OMB Number: 4040-0004
Expiration Date: 12/31/2022

Application for Federal Assistance SF-424

* 1. Type of Submission:
- [ ] Preapplication
- [x] Application
- [ ] Changed/Corrected Application

* 2. Type of Application:
- [x] New
- [ ] Continuation
- [ ] Revision

* If Revision, select appropriate letter(s):

* Other (Specify):

* 3. Date Received:

4. Applicant Identifier: TA2-134-E

5a. Federal Entity Identifier: TA2-134-E

5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:

7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name: DTE ELECTRIC COMPANY

* b. Employer/Taxpayer Identification Number (EIN/TIN): 38-0478650

* c. UEI: HECMEKSW7YR9

d. Address:

* Street1: 1 Energy PLZ
Street2:
* City: Detroit
County/Parish: Wayne
* State: MI: Michigan
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 48226-1221

e. Organizational Unit:

Department Name: Distribution Operations

Division Name:

f. Name and contact information of person to be contacted on matters involving this application:

Prefix:
* First Name: Josh
Middle Name:
* Last Name: Kirk
Suffix:

Title: Senior Strategist

Organizational Affiliation:

* Telephone Number: 734-649-1352
Fax Number:

* Email: josh.kirk@dteenergy.com

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

Q: For-Profit Organization (Other than Small Business)

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

Department of Energy Office of Clean Energy Demonstrations

11. Catalog of Federal Domestic Assistance Number:

CFDA Title:

*** 12. Funding Opportunity Number:**

DE-FOA-0002740

* Title:

Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability

13. Competition Identification Number:

Topic Area 2 (Section 40107)

Title:

Deployment of Technologies to Enhance Grid Flexibility (Smart Grid Grants)"

14. Areas Affected by Project (Cities, Counties, States, etc.):

Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: MI-013 * b. Program/Project: MI-012

Attach an additional list of Program/Project Congressional Districts if needed.

MI-009_Port Austin.txt | Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 01/01/2024 * b. End Date: 01/31/2027

18. Estimated Funding ($):

* a. Federal	(b) (4)
* b. Applicant	(b) (4)
* c. State	0.00
* d. Local	0.00
* e. Other	0.00
* f. Program Income	0.00
* g. TOTAL	(b) (4)

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on .

☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☒ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

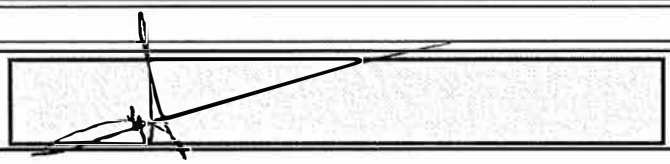
Add Attachment | Delete Attachment | View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 18, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix:	
* First Name:	Josh
Middle Name:	
* Last Name:	Kirk
Suffix:	
* Title:	Senior Strategist
* Telephone Number:	734-649-1352
Fax Number:	
* Email:	josh.kirk@dteenergy.com
* Signature of Authorized Representative:	
* Date Signed:	3/14/23

Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability Project Community Benefits Plan

Introduction

The Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability Project seeks to expand existing microgrids to include adaptive technology that allows the microgrid to have flexible boundaries and be more autonomous. DTE's (DTE or Company) testing facility in Westland, Michigan will be used to complete the engineering due diligence and deployment work for the new technology. The adaptive networked microgrids would be built in rural Port Austin and in urban Detroit. As demonstrated in this Community Benefits Plan, DTE has a longstanding history of supporting and engaging with the communities we serve and will continue to do so throughout this project.

Community and Labor Engagement

Demonstrate Outreach to Local Groups

DTE understands being connected to the communities it serves and knowing our customers' needs is paramount to the company's success. DTE regularly engages with communities to solicit customer feedback and better understand the quality-of-life issues that customers face. Feedback is solicited through an embedded and ongoing stakeholder engagement process which includes:

- Semi-annual Community Advisory Council (CAC) Meetings, focusing on 20 key Detroit stakeholders to share information and solicit feedback.
- General Partners Meetings across Michigan to generate a two-way dialogue, encouraging localized in-depth conversations about current issues. Relationship managers stay connected with these ~300 partners between meetings through monthly newsletters, press releases, seasonal energy assistance reminders, and direct check-ins.
- Trusted network of faith-based leaders and multi-cultural partners for candid feedback
- Relationships with elected local, state, and federal officials and municipal government customers ensure their voices are heard.
- DTE leaders are connected to local non-profit organizations through board service and our Director Community Network, gaining insights into customer challenges and identifying opportunities for DTE to support.
- Weekly customer and quarterly surveys provide direct insight on their experience with DTE, identify improved ways to serve, and validate areas of strength.
- Every three to five years, DTE conducts a sustainability priority assessment to understand the priorities, changing needs and expectations of stakeholders and the business. Assessment results enhance sustainability strategies, inform stakeholder engagements, improve environmental and social governance (ESG) reporting and support the risk management process.

In addition to the above tactics, DTE conducts program/project-specific engagement with targeted communities and stakeholders to ensure their input and support for the long-term success of the project. One example of an initiative specific engagement is the support

DTE provided to customers during the COVID. When the pandemic hit Michigan, DTE activated our community stakeholder network to identify the greatest needs and challenges of customers. DTE hosted listening sessions with CAC members, influential leaders, non-profit partners, faith-based leaders, small businesses, and DTE alumni –informing the COVID-19 support response.

Based on the needs our community partners identified, DTE and the DTE Foundation:

- Leveraged strong supplier relationships to access and donate over 2 million KN95 masks to county emergency managers, first responders, and hospitals along with personal protection equipment kits to small businesses when they could not access the equipment themselves.
- Played a leading role in standing up Detroit Means Business (DMB), a coalition serving small businesses' near- and long-term recovery as well as reopening needs. This pandemic initiative has now become a formal program run by a local agency.
- Played a pivotal role in the "Rona 4 Real" coronavirus awareness campaign and administration for the non-profit MI for All
- Partnered with the Detroit Public Schools Community District (DPSCD) and led the effort to launch and implement Connected Futures, an initiative that raised $23M to distribute 51,000 tablets and provide internet access to every DPSCD student to ensure Detroit youth were not left behind due to digital inequities.
- Instructed Faith-based institutions holding virtual services on electronic outreach

How the Engagement will benefit the community

Located in Detroit, the Tree Trim Academy (TTA) is a collaboration between DTE, the IBEW (International Brotherhood of Electrical Workers), and two local workforce non-profits. The TTA is another example of how collaboration can lead to community benefits.

While the community desires good paying and stable jobs, we recognize that barriers to entry often prevent members from obtaining them. The TTA marries both business and community need through a one-of-its-kind, line clearance tree trim training program whose curriculum thwarts the traditional failure points in those starting this career path. The program includes time management, financial literacy, tree trim/mechanics skill building with in-the-field learning. Students can also obtain a Class-B driving license.

(b) (4) [redacted]

Prior to putting shovels in the ground, DTE canvassed the bordering residential community and held multiple community outreach and engagement meetings with neighborhood associations and the non-profit Friends of Rouge Park to answer all questions and address any concerns. Additionally, DTE has an agreement with the Friends of Rouge Park and the City of Detroit to help clean debris and maintain trees in the 1100-acre park.

DTE and the DTE Foundation have previous engagements with the Port Austin area in Huron County. The DTE Foundation has been a long-time sponsor of the Caseville Cheeseburger festival and the Kinde Polka Fest. The DTE Foundation also provides support to the Huron Creative Writer's Contest, Huron County Safe Place for survivors of domestic abuse, a local Memorial Day Parade and Food Bank, and the John D. Pridnia Community Service Fund.

The Detroit project location would utilize the existing O'Shea solar park, located on the west side of the city in zip code 48227. The 2 MW solar park, an ingrained part of the community today, was once a brownfield development commissioned in 2017 and built in partnership with the City of Detroit. Lease payments to the City of Detroit helped support improvements to the adjacent City Park, including a community gathering space and a bioretention pond. DTE offers educational tours and online videos of the solar park to the community at large with a focus on K-12 students. Aside from clean energy, the solar park supports native pollinator habitat. DTE partnered with local non-profit Bees in the D and hives located on DTE's site provide a home for approximately 120,000 bees.

Negotiating a community benefits agreement

DTE commits to working with local governments and the neighboring community to develop a Community Benefit Agreement. One of the expected benefits includes an expansion of the educational tours DTE provides. It is expected that tour interest will increase from today's mostly local participants to national, and even international stakeholders interested in learning more about advanced energy technology. DTE will partner with the City of Detroit, Detroit Impact, Detroit Public Schools, the Village of Port Austin, and the Detroit Economic Growth Corporation to introduce new visitors to the communities and local minority owned businesses. Through Detroit Impact's STEAM and Solar Girls programs, young leaders will be trained to educate their peers on solar and energy storage technology. The proposed projects have minimal environmental impacts; however, customers may see increased truck traffic and a need to enter yards where alleyways are not present to work on equipment. The community will have input as to the type and frequency of communication they prefer for ongoing construction.

(b) (4) [redacted]

Resources

Description	Cost
(b) (4)	

Investing in the American Workforce

Quality Jobs

The Microgrid project will create opportunities for existing DTE and contract suppliers involving roles such as Engineers, Power Equipment Relay Testing (PERT) Technicians, Overhead, and Underground Line Workers to support the new emerging technology. With this project, DTE's highly skilled workforce will continue to have competitive wages and benefits, have a free and fair chance to join a union, and opportunities for career advancement in the future. Approximately half of DTE's 10,000 employees is represented by one of our eight main labor union partners. Consequently, management and the unions partner to manage and administer collective bargaining agreements covering the wages and benefits of their employees.

DTE offers an extensive collection of benefits that enable employees to take care of themselves and their families. Employees have the flexibility, information and support needed to tailor their benefits in a way that will best contribute to their total wellbeing. All regular full-time and part-time employees are eligible for coverage under the benefits plan which allows individual benefit selections using pre-tax dollars. DTE offers a variety of medical plans in addition to dental, vision and prescription drug coverage. Employees also have access to HSA's, life, and accidental death / dismemberment insurance. All employees (union representation dependent) have access to a variety of time off programs including 11 paid holidays, vacation, and personal time, as well as access to an absence bank and extended disability. (b) (4) [redacted]

One of DTE's top priorities is to achieve a best-in-class Culture of Health and Wellbeing. DTE believes vitality comes from the interactions and harmony between our four dimensions of total wellbeing which are physically thriving, emotional resilience, social connections, and financial security. DTE supports employees and their families' actions through a variety of programs, support services, and resources.

Workforce Development

DTE plans to partner with post-secondary education partners such as colleges and universities with existing Power Engineering programs, such as our partnership with the University of Michigan-Dearborn which delivers Power Engineering content in Bachelor, Master, and Doctorate degree programs. To build a qualified workforce, the plan is to have a post-secondary education provider deliver the technical training and DTE's Learning, and Training Development (LATD) team deliver on-the-job safety and regulatory required training for each position.

The anticipated field deployment of the Microgrid is targeted to start by the fourth quarter of 2025. The project will involve three streams of work involving educating our internal team and existing contractors, educating the next generation of engineers, and educating the industry to develop the equipment. The project will hold annual seminars with product developers, universities, utilities, etc. coordinated by Electric Power Research Institute (EPRI) and UM-Dearborn to share learnings from the project and identify areas to improve.

Educating our internal team and existing contractors will be through the process of on-the-job training. Engineers will work on developing and deploying Adaptive Networked Microgrids (ANMs), Technicians will complete the in-commissioning and testing, and Overhead and Underground Line Workers will install, operate, and maintain the project. Developing processes, standards, operation and maintenance procedures, installation and commissioning instructions, training material, etc. will make future installations more efficient and effective.

By partnering with UM-Dearborn, the learnings and experience will inform the next generation of engineers with a focus on microgrids and specifically ANM. The DTE Workforce Development (WFD) team will develop and execute a strategy to build a qualified talent pipeline through short-term and long-term strategies. The WFD team has a successful track record of partnering with education and community resources in Michigan to support youth, veterans, and adults with barriers including people of color, individuals with disabilities, and returning citizens to gain meaningful employment. One example is the development of

readiness workshops to help prepare individuals for DTE's application process involving employment testing and interview preparation.

DTE will share the results of software and HIL simulations, Westland Yard testing, and deployment, including standards, operation and maintenance procedures, installation and commissioning instructions, training material, etc. with our partners and through the annually planned seminars. Using the approach of three workstreams educating our internal team and existing contractors, next generation of engineers, and industry will ensure the success of the project.

Employees' Involvement in Workplace Safety and Health Plan

DTE's Corporate Safety team supports activities in its business units to perform hazard risk assessments with local resources closest to the work. This risk assessment supports specific safety plans based on approved corporate program criteria, all designed to support the health and well-being of employees. These plans inform the training necessary to perform the local functions. Anti-harassment training is a regular, recurring element for all employees on a two-year cadence, as required by their Ethics and Compliance group.

Through pre-job briefs, safety standards, and regular training, DTE strives to prevent all workplace safety incidents. These tools and processes allow employees to identify hazardous work, categorize hazards according to risk, and mitigate the potential for any serious injuries as well as build in safety measures before the work begins. As a part of their safety governance process, DTE utilizes joint union and management safety committees to collaboratively address safety-related activities and advance safety programs. In 2022, DTE conducted a third-party Safety Culture Assessment through Rogers Leadership Group focusing on front-line perspectives, which resulted in an updated Safety Energy Model and a shift to focus on high-energy hazards that can cause serious injuries or fatalities. DTE monitors its safety performance through many measures, with a primary focus on the rate of safety incidents, as defined by the Office of Safety and Health Administration ("OSHA rate").

Worker Rights

DTE is committed to the engagement and wellbeing of its employees, which includes working effectively with its Union partners in instances where non-represented employees express interest to be represented by a Labor Union. Over the last 20 years, more than 30 distinct workgroups of various sizes have petitioned the National Labor Relations Board to join one of its Union partners. In each instance, DTE has worked in partnership with Unions to negotiate productive collective bargaining agreements providing meaningful job opportunities.

DTE has a long and productive working relationship with its various Union partners which will eclipse 80 years in 2023. We will support and protect employees' free and fair chance to form or join unions of their choosing and exercise their right to bargain collectively in the workplace.

Responsible Employer

DTE greatly values and appreciates the contributions of all their employees, relationships with Union partners, and connections cultivated with its customers and communities. As a result of these strong intentional partnerships, DTE is proud there are zero

violations within the six referenced Acts since 2021 (e.g. Davis-Bacon Act, Fair Labor Standards Act, National Labor Relations Act, Occupational Safety and Health Act, Service Contract Act, and Title VII of the Civil Rights Act).

Each year, DTE attends several conferences to recruit qualified diverse engineers and will continue this practice as the need arises for this microgrid initiative. The conferences include the Society of Black Engineers (NSBE), the Society of Asian Scientists and Engineers (SASE), and Women of Color in Science, Technology, Engineering, and Mathematics (STEM).

Diversity, Equity, Inclusion, and Accessibility (DEIA)

Background

DTE's purpose is to improve lives with our energy, and DEIA is a key aspect of how the Company's planning and work is performed. A fundamental focus of the organization is ownership of DEIA throughout the organization – not just among leadership. This is driven by an executive steering committee, which is a direction-setting group to accelerate, deepen, and broaden work on issues of inclusion, and tackling racism and systemic injustices.

DTE will continue to work toward building a skilled, sustainable, and diverse workforce, with a focus on women, people of color, veterans, and people with disabilities. DTE has taken significant steps to diversify our senior leadership. In November 2021, DTE announced 11 appointments to our executive team, of which 45% were women and people of color.

In 2021, DTE rolled out a refreshed Operating Model incorporating DEIA and analyzed Human Resources Information System (HRIS) data, employee and leader perceptions, and talent management practices. The assessment included inclusive behaviors, equitable and transparent structures, processes, and practices that work for all employees and customers.

In 2022, DTE focused on tying DEIA to our values and leadership principles based on the outcome of our assessment into three long-term strategic goals:

- Prioritizing the effectiveness of the underrepresented talent pipeline by diversifying our workforce, creating a more equitable and inclusive culture, and removing barriers to employment for underrepresented or at-risk people, by providing training and better access to good-paying jobs;
- Creating a speak-up culture encouraging listening, and learning to diverse voices
- Making DEIA a defining and pervasive message in our communications

In 2023, DTE will continue to execute a multi-year strategy that includes monitoring the Company's hiring and retention processes, encouraging a "speak-up" culture and pervasive DEIA communications that welcome diverse voices. To build on this, DTE has and will continue to expand DEIA leadership and employee training offerings including training on "Connecting with Others" and "Conscious Inclusion" for all employees.

Commitments to Supplier Diversity

DTE is committed to developing meaningful partnerships with diverse and local businesses to drive economic growth and build stronger communities. Since 2010, DTE has increased our spend with diverse businesses by 365% and spent over $890M in 2022. 24% of purchase orders were awarded to diverse suppliers. By year-end 2026, DTE aspires to achieve $1 billion in annual spend with diverse suppliers (about 30% of managed spend). On a quarterly

basis, prime suppliers, who are contracted directly with DTE, are expected to report Tier II diverse spend in UniTier, DTE's third-party reporting tool.

To reach these goals, DTE partners with multiple advocacy organizations, chambers, and local and state government offices to identify, develop, connect, and advocate for diverse and local businesses through four main tactics. First, DTE actively supports many of these organizations as board members and subcommittee members. A comprehensive list of these relationships and networks can be provided for additional detail. Furthermore, our Supplier Diversity Team provides DTE buyers opportunities to identify and connect with diverse and local businesses; annually, DTE attends more than 20 external networking events and hosts 1 – 2 networking events every year. Third, the Supplier Diversity Advisory Council (SDAC) was formed to strengthen partnerships between DTE, suppliers, and community leaders and provides DTE with advice and assistance from external resources to ensure DTE's diversity business goals are aligned with and supported by the communities where we live and serve. Lastly, "Elevate", our diverse supplier mentorship program, is focused on capacity building and provides diverse businesses with safety, sustainability, and continuous improvement training. Examples of DTE developing diverse businesses can be given upon request.

In partnership with Henry Ford College, DTE developed a pre-apprenticeship program that fosters careers in gas operations, electric operations, construction, and engineering. Since 2019, the program served more than 350 participants to help prepare and apply for job opportunities within DTE, and help prepare individuals for DTE's application process, aptitude testing requirements, interview preparation, and meeting minimum qualification requirements. DTE aims to bring similar hiring, community engagement, and supply chain practices to the projects in which it is involved.

DTE also partners with Focus: HOPE specifically to recruit, train, and develop talent to complete participation in the Tree Trim Academy (TTA). DTE pays Focus: HOPE for their programming with includes recruitment, workforce development programs and training, test preparation, coursework that includes financial, literacy, and digital fluency and competency, drug testing, license validation, and wrap-around services to support the participants. More details on the program are covered in the community engagement section.

More than a decade ago, with our state in the midst of a deep recession, DTE made a commitment to shift its external purchases to in-state suppliers whenever possible. We've delivered on that commitment every year since. Today at least 60 cents of every dollar we spend externally goes to a Michigan company. Last year, DTE spent $2.5 billion with Michigan suppliers, supporting the local communities, businesses, and residents.

Implementation and Strategy

Two SMART goals and milestones have been created to advance the Diversity, Equity, Inclusion, and Accessibility of this project. The proposed SMART goal, success measure, and timeline of activities and the implementation strategy is discussed below.

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

(b) (4)

[redacted]

Resource Summary

If awarded, additional DEIA team members will be needed to execute connecting the right programs to the specific project requirements.

Description	Cost
(b) (4) [redacted]	[redacted]

Justice40

Assessment of Impacted Communities and Groups

DTE understands that climate change, though a global issue for all communities, has a disproportionate effect on disadvantaged communities and more specifically, on their financial ability to mitigate damages. In total, there are eleven counties in Southeast Michigan. According to the US DOE Disadvantaged Communities (DACs) Reporter tool, ten of these counties have disadvantaged communities with the most significant number in Wayne County, which includes the city of Detroit. The cumulative impacts experienced by southeast Michigan disadvantaged communities result in poor economic, environmental, social, and health indicators. Of the two planned areas for construction of the microgrid, the O'Shea Solar park site is located directly within a disadvantaged community.

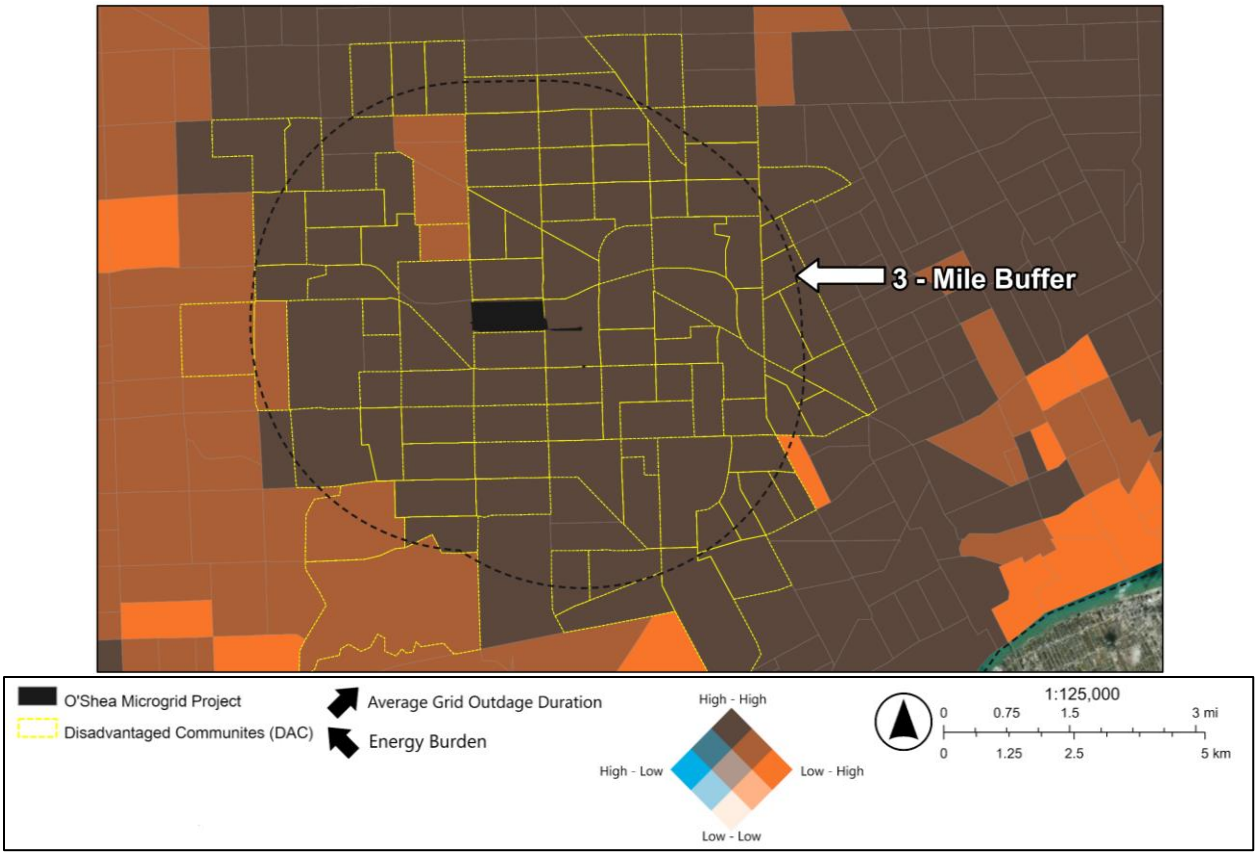
An Environmental Justice (EJ) assessment of the immediate surrounding communities (within three miles) was completed for each microgrid project. This EJ assessment utilized the Michigan Environmental Justice Screening Tool (MiEJScreen) and the Department of Energy's (DOE) Disadvantaged Communities Reporter to identify communities experiencing and/or vulnerable to environmental and energy burden.

The O'Shea EJ assessment identifies numerous communities subject to environmental burdens and vulnerable to environmental justice issues. Of the 115 census tracks within three

miles of the project, 90% are above the 80th percentile for the MiEJScreen composite score. [1] The higher the MiEJScreen composite score, the more impacted and vulnerable a community is EJ. Furthermore, nearly 54% of the communities are above the 90th percentile for the MiEJScreen.

Coinciding with overall MiEJScreen scores at or above the 80th percentile, 94 out 115 census tracks within three miles of the O'Shea Project meet the definition of a Disadvantaged Community (DAC) as defined by the DOE, based on calculations using 36 burden indicator[2]. DACs within three miles of O'Shea project are shown in Figure 1. Census tracks within three miles of the O'Shea project exhibit higher energy burden and experience longer and more frequent outages than other areas of the country. Figure 1 displays relative differences between census tracks based on their energy burden (average annual household energy costs divided by average annual household income) and the average duration of grid outages in one year. Of the DACs within three miles of the project area, 95% have an energy burden of 5% or higher, which is within or above the 82nd percentile nationally. Each of these DACs are in Wayne County, MI which, as a county, resides in the 90th and 89th percentiles nationally for outage duration and outage events, respectively.

Figure 1: Three-mile EJ Assessment of O'Shea Project

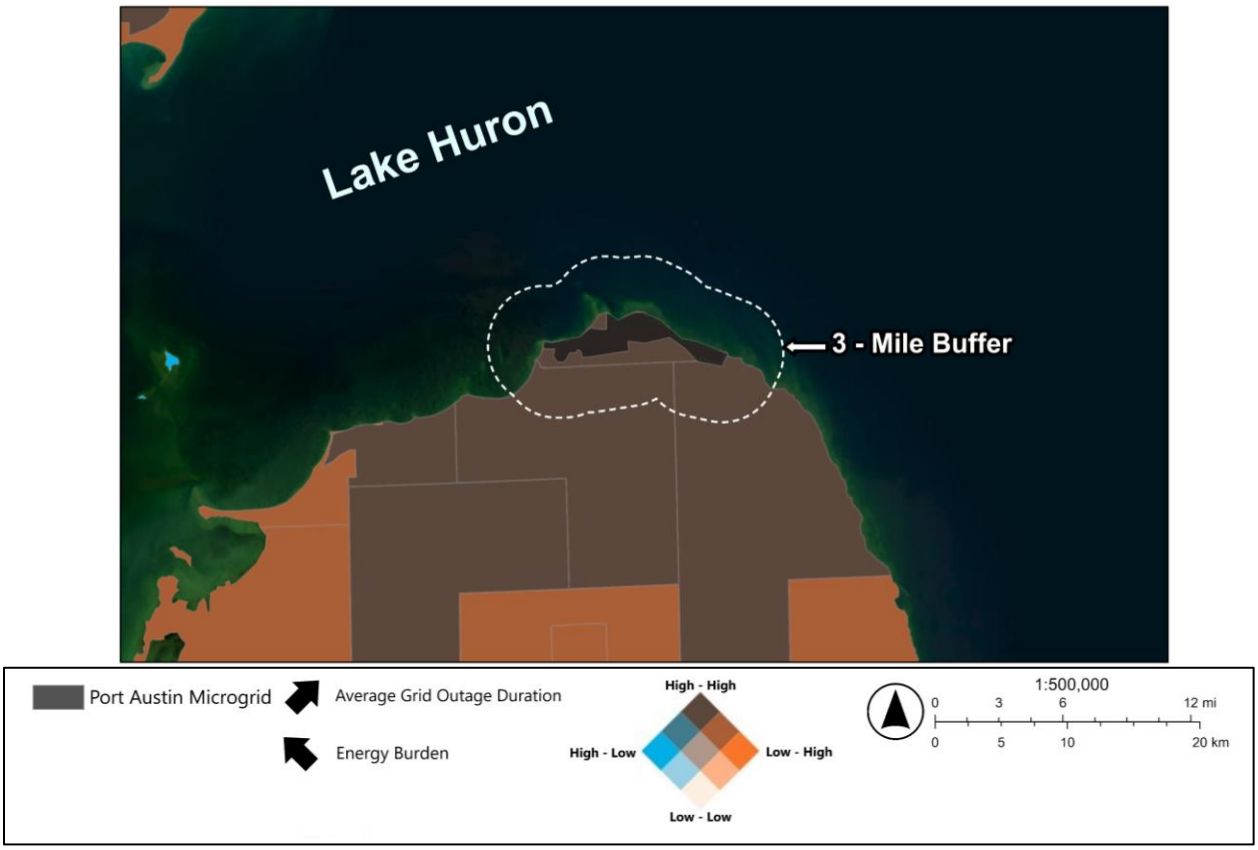


[1] MiEJScreen: Environmental Justice Screening Tool (DRAFT) available at https://www.michigan.gov/egle/maps-data/miejscreen, accessed February 20, 2023.

[2] Energy Justice Mapping Tool - Disadvantaged Communities Reporter available at https://energyjustice.egs.anl.gov/, accessed February 20, 2023.

The Port Austin EJ assessment did not identify any DACs or census tracks above the 80th percentile for the MiEJScreen composite score within three miles of the project area. Only three census tracks are within three miles of the project and although they do not meet the definition of a DAC, they do exhibit higher rates of energy burden and grid outages as shown in Figure 2. Two of the three census tracks are in the 92nd percentile nationally for energy burden, while the third resides in the 96th percentile. Huron County, where each of the three census tracks around the project reside, is within the 89th and 75th national percentiles for outage duration and outage events, respectively. In addition, census tract 26063950300 (southwestern tract within the three-mile buffer) does meet the definition of "disadvantaged" as defined by Climate and Economic Justice Tool within the energy burden category[3].

Figure 2: Three-mile EJ Assessment of Port Austin Project



Assessment and Description of Benefits and Where they Flow

The project enhances regional and local grid resilience by reducing outages from extreme weather events, which maps to the increased energy resilience priority of the GRIP grants. Detroit and Port Austin suffer from top decile outage rates, as described above, which impacts lower income, disadvantaged communities more significantly. We will develop methods to measure improvements in reliability in terms of decreased outages rates for the identified DACs. (b) (4)

[3] Climate and Economic Justice Screen Tool available at https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5, accessed February 20, 2023.

(b) (4) [redacted]

The project increases sustainability through renewable resources. This benefit aligns with the policy principle: increased parity in clean energy technology access and adoption. (b) (4) [redacted] Battery storage utilization will balance energy production and usage within the Microgrid. The O'Shea project includes battery storage, and the Port Austin portion includes additional solar capacity and battery storage to alleviate the existing over-capacity issues on the existing circuits. (b) (4) [redacted]

In the event of long duration outages, DTE will sometimes deploy diesel backup generators and portable substation to affected areas. With improvements to the grid in these areas, it is expected to reduce or eliminate the need for the deployment of these assets. (b) (4) [redacted] would be split between the DAC's near the O'Shea Park project area and the Port Austin project area. Also, there would be less emissions from customer owned back-up generators, but there is no data on number/usage of those in the project areas.

Assessment of Negative Impacts and Where They Flow

(b) (4) [redacted]

Detroit MI, 48226-1221, MI-013
Detroit MI, 48228-2345, MI-012
Port Austin, MI, 48467-9266, MI-009
Westland, MI, 48186-3267, MI-012

Instructions and Summary

Award Number: _____

Award Recipient: _____

Date of Submission: 3/17/2023

Form submitted by: DTE Electric

(May be award recipient or sub-recipient)

Please read the instructions on each worksheet tab before starting. If you have any questions, please ask your DOE contact!

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

BURDEN DISCLOSURE STATEMENT

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

(b) (4)

NETL F 451.1-1/3
Revised: 12/3/2014
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(Previous Editions Obsolete)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

I. INSTRUCTIONS

The proposer shall prepare this Environmental Questionnaire (EQ) as accurately and completely as possible. Supporting information can be provided as attachments. The proposer must identify the location of the project and specifically describe the activities that would occur at that location. The proposer must provide specific information and quantities, regarding air emissions, wastewater discharges, solid wastes, etc., to facilitate the necessary review. In addition, the proposer must submit with this EQ a FINAL copy of the project's statement of work (SOW) or statement of project objective (SOPO) that will be used in the contract/agreement between the proposer and the U.S Department of Energy (DOE).

II. QUESTIONNAIRE

A. PROJECT SUMMARY

1. Solicitation/Project Number: FOA-0002740 Proposer: US Department of Energy (DOE)
2. This Environmental Questionnaire pertains to a: ☒ Recipient or Prime Contractor ☐ Sub-recipient or Subcontractor
3. Principal Investigator: John O'Donnell Telephone Number:
4. Project Title: Deploying Adaptive Microgrids to Improve Grid Flexibility and Reliability
5. Expected Project Duration: 4 years
6. Location of Activities covered by **this** Environmental Questionnaire: (City/Township, County, State):
   Detroit, MI
7. List the full scope of activities planned (only for the location that is the subject of this Environmental Questionnaire).
   Build and deploy an adaptive network microgrid attached to the O'Shea solar park.
8. List all other locations where work would be performed by the primary contractor of the project and subcontractor(s). Each of the following must have an individual Environmental Questionnaire.

Subcontractor or sub-recipient	Location of activities for this project
The Electric Power Research Institute	Detroit, MI
Open Energy Solutions, Inc.	Detroit, MI
Open Systems International, Inc.	Detroit, MI
University of Michigan - Dearborn	Detroit, MI

9. Identify and select the checkbox with the predominant project work activities under Group A, B, or C

Group A

☐ Routine administrative, procurement, training, and personnel actions. Contract activities/awards for management support, financial assistance, and technical services in support of agency business, programs, projects, and goals. Literature searches and information gathering, material inventories, property surveys; data analysis, computer modeling, analytical reviews, technical summary, conceptual design, feasibility studies, document preparation, data dissemination, and paper studies. Technical assistance including financial planning, assistance, classroom training, public meetings, management training, survey participation, academic contribution, technical consultation, and stakeholders surveys. Workshop and conference planning, preparation, and implementation which may involve promoting energy efficiency, renewable energy, and energy conservation.

STOP! ***If all work activities related to this project can be classified and described within categories under Group A, proceed directly to Section III CERTIFICATION BY PROPOSER. No additional information is required.***
If project work activities are described in either Group(s) B or C; then continue filling out questionnaire.

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Group B

☐ Laboratory Scale Research, Bench Scale Research, Pilot Scale Research, Proof-of-Concept Scale Research, or Field Test Research. Work DOES NOT involve new building/facilities construction and site excavation/groundbreaking activities. This work typically involves routine operation of existing laboratories, commercial buildings/properties, offices and homes, project test facilities, factories/power plants, vehicles test stands and components, refueling facilities, utility systems, or other existing structures/facilities. Work will NOT involve major change in facilities missions and operations, land use planning, new/modified regulatory/operating permit requirements. Includes work specific to routine DOE Site operations and Lab research work activities, but NOT building construction and site preparation. DOE work typically involves laboratory facilities and lab equipment operations, buildings and grounds management activities; and buildings and facilities maintenance, repairs, reconfiguration, remodeling, equipment use and replacement.

Group C

☑ Pilot Test Facilities Construction, Pilot Scale Research, Field Scale Demonstration, or Commercial Scale Application. Work typically involves facility construction, site preparation/excavation/groundbreaking, and/or demolition. This work would include construction, retrofit, replacement, and/or major modifications of laboratories, test facilities, energy system prototypes, and power generation infrastructure. Work may also involve construction and maintenance of utilities system right-of-ways, roads, vehicle test facilities, commercial buildings/properties, fuel refinery/mixing facilities, refueling facility, power plants, underground wells, and pipelines, and other types of energy research related facilities. This work may require new or modified regulatory permits, environmental sampling and monitoring requirements, master planning, public involvement, and environmental impact review. Includes work specific to DOE Site Operations and Lab operation activities involving building and facilities construction, replacement, decommissioning/demolition, site preparation, land use changes, or change in research facilities mission or operations.

B. PROPOSED PROJECT ALTERNATIVES

1. If applicable, list any project alternatives considered to achieve the project objectives.

N/A

C. PROJECT LOCATION

1. Provide a brief description of the project location (physical location, surrounding area, adjacent structures).

O'Shea Solar Park located in Detroit is the site of a 2MW solar array.

2. **Attach** a project site location map of the project work area.

See Attached

D. ENVIRONMENTAL IMPACTS

NEPA procedures require evaluations of possible effects (including land use, energy resource use, natural, historic and cultural resources, and pollutants) from proposed projects on the environment.

1. Land Use

a. Characterize present land use where the proposed project would be located.

☑ Urban	☐ Industrial	☐ Commercial	☐ Agricultural
☐ Suburban	☐ Rural	☑ Residential	☐ Research Facilities
☐ Forest	☐ University Campus	☐ Other: _____	

b. Identify the total size of the facility, structure, or system and what portion would be used for the proposed project.

