OMB Number: 4040-0004
Expiration Date: 8/31/2016

## 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: 03/31/2015

4. Applicant Identifier:

5a. Federal Entity Identifier:

5b. Federal Award Identifier:

**State Use Only:**

6. Date Received by State:

7. State Application Identifier:

**8. APPLICANT INFORMATION:**

* a. Legal Name: State of Maine Governor's Energy Office

* b. Employer/Taxpayer Identification Number (EIN/TIN): 01-6000001

* c. Organizational DUNS: 9629474660000

**d. Address:**

* Street1: 62 State House Station
Street2:
* City: Augusta
County/Parish: Kennebec
* State: ME: Maine
Province:
* Country: USA: UNITED STATES
* Zip / Postal Code: 04333-0062

**e. Organizational Unit:**

Department Name:

Division Name:

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

Prefix: Ms.
* First Name: Lisa
Middle Name: J.
* Last Name: Smith
Suffix:

Title: Senior Planner

Organizational Affiliation:

* Telephone Number: 207-624-7445
Fax Number:

* Email: lisa.j.smith@maine.gov

## Application for Federal Assistance SF-424

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

A: State Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

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

Department of Energy, EERE

**11. Catalog of Federal Domestic Assistance Number:**

81.119

CFDA Title:

State Energy Program 2015 Competitive Awards

*** 12. Funding Opportunity Number:**

DE-FOA-0001222

* Title:

Maine Energy Planning Roadmap

**13. Competition Identification Number:**

Title:

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

Add Attachment | Delete Attachment | View Attachment

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

Conduct baseline data development, set time horizon and regional development goals, engage stakeholder community, and develop an actionable Maine State Energy Roadmap.

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: 1 * b. Program/Project: 1, 2

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

Add Attachment | Delete Attachment | View Attachment

**17. Proposed Project:**

* a. Start Date: 10/01/2015 * b. End Date: 09/30/2018

**18. Estimated Funding ($):**

| | |
|---|---|
| * a. Federal | 284,022.00 |
| * b. Applicant | 73,825.00 |
| * c. State | 0.00 |
| * d. Local | 0.00 |
| * e. Other | 0.00 |
| * f. Program Income | 0.00 |
| * g. TOTAL | 357,847.00 |

*** 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 218, 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: Mr. * First Name: Patrick

Middle Name:

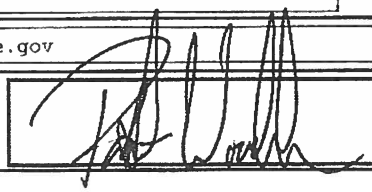
* Last Name: Woodcock

Suffix:

* Title: Director

* Telephone Number: 207-624-7405 Fax Number:

* Email: patrick.c.woodcock@maine.gov

* Signature of Authorized Representative:  * Date Signed: 03/31/2015

## ASSISTANCE AGREEMENT

| . Award No. | 2. Modification No. | 3. Effective Date | 4. CFDA No. |
|---|---|---|---|
| E-EE0007222 | | 01/01/2016 | 81.119 |

| . Awarded To | 6. Sponsoring Office | 7. Period of Performance |
|---|---|---|
| OVERNOR'S ENERGY OFFICE<br>ttn: LISA SMITH<br>2 STATE HOUSE STATION<br>UGUSTA ME 04333 | Energy Effcy & Renewable Energy | 01/01/2016<br>through<br>12/31/2017 |

| . Type of Agreement | 9. Authority | 10. Purchase Request or Funding Document No. |
|---|---|---|
| ☐ Grant<br>☒ Cooperative Agreement<br>☐ Other | 42 USC 6321<br>42 USC 7101 | 16EE000602 |

| 1. Remittance Address | 12. Total Amount | 13. Funds Obligated |
|---|---|---|
| OVERNOR'S ENERGY OFFICE<br>ttn: DEANNA LEFEBRE<br>4 STATE HOUSE STATION<br>UGUSTA ME 04333 | Govt. Share: $284,022.00<br>Cost Share : $73,825.00<br>Total : $357,847.00 | This action: $284,022.00<br>Total : $284,022.00 |

| 4. Principal Investigator | 15. Program Manager | 16. Administrator |
|---|---|---|
| ee page 2 of Agreement | Amy A. Kidd<br>Phone: 202-287-1306 | Golden Field Office<br>U.S. Department of Energy<br>Golden Field Office<br>15013 Denver West Parkway<br>Golden CO 80401 |

| 7. Submit Payment Requests To | 18. Paying Office | 19. Submit Reports To |
|---|---|---|
| | OR for Golden<br>U.S. Department of Energy<br>Oak Ridge Financial Service Center<br>P.O. Box 6017<br>Oak Ridge TN 37831 | See Attachment 2 |

0. Accounting and Appropriation Data

015 SEP Competitive Grant

1. Research Title and/or Description of Project

Y15 SEP COMP: MAINE ENERGY PLANNING ROADMAP

| For the Recipient | | For the United States of America | |
|---|---|---|---|
| 2. Signature of Person Authorized to Sign | | 25. Signature of Grants/Agreements Officer<br>Signature on File | |
| 3. Name and Title | 24. Date Signed | 26. Name of Officer<br>Kristin Laura Johnson | 27. Date Signed<br>12/22/2015 |

| EM NO. (A) | SUPPLIES/SERVICES (B) | QUANTITY (C) | UNIT (D) | UNIT PRICE (E) | AMOUNT (F) |
|---|---|---|---|---|---|
| | DUNS Number: 962947466<br>In addition to this Assistance Agreement, this award consists of the items listed on the Cover Page of the Special Terms and Conditions.<br><br>The Project Period for this award is 01/01/2016 through 12/31/2017, consisting of a single Budget Period with the same dates.<br><br>In Block 7 of the Assistance Agreement, the Period of Performance reflects the beginning of the Project Period through the end of the current Budget Period.<br><br>Additional future DOE funding and additional budget periods are not contemplated under this award. Funding for all awards and future budget periods is contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority.<br><br>Effective for awards executed after 12/26/2014, the DOE Financial Assistance regulations contained in 10 CFR 600 were superseded by the Financial Assistance regulations contained in 2 CFR Part 200 as amended by 2 CFR Part 910.<br><br>DOE Award Administrator: Brenda Dias<br>E-mail: brenda.dias@ee.doe.gov<br>Phone: 720-356-1519<br><br>DOE Project Officer: Amy Kidd<br>E-mail: amy.kidd@ee.doe.gov<br>Phone: 202-287-1306<br><br>Recipient Business Officer: Patrick Woodcock<br>E-mail: patrick.c.woodcock@maine.gov<br>Phone: 207-624-7405<br><br>Recipient Principal Investigator: Lisa J. Smith<br>E-mail: lisa.j.smith@maine.gov<br>Phone: 207-624-7445<br><br>"Electronic signature or signatures as used in this document means a method of signing an electronic message that--<br>(A) Identifies and authenticates a particular person as the source of the electronic message;<br>(B) Indicates such person's approval of the<br>Continued ...<br>information contained in the electronic message; | | | | |

