & INSTITUTION	Director Procurement Americas
1. CONTACT INFORMATION:	Larry.anderson@icl-group.com 3145280837

2. EDUCATION AND TRAINING

INSTITUTION	LOCATION	MAJOR	DEGREE	YEAR
Southern Illinois University Edwardsville	Edwardsville, IL	Business	MBA	1994
Southern Illinois University Edwardsville	Edwardsville, IL	Accounting	BS	1991
`				

3. RESEARCH AND PROFESSIONAL EXPERIENCE

FROM - TO	POSITION	TITLE	ORGANIZATION	LOCATION
July 2021 to present	Procurement	Director	ICL-Group	ST LOUIS, MO
May 2020 to July 2021	Procurement	Senior Procurement Manager	Energizer Holdings	ST LOUIS, MO
Dec 2016 to May 2020	Procurement	Senior Procurement Manager	Wieland Group	EAST ALTON, IL
Apr 2001 to Dec 2016	Procurement	Senior Procurement Manager	John Deere	MOLINE, IL

PRODUCTS & RESEARCH CLOSELY OR DIRECTLY RELEATED TO PROPOSED PROJECT

Project Manager for John Deere's Mentor Protégé Program to work and develop Small Diverse Suppliers

Received Wisconsin Supplier Development Council "Award of Excellence" for work with Small Diverse Supplier International Filter Manufacturing in Litchfield Il. They are a minority supplier, woman owned in a HubZone.

Developed Relationship between Southern Illinois University Edwardsville (SIUE), John Deere and International Filter Manufacturing (IFM) in Litchfield, IL

SIUE worked with IFM and IFM submitted a proposal and won the award to manufacture filters for the Humvee Program

Achieved $200M in Annual Indirect Materials/MRO spend with Small Diverse Supplier Spend when I was a Procurement Manager for John Deere

Supported Indirect Materials required to make Posi-bond (Coinage) Material for U.S. Mint when I worked at Wieland Rolled Products/Olin Brass

Supported Indirect Materials and Tooling required to manufacture Cups which are shipped to ATK Ordnance in Independence, MO to be extruded for shell casings

Previous experience as a Maintenance Manager responsible for Managing Skilled Trades Employees at John Deere
Capital project management experience of over 30 years

Previous experience as a Journeyman Pipefitter went through an 8000 hour - 4 years of schooling, U.S. Government Sponsored Apprenticeship Program

Managed installation of a $10M Ladle Metallurgy Furnace and Continuous Caster Project at Laclede Steel Company

SIGNIFICANT PRODUCTS & RESEARCH NOT DIRECTLY RELATED TO PROPOSED PROJECT

Lead the transformation of John Deere's Indirect Materials Organization to a Center Led Purchasing Organization

Received Deere's Senior VP "Award of Excellence" for work on the Indirect Materials Reorganization since it was seamless

Reduced OSHA Recordables in John Deere's Maintenance Department at Deere's Davenport Works

4. AWARDS & HONORS

Certified Public Accountant - University of Illinois
Certified Professional Supply Management (CPSM) - Institute Supply Management
Senior VP "Award of Excellence"

SIUE's Dean List - Several Semesters

SIUE's Accounting Faculty Scholarship

5. PUBLICATIONS CLOSELY RELATED TO THE PROPOSED PROJECT

None

6. SYNERGISTIC PROFESSIONAL AND SCHOLARLY ACTIVITIES RELATED TO PROPOSED PROJECT

CPSM Institute Supply Management
Certified Purchasing Manager - Institute Supply Management

Effective 5/30/2022 **RESUME**

NAME	Brett May
POSITION, TITLE & INSTITUTION	Director of Marketing, ICL

1. CONTACT INFORMATION: Brett.May@ICL-group.com; 314-637-7517

2. EDUCATION AND TRAINING

INSTITUTION	LOCATION	MAJOR	DEGREE	YEAR
Webster University	St. Louis, MO	MBA		2010
University of Missouri	St. Louis, MO	Finance	BSBA	2006
`				

3. RESEARCH AND PROFESSIONAL EXPERIENCE

FROM - TO	POSITION	TITLE	ORGANIZATION	LOCATION
11/21-Present	Director	Director of Marketing	ICL	St. Louis, MO
2/16-11/21	Leader	Product Leader	ICL	St. Louis, MO
8/14-2/16	Manager	Global Pricing Manager/Product Manager	Eastman Chemical Co	St. Louis, MO
10/12-8/14	Supervisor	Supervisor of Pricing Operations and Contract Complainace	Sigma-Aldrich Inc	St. Louis, MO
12/10-10/12	Specialist	Senior Pricing Specialist	Sigma-Aldrich Inc	St. Louis, MO
11/09-12/10	Specialist	Marketing Specialist	Sigma-Aldrich Inc	St. Louis, MO

PRODUCTS & RESEARCH CLOSELY OR DIRECTLY RELEATED TO PROPOSED PROJECT

Product and market owner of Phosphoric Acid

Product and market owner of Phosphate Salts

Product manager for Therminol (heat transfer fluid) going into solar power applications

Significant experience in business development and bringing new products to market

Participate as a team member in establishing Sigma-Aldrich as a certified government vendor

Extensive experience in gathering competitive data and competing against low cost import products

SIGNIFICANT PRODUCTS & RESEARCH NOT DIRECTLY RELATED TO PROPOSED PROJECT

Development of multiple sales systems
Significant experience in business process development and automation
Significant Experience in strategy development
Broad experience in pricing strategy and implementation
Extensive experience in building value propositions

4. AWARDS & HONORS

NONE

5. PUBLICATIONS CLOSELY RELATED TO THE PROPOSED PROJECT

NONE

6. SYNERGISTIC PROFESSIONAL AND SCHOLARLY ACTIVITIES RELATED TO PROPOSED PROJECT

PDSA trained

Effective 5/30/2022 **RESUME**

NAME	Ran Elazari
POSITION, TITLE & INSTITUTION	Lab Manager, Dr , ICL Industrial Products

1. CONTACT INFORMATION: ran.elazari@icl-group.com; (972) 8 6297105

2. EDUCATION AND TRAINING

INSTITUTION	LOCATION	MAJOR	DEGREE	YEAR
Bar-Ilan university	Ramat-Gan, Israel	Chemistry	Ph.D.	2009-2012
Bar-Ilan university	Ramat-Gan, Israel	Chemistry	M.Sc	2007-2008
Bar-Ilan university	Ramat-Gan, Israel	Biophysics	B.Sc	2003-2006
`				

3. RESEARCH AND PROFESSIONAL EXPERIENCE

FROM - TO	POSITION	TITLE	ORGANIZATION	LOCATION
2017- present	Lab Manager	Head of the Electrochemical & Physic	ICL Goup	Beer Sheva, Israel
2014-2017	Researcher	Electrochemistry & Physical Chemistr	ICL Goup	Beer Sheva, Israel

PRODUCTS & RESEARCH CLOSELY OR DIRECTLY RELEATED TO PROPOSED PROJECT

Ph.D thesis on Li-Ion battteries, focusing on the study of novel systems with high energy and power density for electrical storage and conversion under the supervision of Prof. Doron Aurbach

Battery lab development and qualification of instrumentation for Li and ZnBr2 systems

Developing and characterizing Sulfur composite electrodes for Lithium Sulfur batteries.

Developing thick monolithic a-Si films as anodes by DC-sputtering.

Developing and demonstrating first prototypes of Li-Ion Sulfur batteries (SLS) based on pre-lithiated a-Si anodes and porous activated carbon cloth cathodes impregnated with sulfur.

Developing dry microtoming technique for post mortem analysis of air/water sensitive electrode materials.

Developed new organometallic additives as redox mediators for enhancing sulfur battery performance.

Developed and demonstrated high capacity miniature Li-ion batteries for "smart dust" applications.

SIGNIFICANT PRODUCTS & RESEARCH NOT DIRECTLY RELATED TO PROPOSED PROJECT

Develop new uses of bromine compounds for new applications such as precious metal extraction, urban mining, electromagnetic

Developing and characterizing Bromine based electrolytes for rechargeable fuel/flow battery systems.

Designing and constructing lab and mini pilot scale electrochemical test modules for bromine regeneration and recovery from waste streams, and bromine based energy storage devices.
Developing quaternary ammonium halides for treating halogen contamination

4. AWARDS & HONORS

NONE

5. PUBLICATIONS CLOSELY RELATED TO THE PROPOSED PROJECT

Main contributer

A. Rosenman, R. Elazari, G. Salitra, R. Markevich, A. Garsuch and D. Aurbach, "The Effect of Interactions and Reduction Products of LiNO3, the Anti-Shuttle Agent, in Li-S Battery Systems" J. Electrochem. Soc., vol. 162, pp A470-A473, 2015
S. Meini, R. Elazari, A. Rosenman, A. Garsuch, and D. Aurbach, "The Use of Redox Mediators for Enhancing Utilization of Li2S Cathodes for Advanced Li–S Battery Systems", J. Phys. Chem. Lett., vol. 5 (5), pp 915–918, 2014
R. Elazari, G. Salitra, G. Gershinsky, A. Garsuch, A. Panchenko, and D. Aurbach, "Li Ion Cells Comprising Lithiated Columnar Silicon Film Anodes, TiS2 Cathodes and Fluoroethyene Carbonate (FEC) as a Critically Important Component", J. Electrochem. Soc., vol.
R. Elazari, G. Salitra, G. Gershinsky, A. Garsuch, A. Panchenko, and D. Aurbach, "Rechargeable lithiated silicon–sulfur (SLS) battery prototypes", Electrochem. Commun., vol. 14, no. 1, pp. 21–24, Jan. 2012.
R. Elazari, G. Salitra, A. Garsuch, A. Panchenko, and D. Aurbach, "Sulfur-impregnated activated carbon fiber cloth as a binder-free cathode for rechargeable Li-S batteries", Advanced materials (Deerfield Beach, Fla.), vol. 23, no. 47, pp. 5641–4, Dec. 2011.
R. Elazari, G. Salitra, Y. Talyosef, J. Grinblat, C. Scordilis-Kelley, A. Xiao, J. Affinito, and D. Aurbach, "Morphological and Structural Studies of Composite Sulfur Electrodes upon Cycling by HRTEM, AFM and Raman Spectroscopy", Journal of The Electrochemical
D. Aurbach, E. Pollak, R. Elazari, G. Salitra, C. S. Kelley, and J. Affinito, "On the Surface Chemical Aspects of Very High Energy Density, Rechargeable Li–Sulfur Batteries", Journal of The Electrochemical Society, vol. 156, no. 8, p. A694, 2009.

WO2015044829 - Use of redox mediators as additives in electrolytes of lithium sulfur batteries.
US20150263386 - Lithium ion secondary battery comprising a silicon anode
WO2013027155 - Electrode material for rechargeable electrical cells comprising activated carbon fibers

6. SYNERGISTIC PROFESSIONAL AND SCHOLARLY ACTIVITIES RELATED TO PROPOSED PROJECT

NONE

Effective 5/30/2022

NAME	Gordon A. Leong
POSITION, TITLE & INSTITUTION	Engineering & Technology Mgr - ICL
1. CONTACT INFORMATION:	gordon.leong@icl-group.com; (1) 782 832-4761

2.EDUCATION AND TRAINING

INSTITUTION	LOCATION	MAJOR	DEGREE	YEAR
Washington University	St. Louis	Chem E.	BS	1980
Washington University	St. Louis	Business	MBA	1987
`				

3. RESEARCH AND PROFESSIONAL EXPERIENCE

FROM - TO	POSITION	TITLE	ORGANIZATION	LOCATION
01-2021 - Present	Mfg	Engr & Technology Mgr	ICL	STL
03-2015 - 01/2021	Mfg	Plant Mgr	ICL	KS
2012 - 2015	Mfg	Mfg Mgr	ICL	STL
2005 - 2012	Mfg	Development/Mfg Mgr	ICL	STL
1999 - 2005	Mfg	Mfg Supt	Astaris	STL
1997 - 1999	Mfg	Mfg Team Ldr	Monsanto	Trenton
1991 - 1997	Mfg	Project Eng Tm Lead	Monsanto	Trenton
1988 - 1991	Mfg	Mfg Supervisor	Monsanto	Trenton

PRODUCTS & RESEARCH CLOSELY OR DIRECTLY RELEATED TO PROPOSED PROJECT

Process planning for major expansion of phosphate plants in North America
Responsible for the operations of the site which includes 130 employees,
and an annual budget of $94M
Plant reliability with a 10% improvement in on-stream time, reducing plant manpower by 10%,
improving safety performance with a 25% reduction in recordable rates
Negotiating two labor contracts, and implementing $20M of capital improvements for the facilities.
Implementing the Human and Organization Performance safety model within plants

Debottlenecking a sold-out unit and reducing rework generation
Design of Plant with scaling from pilot to production from 3rd party technology
Driver for process planning and implementation of new protein fiber plant in Carondelet in 2022

SIGNIFICANT PRODUCTS & RESEARCH NOT DIRECTLY RELATED TO PROPOSED PROJECT

Design of Experiments on the unit in order to define the optimal operating conditions.
Good Manufacturing Practices Improvement team where the focus was upgrading the facilities, educating operators and changing the plant culture to a food ingredient mindset
Process development and start up of a protein plant
Food-grade phosphate manufacturing and maintenance operation.