O'Shea park is a 10 acre ploy of city owned land within the city of Detroit

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c. Describe planned construction, installation, and/or demolition activities, i.e., roads, utilities system right-of-ways, parking lots, buildings, laboratories, storage tanks, fueling facilities, underground wells, pipelines, or other structures.

☑ No construction would be anticipated for this project.

d. Describe how land use would be affected by operational activities associated with the proposed project.

☑ No land areas would be affected.

e. Describe any plans to reclaim areas that would be affected by the proposed project.

☑ No land areas would be affected.

f. Would the proposed project affect any unique or unusual landforms (e.g., cliffs, waterfalls, etc.)?

☑ No ☐ Yes (describe)

g. Would the proposed project be located in or near local, state, or federal parks; forests; monuments; scenic waterways; wilderness; recreation facilities; or tribal lands? ☑ No ☐ Yes (describe)

2. Construction Activities and/or Operation

a. Identify project structure(s), power line(s), pipeline(s), utilities system(s), right-of-way(s) or road(s) that will be constructed and clearly mark them on a project site map or topographic map as appropriate. ☐ None

Engineering analysis ongoing.

b. Would the proposed project require the construction of waste pits or settling ponds?

☑ No ☐ Yes (describe and identify location, and estimate surface area disturbed)

c. Would the proposed project affect any existing body of water? ☑ No ☐ Yes (describe)

d. Would the proposed project impact a floodplain or wetland? ☑ No ☐ Yes (describe)

e. Would the proposed project potentially cause runoff/sedimentation/erosion? ☑ No ☐ Yes (describe)

f. Would the proposed project include activities located on perma-frost, near fault zones, or involve fracturing, well drilling, geologic stimulation, sequestration, active seismic data collection, and/or deepwater operations?

☑ No ☐ Yes (describe)

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g. Would the proposed project involve any of the following: nanotechnology; recombinant DNA or genetic engineering; facility decommissioning or disposition of equipment/materials; or management of radioactive wastes/materials?
☑ No ☐ Yes (describe)

3. Biological Resources

a. Identify any State or Federally listed endangered or threatened plant or animal species potentially affected by the proposed project.
☑ None

b. Would any designated critical habitat be affected by the proposed project? ☑ No ☐ Yes (describe)

c. Describe any impacts that construction would have on any other types of sensitive or unique habitats.
☑ No planned construction ☐ No habitats ☐ None ☐ Impact (describe)

d. Would any foreign substances/materials be introduced into ground or surface waters, soil, or other earth/geologic resource because of project activities? How would these foreign substances/materials affect the water, soil, biota, and geologic resources? ☑ No ☐ Yes (describe)

e. Would any migratory animal corridors be impacted or disrupted by the proposed project? ☑ No ☐ Yes (describe)

4. Socioeconomic and Infrastructure Conditions

a. Would local socio-economic changes result from the proposed project? ☑ No ☐ Yes (describe)

b. Would the proposed project generate increased traffic use of roads through local neighborhoods, urban or rural areas?
☐ No ☑ Yes (describe)

During the construction phase but not anticipated to be significant

c. Would the proposed project require new transportation access (roads, rail, etc.)? Describe location, impacts, costs.
☑ No ☐ Yes (describe)

d. Would the proposed project create a significant increase in local energy usage? ☑ No ☐ Yes (describe)

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5. Historical/Cultural Resources

a. Describe any historical, archaeological, or cultural sites in the vicinity of the proposed project; note any sites included on the National Register of Historic Places. ☑ None

b. Would construction or operational activities planned under the proposed project disturb any historical, archaeological, or cultural sites? ☐ No planned construction ☑ No historic sites ☐ Yes (describe) ☐ No Impact (discuss)

None in the area

c. Has the State Historic Preservation Office been contacted with regard to this project? ☑ No ☐ Yes (describe)

d. Would the proposed project interfere with visual resources (e.g., eliminate scenic views) or alter the present landscape?
☑ No ☐ Yes (describe)

e. Would the proposed project be located on or adjacent to tribal lands, lands considered to be sacred, or lands used for traditional purposes? Describe any known tribal sensitivities for the proposed project area.

N/A

6. Atmospheric Conditions/Air Quality

a. Identify air quality conditions in the immediate vicinity of the proposed project with regard to attainment of National Ambient Air Quality Standards (NAAQS). This information is available under the Green Book Non-Attainment Areas for Criteria Pollutants located at http://www.epa.gov/air/oaqps/greenbk/astate.html

	Attainment	Non-Attainment
O_3 - 1 Hour	☑	☐
O_3 - 8 Hour	☐	☑
SO_x	☐	☑
PM - 2.5	☑	☐
PM - 10	☑	☐
CO	☑	☐
NO_2	☑	☐
Lead	☑	☐

b. Would proposed project require issuance of new or modified local, state, or federal air permits to perform project related work and activities? ☑ No ☐ Yes (describe)

c. Would the proposed project be in compliance with local and state air quality requirements? ☑ Yes
If not, please explain.

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d. Would the proposed project be classified as either a New Source or a major modification to an existing source?
☑ No ☐ Yes (describe)

e. What types of air emissions, including fugitive emissions, would be anticipated from the proposed project, and what would be the maximum annual rate of emissions for the project?

	Maximum per Year	Total for Project
☐ SO_x		
☐ NO_x		
☐ PM - 2.5		
☐ PM - 10		
☐ CO		
☐ CO_2		
☐ Lead		
☐ H_2S		
☐ Organic solvent vapors or other volatile organic compounds--List:		
☐ Hazardous air pollutants -- List:		
☐ Other -- List:		
☑ None		

f. Would any types of emission control or particulate collection devices be used?
☑ No ☐ Yes (describe, including collection efficiencies)

g. How would emissions be vented?

N/A

7. Hydrologic Conditions/Water Quality

a. What nearby water bodies may be affected by the proposed project? Provide distance(s) from the project site.

N/A

b. What sources would supply potable and process water for the proposed project?

N/A

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c. Quantify the wastewater that would be generated by the proposed project.

	Gallons/day	Gallons/year
☐ Non-contact cooling water		
☐ Process water		
☐ Sanitary		
☐ Other -- describe:		
☑ None		

d. What would be the major components of each type of wastewater (e.g., coal fines)? ☑ No wastewater produced

e. Identify the local treatment facility that would receive wastewater from the proposed project.
☑ No discharges to local treatment facility

f. Describe how wastewater would be collected and treated. ☑ No wastewater produced

g. Would any run-off or leachates be produced from storage piles or waste disposal sites? ☑ No ☐ Yes (describe source)

h. Would project require issuance of new or modified water permits to perform project work or site development activities?
☑ No ☐ Yes (describe)

i. Where would wastewater effluents from the proposed project be discharged? ☑ No wastewater produced

j. Would the proposed project be permitted to discharge effluents into an existing body of water?
☑ No ☐ Yes (describe water use and effluent impact)

k. Would a new or modified National Pollutant Discharge Elimination System (NPDES) permit be required?
☑ No ☐ Yes (describe)

l. Would the proposed project adversely affect the quality or movement of groundwater? ☑ No ☐ Yes (describe)

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m. Would the proposed project require issuance of an Underground Injection Control (UIC) permit?
☑ No ☐ Yes (describe)

n. Would the proposed project be located in or near a wellhead protection area, drinking water protection area, or above a sole source aquifer or underground source of drinking water (USDW)?
☑ No ☐ Yes (describe)

8. Solid and Hazardous Wastes

a. Identify and estimate wastes that would be generated from the project. Solid wastes are defined as any solid, liquid, semi-solid, or contained gaseous material that is discarded, has served its intended purpose, or is a manufacturing or mining by-product (See EPA Municipal Solid Waste and Municipal Solid Waste by State).

	Annual Quantity
☑ **Municipal solid waste (e.g., paper, plastic, etc.)**	TBD
☐ **Coal or coal by-products**	
☑ **Other -- Identify:**	TBD
☐ **Hazardous waste – Identify:**	
☐ **None**	

b. Would project require issuance of new or modified solid waste and/or hazardous waste related permits to perform project work activities? ☑ No ☐ Yes (explain)

c. How and where would solid waste disposal be accomplished?
☐ None generated
☐ On-site (identify and describe location)
☑ Off-site (identify location and describe facility and treatment)

Waste disposal sites will be decided upon final characterization of the material to be disposed of.

d. How would wastes for disposal be transported?

By box truck or roll-off container, will be determined by the eventual amounts and types of waste generated.

e. Describe hazardous wastes that would be generated, treated, handled, or stored under this project. Hazardous waste information can be found at EPA Hazardous Waste website. ☑ None

f. How would hazardous or toxic waste be collected and stored? ☑ None used or produced

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g. If hazardous wastes would require off-site disposal, have arrangements been made with a certified TSD (Treatment, Storage, and Disposal) facility?

☑ Not required ☐ Arrangements not yet made ☐ Arrangements made with a certified TSD facility (identify)

9. Health/Safety Factors

a. Identify hazardous or toxic materials that would be used in the proposed project.

☑ None ☐ Hazardous or toxic materials that would be used (identify):

b. Describe the potential impacts of this project's hazardous materials on human health and the environment.

☑ None

c. Would there be any special physical hazards or health risks associated with the project? ☑ No ☐ Yes (describe)

d. Does a worker safety program exist at the location of the proposed project? ☐ No ☑ Yes (describe)

DTE has a robust safety program around working with electrical equipment

e. Would additional safety training be necessary for any new laboratory, equipment, or processes involved with the project?

☑ No ☐ Yes (describe)

f. Describe any increases in ambient noise levels to the public from construction and operational activities.

☐ None ☑ Increase in ambient noise level (describe)

Outside work being done during the construction period

g. Would project construction result in the removal of natural or other barriers that act as noise screens?

☐ No construction planned ☑ No ☐ Yes (describe)

h. Would hearing protection be required for workers? ☑ No ☐ Yes (describe)

10. Environmental Restoration and/or Waste Management

a. Would the proposed project include CERCLA removals or similar actions under RCRA or other authorities?

☑ No ☐ Yes (describe)

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b. Would the proposed project include siting, construction, and operation of temporary pilot-scale waste collection and treatment facilities or pilot-scale waste stabilization and containment facilities? ☑ No ☐ Yes (describe)

c. Would the proposed project involve operations of environmental monitoring and control systems?
☑ No ☐ Yes (describe)

d. Would the proposed project involve siting, construction, operation, or decommissioning of a facility for storing packaged hazardous waste for 90 days or less? ☑ No ☐ Yes (describe)

E. REGULATORY COMPLIANCE

1. For the following laws, describe any existing permits, new or modified permits, manifests, responsible authorities or agencies, contacts, etc., that would be required for the proposed project

a. Resource Conservation and Recovery Act (RCRA): ☑ None ☐ New Required ☐ Modification Required
Describe:

b. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):
☑ None ☐ New Required ☐ Modification Required
Describe:

c. Toxic Substance Control Act (TSCA): ☑ None ☐ New Required ☐ Modification Required
Describe:

d. Clean Water Act (CWA): ☑ None ☐ New Required ☐ Modification Required
Describe:

e. Underground Storage Tank Control Program (UST): ☑ None ☐ New Required ☐ Modification Required
Describe:

f. Underground Injection Control Program (UIC): ☑ None ☐ New Required ☐ Modification Required
Describe:

g. Clean Air Act (CAA): ☑ None ☐ New Required ☐ Modification Required
Describe:

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h. Endangered Species Act (ESA): ☑ None ☐ New Required ☐ Modification Required
Describe:

i. Floodplains and Wetlands Regulations: ☐ None ☑ New Required ☐ Modification Required
Describe:

As needed once complete engineering work completed, sites will be evaluated by DTE subject matter experts for applicability

j. Fish and Wildlife Coordination Act (FWCA): ☑ None ☐ New Required ☐ Modification Required
Describe:

k. National Historic Preservation Act (NHPA): ☑ None ☐ New Required ☐ Modification Required
Describe:

l. Coastal Zone Management Act (CZMA): ☑ None ☐ New Required ☐ Modification Required
Describe:

2. Identify any other environmental laws and regulations (Federal, state, and local) for which compliance would be necessary for this project, and describe the permits, manifests, and contacts that would be required.

N/A

F. DESCRIBE ANY ISSUES THAT WOULD GENERATE PUBLIC CONTROVERSY REGARDING THE PROPOSED PROJECT. ☑ None

G. WOULD THE PROPOSED PROJECT PRODUCE ADDITIONAL DEVELOPMENT, OR ARE OTHER MAJOR DEVELOPMENTS PLANNED OR UNDERWAY, IN THE PROJECT AREA?

☑ No ☐ Yes (describe)

H. SUMMARIZE THE SIGNIFICANT IMPACTS THAT WOULD RESULT FROM THE PROPOSED PROJECT.

☑ None (provide supporting detail) ☐ Significant impacts (describe)

No significant environmental impacts expected with the proposed project. Details in the attached Community Benefits Plan.

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ENVIRONMENTAL QUESTIONNAIRE

I. PROVIDE A DESCRIPTION OF HOW THE PROJECT WOULD BE DECOMMISSIONED, INCLUDING THE DISPOSITION OF EQUIPMENT AND MATERIALS.

There are no plans to decommission at this time, this is intended to be a long-term deployment.

III. CERTIFICATION BY PROPOSER

I hereby certify that the information provided herein is current, accurate, and complete as of the date shown immediately below.

Signature: Fadi K. Mourad Digitally signed by Fadi K. Mourad Date: 2023.03.14 17:28:10 -04'00'

Date (mm/dd/yyyy): 03/14/2023

Typed Name: Fadi K. Mourad, P.E.

Title: Director, Environmetnal Strategy

Organization: DTE Energy

IV. REVIEW AND APPROVAL BY DOE

I hereby certify that I have reviewed the information provided in this questionnaire, have determined that all questions have been appropriately answered, and judge the responses to be consistent with the efforts proposed.

DOE Project Manager

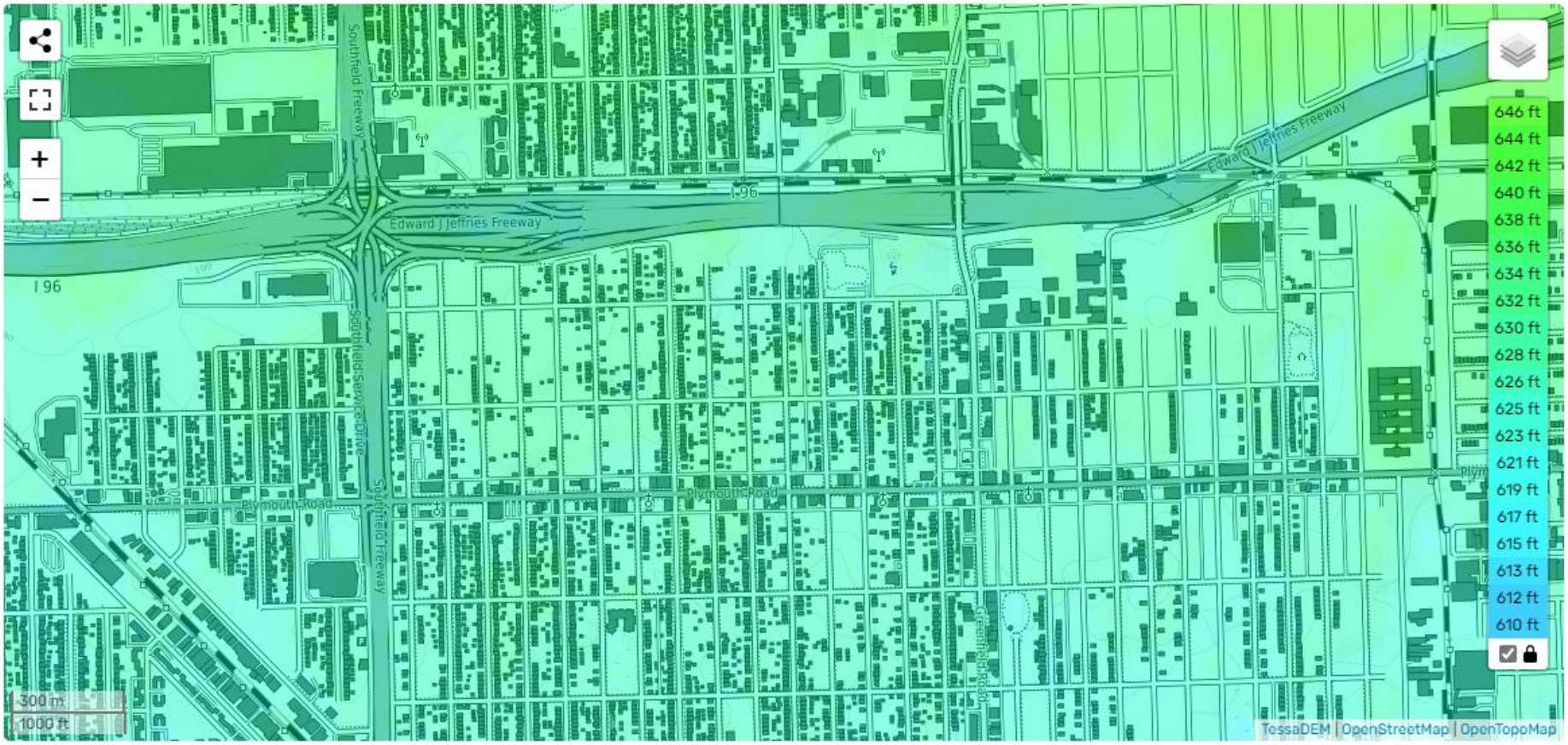
Signature:

Date (mm/dd/yyyy):

Typed Name:

Detroit topographic map

Click on the **map** to display **elevation**.



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ENVIRONMENTAL QUESTIONNAIRE

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II. QUESTIONNAIRE

A. PROJECT SUMMARY

1. Solicitation/Project Number: FOA-0002740 Proposer: US Department of Energy (DOE)
2. This Environmental Questionnaire pertains to a: ☒ Recipient or Prime Contractor ☐ Sub-recipient or Subcontractor
3. Principal Investigator: John O'Donnell Telephone Number:
4. Project Title: Deploying Adaptive Microgrids to Improve Grid Flexibility and Reliability
5. Expected Project Duration: 4 years
6. Location of Activities covered by **this** Environmental Questionnaire: (City/Township, County, State):
   Port Austin, MI
7. List the full scope of activities planned (only for the location that is the subject of this Environmental Questionnaire).
   Build and deploy an adaptive network microgrid attached to the Port Austin substation
8. List all other locations where work would be performed by the primary contractor of the project and subcontractor(s). Each of the following must have an individual Environmental Questionnaire.

Subcontractor or sub-recipient	Location of activities for this project
The Electric Power Research Institute	Port Austin, MI
Open Energy Solutions, Inc.	Port Austin, MI
Open Systems International, Inc.	Port Austin, MI
University of Michigan - Dearborn	Port Austin, MI

9. Identify and select the checkbox with the predominant project work activities under Group A, B, or C

Group A

☐ Routine administrative, procurement, training, and personnel actions. Contract activities/awards for management support, financial assistance, and technical services in support of agency business, programs, projects, and goals. Literature searches and information gathering, material inventories, property surveys; data analysis, computer modeling, analytical reviews, technical summary, conceptual design, feasibility studies, document preparation, data dissemination, and paper studies. Technical assistance including financial planning, assistance, classroom training, public meetings, management training, survey participation, academic contribution, technical consultation, and stakeholders surveys. Workshop and conference planning, preparation, and implementation which may involve promoting energy efficiency, renewable energy, and energy conservation.

STOP! ***If all work activities related to this project can be classified and described within categories under Group A, proceed directly to Section III CERTIFICATION BY PROPOSER. No additional information is required.***
If project work activities are described in either Group(s) B or C; then continue filling out questionnaire.

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

Group B

☐ Laboratory Scale Research, Bench Scale Research, Pilot Scale Research, Proof-of-Concept Scale Research, or Field Test Research. Work DOES NOT involve new building/facilities construction and site excavation/groundbreaking activities. This work typically involves routine operation of existing laboratories, commercial buildings/properties, offices and homes, project test facilities, factories/power plants, vehicles test stands and components, refueling facilities, utility systems, or other existing structures/facilities. Work will NOT involve major change in facilities missions and operations, land use planning, new/modified regulatory/operating permit requirements. Includes work specific to routine DOE Site operations and Lab research work activities, but NOT building construction and site preparation. DOE work typically involves laboratory facilities and lab equipment operations, buildings and grounds management activities; and buildings and facilities maintenance, repairs, reconfiguration, remodeling, equipment use and replacement.

Group C

☑ Pilot Test Facilities Construction, Pilot Scale Research, Field Scale Demonstration, or Commercial Scale Application. Work typically involves facility construction, site preparation/excavation/groundbreaking, and/or demolition. This work would include construction, retrofit, replacement, and/or major modifications of laboratories, test facilities, energy system prototypes, and power generation infrastructure. Work may also involve construction and maintenance of utilities system right-of-ways, roads, vehicle test facilities, commercial buildings/properties, fuel refinery/mixing facilities, refueling facility, power plants, underground wells, and pipelines, and other types of energy research related facilities. This work may require new or modified regulatory permits, environmental sampling and monitoring requirements, master planning, public involvement, and environmental impact review. Includes work specific to DOE Site Operations and Lab operation activities involving building and facilities construction, replacement, decommissioning/demolition, site preparation, land use changes, or change in research facilities mission or operations.

B. PROPOSED PROJECT ALTERNATIVES

1. If applicable, list any project alternatives considered to achieve the project objectives.

N/A

C. PROJECT LOCATION

1. Provide a brief description of the project location (physical location, surrounding area, adjacent structures).

Port Austin is a rural area in the thumb area of Michigan

2. **Attach** a project site location map of the project work area.

See Attached

D. ENVIRONMENTAL IMPACTS

NEPA procedures require evaluations of possible effects (including land use, energy resource use, natural, historic and cultural resources, and pollutants) from proposed projects on the environment.

1. Land Use

a. Characterize present land use where the proposed project would be located.

☐ Urban	☐ Industrial	☐ Commercial	☑ Agricultural
☐ Suburban	☑ Rural	☑ Residential	☐ Research Facilities
☐ Forest	☐ University Campus	☐ Other: _____	

b. Identify the total size of the facility, structure, or system and what portion would be used for the proposed project.

See attached map for project area.

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c. Describe planned construction, installation, and/or demolition activities, i.e., roads, utilities system right-of-ways, parking lots, buildings, laboratories, storage tanks, fueling facilities, underground wells, pipelines, or other structures.

☑ No construction would be anticipated for this project.

d. Describe how land use would be affected by operational activities associated with the proposed project.

☑ No land areas would be affected.

e. Describe any plans to reclaim areas that would be affected by the proposed project.

☑ No land areas would be affected.

f. Would the proposed project affect any unique or unusual landforms (e.g., cliffs, waterfalls, etc.)?

☑ No ☐ Yes (describe)

g. Would the proposed project be located in or near local, state, or federal parks; forests; monuments; scenic waterways; wilderness; recreation facilities; or tribal lands? ☑ No ☐ Yes (describe)

2. Construction Activities and/or Operation

a. Identify project structure(s), power line(s), pipeline(s), utilities system(s), right-of-way(s) or road(s) that will be constructed and clearly mark them on a project site map or topographic map as appropriate. ☐ None

Engineering analysis ongoing.

b. Would the proposed project require the construction of waste pits or settling ponds?

☑ No ☐ Yes (describe and identify location, and estimate surface area disturbed)

c. Would the proposed project affect any existing body of water? ☑ No ☐ Yes (describe)

d. Would the proposed project impact a floodplain or wetland? ☑ No ☐ Yes (describe)

e. Would the proposed project potentially cause runoff/sedimentation/erosion? ☑ No ☐ Yes (describe)

f. Would the proposed project include activities located on perma-frost, near fault zones, or involve fracturing, well drilling, geologic stimulation, sequestration, active seismic data collection, and/or deepwater operations?

☑ No ☐ Yes (describe)

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g. Would the proposed project involve any of the following: nanotechnology; recombinant DNA or genetic engineering; facility decommissioning or disposition of equipment/materials; or management of radioactive wastes/materials?
☑ No ☐ Yes (describe)

3. Biological Resources

a. Identify any State or Federally listed endangered or threatened plant or animal species potentially affected by the proposed project.
☑ None

b. Would any designated critical habitat be affected by the proposed project? ☑ No ☐ Yes (describe)

c. Describe any impacts that construction would have on any other types of sensitive or unique habitats.
☑ No planned construction ☐ No habitats ☐ None ☐ Impact (describe)

d. Would any foreign substances/materials be introduced into ground or surface waters, soil, or other earth/geologic resource because of project activities? How would these foreign substances/materials affect the water, soil, biota, and geologic resources? ☑ No ☐ Yes (describe)

e. Would any migratory animal corridors be impacted or disrupted by the proposed project? ☑ No ☐ Yes (describe)

4. Socioeconomic and Infrastructure Conditions

a. Would local socio-economic changes result from the proposed project? ☐ No ☑ Yes (describe)

Benefits discussed in the Community Development Plan

b. Would the proposed project generate increased traffic use of roads through local neighborhoods, urban or rural areas?
☐ No ☑ Yes (describe)

During the construction phase

c. Would the proposed project require new transportation access (roads, rail, etc.)? Describe location, impacts, costs.
☑ No ☐ Yes (describe)

d. Would the proposed project create a significant increase in local energy usage? ☑ No ☐ Yes (describe)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

5. Historical/Cultural Resources

a. Describe any historical, archaeological, or cultural sites in the vicinity of the proposed project; note any sites included on the National Register of Historic Places. ☑ None

b. Would construction or operational activities planned under the proposed project disturb any historical, archaeological, or cultural sites? ☐ No planned construction ☑ No historic sites ☐ Yes (describe) ☐ No Impact (discuss)

None in the area

c. Has the State Historic Preservation Office been contacted with regard to this project? ☑ No ☐ Yes (describe)

d. Would the proposed project interfere with visual resources (e.g., eliminate scenic views) or alter the present landscape?
☑ No ☐ Yes (describe)

e. Would the proposed project be located on or adjacent to tribal lands, lands considered to be sacred, or lands used for traditional purposes? Describe any known tribal sensitivities for the proposed project area.

N/A

6. Atmospheric Conditions/Air Quality

a. Identify air quality conditions in the immediate vicinity of the proposed project with regard to attainment of National Ambient Air Quality Standards (NAAQS). This information is available under the Green Book Non-Attainment Areas for Criteria Pollutants located at http://www.epa.gov/air/oaqps/greenbk/astate.html

	Attainment	Non-Attainment
O_3 - 1 Hour	☑	☐
O_3 - 8 Hour	☑	☐
SO_x	☑	☐
PM - 2.5	☑	☐
PM - 10	☑	☐
CO	☑	☐
NO_2	☑	☐
Lead	☑	☐

b. Would proposed project require issuance of new or modified local, state, or federal air permits to perform project related work and activities? ☑ No ☐ Yes (describe)

c. Would the proposed project be in compliance with local and state air quality requirements? ☑ Yes
If not, please explain.

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

d. Would the proposed project be classified as either a New Source or a major modification to an existing source?
☑ No ☐ Yes (describe)

e. What types of air emissions, including fugitive emissions, would be anticipated from the proposed project, and what would be the maximum annual rate of emissions for the project?

	Maximum per Year	Total for Project
☐ SO_x		
☐ NO_x		
☐ PM - 2.5		
☐ PM - 10		
☐ CO		
☐ CO_2		
☐ Lead		
☐ H_2S		
☐ Organic solvent vapors or other volatile organic compounds--List:		
☐ Hazardous air pollutants -- List:		
☐ Other -- List:		
☑ None		

f. Would any types of emission control or particulate collection devices be used?
☑ No ☐ Yes (describe, including collection efficiencies)

g. How would emissions be vented?

N/A

7. Hydrologic Conditions/Water Quality

a. What nearby water bodies may be affected by the proposed project? Provide distance(s) from the project site.

N/A

b. What sources would supply potable and process water for the proposed project?

N/A

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ENVIRONMENTAL QUESTIONNAIRE

c. Quantify the wastewater that would be generated by the proposed project.

	Gallons/day	Gallons/year
☐ Non-contact cooling water		
☐ Process water		
☐ Sanitary		
☐ Other -- describe:		
☑ None		

d. What would be the major components of each type of wastewater (e.g., coal fines)? ☑ No wastewater produced

e. Identify the local treatment facility that would receive wastewater from the proposed project.
☑ No discharges to local treatment facility

f. Describe how wastewater would be collected and treated. ☑ No wastewater produced

g. Would any run-off or leachates be produced from storage piles or waste disposal sites? ☑ No ☐ Yes (describe source)

h. Would project require issuance of new or modified water permits to perform project work or site development activities?
☑ No ☐ Yes (describe)

i. Where would wastewater effluents from the proposed project be discharged? ☑ No wastewater produced

j. Would the proposed project be permitted to discharge effluents into an existing body of water?
☑ No ☐ Yes (describe water use and effluent impact)

k. Would a new or modified National Pollutant Discharge Elimination System (NPDES) permit be required?
☑ No ☐ Yes (describe)

l. Would the proposed project adversely affect the quality or movement of groundwater? ☑ No ☐ Yes (describe)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

m. Would the proposed project require issuance of an Underground Injection Control (UIC) permit?
☑ No ☐ Yes (describe)

n. Would the proposed project be located in or near a wellhead protection area, drinking water protection area, or above a sole source aquifer or underground source of drinking water (USDW)?
☑ No ☐ Yes (describe)

8. Solid and Hazardous Wastes

a. Identify and estimate wastes that would be generated from the project. Solid wastes are defined as any solid, liquid, semi-solid, or contained gaseous material that is discarded, has served its intended purpose, or is a manufacturing or mining by-product (See EPA Municipal Solid Waste and Municipal Solid Waste by State).

	Annual Quantity
☑ **Municipal solid waste (e.g., paper, plastic, etc.)**	TBD
☐ **Coal or coal by-products**	
☑ **Other -- Identify:**	TBD
☐ **Hazardous waste – Identify:**	
☐ **None**	

b. Would project require issuance of new or modified solid waste and/or hazardous waste related permits to perform project work activities? ☑ No ☐ Yes (explain)

c. How and where would solid waste disposal be accomplished?
☐ None generated
☐ On-site (identify and describe location)
☑ Off-site (identify location and describe facility and treatment)

Waste disposal sites will be decided upon final characterization of the material to be disposed of.

d. How would wastes for disposal be transported?

By box truck or roll-off container, will be determined by the eventual amounts and types of waste generated.

e. Describe hazardous wastes that would be generated, treated, handled, or stored under this project. Hazardous waste information can be found at EPA Hazardous Waste website. ☑ None

f. How would hazardous or toxic waste be collected and stored? ☑ None used or produced

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g. If hazardous wastes would require off-site disposal, have arrangements been made with a certified TSD (Treatment, Storage, and Disposal) facility?

☑ Not required ☐ Arrangements not yet made ☐ Arrangements made with a certified TSD facility (identify)

9. Health/Safety Factors

a. Identify hazardous or toxic materials that would be used in the proposed project.

☑ None ☐ Hazardous or toxic materials that would be used (identify):

b. Describe the potential impacts of this project's hazardous materials on human health and the environment.

☑ None

c. Would there be any special physical hazards or health risks associated with the project? ☑ No ☐ Yes (describe)

d. Does a worker safety program exist at the location of the proposed project? ☐ No ☑ Yes (describe)

DTE has a robust safety program around working with electrical equipment

e. Would additional safety training be necessary for any new laboratory, equipment, or processes involved with the project?

☑ No ☐ Yes (describe)

f. Describe any increases in ambient noise levels to the public from construction and operational activities.

☐ None ☑ Increase in ambient noise level (describe)

Outside work being done during the construction period

g. Would project construction result in the removal of natural or other barriers that act as noise screens?

☐ No construction planned ☑ No ☐ Yes (describe)

h. Would hearing protection be required for workers? ☑ No ☐ Yes (describe)

10. Environmental Restoration and/or Waste Management

a. Would the proposed project include CERCLA removals or similar actions under RCRA or other authorities?

☑ No ☐ Yes (describe)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

b. Would the proposed project include siting, construction, and operation of temporary pilot-scale waste collection and treatment facilities or pilot-scale waste stabilization and containment facilities? ☑ No ☐ Yes (describe)

c. Would the proposed project involve operations of environmental monitoring and control systems?
☑ No ☐ Yes (describe)

d. Would the proposed project involve siting, construction, operation, or decommissioning of a facility for storing packaged hazardous waste for 90 days or less? ☑ No ☐ Yes (describe)

E. REGULATORY COMPLIANCE

1. For the following laws, describe any existing permits, new or modified permits, manifests, responsible authorities or agencies, contacts, etc., that would be required for the proposed project

a. Resource Conservation and Recovery Act (RCRA): ☑ None ☐ New Required ☐ Modification Required
Describe:

b. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):
☑ None ☐ New Required ☐ Modification Required
Describe:

c. Toxic Substance Control Act (TSCA): ☑ None ☐ New Required ☐ Modification Required
Describe:

d. Clean Water Act (CWA): ☑ None ☐ New Required ☐ Modification Required
Describe:

e. Underground Storage Tank Control Program (UST): ☑ None ☐ New Required ☐ Modification Required
Describe:

f. Underground Injection Control Program (UIC): ☑ None ☐ New Required ☐ Modification Required
Describe:

g. Clean Air Act (CAA): ☑ None ☐ New Required ☐ Modification Required
Describe:

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

h. Endangered Species Act (ESA): ☑ None ☐ New Required ☐ Modification Required
Describe:

i. Floodplains and Wetlands Regulations: ☐ None ☐ New Required ☐ Modification Required
Describe:

As needed once complete engineering work completed, sites will be evaluated by DTE subject matter experts for applicability

j. Fish and Wildlife Coordination Act (FWCA): ☑ None ☐ New Required ☐ Modification Required
Describe:

k. National Historic Preservation Act (NHPA): ☑ None ☐ New Required ☐ Modification Required
Describe:

l. Coastal Zone Management Act (CZMA): ☑ None ☐ New Required ☐ Modification Required
Describe:

2. Identify any other environmental laws and regulations (Federal, state, and local) for which compliance would be necessary for this project, and describe the permits, manifests, and contacts that would be required.

N/A

F. DESCRIBE ANY ISSUES THAT WOULD GENERATE PUBLIC CONTROVERSY REGARDING THE PROPOSED PROJECT. ☑ None

G. WOULD THE PROPOSED PROJECT PRODUCE ADDITIONAL DEVELOPMENT, OR ARE OTHER MAJOR DEVELOPMENTS PLANNED OR UNDERWAY, IN THE PROJECT AREA?

☑ No ☐ Yes (describe)

H. SUMMARIZE THE SIGNIFICANT IMPACTS THAT WOULD RESULT FROM THE PROPOSED PROJECT.

☐ None (provide supporting detail) ☑ Significant impacts (describe)

No significant environmental impacts expected with the proposed project. Details in the attached Community Benefits Plan.

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ENVIRONMENTAL QUESTIONNAIRE

I. PROVIDE A DESCRIPTION OF HOW THE PROJECT WOULD BE DECOMMISSIONED, INCLUDING THE DISPOSITION OF EQUIPMENT AND MATERIALS.

There are no plans to decommission at this time, this is intended to be a long-term deployment.

III. CERTIFICATION BY PROPOSER

I hereby certify that the information provided herein is current, accurate, and complete as of the date shown immediately below.

Signature: Fadi K. Mourad Digitally signed by Fadi K. Mourad Date: 2023.03.14 18:08:04 -04'00'

Date (mm/dd/yyyy): 03/14/2023

Typed Name: Fadi K. Mourad, P.E.

Title: Director, Environmental Strategy

Organization: DTE Energy

IV. REVIEW AND APPROVAL BY DOE

I hereby certify that I have reviewed the information provided in this questionnaire, have determined that all questions have been appropriately answered, and judge the responses to be consistent with the efforts proposed.