| ONTINUATION SHEET | REFERENCE NO. OF DOCUMENT BEING CONTINUED<br>DE-EE0007222 | PAGE 3 OF 3 |
|---|---|---|

AME OF OFFEROR OR CONTRACTOR
OVERNOR'S ENERGY OFFICE

| EM NO. (A) | SUPPLIES/SERVICES (B) | QUANTITY (C) | UNIT (D) | UNIT PRICE (E) | AMOUNT (F) |
|---|---|---|---|---|---|
| | and,<br>(C) Submission via FedConnect constitutes electronically signed documents."<br>ASAP: YES Extent Competed: COMPETED Davis-Bacon Act: NO<br>Fund: 05450 Appr Year: 2015 Allottee: 31 Report Entity: 200835 Object Class: 41020 Program: 1004902 Project: 0000000 WFO: 0000000 Local Use: 0000000 | | | | |

JULY 2004

**State Energy Program 2015 Competitive Awards**
**Funding Opportunity Announcement (FOA) Number: DE-FOA-0001222**
**FOA Area of Interest 1**

# State of Maine
# Energy Planning Roadmap
# Technical Volume

**Submitted to:**
**Department of Energy**
**Office of Energy Efficiency and Renewable Energy**

**Submitted by:**
**State of Maine**
**Governor's Energy Office**
**and**
**The Environmental and Energy Technology Council of Maine (E2Tech)**

**Technical Contact: Jeff Marks, E2Tech**
**jeffmarks@e2tech.org**
**Business Contact: Lisa Smith, Maine GEO**
**Lisa.J.Smith@maine.gov**

**March 2015**

# Table of Contents

# 1.0 Project Overview

The State of Maine has many assets available to address its energy challenges, including in-state renewable resources and regional access to natural gas from the south and hydropower from the north. The Maine Governor's Energy Office (Maine GEO) has proposed that overall energy policy should lower costs for businesses and residential customers and reduce pollution. However, Maine does not have a single, holistic policy with clear objectives, rigorous oversight measures, and actionable strategies.

The ultimate goal of this Maine Energy Planning Roadmap (Roadmap) project is to establish an implementable, stakeholder-driven plan that results in lower costs, improves the environment, and advances energy security.

## 1.1 Background

In 2008, Maine's first comprehensive energy plan attempted to integrate energy, economic development, and environmental issues into a strategic long-term vision. The 2008 plan envisioned public-private partnerships to take Maine out of a fossil-fuel culture, transition to a conservation-based culture, and over time bring the State into a more sustainable energy culture.

In February 2015, the Maine Governor's Energy Office released an updated plan at a time of volatility in energy markets with significant consequences on the people of Maine and the Maine economy. From large employers shutting down because of the cost of natural gas and electricity, to an historic reduction in oil prices that gave some relief to Maine customers, the plan recognized the unpredictability of the market and limited ability of the State to adapt to these changing markets, remain competitive, and reduce air pollution. The plan also acknowledged that more work is needed to facilitate interagency and stakeholder dialogue in order to guide and support Maine's energy sector, with emphasis on electric power, heating, energy efficiency, renewables, and economic development.

> ***Maine GEO Mission Statement***
> *The Maine GEO's mission is to create effective public and private partnerships that advance Maine's energy security and economic development in an environmentally responsible manner.*

The Environmental and Energy Technology Council of Maine (E2Tech) was created by Maine's leading energy and environmental leaders in 2002 and has developed a reputation as a non-partisan representative of a growing sector of the Maine economy. E2Tech's business and policy events are well-attended events. E2Tech's cluster initiative program grants from the Maine Technology Institute provide E2Tech with the opportunity to test strategic initiatives in the market and bring diverse stakeholders together to discuss, evaluate, and solve the State's critical energy problems. They are a logical partner in a larger, more comprehensive state energy-planning endeavor.

> ***E2Tech Mission Statement***
> *E2Tech seeks to build and expand the State's environmental, energy, and clean technology sectors. E2Tech acts as a catalyst to stimulate growth in this sector by facilitating networking, serving as a clearinghouse for objective information, and leading efforts to promote the sector.*

The Maine GEO's 2015 plan is a foundation for the proposed Roadmap. It established eight areas of particular interest. These areas are described in the following paragraphs, including information on progress and successes to date:

1. **Thermal**. Most Maine homes are heated by oil and the State has made significant progress in reducing home heating oil consumption. However, the State's building stock is one of the oldest in the nation and inefficient building envelopes and heating systems are common. In the last two years, the Home Energy Savings Program at Efficiency Maine helped more than 13,000 households save energy and money through upgraded systems and weatherization. The State needs to devote additional resources to these programs to meet its goal of upgrading 10,000 homes per year.
2. **Renewable Energy.** In 2012, Maine generated 54% of its electricity from renewable resources and increased wood energy use for thermal applications. State renewable portfolio standards, the federal production tax credit, and Maine's wind energy resources have had a meaningful impact. The State is considering a consolidation of its renewable energy policies to encourage development of all renewables, improve cost effectiveness, develop a long-term distributed generation program, and explore opportunities for innovative technologies throughout the region.
3. **Commercial/Industrial.** Maine's commercial and industrial electricity and natural gas prices are not nationally competitive. While natural gas distribution expansion has provided a more diverse fuel mix, New England has experienced price volatility in natural gas and electricity markets. The State is pursuing a regional solution to natural gas capacity constraints.
4. **Transportation.** Maine is a rural state and, as a result of its population distribution, Mainers travel more miles than the national average. The State is considering targeted rail investments to increase access for shipping and passenger rail service; public-private partnerships to shift commuters to public transportation; and support for alternative vehicles fueled by natural gas, electricity, and alternative fuels.
5. **Wind Power.** Wind power currently generates 443.5 MW in Maine with additional projects proposed. Most of these projects are supported through purchased power agreements with utilities in Massachusetts and Connecticut. Although Maine construction companies have developed an expertise in the installation of these projects, the State has not successfully developed a wind-related manufacturing base.
6. **State Government.** State government fuel expenditures are approximately $500 million annually and there exists significant opportunities to pursue cost-effective energy efficiency, heating systems, and HVAC system improvements. The Maine GEO, Bureau of General Services, Legislature, and Efficiency Maine should pursue a financing program that allows long-term planning for energy improvements.
7. **Greenhouse Gas Emissions.** While Maine's electric emissions are one of the lowest in the country, its transportation and thermal energy emissions are higher per capita than the national average. The State continues to pursue policies to lower emissions in the electric sector by its participation in the Regional Greenhouse Gas Initiative (RGGI), state electric renewable energy programs, and upcoming compliance with the EPA's Clean Power Plan reflecting its unique mix of resources and opportunities.
8. **Electricity/Efficiency.** Maine has a significantly higher percentage of its electrical load dedicated to industrial users than the rest of New England and is highly susceptible to price volatility. Efficiency Maine allocated $21 million for electric efficiency programs in