4. AWARDS & HONORS

Internal ICL Awards

5. PUBLICATIONS CLOSELY RELATED TO THE PROPOSED PROJECT

None

6. SYNERGISTIC PROFESSIONAL AND SCHOLARLY ACTIVITIES RELATED TO PROPOSED PROJECT

Extensive Phosphate Manufacturing Experience
In-depth internal knowledge of Monsanto engineering/processing methodology

COVER PAGE

TITLE: Commercial Production of Lithium Iron Phosphate Cathode Powder for the Global Lithium Battery Industry

AREA OF INTEREST: 7: Commercial-scale Domestic Battery Cathode Manufacturing

PERFORMING ORGANIZATION:
ICL-IP America Inc.
622 Emerson Road, Suite 500, St. Louis, MO 63141, United States
314-983-7545

TECHNICAL POINTS OF CONTACT:
Dr. Thomas Murray tom.murray@icl-group.com 314-918-4980
Gordon Leong gordon.leong@icl-group.com 782-832-4761

BUSINESSS POINTS OF CONTACT:
Brett May brett.may@icl-group.com 314-983-7849

SENIOR/KEY PERSONNEL
Dr. Thomas Murray, Mr. Brett May, Mr. Gordon Leong, Mr. Larry Anderson, Dr. Ran Elazari

CONFIDENTIALITY

Notice of Restriction on Disclosure and Use of Data:
Pages [**2-3, 6-22, 30-33, 35-41, 44-50**] of this document may contain trade secrets, confidential, proprietary, or privileged information that 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

The applicant, ICL-IP America Inc. (ICL-IP), an American company, was incorporated in Delaware in 2007 and is headquartered at 622 Emerson Road, Suite 500, St. Louis, MO 63141. The phosphate business generated a revenue of about $1.5B in FY2021. ICL produces a large number of "Engineered Materials," such as organophosphates, alkali phosphates and brominated intermediates. Besides other chemical manufacturing facilities, ICL-IP shares a major plant with its sister concern ICL Specialty Products Inc. (ICL SP) in Carondelet, MO, where this project is proposed to be built. The applicant will set up the R&D facility for this project at its existing site at ICL's Webster Groves Technical Center in St. Louis, MO. The applicant will further set up a battery test facility for this project at its site in Tarrytown, NY.

Bromine Compounds Ltd. (BCL), is an Israeli company founded in 1959 and headquartered in Be'er Sheva, Israel. It has 1,600 employees and generated a revenue of $1.6B in FY2021. BCL has experts in electrochemistry and battery materials. For this project, BCL will help bring up the sites and protocols for the R&D and test facilities at Webster Groves and Tarrytown, respectively. In addition, BCL will provide guidance on technical customer applications engineering for the product. BCL provides the majority of electrochemical grade bromine salts and solutions for the flow battery industry. BCL also manufactures a large number of battery chemical additives, such as quaternary amines, for different types or batteries. BCL also proactively makes and cycles batteries of several kinds for validating many of electrochemical materials it manufactures.

All the companies mentioned above: ICL-IP, ICL SP and BCL, are ultimately subsidiaries of ICL Group Ltd. With its headquarters in Tel Aviv, Israel, ICL Group Ltd. is a publicly traded company (New York Stock Exchange: ICL and Tel Aviv Stock Exchange: ICL). Founded in 1929, it has over 12,000 global employees, with 823 employees located in the USA at its US affiliates. The US headquarters is in St. Louis, MO. It has a revenue of $6.9B (FY2021) with a highly diverse chemical products and geographic portfolio, doing business in 90 countries. ICL Group Ltd. has 43 manufacturing plants and 20 R&D centers in 13 countries.

ICL manufactures Phosphoric acid, a key ingredient of the LFP powder with the largest weight fraction, with very high purity, which is critical to the efficacy of the LFP as a cathode material. ICL manufactures Phosphoric acid and its derivatives for food, electronics, and other specialty applications – therefore has developed processes and technologies to manufacture these compounds at very high purity at the lowest cost possible. In fact, ICL already sells the high purity Phosphoric acid and its compounds to LFP powder manufacturers worldwide.

The applicant is licensing the intellectual property for a specific cutting-edge LFP synthesis

(b) (4)

[redacted] (b) (4) [redacted] technology.

[redacted] quality and high volume LFP powder for the first time on US soil, thus significantly contributing to the independence of lithium battery supply chain.

The demand for LFP powder to be produced by ICL-IP under this project is already very brisk. Prospective customers have written us commitment letters that ask for volumes far exceeding the proposed capacity of the plant.

1.2 Project Goals

TECHNOLOGY GOAL: The baseline technology for LFP cathode powder consists of several specifications. Shown in Figure 1 are the specifications which this technology excels at compared to the baseline and how these improvements affect the performance of batteries made from this LFP cathode powder. It is a goal of this project to achieve these superior specifications besides other ones at par with the baseline technologies.

Feature	Unit	Technical Baseline	This Project	Impact
Capacity	mAh/gram	125-150	153	Higher Energy Density Storage
Low Moisture Content	ppm	1000-1500	<700	Longer Cycle and Calendar Life; (10 yrs for this project vs 4-6 years for baseline)
Low Impurity Content	ppm	200	25	

Figure 1: Elements of superior specifications for LFP powder from this project compared to baseline technology and their impact on the battery end-product.

MANUFACTURING GOAL: The applicant will construct and facilitate a plant for manufacturing LFP cathode powder with the superior specifications with a capacity of 30,000 tonnes/year. The production lines will be built in two phases. In the first phase (years 1-3), the applicant will build the entire plant infrastructure and commission a 15,000 metric tonnes/year line (called Phase-I) as an expansion to its existing facility at Carondelet, in St. Louis, MO. In the second phase (years 4-5), the applicant will commission an additional 15,000 MT/year line (called Phase-II).

COMMERCIAL GOAL: At the 30,000 MT/year level of production, in 2027, the plant will enable 12-15 GWh/year of LFP battery production, which will be a substantial contribution towards establishing an independent cathode powder supply chain for the American battery industry. At 30K MT/year, this facility will have a long term competitive cost position due to the colocation with a fully functional phosphate plant operating at >100K MT/year. Our analysis suggests stand-alone plants below 30K MT will not be competitive with potential Chinese imports due to economy of scale.

1.3 DOE Impact

The capital-intensive nature of producing battery cathode materials such as LFP makes it necessary for the DOE to provide financial assistance to establish an American manufacturing presence. During the first 4-6 years of operation the nonproduct costs are dominated by capital in terms of bank interest and factory depreciation.

This grant allows American manufacturing companies like the Applicant to catch up to its competition in technology and manufacturing infrastructure. It also allows American battery cell manufactures to have a reliable and cost competitive domestic choice when sourcing their cathode material. The competition, mainly from China, have made investments in their local plants many years ago. These investments included significant subsidies in capital from the Chinese government. With the Chinese government subsidies and the large amounts of depreciation they have been able to recognize over the years they are able to sell at prices substantially lower than what a new factory in US could offer to the market.

In our analysis of the market and the competitive landscape the applicant has identified a potential cost gap of about 20%. This gap is primarily driven by the cost of capital in the US for a LFP manufacturing site and would limit our ability to penetrate long term into the energy storage market. The Applicant's analysis also shows that with a DOE match of 50% for facility construction and support costs the applicant can eliminate the advantage that its Chinese competitors currently have in the market. The ability to enter the market at cost parity is essential to secure a long-term customer base and enable the Applicant to scale up competitively.

This DOE investment is crucial to building a domestic manufacturer that can compete globally while providing a much-needed safety net for our American manufactures in the energy storage space. This facility will create opportunity for good paying jobs in our community. At full production for a period of 5 years, we anticipate that for every taxpayer dollar invested by the DOE, there will be a return of $13 in terms of revenue.

1.4 Equity Plan

The Equity Plan is detailed with milestones/measurables for each budget period regarding Quality Jobs and Community Benefits. The highlights include the creation of permanent high paying union jobs plus a number of professional positions along with union construction positions. The current production facility (which will be expanded to accommodate the proposed project) has a proud history of DEIA and pledges to maintain this strength. Initiatives are also in place to build upon the inclusion policy with ConstructReach partnership. The plan also details how the Justice 40 initiative will be implemented in both the manufacturing and construction portions of the project. The applicant will work to ensure that 40% of the benefits flow back into Disadvantaged Communities like St. Louis. A sample of our SMART milestones is shown in Figure 2. As evident in the data showing the lack of economic growth detailed in the Equity Plan, the St. Louis Metro area is in dire need for investment to offset the loss of auto manufacturing jobs during the past decades. The local community will benefit not only through

good paying union and professional jobs but also by taking an active role in developing its next generation of employees.

Budget Period 5		
Employee Retention	% Job Retention at 3 yrs	< 20% turnover
Employee training matrix	% Completion	95%
Permanent employee hires	DAC zip codes	40%
Underserved community permanent	% of total	40%
Construction Milestones – Across Project Duration (All Budget Periods)		
Construction jobs – underserved community labor hours	% of total hours worked	40%
Construction vendors – underserved community business enterprises	% of total subcontracted dollars awarded	40%
MBE, WBE, and other disadvantaged businesses, including SDBs and VOSBs	% of subcontracted dollars awarded	25%

Figure 2: Example of SMART Milestones in the Equity Plan.

2 Technical Description, Innovation, and Impact

Three goals will be pursued in this project:

TECHNOLOGY GOAL: The baseline technology for LFP cathode powder consists of several specifications. Shown in Figure 1 are the specifications which this technology excels at compared to the baseline and how these improvements affect the performance of batteries made from this LFP cathode powder. It is a goal of this project to achieve these superior specifications besides other ones at par with the baseline technologies. The approach to achieving the TECHNOLOGY goal is discussed in Section 2.1.1.

MANUFACTURING GOAL: The applicant will construct a plant for manufacturing LFP cathode powder with superior specifications at a capacity of 30,000 tonnes/year. The production lines will be built in two phases. In the first phase (years 1-3), the applicant will build the entire plant infrastructure and commission a 15,000 metric tonnes/year line (called Phase-I) as an expansion to its existing facility at Carondelet, in St. Louis, MO. In the second phase (years 4-5), the applicant will commission an additional 15,000 MT/year line (called Phase-II). The approach to achieving the MANUFACTURING goal is discussed in Section 2.1.1.

COMMERCIAL GOAL: At the 30,000 MT/year level of production, in 2027, the plant will enable 12-15 GWh/year of LFP battery production, which will be a substantial contribution towards establishing an independent cathode powder supply chain for the American battery industry. The approach to achieving the COMMERCIAL goal is discussed in Section 3.10.

2.1 Relevance and Outcomes

Evolution, perfection, and economic scaling of battery technologies are critical for all future generation clean energy vehicles (EV) and energy storage systems (ESS). Due to their energy density, improvement in cycle life, reduction in cost, and high-power performance, Lithium batteries (LIB) have penetrated significantly into both of the markets above during recent years.