DOE Project Manager

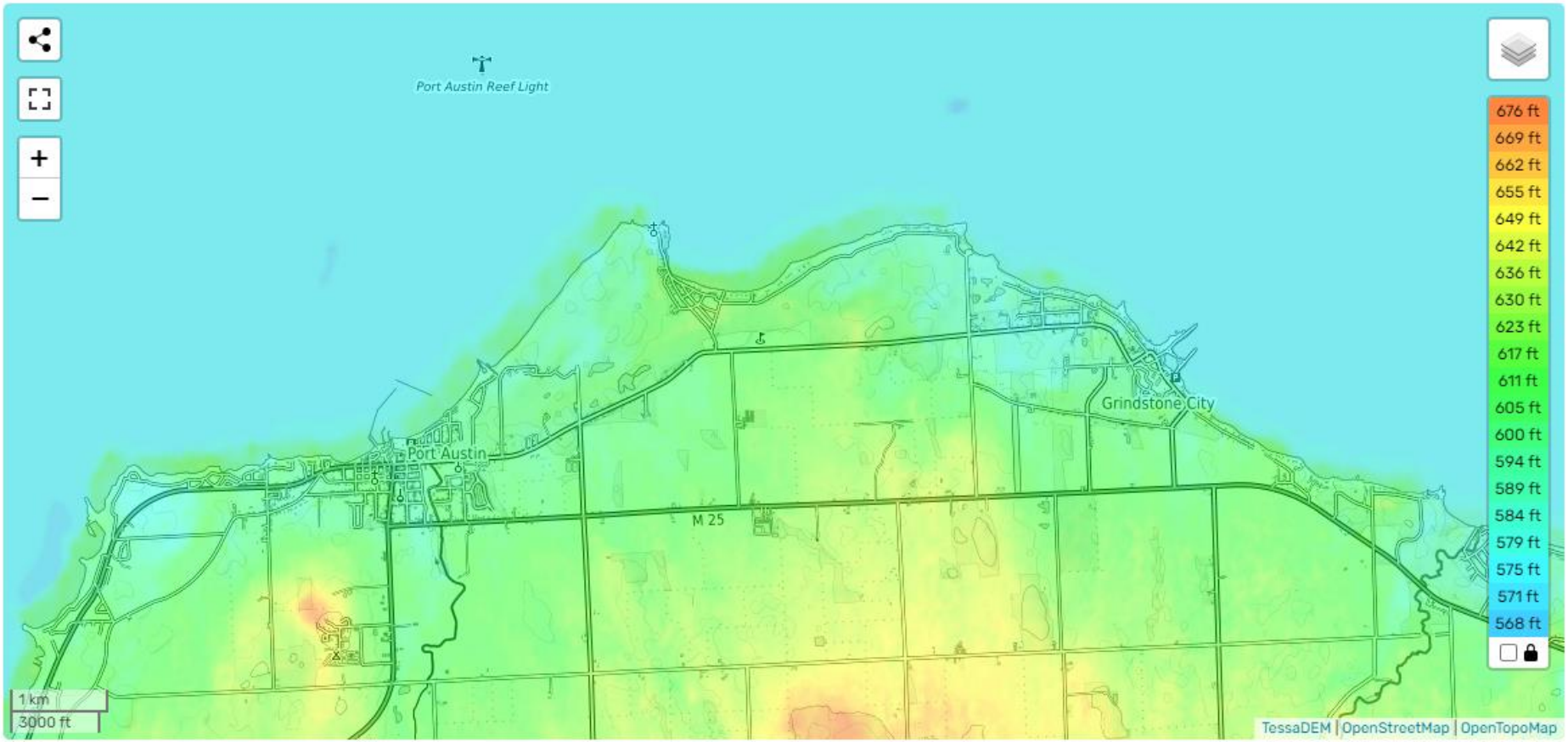
Signature:

Date (mm/dd/yyyy):

Typed Name:

Port Austin topographic map

Click on the **map** to display **elevation**.



NETL F 451.1-1/3
Revised: 12/3/2014
Reviewed: 12/3/2014
(Previous Editions Obsolete)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

I. INSTRUCTIONS

The proposer shall prepare this Environmental Questionnaire (EQ) as accurately and completely as possible. Supporting information can be provided as attachments. The proposer must identify the location of the project and specifically describe the activities that would occur at that location. The proposer must provide specific information and quantities, regarding air emissions, wastewater discharges, solid wastes, etc., to facilitate the necessary review. In addition, the proposer must submit with this EQ a FINAL copy of the project's statement of work (SOW) or statement of project objective (SOPO) that will be used in the contract/agreement between the proposer and the U.S Department of Energy (DOE).

II. QUESTIONNAIRE

A. PROJECT SUMMARY

1. Solicitation/Project Number: **DE-FOA-0002740** Proposer: **The Regents of University of Michigan - Dearborn**
2. This Environmental Questionnaire pertains to a: □ Recipient or Prime Contractor **X** Sub-recipient or Subcontractor
3. Principal Investigator: **Wencong Su & Junho Hong** Telephone Number: **313-593-5314**
4. Project Title: **Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability**
5. Expected Project Duration: **1/1/2024 – 12/31/2027**
6. Location of Activities covered by **this** Environmental Questionnaire: (City/Township, County, State):
   Dearborn, Wayne County, Michigan
7. List the full scope of activities planned (only for the location that is the subject of this Environmental Questionnaire).

   At the University of Michigan-Dearborn, the team will conduct power grid data analytics, evaluate power grid cybersecurity practices, and promote educational activities and workforce development.

8. List all other locations where work would be performed by the primary contractor of the project and subcontractor(s). Each of the following must have an individual Environmental Questionnaire.

Subcontractor or sub-recipient	Location of activities for this project
University of Michigan - Dearborn	**4901 Evergreen Rd. Dearborn, MI 48128.**

9. Identify and select the checkbox with the predominant project work activities under Group A, B, or C

Group A

X Routine administrative, procurement, training, and personnel actions. Contract activities/awards for management support, financial assistance, and technical services in support of agency business, programs, projects, and goals. Literature searches and information gathering, material inventories, property surveys; data analysis, computer modeling, analytical reviews, technical summary, conceptual design, feasibility studies, document preparation, data dissemination, and paper studies. Technical assistance including financial planning, assistance, classroom training, public meetings, management training, survey participation, academic contribution, technical consultation, and stakeholders surveys. Workshop and conference planning, preparation, and implementation which may involve promoting energy efficiency, renewable energy, and energy conservation.

STOP! ***If all work activities related to this project can be classified and described within categories under Group A, proceed directly to Section III CERTIFICATION BY PROPOSER. No additional information is required.***
If project work activities are described in either Group(s) B or C; then continue filling out questionnaire.

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ENVIRONMENTAL QUESTIONNAIRE

Group B

□ Laboratory Scale Research, Bench Scale Research, Pilot Scale Research, Proof-of-Concept Scale Research, or Field Test Research. Work DOES NOT involve new building/facilities construction and site excavation/groundbreaking activities. This work typically involves routine operation of existing laboratories, commercial buildings/properties, offices and homes, project test facilities, factories/power plants, vehicles test stands and components, refueling facilities, utility systems, or other existing structures/facilities. Work will NOT involve major change in facilities missions and operations, land use planning, new/modified regulatory/operating permit requirements. Includes work specific to routine DOE Site operations and Lab research work activities, but NOT building construction and site preparation. DOE work typically involves laboratory facilities and lab equipment operations, buildings and grounds management activities; and buildings and facilities maintenance, repairs, reconfiguration, remodeling, equipment use and replacement.

Group C

□ Pilot Test Facilities Construction, Pilot Scale Research, Field Scale Demonstration, or Commercial Scale Application. Work typically involves facility construction, site preparation/excavation/groundbreaking, and/or demolition. This work would include construction, retrofit, replacement, and/or major modifications of laboratories, test facilities, energy system prototypes, and power generation infrastructure. Work may also involve construction and maintenance of utilities system right-of-ways, roads, vehicle test facilities, commercial buildings/properties, fuel refinery/mixing facilities, refueling facility, power plants, underground wells, and pipelines, and other types of energy research related facilities. This work may require new or modified regulatory permits, environmental sampling and monitoring requirements, master planning, public involvement, and environmental impact review. Includes work specific to DOE Site Operations and Lab operation activities involving building and facilities construction, replacement, decommissioning/demolition, site preparation, land use changes, or change in research facilities mission or operations.

B. PROPOSED PROJECT ALTERNATIVES

1. If applicable, list any project alternatives considered to achieve the project objectives.

C. PROJECT LOCATION

1. Provide a brief description of the project location (physical location, surrounding area, adjacent structures).

2. **Attach** a project site location map of the project work area.

D. ENVIRONMENTAL IMPACTS

NEPA procedures require evaluations of possible effects (including land use, energy resource use, natural, historic and cultural resources, and pollutants) from proposed projects on the environment.

1. Land Use

a. Characterize present land use where the proposed project would be located.

□ Urban	□ Industrial	□ Commercial	□ Agricultural
□ Suburban	□ Rural	□ Residential	□ Research Facilities
□ Forest	□ University Campus	□ Other: _____	

b. Identify the total size of the facility, structure, or system and what portion would be used for the proposed project.

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ENVIRONMENTAL QUESTIONNAIRE

c. Describe planned construction, installation, and/or demolition activities, i.e., roads, utilities system right-of-ways, parking lots, buildings, laboratories, storage tanks, fueling facilities, underground wells, pipelines, or other structures.
□ No construction would be anticipated for this project.

d. Describe how land use would be affected by operational activities associated with the proposed project.
□ No land areas would be affected.

e. Describe any plans to reclaim areas that would be affected by the proposed project.
□ No land areas would be affected.

f. Would the proposed project affect any unique or unusual landforms (e.g., cliffs, waterfalls, etc.)?
□ No □ Yes (describe)

g. Would the proposed project be located in or near local, state, or federal parks; forests; monuments; scenic waterways; wilderness; recreation facilities; or tribal lands? □ No □ Yes (describe)

2. Construction Activities and/or Operation

a. Identify project structure(s), power line(s), pipeline(s), utilities system(s), right-of-way(s) or road(s) that will be constructed and clearly mark them on a project site map or topographic map as appropriate. □ None

b. Would the proposed project require the construction of waste pits or settling ponds?
□ No □ Yes (describe and identify location, and estimate surface area disturbed)

c. Would the proposed project affect any existing body of water? □ No □ Yes (describe)

d. Would the proposed project impact a floodplain or wetland? □ No □ Yes (describe)

e. Would the proposed project potentially cause runoff/sedimentation/erosion? □ No □ Yes (describe)

f. Would the proposed project include activities located on perma-frost, near fault zones, or involve fracturing, well drilling, geologic stimulation, sequestration, active seismic data collection, and/or deepwater operations?
□ No □ Yes (describe)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

g. Would the proposed project involve any of the following: nanotechnology; recombinant DNA or genetic engineering; facility decommissioning or disposition of equipment/materials; or management of radioactive wastes/materials?
□ No □ Yes (describe)

3. Biological Resources

a. Identify any State or Federally listed endangered or threatened plant or animal species potentially affected by the proposed project.
□ None

b. Would any designated critical habitat be affected by the proposed project? □ No □ Yes (describe)

c. Describe any impacts that construction would have on any other types of sensitive or unique habitats.
□ No planned construction □ No habitats □ None □ Impact (describe)

d. Would any foreign substances/materials be introduced into ground or surface waters, soil, or other earth/geologic resource because of project activities? How would these foreign substances/materials affect the water, soil, biota, and geologic resources? □ No □ Yes (describe)

e. Would any migratory animal corridors be impacted or disrupted by the proposed project? □ No □ Yes (describe)

4. Socioeconomic and Infrastructure Conditions

a. Would local socio-economic changes result from the proposed project? □ No □ Yes (describe)

b. Would the proposed project generate increased traffic use of roads through local neighborhoods, urban or rural areas?
□ No □ Yes (describe)

c. Would the proposed project require new transportation access (roads, rail, etc.)? Describe location, impacts, costs.
□ No □ Yes (describe)

d. Would the proposed project create a significant increase in local energy usage? □ No □ Yes (describe)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

5. Historical/Cultural Resources

a. Describe any historical, archaeological, or cultural sites in the vicinity of the proposed project; note any sites included on the National Register of Historic Places. □ None

b. Would construction or operational activities planned under the proposed project disturb any historical, archaeological, or cultural sites? □ No planned construction □ No historic sites □ Yes (describe) □ No Impact (discuss)

c. Has the State Historic Preservation Office been contacted with regard to this project? □ No □ Yes (describe)

d. Would the proposed project interfere with visual resources (e.g., eliminate scenic views) or alter the present landscape? □ No □ Yes (describe)

e. Would the proposed project be located on or adjacent to tribal lands, lands considered to be sacred, or lands used for traditional purposes? Describe any known tribal sensitivities for the proposed project area.

6. Atmospheric Conditions/Air Quality

a. Identify air quality conditions in the immediate vicinity of the proposed project with regard to attainment of National Ambient Air Quality Standards (NAAQS). This information is available under the Green Book Non-Attainment Areas for Criteria Pollutants located at http://www.epa.gov/air/oaqps/greenbk/astate.html

	Attainment	Non-Attainment
O_3 - 1 Hour	□	□
O_3 - 8 Hour	□	□
SO_x	□	□
PM - 2.5	□	□
PM - 10	□	□
CO	□	□
NO_2	□	□
Lead	□	□

b. Would proposed project require issuance of new or modified local, state, or federal air permits to perform project related work and activities? □ No □ Yes (describe)

c. Would the proposed project be in compliance with local and state air quality requirements? □ Yes
If not, please explain.

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d. Would the proposed project be classified as either a New Source or a major modification to an existing source?
□ No □ Yes (describe)

e. What types of air emissions, including fugitive emissions, would be anticipated from the proposed project, and what would be the maximum annual rate of emissions for the project?

	Maximum per Year	Total for Project
□ SO_x		
□ NO_x		
□ PM - 2.5		
□ PM - 10		
□ CO		
□ CO_2		
□ Lead		
□ H_2S		
□ Organic solvent vapors or other volatile organic compounds--List:		
□ Hazardous air pollutants -- List:		
□ Other -- List:		
□ None		

f. Would any types of emission control or particulate collection devices be used?
□ No □ Yes (describe, including collection efficiencies)

g. How would emissions be vented?

7. Hydrologic Conditions/Water Quality

a. What nearby water bodies may be affected by the proposed project? Provide distance(s) from the project site.

b. What sources would supply potable and process water for the proposed project?

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ENVIRONMENTAL QUESTIONNAIRE

c. Quantify the wastewater that would be generated by the proposed project.

	Gallons/day	Gallons/year
□ Non-contact cooling water		
□ Process water		
□ Sanitary		
□ Other -- describe:		
□ None		

d. What would be the major components of <u>each</u> type of wastewater (e.g., coal fines)? □ No wastewater produced

e. Identify the local treatment facility that would receive wastewater from the proposed project.
□ No discharges to local treatment facility

f. Describe how wastewater would be collected and treated. □ No wastewater produced

g. Would any run-off or leachates be produced from storage piles or waste disposal sites? □ No □ Yes (describe source)

h. Would project require issuance of new or modified water permits to perform project work or site development activities?
□ No □ Yes (describe)

i. Where would wastewater effluents from the proposed project be discharged? □ No wastewater produced

j. Would the proposed project be permitted to discharge effluents into an existing body of water?
□ No □ Yes (describe water use and effluent impact)

k. Would a new or modified National Pollutant Discharge Elimination System (NPDES) permit be required?
□ No □ Yes (describe)

l. Would the proposed project adversely affect the quality or movement of groundwater? □ No □ Yes (describe)

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ENVIRONMENTAL QUESTIONNAIRE

m. Would the proposed project require issuance of an Underground Injection Control (UIC) permit?

□ No □ Yes (describe)

n. Would the proposed project be located in or near a wellhead protection area, drinking water protection area, or above a sole source aquifer or underground source of drinking water (USDW)?

□ No □ Yes (describe)

8. Solid and Hazardous Wastes

a. Identify and estimate wastes that would be generated from the project. Solid wastes are defined as any solid, liquid, semi-solid, or contained gaseous material that is discarded, has served its intended purpose, or is a manufacturing or mining by-product (See EPA Municipal Solid Waste and Municipal Solid Waste by State).

	Annual Quantity
□ **Municipal solid waste (e.g., paper, plastic, etc.)**	
□ **Coal or coal by-products**	
□ **Other -- Identify:**	
□ **Hazardous waste – Identify:**	
□ **None**	

b. Would project require issuance of new or modified solid waste and/or hazardous waste related permits to perform project work activities? □ No □ Yes (explain)

c. How and where would solid waste disposal be accomplished?

□ None generated

□ On-site (identify and describe location)

□ Off-site (identify location and describe facility and treatment)

d. How would wastes for disposal be transported?

e. Describe hazardous wastes that would be generated, treated, handled, or stored under this project. Hazardous waste information can be found at EPA Hazardous Waste website. □ None

f. How would hazardous or toxic waste be collected and stored? □ None used or produced

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ENVIRONMENTAL QUESTIONNAIRE

g. If hazardous wastes would require off-site disposal, have arrangements been made with a certified TSD (Treatment, Storage, and Disposal) facility?
□ Not required □ Arrangements not yet made □ Arrangements made with a certified TSD facility (identify)

9. Health/Safety Factors

a. Identify hazardous or toxic materials that would be used in the proposed project.
□ None □ Hazardous or toxic materials that would be used (identify):

b. Describe the potential impacts of this project's hazardous materials on human health and the environment.
□ None

c. Would there be any special physical hazards or health risks associated with the project? □ No □ Yes (describe)

d. Does a worker safety program exist at the location of the proposed project? □ No □ Yes (describe)

e. Would additional safety training be necessary for any new laboratory, equipment, or processes involved with the project?
□ No □ Yes (describe)

f. Describe any increases in ambient noise levels to the public from construction and operational activities.
□ None □ Increase in ambient noise level (describe)

g. Would project construction result in the removal of natural or other barriers that act as noise screens?
□ No construction planned □ No □ Yes (describe)

h. Would hearing protection be required for workers? □ No □ Yes (describe)

10. Environmental Restoration and/or Waste Management

a. Would the proposed project include CERCLA removals or similar actions under RCRA or other authorities?
□ No □ Yes (describe)

U.S. DEPARTMENT OF ENERGY

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b. Would the proposed project include siting, construction, and operation of temporary pilot-scale waste collection and treatment facilities or pilot-scale waste stabilization and containment facilities? □ No □ Yes (describe)

c. Would the proposed project involve operations of environmental monitoring and control systems?
□ No □ Yes (describe)

d. Would the proposed project involve siting, construction, operation, or decommissioning of a facility for storing packaged hazardous waste for 90 days or less? □ No □ Yes (describe)

E. REGULATORY COMPLIANCE

1. For the following laws, describe any existing permits, new or modified permits, manifests, responsible authorities or agencies, contacts, etc., that would be required for the proposed project

a. Resource Conservation and Recovery Act (RCRA): □ None □ New Required □ Modification Required
Describe:

b. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):
□ None □ New Required □ Modification Required
Describe:

c. Toxic Substance Control Act (TSCA): □ None □ New Required □ Modification Required
Describe:

d. Clean Water Act (CWA): □ None □ New Required □ Modification Required
Describe:

e. Underground Storage Tank Control Program (UST): □ None □ New Required □ Modification Required
Describe:

f. Underground Injection Control Program (UIC): □ None □ New Required □ Modification Required
Describe:

g. Clean Air Act (CAA): □ None □ New Required □ Modification Required
Describe:

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

h. Endangered Species Act (ESA): □ None □ New Required □ Modification Required
Describe:

i. Floodplains and Wetlands Regulations: □ None □ New Required □ Modification Required
Describe:

j. Fish and Wildlife Coordination Act (FWCA): □ None □ New Required □ Modification Required
Describe:

k. National Historic Preservation Act (NHPA): □ None □ New Required □ Modification Required
Describe:

l. Coastal Zone Management Act (CZMA): □ None □ New Required □ Modification Required
Describe:

2. Identify any other environmental laws and regulations (Federal, state, and local) for which compliance would be necessary for this project, and describe the permits, manifests, and contacts that would be required.

F. DESCRIBE ANY ISSUES THAT WOULD GENERATE PUBLIC CONTROVERSY REGARDING THE PROPOSED PROJECT. □ None

G. WOULD THE PROPOSED PROJECT PRODUCE ADDITIONAL DEVELOPMENT, OR ARE OTHER MAJOR DEVELOPMENTS PLANNED OR UNDERWAY, IN THE PROJECT AREA?

□ No □ Yes (describe)

H. SUMMARIZE THE SIGNIFICANT IMPACTS THAT WOULD RESULT FROM THE PROPOSED PROJECT.

□ None (provide supporting detail) □ Significant impacts (describe)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

I. PROVIDE A DESCRIPTION OF HOW THE PROJECT WOULD BE DECOMMISSIONED, INCLUDING THE DISPOSITION OF EQUIPMENT AND MATERIALS.

III. CERTIFICATION BY PROPOSER

I hereby certify that the information provided herein is current, accurate, and complete as of the date shown immediately below.

Signature:  Date (mm/dd/yyyy): **2/15/2023**

Typed Name: **Wencong Su**

Title: **Associate Professor and Interim Chair**

Organization: **University of Michigan-Dearborn**

IV. REVIEW AND APPROVAL BY DOE

I hereby certify that I have reviewed the information provided in this questionnaire, have determined that all questions have been appropriately answered, and judge the responses to be consistent with the efforts proposed.

DOE Project Manager

Signature: _____ Date (mm/dd/yyyy): _____

Typed Name: _____

UM-Dearborn Statement of Work

Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability

Wencong Su

Submitted to: DTE Energy (DOE Prime)

1. **Work to be performed:**

- Implementing and evaluating novel data analytics methods;
- Validating new cyber security practices through software and hardware-in-the-loop simulation;
- Developing educational and lessons learned sharing opportunities;
- Participating in team meetings and reviewing technical progress/reports/papers;
- Continuing to share ideas and participate in technical discussions; and
- Submitting financial and technical reports regularly.

2. **Timeline/schedule**

January 1, 2024, to December 31, 2027

3. **Deliverables**

Technical reports and presentation slides.

Source codes and user manual.

Unique attribute contributions

UM-Dearborn has a long history of R&D experience in power systems, power electronics, cybersecurity, and machine learning, with a strong focus on real-world applications. Prior work has been supported by the U.S. DOE, NSF, DOD, and local industries. The UM-Dearborn team has substantial experience transforming basic and applied research into commercially viable solutions. The team members are all well-known for their R&D experience and have a long history of collaboration with the domestic power industry.

UM-Dearborn is located ten miles west of Detroit and is surrounded by minority communities. It is uniquely positioned to provide high-quality STEM education to underrepresented students to benefit Southeast Michigan and our nation.

A 4,100 sqft power engineering suite is equipped with state-of-the-art power system testing facilities (e.g., OPAL-RT hardware-in-loop testbed, power amplifier, energy management systems, advanced distribution management system, intelligent electronic devices, Chroma regenerative grid simulator, DC fast EV charger, relay, programmable AC/DC electronic load, and digital AC/DC power supply) for co-simulation and high-performance GPU computers for data analytics and machine learning algorithm development.

NETL F 451.1-1/3
Revised: 12/3/2014
Reviewed: 12/3/2014
(Previous Editions Obsolete)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

I. INSTRUCTIONS

The proposer shall prepare this Environmental Questionnaire (EQ) as accurately and completely as possible. Supporting information can be provided as attachments. The proposer must identify the location of the project and specifically describe the activities that would occur at that location. The proposer must provide specific information and quantities, regarding air emissions, wastewater discharges, solid wastes, etc., to facilitate the necessary review. In addition, the proposer must submit with this EQ a FINAL copy of the project's statement of work (SOW) or statement of project objective (SOPO) that will be used in the contract/agreement between the proposer and the U.S Department of Energy (DOE).

II. QUESTIONNAIRE

A. PROJECT SUMMARY

1. Solicitation/Project Number: DOE-2740 –_____ Proposer: DTE Electric
2. This Environmental Questionnaire pertains to a: □ Recipient or Prime Contractor □X Sub-recipient or Subcontractor
3. Principal Investigator: John O'Donnell_____ Telephone Number: _____
4. Project Title: Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability_____
5. Expected Project Duration: Jan 2024 – Dec 2027_____
6. Location of Activities covered by **this** Environmental Questionnaire: (City/Township, County, State): Knoxville, TN;
7. List the full scope of activities planned (only for the location that is the subject of this Environmental Questionnaire).

   EPRI work: Provide viability analysis of the microgrid designs, review of controller architecture, test plan support and review, and guidance during site implementation. EPRI will also support project outreach and technology transfer component by publishing papers and disseminating results with members and the broader stakeholder community.

8. List all other locations where work would be performed by the primary contractor of the project and subcontractor(s). Each of the following must have an individual Environmental Questionnaire.

Subcontractor or sub-recipient	Location of activities for this project
N/A	

9. Identify and select the checkbox with the predominant project work activities under Group A, B, or C

Group A

□X Routine administrative, procurement, training, and personnel actions. Contract activities/awards for management support, financial assistance, and technical services in support of agency business, programs, projects, and goals. Literature searches and information gathering, material inventories, property surveys; data analysis, computer modeling, analytical reviews, technical summary, conceptual design, feasibility studies, document preparation, data dissemination, and paper studies. Technical assistance including financial planning, assistance, classroom training, public meetings, management training, survey participation, academic contribution, technical consultation, and stakeholders surveys. Workshop and conference planning, preparation, and implementation which may involve promoting energy efficiency, renewable energy, and energy conservation.

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ENVIRONMENTAL QUESTIONNAIRE

STOP! ***If all work activities related to this project can be classified and described within categories under Group A, proceed directly to Section III CERTIFICATION BY PROPOSER. No additional information is required.***
If project work activities are described in either Group(s) B or C; then continue filling out questionnaire.

Group B

□ Laboratory Scale Research, Bench Scale Research, Pilot Scale Research, Proof-of-Concept Scale Research, or Field Test Research. Work DOES NOT involve new building/facilities construction and site excavation/groundbreaking activities. This work typically involves routine operation of existing laboratories, commercial buildings/properties, offices and homes, project test facilities, factories/power plants, vehicles test stands and components, refueling facilities, utility systems, or other existing structures/facilities. Work will NOT involve major change in facilities missions and operations, land use planning, new/modified regulatory/operating permit requirements. Includes work specific to routine DOE Site operations and Lab research work activities, but NOT building construction and site preparation. DOE work typically involves laboratory facilities and lab equipment operations, buildings and grounds management activities; and buildings and facilities maintenance, repairs, reconfiguration, remodeling, equipment use and replacement.

Group C

□ Pilot Test Facilities Construction, Pilot Scale Research, Field Scale Demonstration, or Commercial Scale Application. Work typically involves facility construction, site preparation/excavation/groundbreaking, and/or demolition. This work would include construction, retrofit, replacement, and/or major modifications of laboratories, test facilities, energy system prototypes, and power generation infrastructure. Work may also involve construction and maintenance of utilities system right-of-ways, roads, vehicle test facilities, commercial buildings/properties, fuel refinery/mixing facilities, refueling facility, power plants, underground wells, and pipelines, and other types of energy research related facilities. This work may require new or modified regulatory permits, environmental sampling and monitoring requirements, master planning, public involvement, and environmental impact review. Includes work specific to DOE Site Operations and Lab operation activities involving building and facilities construction, replacement, decommissioning/demolition, site preparation, land use changes, or change in research facilities mission or operations.

B. PROPOSED PROJECT ALTERNATIVES

1. If applicable, list any project alternatives considered to achieve the project objectives.

C. PROJECT LOCATION

1. Provide a brief description of the project location (physical location, surrounding area, adjacent structures).

2. **Attach** a project site location map of the project work area.

D. ENVIRONMENTAL IMPACTS

NEPA procedures require evaluations of possible effects (including land use, energy resource use, natural, historic and cultural resources, and pollutants) from proposed projects on the environment.

1. Land Use

a. Characterize present land use where the proposed project would be located.

□ Urban	□ Industrial	□ Commercial	□ Agricultural
□ Suburban	□ Rural	□ Residential	□ Research Facilities
□ Forest	□ University Campus	□ Other: _____	

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ENVIRONMENTAL QUESTIONNAIRE

b. Identify the total size of the facility, structure, or system and what portion would be used for the proposed project.

c. Describe planned construction, installation, and/or demolition activities, i.e., roads, utilities system right-of-ways, parking lots, buildings, laboratories, storage tanks, fueling facilities, underground wells, pipelines, or other structures.
□ No construction would be anticipated for this project.

d. Describe how land use would be affected by operational activities associated with the proposed project.
□ No land areas would be affected.

e. Describe any plans to reclaim areas that would be affected by the proposed project.
□ No land areas would be affected.

f. Would the proposed project affect any unique or unusual landforms (e.g., cliffs, waterfalls, etc.)?
□ No □ Yes (describe)

g. Would the proposed project be located in or near local, state, or federal parks; forests; monuments; scenic waterways; wilderness; recreation facilities; or tribal lands? □ No □ Yes (describe)

2. Construction Activities and/or Operation

a. Identify project structure(s), power line(s), pipeline(s), utilities system(s), right-of-way(s) or road(s) that will be constructed and clearly mark them on a project site map or topographic map as appropriate. □ None

b. Would the proposed project require the construction of waste pits or settling ponds?
□ No □ Yes (describe and identify location, and estimate surface area disturbed)

c. Would the proposed project affect any existing body of water? □ No □ Yes (describe)

d. Would the proposed project impact a floodplain or wetland? □ No □ Yes (describe)

e. Would the proposed project potentially cause runoff/sedimentation/erosion? □ No □ Yes (describe)

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f. Would the proposed project include activities located on perma-frost, near fault zones, or involve fracturing, well drilling, geologic stimulation, sequestration, active seismic data collection, and/or deepwater operations?

□ No □ Yes (describe)

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g. Would the proposed project involve any of the following: nanotechnology; recombinant DNA or genetic engineering; facility decommissioning or disposition of equipment/materials; or management of radioactive wastes/materials?
□ No □ Yes (describe)

3. Biological Resources

a. Identify any State or Federally listed endangered or threatened plant or animal species potentially affected by the proposed project.
□ None

b. Would any designated critical habitat be affected by the proposed project? □ No □ Yes (describe)

c. Describe any impacts that construction would have on any other types of sensitive or unique habitats.
□ No planned construction □ No habitats □ None □ Impact (describe)

d. Would any foreign substances/materials be introduced into ground or surface waters, soil, or other earth/geologic resource because of project activities? How would these foreign substances/materials affect the water, soil, biota, and geologic resources? □ No □ Yes (describe)

e. Would any migratory animal corridors be impacted or disrupted by the proposed project? □ No □ Yes (describe)

4. Socioeconomic and Infrastructure Conditions

a. Would local socio-economic changes result from the proposed project? □ No □ Yes (describe)

b. Would the proposed project generate increased traffic use of roads through local neighborhoods, urban or rural areas?
□ No □ Yes (describe)

c. Would the proposed project require new transportation access (roads, rail, etc.)? Describe location, impacts, costs.
□ No □ Yes (describe)

d. Would the proposed project create a significant increase in local energy usage? □ No □ Yes (describe)

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5. Historical/Cultural Resources

a. Describe any historical, archaeological, or cultural sites in the vicinity of the proposed project; note any sites included on the National Register of Historic Places. □ None

b. Would construction or operational activities planned under the proposed project disturb any historical, archaeological, or cultural sites? □ No planned construction □ No historic sites □ Yes (describe) □ No Impact (discuss)

c. Has the State Historic Preservation Office been contacted with regard to this project? □ No □ Yes (describe)

d. Would the proposed project interfere with visual resources (e.g., eliminate scenic views) or alter the present landscape? □ No □ Yes (describe)

e. Would the proposed project be located on or adjacent to tribal lands, lands considered to be sacred, or lands used for traditional purposes? Describe any known tribal sensitivities for the proposed project area.

6. Atmospheric Conditions/Air Quality

a. Identify air quality conditions in the immediate vicinity of the proposed project with regard to attainment of National Ambient Air Quality Standards (NAAQS). This information is available under the Green Book Non-Attainment Areas for Criteria Pollutants located at http://www.epa.gov/air/oaqps/greenbk/astate.html

	Attainment	Non-Attainment
O_3 - 1 Hour	□	□
O_3 - 8 Hour	□	□
SO_x	□	□
PM - 2.5	□	□
PM - 10	□	□
CO	□	□
NO_2	□	□
Lead	□	□

b. Would proposed project require issuance of new or modified local, state, or federal air permits to perform project related work and activities? □ No □ Yes (describe)

c. Would the proposed project be in compliance with local and state air quality requirements? □ Yes
If not, please explain.

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d. Would the proposed project be classified as either a New Source or a major modification to an existing source?
□ No □ Yes (describe)

e. What types of air emissions, including fugitive emissions, would be anticipated from the proposed project, and what would be the maximum annual rate of emissions for the project?

	Maximum per Year	Total for Project
□ SO_x		
□ NO_x		
□ PM - 2.5		
□ PM - 10		
□ CO		
□ CO_2		
□ Lead		
□ H_2S		
□ Organic solvent vapors or other volatile organic compounds--List:		
□ Hazardous air pollutants -- List:		
□ Other -- List:		
□ None		

f. Would any types of emission control or particulate collection devices be used?
□ No □ Yes (describe, including collection efficiencies)

g. How would emissions be vented?

7. Hydrologic Conditions/Water Quality

a. What nearby water bodies may be affected by the proposed project? Provide distance(s) from the project site.

b. What sources would supply potable and process water for the proposed project?

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c. Quantify the wastewater that would be generated by the proposed project.

	Gallons/day	Gallons/year
□ Non-contact cooling water		
□ Process water		
□ Sanitary		
□ Other -- describe:		
□ None		

d. What would be the major components of <u>each</u> type of wastewater (e.g., coal fines)? □ No wastewater produced

e. Identify the local treatment facility that would receive wastewater from the proposed project.
□ No discharges to local treatment facility

f. Describe how wastewater would be collected and treated. □ No wastewater produced

g. Would any run-off or leachates be produced from storage piles or waste disposal sites? □ No □ Yes (describe source)

h. Would project require issuance of new or modified water permits to perform project work or site development activities?
□ No □ Yes (describe)

i. Where would wastewater effluents from the proposed project be discharged? □ No wastewater produced

j. Would the proposed project be permitted to discharge effluents into an existing body of water?
□ No □ Yes (describe water use and effluent impact)

k. Would a new or modified National Pollutant Discharge Elimination System (NPDES) permit be required?
□ No □ Yes (describe)

l. Would the proposed project adversely affect the quality or movement of groundwater? □ No □ Yes (describe)

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m. Would the proposed project require issuance of an Underground Injection Control (UIC) permit?
□ No □ Yes (describe)

n. Would the proposed project be located in or near a wellhead protection area, drinking water protection area, or above a sole source aquifer or underground source of drinking water (USDW)?
□ No □ Yes (describe)

8. Solid and Hazardous Wastes

a. Identify and estimate wastes that would be generated from the project. Solid wastes are defined as any solid, liquid, semi-solid, or contained gaseous material that is discarded, has served its intended purpose, or is a manufacturing or mining by-product (See EPA Municipal Solid Waste and Municipal Solid Waste by State).

	Annual Quantity
□ **Municipal solid waste (e.g., paper, plastic, etc.)**	
□ **Coal or coal by-products**	
□ **Other -- Identify:**	
□ **Hazardous waste – Identify:**	
□ **None**	

b. Would project require issuance of new or modified solid waste and/or hazardous waste related permits to perform project work activities? □ No □ Yes (explain)

c. How and where would solid waste disposal be accomplished?
□ None generated
□ On-site (identify and describe location)
□ Off-site (identify location and describe facility and treatment)

d. How would wastes for disposal be transported?

e. Describe hazardous wastes that would be generated, treated, handled, or stored under this project. Hazardous waste information can be found at EPA Hazardous Waste website. □ None

f. How would hazardous or toxic waste be collected and stored? □ None used or produced

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g. If hazardous wastes would require off-site disposal, have arrangements been made with a certified TSD (Treatment, Storage, and Disposal) facility?

□ Not required □ Arrangements not yet made □ Arrangements made with a certified TSD facility (identify)

9. Health/Safety Factors

a. Identify hazardous or toxic materials that would be used in the proposed project.

□ None □ Hazardous or toxic materials that would be used (identify):

b. Describe the potential impacts of this project's hazardous materials on human health and the environment.

□ None

c. Would there be any special physical hazards or health risks associated with the project? □ No □ Yes (describe)

d. Does a worker safety program exist at the location of the proposed project? □ No □ Yes (describe)

e. Would additional safety training be necessary for any new laboratory, equipment, or processes involved with the project?

□ No □ Yes (describe)

f. Describe any increases in ambient noise levels to the public from construction and operational activities.

□ None □ Increase in ambient noise level (describe)

g. Would project construction result in the removal of natural or other barriers that act as noise screens?

□ No construction planned □ No □ Yes (describe)

h. Would hearing protection be required for workers? □ No □ Yes (describe)

10. Environmental Restoration and/or Waste Management

a. Would the proposed project include CERCLA removals or similar actions under RCRA or other authorities?