FY14. The Maine Legislature also devoted 55% of funds from the Maine Yankee Settlement nuclear waste settlement to invest in energy efficiency programs. Other electricity-related initiatives include a state requirement to consider non-transmission alternatives as a substitute for transmission projects; long-term contracting; modernizing utility infrastructure to ensure the reliable and efficient delivery of electricity; and improving diversity of resources in its residential, commercial, and industrial sectors.

## 1.2 Project Goal

The goal of the Maine Energy Planning Roadmap is to determine a strategic direction for developing, integrating, and promoting policies and initiatives for growing Maine's energy sector and enhancing Maine's energy supplies and the electric grid. At the same time, the Roadmap will seek to advance environmental, energy, and clean technology companies, products, and services. The Roadmap is critical to guiding and stimulating innovative, facilitated discussions among businesses, non-profits, government entities, and other parties to drive public support and private sector capacity to achieve the following results:

- Increase energy efficiency and weatherization in building or facility envelopes, appliances, lighting, industrial equipment, and electric heating and cooling systems.
- Increase the use of renewable, indigenous energy sources like biomass, biofuels, on-and off-shore wind, hydropower, solar, tidal power, and geothermal energy.
- Increase installation or expansion of combined cooling, heat and power systems, and waste-heat recovery systems.
- Increase switching to low-carbon, transitional, renewable, and/or efficient fuels and technologies.
- Increase reliability, resiliency, and energy assurance across the regional electricity grid.
- Increase the probability of meeting Maine's energy goals in the current state energy plan, Efficiency Maine's triennial plan, and E2Tech's cleantech reports – including goals to weatherize homes and businesses; reduce heating oil use; lower energy costs; encourage alternative energy resources and systems; create cleantech jobs in Maine and enhance its workforce; and reduce greenhouse gas and other air emissions.

Without a comprehensive Roadmap, Maine will continue to be unprepared for price volatility, be dependent on fossil fuels, be restricted in its ability to build businesses and create jobs, and be constrained in its ability to access natural gas, energy efficiency, and renewable resources.

## 1.3 DOE Impact

An award under the SEP Competitive Award program (DE-FOA-0001222) will fund the next logical step to develop an energy and economic opportunity roadmap to coordinate, prioritize, and risk-assess Maine's efforts to foster sustainably competitive, private-sector capacity in energy infrastructure, resources, manufacturing, delivery, and services. The award will bolster state and regional energy planning through robust supply chains, natural resources, supporting business assets and infrastructure, and policies and programs.

Economic conditions, federal appropriations, state budgets, and private capital help drive the number of programs and amounts of money available for this project and these financial resources may not always be available, or are only accessible in small quantities. However, a viable, sustainable Roadmap is paramount in a state that is at the end of the energy and financial pipeline. DOE funding is critical to build on current baseline data, improve upon prior plans,

convene an expert Task Force to set goals for the Roadmap, identify potential policy and strategic options, and build a broad, grassroots outreach effort to develop consensus among stakeholders in the public and private sectors as to appropriate actions moving forward. When consensus is reached, the action plan will be appropriately documented and communicated. The team has worked together before to successfully complete previous research and planning projects, and many of the partners have worked together on other energy policy and strategy activities. The project is well defined, with specific tasks, deliverables, schedules and timelines, so execution should proceed as planned.

## 2.0 Technical Description, Innovation, and Impact

The following subsections address each of the merit review criteria and sub criteria listed in Section V.A.1 of the FOA.

### 2.1 Criterion 1: Program Strategy and Plan

***Reasonableness, completeness and feasibility of the proposed approach to meet the objectives of the Funding Opportunity Announcement.***

- **Energy Efficiency and Renewable Energy.** Maine has successfully integrated energy efficiency and renewable energy through legislative goals and creative funding. A few of the State's accomplishments are listed in Table 2-1. RGGI funds, combined with other eligible energy efficiency funds, are increasing. Maine is targeting resources to install alternative heating systems; expanding financing methods; assisting low-income homeowners; and establishing metrics for weatherizing homes. Renewable generation sources are increasing, long-term contracts exist for wind and tidal generation, and the Maine Public Utilities Commission released a February 2015 report with a positive outlook and valuation for solar energy. Additional wind projects are under construction or review and several small-scale wind projects have been accepted into the Community Renewable Energy Pilot Program.

**Table 2-1**
**Maine's Energy Efficiency and Renewable Energy Successes**

| | | | |
|---|---|---|---|
| 26% | reduced oil consumption from 2007 to 2010 | 100% | homes weatherized and 50% businesses weatherized by 2030 |
| 54% | electricity generated from renewable sources in 2012, surpassing statutory requirements | 8,000 | homes converted to natural gas in 2013/14 |
| 11 | land-based wind projects generating 443.5 MW | 40% | reduced industrial oil use from 2007 to 2012 |
| 1st | grid-connected tidal generation project in US | 8,000 | MW wind capacity goal for 2030, including 5,000 MW offshore wind |

- **Barriers.** Although heating oil use has declined, Maine remains one of the most petroleum-dependent states for home heating. Most Maine residents reside in areas too rural to access lower-priced options and current programs are not always reaching low-income users. The Maine Energy Planning Roadmap will confront this challenge and bring together heating and financial institutions and companies to accelerate the transition to cleaner and more affordable heat. In the industrial and commercial sectors, the Roadmap will provide guidance to assist large, energy-intensive industrial users to install efficiency improvements and invest in distributed generation while the State pursues

regional natural gas initiatives, provides more assistance to small businesses, and explores co-generation and district heating clusters.