However, supply chain and operational safety issues have plagued the manufacturers of the EV and ESS lately. Out of several LIB cathode chemistries commercialized (such as LCO, NMC, and LFP), LCO and NMC chemistries are considered sensitive to operational abuse and create unsafe conditions, resulting in battery fires. LCO and NMC cathodes also contain a significant amount of Cobalt, which is scarcely available and often unethically mined. Although LIBs with LFP (Lithium Iron Phosphate) cathode have a bit smaller energy density compared to LIBs with LCO and NMC cathodes, they are free from Cobalt and much safer against operational abuse. As a result, many EV and ESS manufacturers have announced that a significant or all of their current and future products will have LFP batteries. LFP cathode material contains only inexpensive elements - Iron and Phosphorous, besides Lithium.

Currently there is no large-scale manufacturer of LFP material in the USA. Most of this material is manufactured in China. Therefore, all LIB manufacturers using LFP cathode today depend on China for this material, and therefore are exposed to the ensuing geo-political risk.

LFP powders can be prepared by both, solid state, and solution-based methods. Solid state techniques are carried out at high temperatures, and in general are energy intensive. On the other hand, solution-based methods consume relatively less energy and are based on reactions that take place in one of the following modes - (a) Hydrothermal Synthesis, (b) Spray Pyrolysis, (c) Sol-Gel Synthesis, and (d) Co-precipitation.

Sol-Gel Synthesis (method c) has low throughput and therefore not ideal for high volume production. Co-precipitation (method d) requires fine control of process and solution parameters and therefore does not scale to very large production vessels, therefore requiring large number of parallel processing tanks and spray Pyrolysis (method b) is in its infancy – more research is required to scale it up to large production throughput.

[redacted] (b) (4) [redacted] practice for production of LFP. Besides, the applicant has decades of experience in this type of processing method for processing its specialty minerals.

2.1.1 Description of Process Technology

The high-level process diagram for the technology is shown in Figure 3. The model layout of the production line using this technology is shown in Figure 4.

[redacted]

While LFP-SC will work for most cell manufacturers, LFP-DC will be beneficial for applications that require higher power. The applicant will manufacture and sell LFP-DC with a premium as per the market demand.
Following the process flowchart in Figure 3, the process steps are described below –

(b) (4)

(b) (4)

[redacted]

(b) (4)

[redacted]

(b) (4)

(b) (4)

quality control includes measurement and reporting of a wide range of parameters, including

2.1.2 Specifications, Characterization and Performance

(b) (4)

The COA shown in Figure 12 confirms the Particle Size Distribution (D10, D50, D95), tap density, surface area, first cycle discharge capacity. Additional characterization data have been determined as follows –

(1) The LFP powder produced in this process has been tested for impurities using an ICP-MS instrument (Perkins Elmer NexION 1000). The net impurity due to elements outside of the

(2) Using this LFP cathode powder, prismatic cells of size 28Ah, as shown in Figure 22, were commercially manufactured with 2.4 mAh/cm2 cathode loading with synthetic graphite anode and LiPF6 electrolyte with proprietary additives and a 15um separator and tested for cycle life on Neware BTS4000 battery testers. At 25 deg C ambient, at Charge/Discharge rates of 0.2C,

permanent loss of capacity.

(3) The calendar life was estimated by storing the same cells at 25 deg C ambient at 80% SOC and testing for full cycle capacity at 0.2C Charge/Discharge every 30 days with Neware BTS4000

(4) Power Performance: The LFP powder produced in this process is optimized for higher energy density and medium power density. When charged at 0.2C, round-trip energy efficiency

(5)

(6) First cycle characteristics of these same cells are shown in Figure 13. The cycles were run at

(b) (4)

(b) (4) [redacted] and by the customers (discussed below in the "Feasibility" section) who buy this cathode powder to make battery cells today.

A comparison of critical technical specifications of LFP cathode powders produced by key [redacted]

2.1.3 Plant Location and Synergy

As described earlier, the proposed plant will be built in two phases at the applicant's existing site at Carondelet (MO), in the St. Louis area. The applicant would share this site with its sister concern ICL SP. The plant has a long history of American manufacturing. It was founded in 1876 as Provident Chemical Works to manufacture Mono Calcium Phosphate. Over many decades of expansion, joint ventures and acquisitions, in 2005 it became a part of the ICL group. Now the plant operates on a 19-acre site, running 24x7, employing a unionized workforce of 140 employees, producing 200+ million pounds of phosphorus-based chemicals, such as Mono Calcium Phosphate, Sodium Aluminum Phosphate, and Sodium Phosphate. As an added advantage, when the plant expands beyond the proposed annual capacity of 30KT, this phosphate manufacturing infrastructure will support an economy of scale, resulting in reduced cost of the product.

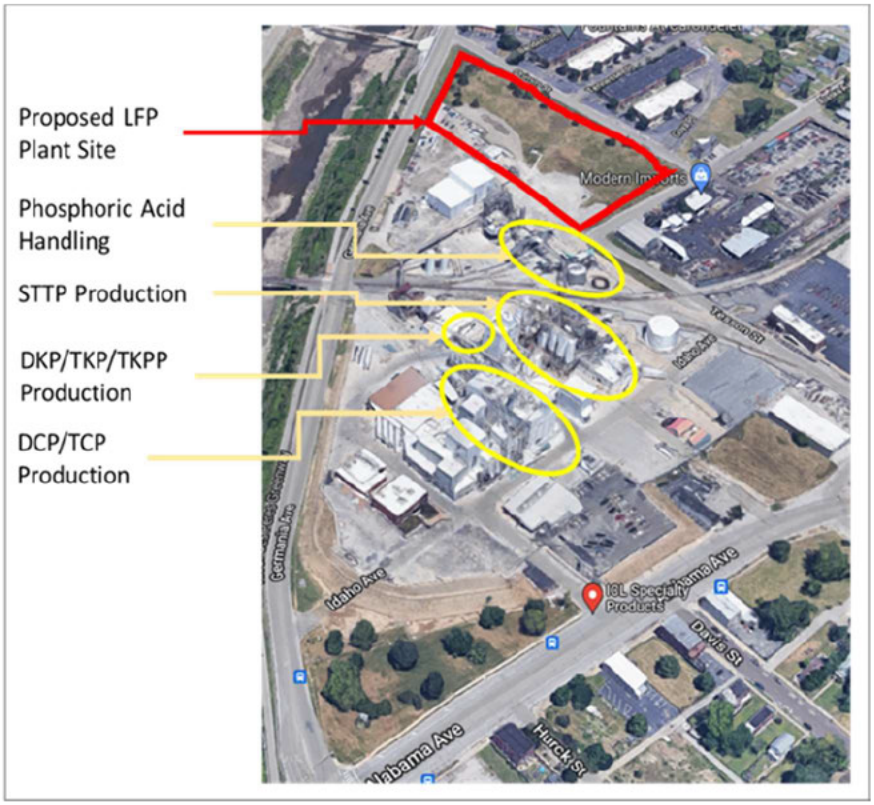


Figure 16: Aerial view of the Carondelet plant which will be expanded to include the proposed project.

Major raw materials for the existing Carondelet plant are Phosphoric Acid (PhA), and several alkali & alkaline earth hydroxides. These are the very same and similar materials needed for the LFP production (PhA and Lithium Hydroxide). Besides, most of the [redacted] the LFP production have very

similar counterparts found in this plant. Therefore, the applicant has chosen to expand this site to house the proposed plant. An aerial view of the existing Carondelet plant with proposed area of expansion is shown in Figure 16. Highlighted in yellow are existing facilities that manufacture different phosphorous-based chemicals, such as STTP, DKP, TKP, TKPP, DCP and TCP. A large PhA handling facility is also highlighted. Highlighted in red is the outline of the area upon which the proposed plant will be built.

One of the major advantages of this site is that much of the environmental, public access, utility, and discharge permits can be grandfathered into this site from the existing plant, thus greatly reducing the time and cost of the permitting process.

Another significant advantage is the availability of workforce that is familiar with the chemical industry.

2.1.4 Capital Expenditure Estimations

In terms of capital costs, there are two parts that will be built or procured within the scope of this project: (a) Plant building and facilities, (b) Production, QC and R&D Lab Equipment.

(a) Plant Building and Facilities: The applicant has considered the cost of construction, utilities connection, lighting, HVAC, sewage, treatment, compressed air, nitrogen, and other facilitations, and estimates it to be approximately **$218M**. A construction management vendor McCarthy, which is nationally recognized and has completed many projects for DOE contracts, will manage the sub-contractors.

(b) Production, QC, and R&D Equipment: The applicant has much experience in sourcing, commissioning, and operating the type of equipment required for this plant. It has performed (b) (4) [redacted] not belong to the foreign countries of risk, as defined in the FOA. This work will continue as part of value engineering until the orders are placed. The list of equipment, purchasing schedule aligned with the SOPO tasks, cost, cost basis, and justification are shown in Figure 17 (a) and (b). Total cost of capital equipment is estimated to be **$132M**.

2.1.5 Waste Management

Waste generated by LFP production will be minimal. Air emissions will be water vapor and LFP dust from the spray dryer and the roller hearth kiln. The dust will be scrubbed or collected in bag houses. Approximately 10kg will be produced per day or less than 4MT per year of LFP waste powder. This waste along with any waste generated through cleaning processes will be recycled to the cement industry as filler for construction concretes as non-hazardous materials. (b) (4) [redacted] In the proposed plant, any material being disposed in landfill is not foreseen. Process water from heating/cooling tanks will be closed loop systems to minimize usage. Water that needs to be discharged along with water used for cleaning will be collected in our system that is monitored

(b) (4)

[redacted]

(b) (4)

[redacted]

for particulate level, pH and metal content prior to discharge to the St. Louis Metropolitan Sewer District (POTW) as per the regulatory permits. The vast majority of the water used will be emitted as steam during the spray drying process.

Lithium ion cathode production is an energy intensive process due to the particle isolation technique and the sintering process. However, LFP production uses the same basic process for particle isolation (spray dryer) as NMC and LCO but much lower temperatures during sintering which is an advantage. The energy usage is detailed in Figure 18 along with nitrogen and water usage. Nitrogen will be generated on-site to minimize environmental impact of transporting liquid nitrogen. ICL has a global policy to be carbon neutral by 2050. In fact, the Lawrence, KS plant is currently carbon neutral through credits, and the St. Louis facility is next on the list. Overall, emissions from the LFP plant will be minimal as all waste steams will be recycled through the cement industry which prevents any material finding its way to the landfill.

No	Usage	Unit	Annual capacity / 30,000 tons	Remarks
1	Water	m^3	161,000	
2	Electric	GWh	219	Peak: 22 MWh
3	Nitrogen	Nm^3	67 million	Nitrogen purity@ 99.99%

Figure 18: Annual water, electric & nitrogen usage.

2.1.6 Feasibility

Raw materials used in the LFP production process must be of very high purity, otherwise safety and performance of batteries produced from this material will be highly compromised. Shown in Figure 19 is the annual usage of different precursor materials for the 30K (30,000 tonnes/year) LFP plant using this technology. As can be observed, Phosphoric Acid (PhA) constitutes about 50% of the raw materials by weight, and therefore the purity of PhA is of utmost importance in maintaining the ultimate purity of the LFP powder.

Precursor	Annual usage in a 30K line (tonnes)
Phosphoric Acid	21,000
Iron Powder	9,900
LiOH	6,900
Fructose	2,610
Li_2CO_3	1,200

Figure 19: Usage of precursor materials for a 15K LFP manufacturing line.

(b) (4)

[redacted]

High purity PhA production is the applicant's core strength. ICL produces PhA for electronic and food grade applications in its 32-acre plant in Lawrence, KS shown in Figure 20 [Left]. The Lawrence plant employs a unionized workforce of 126 people, operates 24x7 and manufactures different types of phosphates in addition to PhA. Impurity specifications for PhA for this process are given in Figure 20 [Right], and they are met or exceeded by the PhA produced in this plant.

(b) (4)

[redacted]

(b) (4)

The proposed process engineering for production of LFP-SC and LFP-DC has been proven on a [redacted]

As another example, the cells shown in Figure 23 are subsequently integrated into a residential [redacted] large scale production, which the applicant wishes to do under this project. Batteries made out [redacted] fade.