□ No □ Yes (describe)

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b. Would the proposed project include siting, construction, and operation of temporary pilot-scale waste collection and treatment facilities or pilot-scale waste stabilization and containment facilities? □ No □ Yes (describe)

c. Would the proposed project involve operations of environmental monitoring and control systems?
□ No □ Yes (describe)

d. Would the proposed project involve siting, construction, operation, or decommissioning of a facility for storing packaged hazardous waste for 90 days or less? □ No □ Yes (describe)

E. REGULATORY COMPLIANCE

1. For the following laws, describe any existing permits, new or modified permits, manifests, responsible authorities or agencies, contacts, etc., that would be required for the proposed project

a. Resource Conservation and Recovery Act (RCRA): □ None □ New Required □ Modification Required
Describe:

b. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):
□ None □ New Required □ Modification Required
Describe:

c. Toxic Substance Control Act (TSCA): □ None □ New Required □ Modification Required
Describe:

d. Clean Water Act (CWA): □ None □ New Required □ Modification Required
Describe:

e. Underground Storage Tank Control Program (UST): □ None □ New Required □ Modification Required
Describe:

f. Underground Injection Control Program (UIC): □ None □ New Required □ Modification Required
Describe:

g. Clean Air Act (CAA): □ None □ New Required □ Modification Required
Describe:

U.S. DEPARTMENT OF ENERGY

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h. Endangered Species Act (ESA): □ None □ New Required □ Modification Required
Describe:

i. Floodplains and Wetlands Regulations: □ None □ New Required □ Modification Required
Describe:

j. Fish and Wildlife Coordination Act (FWCA): □ None □ New Required □ Modification Required
Describe:

k. National Historic Preservation Act (NHPA): □ None □ New Required □ Modification Required
Describe:

l. Coastal Zone Management Act (CZMA): □ None □ New Required □ Modification Required
Describe:

2. Identify any other environmental laws and regulations (Federal, state, and local) for which compliance would be necessary for this project, and describe the permits, manifests, and contacts that would be required.

F. DESCRIBE ANY ISSUES THAT WOULD GENERATE PUBLIC CONTROVERSY REGARDING THE PROPOSED PROJECT. □ None

G. WOULD THE PROPOSED PROJECT PRODUCE ADDITIONAL DEVELOPMENT, OR ARE OTHER MAJOR DEVELOPMENTS PLANNED OR UNDERWAY, IN THE PROJECT AREA?

□ No □ Yes (describe)

H. SUMMARIZE THE SIGNIFICANT IMPACTS THAT WOULD RESULT FROM THE PROPOSED PROJECT.

□ None (provide supporting detail) □ Significant impacts (describe)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

I. PROVIDE A DESCRIPTION OF HOW THE PROJECT WOULD BE DECOMMISSIONED, INCLUDING THE DISPOSITION OF EQUIPMENT AND MATERIALS.

III. CERTIFICATION BY PROPOSER

I hereby certify that the information provided herein is current, accurate, and complete as of the date shown immediately below.

Signature: *Jacqueline Baum* Date (mm/dd/yyyy): 2/16/2023

Typed Name: Jacqueline Baum

Title: Technical Leader

Organization: EPRI

IV. REVIEW AND APPROVAL BY DOE

I hereby certify that I have reviewed the information provided in this questionnaire, have determined that all questions have been appropriately answered, and judge the responses to be consistent with the efforts proposed.

DOE Project Manager

Signature: _____ Date (mm/dd/yyyy): _____

Typed Name: _____

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Revised: 12/3/2014
Reviewed: 12/3/2014
(Previous Editions Obsolete)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

I. INSTRUCTIONS

The proposer shall prepare this Environmental Questionnaire (EQ) as accurately and completely as possible. Supporting information can be provided as attachments. The proposer must identify the location of the project and specifically describe the activities that would occur at that location. The proposer must provide specific information and quantities, regarding air emissions, wastewater discharges, solid wastes, etc., to facilitate the necessary review. In addition, the proposer must submit with this EQ a FINAL copy of the project's statement of work (SOW) or statement of project objective (SOPO) that will be used in the contract/agreement between the proposer and the U.S Department of Energy (DOE).

II. QUESTIONNAIRE

A. PROJECT SUMMARY

1. Solicitation/Project Number: _____ Proposer: Open Systems International, Inc._____
2. This Environmental Questionnaire pertains to a: □ Recipient or Prime Contractor X Sub-recipient or Subcontractor
3. Principal Investigator: _____ Telephone Number: _____
4. Project Title: _____
5. Expected Project Duration: _____
6. Location of Activities covered by **this** Environmental Questionnaire: (City/Township, County, State):
   Opens Systems International, Inc. Existing office facility in Medina, Minnesota, (Hennepin county)
7. List the full scope of activities planned (only for the location that is the subject of this Environmental Questionnaire).

   OSI's approach for the answers presented below assumes the "Project" and "Subject" of this EQ is our office facility that will be used to develop, write, and compile software code in electronic format.

8. List all other locations where work would be performed by the primary contractor of the project and subcontractor(s). Each of the following must have an individual Environmental Questionnaire.

Subcontractor or sub-recipient	Location of activities for this project

9. Identify and select the checkbox with the predominant project work activities under Group A, B, or C

Group A

□X Routine administrative, procurement, training, and personnel actions. Contract activities/awards for management support, financial assistance, and technical services in support of agency business, programs, projects, and goals. Literature searches and information gathering, material inventories, property surveys; data analysis, computer modeling, analytical reviews, technical summary, conceptual design, feasibility studies, document preparation, data dissemination, and paper studies. Technical assistance including financial planning, assistance, classroom training, public meetings, management training, survey participation, academic contribution, technical consultation, and stakeholders surveys. Workshop and conference planning, preparation, and implementation which may involve promoting energy efficiency, renewable energy, and energy conservation.

STOP! ***If all work activities related to this project can be classified and described within categories under Group A, proceed directly to Section III CERTIFICATION BY PROPOSER. No additional information is required.***

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If project work activities are described in either Group(s) B or C; then continue filling out questionnaire.

Group B

□ Laboratory Scale Research, Bench Scale Research, Pilot Scale Research, Proof-of-Concept Scale Research, or Field Test Research. Work DOES NOT involve new building/facilities construction and site excavation/groundbreaking activities. This work typically involves routine operation of existing laboratories, commercial buildings/properties, offices and homes, project test facilities, factories/power plants, vehicles test stands and components, refueling facilities, utility systems, or other existing structures/facilities. Work will NOT involve major change in facilities missions and operations, land use planning, new/modified regulatory/operating permit requirements. Includes work specific to routine DOE Site operations and Lab research work activities, but NOT building construction and site preparation. DOE work typically involves laboratory facilities and lab equipment operations, buildings and grounds management activities; and buildings and facilities maintenance, repairs, reconfiguration, remodeling, equipment use and replacement.

Group C

□ Pilot Test Facilities Construction, Pilot Scale Research, Field Scale Demonstration, or Commercial Scale Application. Work typically involves facility construction, site preparation/excavation/groundbreaking, and/or demolition. This work would include construction, retrofit, replacement, and/or major modifications of laboratories, test facilities, energy system prototypes, and power generation infrastructure. Work may also involve construction and maintenance of utilities system right-of-ways, roads, vehicle test facilities, commercial buildings/properties, fuel refinery/mixing facilities, refueling facility, power plants, underground wells, and pipelines, and other types of energy research related facilities. This work may require new or modified regulatory permits, environmental sampling and monitoring requirements, master planning, public involvement, and environmental impact review. Includes work specific to DOE Site Operations and Lab operation activities involving building and facilities construction, replacement, decommissioning/demolition, site preparation, land use changes, or change in research facilities mission or operations.

B. PROPOSED PROJECT ALTERNATIVES

1. If applicable, list any project alternatives considered to achieve the project objectives.
   Not applicable

C. PROJECT LOCATION

1. Provide a brief description of the project location (physical location, surrounding area, adjacent structures).

   Professional services office facility located at 4101 Arrowhead Dr., Medina, MN 55340

2. **Attach** a project site location map of the project work area.

   Available on google maps

D. ENVIRONMENTAL IMPACTS

NEPA procedures require evaluations of possible effects (including land use, energy resource use, natural, historic and cultural resources, and pollutants) from proposed projects on the environment.

1. Land Use

a. Characterize present land use where the proposed project would be located.

□ Urban	□ Industrial	□X Commercial	□ Agricultural
□ Suburban	□ Rural	□ Residential	□ Research Facilities
□ Forest	□ University Campus	□ Other: _____	

b. Identify the total size of the facility, structure, or system and what portion would be used for the proposed project.
   OSI office space 180,000 sqft – 5%

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ENVIRONMENTAL QUESTIONNAIRE

c. Describe planned construction, installation, and/or demolition activities, i.e., roads, utilities system right-of-ways, parking lots, buildings, laboratories, storage tanks, fueling facilities, underground wells, pipelines, or other structures.
□X No construction would be anticipated for this project.

d. Describe how land use would be affected by operational activities associated with the proposed project.
□X No land areas would be affected.

e. Describe any plans to reclaim areas that would be affected by the proposed project.
□X No land areas would be affected.

f. Would the proposed project affect any unique or unusual landforms (e.g., cliffs, waterfalls, etc.)?
□X No □ Yes (describe)

g. Would the proposed project be located in or near local, state, or federal parks; forests; monuments; scenic waterways; wilderness; recreation facilities; or tribal lands? □X No □ Yes (describe)

2. Construction Activities and/or Operation

a. Identify project structure(s), power line(s), pipeline(s), utilities system(s), right-of-way(s) or road(s) that will be constructed and clearly mark them on a project site map or topographic map as appropriate. □X None

b. Would the proposed project require the construction of waste pits or settling ponds?
□X No □ Yes (describe and identify location, and estimate surface area disturbed)

c. Would the proposed project affect any existing body of water? □X No □ Yes (describe)

d. Would the proposed project impact a floodplain or wetland? □X No □ Yes (describe)

e. Would the proposed project potentially cause runoff/sedimentation/erosion? □X No □ Yes (describe)

f. Would the proposed project include activities located on perma-frost, near fault zones, or involve fracturing, well drilling, geologic stimulation, sequestration, active seismic data collection, and/or deepwater operations?
□X No □ Yes (describe)

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g. Would the proposed project involve any of the following: nanotechnology; recombinant DNA or genetic engineering; facility decommissioning or disposition of equipment/materials; or management of radioactive wastes/materials?
□X No □ Yes (describe)

3. Biological Resources

a. Identify any State or Federally listed endangered or threatened plant or animal species potentially affected by the proposed project.
□X None

b. Would any designated critical habitat be affected by the proposed project? □X No □ Yes (describe)

c. Describe any impacts that construction would have on any other types of sensitive or unique habitats.
□X No planned construction □ No habitats □ None □ Impact (describe)

d. Would any foreign substances/materials be introduced into ground or surface waters, soil, or other earth/geologic resource because of project activities? How would these foreign substances/materials affect the water, soil, biota, and geologic resources? □X No □ Yes (describe)

e. Would any migratory animal corridors be impacted or disrupted by the proposed project? □X No □ Yes (describe)

4. Socioeconomic and Infrastructure Conditions

a. Would local socio-economic changes result from the proposed project? □X No □ Yes (describe)

b. Would the proposed project generate increased traffic use of roads through local neighborhoods, urban or rural areas?
□X No □ Yes (describe)

c. Would the proposed project require new transportation access (roads, rail, etc.)? Describe location, impacts, costs.
□X No □ Yes (describe)

d. Would the proposed project create a significant increase in local energy usage? □X No □ Yes (describe)

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5. Historical/Cultural Resources

a. Describe any historical, archaeological, or cultural sites in the vicinity of the proposed project; note any sites included on the National Register of Historic Places. □X None

b. Would construction or operational activities planned under the proposed project disturb any historical, archaeological, or cultural sites? □X No planned construction □ No historic sites □ Yes (describe) □ No Impact (discuss)

c. Has the State Historic Preservation Office been contacted with regard to this project? □X No □ Yes (describe)

d. Would the proposed project interfere with visual resources (e.g., eliminate scenic views) or alter the present landscape? □X No □ Yes (describe)

e. Would the proposed project be located on or adjacent to tribal lands, lands considered to be sacred, or lands used for traditional purposes? Describe any known tribal sensitivities for the proposed project area.
None.

6. Atmospheric Conditions/Air Quality

a. Identify air quality conditions in the immediate vicinity of the proposed project with regard to attainment of National Ambient Air Quality Standards (NAAQS). This information is available under the Green Book Non-Attainment Areas for Criteria Pollutants located at http://www.epa.gov/air/oaqps/greenbk/astate.html

	Attainment	Non-Attainment
O_3 - 1 Hour	□	□
O_3 - 8 Hour	□	□
SO_x	□	□
PM - 2.5	□	□
PM - 10	□	□
CO	□	□
NO_2	□	□
Lead	□	□

b. Would proposed project require issuance of new or modified local, state, or federal air permits to perform project related work and activities? □X No □ Yes (describe)

c. Would the proposed project be in compliance with local and state air quality requirements? □X Yes
If not, please explain.

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d. Would the proposed project be classified as either a New Source or a major modification to an existing source?
□X No □ Yes (describe)

e. What types of air emissions, including fugitive emissions, would be anticipated from the proposed project, and what would be the maximum annual rate of emissions for the project?

	Maximum per Year	Total for Project
□ SO_x		
□ NO_x		
□ PM - 2.5		
□ PM - 10		
□ CO		
□ CO_2		
□ Lead		
□ H_2S		
□ Organic solvent vapors or other volatile organic compounds--List:		
□ Hazardous air pollutants -- List:		
□ Other -- List:		
□ None		

f. Would any types of emission control or particulate collection devices be used?
□X No □ Yes (describe, including collection efficiencies)

g. How would emissions be vented?
Not applicable.

7. Hydrologic Conditions/Water Quality

a. What nearby water bodies may be affected by the proposed project? Provide distance(s) from the project site.
Not applicable.

b. What sources would supply potable and process water for the proposed project?
Not applicable.

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c. Quantify the wastewater that would be generated by the proposed project.

	Gallons/day	Gallons/year
□ Non-contact cooling water		
□ Process water		
□ Sanitary		
□ Other -- describe:		
□ None		

d. What would be the major components of each type of wastewater (e.g., coal fines)? □X No wastewater produced

e. Identify the local treatment facility that would receive wastewater from the proposed project.
□X No discharges to local treatment facility

f. Describe how wastewater would be collected and treated. □X No wastewater produced

g. Would any run-off or leachates be produced from storage piles or waste disposal sites? □XNo □ Yes (describe source)

h. Would project require issuance of new or modified water permits to perform project work or site development activities?
□X No □ Yes (describe)

i. Where would wastewater effluents from the proposed project be discharged? □X No wastewater produced

j. Would the proposed project be permitted to discharge effluents into an existing body of water?
□X No □ Yes (describe water use and effluent impact)

k. Would a new or modified National Pollutant Discharge Elimination System (NPDES) permit be required?
□X No □ Yes (describe)

l. Would the proposed project adversely affect the quality or movement of groundwater? □X No □ Yes (describe)

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ENVIRONMENTAL QUESTIONNAIRE

m. Would the proposed project require issuance of an Underground Injection Control (UIC) permit?
□X No □ Yes (describe)

n. Would the proposed project be located in or near a wellhead protection area, drinking water protection area, or above a sole source aquifer or underground source of drinking water (USDW)?
□X No □ Yes (describe)

8. Solid and Hazardous Wastes

a. Identify and estimate wastes that would be generated from the project. Solid wastes are defined as any solid, liquid, semi-solid, or contained gaseous material that is discarded, has served its intended purpose, or is a manufacturing or mining by-product (See EPA Municipal Solid Waste and Municipal Solid Waste by State).

	Annual Quantity
□ **Municipal solid waste (e.g., paper, plastic, etc.)**	
□ **Coal or coal by-products**	
□ **Other -- Identify:**	
□ **Hazardous waste – Identify:**	
□ **None**	

b. Would project require issuance of new or modified solid waste and/or hazardous waste related permits to perform project work activities? □X No □ Yes (explain)

c. How and where would solid waste disposal be accomplished?
□X None generated
□ On-site (identify and describe location)
□ Off-site (identify location and describe facility and treatment)

d. How would wastes for disposal be transported?
Not Applicable

e. Describe hazardous wastes that would be generated, treated, handled, or stored under this project. Hazardous waste information can be found at EPA Hazardous Waste website. □X None

f. How would hazardous or toxic waste be collected and stored? □X None used or produced

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g. If hazardous wastes would require off-site disposal, have arrangements been made with a certified TSD (Treatment, Storage, and Disposal) facility?
□X Not required □ Arrangements not yet made □ Arrangements made with a certified TSD facility (identify)

9. Health/Safety Factors

a. Identify hazardous or toxic materials that would be used in the proposed project.
□X None □ Hazardous or toxic materials that would be used (identify):

b. Describe the potential impacts of this project's hazardous materials on human health and the environment.
□X None

c. Would there be any special physical hazards or health risks associated with the project? □X No □ Yes (describe)

d. Does a worker safety program exist at the location of the proposed project? □ No □X Yes (describe)

e. Would additional safety training be necessary for any new laboratory, equipment, or processes involved with the project?
□X No □ Yes (describe)

f. Describe any increases in ambient noise levels to the public from construction and operational activities.
□X None □ Increase in ambient noise level (describe)

g. Would project construction result in the removal of natural or other barriers that act as noise screens?
□X No construction planned □ No □ Yes (describe)

h. Would hearing protection be required for workers? □X No □ Yes (describe)

10. Environmental Restoration and/or Waste Management

a. Would the proposed project include CERCLA removals or similar actions under RCRA or other authorities?
□X No □ Yes (describe)

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b. Would the proposed project include siting, construction, and operation of temporary pilot-scale waste collection and treatment facilities or pilot-scale waste stabilization and containment facilities? □X No □ Yes (describe)

c. Would the proposed project involve operations of environmental monitoring and control systems?
□X No □ Yes (describe)

d. Would the proposed project involve siting, construction, operation, or decommissioning of a facility for storing packaged hazardous waste for 90 days or less? □X No □ Yes (describe)

E. REGULATORY COMPLIANCE

1. For the following laws, describe any existing permits, new or modified permits, manifests, responsible authorities or agencies, contacts, etc., that would be required for the proposed project

a. Resource Conservation and Recovery Act (RCRA): □X None □ New Required □ Modification Required
Describe:

b. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):
□X None □ New Required □ Modification Required
Describe:

c. Toxic Substance Control Act (TSCA): □X None □ New Required □ Modification Required
Describe:

d. Clean Water Act (CWA): □X None □ New Required □ Modification Required
Describe:

e. Underground Storage Tank Control Program (UST): □X None □ New Required □ Modification Required
Describe:

f. Underground Injection Control Program (UIC): □X None □ New Required □ Modification Required
Describe:

g. Clean Air Act (CAA): □X None □ New Required □ Modification Required
Describe:

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h. Endangered Species Act (ESA): □X None □ New Required □ Modification Required
Describe:

i. Floodplains and Wetlands Regulations: □X None □ New Required □ Modification Required
Describe:

j. Fish and Wildlife Coordination Act (FWCA): □X None □ New Required □ Modification Required
Describe:

k. National Historic Preservation Act (NHPA): □X None □ New Required □ Modification Required
Describe:

l. Coastal Zone Management Act (CZMA): □X None □ New Required □ Modification Required
Describe:

2. Identify any other environmental laws and regulations (Federal, state, and local) for which compliance would be necessary for this project, and describe the permits, manifests, and contacts that would be required.
None.

F. DESCRIBE ANY ISSUES THAT WOULD GENERATE PUBLIC CONTROVERSY REGARDING THE PROPOSED PROJECT. □X None

G. WOULD THE PROPOSED PROJECT PRODUCE ADDITIONAL DEVELOPMENT, OR ARE OTHER MAJOR DEVELOPMENTS PLANNED OR UNDERWAY, IN THE PROJECT AREA?

□X No □ Yes (describe)

H. SUMMARIZE THE SIGNIFICANT IMPACTS THAT WOULD RESULT FROM THE PROPOSED PROJECT.

□X None (provide supporting detail) □ Significant impacts (describe)

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ENVIRONMENTAL QUESTIONNAIRE

I. PROVIDE A DESCRIPTION OF HOW THE PROJECT WOULD BE DECOMMISSIONED, INCLUDING THE DISPOSITION OF EQUIPMENT AND MATERIALS.
Not applicable.

III. CERTIFICATION BY PROPOSER

I hereby certify that the information provided herein is current, accurate, and complete as of the date shown immediately below.

Signature: _____ Date (mm/dd/yyyy): _____

Typed Name: _____

Title: _____

Organization: _____

IV. REVIEW AND APPROVAL BY DOE

I hereby certify that I have reviewed the information provided in this questionnaire, have determined that all questions have been appropriately answered, and judge the responses to be consistent with the efforts proposed.

DOE Project Manager

Signature: _____ Date (mm/dd/yyyy): _____

Typed Name: _____

NETL F 451.1-1/3
Revised: 12/3/2014
Reviewed: 12/3/2014
(Previous Editions Obsolete)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

I. INSTRUCTIONS

The proposer shall prepare this Environmental Questionnaire (EQ) as accurately and completely as possible. Supporting information can be provided as attachments. The proposer must identify the location of the project and specifically describe the activities that would occur at that location. The proposer must provide specific information and quantities, regarding air emissions, wastewater discharges, solid wastes, etc., to facilitate the necessary review. In addition, the proposer must submit with this EQ a FINAL copy of the project's statement of work (SOW) or statement of project objective (SOPO) that will be used in the contract/agreement between the proposer and the U.S Department of Energy (DOE).

II. QUESTIONNAIRE

A. PROJECT SUMMARY

1. Solicitation/Project Number: _____ Proposer: _____
2. This Environmental Questionnaire pertains to a: □ Recipient or Prime Contractor x Sub-recipient or Subcontractor
3. Principal Investigator: Dileep Rudran Telephone Number: 480-253-2110
4. Project Title: Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability
5. Expected Project Duration: 3.25 years
6. Location of Activities covered by **this** Environmental Questionnaire: (City/Township, County, State):
   Spokane, Spokane County, Washington
7. List the full scope of activities planned (only for the location that is the subject of this Environmental Questionnaire).

   Software design, development, configuration, and testing

8. List all other locations where work would be performed by the primary contractor of the project and subcontractor(s). Each of the following must have an individual Environmental Questionnaire.

Subcontractor or sub-recipient	Location of activities for this project
Open Energy Solutions, Inc.	12 N. Sheridan St. Ste. 330 Spokane, WA 99202, USA

9. Identify and select the checkbox with the predominant project work activities under Group A, B, or C

Group A

X Routine administrative, procurement, training, and personnel actions. Contract activities/awards for management support, financial assistance, and technical services in support of agency business, programs, projects, and goals. Literature searches and information gathering, material inventories, property surveys; data analysis, computer modeling, analytical reviews, technical summary, conceptual design, feasibility studies, document preparation, data dissemination, and paper studies. Technical assistance including financial planning, assistance, classroom training, public meetings, management training, survey participation, academic contribution, technical consultation, and stakeholders surveys. Workshop and conference planning, preparation, and implementation which may involve promoting energy efficiency, renewable energy, and energy conservation.

STOP! ***If all work activities related to this project can be classified and described within categories under Group A, proceed directly to Section III CERTIFICATION BY PROPOSER. No additional information is required.***
If project work activities are described in either Group(s) B or C; then continue filling out questionnaire.

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ENVIRONMENTAL QUESTIONNAIRE

Group B

□ Laboratory Scale Research, Bench Scale Research, Pilot Scale Research, Proof-of-Concept Scale Research, or Field Test Research. Work DOES NOT involve new building/facilities construction and site excavation/groundbreaking activities. This work typically involves routine operation of existing laboratories, commercial buildings/properties, offices and homes, project test facilities, factories/power plants, vehicles test stands and components, refueling facilities, utility systems, or other existing structures/facilities. Work will NOT involve major change in facilities missions and operations, land use planning, new/modified regulatory/operating permit requirements. Includes work specific to routine DOE Site operations and Lab research work activities, but NOT building construction and site preparation. DOE work typically involves laboratory facilities and lab equipment operations, buildings and grounds management activities; and buildings and facilities maintenance, repairs, reconfiguration, remodeling, equipment use and replacement.

Group C

□ Pilot Test Facilities Construction, Pilot Scale Research, Field Scale Demonstration, or Commercial Scale Application. Work typically involves facility construction, site preparation/excavation/groundbreaking, and/or demolition. This work would include construction, retrofit, replacement, and/or major modifications of laboratories, test facilities, energy system prototypes, and power generation infrastructure. Work may also involve construction and maintenance of utilities system right-of-ways, roads, vehicle test facilities, commercial buildings/properties, fuel refinery/mixing facilities, refueling facility, power plants, underground wells, and pipelines, and other types of energy research related facilities. This work may require new or modified regulatory permits, environmental sampling and monitoring requirements, master planning, public involvement, and environmental impact review. Includes work specific to DOE Site Operations and Lab operation activities involving building and facilities construction, replacement, decommissioning/demolition, site preparation, land use changes, or change in research facilities mission or operations.

B. PROPOSED PROJECT ALTERNATIVES

1. If applicable, list any project alternatives considered to achieve the project objectives.

   N/A

C. PROJECT LOCATION

1. Provide a brief description of the project location (physical location, surrounding area, adjacent structures).

   The location contains office facilities within the Scott Morris Center for Innovation (HUB) which is the energy services hub for the South Landing Eco-District in Spokane, WA. This eco-district is net carbon zero and grid participative for close to net energy zero consumption if operated to that objective. The Catalyst building served by the HUB is occupied by Eastern Washington University, McKinstry, and a handful of other small companies. There is parking located around the hub and adjacent to the Catalyst building. The general location is just east of downtown Spokane, just off a major arterial, Sprague Avenue.

2. **Attach** a project site location map of the project work area.

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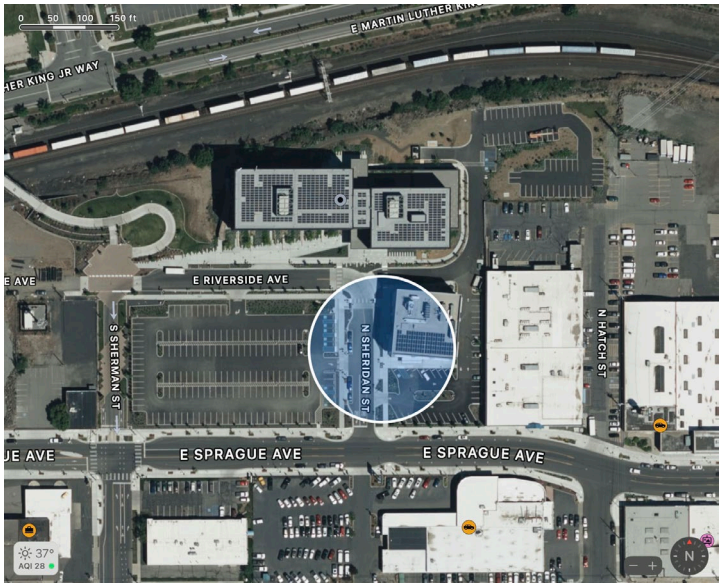
ENVIRONMENTAL QUESTIONNAIRE



D. ENVIRONMENTAL IMPACTS

NEPA procedures require evaluations of possible effects (including land use, energy resource use, natural, historic and cultural resources, and pollutants) from proposed projects on the environment.

1. Land Use

a. Characterize present land use where the proposed project would be located.

X Urban	□ Industrial	X Commercial	□ Agricultural
□ Suburban	□ Rural	□ Residential	□ Research Facilities
□ Forest	□ University Campus	□ Other: _____	

b. Identify the total size of the facility, structure, or system and what portion would be used for the proposed project.
1000 sq.ft.

c. Describe planned construction, installation, and/or demolition activities, i.e., roads, utilities system right-of-ways, parking lots, buildings, laboratories, storage tanks, fueling facilities, underground wells, pipelines, or other structures.
X No construction would be anticipated for this project.

d. Describe how land use would be affected by operational activities associated with the proposed project.
X No land areas would be affected.

e. Describe any plans to reclaim areas that would be affected by the proposed project.
X No land areas would be affected.

f. Would the proposed project affect any unique or unusual landforms (e.g., cliffs, waterfalls, etc.)?
X No □ Yes (describe)

g. Would the proposed project be located in or near local, state, or federal parks; forests; monuments; scenic waterways; wilderness; recreation facilities; or tribal lands? X No □ Yes (describe)

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2. Construction Activities and/or Operation

a. Identify project structure(s), power line(s), pipeline(s), utilities system(s), right-of-way(s) or road(s) that will be constructed and clearly mark them on a project site map or topographic map as appropriate. X None

b. Would the proposed project require the construction of waste pits or settling ponds?
X No □ Yes (describe and identify location, and estimate surface area disturbed)

c. Would the proposed project affect any existing body of water? X No □ Yes (describe)

d. Would the proposed project impact a floodplain or wetland? X No □ Yes (describe)

e. Would the proposed project potentially cause runoff/sedimentation/erosion? X No □ Yes (describe)

f. Would the proposed project include activities located on perma-frost, near fault zones, or involve fracturing, well drilling, geologic stimulation, sequestration, active seismic data collection, and/or deepwater operations?
X No □ Yes (describe)

g. Would the proposed project involve any of the following: nanotechnology; recombinant DNA or genetic engineering; facility decommissioning or disposition of equipment/materials; or management of radioactive wastes/materials?
X No □ Yes (describe)

3. Biological Resources

a. Identify any State or Federally listed endangered or threatened plant or animal species potentially affected by the proposed project.
X None

b. Would any designated critical habitat be affected by the proposed project? X No □ Yes (describe)

c. Describe any impacts that construction would have on any other types of sensitive or unique habitats.
X No planned construction □ No habitats □ None □ Impact (describe)

d. Would any foreign substances/materials be introduced into ground or surface waters, soil, or other earth/geologic resource because of project activities? How would these foreign substances/materials affect the water, soil, biota, and geologic resources? X No □ Yes (describe)

e. Would any migratory animal corridors be impacted or disrupted by the proposed project? X No □ Yes (describe)

4. Socioeconomic and Infrastructure Conditions

a. Would local socio-economic changes result from the proposed project? X No □ Yes (describe)

b. Would the proposed project generate increased traffic use of roads through local neighborhoods, urban or rural areas?
X No □ Yes (describe)

c. Would the proposed project require new transportation access (roads, rail, etc.)? Describe location, impacts, costs.
X No □ Yes (describe)

d. Would the proposed project create a significant increase in local energy usage? X No □ Yes (describe)

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5. Historical/Cultural Resources

a. Describe any historical, archaeological, or cultural sites in the vicinity of the proposed project; note any sites included on the National Register of Historic Places. X None

b. Would construction or operational activities planned under the proposed project disturb any historical, archaeological, or cultural sites? X No planned construction □ No historic sites □ Yes (describe) □ No Impact (discuss)

c. Has the State Historic Preservation Office been contacted with regard to this project? X No □ Yes (describe)

d. Would the proposed project interfere with visual resources (e.g., eliminate scenic views) or alter the present landscape?
X No □ Yes (describe)

e. Would the proposed project be located on or adjacent to tribal lands, lands considered to be sacred, or lands used for traditional purposes? Describe any known tribal sensitivities for the proposed project area.
No / None

6. Atmospheric Conditions/Air Quality

a. Identify air quality conditions in the immediate vicinity of the proposed project with regard to attainment of National Ambient Air Quality Standards (NAAQS). This information is available under the Green Book Non-Attainment Areas for Criteria Pollutants located at http://www.epa.gov/air/oaqps/greenbk/astate.html

	Attainment	Non-Attainment
O_3 - 1 Hour	X	□
O_3 - 8 Hour	X	□
SO_x	X	□
PM - 2.5	X	□
PM - 10	X	□
CO	□	X
NO_2	X	□
Lead	X	□

b. Would proposed project require issuance of new or modified local, state, or federal air permits to perform project related work and activities? X No □ Yes (describe)

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c. Would the proposed project be in compliance with local and state air quality requirements? X Yes
If not, please explain.

d. Would the proposed project be classified as either a New Source or a major modification to an existing source?
X No □ Yes (describe)

e. What types of air emissions, including fugitive emissions, would be anticipated from the proposed project, and what would be the maximum annual rate of emissions for the project?

	Maximum per Year	Total for Project
□ SO_x		
□ NO_x		
□ PM - 2.5		
□ PM - 10		
□ CO		
□ CO_2		
□ Lead		
□ H_2S		
□ Organic solvent vapors or other volatile organic compounds--List:		
□ Hazardous air pollutants -- List:		
□ Other -- List:		
X None		

f. Would any types of emission control or particulate collection devices be used?
X No □ Yes (describe, including collection efficiencies)

g. How would emissions be vented?
N/A

7. Hydrologic Conditions/Water Quality

a. What nearby water bodies may be affected by the proposed project? Provide distance(s) from the project site.
Spokane River is closest, but not affected in any way. 1000 ft to the river

b. What sources would supply potable and process water for the proposed project?
City of Spokane

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ENVIRONMENTAL QUESTIONNAIRE

c. Quantify the wastewater that would be generated by the proposed project.

	Gallons/day	Gallons/year
□ Non-contact cooling water		
□ Process water		
□ Sanitary		
□ Other -- describe:		
X None		

d. What would be the major components of each type of wastewater (e.g., coal fines)? X No wastewater produced

e. Identify the local treatment facility that would receive wastewater from the proposed project.
X No discharges to local treatment facility

f. Describe how wastewater would be collected and treated. X No wastewater produced

g. Would any run-off or leachates be produced from storage piles or waste disposal sites? X No □ Yes (describe source)

h. Would project require issuance of new or modified water permits to perform project work or site development activities?
X No □ Yes (describe)

i. Where would wastewater effluents from the proposed project be discharged? X No wastewater produced

j. Would the proposed project be permitted to discharge effluents into an existing body of water?
X No □ Yes (describe water use and effluent impact)

k. Would a new or modified National Pollutant Discharge Elimination System (NPDES) permit be required?
X No □ Yes (describe)

l. Would the proposed project adversely affect the quality or movement of groundwater? X No □ Yes (describe)

m. Would the proposed project require issuance of an Underground Injection Control (UIC) permit?
X No □ Yes (describe)

n. Would the proposed project be located in or near a wellhead protection area, drinking water protection area, or above a sole source aquifer or underground source of drinking water (USDW)?
□ No X Yes (describe)

Located above the Spokane aquifer (https://www.spokaneaquifer.org/), however, separated by a basalt layer, which was taken into consideration when the Eco district was constructed. No ground source water is used by or discharged by the Eco District facilities.

8. Solid and Hazardous Wastes

a. Identify and estimate wastes that would be generated from the project. Solid wastes are defined as any solid, liquid, semi-solid, or contained gaseous material that is discarded, has served its intended purpose, or is a manufacturing or mining by-product (See EPA Municipal Solid Waste and Municipal Solid Waste by State).