- **Interagency Dialogue and Problem-Solving.** The Maine GEO and E2Tech have existing strong relationships with all State agencies possessing authority over Maine's energy policy and programs, including Efficiency Maine (Maine GEO's Director sits on Efficiency Maine's Board and Efficiency Maine's Director is on the E2Tech Board); the Public Utilities Commission (PUC); Office of Public Advocate (OPA); Department of Environmental Protection (DEP); Department of Transportation (DOT); Maine Technology Institute (MTI) (E2Tech's Director is on the MTI Technology Board); and Maine Department of Economic and Community Development (DECD). The GEO currently chairs interagency review teams on electric power sector planning – including a regular process for soliciting, accepting, and evaluating energy infrastructure proposals for using transportation corridors (*i.e.,* highways) – and state energy planning.
- **Stakeholder Engagement.** The Maine GEO and E2Tech will leverage existing relationships and reach out to additional parties to assure broad input on electric power sector planning. Representatives of Iberdrola, the parent company of Central Maine Power, Maine's largest utility sits on the E2Tech Board. GEO and E2Tech regularly work with ISO New England. ISO-NE performs grid operation, market administration, and power system planning for the region (Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, and most of Maine). GEO works with the New England States Committee on Electricity (NESCOE) and other regional electricity groups. E2Tech's membership, including T&D utilities and energy companies, provides a ready mechanism to communicate various phases of the project and solicit input from a wide-ranging audience. E2Tech's current Cluster Initiative Grant projects, funded by MTI, have further broadened its visibility in the State and relationships with companies in the energy sector. As will be described in Section 3.0, the project approach includes formation of a Steering Committee and a Task Force. These participants will be from public and private organizations across the State, further assuring broad stakeholder engagement.
- **Mapping and Assessment of Scenario Solutions.** To identify policy and strategic options, Maine GEO and E2Tech will assemble a Task Force of leaders in Maine and New England with expertise in clean energy, energy efficiency, natural gas, electricity reliability and resiliency, economic development, and policy. This Task Force will include state organizations such as Efficiency Maine, the Maine PUC, MTI, and others as well as regional organizations like the New England Clean Energy Council. Members will set goals for the Roadmap (*e.g.,* increase employment in the energy sector by 25% by 2020, meet natural gas demands in the industrial sector by 2025). These goals will reflect industry best practices and creative thinking about what is needed to achieve our collective goals for lowering energy costs for Maine citizens and businesses, addressing environmental regulations, including the Federal Clean Power Act greenhouse gas emission reduction mandates, and adjusting and consolidating renewable energy and energy efficiency programs to achieve energy savings and emission reductions. Potential solutions will be assessed over multiple scenarios that meet projected electricity and natural gas demand, address reliability and resiliency concerns, promote economic development, mitigate costs to ratepayers, and identify energy resource constraints. For

example, the Maine GEO (prepared by E2Tech's Executive Director) developed the State's first Energy Assurance and Emergency Management Plan, the National Association of State Energy Officials and DOE used as a model for other State plans.

***Clear Goals, Metrics, Tasks, Deliverables, Schedule, Budget.*** Section 3.0 of this proposal contains a complete project plan that can reasonably be completed in the timeframe identified and with the capacity and experience of the project team and partners. The proposal provides a description of the roadmapping approach, including methodology, partnership structures, data needs, schedule, and implementation plan. The proposal specifies in detail the approach to baselining the region's existing assets, examining the energy market opportunities to assess alignment with existing resources, and identifying key areas of regional cooperation and competitive advantage. The proposed approach has clear tasks with defined methods, deliverables, schedules and budgets. Goals for each task are clearly outlined. The scope of work clearly delineates the components and tasks to be performed in phases and distinct, but interrelated and coherent tasks.

***Roadmapping.*** This proposal with supporting project plan describes the various strategic planning and research projects that have been completed in the recent past that form the basis for this project. These include projects to define the cleantech (energy and environment) sector; describe the sector's members, characteristics and interconnections; determine the economic impact of the sector; and develop strategic directions for growing the sector. The project will also take into account Maine GEO's experience in public-private partnerships and development of state policies and plans as well as E2Tech's experience in completing research, roadmaps and convening of stakeholders in the energy, environmental, and clean technology sectors.

***Best practices.*** Maine GEO, E2Tech and partners will incorporate best practices throughout the baseline and roadmap processes, engaging public, non-profit, and private sector knowledge and guidance. The approach is consistent with best practices in energy sector research and stakeholder involvement in strategic planning efforts.

## 2.2 Criterion 2: Potential Impact

***Degree to which the applicant demonstrates that the proposed approach will lead to continuing dialogue among State Energy Offices, State and local environmental agencies, public utility commissioners, and utilities to address energy, environmental and economic interests.*** The Maine GEO coordinates all energy-related activities throughout State government and works closely with the Maine PUC, DECD, DEP, Efficiency Maine, and officials at other departments to address energy, environmental, and economic issues. E2Tech represents more than 220 private, public, and non-profit members; dozens of partners; and more than 2500 contacts that support the State's environmental, energy, and cleantech sectors. E2Tech communicates regularly with State and local agencies and officials from government agencies regularly attend its meetings, forums, and other events. The Maine GEO and E2Tech both possess the contacts and experience to continue meaningful dialogue among all parties.

***Degree to which the applicant will use analytical tools (modeling, etc.) to inform the development of the roadmap.*** Task Force members will participate in modeling and scenario analysis to develop the vision and long-term goals of the Roadmap. This may include workshops or other gatherings to consider trends driving energy markets and economic opportunities, examining the baseline data gathered in previous efforts, making scenario forecasts for future development, and setting long-term goals and objectives for market growth and coordination.

Based on these goals, and the research already completed, the Task Force will develop a set of alternative policy and strategic options for broader discussion in the stakeholder community. These options will likely cover a range of economic and energy development strategies (*e.g.*, how to better equip companies in the sector to meet customer demands at a reasonable cost; how to better promote the commercialization of energy technologies through innovation and entrepreneurial support). Various analytical tools (*e.g.*, Porter's Five Forces) will be used throughout the project to guide decisions based on energy supply/demand data and forecasts and experts will be invited to provide their analytical methods to each of policy option categories.