[redacted]

(b) (4)

The applicant is currently compliant to ISO 14001 (environmental) and 9001 (quality). To supply to the automotive industry, compliance to IATF 16949 is required. For self-certification of the cathode powder, the QC lab needs to be compliant with ISO/IEC 17025.

[redacted] help with these certifications that the applicant does not possess at this time. The applicant will [redacted]

quality management system for the automotive industry in accordance with the ISO 9001:2015. [redacted]

(b) (4) [redacted]

2.1.7 Workforce Hiring and Retention

The senior management team, comprising of 16 exempt employees, is already on board with the applicant, and will be assigned to this project. Their credentials and relevance are discussed in the "Technical Qualifications and Resources" section.
The junior management team and plant operators will be hired locally. The St. Louis, MO area, where the plants will be located, has a pool of workforce trained in the chemical industry. All positions created will be above prevailing wage in the area and operation workers will be [redacted] and Talent Acquisition team is responsible for workforce screening and hiring. The Applicant offers a comprehensive benefits package including 401(k), health, PTO, and sick time. The package is considered highly competitive to what other companies offer in the locality, thus helping the recruitment and retention.

[redacted]

(b) (4)

The human resources required to run the plant in 3 shifts with one 15K line and both lines are listed in Figure 25.

2.2 Innovation and Impacts

End-product of the proposed project is high quality Lithium Iron Phosphate (LFP) cathode powder for safe, long-life, high capacity, and commercial LFP batteries. This is achieved by having a process technology that advances the following characteristics of the LFP powder:
(a) particle morphology, *(b) conductivity,*
(c) compositional homogeneity, *(d) purity and* *(e) cost.*
While the basic chemistry of LFP manufacturing has been known for over 25 years, only in the last decade tremendous amount of innovation has occurred in the industry in terms of processing technology in order to improve the five critical success factors above.

[redacted] which in turn significantly affects the safety and lifetime of the batteries produced with this powder. Lithium Hydroxide and Carbonate have been produced with high purity by both,

domestic and overseas manufacturers due to the demand and success of other types of Lithium batteries, such as LCO and NMC cathode chemistries, and is not considered to be a quality risk. (b) (4) [redacted] therefore is not considered a quality or supply chain risk.

Phosphoric acid, on the other hand, is produced by many companies with varying degrees of purities. Major applications of phosphoric acid and phosphates are fertilizers, fire-retardants, and water treatment, all of which do not require high purity. However, ICL, a major producer of Phosphoric acid and phosphates, also manufactures these compounds for food, electronics, and other specialty applications – therefore has developed processes and technologies to manufacture these compounds at very high purity at the lowest cost possible. ICL is therefore uniquely poised to provide this very important raw material for this industry and specifically for this project. This supports the **critical success factors (d)** and **(e)** described above. In fact, ICL already sells the high purity Phosphoric acid and its compounds to LFP powder manufacturers worldwide.

ICL plays a critical part in the phosphoric acid supply to the LFP marketplace. Market conditions are currently straining high purity phosphoric acid capacity globally even without the demand expected from LFP growth. ICL is back integrated to phosphate rock and also has strategic [redacted] (b) (4) [redacted] important step in the production of LFP powder is the compositional homogeneity. It may [redacted] melting point, slurry viscosity, etc... techniques of mixing them and then calcining them to proper homogeneity at large scale requires mastering the processes and parameters that can only be obtained by running a manufacturing business for synthesizing materials of similar complexity.

The applicant manufactures a large number of such "Engineered Materials" with very similar processes. More specifically, relevant to this project, it produces Specialty Minerals, such as phosphate salts of Calcium, Magnesium, Potassium and Sodium for a wide range of industries, such as Pharma, Nutrition, Food, Feed, Cosmetics and General Technical. This supports the **critical success factor (c)** described above.

Although the basic science and technology of LFP material has been known for 25 years, the field has advanced dramatically in terms of making the LFP powder morphologically superior and more conductive, which make the capacity, cycle life and power delivery capability of resultant batteries far better than they were 25 years ago. Much of the intellectual property (IP) for these advances and ensuing commercialization of LFP batteries have happened outside of the US. It is therefore imperative that for an American company to manufacture world-class (b) (4) [redacted] licensing relevant patents that support the **critical success factors (a)** and **(b)**.

[redacted]

(b) (4)

[redacted]

[redacted]

[redacted]

2.2.1 Organic R&D Strategy

The technology strategy the applicant has formulated is to procure current state of the art [redacted] Critical to the long-term success of this investment is continued development of the applicant's Research and Development capabilities for next generation lithium-phosphorus materials to serve the cathode market. The ICL group has past synthesis experience with development of LFP materials with A123 (a leading LFP battery manufacturer in the past) along with critical knowledge of particle size and morphology control on an industrial scale. BCL has expert Battery scientists in Israel that the Applicant has leveraged to recruit scientists at Battery Test Laboratories in the USA. It is the Applicant's intention to further expand these groups and establish a cathode material synthesis lab in St. Louis, complimented with a full battery test laboratory in Tarrytown NY within ICL-IP. The Applicant has also announced they are evaluating new opportunities for electrolytes currently used in batteries and next-generation solid electrolytes. By combining the past technical knowledge of phosphate salt morphology control on an industrial scale with battery and cell test capabilities and electrolyte design, the Applicant will establish a leading-edge R&D group devoted to innovations in cathode materials for use in energy storage solutions.

3 Workplan and Market Transformation Plan

3.1 Project Objectives

The project will be executed in two phases: Phase-I and Phase-II.

In Phase-I, the Applicant will build the full factory shell as an expansion to its existing facility at Carondelet, but commission the first manufacturing line of 15,000 MT/year capacity. In Phase-II, the Applicant will commission a second 15,000 MT/year line.

The size of 15K is determined by the process modularity of the technology, while two lines leading to 30K level of production is required to achieve the economic viability. Rather than building both the lines in parallel, the applicant is building them in sequence within the same building structure. Major expenses on the second line will not occur until the production from the first line has been validated by the customer. Major commercial risk in the project will be mitigated by staging the plant construction in this manner.

3.2 Technical Scope Summary

The project will be performed over a period of five years, and as such there will be five budget periods. Each budget period has specific milestones for every quarter and an annual Go/No-Go decision point.

In the Budget Period 1, planning and preparatory work for the plant will be carried out. Detailed engineering design of the plant and any value engineering will be carried out. A construction bid package will be prepared and sent out to prospective bidders for competitive quotes. The quotes will be evaluated, and construction contracts will be signed. Based on the engineering designs, permits will be applied for at the city and state regulators. The facility shell construction will start, and part of the utility connections will be done in this period. Competitive quotes for all the production equipment for the Phase-I line, QC lab and R&D lab will be obtained, and orders will be placed.

Milestones for Budget Period 1 are:

ML No.	Milestone
1.1	Permit application to the city & state
1.2	Production Equipment Orders confirmed by vendors and delivery dates committed by all vendors
1.3	Vendors for base construction packages selected and contracted
1.4	Provisional Permits obtained for starting the construction
1.5	QC, R&D Orders confirmed by vendors; delivery dates committed by all vendors
1.6	Vendors for different work packages selected and contracts signed
1.7	All permits are obtained from city & state based on the design

The Go/No-Go decision point for Budget Period 1 is:
All Permits Obtained and All Vendors Selected and Contracted

In the Budget Period 2, construction of the factory shell will be completed.

The shell construction and all the utility connections to it will be completed. Warehouses for incoming raw materials, outgoing finished products, and the office area will be furnished. Conditioned water plant, Nitrogen plant and compressed air generator will be installed. Wastewater treatment, electrical systems and control room will be installed. Installation of reaction & dispersion tanks, ball & jet milling machines will be initiated. Air delivery and exhaust systems integration will be initiated in this budget period.

Milestones for Budget Period 2 are:

ML No.	Milestone
2.1	Basic Utilities Connections Completed
2.2	All Construction Work Complete
2.3	All Utilities Connections Complete
2.4	Electrical and Controls Commissioned

The Go/No-Go decision point for Budget Period 2 is:
All Construction, Utilities, Electrical Systems and Controls Commissioned

In the Budget Period 3, production from the Phase-I line (first 15K line) will start; Planning and equipment ordering for the Phase-II (second 15K line) will be carried out.

R&D and QC labs will be commissioned. Lab scale production of LFP in three batches will be carried out, with about 1 kg of material produced for each batch. The process will be tuned until the physical specifications as shown in Figure 32 for the product are met at this scale.

A Quality & Safety Plan will be created and implemented. The list of plans includes:
Raw materials IQC Specs and Plan
Process Control and Mitigation Plan
Equipment Maintenance Plan
Outgoing Materials OQC Plan
Equipment Training Plan
Safety Training Plan

A comprehensive Equipment and Safety Training will be carried out before the production starts. Work towards the Quality Certification will also start.

(b) (4)

of the LFP powder will start by making at least 3 batches, with at least 10 tonnes produced in each batch. For each batch, besides verifying the physical specifications, batteries will be made and their electrochemical performance will be verified against established specs as shown in Figure 32. Sample LFP powders will be sent to customers for their evaluation and approval.

After successful electrochemical verification, the production will be ramped to 41 tonnes/day (equivalent to 15,000 tonnes/year) for 5 consecutive days to demonstrate the 15K capability.

For the Phase-II line: All production equipment for this line will be ordered.

Milestones for Budget Period 3 are:

ML No.	Milestone
3.1	R&D and QC Lab Functional
3.2	Test Batch 3 meets physical specifications
3.3	Factory Construction Completed for Phase-I
3.4	Pilot Batch 3 meets electrochemical and physical specifications
3.5	ISO Certification of the plant
3.6	Orders confirmed & delivery dates committed by all vendors for Phase-II line
3.7	Commercial Sale of 900MT of LFP powder

The Go/No-Go decision point for Budget Period 3 is:
Phase-I Line: Production meets electrochemical and physical specifications; 15KT/year capability demonstrated.

In the Budget Period 4, commercial production from the Phase-I (with the first 15K line) will start.

Phase-I Line: Customers will evaluate, approve LFP powder samples and place commercial orders. Quarterly sales growth will be tracked.

Phase-II Line: The production equipment would be arriving, and being placed.

Milestones for Budget Period 4 are:

ML No.	Milestone
4.1	Sales in 2026/Q1 1000 tonnes or more from Phase-I Line
4.2	Sales in 2026/Q2 1500 tonnes or more from Phase-I Line
4.3	Sales in 2026/Q3 2000 tonnes or more from Phase-I Line
4.4	Sales in 2026/Q4 3000 tonnes or more from Phase-I Line

The Go/No-Go decision point for Budget Period 4 is:
Phase-I Line: 8400 tonnes or more of LFP powder sold cumulatively.

In the Budget Period 5, production from the Phase-I line will continue to ramp; Commissioning, Validation, Production from Phase-II line will be carried out.

Phase-I Line: More customers will evaluate or order LFP powder. Quarterly sales growth is tracked.

[redacted] (b) (4)

of the LFP powder will start by making at least 2 batches, with at least 10 tonnes produced in

each batch. For each batch, besides verifying the physical specifications, batteries will be made, and their electrochemical performance will be verified against established specs as shown in Figure 12. After successful electrochemical verification, the production will be ramped to 41 tonnes/day (equivalent to 15,000 tonnes/year) for 5 consecutive days to demonstrate the 15K capability.

Milestones for Budget Period 5 are:

ML No.	Milestone
5.1	Sales in 2027/Q1 3750 tonnes or more from Phase-I Line
5.2	Sales in 2027/Q2 3750 tonnes or more from Phase-I Line
5.3	Phase-II Line Commissioned
5.4	Sales in 2027/Q3 3750 tonnes or more from Phase-I Line
5.5	Phase-II Line Output Verified in Battery
5.6	Phase-II Pilot Batch 2 meets electrochemical and physical specs
5.7	Phase-II line Demonstrate 15KT/year Capability
5.8	Sales in 2027/Q4 3750 tonnes or more from Phase-I Line

The Go/No-Go decision point for Budget Period 5 is:
Phase-II Line: Production meets electrochemical and physical specifications; 30KT/year capability demonstrated from both lines together.