	Annual Quantity
□ **Municipal solid waste (e.g., paper, plastic, etc.)**	
□ **Coal or coal by-products**	

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□ **Other -- Identify:**	
□ **Hazardous waste – Identify:**	
X **None**	

b. Would project require issuance of new or modified solid waste and/or hazardous waste related permits to perform project work activities? X No □ Yes (explain)

c. How and where would solid waste disposal be accomplished?
X None generated
□ On-site (identify and describe location)
□ Off-site (identify location and describe facility and treatment)

d. How would wastes for disposal be transported?
N/A

e. Describe hazardous wastes that would be generated, treated, handled, or stored under this project. Hazardous waste information can be found at EPA Hazardous Waste website. X None

f. How would hazardous or toxic waste be collected and stored? X None used or produced

g. If hazardous wastes would require off-site disposal, have arrangements been made with a certified TSD (Treatment, Storage, and Disposal) facility?
X Not required □ Arrangements not yet made □ Arrangements made with a certified TSD facility (identify)

9. Health/Safety Factors

a. Identify hazardous or toxic materials that would be used in the proposed project.
X None □ Hazardous or toxic materials that would be used (identify):

b. Describe the potential impacts of this project's hazardous materials on human health and the environment.
X None

c. Would there be any special physical hazards or health risks associated with the project? X No □ Yes (describe)

d. Does a worker safety program exist at the location of the proposed project? X No □ Yes (describe)

e. Would additional safety training be necessary for any new laboratory, equipment, or processes involved with the project?
X No □ Yes (describe)

f. Describe any increases in ambient noise levels to the public from construction and operational activities.
X None □ Increase in ambient noise level (describe)

g. Would project construction result in the removal of natural or other barriers that act as noise screens?
X No construction planned □ No □ Yes (describe)

h. Would hearing protection be required for workers? X No □ Yes (describe)

10. Environmental Restoration and/or Waste Management

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

a. Would the proposed project include CERCLA removals or similar actions under RCRA or other authorities?
X No □ Yes (describe)

b. Would the proposed project include siting, construction, and operation of temporary pilot-scale waste collection and treatment facilities or pilot-scale waste stabilization and containment facilities? X No □ Yes (describe)

c. Would the proposed project involve operations of environmental monitoring and control systems?
X No □ Yes (describe)

d. Would the proposed project involve siting, construction, operation, or decommissioning of a facility for storing packaged hazardous waste for 90 days or less? X No □ Yes (describe)

E. REGULATORY COMPLIANCE

1. For the following laws, describe any existing permits, new or modified permits, manifests, responsible authorities or agencies, contacts, etc., that would be required for the proposed project

a. Resource Conservation and Recovery Act (RCRA): X None □ New Required □ Modification Required
Describe:

b. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):
X None □ New Required □ Modification Required
Describe:

c. Toxic Substance Control Act (TSCA): X None □ New Required □ Modification Required
Describe:

d. Clean Water Act (CWA): X None □ New Required □ Modification Required
Describe:

e. Underground Storage Tank Control Program (UST): X None □ New Required □ Modification Required
Describe:

f. Underground Injection Control Program (UIC): X None □ New Required □ Modification Required
Describe:

g. Clean Air Act (CAA): X None □ New Required □ Modification Required
Describe:

h. Endangered Species Act (ESA): X None □ New Required □ Modification Required
Describe:

i. Floodplains and Wetlands Regulations: X None □ New Required □ Modification Required
Describe:

j. Fish and Wildlife Coordination Act (FWCA): X None □ New Required □ Modification Required
Describe:

k. National Historic Preservation Act (NHPA): X None □ New Required □ Modification Required
Describe:

l. Coastal Zone Management Act (CZMA): X None □ New Required □ Modification Required

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

Describe:

2. Identify any other environmental laws and regulations (Federal, state, and local) for which compliance would be necessary for this project, and describe the permits, manifests, and contacts that would be required.
N/A

F. DESCRIBE ANY ISSUES THAT WOULD GENERATE PUBLIC CONTROVERSY REGARDING THE PROPOSED PROJECT. X None

G. WOULD THE PROPOSED PROJECT PRODUCE ADDITIONAL DEVELOPMENT, OR ARE OTHER MAJOR DEVELOPMENTS PLANNED OR UNDERWAY, IN THE PROJECT AREA?

X No □ Yes (describe)

H. SUMMARIZE THE SIGNIFICANT IMPACTS THAT WOULD RESULT FROM THE PROPOSED PROJECT.

X None (provide supporting detail) □ Significant impacts (describe)

I. PROVIDE A DESCRIPTION OF HOW THE PROJECT WOULD BE DECOMMISSIONED, INCLUDING THE DISPOSITION OF EQUIPMENT AND MATERIALS.
N/A

III. CERTIFICATION BY PROPOSER

I hereby certify that the information provided herein is current, accurate, and complete as of the date shown immediately below.

Signature: _____ Date (mm/dd/yyyy): 2/16/23

Typed Name: Wade Malcolm

Title: CEO

Organization: Open Energy Solutions Inc.

IV. REVIEW AND APPROVAL BY DOE

I hereby certify that I have reviewed the information provided in this questionnaire, have determined that all questions have been appropriately answered, and judge the responses to be consistent with the efforts proposed.

DOE Project Manager

Signature: _____ Date (mm/dd/yyyy): _____

Typed Name: _____

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

Type text here

NETL F 451.1-1/3
Revised: 12/3/2014
Reviewed: 12/3/2014
(Previous Editions Obsolete)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

I. INSTRUCTIONS

The proposer shall prepare this Environmental Questionnaire (EQ) as accurately and completely as possible. Supporting information can be provided as attachments. The proposer must identify the location of the project and specifically describe the activities that would occur at that location. The proposer must provide specific information and quantities, regarding air emissions, wastewater discharges, solid wastes, etc., to facilitate the necessary review. In addition, the proposer must submit with this EQ a FINAL copy of the project's statement of work (SOW) or statement of project objective (SOPO) that will be used in the contract/agreement between the proposer and the U.S Department of Energy (DOE).

II. QUESTIONNAIRE

A. PROJECT SUMMARY

1. Solicitation/Project Number: _____ Proposer: Open Systems International, Inc._____
2. This Environmental Questionnaire pertains to a: □ Recipient or Prime Contractor X Sub-recipient or Subcontractor
3. Principal Investigator: _____ Telephone Number: _____
4. Project Title: _____
5. Expected Project Duration: _____
6. Location of Activities covered by **this** Environmental Questionnaire: (City/Township, County, State):
   Opens Systems International, Inc. Existing office facility in Medina, Minnesota, (Hennepin county)
7. List the full scope of activities planned (only for the location that is the subject of this Environmental Questionnaire).

   OSI's approach for the answers presented below assumes the "Project" and "Subject" of this EQ is our office facility that will be used to develop, write, and compile software code in electronic format.

8. List all other locations where work would be performed by the primary contractor of the project and subcontractor(s). Each of the following must have an individual Environmental Questionnaire.

Subcontractor or sub-recipient	Location of activities for this project

9. Identify and select the checkbox with the predominant project work activities under Group A, B, or C

Group A

□X Routine administrative, procurement, training, and personnel actions. Contract activities/awards for management support, financial assistance, and technical services in support of agency business, programs, projects, and goals. Literature searches and information gathering, material inventories, property surveys; data analysis, computer modeling, analytical reviews, technical summary, conceptual design, feasibility studies, document preparation, data dissemination, and paper studies. Technical assistance including financial planning, assistance, classroom training, public meetings, management training, survey participation, academic contribution, technical consultation, and stakeholders surveys. Workshop and conference planning, preparation, and implementation which may involve promoting energy efficiency, renewable energy, and energy conservation.

STOP! ***If all work activities related to this project can be classified and described within categories under Group A, proceed directly to Section III CERTIFICATION BY PROPOSER. No additional information is required.***

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

If project work activities are described in either Group(s) B or C; then continue filling out questionnaire.

Group B

□ Laboratory Scale Research, Bench Scale Research, Pilot Scale Research, Proof-of-Concept Scale Research, or Field Test Research. Work DOES NOT involve new building/facilities construction and site excavation/groundbreaking activities. This work typically involves routine operation of existing laboratories, commercial buildings/properties, offices and homes, project test facilities, factories/power plants, vehicles test stands and components, refueling facilities, utility systems, or other existing structures/facilities. Work will NOT involve major change in facilities missions and operations, land use planning, new/modified regulatory/operating permit requirements. Includes work specific to routine DOE Site operations and Lab research work activities, but NOT building construction and site preparation. DOE work typically involves laboratory facilities and lab equipment operations, buildings and grounds management activities; and buildings and facilities maintenance, repairs, reconfiguration, remodeling, equipment use and replacement.

Group C

□ Pilot Test Facilities Construction, Pilot Scale Research, Field Scale Demonstration, or Commercial Scale Application. Work typically involves facility construction, site preparation/excavation/groundbreaking, and/or demolition. This work would include construction, retrofit, replacement, and/or major modifications of laboratories, test facilities, energy system prototypes, and power generation infrastructure. Work may also involve construction and maintenance of utilities system right-of-ways, roads, vehicle test facilities, commercial buildings/properties, fuel refinery/mixing facilities, refueling facility, power plants, underground wells, and pipelines, and other types of energy research related facilities. This work may require new or modified regulatory permits, environmental sampling and monitoring requirements, master planning, public involvement, and environmental impact review. Includes work specific to DOE Site Operations and Lab operation activities involving building and facilities construction, replacement, decommissioning/demolition, site preparation, land use changes, or change in research facilities mission or operations.

B. PROPOSED PROJECT ALTERNATIVES

1. If applicable, list any project alternatives considered to achieve the project objectives.
   Not applicable

C. PROJECT LOCATION

1. Provide a brief description of the project location (physical location, surrounding area, adjacent structures).

   Professional services office facility located at 4101 Arrowhead Dr., Medina, MN 55340

2. **Attach** a project site location map of the project work area.

   Available on google maps

D. ENVIRONMENTAL IMPACTS

NEPA procedures require evaluations of possible effects (including land use, energy resource use, natural, historic and cultural resources, and pollutants) from proposed projects on the environment.

1. Land Use

a. Characterize present land use where the proposed project would be located.

□ Urban	□ Industrial	□X Commercial	□ Agricultural
□ Suburban	□ Rural	□ Residential	□ Research Facilities
□ Forest	□ University Campus	□ Other: _____	

b. Identify the total size of the facility, structure, or system and what portion would be used for the proposed project.
   OSI office space 180,000 sqft – 5%

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

c. Describe planned construction, installation, and/or demolition activities, i.e., roads, utilities system right-of-ways, parking lots, buildings, laboratories, storage tanks, fueling facilities, underground wells, pipelines, or other structures.
□X No construction would be anticipated for this project.

d. Describe how land use would be affected by operational activities associated with the proposed project.
□X No land areas would be affected.

e. Describe any plans to reclaim areas that would be affected by the proposed project.
□X No land areas would be affected.

f. Would the proposed project affect any unique or unusual landforms (e.g., cliffs, waterfalls, etc.)?
□X No □ Yes (describe)

g. Would the proposed project be located in or near local, state, or federal parks; forests; monuments; scenic waterways; wilderness; recreation facilities; or tribal lands? □X No □ Yes (describe)

2. Construction Activities and/or Operation

a. Identify project structure(s), power line(s), pipeline(s), utilities system(s), right-of-way(s) or road(s) that will be constructed and clearly mark them on a project site map or topographic map as appropriate. □X None

b. Would the proposed project require the construction of waste pits or settling ponds?
□X No □ Yes (describe and identify location, and estimate surface area disturbed)

c. Would the proposed project affect any existing body of water? □X No □ Yes (describe)

d. Would the proposed project impact a floodplain or wetland? □X No □ Yes (describe)

e. Would the proposed project potentially cause runoff/sedimentation/erosion? □X No □ Yes (describe)

f. Would the proposed project include activities located on perma-frost, near fault zones, or involve fracturing, well drilling, geologic stimulation, sequestration, active seismic data collection, and/or deepwater operations?
□X No □ Yes (describe)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

g. Would the proposed project involve any of the following: nanotechnology; recombinant DNA or genetic engineering; facility decommissioning or disposition of equipment/materials; or management of radioactive wastes/materials?
□X No □ Yes (describe)

3. Biological Resources

a. Identify any State or Federally listed endangered or threatened plant or animal species potentially affected by the proposed project.
□X None

b. Would any designated critical habitat be affected by the proposed project? □X No □ Yes (describe)

c. Describe any impacts that construction would have on any other types of sensitive or unique habitats.
□X No planned construction □ No habitats □ None □ Impact (describe)

d. Would any foreign substances/materials be introduced into ground or surface waters, soil, or other earth/geologic resource because of project activities? How would these foreign substances/materials affect the water, soil, biota, and geologic resources? □X No □ Yes (describe)

e. Would any migratory animal corridors be impacted or disrupted by the proposed project? □X No □ Yes (describe)

4. Socioeconomic and Infrastructure Conditions

a. Would local socio-economic changes result from the proposed project? □X No □ Yes (describe)

b. Would the proposed project generate increased traffic use of roads through local neighborhoods, urban or rural areas?
□X No □ Yes (describe)

c. Would the proposed project require new transportation access (roads, rail, etc.)? Describe location, impacts, costs.
□X No □ Yes (describe)

d. Would the proposed project create a significant increase in local energy usage? □X No □ Yes (describe)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

5. Historical/Cultural Resources

a. Describe any historical, archaeological, or cultural sites in the vicinity of the proposed project; note any sites included on the National Register of Historic Places. □X None

b. Would construction or operational activities planned under the proposed project disturb any historical, archaeological, or cultural sites? □X No planned construction □ No historic sites □ Yes (describe) □ No Impact (discuss)

c. Has the State Historic Preservation Office been contacted with regard to this project? □X No □ Yes (describe)

d. Would the proposed project interfere with visual resources (e.g., eliminate scenic views) or alter the present landscape? □X No □ Yes (describe)

e. Would the proposed project be located on or adjacent to tribal lands, lands considered to be sacred, or lands used for traditional purposes? Describe any known tribal sensitivities for the proposed project area.
None.

6. Atmospheric Conditions/Air Quality

a. Identify air quality conditions in the immediate vicinity of the proposed project with regard to attainment of National Ambient Air Quality Standards (NAAQS). This information is available under the Green Book Non-Attainment Areas for Criteria Pollutants located at http://www.epa.gov/air/oaqps/greenbk/astate.html

	Attainment	Non-Attainment
O_3 - 1 Hour	□	□
O_3 - 8 Hour	□	□
SO_x	□	□
PM - 2.5	□	□
PM - 10	□	□
CO	□	□
NO_2	□	□
Lead	□	□

b. Would proposed project require issuance of new or modified local, state, or federal air permits to perform project related work and activities? □X No □ Yes (describe)

c. Would the proposed project be in compliance with local and state air quality requirements? □X Yes
If not, please explain.

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ENVIRONMENTAL QUESTIONNAIRE

d. Would the proposed project be classified as either a New Source or a major modification to an existing source?
□X No □ Yes (describe)

e. What types of air emissions, including fugitive emissions, would be anticipated from the proposed project, and what would be the maximum annual rate of emissions for the project?

	Maximum per Year	Total for Project
□ SO_x		
□ NO_x		
□ PM - 2.5		
□ PM - 10		
□ CO		
□ CO_2		
□ Lead		
□ H_2S		
□ Organic solvent vapors or other volatile organic compounds--List:		
□ Hazardous air pollutants -- List:		
□ Other -- List:		
□ None		

f. Would any types of emission control or particulate collection devices be used?
□X No □ Yes (describe, including collection efficiencies)

g. How would emissions be vented?
Not applicable.

7. Hydrologic Conditions/Water Quality

a. What nearby water bodies may be affected by the proposed project? Provide distance(s) from the project site.
Not applicable.

b. What sources would supply potable and process water for the proposed project?
Not applicable.

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

c. Quantify the wastewater that would be generated by the proposed project.

	Gallons/day	Gallons/year
□ Non-contact cooling water		
□ Process water		
□ Sanitary		
□ Other -- describe:		
□ None		

d. What would be the major components of each type of wastewater (e.g., coal fines)? □X No wastewater produced

e. Identify the local treatment facility that would receive wastewater from the proposed project.
□X No discharges to local treatment facility

f. Describe how wastewater would be collected and treated. □X No wastewater produced

g. Would any run-off or leachates be produced from storage piles or waste disposal sites? □XNo □ Yes (describe source)

h. Would project require issuance of new or modified water permits to perform project work or site development activities?
□X No □ Yes (describe)

i. Where would wastewater effluents from the proposed project be discharged? □X No wastewater produced

j. Would the proposed project be permitted to discharge effluents into an existing body of water?
□X No □ Yes (describe water use and effluent impact)

k. Would a new or modified National Pollutant Discharge Elimination System (NPDES) permit be required?
□X No □ Yes (describe)

l. Would the proposed project adversely affect the quality or movement of groundwater? □X No □ Yes (describe)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

m. Would the proposed project require issuance of an Underground Injection Control (UIC) permit?
□X No □ Yes (describe)

n. Would the proposed project be located in or near a wellhead protection area, drinking water protection area, or above a sole source aquifer or underground source of drinking water (USDW)?
□X No □ Yes (describe)

8. Solid and Hazardous Wastes

a. Identify and estimate wastes that would be generated from the project. Solid wastes are defined as any solid, liquid, semi-solid, or contained gaseous material that is discarded, has served its intended purpose, or is a manufacturing or mining by-product (See EPA Municipal Solid Waste and Municipal Solid Waste by State).

	Annual Quantity
□ **Municipal solid waste (e.g., paper, plastic, etc.)**	
□ **Coal or coal by-products**	
□ **Other -- Identify:**	
□ **Hazardous waste – Identify:**	
□ **None**	

b. Would project require issuance of new or modified solid waste and/or hazardous waste related permits to perform project work activities? □X No □ Yes (explain)

c. How and where would solid waste disposal be accomplished?
□X None generated
□ On-site (identify and describe location)
□ Off-site (identify location and describe facility and treatment)

d. How would wastes for disposal be transported?
Not Applicable

e. Describe hazardous wastes that would be generated, treated, handled, or stored under this project. Hazardous waste information can be found at EPA Hazardous Waste website. □X None

f. How would hazardous or toxic waste be collected and stored? □X None used or produced

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

g. If hazardous wastes would require off-site disposal, have arrangements been made with a certified TSD (Treatment, Storage, and Disposal) facility?
□X Not required □ Arrangements not yet made □ Arrangements made with a certified TSD facility (identify)

9. Health/Safety Factors

a. Identify hazardous or toxic materials that would be used in the proposed project.
□X None □ Hazardous or toxic materials that would be used (identify):

b. Describe the potential impacts of this project's hazardous materials on human health and the environment.
□X None

c. Would there be any special physical hazards or health risks associated with the project? □X No □ Yes (describe)

d. Does a worker safety program exist at the location of the proposed project? □ No □X Yes (describe)

e. Would additional safety training be necessary for any new laboratory, equipment, or processes involved with the project?
□X No □ Yes (describe)

f. Describe any increases in ambient noise levels to the public from construction and operational activities.
□X None □ Increase in ambient noise level (describe)

g. Would project construction result in the removal of natural or other barriers that act as noise screens?
□X No construction planned □ No □ Yes (describe)

h. Would hearing protection be required for workers? □X No □ Yes (describe)

10. Environmental Restoration and/or Waste Management

a. Would the proposed project include CERCLA removals or similar actions under RCRA or other authorities?
□X No □ Yes (describe)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

b. Would the proposed project include siting, construction, and operation of temporary pilot-scale waste collection and treatment facilities or pilot-scale waste stabilization and containment facilities? □X No □ Yes (describe)

c. Would the proposed project involve operations of environmental monitoring and control systems?
□X No □ Yes (describe)

d. Would the proposed project involve siting, construction, operation, or decommissioning of a facility for storing packaged hazardous waste for 90 days or less? □X No □ Yes (describe)

E. REGULATORY COMPLIANCE

1. For the following laws, describe any existing permits, new or modified permits, manifests, responsible authorities or agencies, contacts, etc., that would be required for the proposed project

a. Resource Conservation and Recovery Act (RCRA): □X None □ New Required □ Modification Required
Describe:

b. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):
□X None □ New Required □ Modification Required
Describe:

c. Toxic Substance Control Act (TSCA): □X None □ New Required □ Modification Required
Describe:

d. Clean Water Act (CWA): □X None □ New Required □ Modification Required
Describe:

e. Underground Storage Tank Control Program (UST): □X None □ New Required □ Modification Required
Describe:

f. Underground Injection Control Program (UIC): □X None □ New Required □ Modification Required
Describe:

g. Clean Air Act (CAA): □X None □ New Required □ Modification Required
Describe:

U.S. DEPARTMENT OF ENERGY

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h. Endangered Species Act (ESA): □X None □ New Required □ Modification Required
Describe:

i. Floodplains and Wetlands Regulations: □X None □ New Required □ Modification Required
Describe:

j. Fish and Wildlife Coordination Act (FWCA): □X None □ New Required □ Modification Required
Describe:

k. National Historic Preservation Act (NHPA): □X None □ New Required □ Modification Required
Describe:

l. Coastal Zone Management Act (CZMA): □X None □ New Required □ Modification Required
Describe:

2. Identify any other environmental laws and regulations (Federal, state, and local) for which compliance would be necessary for this project, and describe the permits, manifests, and contacts that would be required.
None.

F. DESCRIBE ANY ISSUES THAT WOULD GENERATE PUBLIC CONTROVERSY REGARDING THE PROPOSED PROJECT. □X None

G. WOULD THE PROPOSED PROJECT PRODUCE ADDITIONAL DEVELOPMENT, OR ARE OTHER MAJOR DEVELOPMENTS PLANNED OR UNDERWAY, IN THE PROJECT AREA?

□X No □ Yes (describe)

H. SUMMARIZE THE SIGNIFICANT IMPACTS THAT WOULD RESULT FROM THE PROPOSED PROJECT.

□X None (provide supporting detail) □ Significant impacts (describe)

U.S. DEPARTMENT OF ENERGY

ENVIRONMENTAL QUESTIONNAIRE

I. PROVIDE A DESCRIPTION OF HOW THE PROJECT WOULD BE DECOMMISSIONED, INCLUDING THE DISPOSITION OF EQUIPMENT AND MATERIALS.
Not applicable.

III. CERTIFICATION BY PROPOSER

I hereby certify that the information provided herein is current, accurate, and complete as of the date shown immediately below.

Signature: _____ Date (mm/dd/yyyy): _____

Typed Name: _____

Title: _____

Organization: _____

IV. REVIEW AND APPROVAL BY DOE

I hereby certify that I have reviewed the information provided in this questionnaire, have determined that all questions have been appropriately answered, and judge the responses to be consistent with the efforts proposed.

DOE Project Manager

Signature: _____ Date (mm/dd/yyyy): _____

Typed Name: _____

March 13, 2023

Department of Energy (DOE)
Grid Deployment Office (GDO)
Office of Clean Energy Demonstrations (OCED)
BIL – Grid Resilience and Innovation Partnership (GRIP)

Subject: DTE Electric's Letter of Commitment for FOA Number: DE-FOA-0002740, Topic Area 2

To: The DE-FOA-0002740 Team,

DTE Electric is very excited to apply for DOE support of the "Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability" project. Please allow this letter to serve as DTE Electric's commitment to the project entitled. As you know, after the DOE's review of the concept paper (TA2-134-E), the DOE encouraged the partnership led by DTE Electric between the University of Michigan-Dearborn (UM-Dearborn), Electric Power Research Institute (EPRI), Open Energy Solutions (OES), and Open Systems International (OSI) to submit a full proposal. DTE Electric is enthusiastic about the vision for the future of the electrical distribution system that is demonstrated by new technology including Adaptive Networked Microgrids (ANM). If this project is awarded a grant by the DOE, DTE Electric will participate as the primary investigator. DTE Electric will specifically complete the following:

- Manage the overall project
  - Perform end-to-end project management
  - Manage the work completed by DTE Electric's direct employees
  - Direct the work of DTE Electric's contractors, service providers, and suppliers
  - Coordinate the work of all the project partners:
    - EPRI: Simulations for engineering due diligence and knowledge sharing
    - OES: Implement grid edge device software for ANMs
    - OSI: Implement ADMS software to support ANMs
    - UM-Dearborn: Validate new cyber security practices, implement novel data analytics methods, and knowledge sharing
- Provide technical expertise on the development of ANMs including the work needed in the areas of Sensors and Data Analytics, Cybersecurity, and Control and Protection Architecture and Methods
- Complete the engineering due diligence and testing required to deploy this new technology including steady state and dynamic system simulations, hardware in the loop testing, and testing in DTE Electric's Westland testing facility
- Deploy the technology in the field at O'Shea Solar Park and Port Austin
- Coordinate the sharing of lessons learned by the partnership with research institutions, utilities, and others to further the deployment of ANMs.

The total estimated cost of the project (b) (4). In support of this effort and if the project is fully awarded, DTE Electric would provide (b) (4) in cost share toward project expenditures over the duration of the program. The anticipated funding from the DOE (b) (4). The project is anticipated to be completed between January 1, 2024 to December 31, 2027. Please contact the undersigned via email at sharon.pfeuffer@dteenergy.com or by phone at 313.235.9190.

Signed: _____ Print Name: Sharon Pfeuffer

Date: _____ Institution: DTE Electric

Department of Energy (DOE)
Grid Deployment Office (GDO)
Office of Clean Energy Demonstrations (OCED)
BIL – Grid Resilience and Innovation Partnership (GRIP)

Subject: UM-Dearborn's Letter of Commitment for Project Submitted by DTE Electric for FOA Number: E-FOA-0002740, Topic Area 2

Dear DTE Proposal Team,

Please allow this letter to serve as the University of Michigan's commitment to the project entitled "Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability." The DOE encouraged the partnership led by DTE Electric between the University of Michigan-Dearborn, Electric Power Research Institute, Open Energy Solutions, and Open Systems International to submit a full proposal after the DOE's review of the concept paper (TA2-134-E). The University of Michigan-Dearborn is excited about this vision for the future of the electrical distribution system. If this project is awarded a grant by the DOE, DTE Electric will participate as the primary investigator, and the University of Michigan-Dearborn will serve as the project sub-awardee. The University of Michigan-Dearborn will specifically collaborate on this project by:

- validating new cyber security practices through software and hardware-in-the-loop simulation;
- implementing and evaluating novel data analytics methods;
- developing educational and lessons learned sharing opportunities;
- participating in team meetings and reviewing technical progress/reports/papers;
- continuing to share ideas and participate in technical discussions; and
- submitting financial and technical reports regularly.

The requested DoE funding for the University of Michigan-Dearborn (b) (4). In support of this effort and if the project is fully awarded, the University of Michigan-Dearborn will provide (b) (4) toward project expenses over the duration of the program. The project is anticipated to be completed between January 1, 2024, to December 31, 2027. Please contact the PI, Dr. Wencong Su at wencong@umiche.du or by phone at 313.593.5314 for technical questions. Please contact Emily Baxter via email at ekbaxter@umich.edu or by phone at 734.647.9741 for administrative and contractual concerns.

Signed: Emily K. Baxter Print Name: Emily K. Baxter

Date: 02/28/2023 Institution: Regents of the University of Michigan

DANIEL L. BROOKS
Vice President,
Integrated Grid and Energy Systems

March 10, 2023

John O'Donnell
DTE Energy
One Energy Plaza
Detroit, Michigan 40226

Subject: Cost Share Letter of Commitment for DTE Energy's Proposal for the Department of Energy Funding Opportunity Announcement No. DE-FOA-0002740

Dear Mr. O'Donnell:

The Electric Power Research Institute, Inc. (EPRI) is pleased to offer this letter of commitment for the DTE Energy (DTE) proposal submitted in response to DOE, DE-FOA-0002740. EPRI conducts research, development, and demonstration projects for the benefit of the public in the United States and internationally. As an independent, 501 (c)(3) nonprofit organization for public interest energy and environmental research, we focus on electricity generation, delivery, and use in collaboration with the electricity sector, its stakeholders and others to enhance the quality of life by making electric power safe, reliable, affordable, and environmentally responsible.

EPRI would work as a subrecipient to DTE on this proposed project. EPRI's role would be to support DTE in the networked microgrid implementation process by providing viability analysis of the microgrid designs, review of controller architecture, test plan support and review, and guidance during site implementation. EPRI would also support the project outreach and technology transfer component by publishing papers and disseminating results with members and the broader stakeholder community. The total estimated cost of the anticipated EPRI effort, if the resultant award is fully funded, would (b) (4), of which EPRI would (b) (4) cash cost share.

Any potential support provided by EPRI is conditioned upon the successful negotiation of mutually acceptable contractual arrangements that may be required. EPRI's potential support shall not be construed as an endorsement of any facility, product, or entity, as EPRI does not endorse specific facilities, companies, or products. For the avoidance of doubt, this letter may not be construed by DTE Energy, DOE, EPRI, or any third party as creating any legally binding obligation. EPRI looks forward to participating with DTE Energy in this effort.

Sincerely,

942 Corridor Park Boulevard, Knoxville, TN 37932-3723 USA • 865.218.8040 • dbrooks@epri.com

OSI
An AspenTech® Business

February 17, 2023

Department of Energy (DOE)
Grid Deployment Office (GDO)
Office of Clean Energy Demonstrations (OCED)
BIL – Grid Resilience and Innovation Partnership (GRIP)

(b) (4) [redacted]

[redacted]

[redacted]

- [redacted]
- [redacted]

[redacted]

[redacted]

(b) (4) [redacted]

Open Systems International, Inc.
4101 Arrowhead Drive, Medina, Minnesota, 55340-9457 USA
Phone: (763) 551-0559 Fax: (763) 551-0750
Email: info@osii.com http://www.osii.com

Department of Energy (DOE)
Grid Deployment Office (GDO)
Office of Clean Energy Demonstrations (OCED)
BIL – Grid Resilience and Innovation Partnership (GRIP)

Subject: Open Energy Solutions, Inc. (OES) Letter of Commitment for FOA Number: DE-FOA-0002740, Topic Area 2

Dear DE-FOA-0002740 Team,

This letter serves as our commitment to the project entitled "Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability". As part of the partnership for this project, Open Energy Solutions (OES) is enthusiastic about this vision for distribution operation, which will be demonstrated via new technology enabling adaptive networked microgrids. If this project is awarded, OES will participate as a co-recipient and complete the following:

- Participate in definition of use cases, requirements and overall solution architecture
- Implement and deploy a distributed intelligence and data acquisition platform (OpenDSO™) to collect data from sensors and control edge devices:
  - An architecture and design for deployment at DTE Electric sites
  - Network model ingestion
  - Protocol adapters configuration
  - Base OpenDSO platform deployment
- Implement a hybrid-control architecture:
  - Laminar coordination interfaces between networked microgrids
  - North-south laminar coordination between ADMS and microgrids
- Support implementation and execute deployment of distributed applications:
  - Real-time state estimation algorithms on OpenDSO
  - Distributed machine learning algorithms
- Implement optimal dispatch applications:
  - Enhanced DTE's battery management application for optimization
  - Additional optimal dispatch application (identified during the requirements definition phase)
- Support HIL modeling and simulation activities for the duration of the project
- Provide platform and application support for field deployment and operations at DTE Electric's networked microgrids implemented under this grant
- Provide subject matter advisory and project management services
- Participate in sharing of lessons learned by partnership with institutions, utilities, and others to further the development and deployment of adaptive network microgrids

The total estimated cost of the work performed by OES (b) (4) . In support of this effort and if the project is fully awarded, OES would (b) (4) in cost share toward project expenditures over the duration of the program, anticipated as January 1, 2024 to December 31, 2027. If any questions, I can be reached at wade@openenergysolutionsinc.com or by phone at 408.230.8135.

Signed: _____ Print Name: Mr. Wade Malcolm

Date: March 8, 2023 Institution: Open Energy Solutions, Inc.

DRAFT

Locations of Work (DE-FOA-0002740)						
Control Number: TA2-134-E_DTE ELECTRIC						
Prime or Sub	**Name**	**Address**	**City**	**State**	**Zip Code + 4**	**Site Congressional District**
Prime	DTE Electric - Corporate Offices	1 Energy Plaza	Detroit	MI	48226-1221	MI-013
Prime	DTE Electric - Chicago Substation	(b) (4)	Detroit	MI	48228-2345	MI-012
Prime	DTE Electric - Port Austin Substation		Port Austin	MI	48467-9266	MI-009
Prime	DTE Electric - Training and Development Center		Westland	MI	48186-3267	MI-012
Sub	U of M - Dearborn	4901 Evergreen Road	Dearborn	MI	48128-2406	MI-012
Sub	EPRI	3420 Hillview Avenue	Palo Alto	CA	94304-1382	CA-016
Sub	EPRI	1300 West WT Harris Boulevard	Charlotte	NC	28262-8550	NC-012
Sub	EPRI	942 Corridor Park Blvd	Knoxville	TN	37932-3723	TN-002
Sub	EPRI	201 East John Carpenter Freeway, Ste 800	Irving	TX	75062-2877	TX-006
Sub	OES	5201 Great America Pkwy, Suite 320	Santa Clara	CA	95054-1120	CA-017
Sub	OES	12 N. Sheridan St. Ste. 330	Spokane	WA	99202-5901	WA-005
Sub	OSI	4101 Arrowhead Drive	Medina	MN	55340-9457	MN-003

MI-009, Port Austin

(b) (4)

PROJECT DESCRIPTION AND ASSURANCES DOCUMENT TEMPLATE (PDAD)

Project title: Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability
Applicant Name: DTE Energy
Applicant Address: One Energy Plaza, Detroit, MI 48226
Names of all team member organizations (if applicable): DTE Energy, The University of Michigan-Dearborn, Electric Power Research Institute, Open Systems International, and Open Energy Solutions
Principal Investigator (Name, Address if different than Applicant's, Phone Number, E-mail): John O'Donnell, 313.235.9017, john.j.odonnell@dteenergy.com
Business Point of Contact (Name, Address if different than Applicant's, Phone Number, E-mail): Josh Kirk, 313.235.5177, josh.kirk@dteenergy.com
Include any statements regarding confidentiality.
Federal Share: $22,938,494
Cost Share: $22,941,046
Total Estimated Project Cost: $45,879,540
Item 1: Specify (mark with "X")" the FOA Topic Area and as applicable the Area of Interest (AOI):
_____Topic Area 1: **Grid Resilience Grants** (BIL section 40101(c))
___X___Topic Area 2: **Smart Grid Grants** (BIL section 40107)
_____Topic Area 3: **Grid Innovation Program** (BIL section 40103(b)) – Area of Interest 1 (**Transmission** System Applications)
_____Topic Area 3: **Grid Innovation Program** (BIL section 40103(b)) – Area of Interest 2 (**Distribution** System Applications)
_____Topic Area 3: **Grid Innovation Program** (BIL section 40103(b)) – Area of Interest 3 (**Combination** System Applications)

TOPIC AREA 1 Specific Items:

Item 2: Specify (mark with "X")" the entity type of the applicant organization:
___X___electric grid operator
_____electricity storage operator
___X___electricity generator
_____transmission owner or operator
_____distribution provider
_____fuel supplier
If further description is needed for the specified entity type, please provide below:
Item 3: Please provide the total amount (USD) of qualifying resilience investments (as outlined in DE-FOA-00002740) that has been spent for the previous 3 years. Please also provide the time period utilized for calculation of this amount.
Total Amount:
Time Period for Resilience Investments:
Note: Topic Area 1 applicants must submit as part of their application, a report detailing past, current, and future efforts by the eligible entity to reduce the likelihood and consequences of disruptive events. This report should include efforts over at least the previous 3 years and at least the next 3 years and any broader resilience strategy used by the applicant.
Item 4: Is the eligible entity a Small Utility as defined in DE-FOA-0002740 (sells no more than 4,000,000 MWh of electricity per year)? If NO is selected, skip to Item 7.
_____Yes
_____No
Note: If YES, applicant must provide their Form 861 for the last reporting year submitted to the Energy Information Administration (EIA).
Item 5: Per BIL section 40101(e)(2) (C) APPLICATION LIMITATIONS.—An eligible entity may not submit an application for a grant provided by the Secretary under subsection (c) and a grant provided by a State or Indian Tribe pursuant to subsection (d) during the same application cycle.
Therefore, is the eligible entity a Subaward/Subcontract recipient for an application

submitted under IIJA Section 40101(d), ALRD 2736? If "YES", please describe the differences between the GRIP FOA 2740 application [40101(c)] and the ALRD 2736 [40101(d)] applications in the box below:

_____Yes
_____No

TOPIC AREA 2 Specific

No items

TOPIC AREA 3 Specific

Item 6: Specify (mark with "X")" the entity type of the applicant organization:

_____a State
_____a combination of 2 or more States
_____an Indian Tribe
_____a unit of local government
_____a public utility commission

If further description is needed for the specified entity type, please provide below:

Item 7:

Authorized Organizational Representative (AOR): please provide name, address, phone number and email address for the authorized agent to bind the entity

Authorized Organizational Representative (AOR):

Name: Michael J Solo, Jr.
Address: One Energy Plaza, Detroit, MI 48226
Phone: 313.235.9512
E-mail: michael.solo@dteenergy.com

Item 8: Signature of Authorized Organizational Representative (AOR)

_____

(b) (6)

DISCLOSURE OF LOBBYING ACTIVITIES

Complete this form to disclose lobbying activities pursuant to 31 U.S.C.1352

OMB Number: 4040-0013
Expiration Date: 02/28/2025

1. * Type of Federal Action:
- [ ] a. contract
- [x] b. grant
- [ ] c. cooperative agreement
- [ ] d. loan
- [ ] e. loan guarantee
- [ ] f. loan insurance

2. * Status of Federal Action:
- [x] a. bid/offer/application
- [ ] b. initial award
- [ ] c. post-award

3. * Report Type:
- [x] a. initial filing
- [ ] b. material change

4. Name and Address of Reporting Entity:

[x] Prime [ ] SubAwardee

*Name: DTE Energy

*Street 1: One Energy Plaza Street 2:

*City: Detroit State: MI: Michigan Zip: 48226

Congressional District, if known: MI-13

5. If Reporting Entity in No.4 is Subawardee, Enter Name and Address of Prime:

6. * Federal Department/Agency:

U.S. Department of Energy

7. * Federal Program Name/Description:

Bipartisan Infrastructure Law: Grid Resilience and Innovation Partnerships (GRIP) Section 40107: Smart Grid Grants

CFDA Number, *if applicable:*

8. Federal Action Number, *if known:*

DE-FOA-0002740

9. Award Amount, *if known:*

$

10. a. Name and Address of Lobbying Registrant:

Prefix *First Name: N/A Middle Name

*Last Name Suffix

*Street 1 Street 2

*City State Zip

b. Individual Performing Services (including address if different from No. 10a)

Prefix *First Name: N/A Middle Name

*Last Name Suffix

*Street 1 Street 2

*City State Zip

11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when the transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

*** Signature:**

***Name:** Prefix *First Name: Andrew Middle Name: J.

*Last Name: Coulouris Suffix

Title: VP, Corporate and Government Affairs **Telephone No.:** **Date:** 02/21/2023

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DISCLOSURE OF LOBBYING ACTIVITIES

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OMB Number: 4040-0013
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1. * Type of Federal Action:
- [ ] a. contract
- [ ] b. grant
- [x] c. cooperative agreement
- [ ] d. loan
- [ ] e. loan guarantee
- [ ] f. loan insurance

2. * Status of Federal Action:
- [x] a. bid/offer/application
- [ ] b. initial award
- [ ] c. post-award

3. * Report Type:
- [x] a. initial filing
- [ ] b. material change

4. Name and Address of Reporting Entity:

[ ] Prime [x] SubAwardee Tier if known:

*Name: Electric Power Research Institute (EPRI)

*Street 1: 3420 Hillview Ave. Street 2:

*City: Palo Alto State: CA: California Zip: 94304

Congressional District, if known: CA-016

5. If Reporting Entity in No.4 is Subawardee, Enter Name and Address of Prime:

*Name: DTE Energy

*Street 1: One Energy Plaza Street 2:

*City: Detroit State: MI: Michigan Zip: 49226

Congressional District, if known: MI-013

6. * Federal Department/Agency:

U.S. Department of Energy (DOE)

7. * Federal Program Name/Description:

Grid Deployment Office (GDO)
Office of Clean Energy Demonstrations (OCED)

CFDA Number, *if applicable:* 81.254

8. Federal Action Number, *if known:*

DE-FOA-0002740

9. Award Amount, *if known:*

$

10. a. Name and Address of Lobbying Registrant:

Prefix: * First Name: N/A Middle Name:

* Last Name: EPRI does not lobby with Federal funds. Suffix:

* Street 1: Street 2:

* City: State: Zip:

b. Individual Performing Services (including address if different from No. 10a)

Prefix: * First Name: N/A Middle Name: K.