***Degree to which the proposed programs and activities will lead to the development of a plan that is likely to achieve increased levels of energy efficiency and renewable energy in the State/region, increases economic development opportunities associated with promoting energy efficiency and renewable energy, enhances the resiliency and reliability of energy supplies and the electric grid, complies with current and future environmental regulations, and addresses other economic pressures that will have an impact on the energy sector.*** The major strength of this proposal is in the diversity, expertise, and cooperative nature of the partners in the Maine GEO/E2Tech network. In addition to the state agencies outlined earlier, the developed plan will contain the input of renewable energy technology and manufacturing companies (solar, wind, hydro, biomass, tidal), utilities (both of Maine's investor-owned electric utilities, CMP and Emera), environmental consultants, universities (including Maine's flagship institution, the University of Maine), professional firms, regional partners covering all of New England and New York (NECEC, NASEO, other state energy offices), and many others. All of these entities have developed their own policies, plans, and procedures in all aspects of sound energy planning and policy, including electricity generation; transmission and distribution; reliability and resiliency; critical infrastructure; and environmental protection. Economic pressures will be addressed based on results of market opportunity and competitive analysis tasks and deliverables. This project will collate and organize a comprehensive set of policies, plans and procedures based on best practices and clearly define performance metrics.

***Degree to which the proposal will focus on regional or multi-State (as opposed to State-specific) challenges and will develop regional solutions and outlines a coherent proposal for such an approach.*** This is a single-state project, culminating in an energy plan roadmap for the State of Maine. However, its size and geographical diversity require a regional approach to planning. Maine is unique in the energy arena. About 90% of Maine is forested, covering 17 million acres, the most of any state. Maine boasts 3,478 miles of tidal coastline, longer than all but two other states in the continental United States. Over 5,000 rivers and streams, 37,000 miles long, cross the state and there are also 6,000 ponds and lakes. Maine's abundant natural wind, ocean, and biomass resources are economic drivers and position the State as a leader in renewable energy. Local development of technologies and expertise throughout the supply chains that take advantage of these resources are creating exportable expertise and services.

While the focus is on Maine, the project team will also work to incorporate regional baseline analyses, data, and expertise into the Roadmap. The New England region has a diverse set of focused energy capabilities. For example, the New England Clean Energy Council (NECEC) encompasses the entirety of the regional clean energy cluster and helps provide direct services on a regional scale. E2Tech is an affiliate of NECEC and the Maine Liaison with NECEC Institute, Cleantech Navigate, Cleantech Open Northeast, and ACTION (Association of Clean Tech Incubators of New England). Together, these organizations coordinate and streamline the

network of assets, programs, and clean energy market segments already present in the region to create an engagement channel for stakeholders. Regional cooperation and coordination to energy planning will be key components of the Roadmap and the Project Team will work with other state energy offices throughout New England, especially Vermont and New Hampshire.

***Degree to which the proposal focuses on creating mechanisms for accurately and rigorously measuring, tracking, and reporting energy savings and emissions reductions.*** Previous experience with such comprehensive planning has resulted in the dramatic growth of the energy sector in the past 12 years as well as tremendous growth of Maine's renewable and energy efficiency portfolio. This growth can reasonably be expected to continue over the next decade with the proper plan in place. Support for the sector is strong throughout the public and private sector. At the end of the two-year project, the Project Team will launch the Roadmap and establish the tracking system that will measure and evaluate progress of the energy savings, emissions reductions, and economic development strategies specified in the Roadmap.

## 2.3 Criterion 3: Estimated Energy Savings Impact

***Estimate of energy savings and associated cost savings and carbon dioxide reductions that would result from implementation of the project as conceived.*** Maine GEO, E2Tech, and their partners will develop a plan to support energy-saving programs that deliver lower-cost energy resources by saving electricity and heating fuel through energy efficiency improvements and the increased use of cost-effective alternative energy.

Maine's statutes include the following 2020 targets: 30% reduction in electricity sales, a peak demand of 100 megawatts (MW), and a 30% reduction in natural gas sales. In addition, Efficiency Maine-enabling legislation contains the goals of a 20% reduction in heating fuel consumption and the weatherization of 100% of Maine homes and 50% of Maine businesses by 2030; 100 MW reduction of peak-load electric energy consumption by 2010; and electricity and natural gas savings of at least 20% by 2010. Under current technologies, programs, and market conditions, the state will attain its 30% oil reduction goal by 2030 and this plan will strive to achieve incremental progress toward other efficiency goals.

A CMP $1.4 billion upgrade to the utility's bulk transmission system to be completed in 2015 will improve grid reliability and accommodate increases in load. The 2013 Energy Omnibus bill included a provision requiring the evaluation of non-transmission alternatives for all proposed new transmission lines less than 69 kilovolts, and with costs over $20 million. These alternatives will include energy efficiency, load management, demand response, and/or distributed generation with additional savings.

According to the DEP, 86% of GHG emissions in Maine are the result of energy consumption largely produced by combustion of petroleum products. Emissions have already been reduced to 1990 levels and are continuing their downward trend to 10% less than 1990 levels by 2020. Legislation enacted in 2013 directs other additional funds to Efficiency Maine, including allocations from RGGI and the nuclear waste fund. Under RGGI, Maine's proceeds are invested in Efficiency Maine programs. Recent changes to the emissions goals adopted by the RGGI states means that 2020 CO2 levels are projected to be more than 45% below 2005 levels. The Roadmap, in partnership with Efficiency Maine's Triennial Plan and the DEP's GHG reductions goals, will seek to meet and/or exceed these reduction projections.

### 2.4 Criterion 4: Capabilities and Partnership Structure

***Appropriateness of the credentials, capabilities, and experience of the project team and key personnel.*** The project team and key personnel have extensive experience in their respective fields, and the Steering Committee and Task Force will include policy, energy efficiency, business and economic development, manufacturing, renewable energy, utilities, and other state and regional experts with many years of experience in supporting the energy sector. Qualifications for the team and key partners are presented in Section 4.0.

***Degree to which the roles, responsibilities, and level of effort of each of the project team members has been identified, and to which the described management approach allows for successful management and implementation of the proposed project.*** The project is well defined, with specific roles and responsibilities described. The workplan will enable the team members to complete their tasks in a timely and coordinated way that will enable successful completion of the project and implementation of the resulting action plan.

The Maine GEO has a core mission to create effective public and private partnerships that advance Maine's energy security and economic development in an environmentally-responsible manner. The Maine GEO is the primary contact in state government for energy activities in the public and private sectors. E2Tech has a fundamental mission to be a catalyst to stimulate growth in and lead efforts to grow this sector. E2Tech is a member-based organization and includes renewable power companies, environmental engineers, emerging entrepreneurs, innovators and designers, as well as government agencies, educational institutions, and non-profit organizations and businesses. E2Tech has assembled multiple energy-related steering committees, and has a deep roster and wide diversity of private companies, institutions, non-profits, state and local government officials and regional organizations in its membership.