3.3 WBS and Task Description Summary

WBS No.	Task
1	Budget Period 1: Planning, Construction Start and Phase-I Equipment Order of 30K Plant
1.1	Plant Design
1.2	Facility Construction: Planning, Bidding, and Permits
1.3	Equipment Ordering for Phase-I line
2	Budget Period 2: Construction of Plant
2.1	Facilities Construction of 30K Plant
2.2	Production Equipment Installation and Commissioning for Phase-I line
3	Budget Period 3: Production from Phase-I Line; Equipment Order for Phase-II Line
3.1	Test Production
3.2	Production Line Setup of Phase-I line
3.3	Quality & Safety Plan Creation and Implementation
3.4	Pilot Production from Phase-I Line and Electrochemical Verification
3.5	Ramp to 15K-tonne/year capacity in Phase-I Line
3.6	Phase-II Line Planning
4	Budget Period 4: Commercial Production from Phase-I Line; Construction of Phase-II Line
4.1	Phase-I Line Commercial Production
4.2	Phase-II Line Installation
5	Budget Period 5: High-Capacity Production from Phase-I; Production from Phase-II Line

5.1	Phase-I Line High-Capacity Production & Sales
5.2	Phase-II Line Production Equipment Installation and Commissioning
5.3	Phase-II Line Pilot Production and Electrochemical Verification
5.4	Ramp to 15K-tonnes/year Capacity for Phase-II Line

3.4 Milestone Summary

Milestones for Budget Period 1 ending 12/29/23

ML No.	Milestone	Date
1.1	Permit application to the city & state	3/30/23
1.2	Production Equipment Orders confirmed by vendors and delivery dates committed by all vendors	4/4/23
1.3	Vendors for base construction packages selected and contracted	5/11/23
1.4	Provisional Permits obtained for starting the construction	5/15/23
1.5	QC, R&D Orders confirmed by vendors; delivery dates committed by all vendors	5/22/23
1.6	Vendors for different work packages selected and contracts signed	8/17/23
1.7	All permits are obtained from city & state based on the design	12/29/23

Milestones for Budget Period 2 ending 12/27/24

ML No.	Task Name	Date
2.1	Basic Utilities Connections Completed	2/23/24
2.2	All Construction Work Complete	6/17/24
2.3	All Utilities Connections Complete	7/15/24
2.4	Electrical and Controls Commissioned	12/27/24

Milestones for Budget Period 3 ending 12/27/25

ML No.	Milestone	Date
3.1	R&D and QC Lab Functional	3/12/25
3.2	Test Batch 3 meets physical specifications	5/23/25
3.3	Factory Construction Completed for Phase-I	5/30/25
3.4	Pilot Batch 3 meets electrochemical and physical specifications	9/2/25
3.5	ISO Certification of the plant	9/10/25
3.6	Orders confirmed; delivery dates committed by vendors for Phase-II line	7/23/25
3.7	Commercial Sale of 900MT of LFP powder	12/30/25

Milestones for Budget Period 4 ending 12/30/26

ML No.	Milestone	Date
4.1	Sales in 2026/Q1 1000 tonnes or more from Phase-I Line	3/31/26
4.2	Sales in 2026/Q2 1500 tonnes or more from Phase-I Line	6/30/26
4.3	Sales in 2026/Q3 2000 tonnes or more from Phase-I Line	9/30/26
4.4	Sales in 2026/Q4 3000 tonnes or more from Phase-I Line	12/30/26

Milestones for Budget Period 5 ending 12/30/27

ML No.	Milestone	Date
5.5.1	Sales in 2027/Q1 3750 tonnes or more from Phase-I Line	3/31/27
5.5.2	Sales in 2027/Q2 3750 tonnes or more from Phase-I Line	6/30/27
5.5.3	Phase-II Line Commissioned	7/27/27
5.5.4	Sales in 2027/Q3 3750 tonnes or more from Phase-I Line	9/30/27
5.5.5	Phase-II Line Output Verified in Battery	9/29/27
5.5.6	Phase-II Pilot Batch 2 meets electrochemical and physical specs	9/29/27
5.5.7	Phase-II line Demonstrate 15KT/year Capability	10/27/27
5.5.8	Sales in 2027/Q4 3750 tonnes or more from Phase-I Line	12/30/27

Go/No-Go Decision Points

1	All Permits Obtained and All Vendors Selected and Contracted	12/29/23
2	All Construction, Utilities, Electrical Systems and Controls Commissioned	12/27/24
3	Phase-I Line: Production meets electrochemical and physical specifications; 15KT/year capability demonstrated.	9/30/25
4	Phase-I Line: 8400 tonnes or more of LFP powder sold cumulatively.	12/30/26
5	Phase-II Line: Production meets electrochemical and physical specifications; 30KT/year capability demonstrated from both lines together.	10/28/27

End of Project Goal

The applicant will construct and facilitate a plant for manufacturing LFP cathode powder with the superior specifications as shown in Figure 12 with a capacity of 30,000 tonnes/year.

3.5 Project Schedule

The project Gantt Chart is shown in Figure 26.

3.6 Waiver for performance of work in the United States (Foreign work waiver)

A waiver is being requested for Work in the United States as part of the application. Ran Elazari (b) (4) and [redacted] are employed by Bromine Compounds, Ltd., part of ICL Group based in Israel, but are essential in building the foundation for developing the next generation of lithium iron phosphate in the US. While ICL has extensive experience in manufacturing and handling phosphate salts for the past 150 years, its US division does not have much local experience in battery material research and testing. Ran has extensive experience in establishing and leading a battery development and testing facility in Israel. As part of this DOE grant, the Applicant anticipates building up its knowledge base in the US with US based researchers. However, Ran allows the Applicant to bridge the knowledge gap while actively recruiting established researchers in the US. Ran will assist in setting up the battery test lab and materials development programs.

WBS #	Task Name		
0	ICL-IP America Inc LFP Plant	1/2/23	12/30/27
1	Budget Period 1 : Planning, Construction Start and Phase-I Equipment Order of 30K Plant	1/2/23	12/29/23
1.1	Plant Design	1/2/23	5/1/23
1.2	Facility Construction : Planning, Bidding, and Permits	3/31/23	12/29/23
1.3	Equipment Ordering for Phase-I line	3/1/23	5/22/23
2	Budget Period 2 : Construction of Plant	1/2/23	12/28/23
2.1	Facilities Construction of 30K Plant	1/2/23	12/28/23
2.2	Production Equipment Installation and Commissioning for Phase-I Plant	7/3/23	12/28/23
3	Budget Period 3 : Production from Phase-I Line; Equipment Order for Phase-II Line	12/29/23	5/30/25
3.1	Test Production	12/29/23	5/21/24
3.2	Production Line Setup of Phase-I Line	12/29/23	5/30/25
3.3	Quality & Safety Plan Creation and Implementation	12/29/23	9/6/24
3.4	Pilot Production from Phase-I Line and Electrochemical Verification	5/29/24	8/29/24
3.5	Ramp to 15K-tonne/year capacity in Phase-I Line	8/30/24	12/26/24
3.6	Phase-II Plant Planning	7/1/24	7/19/24
4	Budget Period 4: Commercial Production from Phase-I Line and Construction of Phase-II Line	12/27/24	12/30/26
4.1	Phase-I Line Commercial Production	12/27/24	12/29/25
4.2	Phase-II Line Installation	1/5/26	12/30/26
5	Budget Period 5 : High Capacity Production from Phase-I; Production from Phase-II Line	12/30/25	12/29/27
5.1	Phase-I Line High Capacity Production & Sales	12/30/25	12/29/26
5.2	Phase-II Line Production Equipment Installation and Commissioning	1/4/27	7/27/27
5.3	Phase-II Plant Line Production and Electrochemical Verification	7/28/27	9/29/27
5.4	Ramp to 15K-tonnes/year Capacity for Phase-II Line	9/30/27	12/29/27

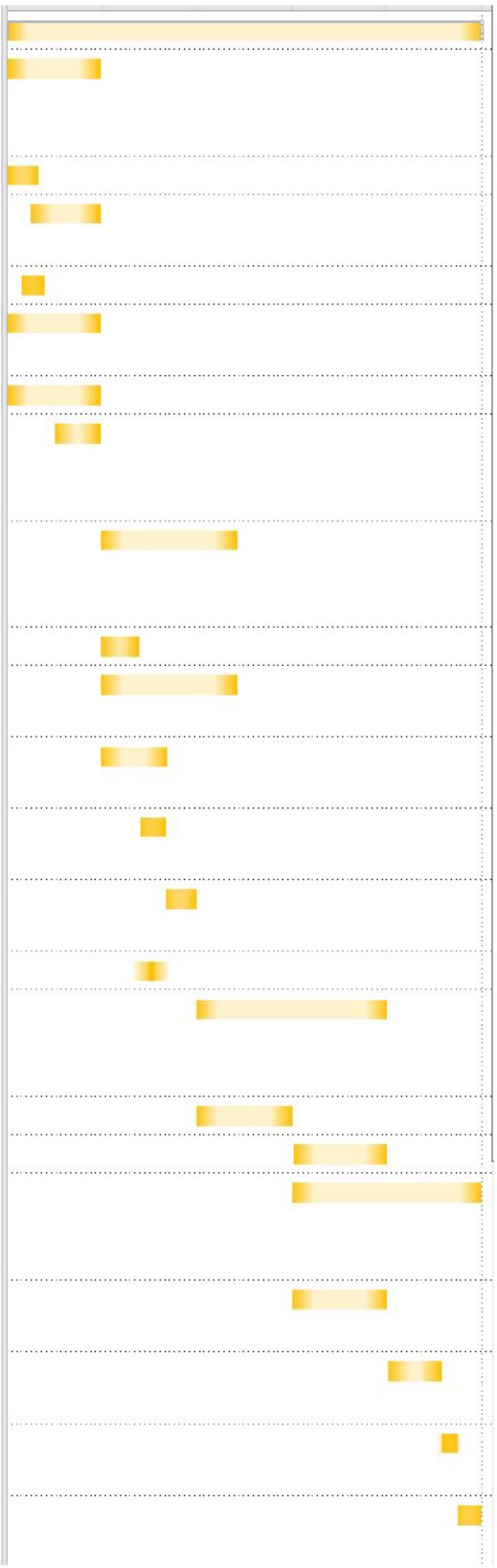


Figure 26: Project Gantt Chart

Equipment qualification and validation needs will also be covered by Ran's knowledge and expertise. Ran will specify equipment needed for quality control and R&D purposes. Ran will also help in qualification of materials produced from the new production facility and training of QC analyst on coating and test methods. Ran's experience and knowledge will accelerate the Applicant's production qualification of materials and also its development of future materials here in the US. Ran will assist in hiring qualified US researchers and their development programs.

(b) (4) [redacted] will be assisting Ran in developing test methods and qualification of equipment to be used in the US for this program. [redacted] In the US the Applicant do not have this level of experience and looks to hire researchers for this purpose. [redacted]

All IP generated by this program will be solely owned by the Applicant: ICL-IP America Inc., a US company. The role of Ran [redacted] are to help ICL-IP establish R&D and test capabilities lab in the US and then will no longer be directly involved in the project. All technical information regarding future R&D developments will be held in our Tarrytown Battery research center. Each R&D center has their own server for storage of information that is not accessible from other facilities within ICL.

3.7 Project Management

Project management is critical in coordinating such a detailed project. The Program Manager, Thomas Murray will have overall responsibility for this project and be the key interface with the DOE Program Manager. He will be responsible for assembling the R&D staff and their research activities related to LFP process optimization and synthesis of novel materials as detailed in Section 2.1.1. Thomas has extensive experience developing R&D teams in projects ranging from materials for use in high voltage systems to UV curable coatings used in optical fiber. He will facilitate the activities of Project Manager, Mr. Gordon Leong. Gordon has 30 years of engineering/construction project management along with roles such as Plant Manager. The construction project activities will be guided by McCarthy Holdings as General Contractor, under the direction of Gordon. McCarthy is the 9th largest construction firm in the country. They are currently working on the Next National Geospatial Intelligence Agency West ("N2W") campus, an ongoing federal project with a contract value of approximately $740M that McCarthy HITT-A Joint Venture is constructing in north St. Louis City. ICL and McCarthy will work together on an Earned Value Management Plan. McCarthy utilizes the Oracle platform of Project Management software including Primavera P6. This software allows the team to optimize resources to keep projects on track. Role and resource optimization, demand, and capacity planning are standard methods used by McCarthy on large projects. P6 allows them to explore scenarios with what-if analysis, along with graphical analysis of resource and role utilization in real time. McCarthy has extensive experience in handling PLAs with local trade unions as detailed in the Equity Plan, which this project will be governed by.