* Last Name: EPRI does not lobby with Federal funds. Suffix:

* Street 1: Street 2:

* City: State: Zip:

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* Signature: Cynthia K Toth

*Name: Prefix: Ms. * First Name: Cynthia Middle Name: K.

* Last Name: Toth Suffix:

Title: Manager, Government Contracts Telephone No.: (865) 218-8106 Date: 02/28/2023

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DISCLOSURE OF LOBBYING ACTIVITIES

Complete this form to disclose lobbying activities pursuant to 31 U.S.C.1352

OMB Number: 4040-0013
Expiration Date: 02/28/2022

1. * Type of Federal Action:

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- [x] b. grant
- [ ] c. cooperative agreement
- [ ] d. loan
- [ ] e. loan guarantee
- [ ] f. loan insurance

2. * Status of Federal Action:

- [x] a. bid/offer/application
- [ ] b. initial award
- [ ] c. post-award

3. * Report Type:

- [x] a. initial filing
- [ ] b. material change

4. Name and Address of Reporting Entity:

[ ] Prime [x] SubAwardee Tier if known:

*Name: Open Energy Solutions Inc.

*Street 1: 5201 Great America Parkway Street 2: Suite 320

*City: Santa Clara State: CA: California Zip: 95054

Congressional District, if known: CA-17

5. If Reporting Entity in No.4 is Subawardee, Enter Name and Address of Prime:

*Name: DTE Electric

*Street 1: 1 Energy Plaza Street 2:

*City: Detroit State: MI: Michigan Zip: 48226

Congressional District, if known: MI-13

6. * Federal Department/Agency:

U.S. Department of Energy

7. * Federal Program Name/Description:

BIL- Grid Resilience and Innovation Partnerships (GRIP) Funding Opportunity Announcement DE-FOA-0002740

CFDA Number, *if applicable:* 81.254

8. Federal Action Number, *if known:*

9. Award Amount, *if known:*

$

10. a. Name and Address of Lobbying Registrant:

Prefix: *First Name: N/A Middle Name:

*Last Name: Suffix:

*Street 1: Street 2:

*City: State: Zip:

b. Individual Performing Services (including address if different from No. 10a)

Prefix: *First Name: N/A Middle Name:

*Last Name: Suffix:

*Street 1: Street 2:

*City: State: Zip:

11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when the transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

*** Signature:** [signature]

***Name:** Prefix: Mr. *First Name: Wade Middle Name:

*Last Name: Malcolm Suffix:

Title: CEO **Telephone No.:** 408-230-8135 **Date:** 02/14/2023

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DISCLOSURE OF LOBBYING ACTIVITIES

Complete this form to disclose lobbying activities pursuant to 31 U.S.C.1352

OMB Number: 4040-0013
Expiration Date: 02/28/2022

1. * Type of Federal Action:

- [ ] a. contract
- [x] b. grant
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- [ ] d. loan
- [ ] e. loan guarantee
- [ ] f. loan insurance

2. * Status of Federal Action:

- [ ] a. bid/offer/application
- [x] b. initial award
- [ ] c. post-award

3. * Report Type:

- [x] a. initial filing
- [ ] b. material change

4. Name and Address of Reporting Entity:

[ ] Prime [x] SubAwardee Tier if known:

** Name:* Open Systems International, Inc.

** Street 1:* 4101 Arrowhead Drive *Street 2:*

** City:* Medina *State:* MN: Minnesota *Zip:* 55340-9457

Congressional District, if known:

5. If Reporting Entity in No.4 is Subawardee, Enter Name and Address of Prime:

** Name:* DTE

** Street 1:* 1 Energy Plaza *Street 2:*

** City:* Detroit *State:* MI: Michigan *Zip:* 48226

Congressional District, if known:

6. * Federal Department/Agency:

Department of Energy EERE

7. * Federal Program Name/Description:

CFDA Number, *if applicable:*

8. Federal Action Number, *if known:*

9. Award Amount, *if known:*

$

10. a. Name and Address of Lobbying Registrant:

Prefix: ** First Name:* N/A *Middle Name:*

** Last Name:* *Suffix:*

** Street 1:* *Street 2:*

** City:* *State:* *Zip:*

b. Individual Performing Services (including address if different from No. 10a)

Prefix: ** First Name:* N/A *Middle Name:*

** Last Name:* *Suffix:*

** Street 1:* *Street 2:*

** City:* *State:* *Zip:*

11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when the transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

*** Signature:** Sally Jacquemin

***Name:** *Prefix:* ** First Name:* Sally *Middle Name:*

** Last Name:* Jacquemin *Suffix:*

Title: Associate VP, Distribution & Smart Grid **Telephone No.:** 763-551-0559 **Date:** 02/17/2023

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Approved by OMB
0348-0046

Disclosure of Lobbying Activities

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

1. Type of Federal Action: a. contract _b___ b. grant c. cooperative agreement d. loan e. loan guarantee f. loan insurance	**2. Status of Federal Action:** a. bid/offer/application ___b__ b. initial award c. post-award	**3. Report Type:** a. initial filing _a____ b. material change **For material change only:** Year _____ quarter _____ Date of last report_____

4. Name and Address of Reporting Entity: ____ Prime __X___ Subawardee Tier_____, if Known: **Regents of the University of Michigan** 3003 S. State Street, Ann Arbor, MI 48109-1274 **Congressional District, *if known*: MI-012**	**5. If Reporting Entity in No. 4 is Subawardee,** Enter Name and Address of Prime: **DTE Energy** **1 Energy Plz,** **Detroit, Michigan, 48226, United States** **Congressional District, *if known*:**
6. Federal Department/Agency: **Department of Energy**	**7. Federal Program Name/Description:** **BIL – Grid Resilience and Innovation Partnerships** CFDA Number, *if applicable*: _____
8. Federal Action Number, *if known:*	**9. Award Amount**, *if known:*
10. a. Name and Address of Lobbying Registrant *(if individual, last name, first name, MI):* U of M, by law, is not allowed to lobby	**b. Individuals Performing Services** *(including address if different from No. 10a)* *(last name, first name, MI):* U of M, by law, is not allowed to lobby
11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.	**Signature: _____** **Print Name: Reynaldo Martell** **Title: Project Representative** **Telephone No.: 734-647-9099** **Email: martellr@umich.edu** **Date: _____**
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STATEMENT OF PROJECT OBJECTIVES (SOPO)

Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability

A. OBJECTIVES

The proposed demonstration project is aligned with the U.S. Department of Energy's GRIP topic area 2 that seeks to deploy technology solutions that increase the flexibility, efficiency, reliability, and resilience of the electric power system. Adaptive network microgrids create a stronger power grid with (1) greater resilience to extreme weather conditions, (2) improved reliability for communities, (3) better resistance to systems-wide disturbances, (4) variable renewable energy resources integrated at the distribution levels, and (5) increased sustainability through energy efficient and renewable resources. DTE Electric and its partners have identified two project goals. The first is to test and refine the concept of Adaptive Network Microgrids (ANM) with two real-world deployments in very different environments. These applications will bring practical lessons learned to the concept and accelerate the vision to reality. The second goal is to partner with the research and development community to both share our lessons learned and gain insights from that community.

B. SCOPE OF WORK

A team comprised of DTE Electric and partner organizations will take a significant step toward developing and demonstrating first-of-their-kind microgrids with adaptative boundaries, all renewable energy sources, and energy storage equipment. These ANMs will provide solutions that will increase the flexibility, efficiency, reliability, and resilience of the electric power system. The real-world lessons learned from the proposed demonstration project at two DTE Electric locations will be assessable and replicable. The development requirements needed to achieve the objectives can be considered in the areas of Sensors and Data Analytics; Cybersecurity; Control and Protection Architecture and Methods; Engineering Due Diligence; Microgrid Deployment; and Share Lessons Learned with Research Institutions, Utilities, and Others.

C. TASKS TO BE PERFORMED

Task 1.0: Project Management and Planning

Subtask 1.1 – Project Management Plan (PMP):

Within 30 days of award, the DTE Electric will submit a Project Management Plan (PMP) to the designated Federal Project Officer (FPO). The project team will not proceed beyond Task 1.0 until the PMP has been accepted by the FPO. The PMP shall be revised and resubmitted as often as necessary, during the course of the project, to capture any major/significant changes to the planned approach, budget, key personnel, major resources, etc. DTE Electric shall manage and direct the project in accordance with the accepted PMP to meet all technical, schedule and budget objectives and requirements. DTE Electric will coordinate activities to effectively accomplish the work, and will ensure that project plans, results, and decisions are appropriately documented, and that project reporting and briefing requirements are satisfied.

Subtask 1.2: National Environmental Policy Act (NEPA) Compliance

Environmental Questionaries (NETL F 451.1-1/3) have been completed by each partner. Any changes will be reported to the DOE during progress reviews.

Subtask 1.3: Cybersecurity Plan (CSP)*

The CSP shall be revised and resubmitted as often as necessary, during the course of the project, to capture any major/significant changes.

The National Institute of Standards and Technology (NIST)'s risk management framework provides a process that integrates security, privacy, and cyber supply chain risk management activities into the system development life cycle. In this project, we propose a Minimum Cybersecurity Management Plan (MCMP) based on industrial cybersecurity standards. The proposed MCMP explains how basic cybersecurity practices will be maintained throughout the life of the proposed project. We will divide the MCMP into eight categories, (1) secure communication, (2) zoning/perimeter protection, (3) malware protection, (4) patch management, (5) backup/recovery, (6) account management, (7) security logging/monitoring and (8) product hardening. To assess and address cyber security, the work will be divided into two phases. In the first phase, threat analysis and vulnerability assessments will be conducted considering all eight of the MCMP categories. Any identified vulnerabilities will be mitigated by updating the system software/firmware (i.e., maintaining the cybersecurity life cycle). In the second phase, areas of uncertainty or cases that require complex mitigation will be simulated jointly by DTE Electric and U of M –Dearborn.

Subtask 1.4: Continuation Briefing(s):

The project team led by DTE Electric will brief the DOE on annual basis to explain the plans, progress, and results of the technical effort. The briefing shall also describe performance relative to project success criteria, milestones, and the Go/No-Go Decision points that are documented in the Project Management Plan (PMP).

Task 2.0 – Sensors and Data Analytics

Subtask 2.1 – Sensor Placement

Sensors are the primary equipment used in a microgrid to monitor the state of the system, assess load flow, and provide key inputs that are needed to properly control the microgrid. The sensing infrastructure is a vital part of maintaining a resilient microgrid and finding the optimal configuration for the current conditions and availability of the DER.

Subtask 2.2 – Real Time State Estimation

Visibility of the system state (such as voltages) at any time is a key requirement to carry out advanced control activities like the adaptative microgrid management and DER coordination. Typically, visibility is acquired through a real time state estimation procedure based on the system's readily accessible measurement data. Modern distribution systems have a challenge since the generated data streams come from various sources, like PMUs and smart meters, and come in a variety of temporal and spatial resolutions. To extract useful information to carry out real-time control activities, the data streams must be processed online using machine learning and data analytics techniques. National Renewable Energy Laboratory (NREL) and Lawrence Livermore National Laboratory (LLNL) have received DOE funding to develop this concept. DTE Electric will collaborate with both national labs to incorporate NREL and LLNL work into this project to make it useful for the adaptive networked microgrid concept. No IIJA funding will be used to support the work occurring at NREL and LLNL.

Subtask 2.3 – Device Operation Monitoring

With increasing penetration of DER utilities need to implement machine learning algorithms using smart meter and other data to identify unusual behaviors and develop plans to solve the issues before they impact customers or equipment.

Subtask 2.4 – Modern Stochastic Methods for Design and Resilience

A thorough understanding of uncertainty and variation in load are critical to the successful deployment of microgrids. The team will develop, test, and refine new methods to forecast load that incorporates this uncertainty and variation and use those methods to properly design the microgrids.

Task 3.0 - Cybersecurity

Subtask 3.1 – Cybersecurity Plan Please see subtask 1.3.

Task 4.0 – Control and Protection Architecture and Methods

Subtask 4.1 – Hybrid Control Method

Determining the specific functions that reside in key components, such as ADMS, site gateways, and grid-edge devices, will be a key area of focus for the project.

Subtask 4.2 – Adaptative Formation and Reconfigurations of Network of Microgrids

To implement this vision, this project will consider control methods for adaptative formation and operation of networked microgrids. The novelty of the approach is the microgrid boundaries are designed to be dynamically adapted during operation, as opposed to existing approaches with static microgrid boundaries.

Subtask 4.3 – Grid Forming Inverters with Intelligent Control

Grid Forming Inverters are critical grid- edge devices because a modern microgrid lacks the large rotational inertia and robust synchronization mechanism that was guaranteed by synchronous machine-based generation in the legacy grid. Grid-connected inverters, the interface between DER and the grid and provide services to the grid when called upon such as voltage response or dispatching of storage.

Subtask 4.4 – Optimal Dispatch Methods

To meet load demand, utilities can generate from owned or contracted resources, buy from the wholesale market, or dispatch storage. In addition, with Federal Energy Regulatory Commission orders 841 and 2222, DERs will have the ability to bid on the wholesale market. For utilities to maximize their cost savings, it is important to understand how battery systems can be optimally operated to reduce peak, market, and generation prices while still maintaining system reliability.

Task 5.0 – Engineering Due Diligence

Subtask 5.1 – Steady State & Dynamic System Modeling

Use cases will be developed, system configurations will be considered and understood, concerning power quality, protection and other issues will be identified through model simulations and countermeasures will be developed and tested. This will be used to validate the variety of scenarios that are anticipated to be used to deploy adaptive networked microgrids reliably.

Subtask 5.2 – Hardware in the Loop Testing

The models, use cases, and other aspects from Subtask 5.1 - Steady State & Dynamic System Modeling will be extended with hardware systems developed to test for proper responses, timing and to validate the actual control hardware, communications, and

algorithm behavior in a low energy environment. This will ensure that the controls will all work together and allow for different settings to be tested before deploying.

Subtask 5.3 – Westland Yard Testing

The work from subtasks 5.1 and 5.2 will be extended in this subtask. It will have the dual purpose of testing the hardware and control systems with physical equipment in an energized environment and determining the methods and training to do field deployments. This will allow any deployment risks to be mitigated before the technology is deployed in the target communities.

Task 6.0 – Microgrid Deployment

Subtask 6.1 – O'Shea Solar Park

O'Shea Solar Park located in Detroit is the site of a 2MW solar array connected to Chicago substation, which serves (b) (4) .

Subtask 6.1.1 – Conceptual Engineering

The lessons learned from the previous steps will be combined with actual and forecasted loads in the area to determine the exact placement of distributed energy resources, sectionalizing, and other equipment. Work orders will be written for detailed design to be completed.

Subtask 6.1.2 – Detailed Design

The work from the conceptual engineering subtask will be extended in this phase to order material and produce detailed installation instructions.

Subtask 6.1.3 – Construction

The design will be implemented in this subtask with equipment being installed.

Subtask 6.1.4 – Commissioning and Testing

The installed equipment will be checked for proper installation and testing will be completed to ensure everything is working properly individually and as system.

Subtask 6.1.5 – Monitoring Performance

After the installation is completed, the system performance will be monitored to ensure that it is working properly and providing the benefits intended.

Subtask 6.2 – Port Austin – Rural

The city of Port Austin is home to a community of (b) (4) and is in the rural thumb area of Michigan. The same steps completed for O'Shea will be completed for Port Austin

Subtask 6.2.1 – Conceptual Engineering

Subtask 6.2.2 – Detailed Design

Subtask 6.2.3 – Construction

Subtask 6.2.4 – Commissioning and Testing

Subtask 6.2.5 – Monitoring Performance

Task 7.0 – Share Learning with Research Institutions, Utilities and Others

With the objective of expanding the use of adaptive network microgrids across the industry, the partnership plans to actively share the lessons learned from the work being performed by publishing papers and after the second year of the project, the Company will work with EPRI and UofM-Dearborn to present the lessons learned and progress to industry in virtual sessions

twice per year. UofM-Dearborn will also promote educational opportunities based on the experiences with this project within its undergraduate and graduate student base.

D. DELIVERABLES

Budget Period 1

- Milestone 1.1 Project Management Plan Complete
- Milestone 1.4 Continuation Briefing Document(s)
- Milestone 6.1.2, 6.2.2 Design Start
- Milestone 2.1 Sensor Specifications Complete

Budget Period 2

- Milestone 2.2 Develop Data Collection Processes and Design Data Structure
- Milestone 6.1.3, 6.2.3 Construction Start
- Milestone 4.2 Complete Implementation of Component Specifications
- Milestone 5.2 HIL Simulations for Use Cases and Countermeasures to Concerns

Budget Period 3

- Milestone 3.2 Present Refined Cybersecurity Plan and Progress Report
- Milestone 2.3 Present Sensor and Algorithm Performance Progress
- Milestone 5.3 Complete Westland Yard Testing for Use Cases and Countermeasures to Concerns
- Milestones 6.1.4, 6.2.4 Commissioning and Testing Completed

Budget Period 4

- Milestone 4.1 Provide Report on Final Architecture
- Milestone 4.3 Present Final Component Functional Specifications
- Milestone 5.4 Present Performance Report for O'Shea and Port Austin
- Milestone 6.4 Overall Project Completion Report

E. BRIEFINGS/TECHNICAL PRESENTATIONS

DTE Electric will prepare, and present annual briefings, technical presentations and demonstrations as requested by the Federal Project Officer, which may be held at a DOE or DTE Electric's facility, other mutually agreeable location, or via webinar. Such meetings may include all or a combination of the following:

Kickoff Briefing - Not more than 30 days after submission of the Project Management Plan, DTE Electric shall prepare and present a project summary briefing as part of a Project Kickoff Meeting.

Pre-Continuation Briefing - Not less than 90 days prior to the planned start of a budget period, DTE Electric shall brief the DOE on the results to date, and their plans for the subsequent periods of work. The DOE will consider the information from this briefing, as well as the content of deliverables submitted to date, prior to authorizing continuing the project.

Final Project Briefing - Not less than 30 days prior to the end of the project, DTE Electric shall prepare and present a Final Project Briefing on the results and accomplishments of the entire project.

Other Briefings – DTE Electric shall prepare and present technical, financial, and/or administrative briefings as requested by the DOE. Additionally, the DOE may require DTE Electric to make technical presentations at national and/or industry conferences.

PROJECT SUMMARY FOR PUBLIC RELEASE FILE
DOE Funding Opportunity: DE-FOA-0002740, Topic Area 2: Smart Grid Grants (BIL section 40107)
Applicant: DTE Electric, 1 Energy Plaza, Detroit, MI, 48226
Project manager: DTE Electric, John J O'Donnell
Major participants: DTE Electric, Open Systems International; Open Energy Solutions; Electric Power Research Institute; and the University of Michigan-Dearborn; Advisors with no project funding include National Renewable Energy Laboratory and Lawrence Livermore National Laboratory
Title: Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability

The groundwork for our country's electric infrastructure was laid more than a century ago and provided energy for a much simpler lifestyle. Today, the demands on the electrical infrastructure have changed, and customers rely on electric service much more than in the past. Enter Adaptive Networked Microgrids (ANM). Unlike traditional centralized power grids, ANMs can adapt to changing energy demands and supply conditions in real-time, especially after extreme weather events. With their flexibility and ability to incorporate renewable energy and improve reliability, ANMs are a promising solution for meeting increasing electricity demand and reliance.

Project description: DTE Electric (DTEE) and its partners will complete the development, engineering and testing needed to progress ANMs from a concept to reality. The company will deploy two ANMs in Detroit and Port Austin, Michigan over the span of four years. With this project, DTEE and its partners (EPRI, OES, OSI, & UM-Dearborn) aim to use these two real-world deployments to bring practical lessons learned to the concept of ANMs and accelerate the vision to reality. The second goal is to partner with the research and development community to share our lessons learned and gain insights.

To bring ANMs to life, DTEE and its partner organizations will focus on the following: (1) Project and technical management, (2) Improved sensors and data analytics, (3) Enhanced cybersecurity plans that will protect DTEE and customer systems and information; (4) Innovative and adaptive control and protection architecture and methods; (5) A series of steps from simulation to lab testing that will lead to ANM field deployments, (6) Deploying ANMs at locations in Detroit and Port Austin; and (7) Sharing lessons learned with the industry.

Potential project impact: This project will benefit customers by creating a stronger, more reliable grid that primarily is more resilient to extreme weather conditions and system disturbances, with energy efficient and renewable energy resources built in for increased sustainability.

It is DTEE's hope that this project will lay the foundation for the grid of the future by jumpstarting the incorporation of ANMs into electric grids across the country and beyond.

EERE T 540.132 02 Budget Justification (5 BPs)

Instructions and Summary

OMB Control Number: 1910-5162
Expiration Date: 04/30/2025

Award Number: _____

Award Recipient: _____

Date of Submission: 3/17/2023

Form submitted by: EPRI (Sub to DTE)

(May be award recipient or sub-recipient)

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Do not modify this template or any cells or formulas!

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6. Ensure all entered costs are allowable, allocable, and reasonable in accordance with the administrative requirements prescribed in 2 CFR 200, and the applicable cost principles for each entity type: FAR Part 31 for For-Profit entities; and 2 CFR Part 200 Subpart E - Cost Principles for all other non-federal entities.
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8. ALL budget period cost categories are rounded to the nearest dollar.

BURDEN DISCLOSURE STATEMENT

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(b)(4)

Instructions and Summary

Award Number: _____

Award Recipient: _____

Date of Submission: 3/17/2023

Form submitted by: Open Energy Solutions, Inc. (OES)

(May be award recipient or sub-recipient)

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(b) (4)

Instructions and Summary

Award Number: _____

Award Recipient: _____

Date of Submission: 3/17/2023

Form submitted by: Open System International (OSI)

(May be award recipient or sub-recipient)

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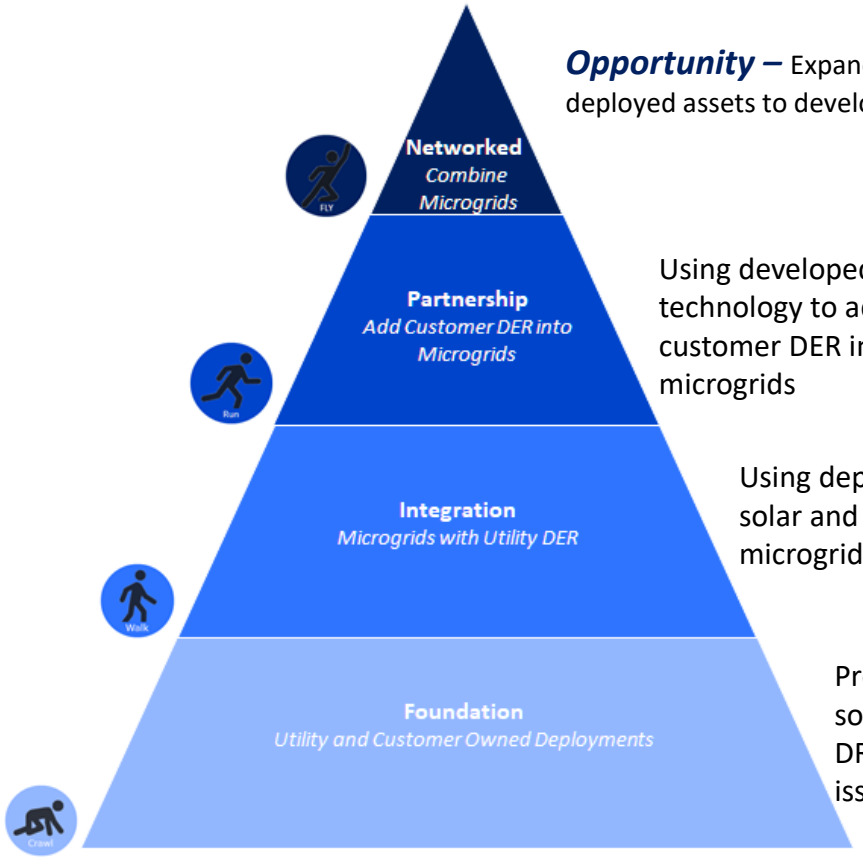
(b) (4)

Adaptive Networked Microgrids *– Technology* - DTE Electric's Non-Wires Alternatives plans provide the foundation for the development and deployment of Adaptive Networked Microgrids (ANM), and the foundation can be used to reduce the cost and time to realize that vision.

DTE Electric's NWA Growth

- Crawl, Walk, Run, Fly Approach Develops the Organizations Capabilities to Use NWA Technology
- Pilots Result in New Use Cases for Further Application and Progressively Provide More Benefits to Customers
- The DOE's support for the DynaGrid Concept can Build on this Work



Opportunity – Expand on deployed assets to develop ANMs.

Using developed technology to add customer DER into the microgrids

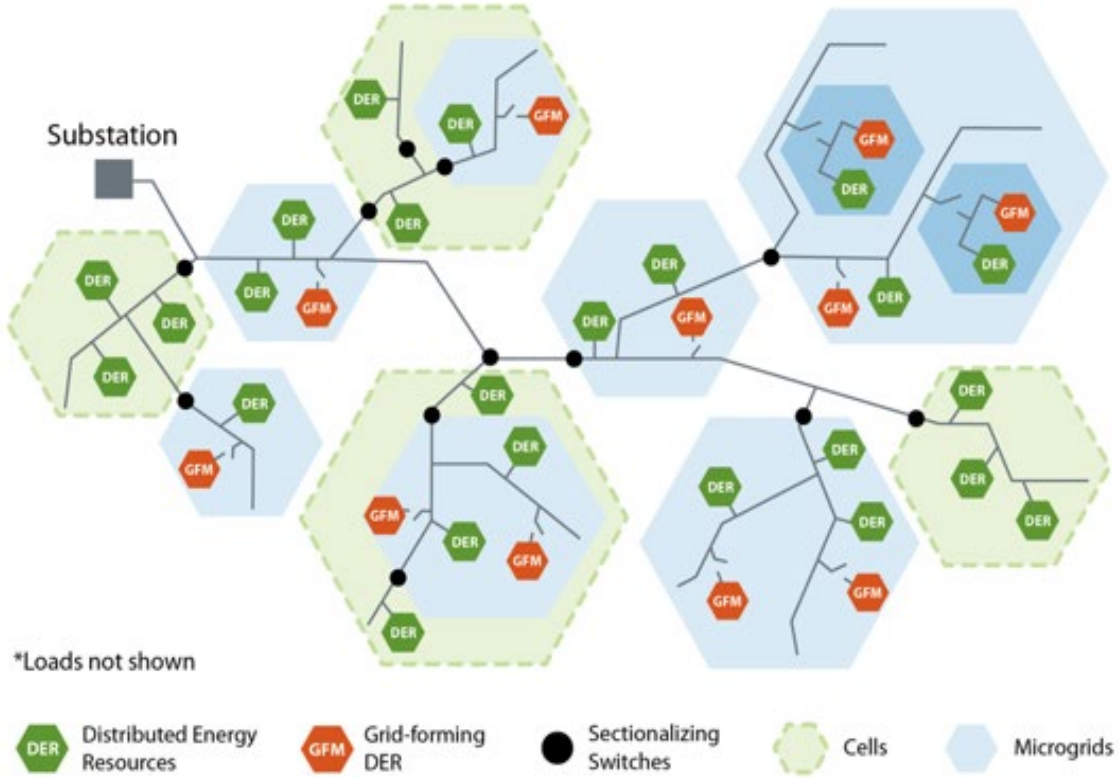
Using deployed solar and storage in microgrids

Projects deploying solar, storage, EWR and DR to relive loading issues.

Proposed Scope for GRIP40107 - Smart Grid Grant - DE-FOA-0002740

Title: Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability

- DTE Electric has been discussing the DynaGrid concept with National Renewable Energy Laboratory and Lawrence Livermore National Laboratory.
- DynaGrid is the inspiration for this project (*The National Labs will not receive any funding from this project*)
- Developing and Deploying ANMs is the Focus of this Proposal
  - Microgrid Cells with Generation and Load are the Fundamental Components
  - Boundaries Change to Optimize Generation to Meet Load after Extreme Weather Events
  - Grid Forming Devices, Sectionalizing, ADMS and Distributed Controls are Key Elements



[1]DOE OE 2021 Strategy White Papers on Microgrids: Program Vision, Objectives, and R&D Targets in 5 and 10 years–Topic Area #1

Adaptive Networked Microgrids *– Project Specifics* – Engineering due diligence and development will lead to the deployment of two ANMs in DTE Electric's service territory over a four-year period.

Scope

Development and Deployment will Occur over Seven Areas of Focus

- Project and Technical Management – Effectively manage the overall project to meet objectives on-time and within budget
- Sensors and Data Analytics – ANMs will require greater system visibility
- Cybersecurity – Greater deployment and reliance on DER will increase attack surfaces
- Control and Protection Architecture and Methods – New control methods will be required, and protection must adapt to changing boundaries
- Engineering Due Diligence – Steps from simulation to hardware testing will lead to field deployment
- Microgrid Deployment – Complete engineering, design, and construction of ANMs in Detroit and Port Austin
- Sharing Lessons Learned – The partnership led by DTE Electric sees the promise of ANMs and intends to share the lessons learned with the industry to broaden ANM development and use

Schedule

- Engineering Phase – 2024 - specifications will be developed for the individual components and overall system, software (CYME and PSCAD) simulations will be completed, and the engineering needed for the Port Austin and O'Shea deployments
- Development Phase – 2025 - The specifications developed in phase 1 will be implemented by the team in phase 2; grid-edge and ADMS software will be developed, tested, and refined; hardware-in-the-loop testing will be completed; Westland Equipment Yard testing will start; and initial drafts of standards; and testing, operating and maintenance procedures will be completed
- Deployment Phase – 2026 - After the successful completion of development work and engineering due diligence in phases 1 and 2, ANMs will be deployed in the field by establishing ANMs on two distribution circuits
- Assessment Phase – 2027 - With ANM deployments completed at Port Austin and O'Shea, the team will focus on monitoring the performance and benefits of the new technology. There will be particular focus on the energy justice benefits from ANMs

Cost

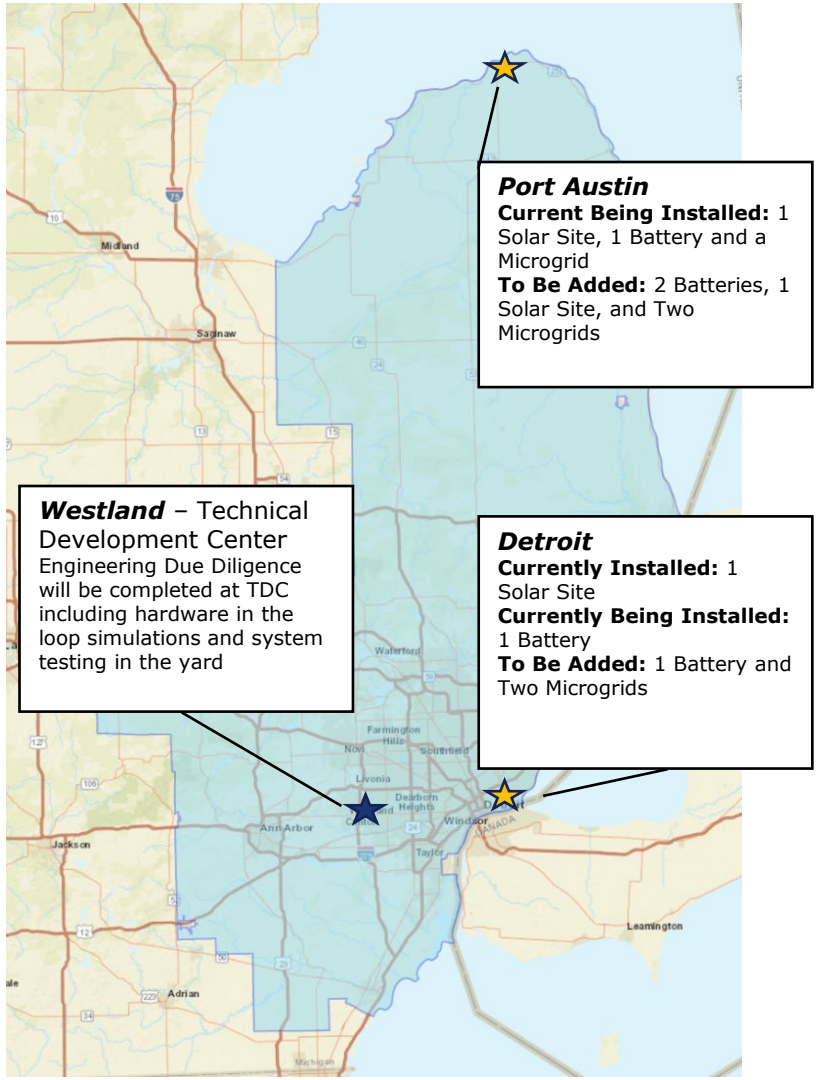
- The anticipated total cost of the project is approximately $46M, and the DOE funding to support the project is approximately $26M

Partnership

- **DTE Electric** - **Prime Recipient / Project Management** – Overall project management, engineering, design, and construction. Run software and hardware technology in-the-lab and in-the-field at DTE Electric's Westland facility for the necessary due diligence. – John O'Donnell, Smriti Sharma, Mike Cooley, Yong Li, Nelu Andrei, Joe Jacunski, and Richard Mueller
- **Electric Power Research Institute** - Viability analysis for networked microgrids, laboratory test plan development for networked microgrid controls and protection systems, flexible protection design and implementation for networked microgrids and factory and site acceptance test planning for networked microgrid controls and grid-forming inverters. - Jacqueline Baum and Ben York
- **Open Energy Solutions** - Integration of advanced microgrid logic based on DynaGrid algorithms into interoperable communication and control network between microgrid devices, zones and SCADA. - Dileep Rudran, Josh Hambrick and Sean Drexler
- **Open Systems International -** Provide ADMS support and develop applications based on DynaGrid algorithms. Sally Jacquemin, Eric Sortomme, Chiru Chelluboina, and Leland Severson
- **University of Michigan-Dearborn** - Support the development and testing of cybersecurity practices. Also, developing a series of workshops in which industrial and national lab members, faculty, and students can share technical skills, internship opportunities, and other follow-on collaboration opportunities. - Wencong Su and Junho Hong

Advisors – *No DOE Funding*

- **National Renewable Energy Laboratory** – Provide DynaGrid Algorithms and advise on implementation. – Andrey Bernstein
- **Lawrence Livermore National Laboratory** - Advise on system modeling for Engineering Due Diligence. – Vaibhav Donde



Project Locations include Detroit, Port Austin and Westland

Adaptive Networked Microgrids – *Goals and Benefits* – The goal of the project is to develop and demonstrate ANMs to realize the benefits for customers and increase the deployment of the technology. The project has been developed to closely align with the priorities for Topic Area 2.