These two organizations have worked together successfully on both state and regional energy projects and will provide sound management of the work teams and tasks. The project team, steering committee, and Task Force will be assembled from a dynamic and engaged group of entities dedicated to working together to identify and implement opportunities for Maine's energy sector. The team has a long history of working together on state and regional energy projects, and the State has consistently achieved consensus on energy policy. The proposed approach can be replicated elsewhere as it is grassroots-based and fixed in accessible data and information. It will be especially relevant to other natural-resource-rich, rural states and regions.

## 3.0 Workplan

### 3.1 Project Objectives

The objectives of the Maine Energy Planning Roadmap are as follows:

1. Achieve energy and cost savings in the residential, commercial, industrial, and transportation sectors.
2. Reduce pollution and greenhouse gas emissions.
3. Support the growth of a robust state and regional energy market and workforce, including products, services, infrastructure, and manufacturing processes related to electricity reliability, energy efficiency, renewable energy, distributed generation, natural gas and transport, and other technologies.

4. Facilitate stakeholder and interagency discussions and activities that achieve Objectives 1 through 3 with emphasis on the electric power sector, natural gas supply, and transport; and integration of more renewable energy and energy efficiency into the portfolio.

Extending the understanding of the sector and bringing leaders together will contribute to the development of more targeted and successful strategies than have been heretofore possible. Public and private investment in research and development, a robust policy environment that supports energy generation and delivery, and smart use of the abundant natural resources in the State will help fuel the envisioned growth. This project will foster the development, growth and evolution of energy infrastructure, products, services, industrial improvements, and assets described in the Roadmap and augment the performance of the sector/cluster in light of state and regional assets, market circumstances and expectations, public policy, and other influences.

## 3.2 Project Narrative

The Maine Energy Planning Roadmap will be developed in three phases:

- Phase I: Baselining
- Phase II: Time-Horizon and Regional Development Goals
- Phase III: Action/Implementation Plans – Roadmap Development

These phases and the specific tasks and subtasks necessary to meet the project goals and objectives are detailed in the Work Breakdown Structure included in Subsection 3.5 and Appendix B. The overall approach to the project is described in the following subsections.

### *3.2.1 Objective, goals & potential impacts and outcomes*

As described in Subsection 3.1, the Roadmap will continue Maine on the path to reduce energy costs and energy-related pollution while creating economic opportunities for Mainers. The three-phased approach will ensure that existing and new research, data, and approaches are considered in Maine's Roadmap. The Task Force convened in the second phase will assure that the Roadmap's goals are appropriate for Maine and meet the FOA's AOI1 focus to *"explore and enhance economic development opportunities, identify measures for enhancing the resiliency and reliability of energy supplies and the electric grid, undertake relevant analytical efforts, and plan strategically for current and future environmental regulations and other economic pressures that will have an impact on the energy sector."* This will be followed by a broad, grassroots outreach effort to develop consensus among stakeholders in the public and private sectors as to appropriate actions moving forward. When consensus is reached, the action plan will be appropriately and communicated and implemented.

### *3.2.2 Approach and strategies to achieve objectives, goals, and impacts*

The Maine Energy Planning Roadmap project will be led and managed by the Maine GEO and E2Tech; these two organizations are uniquely positioned to develop a solid, workable energy plan for Maine with the assistance of dozens of public and private entity partners including those from other states in the region. The Roadmap will build on more than ten years of state investment and policy development, expand the current knowledge about the energy subsectors and policies in Maine's energy sector, and convert the information gathered into a consensus action and implementation plan. The approach will be measured and collaborative and help government and businesses build on initial energy successes to manage energy costs and use in the future. The final Roadmap will provide an assessment of current and future energy supply

and demand needs, examining existing energy policies and programs, and identify emerging energy challenges and opportunities.

### *3.2.3 Existing efforts & how they will be leveraged*

The Maine GEO, E2Tech, and other team members have been working together and separately on energy, economic, and environmental projects for several years. The funding received through this award will enable Maine to move forward while not starting from ground zero. Using a cluster approach, the team has already defined the clean energy sector; detailed its economic impact in Maine; described the research and development assets in the state; analyzed capital investments; assessed the business climate via an extensive survey effort; and assessed innovation and entrepreneurship support assets. Members of the team have detailed the on- and off-shore wind energy sector in depth, including supply chain and regulatory environments. E2Tech, in partnership with the Maine Manufacturing Extension Partnership and the Maine Ocean & Wind Industry Initiative, is currently creating a series of web-based supply chain databases to include the Renewable Energy, Manufacturing and Composite, Energy Efficiency, Environmental Services, and possibly Advanced Materials and Transportation & Advanced Fuels. The Maine GEO released an energy plan in February 2015 that will be significantly expanded and enhanced through this project, with much more participation by and input from public and private entities. The Maine GEO has also developed reports on oil reduction, energy assurance, wind development, and other forward-looking planning documents.

### *3.2.4 Identification of possible barriers and how they will be overcome*

While certain that a roadmap with broad consensus is achievable and will benefit all Mainers, the project team recognizes that there will be some hurdles to finalization and implementation. Identification and recognition of these factors will assure that they are planned for and overcome.

- **Scale.** Although relatively large in area, Maine has a low population and lacks large-scale energy customers and investors. As a result, Maine energy and technology companies often individually lack the ability to scale up to meet market needs. Neighboring New Hampshire and Vermont face similar situations. To overcome this constraint, the Roadmap will encourage collaboration among Maine energy stakeholders and policymakers as well as with resources elsewhere in northern New England. Participation from NECEC on the Steering Committee will assure that compatible partnerships are identified and explored.
- **Business Culture, Policy, and Regulatory Environment.** Maine is reported to have a regulatory and business environment that is slow to embrace innovation or new approaches. From a policy perspective, stakeholders in previous efforts noted that regulatory actions move slowly and energy incentives are inconsistent. The Roadmap will incorporate activities to address the gap between policy and programs that support energy generation, investment and development, and business community engagement and strategies.
- **Access to Investment, Engineering Expertise, and Entrepreneurial Programs.** Some companies report that they have poor access to investors. Venture capital investment per capita in Maine is only $5.08 in all sectors; significantly lower than regional peers Vermont ($22.06), New Hampshire ($105.90) and Massachusetts ($430.00). The relatively low level of investment in Maine may be a result of a number of factors – including the challenging business and policy environment described above. The Roadmap will explore regional opportunities available to inject additional capital and resources into the State.