3.7.1 Organizational Structure

The Program Manager/Principal Investigator of this program will report directly to the President and a Member of the Board of Directors of ICL-IP, Mr. Phillip Brown. Thus, this program will get the visibility and support of the executive management. ICL is a Global company with over 850 employees in North America. This would include production workers as well as quality control staff.

The Project Manager will report his activity through the Program Manager/Principal Investigator as detailed in the Organization chart, shown in Figure 27. A key element of the Project Manager is not only the design and construction of the LFP plant but also assembling the production staff for a 30K plant. Production/Engineering staffing needs will be supported by ICL-North America Human Resources group which is located in St. Louis.

To assist in this project, the Project Manager will have a Manufacturing Manager and Quality Manager reporting to him. A Design Engineering Manager and Process Engineering Manager

(b) (4) [redacted]

The Plant Manager will lead the plant day-to-day operations, with most of the operations staff reporting to him. He will be responsible for coordinating the operations with the supply chain and quality departments so that products within specifications are delivered to the customers on schedule. As such, all JIT and Kanban processes will be implemented, executed, and monitored by his team.

The Commercial Manager will be responsible for day-to-day activities with current customers as well as potential new customers. He will leverage our current sales organization located throughout North America and Europe in sales and customer support of our products.

The Contract Manager role will be to maintain compliance for all construction and government contracts as well as financial reporting as the project proceeds. The ICL Contract Manager will be the key point of contact to the DOE Contract Manager. The Battery Technical Lead will assist ICL-IP America assemble battery testing capabilities and direct R&D in the cathode powder technology to advance the state-of-the-art in the US. He and his team will qualify the R&D & QC equipment and establish a laboratory for testing. They will also assist ICL-IP in recruiting qualified technical staff in the US to work in the laboratory.

3.7.2 Project Change & Risk Analysis

Project changes will be handled through the ICL Contract Manager and Program Manager in consultation with the DOE. A full analysis including financial and technical impact would be jointly presented should any changes come to our attention. Using an experienced General Contractor such as McCarthy and their Project Management software along with project monitoring via Earned Value Management tool should minimize changes and allow early identification of upcoming issues.

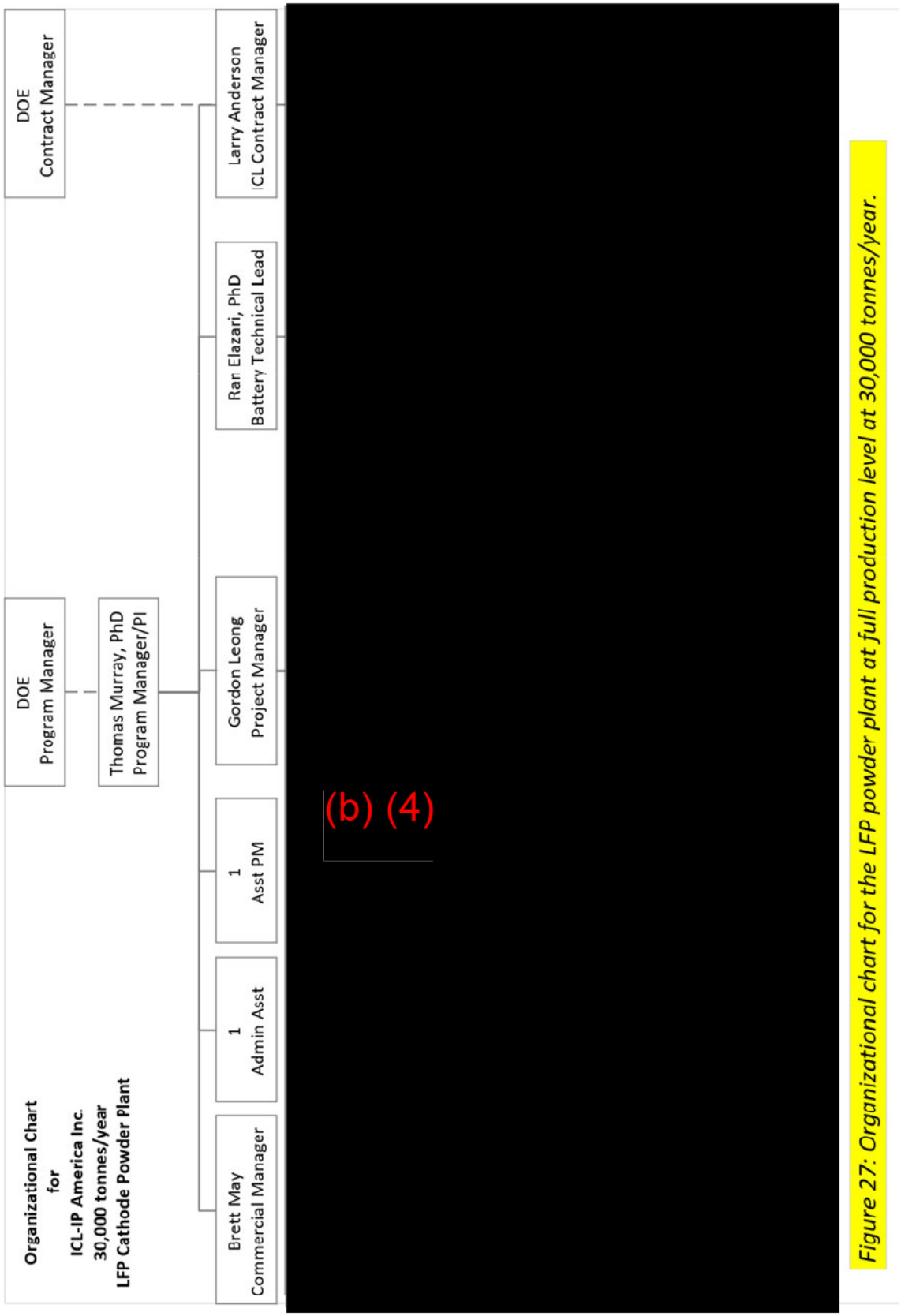


Figure 27: Organizational chart for the LFP powder plant at full production level at 30,000 tonnes/year.

A project risk analysis of the Project plan and top potential solutions are listed below:

Risk Identified	Solutions
Key Equipment lead time (kiln, transformers)	Evaluating multiple vendors
LFP market slow to develop in US	Secure global customers (EU, Asia)
(b) (4) [redacted]	
Price Escalation	22% contingency built into proposal

This project is being constructed within the current Carondelet facility so there is minimal risk of community opposition. As detailed in the Equity Plan, ICL is looking to establish a Community Benefit Agreement/Good Neighbor agreement upon project award. ICL has a strong relationship with the local community including the Carondelet Community Betterment Association.

3.7.3 Quality Management

A Quality Assurance Program will be instituted including ISO 9001, ISO 14001 as well as IATF 16949, and ISO/IEC 17025 as Tier 2 Supplier to automotive customers. The Carondelet facility is currently ISO 9001 and 14001 certified. R&D Project team members will communicate through weekly status updates, email, TEAMS channels and Quarterly reports. This will include quarterly in person reviews along with two extended visits by Ran and [redacted] (b) (4) to monitor the QC and R&D lab testing program.

3.8 Market Transformation Plan

3.8.1 General Market Conditions

Lithium Battery Pricing & Demand: Trends and Forecast

Lithium Battery pricing has increased in 2021 by 35% to $161/kWh for automotive cells. This is primarily due to materials input price spikes (for everything ranging from spot pricing for Li [200%+] to PVDF [20%]). Pricing pressure will remain in 2022 before prices potentially drop dramatically in 2023, as shown in Figure 28. The $100/kWh average price threshold will be crossed in 2025. These are average automotive prices on a cell level. Some producers, most notably Tesla, should reach $100/kWh for their high nickel cells (and lower for their LFP cells) much earlier (probably 2023).

In response to the price reduction, Cairn ERA expects that the global Lithium battery industry will grow from 307 GWh in 2021 to 1,079 GWh in 2025 and 2,725 GWh in 2030, as shown in Figure 29. On a revenue basis, the battery industry will grow from $60 billion worth of battery cells sold in 2021 to $101 billion in 2025 and $241 billion in 2030. That puts the average price for cells in 2030 at $88/kWh.

The greatest downside risks to the forecasts in Figures 28 and 29 are availability of natural resources, especially lithium & cobalt, and geo-political changes that might lead to a watering down of pro-battery policies in Europe. The greatest upside risk to the forecast is if political initiatives start to push for a net-zero world by 2030.

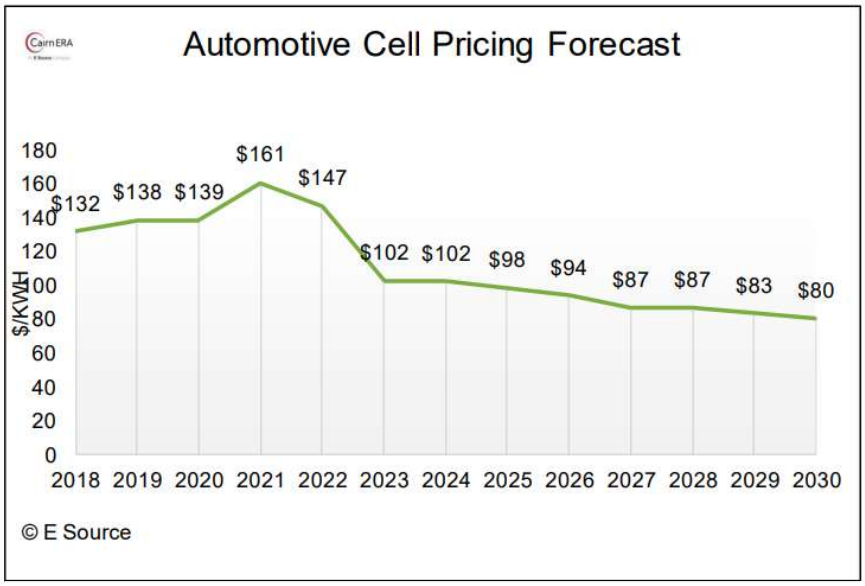


Figure 28: Global pricing trend of rechargeable Lithium Batteries.

The North American Li ion battery market is expected to grow from 61 GWh in batteries sold in 2021 to 244 GWh in 2025 and 607 GWh in 2030, as shown in Figure 30. The US is currently the largest market for grid storage in the world, however transportation batteries will dominate the usage of Li ion batteries during the coming decade. Majority of lithium batteries for transportation sold today in North America are made in the U.S. thanks to the Tesla Gigafactory in Nevada. The proportion of domestically manufactured batteries will increase over the coming decade with more than a dozen new factories expected to be built.

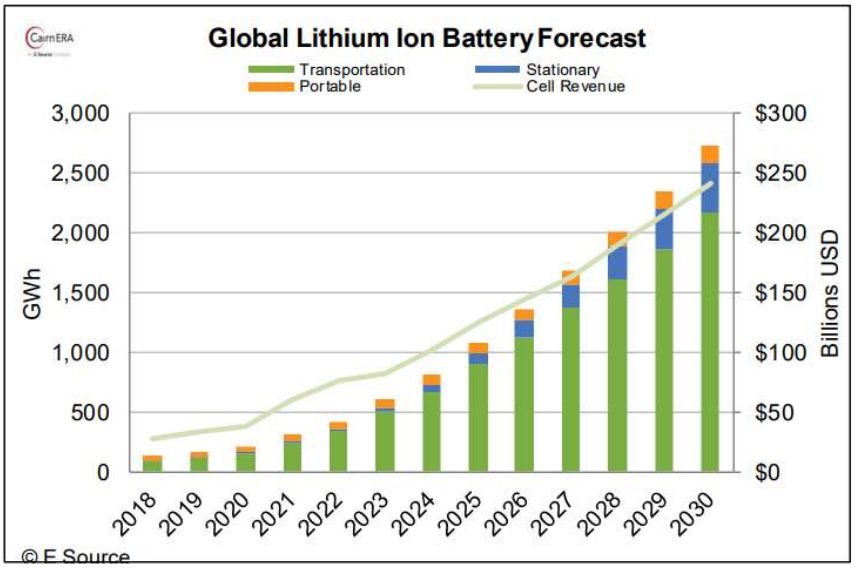


Figure 29: Capacity and Revenue growth of rechargeable Lithium batteries.