Goals

- Complete the needed development to realize the benefits of ANMs
- Complete the engineering due diligence to support the deployment of the new technology
- Deploy ANMs to demonstrate the benefits of the technology for the industry to observe
- Share lessons learned with the industry to grow the concept and deployment of ANMs

Alignment with Topic Area 2

Priority Investments in Topic Area 2	Project Benefits Alignment
Increasing transmission capacity and operational transfer capacity through grid enhancing technologies such as dynamic line rating, flow control devices, advanced conductors, and network topology optimization, to improve system efficiency and reliability.	Adaptive protection is required for dynamic microgrids and will be a key area for development and deployment. Also, Company's newly deployed ADMS will be featured to provide this functionality
Improving the visibility of the electrical system to grid operators, to help quickly rebalance the electrical system with autonomous controls, through data analytics, software, and sensors.	New sensors will be deployed, and they will be leveraged with new algorithms to optimize continued service to customers. This included innovative new fault locating that will be beneficial on the 4.8kV system.
Enhance secure communication and data flow between distribution components, through investments in optical ground wire, dark fiber, operational fiber, and wireless broadband communications networks.	Communication technologies will be deployed and tested to interface the new equipment together with a focus on cybersecurity deployments.
Aggregation and integration of distributed energy resources and other “grid-edge” devices to provide system benefits, such as renewable energy resources, electric vehicle charging infrastructure, vehicle-to-grid technologies and capabilities, and smart building technologies.	The project will use all renewable resources, and these devices and sectionalizing will interface with customer DER and other grid devices to best sectionalize faults and optimize boundaries to serve customers to enhance customer reliability after an extreme weather event.
Enhancing interoperability and data architecture of systems that support two-way flow of both electric power and localized analytics to provide information between electricity system operators and consumers.	New stochastic planning methods will be developed as part of this effort to better understand two-way power flow. DER anomaly detection will also be developed and deployed to prevent damage that could result from equipment operating incorrectly.
Anticipate and mitigate the impacts of extreme weather or natural disaster on grid resiliency, including investments to increase the ability to redirect or shut of power to minimize blackouts, prevent wildfires, and avoid further damage.	The pilot will be completed on 4.8kV circuits that will have Viper reclosers at the beginning of the circuit. The networked microgrids will work in collaboration with this equipment to isolate the fault and continue to serve customers if they cannot be served from the substation.

DTE

Instructions and Summary

Award Number: _____

Award Recipient: _____

Date of Submission: 3/17/2023

Form submitted by: University of Michigan-Dearborn

(May be award recipient or sub-recipient)

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(b) (4)

OMB Number: 4040-0010
Expiration Date: 11/30/2025

Project/Performance Site Location(s)

Project/Performance Site Primary Location

☐ I am submitting an application as an individual, and not on behalf of a company, state, local or tr bal government, academia, or other type of organization.

Organization Name: DTE Electric

UEI:

* Street1: 1 Energy PLZ

Street2:

* City: Detroit

County:

* State: MI: Michigan

Province:

* Country: USA: UNITED STATES

* ZIP / Postal Code: 48226-1221

* Project/ Performance Site Congressional District: MI-013

Project/Performance Site Location 1

☐ I am submitting an application as an individual, and not on behalf of a company, state, local or tr bal government, academia, or other type of organization.

Organization Name: DTE Electric - Chicago (b) (4)

UEI:

* Street1: (b) (4)

Street2:

* City: Detroit

County:

* State: MI: Michigan

Province:

* Country: USA: UNITED STATES

* ZIP / Postal Code: 48228-2345

* Project/ Performance Site Congressional District: MI-012

Project/Performance Site Location 2

☐ I am submitting an application as an individual, and not on behalf of a company, state, local or tr bal government, academia, or other type of organization.

Organization Name: DTE Electric - Port Austin (b) (4)

UEI:

* Street1: (b) (4)

Street2:

* City: Port Austin

County:

* State: MI: Michigan

Province:

* Country: USA: UNITED STATES

* ZIP / Postal Code: 48467-9266

* Project/ Performance Site Congressional District: MI-009

Project/Performance Site Location(s)

Project/Performance Site Location 3

☐ I am submitting an application as an individual, and not on behalf of a company, state, local or tr bal government, academia, or other type of organization.

Organization Name: DTE Electric - Training and Development Center

UEI:

* Street1: (b) (4)

Street2:

* City: Westland County:

* State: MI: Michigan

Province:

* Country: USA: UNITED STATES

* ZIP / Postal Code: 48186-3267 * Project/ Performance Site Congressional District: MI-012

Project/Performance Site Location 4

☐ I am submitting an application as an individual, and not on behalf of a company, state, local or tr bal government, academia, or other type of organization.

Organization Name: University of Michigan-Dearborn

UEI:

* Street1: 4901 Evergreen Road

Street2:

* City: Dearborn County:

* State: MI: Michigan

Province:

* Country: USA: UNITED STATES

* ZIP / Postal Code: 48128-2406 * Project/ Performance Site Congressional District: MI-012

Project/Performance Site Location 5

☐ I am submitting an application as an individual, and not on behalf of a company, state, local or tr bal government, academia, or other type of organization.

Organization Name: Electric Power and Research Institute

UEI:

* Street1: 3420 Hillview Avenue

Street2:

* City: Palo Alto County:

* State: CA: California

Province:

* Country: USA: UNITED STATES

* ZIP / Postal Code: 94304-1382 * Project/ Performance Site Congressional District: CA-016

Project/Performance Site Location(s)

Project/Performance Site Location 6

☐ I am submitting an application as an individual, and not on behalf of a company, state, local or tr bal government, academia, or other type of organization.

Organization Name: Electric Power and Research Institute

UEI:

* Street1: 1300 West WT Harris Boulevard

Street2:

* City: Charlotte County:

* State: NC: North Carolina

Province:

* Country: USA: UNITED STATES

* ZIP / Postal Code: 28262-8550 * Project/ Performance Site Congressional District: NC-012

Project/Performance Site Location 7

☐ I am submitting an application as an individual, and not on behalf of a company, state, local or tr bal government, academia, or other type of organization.

Organization Name: Electric Power and Research Institute

UEI:

* Street1: 942 Corridor Park Blvd

Street2:

* City: Knoxville County:

* State: TN: Tennessee

Province:

* Country: USA: UNITED STATES

* ZIP / Postal Code: 37932-3723 * Project/ Performance Site Congressional District: TN-002

Project/Performance Site Location 8

☐ I am submitting an application as an individual, and not on behalf of a company, state, local or tr bal government, academia, or other type of organization.

Organization Name: Electric Power and Research Institute

UEI:

* Street1: 201 East John Carpenter Freeway

Street2: Ste 800

* City: Irving County:

* State: TX: Texas

Province:

* Country: USA: UNITED STATES

* ZIP / Postal Code: 75062-2877 * Project/ Performance Site Congressional District: TX-006

Project/Performance Site Location(s)

Project/Performance Site Location 9

☐ I am submitting an application as an individual, and not on behalf of a company, state, local or tr bal government, academia, or other type of organization.

Organization Name: Open Energy Solutions

UEI:

* Street1: 5201 Great America Pkwy

Street2: Suite 320

* City: Santa Clara County:

* State: CA: California

Province:

* Country: USA: UNITED STATES

* ZIP / Postal Code: 95054-1120 * Project/ Performance Site Congressional District: CA-017

Project/Performance Site Location 10

☐ I am submitting an application as an individual, and not on behalf of a company, state, local or tr bal government, academia, or other type of organization.

Organization Name: Open System International

UEI:

* Street1: 4101 Arrowhead Drive

Street2:

* City: Medina County:

* State: MN: Minnesota

Province:

* Country: USA: UNITED STATES

* ZIP / Postal Code: 55340-9457 * Project/ Performance Site Congressional District: MN-003

Additional Location(s) Add Attachment Delete Attachment View Attachment

OMB Number: 4040-0004
Expiration Date: 11/30/2025

Application for Federal Assistance SF-424

* 1. Type of Submission:
- [ ] Preapplication
- [x] Application
- [ ] Changed/Corrected Application

* 2. Type of Application:
- [x] New
- [ ] Continuation
- [ ] Revision

* If Revision, select appropriate letter(s):

* Other (Specify):

* 3. Date Received: 03/16/2023

4. Applicant Identifier: TA2-134-E

5a. Federal Entity Identifier: TA2-134-E

5b. Federal Award Identifier:

State Use Only:

6. Date Received by State:

7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name: DTE ELECTRIC COMPANY

* b. Employer/Taxpayer Identification Number (EIN/TIN): 38-0478650

* c. UEI: HECMEKSW7YR9

d. Address:

* Street1: 1 Energy PLZ
Street2:
* City: Detroit
County/Parish:
* State: MI: Michigan
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 48226-1221

e. Organizational Unit:

Department Name: Distribution Operations

Division Name:

f. Name and contact information of person to be contacted on matters involving this application:

Prefix:
* First Name: Josh
Middle Name:
* Last Name: Kirk
Suffix:

Title:

Organizational Affiliation: DTE Electric

* Telephone Number: 7346491352
Fax Number:

* Email: josh.kirk@dteenergy.com

Application for Federal Assistance SF-424

*** 9. Type of Applicant 1: Select Applicant Type:**

Q: For-Profit Organization (Other than Small Business)

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

National Energy Technology Laboratory

11. Catalog of Federal Domestic Assistance Number:

81.254

CFDA Title:

Grid Infrastructure Deployment and Resilience

*** 12. Funding Opportunity Number:**

DE-FOA-0002740

* Title:

BIL Grid Resilience and Innovation Partnerships (GRIP)

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

1254-FOA_2740_TA2-134-E_Areas.txt | Add Attachment | Delete Attachment | View Attachment

*** 15. Descriptive Title of Applicant's Project:**

Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability

Attach supporting documents as specified in agency instructions.

Add Attachments | Delete Attachments | View Attachments

Application for Federal Assistance SF-424

16. Congressional Districts Of:

* a. Applicant: MI-013 * b. Program/Project: MI-012

Attach an additional list of Program/Project Congressional Districts if needed.

1255-FOA2740_TA2-134-E_DTE_MI-009_Port Aus | Add Attachment | Delete Attachment | View Attachment

17. Proposed Project:

* a. Start Date: 01/01/2024 * b. End Date: 01/01/2027

18. Estimated Funding ($):

* a. Federal	(b) (4)
* b. Applicant	(b) (4)
* c. State	0.00
* d. Local	0.00
* e. Other	(b) (4)
* f. Program Income	0.00
* g. TOTAL	(b) (4)

*** 19. Is Application Subject to Review By State Under Executive Order 12372 Process?**

☐ a. This application was made available to the State under the Executive Order 12372 Process for review on .

☐ b. Program is subject to E.O. 12372 but has not been selected by the State for review.

☒ c. Program is not covered by E.O. 12372.

*** 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)**

☐ Yes ☒ No

If "Yes", provide explanation and attach

Add Attachment | Delete Attachment | View Attachment

21. *By signing this application, I certify (1) to the statements contained in the list of certifications and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 18, Section 1001)**

☒ ** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: * First Name: Josh

Middle Name:

* Last Name: Kirk

Suffix:

* Title: Senior Strategist

* Telephone Number: 7346491352 Fax Number:

* Email: josh.kirk@dteenergy.com

* Signature of Authorized Representative: Josh A Kirk * Date Signed: 03/16/2023

BUDGET INFORMATION - Non-Construction Programs

OMB Number: 4040-0006
Expiration Date: 02/28/2025

SECTION A - BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. DE-FOA-0002740	81.254	$	$	$ (b) (4)	$ [redacted]	$ [redacted]
2. DE-FOA-0002740	81.254			[redacted]	[redacted]	[redacted]
3. DE-FOA-0002740	81.254			[redacted]	[redacted]	[redacted]
4. DE-FOA-0002740	81.254			[redacted]	[redacted]	[redacted]
5. Totals		$	$	$ [redacted]	$ [redacted]	$ [redacted]

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SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY (1) DE-FOA-0002740	(2) DE-FOA-0002740	(3) (b) (4)	(4)	Total (5)
a. Personnel	(b) (4)			$	$
b. Fringe Benefits					
c. Travel					
d. Equipment					
e. Supplies					
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges (sum of 6a-6h)					$
j. Indirect Charges					$
k. TOTALS (sum of 6i and 6j)	$	$	$	$	$
7. Program Income	$	$	$	$	$

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SECTION C - NON-FEDERAL RESOURCES

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e)TOTALS
8. DE-FOA-0002740	$ (b) (4)	$	$	$
9. DE-FOA-0002740				
10. DE-FOA-0002740				
11. DE-FOA-0002740				
12. TOTAL (sum of lines 8-11)	$	$	$	$

SECTION D - FORECASTED CASH NEEDS

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$ (b) (4)		$	$	$
14. Non-Federal	$				
15. TOTAL (sum of lines 13 and 14)	$	$	$	$	$

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT

(a) Grant Program	FUTURE FUNDING PERIODS (YEARS) (b)First	(c) Second	(d) Third	(e) Fourth
16. DE-FOA-0002740	$ (b) (4)	$	$	$
17. DE-FOA-0002740				
18. DE-FOA-0002740				
19. DE-FOA-0002740				
20. TOTAL (sum of lines 16 - 19)	$			$

SECTION F - OTHER BUDGET INFORMATION

21. Direct Charges:

22. Indirect Charges:

23. Remarks:

Project Title: Deploying Adaptive Networked Microgrids to Improve Grid Flexibility and Reliability
Topic Area 2: 40107 - Smart Grid Grants
U.S. Department of Energy (DOE)
Grid Deployment Office (GDO)
Office of Clean Energy Demonstrations (OCED)

BIL– Grid Resilience and Innovation Partnerships (GRIP)
Funding Opportunity Announcement DE- FOA-0002827
Assistance Listing Number: 81.254
March 17, 2023

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Business Point of Contact:
DTE Electric
Josh Kirk
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Team Members/Key Personnel:
DTE Electric – John O'Donnell, Smriti Sharma, Mike Cooley, Yong Li, Nelu Andrei, Joe Jacunski, and Richard Mueller

Electric Power and Research Institute – Jacqueline Baum and Ben York

Open Energy Solutions – Dileep Rudran, Josh Hambrick, and Sean Drexler

Open System International – Sally Jacquemin, Eric Sortomme, Chiru Chelluboina, and Leland Severson

University of Michigan-Dearborn – Wencong Su and Junho Hong

Primary Project Locations:
Detroit, Michigan
Port Austin, Michigan
Westland, Michigan

Confidentiality:
Contains Confidential, Proprietary, or Privileged Information Exempt from Public Disclosure

1. Project Overview

This section provides background on the overall project as well as information on the project goals, the impact of DOE funding, and a summary of the Community Benefits Plan.

1.1. Background

A great deal has changed since the development of our country's electric infrastructure began more than a century ago. Customers increasingly depend on reliable and resilient electricity for their needs at home and work, and clean energy goals are driving a move to electrification, including vehicles. A growing number of customers are now generating and storing their own energy through Distributed Energy Resources (DER), predominantly rooftop solar and energy storage. DERs have the potential to support the overall resilience of the grid, but only if the grid is modernized to integrate the resources safely and reliably.

Detroit Edison developed the electric grid supporting Detroit over 100 years ago. Today, its successor company, DTE Electric (DTEE), is modernizing that infrastructure to build the grid of the future. Modernizing the grid includes upgrades to traditional infrastructure while deploying the new modern technology that will be required to meet 21st century demands

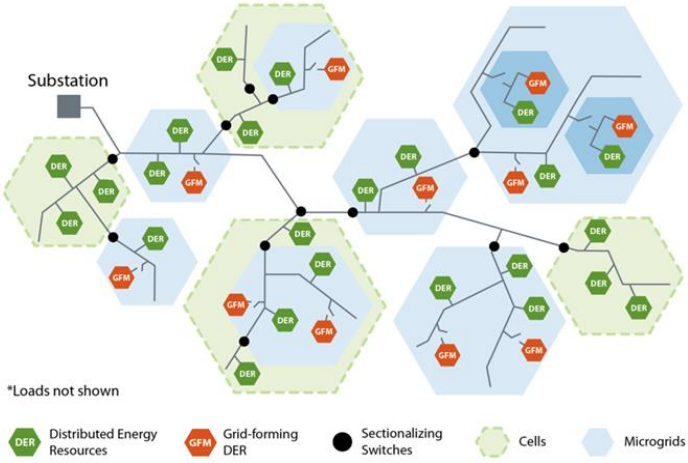

Figure 1: Adaptive Networked Microgrids Vision

DTEE's new technology focus includes a series of all renewable Non-Wires Alternative (NWA) projects that are designed to expand NWA use. One technology that shows promise in optimizing DERs and is consistent with the company's NWA model is Adaptive Networked Microgrids (ANMs). Building on the base technologies of NWAs and microgrids as a resiliency solution, ANMs refer to a decentralized system of interconnected microgrids that work together to provide electricity to a community, as illustrated in Figure 1. ANMs were inspired by the National Laboratories work on DynaGrid[1]. In this framework, a part of the grid is partitioned into multiple areas, or cells, essentially forming a network of microgrids. When the grid is operating under normal conditions, the individual microgrids are interconnected. When the grid is disrupted, as happens after an extreme weather event, some of the cells contain grid-forming resources that allow them to operate autonomously, disconnected from the grid.

To move the ANM technology from a promising concept to a practical reality, DTEE, Electric Power Research Institute (EPRI), Open Energy Solutions (OES), Open Systems International (OSI), and the University of Michigan-Dearborn (UM-Dearborn) along with advisors at National Renewable Energy Laboratory (NREL) and Lawrence Livermore National Laboratory

[1] A. Bernstein et al, "DynaGrid: Dynamic Microgrids for Large-Scale DER Integration and Electrification". The National Laboratories work on DynaGrid has been funded by DOE Office of Electricity Microgrid program.

(LLNL)[2] have formed the Adaptive Networked Microgrid Partnership (ANMP) and are proposing the project described in this document. This partnership has the experience, background, and infrastructure to move ANMs forward as key part of the grid of the future, and the ANMP is proposing to deploy two real world ANMs for that purpose.

1.2. Project Goal

The goal for this ANM project is to complete and share the development, engineering due diligence, and deployments to drive toward a vision of the future electrical distribution system that includes ANMs as a fundamental element to improve customer reliability. Specifically, the changing nature of ANM's boundaries requires increased visibility and situational awareness. Sensor technology can be deployed strategically at key grid points to provide this visibility, and machine learning and data analytic techniques can be used to collect the data and analyze it to keep track of system stability and propose optimal configurations. Controls and protection architectures need to be determined for ANMs, and individual components must be developed to fit that architecture. Maintaining cybersecurity with the increased attack surface that results from more nodes on the system is also critical. The project envisions a future where both DTEE resources and customer owned DERs will provide electricity to the microgrids. Including customer owned DER will need to be studied to ensure safe operation and integration in the new grid environment, and if found to provide additional value with additional controls, new or revised tariffs may be required.

1.3. DOE Impact

Regulated electric utilities often face challenges in garnering the support needed from their state regulatory agencies to fund innovative deployment projects. Stakeholders demand clear cost benefit analysis to shield customers from new technologies that have not yet been proven viable. To bring innovative solutions to the growing need for a more resilient grid, DOE assistance and financing are essential. This support will accelerate development and expand the use of ANMs, which can create a more reliable grid and enable the transition to clean energy. Specifically, DOE funding of this project will support:

- engineering, designing, and constructing two real-world ANMs
- the equipment needed to complete the engineering due diligence and field deployments
- implementing local control algorithms and protection methods for resilience and coordination between microgrids
- creating new sensor, data analytic and cybersecurity approaches to support the increased deployment of ANMs and DER, as well as electrification
- executing collaborative autonomy in a layered architecture between the grid-edge and ADMS

[2] **The National Laboratories will not receive any funding from this project. They will serve as advisors without funding from this project.**

1.4. Community Benefits Plan

A cross-functional and collaborative team of nearly a dozen teams at DTEE created a Community Benefits Plan (CBP) that brings benefits to the local communities where the ANMs will be deployed. The community and labor engagement described in the plan demonstrates DTEE's past outreach and impact to communities during the COVID-19 pandemic and establishing a tree trim academy as a foundation for the microgrid outreach plan. Second, in the CBP, DTEE describes employee benefits, collaboration with unions, and plans to build the talent pipeline. Third, DTEE details its journey in DEIA and focus on supporting local suppliers since 2010. Lastly, the CBP includes an environment assessment for each microgrid location, the flow of benefits, and the mitigation of negative impacts. Refer to the CBP for more detail.

1.4.1. Benefits Across Disadvantaged Communities

In total, there are eleven counties in Southeast Michigan. According to the US DOE Disadvantaged Communities (DACs) Reporter tool, ten of these counties have disadvantaged communities with the most significant number in Wayne County, which includes the city of Detroit. The cumulative impacts experienced by Southeast Michigan disadvantaged communities result in poor economic, environmental, social, and health indicators. Of the two planned areas for construction of the microgrids, one of them (the O'Shea Solar Park project) is located directly within a disadvantaged community.

The two locations for the ANM deployments (Detroit and Port Austin) suffer from top decile outage rates, which affects lower income and disadvantaged communities in a more negative manner than areas of higher incomes. With the execution of the proposed projects, there will be improvement in the regional and local resilience by reducing outages and increasing sustainability through energy efficiency and renewable resources. Additionally, solar capacity and battery storage will be installed at both locations, to alleviate the existing over-capacity issues on the existing circuits. Furthermore, the DynaGrid algorithms support energy justice factors by considering the loss of load in its decisions.

In terms of constraints to community's access to natural resources, with the implementation of ANMs DTEE does not foresee this project prohibiting any access to natural resources for the surrounding community members.

1.5. Climate resilience strategy

DTEE's grid, like the rest of the U.S., has had reliability impacts from more frequent and severe storms, including high winds, extreme heat and cold, and flooding. The company has increased investments in traditional approaches to resiliency including hardening through inspections and replacements of equipment, and technology that enhances grid visibility and control. ANMs will add an additional innovative technical solution that will allow a local community to retain power even in the event of a grid disruption caused by a storm or other event.

2. Technical Description

This section contains the relevance and outcome of the proposed project, along with the feasibility of field deployment of ANMs.

2.1. Relevance and Outcomes

The development and deployment of ANMs supports GRIP Topic Area 2, which targets the implementation of technological solutions that improve the flexibility, efficiency, reliability, and resilience of the electric power system. ANMs create a stronger power grid with (1) greater resilience to extreme weather conditions, (2) improved reliability for communities, (3) better resistance to system-wide disturbances, (4) variable renewable energy resources integrated at the distribution levels, and (5) increased sustainability through energy efficient and renewable resources. To implement the ANMs, sensor technology must be strategically placed at important grid locations, and controls and protection for safe, efficient, and reliable operation of the microgrid must be developed. Cybersecurity technology will be enhanced to prevent cyberattacks. Machine learning and data analytics techniques can then be used to collect the data, analyze it, and suggest the best configurations.

2.1.1. Project Impact on Problem Being Addressed

The project will develop the technology and complete the engineering due diligence to allow all renewable ANMs to support grid resiliency. Table 2 elaborates on the project's impact.

Problems addressed in Topic Area 2	**Project Impact**
Increasing transmission capacity and operational transfer capacity through grid enhancing technologies such as dynamic line rating, flow control devices, advanced conductors, and network topology optimization, to improve system efficiency and reliability	ANMs will modify the topology of the electrical system to optimize customer benefits. This will increase the ability for microgrids to be deployed in complex and varying situations and enable more communities to benefit from resiliency and increased DER penetration.
Improving the visibility of the electrical system to grid operators, to help quickly rebalance the electrical system with autonomous controls, through data analytics, software, and sensors	New sensors will be deployed to increase grid visibility. Advanced sectionalizing devices with remote operation will be leveraged with new algorithms to provide optimized non-interrupted service to customers.
Enhance secure communication and data flow between distribution components, through investments in optical ground wire, dark fiber, operational fiber, and wireless broadband communications networks	Communication technologies will be deployed and tested to interface the new equipment together with a focus on cybersecurity deployments, reducing the risk that grid infrastructure may be compromised.
Aggregation and integration of distributed energy resources and other "grid-edge" devices to provide system benefits, such as renewable energy resources, electric vehicle charging infrastructure, vehicle-to-grid technologies and capabilities, and smart building technologies	The project will use renewable resources (solar and storage), sectionalizing, customer DER, and other grid devices to isolate faults and adapt microgrid boundaries to best serve customers after extreme weather events and demonstrate the ability to integrate clean sources of energy in more areas.
Enhancing interoperability and data architecture of systems that support two-way flow of both electric power and localized analytics to provide information between electricity system operators and consumers	New stochastic planning methods will be developed as part of this effort to better understand two-way power flow. This will allow more DER integration of clean resources. DER anomaly detection will also be developed and deployed to prevent damage that could result from equipment operating incorrectly.

Table 1: Project Impact on FOA Objectives

Problems addressed in Topic Area 2	Project Impact
Anticipate and mitigate the impacts of extreme weather or natural disaster on grid resiliency, including investments to increase the ability to redirect or shut of power to minimize blackouts, prevent wildfires, and avoid further damage	ANMs will be deployed on 4.8kV ungrounded delta circuits to isolate faults and continue to serve customers if they cannot be served from the substation. This older infrastructure will drive unique learnings that will be shared as part of the project plan. Down wires will be more quickly isolated and located as a result.

Table 2: Project Impact on FOA Objectives continued

2.2. Feasibility

DTEE has completed or is in progress of completing projects that implement NWA technology and help support the development of ANMs. With the development and engineering due diligence work to be completed as part of this project, and the pilots being completed to implement new technology (section 2.2.1); the team can achieve the anticipated improvements in modernizing the grid and support the growing reliability needs. The National Laboratories work on DynaGrid and the strong ANMP partnership increases the confidence of achieving the goals of the project as well.

2.2.1. Technical Feasibility, Previous Work, and Prior Results

DTEE has been developing the use of all renewable NWA solutions for several years to benefit its customers. Given the technical growth required, the Company has adopted a "Crawl, Walk, Run, Fly" development approach to grow technical sophistication and increase customer benefits. DTEE partnered with EPRI[3] to complete simulations on each of the layers to identify concerns prior to field deployment. This approach is illustrated in Figure 2.

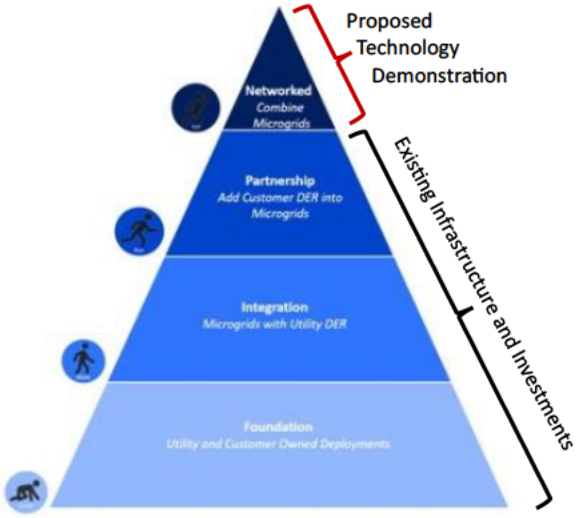

Figure 2: DTE Electric's Non-Wires Alternatives Development Model

Existing Infrastructure and Investments:

At the Foundational Level, DTEE is completing several projects including: the O'Shea Solar Park project with 2MW Photovoltaic System (PV) and 1MW/1MWh Battery Energy Storage System (BESS); the Omega Substation project includes two mobile batteries and the associated controls to support load growth; and the Port Austin project with 500kW PV and 1MW/4MWh BESS.

At the Integration Level, resources are being deployed in Port Austin to serve approximately (b) (4) in the event an extreme weather event leads to the loss of the circuit or substation.

[3] DTE Electric Non-Wires Alternatives Roadmap. EPRI, Palo Alto, CA: 2022. 3002025001. https://www.epri.com/research/products/000000003002025001
Non-Wires Alternative Evaluations: Assessments of DER Capabilities and Impacts – Phase I. EPRI, Palo Alto, CA: 2022. 3002025449. https://www.epri.com/research/products/000000003002025449
Non-Wires Alternative Evaluations: Assessments of DER Capabilities and Impacts – Phase II. EPRI, Palo Alto, CA: 2023 (forthcoming).

At the Partnership Level, DTEE is working with a developer of a net-zero community. A high penetration of solar, storage and Electric Vehicle (EV) charging is expected as part of this development. In this case, DTEE will leverage its deployed resources and customer resources to both reduce the cost of construction needed to serve the customers and to form a microgrid in the event of extreme weather leading to the loss of the circuit or substation.

Proposed Technology Demonstration at the Networked Level:
The work previously completed will be leveraged to execute the project being proposed, which will include the development of two sets of ANMs to optimize the amount of time all renewable sources can be used to serve customers if an extreme weather event leads to the loss of circuits or substations.

2.2.2. Infrastructure and Skilled Workforce to Support the Project

DTEE owns and operates a facility in Westland, Michigan to test new technologies, develop training material, produce operating and maintenance procedures, and create standards. The Westland facility includes a Hardware In the Loop (HIL) testing platform and a yard with energized distribution circuits. The infrastructure is not serving any actual load (no customers connected), and it includes a large variety of electrical system equipment. This environment allows DTEE to investigate protection, power quality, and other concerns and develop installation methods and standards in a controlled environment. This Westland facility will provide the needed infrastructure to complete the engineering due diligence for the proposed project. Concurrent with the needed engineering due diligence, development work is needed before real-world ANM deployment can be completed. The Westland facility will be key to completing the needed development testing as well. This coupled with the deployments already occurring at O'Shea and Port Austin will provide the key assets to move ANMs forward. To implement ANMs, DTEE is closely collaborating with a combination of expert partners to access the necessary skilled workforce. Please see section 4 for more information.

2.3. Innovation and Impact

Microgrids currently make up a very small portion of electricity generation throughout the US, but with increasing deployment of DER, microgrids present an important opportunity to improve reliability. To realize that potential, the ANMP has the combination of research, development, and utility engineering experience needed to move ANMs forward.

Controls: Coordinating ANMs requires consideration for all the states in which they may operate including normal operation, grid-independent operation, and multi-microgrid control. Each has its unique challenges with specific logic to be developed and tested. This is further complicated by the need to coordinate equipment developed by different vendors and incorporate customer deployed resources.

Protection: The electrical system has devices in place to prevent equipment damage as the result of extreme weather events. Changing electrical system boundaries and new uncertain sources will require new dynamic or more complex protection methods to be developed and tested.

Communications, Sensors and Cybersecurity: The newly developed controls and protection methods will be reliant on additional sensors to provide the needed visibility into the electrical

system. This increases both the number of communication end points on the electrical system and also the importance and range of the communication system. This will create a broader attack surface that, if not effectively addressed, could lead to vulnerabilities in a fundamental building block of the future electrical system.

Tools and Data Analytics: The electrical system is currently designed with tools that assess load flow, system capabilities, protection needs, and other key attributes. ANMs bring changing boundaries and load that is isolated with variable sources to the system. This will dramatically increase the complexity of the planning activity. New methods and tools are needed to address this complexity. Typically, deterministic methods have been used, but the new vision requires stochastic approaches and mindsets.

Regulatory: In a future where customer owned DERs may be part of ANMs, DTEE may need to study the value the DER is providing to that ANM or the broader grid. Any new DERs must be studied for their impact on the distribution system through the interconnection process, and this analysis will need to be extended to the new dynamic ANM context. As ANM creates a dynamic boundary and changes operational scenarios, customer owned DER will need to be studied to ensure safety and integration in the new grid environment. Additionally, control of the customer owned DER may be needed in an ANM. If there is additional value beyond DTEE's current or proposed tariffs, DTEE will explore appropriate changes through a contested rate case governed by the Michigan Public Service Commission.

As stated earlier, the goal for the project is to complete and share the development, engineering due diligence, and deployments to drive toward a vision of the future electrical distribution system that includes ANMs as a fundamental element to improve customer reliability.

2.4. Support Decarbonization Goals

The proposed project is aligned with the State of Michigan's MI Healthy Climate Plan and the City of Detroit's Climate Strategy.

2.4.1. MI Healthy Climate Plan

In 2020, Michigan Governor Gretchen Whitmer signed Executive Directive 2020-10[4] committing Michigan to the goal of achieving economy-wide carbon neutrality no later than 2050. The proposed project lays out a broad vision for fulfilling the governor's commitment for Michigan, and states "Across all sectors, Michigan should use every tool and chase every dollar available, including Infrastructure Investment and Jobs Act funds, to help meet the climate goals". The proposed project aligns with two of the MI Healthy Climate Plan goals.

2.4.1.1. Commit to Environmental Justice and Pursue a Just Transition

The MI Healthy Climate Plan has a focus on climate-related initiatives that benefit Michigan's impacted communities The O'Shea ANMs project area in Detroit is 100% designated with a DAC (disadvantaged community) status of Disadvantaged, with an average national ranking of 89%

[4] Executive Directive 2020-10: Executive Directive 2020 - 10 (michigan.gov), available at: https://www.michigan.gov/whitmer/news/state-orders-and-directives/2020/09/23/executive-directive-2020-10 accessed November 16, 2022

and a DAC score of 21.[5] Port Austin has a DAC status of Not Disadvantaged, however, the county's outage duration from 2017-2020 is 89th percentile nationally. By adding battery storage, solar, and sectionalizing, this rural community is expected to experience fewer outages.

2.4.1.2. Clean the Electric Grid

The Clean Electric Grid seeks to generate 60 percent of the state's electricity from renewable resources. The proposed projects will install additional energy storage to capture the energy from O'Shea's 7,000 solar panels and will install new renewable assets in Port Austin. The Port Austin microgrids will provide a clean, local, and cost-effective way to solve the capacity constraint in Port Austin.

2.4.2. Detroit Climate Strategy

The Detroit Climate Strategy connects climate action to the needs of Detroiters and has areas of focus that on utility affordability, improving air quality and transportation options, and ensuring the community is prepared for extreme weather. The O'Shea microgrids are aligned with the Detroit Climate Strategy[6]. By adding storage and sectionalizing to existing solar at O'Shea, the grid will be able to respond at times of extreme heat or cold and isolate to continue to serve customers.

2.5. Project Risk Mitigation

Major risks for the project have been identified and mitigation strategies have been developed as shown in Table 3.

Risks	Mitigation Strategy
Global supply chain issues, causing material delays	Identify all major material and lead times early. Engage DTEE's supply chain team to start the procurement process in Q3 2024 to avoid delays.
New technology implementation can cause unexpected response from the existing system and effect reliability, power quality and equipment life	Complete engineering due diligence steps including steady state and dynamic modeling, controlled lab environment testing, and controlled field deployments will identify potential concerns early to address them before they impact customers or damage equipment.
The communication network is critical for data and control	Design with a failsafe mentality that will maintain reliable and quality service.
Limited technical staffing	Have dedicated, highly-technical staff to this project as a high priority.
Environmental permit delays	Coordinate with DTEE environmental subject matter experts and environmental agencies to ensure all requirements and expectations are understood and addressed in a timely fashion.
Standards, procedures, and processes are not thoroughly defined	Leverage past work from foundation, integration and partnership levels and initiate the project with a focus on standards, interoperability, in-commissioning, operations and maintenance procedures and processes.

Table 3: Project Risks and Mitigation Strategy

[5] https://energyjustice.egs.anl.gov, accessed December 14, 2022

[6] Detroit Climate Strategy, https://detroitmi.gov/departments/general-services-department/office-sustainability/detroit-climate-strategy, Accessed on November 17, 2022

Risks	Mitigation Strategy
The timeframe and cost to develop new technology is uncertain	Performing engineering due diligence for ANM deployment, establishment of timeframe for field deployment, input from partnerships and their experiences, and leveraging DTEE's experience from past work to establish a cost and schedule baseline. ANMP advisors from the National Laboratories with experience in research, algorithms, and simulation results from implementing the DynaGrid concept will be used as well.
Property acquisition	Work with the DTEE's real estate team to start property purchases early. Real Estate Checklist entails working with environmental groups to determine if there are any known contaminates on the site, review any known wetlands, perform Ground Penetrating Radar (GPR) to identify any underground utilities, and review title documents to ensure unregistered easements do not exist.