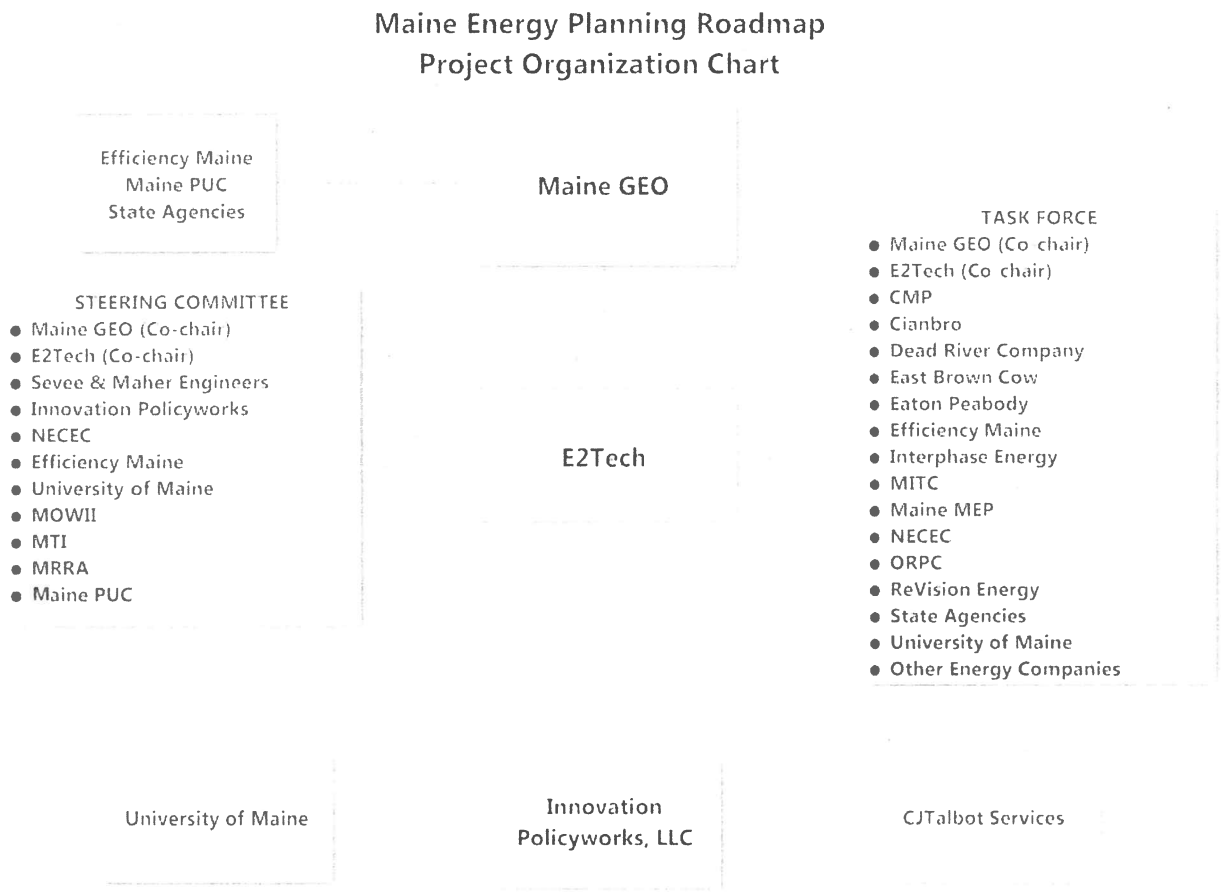
- **Workforce.** Maine's workforce reportedly has inadequate science, technology, engineering, and math (STEM) skills. The Roadmap will involve Maine's educational institutions, including the seven-campus University of Maine system, Maine's seven community colleges, private colleges and universities, and technical and STEM-focused high schools, as stakeholders. Despite the perceived inadequacies, Maine does have extensive opportunities for training. The Roadmap will help to develop career opportunities.
- **Public Awareness of Energy Benefits.** Stakeholders report that the general public in Maine is typically unaware of the economic, environmental, and job creation benefits of energy and technology innovation and of the policies that govern the energy sector. As a result, stakeholders indicated that it is challenging to build political support for the sector (and/or public sector investment). Stakeholders reported that it would be worthwhile to build grassroots support for energy technology innovation. As part of the plan, Maine GEO and E2Tech will develop and implement an outreach program to communicate the benefits of a strong clean energy production, manufacturing, and service sector and strategies for policy and public/private partnerships, support, and investment to improve public awareness.
- **Demographics.** Maine is about 320 miles long and 210 miles wide, with a total area of 33,215 square miles or about the size of the other five New England states combined. It consists of 16 counties with 22 cities, 435 towns, 33 plantations, and 424 unorganized townships with a population of about 1.3 million people. The rural nature of the State lends itself to more miles traveled, with nearly 100% dependence on oil for transportation. It is the oldest state in the country with a median age of 43.5 years in 2014, up from 43.2 years in 2011. That's more than six years older than the U.S. median age of 37.4 years. More than one in ten Mainers lives in poverty. Approximately 65% of Maine households use oil as their primary heating fuel, more than any other state. When combined with some of the oldest housing stock in the country (25% built before World War II), and the highest energy usage by industry in the country, the urgency to develop a plan for energy is clear. Not only must Maine have lower energy prices for its citizens to survive its challenging climate, and for its industry to be competitive, the State must also seize the opportunity to build a stronger sector that will employ Mainers.

### *3.2.5 Project team, roles and structure, including partners and capabilities*

The Maine Energy Planning Roadmap Project will be administered and managed by the Maine GEO and E2Tech, the preeminent organization focused on economic and business development in the environmental and energy technology sector in the state. The project organization, including team members and partners (i.e., members of the Steering Committee and Task Force) are illustrated in Figure 3-1.

The Maine GEO is responsible for administering the State Energy Program, is the grant applicant under DE-FOA 0001222, and will be administering, reporting, and providing record-keeping functions under the grant. The Maine GEO will manage sub-contractors under this grant. E2Tech, a non-State entity, 501(c)(3) non-profit, will be the primary sub-contractor under the grant. E2Tech will provide management, oversight, consulting, and advice and will perform specific tasks and deliverables with milestones. E2Tech will work with other sub-contractors, the Task Force and an industry-led Steering Committee made up of companies and organizations in Maine's energy sector, and along with the Maine GEO will provide the strategic and operational leadership for the project.