<u>Lithium Battery Cathode Forecast:</u>

Although the production of LFP cathode-based Lithium batteries has been going up gradually for last 4 years, their relative share in the new lithium battery sales has slightly declined since 2019. This has happened due to the launch of dozens of new NMC-based battery factories in Europe and North America. Meanwhile in China, where LFP is widely used in small vehicles, the growth rate of NMC batteries for larger vehicles will outpace LFP sales into smaller vehicles, even though the actual vehicle sales of these smaller cars will increase more quickly. That trend will continue through 2023. As shown in Figure 31, after 2023, LFP will start to rise

considerably, primarily thanks to the introduction of the cathode chemistry in small and mid-sized cars in Europe and North America. For instance, Tesla has already changed the technology from NCA to LFP in certain models and Rivian has announced its plans to change its technology from NMC to LFP. By 2025, the share of LFP batteries will reach 26% of all battery shipments. By 2030, 1 TWh of batteries will have LFP cathodes, equaling 39% of the global battery market.

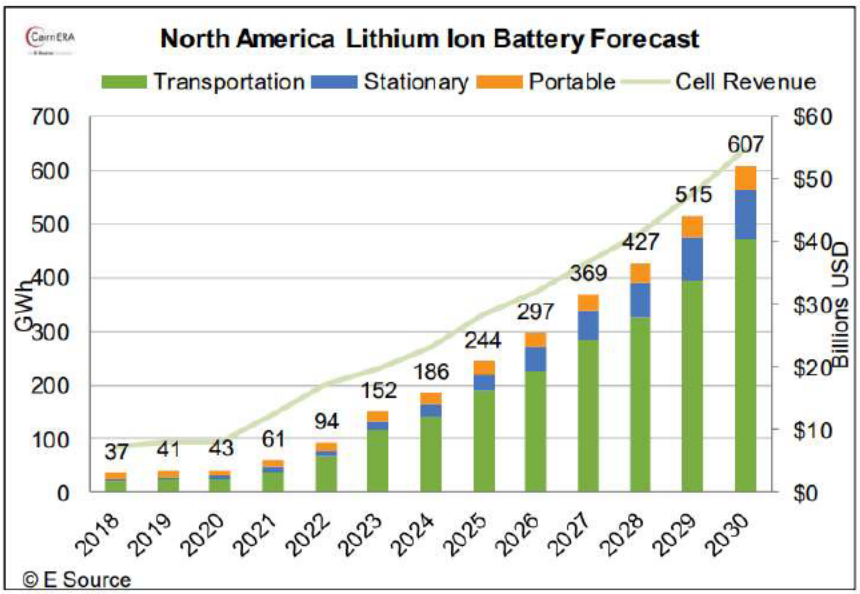


Figure 30: Growth trend of Lithium batteries in NA by market sectors.

Over 95% of the LFP cathode powder is currently produced by Chinese and non-Chinese companies – but within the geography of China. Current suppliers of

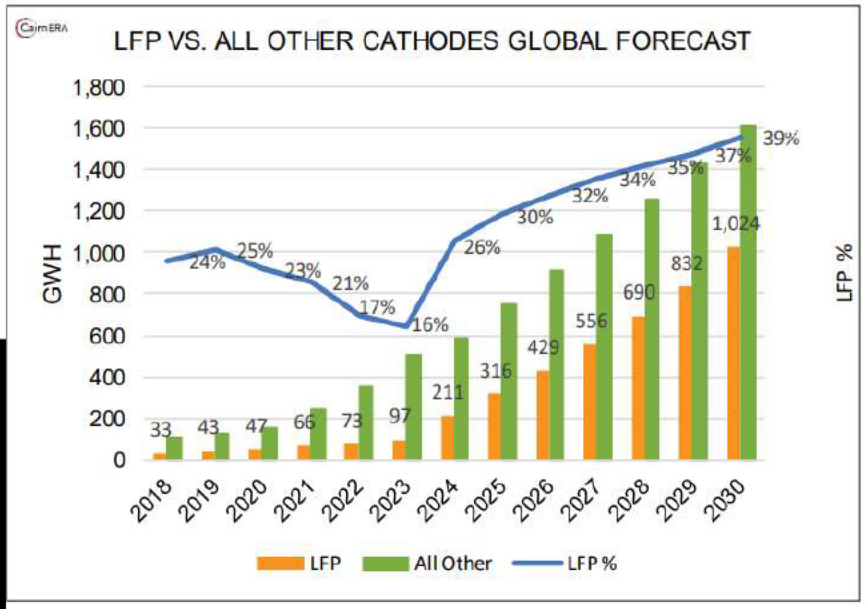


Figure 31: Market growth of LFP Batteries.

[redacted]

(b) (4)

[redacted]

to market the LFP powders produced by ICL-IP to its customers.

3.8.2 Customer Commitment & Backlog Creation

[redacted]

proposed in this project. It motivates the applicant to add more capacity to the factory beyond the proposed project with its own investment.

(b) (4)

[redacted]

the production has also been received by the applicant, as excerpted in Figure 33. Their annual demand for 35 KT of LFP cathode powder far exceeds the production capacity of the project.

[redacted]

manufacturers. All of them are generally very enthusiastic about the product and are eager to validate and accept the product once the production starts. Given the market analysis and response, it is unlikely that there will be a barrier to selling the product as long as the specifications shown in Figure 12 & Section 2.1.2 and pricing expectations as discussed in Section 3.10.4.2 are met.

(b) (4)

(b) (4)

[redacted]

3.8.3 Intellectual Property & Regulatory Compliance

An extensive Freedom-to-Operate (FTO) search completed by a third party (Origin Patent) regarding manufacturing LFP cathode powder and process technology pointed to no infringement concerns. In summary, all the fundamental LFP material patents granted to different universities and companies have expired and therefore available publicly. The specifics

(b) (4)

[redacted]

In the course of this project, the applicant will patent any innovations developed during the R&D. It will consider patenting in the US and other relevant geographies, such as EU (including several member countries), Japan, China, South Korea, Canada, India, and Australia. The only regulatory compliances required for selling LFP cathode powders to the automotive industry

[redacted]

certifications, and the applicant will implement the processes necessary to get these certifications for the LFP powder plants at Carondelet as well.

3.8.4 Business Plan

(b) (4)

Cost components, revenue projections, financial feasibility, IRR analysis, margin analysis, and impact of cost share are discussed in this section.

3.8.4.1 Cost Components

Cost components of the LFP powder produced at the proposed plant are depicted in Figure 34, based on raw materials and operational estimates as of January 2022. It may be observed that raw materials dominate the cost structure,

There is certain amount of volatility in the lithium salt pricing in the market, but that is common to all lithium battery and cathode powder manufacturers. Price to the end customer will be eventually driven by the lithium price – the Applicant has no particular advantage or disadvantage with respect to this material and it will competitively procure the lithium salts from the global marketplace.

It is very encouraging to observe that despite the manufacturing happening in the USA, the cost

with similar factories in China. Traditionally, products with labor costs less than 10% of total cost are not at risk to offshoring.

3.8.4.2 Revenue Ramp, Profitability, IRR

Utilizing ICL-IPs vast knowledge in scaling up production and based on detailed process

can be safely assumed. In line with the general market analysis as described above and given the two customer letters of intent already exceed plant capacity, the following sales volumes are expected and build the fundament of the financial feasibility analysis:

Volumes	2023	2024	2025	2026	2027	2028ff
in k MT	-	-	900	7,500	15,000	30,000

(b) (4)

The general competitive pricing in 2027 for LFP cathode powders is expected to be in the range

of variable costs is deemed manageable via final product pricing, given the high market demand. In addition, ICL Group is fully backward integrated in PhA, which is the major component in terms of volume of the final product. Apart from Lithium, PhA has the highest cost in product and ICL-IPs market position in this raw material gives the company a significant

the project at full capacity.

The financial chart in Figure 35 depicts the development of volume, net sales, EBITDA, accumulated free cash flow and accumulated net present value in accordance with the statements above.

3.10.5 Cost Share

The very capital-intensive investment in the first years of the project constitutes a natural barrier to entry in the LFP market. Equipment, design and construction total more than $350M in the first four years of the project.

Without financial support, the project's main key performance indicators are outside of the general approval threshold of ICL-IP. Discounted cash payback would only be achieved in 2033.
(b) (4) [redacted]

However, there are non-financial gains from this project - including community employment, tax revenue, and especially domestic production of a critical material to the United States energy storage, mobility, and infrastructure market.
To become competitive, especially compared to the major market players located in China, ICL-IP proposes the following cost share shown in Figure 36 between ICL-IP and the DOE:

in %	2023	2024	2025	2026	2027	2028ff
ICL-IP	53%	50%	59%	59%	59%	100%
DOE	47%	50%	41%	41%	41%	0%
Total	100%	100%	100%	100%	100%	100%

Figure 36: Cost share proposal in percentage.

Especially during the capital-intensive construction period, ICL-IP requires additional funds and proposes an accumulated 52/48 (ICL-IP / DOE) share during Phase I of the project (years 1 & 2). Since Phase II of the project is already partially funded by Phase I, ICL-IP proposes a 59/41 share as of period 3. Figure 37 depicts the cost sharing in terms of USD:

in $M	2023	2024	2025	2026	2027	Total
ICL-IP	111	44	32	39	7	232
DOE	100	44	22	27	5	197
Total	210	88	54	66	11	430

Figure 37: Cost share proposal in USD.

Land, public infrastructure on the site as well as equipment maintenance costs are not included in the cost sharing scheme above and are deemed donations from ICL-IP to contribute to the success of the project.

4 Technical Qualifications and Resources

This is a single-applicant project, ICL-IP America Inc. being the applicant. The applicant is supported by three vendors critical to the project:
(A) Bromine Compounds Ltd. (BCL): Provides the electrochemistry and battery R&D experience.
(b) (4) [redacted]
(C) McCarthy: Provides the management of General Contracting.

4.1 Relevant Technology & Operational Expertise of the Applicant

ICL-IP produces a large number of "Engineered Materials," such as organophosphates, alkali phosphates and brominated intermediates. It also uses a large amount of Phosphoric Acid (PhA) produced by its sister concern ICL Specialty Products (ICL SP). Besides other chemical manufacturing facilities, ICL-IP shares a major plant with ICL SP in Carondelet, MO, where this project is proposed to be built.

Besides the Lithium salts, the main raw material for the process is PhA, which is more than 50% by weight of all the raw materials, as shown in Figure 19. Purity of PhA used in the process must be very high, of electronics/food/pharma grade, as described in Figure 20[Right]. High purity PhA is ICL's core strength and produces PhA of such quality in its 32-acre plant in Lawrence, KS shown in Figure 20 [Left].

The Lawrence plant employs a unionized workforce of 126 people, operates 24x7 and manufactures different types of phosphates in addition to PhA. Very few manufacturers in the world can manufacture PhA of such quality at scale and ICL is one of them. In fact, ICL is a vendor of PhA to many cathode material manufacturers worldwide.

4.2 Relevant Expertise of Senior Team Members of the Applicant

The senior management team, comprising of 17 people, is already on board with ICL-IP, and will be assigned to this project. The program reporting structure is shown in Figure 25. Time commitment of the team members to the project in terms of % FTE (Full Time Equivalent) over the budget periods is shown in Figure 38.