Table 3: Project Risks and Mitigation Strategy continued

2.6. ANMs as a Fundamental Element of the Future Electrical System

The goal for the project described in this document is to drive toward a vision of the future electrical distribution system that incorporates ANMs. As described earlier, this vision has the promise to benefit customers by improving reliability and reducing carbon emissions. To achieve that vision, the first step is to complete the development and engineering due diligence for the technology. Utilities need to be confident that it will not lead to power quality, reliability, equipment damage, or other concerns. For widespread deployment, utilities need case studies that prove this technology provides benefits without systemic issues. If that demand is created, it will logically lead to increased investments by equipment providers. That in turn will lead to reduced costs and improved equipment. To start that cycle and realize the improvements for end use customers, a first mover is needed, and that first mover needs to be willing to share learning. DTEE and the partnership it has formed intend to be the catalyst to spark that growth cycle. The ANMP will collaborate with the National Laboratories[7] to develop the DynaGrid concept into a practical deployment ready technology. After a period of development and engineering due diligence, ANMs will be deployed in real-world situations to further demonstrate their value. With this experience and a focus on driving the ANM vision forward, the ANMP will focus on sharing the lessons learned with the industry. This will start the investment cycle needed to drive the future electrical system toward a vision that strategically and consistently includes ANMs. Please refer to Table 2 for the project's objectives and how they are addressed.

3. Workplan

The ANMP has developed a workplan to effectively manage the project to achieve its objectives. A summary of that work plan is presented in this section.

3.1. Project Objectives

In the coming years, pressure on the grid will increase, creating a need for a more resilient grid that can reliably satisfy the growing demand for power. To meet the growing demand, new

[7] **National Laboratories will not receive any funding from this project.**

technology, such as ANMs, must be deployed. This project's objective is to develop and demonstrate this technology to spark future deployments. At the end of the project, the ANMP will deliver the following to increase ANM deployments:

- ANM specifications for sensors, controls and protection architecture, and components
- DynaGrid software refined through engineering due diligence and real-world ANM deployments
- An ANM specific cybersecurity plan
- Lessons learned sharing including annual seminars, an overall lesson learned document, and numerous industry publications
- Demonstration sites in Detroit, Port Austin, and Westland, Michigan
- ANM construction standards
- ANM testing, operating and maintenance procedures

3.2. Technical Scope Summary and Go/No Go Decisions

The project is comprised of four phases that coincide with the annual budget periods of the project. Table 4 describes the phases of the project and the annual go/no go decisions that are associated with each phase.

Phase	Budget Period	Scope Summary and Go/No Go Decision
Phase 1: ANM Engineering	1	As described earlier, development is needed in the areas of sensors and data analytics, cybersecurity, and controls and protection to make ANMs a reality. In this phase, specifications will be developed for the individual components and the overall system. Software (CYME and PSCAD) simulations will inform these specifications and the engineering needed for deployments in Port Austin and Detroit, Michigan. A go/no-go decision will be made at the beginning of month 12 based on the successful completion of achieving budget targets and developing a project management plan, sensors specifications, cybersecurity plan, controls and protection architecture development, steady state and dynamic simulations, Port Austin and Detroit engineering, and regulatory support received.
Phase 2: ANM Development	2	The specifications developed in phase 1 will be implemented by the ANMP in phase 2. This includes developing the grid-edge and ADMS software. The newly developed software can then be further tested and refined by using DTEE's HIL platform. Another key aspect of phase 2 will be to start Westland Equipment Yard testing. In addition to the testing benefits, this work will allow the ANMP to develop initial drafts of standards; testing, operating and maintenance procedures, and training material. The detailed design work, which includes ordering material and using the developed standards for specific construction plans, will also be completed during this phase. A go/no-go decision will be made at the beginning of month 24 based on the successful completion of achieving budget targets, HIL simulations, Port Austin and Detroit design, first drafts of standards, testing, operating and maintenance procedures, and training materials.

Table 4: Project Phases

Phase	Budget Period	Scope Summary and Go/No Go Decision
Phase 3: ANM Deployment	3	After the successful completion of development work and engineering due diligence in phases 1 and 2, ANMs will be deployed in the field by establishing ANMs on two distribution circuits, one in the rural area of Port Austin and one in the urban area of Detroit. Additional refinements should be expected to the software, standards, and other deliverables during this timeframe. A go/no-go decision will be made during the beginning of month 36 based on successful completion of achieving budget targets, Westland yard simulations and field construction and operation.
Phase 4: ANM Assessment	4	With ANM deployments completed in Port Austin and Detroit, the ANMP will focus on testing and commissioning for Detroit and Port Austin, monitoring the performance and benefits of the new technology. There will be particular focus on the energy justice benefits from ANMs. Again, additional refinements to projects deliverables should be expected during this period, and in the second half of this phase, the ANMP will focus on completing the lessons learned and other project deliverables to share with other utilities, research institutions, product developers, and others.

Table 5: Project Phases continued

3.3. Work Breakdown Structure and Task Description

This project plan is designed around five key technical development areas to advance ANMs: enhanced sensors and data analytics, cybersecurity, control, and protection, engineering due diligence, and microgrid deployment. There are also two support areas: project and technical management, and sharing lessons learned. This is illustrated in Figure 3 and will be expanded on in the remainder of this section.

1. Project and Technical Management: Project Management Plan and Overall Project Report
2. Sensors and Data Analytics
3. Cybersecurity
4. Control and Protection Architecture and Methods
5. Engineering Due Diligence: Steady State and Dynamic System Simulations, HIL Simulations, and Westland Test Yard
6. Microgrid Deployment: O'Shea and Port Austin: Conceptual Engineering, Detailed Design, Construction, Commissioning and Testing, and Monitoring Performance
7. Share Learnings with Research Institutions, Utilities and Others: Publish Papers, Present at Conferences, and Annual Seminars Coordinate by EPRI and UM-Dearborn

Figure 3: Work Breakdown Structure Summary

3.3.1. Project and Technical Management

The ANMP is very focused on managing the project effectively to meet the objectives on-time and budget. A separate task focused on that is included in the work breakdown and includes developing an overall project plan and technical management plan.

3.3.1.1. Project Management Plan

The ANMP will use the overall project management approach developed by the Project Management Institute (PMI) as described in the Project Management Body of Knowledge (PMBOK). Table 4 summarizes the key elements of the project management plan adapted from the PMBOK for this project.

PM Element	Summary
Approach	The project manager has the overall authority and responsibility for managing and executing this project according to this project plan and its subsidiary management plans. The project manager will work with all resources to perform project planning. All project and subsidiary management plans will be reviewed and approved by the DOE.
Scope	Scope management for the adaptive networked microgrids will be the responsibility of the project manager. The engineer, project manager, project estimator and the DTEE governance representative(s) will establish and approve documentation for measuring project scope which may include the cost, deliverable checklists/reporting and/or work performance measurements.
Cost	The project manager is responsible for accounting for the project changes and presenting them to the DTEE's governance representative. Cost and schedule performance will be reported monthly by the project manager through the submission of monthly billings.
Schedule	Project schedules for the project will be created using Primavera P6 with the deliverables identified in the project's Work Breakdown Structure (WBS). Activity sequencing will be used to determine the relationships between project activities. Once a preliminary schedule has been developed, it will be reviewed and finalized by the project team and any resources tentatively assigned to a project task.
Quality	Field supervisors, engineers, designers, and the project manager will ensure all quality standards and quality control activities are met throughout the project. Testing agencies (e.g., soil, concrete, and environmental testing) will be requested to provide daily reports and records while verifying that all quality standards are met for each deliverable.
Resource	The Resource Management Plan consists of identifying the specific human resource needs for the project. For resource management, the following activities will be completed throughout the duration of the project: estimate activity resources, update bandwidth report, staffing methodologies, assumptions and constraints, division of responsibility, roles and responsibilities, acquire resources, team meetings, conflict management, manage team, and control resources.
Communication	The Communications Management Plan identifies and defines the roles of project team members as they pertain to communications. It also includes a communications matrix which maps the communication requirements of this project, and communication conduct for meetings and other forms of communication. A project team directory is also included to provide contact information for all stakeholders directly involved in the project.
Risk	To plan for risks that will affect the project, continuously complete the iterative process of risk planning. Identify any risk that could cause a change to the project's scope, cost, schedule, or quality. Continually identify risks throughout the lifecycle of your project. Risk repository, checklist analysis, expert judgement, and project status updates are some of the risk sources that will be considered.
Procurement	The project team shall provide DTEE's procurement team with a plan for the required products and/or services to be procured. The plan shall describe when to procure products and/or services. The procurement organization will facilitate the decision on which vendors to contact and prepare the procurement documentation with participation from the project team.
Stakeholder Management Plan	The key stakeholders include Engineering, Planning, Logistics, Scheduling, managers and directors, executive leadership, Supply Chain, Corporate Communications, Legal, customers (Internal/external), Michigan Public Service Commission (MPSC), permitting agencies, and local/state/federal governments and agencies.

Table 4: Project Management Plans Description

3.3.1.2. Technical Management Plan

In addition to the engineering due diligence and other aspects described in the following sections, the technical management plan will include processes for software rollout to avoid conflicts,

standards development to document improvement and lessons learned, and involvement of cross-functional teams to write the specifications jointly. The feedback and public comments on deliverables will be utilized to lead to industry best practices. Additionally, the operating, maintenance, and training procedures will be rolled out as early in the project as practically possible. This will allow for continuous improvement and capturing lessons learned as the project progresses.

3.3.2. Sensors and Data Analytics

Sensors are the primary equipment used in a microgrid to monitor the state of the system, locate faults, assess load flow, and provide the key inputs to perform control. These include SCADA (Supervisory Control and Data Acquisition) devices, smart meters, Digital Fault Recorders (DFR), line sensors, and other precision electrical monitoring equipment. In addition to the equipment, analytic methods, such as machine learning, will need to be deployed to manage the massive amount of data, so that it may be leveraged in the control and monitoring needed for grid reliability. Sensors and data analytics are even more critical for ANM control and monitoring because the changing nature of the system necessitates real-time data on the state of the infrastructure to determine the best configuration to meet customer needs. This section focuses on using existing sensors, placement of new sensors, and machine learning algorithms to use that data to support the deployment of ANMs.

3.3.2.1. Sensors

As already described, ANMs will require greater system visibility for system control and monitoring, and sensor placement will support that need. The ANMP will determine a strategy for the specification and placement of sensors that considers the cost of the sensors, the functional and locational use of the measurements, the supplemental support of data analytics, and other factors.

3.3.2.2. Real-Time State Estimation

To perform advanced control tasks that are needed in ANMs, such as dynamic microgrid formation and coordination of DERs, visibility into the system state (e.g., voltages and fault locations) is needed on a real-time basis. Sensor placement will support this visibility, but sensors cannot practically be placed everywhere. Typically, the supplemental visibility will be obtained via a state estimation process based on available measurement data from the system. This project will leverage the work of NREL[8] in distribution systems state estimation.

3.3.2.3. DER Operation Monitoring

DERs have various configurations and characteristics which makes it challenging to monitor their operational states, resulting in the potential to impact upstream grid equipment and power quality. This project will use machine learning algorithms and smart meter data to identify and mitigate grid impacts.

[8] ***National Laboratories will not be receiving any funding from this project.***

3.3.2.4. Modern Stochastic Methods for Resilience and Design

Greater electrical load and load variation due to the adoption of EVs, DERs, energy storage, and other technologies will vary by region and time. This customer evolution must be both identified and managed by electric utilities to avoid issues with loading, voltage, power quality, reliability, and protection. In a grid isolated microgrid, serving the load can be a greater challenge due to the reduced advantages of aggregation and uncertain generation sources. A thorough understanding of uncertainty and variation is critical to the successful deployment of microgrids. Methods being considered include efficient data analytic and engineering approaches, such as clustering, parallel and attention focused neural networks, Monte Carlo simulations, and standards focused engineering analysis. The ANMP will develop, test, and refine new methods to address these challenges and well as properly design and operate the microgrids for this project.

3.3.3. Cybersecurity

While DERs can significantly increase the efficiency and resilience of the electrical distribution grid, they can also increase the risk for cyberattacks. Integration of DERs and the associated tools involves multiple vendors, third party applications, supply chain mechanisms, and sensitive operational data. In this project, the ANMP proposes a Minimum Cybersecurity Management Plan (MCMP) based on The National Institute of Standards and Technology (NIST)'s industrial cybersecurity standards. The proposed MCMP maintains cybersecurity throughout the life of the proposed project. The MCMP will include secure communication, zoning/perimeter protection, malware protection, patch management, backup/recovery, account management, security logging/monitoring, and product hardening. The work will be divided into two phases: 1) threat analysis, vulnerability assessments, and mitigation approaches, and 2) simulations for project areas that require complex mitigation, completed jointly by DTEE and UM–Dearborn. This two-phase process will be implemented early in the project and will be repeated as the work progresses.

3.3.4. Control and Protection Architecture and Methods

To ensure the reliable and efficient operation of a microgrid, a control system is needed to manage and coordinate the components. The control system must be able to monitor each microgrid's status, adjust the output of the DERs to meet the electric demand, and manage the energy storage systems to balance supply and demand**.** Some elements of this control system are best distributed, near the grid-edge, while others are necessarily centralized to coordinate overall resources. Determining the best overall architecture that balances tradeoffs and developing components toward that definition will be two deliverables. These are essential for interoperability and effective use of resources. Protection will be another challenge that needs to be considered with ANMs. With changing boundaries, zones of protection must be adapted, and the settings for protective devices need to consider the range of boundaries. Protection will be a greater challenge with ANMs and increasing DER deployment. Static settings for protective devices will no longer meet the need, and more sophisticated approaches, such as adaptive protection or situationally aware settings, will be required.

3.3.4.1. Adaptive Formation and Reconfiguration of Network of Microgrids

To implement the ANM vision, shown in Figure 1, the ANMP will consider control methods for dynamic formation and operation of networked microgrids. The novelty of the approach is that the boundaries of the microgrids are designed to be dynamically adapted during operation, as opposed to existing approaches where microgrid boundaries are static. The goal of this dynamic formation is to empower local communities to improve the use and sharing of local energy resources during normal operation but primarily during emergency conditions (addressing ice storms, windstorms, natural disasters, and wildfires).

The approach builds upon previous efforts at NREL, LLNL, and other National Laboratories[9] and is based on the vision outlined in the DOE Microgrid Strategic Topic 4 as well as the Autonomous Energy Systems[10] vision. It is based on the multi-resolution approach, which considers several layers of dynamic grid partitioning with differing levels of detail, laying the foundation for a fractal grid. At the most granular level, the grid is divided into load blocks (containing a mix of standard loads, DERs, and critical loads) which relate to each other through switches. These blocks can be combined to create smaller or larger microgrids. For the microgrid to be operational, it needs to contain at least one anchor-node that provides balancing and control capabilities (e.g., a generator or a battery with a grid-forming inverter). These microgrids form the lowest level of the multi-resolution hierarchy. Further up in the hierarchy, collections of microgrids might form a regional grid, which are again connected with other regional grids to form an interconnection. As such, similar patterns of microgrids interconnected with other microgrids repeat at different levels. The partitions in each level of the hierarchy may to some extent follow traditional voltage-level and geographical boundaries but will be more adaptive considering resource availability.

3.3.4.2. Hybrid Control Method

A hybrid of distributed and centralized controls architecture and components will be developed collaboratively by the ANMP. An early deliverable will be specifications for the overall architecture and component functionality. These specifications will be implemented and refined during the course of the project; and at the end of the project, the final specifications will be available for others to use in future ANM development and deployments.

ADMS: The project will utilize DTEE's recently deployed OSI ADMS system, providing direct supervisory control, planned topology changes, emergency and outage restoration intervention, and broad scale optimization. The ADMS will also provide permissive granting authority for localized / grid-edge systems, and when incorporated DERMS will provide broad scale optimization of economics and defer to ADMS permissive controls.

Gateway: The gateway acts as an aggregation and coordination point between the grid-edge and ADMS. It takes control and permissive signals to perform less urgent and critical actions, such as local dispatch optimization. The gateway can also adjust to site reconfiguration or topology changes, and it can respond to new constraints or controls. The gateway can act as a microgrid area controller or support a single DER, and it can be placed at substations or individual sites.

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[9] **The National Laboratories will not receive any funding from this project.**

[10] B. Kroposki et al, "Autonomous energy grids: Controlling the future grid with large amounts of distributed energy resources," IEEE Power and Energy Magazine, 2020.

Grid-Edge Devices: Grid-edge devices are the lowest level of controllable device that performs grid services. It will have services that can be configured. Both the gateway and grid-edge devices will align with the forthcoming IEEE1547.10 gateway proposal.

3.3.4.3. Grid-Forming Inverters with Intelligent ANM Controls

Grid-connected inverters can be categorized as grid-following inverters and grid-forming inverters. A grid-following inverter works under the presumption that a "stiff" voltage with minimal deviations will be maintained at its terminals such that it can simply follow that voltage and inject a controlled current. Grid-forming inverters have the capability of providing the voltage source to which other inverters can synchronize. For this project, the ADMS and gateway algorithms will collaboratively determine the boundaries and scope of control for each microgrid in the ANM system when a major event causes the microgrids to operate independent of the traditional distribution system. Based on those boundaries, the ADMS and the local gateways will determine what inverter in each microgrid will be the grid-forming inverter, establish what sensors are most critical to monitor for each zone in the microgrid configuration, and establish objectives for the grid-forming inverters. With that determined, the ADMS and local gateway collaboration will provide several operating instructions for the grid-forming inverters. These instructions could include set points for real and reactive power, terminal voltage, and operational curve shape to establish speed of response. When reconfiguring microgrid boundaries and returning the microgrids to traditional system service, the operating instructions will include synchronizing information, such as voltage, phase shift, and frequency.

3.3.4.4. Optimal Dispatch Methods

For utilities to maximize the power supply cost savings possible with ANMs, it will be important to determine how battery systems can be optimally operated to reduce peak, market, and generation prices, including maximizing storage system capacity timed to market dynamics. This project will analyze the optimal charging and discharging for distributed resources in a coordinated fashion with other assets included in the microgrid. Objective functions will be developed, and linear programming methods will be implemented for these purposes.

3.3.5. Engineering Due Diligence

The elements of engineering due diligence are described in more detail in the following sections.

3.3.5.1. Steady State and Dynamic System Simulations

In this element, use cases will be developed; system configurations will be considered and understood; concerning power quality, protection and other issues will be identified; and countermeasures will be developed and tested in software simulations. PSCAD and CYME will be the primary tools used in this step.

3.3.5.2. Hardware in the Loop Testing

The models, use cases, and other aspects from the simulations element will be extended with hardware control and protection systems to test for proper responses. DTEE's Typhoon HIL system will be the primary tool used in this step.

3.3.5.3. Westland Yard Testing

This element serves the dual purpose of testing the hardware and control systems with physical energized equipment and determining the methods, standards, and training to do field deployments.

3.3.6. Microgrid Deployment

ANMs will be deployed on two distribution circuits with renewable sources and additional appropriate technology including sectionalizing.

3.3.6.1. O'Shea Solar Park – Urban Area

O'Shea Solar Park, located in Detroit, is the site of a 2MW solar array serving (b) (4) . During periods where solar generation is changing rapidly, voltage data from AMI meters indicates there is potential for small voltage fluctuations outside of standards. DTEE is currently installing a 1MW x 1MWh battery co-located with the solar array. There are multiple goals for the original O'Shea projects, including improving the power quality in the area and demonstrating strategies for mitigating voltage and power quality fluctuations from solar. With grant funding, the Company will supplement the assets being installed to implement two microgrids on one of the circuits being served from the substation. This will include adding six new sectionalizing devices, communication, and controls equipment, and a 1MW x 4MWh battery, which is already owned by the Company. These two microgrids will work together as a set of ANMs to provide optimized reliability to the customers on this circuit.

3.3.6.2. Port Austin – Rural Area

The city of Port Austin is home to a community of (b) (4) and is in the rural thumb area of Michigan. Port Austin is located directly on Lake Huron; and consequently, the area often experiences intense wind and weather systems including tornadoes in recent years, impacting local reliability. The substation that serves this community is overloaded, and the area also experiences short periods of low voltage at the end of the circuits. DTEE is currently installing a 500kW solar array and a 1MW x 4MWh battery to be grid-connected with two sectionalizing devices, and communication and controls equipment to utilize the assets as a microgrid on one of the circuits served by the substation. The goals of the Port Austin project are to significantly reduce hours with loading concerns and provide improved redundancy and power quality for the area. With grant funding, the Company will supplement the assets being installed with two additional microgrids on the circuit. An additional 500kW solar array and a 1MW x 4MWh battery will be installed at a new location, as well as a 1MW x 4MWh battery installed on its own at a separate new location. This configuration will include adding six sectionalizing devices along with communication and controls at each new site. Again, these three microgrids will work together as a set of ANMs.

3.3.7. Sharing Lesson Learned

To expand the use of ANMs, the ANMP will have a primary objective of sharing the lessons it is learning with the overall industry. This includes sharing sensor specifications; cybersecurity plans;

architecture and component functional specifications; construction and design standards; testing, operating and maintenance procedures; training material; software and HIL simulation results; and other key elements to help others develop ANMs. To supplement this sharing, EPRI and UM-Dearborn will coordinate with DTEE to complete annual lessons learned events with the industry. These sessions will allow the ANMP to share lessons learned and get input from the industry on the direction of the development. The ANMP also will leverage the lessons learned from its members' experience and facilities (as detailed in section 4.1 and section 4.2), DynaGrid research, and other industry research to reduce project risks and improve the efficiency to achieve the objectives.

3.4. Milestone Summary

The milestones for the project are presented in Table 5.

Milestone Task	Milestone Description	Summary	Budget Period[11]	Timing
[redacted]	(b) (4) [redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 4
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 5: Milestone Summary

[11] Milestones include some deliverables that are updated each budget period as noted

Milestone Task	Milestone Description	Summary	Budget Period[12]	Timing
[redacted]	(b) (4) [redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Table 5: Milestone Summary Continued

3.5. End of Project Goal

To widely deploy new technologies, as shown in Figure 1, electric utilities need to have confidence that it will not lead to power quality concerns or equipment damage and will benefit customers through enhanced reliability, greater resiliency, more environmentally friendly

[12] Milestones include some deliverables that are updated each budget period as noted

generation, and improved affordability. The ANMP intends to develop the ANM technology, complete the engineering due diligence, and demonstrate the work in such a way that electric utilities will have the needed confidence to deploy the technology on a wider scale for further development and enhancement. The GRIP Topic Area 2, which aims to implement technological solutions that raise the flexibility, efficiency, reliability, and resilience of the electric power system, is in line with the proposed demonstration project. A more resilient power grid is produced through ANMs, which also improves community reliability, better system resistance, distribution-level integration of variable renewable energy sources, and increased sustainability using energy-efficient and renewable resources.

3.6. Project Schedule

An overall project schedule has been developed and is presented in Figure 4.

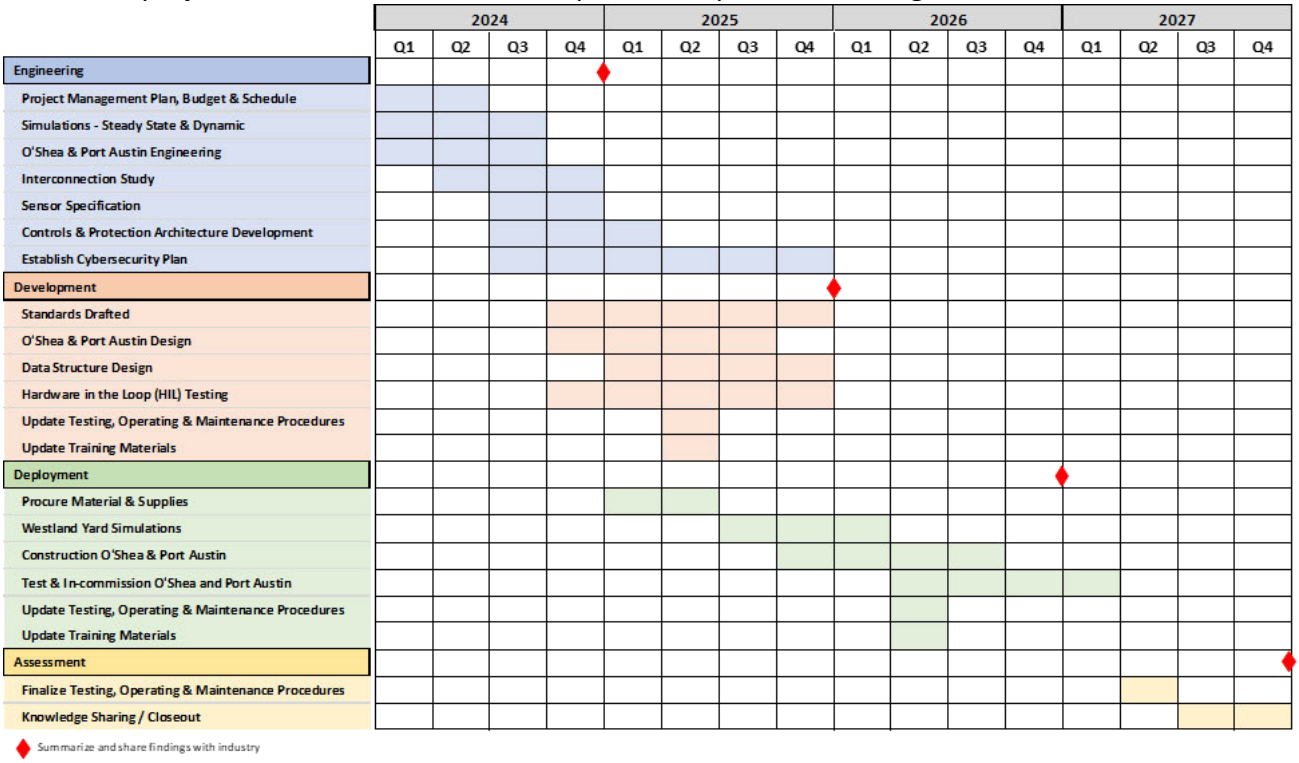

Figure 4: Project Schedule

3.7. Buy America Requirements

This project will include the construction of new infrastructure that will be part of the electrical infrastructure in Southeastern Michigan. This includes adding photovoltaic systems, battery storage, electrical system sectionalizing equipment, controls and communication equipment, and other equipment to improve the loadability and reliability of the electrical system. DTEE is committed in utilizing American manufacturing for its material requirements. DTEE will strive to source all identified major material for this project domestically wherever possible. DTEE has long-standing competitive contracts with all major material suppliers which have below-market costs and reduced lead times. DTEE has measured goals and tracks metrics on sourcing labor and material locally competitively. The Company's electric footprint is solely in Michigan, and the

most competitive labor resources reside in its service territory. DTEE's spending with Michigan, Detroit and diversity vendors has increased for the past 10 years on a year over year basis. In 2022, DTEE spent $2.48 Billion with Michigan vendors, $900 Million with Detroit-based vendors, and $894 Million with diversity vendors.

4. Technical Qualifications

To evolve DynaGrid from vision to reality, a series of steps need to be taken. The ANMP has collaborated with National Laboratories to determine the steps to operationalize the conceptual DynaGrid approach to grid resilience. The ANMP is a consortium of experienced partners who will collaborate to execute the project.

4.1. Unique Qualifications, Expertise and Experience

The scope and qualifications of each member of the ANMP are provided in this section.

DTEE – DTEE will perform end-to-end project management, complete the engineering due diligence and testing required to deploy this new technology, and develop and deploy two ANMs in Detroit and Port Austin. As shown in Figure 5, DTEE has been developing its staff, processes, standards, and technology toward ANMs for several years by developing and deploying increasingly more sophisticated and all-renewable sourced NWAs.

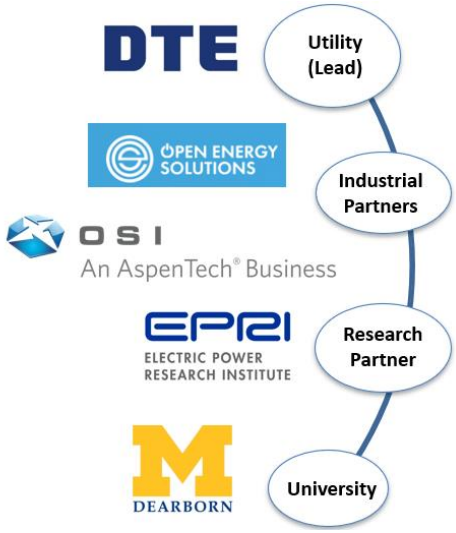

Figure 5: DTE Electric Equipment to Support Adaptive Networked Microgrids

EPRI – EPRI was established in 1972 and continues to operate as a nonprofit technology R&D organization, providing research and industry services to more than 1,000 energy-related organizations in over 40 countries. The EPRI team has extensive prior experience leading and supporting complex projects and is an industry leader in microgrids, controls, and communications projects for utilities as well as DOE. EPRI's primary responsibilities on this project will be to simulate operating grid scenarios for engineering due diligence and to develop lessons learned sharing opportunities.

OES –The OES team brings experience in products and services to utilize advanced and emerging technologies in grid integration of distributed resources and has a track record as a team member on DOE projects and with DTEE. OES's primary role will be to implement grid-edge device software for ANMs.

OSI – OSI is an energy industry leader in ADMS software including Generation Management Systems (GMS), Outage Management Systems (OMS), and Distribution Management Systems (DMS) and is the provider of DTEE's newly-launched OMS and DMS systems. OSI has over 600 SCADA/EMS/DMS/OMS/GMS installations. OSI has implemented several microgrid projects including microgrids at the world's largest aluminum plant, more than six microgrids for critical US Government infrastructure, and a microgrid at OSI's headquarters. OSI's primary role will be to provide and implement ADMS software to support ANMs.

UM-Dearborn – UM-Dearborn's primary responsibilities will be to develop and validate new cybersecurity practices, create and implement novel data analytics methods, and develop educational and lessons learned sharing opportunities. UM-Dearborn has a long history of R&D leadership in power systems, power electronics, cybersecurity, and machine learning, with a strong focus on real-world applications. Prior work has been supported by the U.S. DOE, NSF, DOD, and local industries.

4.2. Equipment and Facilities

Each partner will provide critical equipment and facilities to support the project. A summary of each partner's support is provided in this section.

4.2.1. Existing Equipment and Facilities

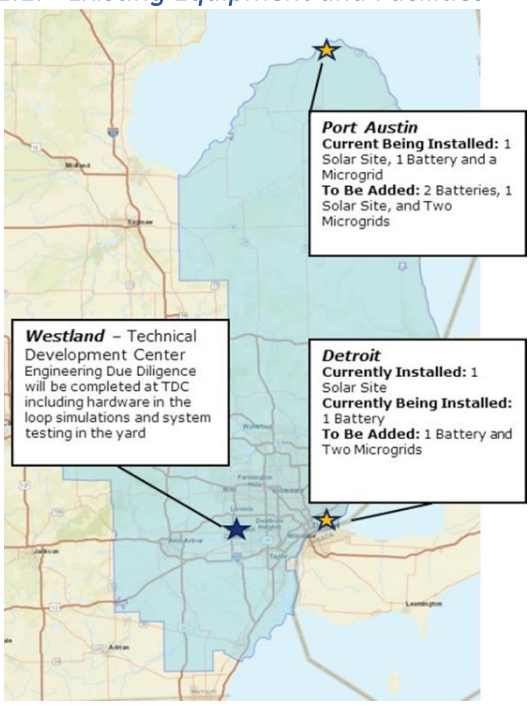

Figure 6: DTE Electric Equipment to Support Adaptive Networked Microgrids

DTEE - DTEE is one of the largest electric utilities in the nation and owns and operates approximately 31,000 miles of overhead and 16,000 miles of underground distribution. DTEE's service territory encompasses 7,600 square miles and includes approximately 2.3 million residential, commercial, and industrial customers. In addition to the facilities described in section 2.2.1 and Figure 6, DTEE owns a facility in Westland, Michigan that includes a platform to test new technologies, and it includes energized distribution circuits with a variety of equipment that is typically owned by utilities and customers. This facility allows the company to test equipment and new technologies in a safe environment. DTEE also uses CYME and PSCAD for software simulations and a Typhoon HIL system to allow for controls and protection development and testing. The Westland facility will be used to support engineering due diligence prior to field deployments and provides the platform to develop standards and training. The Company is also installing two PowerEdge R750XA high speed GPU servers with data access and tools to support machine learning development for the data analytics portion of the scope. Each has two NVIDIA A40 (GA102GL) GPUs with 48 GB of GDDR6 memory with a bandwidth of 696 GB/s and 84 cores. Figure 6 summarizes the facilities that DTEE brings to the project.

EPRI – EPRI has a laboratory in Knoxville, Tennessee that includes a simulation platform for DER and microgrid integration. The facility includes up to 150kW of PV and energy storage smart inverter test capability, solar and grid simulators, and 4+TB (growing) of high-resolution field measured DER data in database.

OES – Two of the tools OES brings to the project are OpenDSO™ Distributed Intelligence Platform and OpenDSO's OpenFMB. OES' OpenDSO™ Distributed Intelligence Platform provides a

Distributed Intelligence (DI) platform that allows for deploying intelligence at the edge of the grid to automate near real-time monitoring and operations without the need for continuous human guidance or centralized control. OES' OpenFM™ Adapter Framework is responsible for the conversion of edge device protocols to edge device-specific OpenFMB profiles for time-series data, control, and configuration.

OSI –The monarch™ platform is OSI's state-of-the-art, real-time system architecture to support the monitoring, control, scheduling, and optimization of complex networked operations for the electric industry. Specific applications of the monarch™ platform include SCADA systems, Energy Management Systems (EMS), DMS, GMS, Network Management Systems (NMS) and Market Management Systems (MMS). OSI's OpenCalc™ Calculation subsystem is an integrated development environment that allows users of the monarch™ platform to design and create custom calculations logic or sophisticated control and monitoring applications. OpenCalc™ will be used to implement the centralized algorithms needed for ANM deployment.

UM-Dearborn - UM-Dearborn is located ten miles west of Detroit, providing high-quality STEM education including an electrical engineering power systems focused program at the bachelors through doctorate levels. A 4,100 square foot power engineering suite is equipped with state-of-the-art power system testing facilities including OPAL-RT hardware-in-loop testbed for co-simulation and high-performance GPU computers for data analytics and machine learning algorithm development.

4.2.2. New Equipment and Facilities

As described in sections 2.2.1, 3.3.6, and 4.2.1, DTE Electric has significant infrastructure to support this project. Table 6 provides a summary of the major equipment to be purchased to support this project, and additional information for other equipment is provided in the SF-424.

Equipment	Purpose
2 1MW x 2 to 4MWh BESS	This will provide additional sources for the Port Austin deployment. One will be a standalone source, and the other will be coupled with a solar array.
1 250 to 500kW Solar	This will provide an additional source for the Port Austin deployment, and it will be coupled with one of the storage systems described above.
12 Sectionalizing Devices	Six of these devices are needed to provide the adaptive boundaries for O'Shea's ANMs, and six are needed for Port Austin.
HIL Upgrades	Adding 2 FPGA modules, 4 modular connect modules and 6 controllers are required to augment the existing HIL simulation capabilities at DTEE's Westland facility to simulate the more sophisticated ANM systems to be installed at O'Shea and Port Austin.
ADMS Testbed	To test ADMS functionality to be provided by OSI outside of the production environment, VxRail servers will be installed at DTEE's Westland facility.

Table 6: Major Equipment Needed to Support the Project

4.3. Time Commitment

Each member of the core team is listed in Table 7 along with their project role and estimated average time commitment.

Partner	Core Team Member[13]	ANMs Project Role	Time Commitment
DTEE	(b) (4)		
EPRI			
OES			
OSI			
UM-Dearborn			

Table 7: Core Team Members' Key Role and Time Commitment

4.4. Support from Federally Funded Research and Development Centers

As described earlier in section 1.1, several National Laboratories, including NREL and LLNL, have been developing the DynaGrid concept to create a dynamic microgrid concept to support large scale DER integration and electrification and improve reliability. This includes innovations needed to make DynaGrid a reality including developing algorithms for dynamic and multi-resolution formation of microgrids, distributed control and operation of networked microgrids, and a network of equitable microgrids for improved energy justice

DTEE sees the potential for the DynaGrid concept to provide benefits for its customers, and DynaGrid is the inspiration for the project described in this document. Considering the thought leadership provided by the National Laboratories toward the next generation distribution system, DTEE and its partners have engaged the National Laboratories as advisors to the project for three purposes: share the DynaGrid algorithms to be implemented, share the simulation work associated with the DynaGrid concept, and guide the project toward the DynaGrid objectives[14].

[13] Additional individual contributors will also be assigned during the project and within the allocated budget Additional individual contributors will also be assigned during the project a