		Time Commitment (% FTE)				
Key Member	**Position**	**BP 1**	**BP 2**	**BP 3**	**BP 4**	**BP 5**
Dr. Thomas Murray	Program Manager & PI	100	100	100	100	100
Mr. Brett May	Commercial Manager	15	15	50	100	100
Mr. Gordon Leong	Project Manager	100	100	100	100	100
[redacted]	Process Engineering Manager	15	15	15	15	15
	Design Engineering Manager	100	100	100	100	100
	Plant Manager	0	50	100	100	100
	Process Consultant	100	100	100	100	100
	Project Engineer	100	100	100	100	100
	Plant Engineer	30	30	15	30	15
	Process Chemist	100	100	100	100	100
	Quality Manager	50	100	100	100	100
Mr. Larry Anderson	ICL Contract Manager	10	10	10	10	10
[redacted]	ICL Contracts Specialist	10	10	10	10	10
	Contract Accounting Specialist	100	100	100	100	100
Dr. Ran Elazari	Battery Technical Lead	15	15	30	0	0
[redacted]	Battery Test Engineer	15	15	30	0	0
	Battery Materials Engineer	100	100	100	100	100

(b) (4)

Figure 38: Time commitment of key members for the project.

Their credentials and relevance are discussed below.

Dr. Thomas Murray (Program Manager and Principal Investigator) has a long and successful career in Research and Development, program management, and new business development. He has led international research projects for ELANTAS and facilitated the technology transfer of established processes from Asia/Europe to the US and technology flow from the US to Europe/Asia as well. Thomas has overseen over 40 successful technology transfers during his career. He was instrumental in leading a team of researchers and production staff in the successful transfer of lab process at a leading Fiber Optic company to ELANTAS.

In two years, lab trials were transferred from an outside group to his lab and then scaled to full production. Sales of the technology product went from $0 to greater than $25M over this two-year period. Thomas has managed a diverse team as large as 35 people: synthetic chemists, engineers, material scientists, physicists, and analytical chemists. He has primary authored over 10 US patents ranging from photothermography to nanoparticle design for reduction of pulse discharge in high voltage systems. At 3M, Thomas innovated a key technology component in photo-thermographic media for Medical Imaging films. This technology was sold to Kodak for over $500M who later packaged the technology to Carestream for over $1B. Thomas has over 15 years of experience developing materials for the e-Mobility market including patented materials for magnet wire coatings to improve partial discharge, thermal load management in battery systems, and electrically insulating films. In 2018, Thomas was awarded the ALTANA Innovation Award for his work on development and commercialization of High Temperature Polyamideimide composite films. This was ELANTAS's first foray into solid electrical insulating materials, which included the conversion of a coating line from decorative films at a sister company to UL approved electrically insulating films for use in electric motors and generators.

In this program, Thomas will oversee the entire program execution, but especially will provide creative guidance on the process development activities in Tasks 3.1, 3.4, 3.5, and 5.3.

Mr. Larry Anderson (ICL Contract Manager) is a highly experienced Purchasing/Manufacturing Executive who has delivered multi-million-dollar cost savings in a variety of projects including extensive CAPEX projects. He has developed and completed over 100 Purchasing Strategies. He has hands-on experience in Plant Management, Purchasing/Supply Management and Maintenance Management. As Procurement Director Americas, at ICL, he is responsible for $600M in annual spend including Direct Materials and Indirect Materials across 6 Plants, 2 R&D Centers and ICL's North American Headquarters. His experience as a Change Agent includes leading the largest transformation of Indirect Materials (includes MRO and CAPEX) in John Deere's history where he received the Executive VP "Award of Excellence" for his work.

Larry has extensive experience working with Small Diverse Suppliers (SDS) including Small Business, WBE, MBE, HubZone, etc. Forty-Four percent of his spend at Deere ($220M) was with SDS. He increased Deere's SDS spend by $20M (10%) compared to when he started as Manager Central East Regional Procurement Center.

U.S. Government Programs: At Wieland/Olin Brass as a Purchasing Manager, he was responsible for supporting Material Requirements for the Posi-Bond Operations that provided material to the U.S. Mint for Coin Production. He also supported tooling and material

requirements for fabricating CUPs that were sent to ATK Government Ordnance at Lake City/Independence MO. His experience at Wieland has provided him with familiarity with ITAR requirements.

In this project, Larry will negotiate with the General Contractor and ensure ICL meets or exceeds all of the Minority Contractor/s and Small Diverse Supplier spend requirements. He will be heavily involved in the CAPEX negotiations regarding equipment purchases. He will also be responsible for monitoring the progress of the project to ensure it is completed on time.

Larry will lead the Tasks 1.2, 1.3, and 3.6, besides contributing to several other activities.

Mr. Brett May (Commercial Manager) is an experienced Sales & Marketing Executive who's unique background in Sale, Marketing, Accounting and Data Analysis provide a solid platform to develop this market in a disciplined way. His track record for building value propositions for new products and maintaining market stability is one of his greatest strengths. At ICL Brett has continually increased his responsibilities to now managing a nearly $300M portfolio of products across North America. Along with sales and marketing responsibilities he takes an active role in the supply chain and customer service organizations in order to manage the overall customer experience.

Outside direct Sales and Marketing Brett has worked on many significant process and system improvements. Most notably he was the project owner for our new CRM system which includes pricing and data integration to our ERP system. This has allowed us to capture market data in a way that allows us to gain incites that are driving growth in both profitability as well as top line growth by 25%.

Throughout his career Brett has shown himself as a self-starter that has the tenacity to follow a project through to completion. In this project he will work to build a market strategy that best utilizes our product in the energy storage market. He will also lead the sales team in customer acquisition and business development activities.

Brett will lead the tasks 3.5, 4.1, 5.1, and 5.4, besides contributing to several other activities.

Mr. Gordon Leong (Project Manager) has an extensive career in manufacturing and project management. Gordon was the major driver for process planning and implementation of new protein fiber plant in Carondelet in 2022. This $20M investment is a completely new process and product to ICL. This included design and build activities for this novel venture. Gordon's experience in Project Management was critical to the project success. The pea fiber processing technology was developed by a third-party at pilot scale. Gordon managed a team to scale this pilot unit to a full production unit in two years. The design and construction of this unit was on time and on budget even with Covid complications. He led a multifunctional team of experts, both internal and external, located in the US and Israel to accomplish this task.

Gordon has also been responsible for the operations of the Carondelet site which includes 140 employees and an annual budget of $94M for six years. Carondelet produces greater than 100K MT of phosphate materials per year. Gordon negotiated two labor contracts and implemented

$20M in capital improvements for the facilities. He implemented Human and Organization safety models in the plant which led to a 25% reduction in recordable injury rates. During his tenure the plant saw a 10% improvement in on-stream time.

Prior to being Plant Manager, he was responsible for process planning of major expansions of phosphate plants in North America. This included sites in Lawrence KS, Carteret NJ and St Louis MO. He was in charge of plant reliability, process development and use of design of experiment to define optimal operation conditions. He also was lead for GMP implementation at North American facilities.

In this project, Gordon will be responsible for the construction and operation of the plant, leading the tasks 1.1. 1.2, 2.1, 2.2, 3.2, 3.4, 3.6, 4.1, and 5.2, besides contributing to several other activities.

(b) (4)

(b) (4)

(b) (4)

(b) (4)

[redacted]

[redacted]

[redacted]

[redacted]

4.3 Relevant Expertise of Vendor (A) - Bromine Compounds Ltd. (BCL)

Bromine Compounds Ltd. (BCL), is an Israeli company founded in 1959 and headquartered in Be'er Sheva, Israel. It has 1,600 employees and generated a revenue of $1.6B in FY2021. Together with the applicant ICL-IP, it is ultimately part of the ICL Group companies.

BCL has experts in electrochemistry and battery materials. BCL provides the majority of electrochemical grade bromine salts and solutions for the flow battery industry. BCL also manufactures a large number of battery chemical additives, such as quaternary amines, for different types or batteries. BCL also proactively makes and cycles batteries of several kinds for validating many of electrochemical materials it manufactures. BCL will support the R&D and

technical customer applications engineering for the LFP materials the project will produce. BCL will also set up the R&D facility at the project site at Carondelet.

The two electrochemistry experts Dr. Elazari [redacted] (b) (4) will lead the setting up of the R&D and quality control labs and electrochemical verification of LFP powders produced.

Dr. Ran Elazari has many years of experience in fields of battery electrochemistry such as known Li-Ion chemistries, redox couples, all solid-state batteries, and aqueous based electrochemical systems. During his Ph.D, at Bar Ilan university, Ran studied several cathode materials such as LCO, TiS2, V2O5 NMC and LFP, as well as their anode couples - Lithium metal, Graphite and Lithium Titanate. In addition to these intercalation systems, a significant part of his research focus was on advanced cathode and anode materials with high power/energy density and in particular - the Lithium sulfur redox couple and amorphous silicon anode. He was able to design Li-ion sulfur battery prototype using unique binder free sulfur-carbon composite cathode coupled with a thick a-Si anode that was cycled for more than 100 cycles. Ran utilized and designed in-situ EQCM and AFM technique to investigate and understand interphase interactions between the electrolyte solution and the solid media. Most of his research was supported by industrial and academic partners such as Sion Power, BASF and TUM university. After his Ph.D. Ran joined the new electrochemical laboratory of the R&D unit at Bromine Compound LTD (ICL-IP). As a leading researcher in ICL Electrochemistry program, With this new field of research opportunity, he designed and constructed a lab and mini pilot scale electrochemical test modules for bromine regeneration and recovery from waste streams, and bromine-based energy storage devices. Similar to his Ph.D studies in the university, Ran initiated scientific collaborations in the field of Br based batteries with academic institutes such as Fraunhofer, Columbia university, DICP, and Technion as well as industrial companies such as Lotte chemicals, Primus power, Redflow and Elestor.

As Ran became the Head of the Electrochemical & Physical Chemistry Laboratory, he managed and supported all ICL technical and scientific activity in the field of energy storage. He also started new research activities utilizing ICL core minerals: Phosphorous, Potassium, Bromine, and Magnesium, for various applications such as precious metal extraction, urban mining, electromagnetic shielding, and environmental safety applications. Currently he is part of energy storage solution unit of ICL and actively involved in promoting ICL core mineral and advanced compounds for Lithium-ion battery applications including cathode material such as lithium iron phosphate, Lithium phosphate salts and additives, solid electrolytes, and recycling of Li-Ion core minerals.

[redacted] (b) (4) [redacted]

(b) (4)

[redacted]

4.4 Relevant Expertise of Vendor (B) [redacted]

[redacted]

(b) (4) [redacted]

4.5 Relevant Expertise of Vendor (C) – McCarthy or Competition

McCarthy Holdings is the 9th largest domestic builder (Engineering News-Record, May 2020) – and is 100% owned by its employees. In addition to working alongside industry groups such as the Associated General Contractors of Missouri, the St. Louis Council of Construction Consumers (SLC3), and the Construction Forum, McCarthy collaborates with construction trade unions, union apprenticeship training programs, and employment assistance centers like Better Family Life and Worknet (for SSDI disability benefit recipients) as they seek businesses and candidates for hiring. Preconstruction directors, project managers, field superintendents, and executive leaders – all lead and participate in outreach events in our efforts toward guiding historically underrepresented diverse workers and business owners to gain exposure, pursue, and succeed in construction jobs and careers.

The Next National Geospatial Intelligence Agency West ("N2W") campus with a contract value of approximately $740M in north St. Louis City is an example of the breadth of knowledge and experience they will bring to this project. N2W relevance to the proposed ICL project is in terms of its location, significant size, lengthy construction duration, and union-based workforce, where a project labor agreement is in effect. N2W, located amidst disadvantaged communities in the zip code 63106, this project is exceeding goals established for both diverse business enterprise and workforce participation.

4.6 Need for New Equipment & Facilities

The LFP cathode powder plants to be built under this project incorporate a completely new sequence of processes for which substantially new process equipment are necessary. The existing similar equipment owned by the applicant are either fully utilized or are too expensive to move to a new line.

Since the LFP plants are quite large in footprint, and therefore cannot be co-located under the same roof as applicant's existing plants, facilities such as water, air, lighting, nitrogen, waste-water treatment, power need to be designed and built new. However, the applicant will provide the land and the public infrastructure on the site. The deferred cost of that is NOT considered in the cost share and is treated as a donation to the project.

4.7 Other Declarations

This is a single-organization, single-investigator project.
There are no technical services provided by DOE/NNSA FFRDCs.
The applicant does not intend to export recovered or critical materials to a foreign entity of concern as defined in 42 U.S.C. 18741 (a)(5).
The applicant commits to not use battery material supplied by or originating from a foreign entity of concern as defined in 42 U.S.C. 18741 (a)(5).

*****