**Figure 3-1**




The Steering Committee members will be selected from representatives of E2Tech's member companies, partners, and organizations. These individuals are extremely active in and central to the energy and economic development sectors and have specific knowledge of importance to this project. Capabilities of key project team members and partners are provided in the following paragraphs. More information on the team members' qualifications is presented in Section 4.0. Resumes of key personnel on the project team and letters of support and commitment from partner organizations are provided separately, as requested.

**Project Team Members**

The ***Maine GEO*** is responsible for planning and coordinating state energy policy and, as the designated State Energy Office, is charged with providing leadership in the development of public and private partnerships that achieve clean, reliable, affordable, efficient, sustainable, indigenous and renewable energy resources. It is the responsibility of the Maine GEO to work in conjunction with other departments of State government, the Legislature, and private and nonprofit sectors to advance and optimize Maine's energy security, economic development and environmental health. Following are Maine GEO's goals:

- Achieve all cost-effective energy efficiency in the State of Maine.
- Provide resources to invest in renewable and clean energy projects.

- Support investment in improving transportation and fuel efficiencies.
- Reduce electricity prices and overall energy costs to Maine consumers.
- Make available the financial, regulatory and policy support to upgrade electricity and natural gas services, transmission systems and infrastructures.

Patrick Woodcock is the Director of the Maine GEO and has worked for U.S. Senator Olympia Snowe on energy and environmental issues. Mr. Woodcock will provide executive-level leadership required to promote efforts to create and implement a Roadmap for improved policies, robust programs, and increased energy-related business and economic development opportunities. He will work closely with the Maine DECD Commissioner on the economic opportunity components, and Efficiency Maine, PUC, DEP, Public Advocate, and other state agencies responsible for energy policies and programs. Senior Planner Lisa Smith will administer the grant on behalf of the Maine GEO. www.maine.gov/energy.

***E2Tech*** is a non-profit business trade association whose mission is to build and expand the State's environmental, energy and clean technology sectors. In addition to providing valuable networking and educational events, E2Tech promotes business development and sustainable job growth, research and development, product commercialization, cluster initiatives, and supply chain development. E2Tech members include private and non-profit businesses, manufacturing leaders, educational institutions, governmental agencies and a range of technology, financial and legal professionals. Jeff Marks is the Executive Director of E2Tech and has worked on behalf of leading large, mid-sized and small manufacturers in the forest and paper, renewable energy, buildings, aerospace and other industries. E2Tech will be the primary subcontractor on this project and Mr. Marks will manage and provide substantive content to the Roadmap development process. Bonnie Frye Hemphill is E2Tech's Senior Planner, and will work with Mr. Marks on the Baseline Development, Time Horizon/Goals, and Roadmapping phases, tasks, and deliverables. www.e2tech.org.

***CJTalbot Services/Cynthia Talbot*** is a woman-owned, administrative support provider who has worked with E2Tech for 3 years. Ms. Talbot is E2Tech's Operations Director and will work on grant administration, roadmap preparation, and other duties. Mr. Marks and Ms. Talbot have managed other large-scale grants including the Maine Cleantech Cluster Initiative Program (CIP-144), Maine Cleantech Business & Economic Development Project (CIP-161), and Cleantech Navigate Northeast (CIP-164) grants to stimulate the formation and growth of technology businesses, increase Maine's capacity for technology-based companies and services, address gaps in the business infrastructure, and support an integrated, targeted-industry cluster enhancing the competitive positions of those industries.

The ***University of Maine*** is the state's premier public university and is among the most comprehensive higher education institutions in the Northeast. Professor Todd Gabe specializes in regional and community economic development and public finance. Research Associate Caroline Noblet conducts research on environmental and energy economics, education and marketing. Mr. Gabe and Ms. Noblet will be conducting research and analyzing demographics, supply chain, and work force data in Phase I – Baselining. Professor Jeff Thaler and Jake Ward will serve on the Steering Committee. Mr. Thaler is from the School of Economics and a visiting professor of Energy Law and Policy at the University of Maine, School of Law. He is also

one of the founders of E2Tech and a leading regional environmental and energy attorney. He is the University's lead attorney on such clean energy initiatives as its floating offshore wind projects and landfill gas project. Mr. Ward is on the University of Maine President's Cabinet and is Vice President of Innovation and Economic Development. http://umaine.edu/soe/.

***Innovation Policyworks, Inc.*** is a technology-based economic-development consulting firm. Their services include economic research, evaluation of innovation and entrepreneurship programs, strategic planning and facilitation, as well as coaching for creation and development of new products, services and processes. Dr. Catherine Renault has more than 23 years of experience in innovation-based policies and economic development that is grounded in best practice as well as academic research and methodologies, as well as being the former Director of Innovation for the state. She is the co-author of the E2Tech Cleantech Sector Study, and earlier papers on clean technology in Maine. She brings a wealth of experience in cluster research and cluster development strategies to this project. www.innovationpolicyworks.com

**Project Partners/Steering Committee and Task Force Members**

Partners in this project will include members of the Steering Committee and Task Force, as well as others in Maine's energy sector. Currently anticipated Steering Committee members are presented in Table3-1.

**Table 3-1**
**Maine Energy Planning Roadmap Steering Committee**

| Name | Title and Organization |
|---|---|
| Patrick Woodcock (Committee Co-Chair) | Director, Maine GEO |
| Jeff Marks (Committee Co-Chair) | Executive Director, E2Tech |
| Jim Atwell | Senior Project Director, Sevee & Maher Engineers, Inc. |
| Catherine Renault | Principal, Innovation Policyworks LLC |
| Peter Rothstein | President, New England Clean Energy Council/NECEC Institute |
| Michael Stoddard | Executive Director, Efficiency Maine |
| Jeffrey Thaler | Professor and Assistant University Counsel, University of Maine Schools of Law and Economics |
| Paul Williamson | Executive Director, Maine Ocean and Wind Industry Initiative |
| Martha Bentley | CIP & MTAF Program Consultant, Maine Technology Institute |
| Tom Brubaker | Public Works and Utilities Manager, Midcoast Regional Redevelopment Authority |
| Mark Vannoy | Chairman, Maine PUC |
| TBD | Representatives of energy companies and utilities |

The Steering Committee represents a cross section of Maine's energy sector. Key project partners, with representatives on the Steering Committee, include the following organizations.

***Efficiency Maine*** is an independent trust dedicated to promoting the efficient and cost-effective use of energy in order to save money for Maine residents and businesses, grow the economy, and create jobs. Efficiency Maine's energy-saving programs deliver Maine's

lowest-cost energy resource by saving electricity and heating fuels through energy efficiency improvements and the increased use of cost-effective alternative energy. Michael Stoddard, Executive Director, will be on the project's Steering Committee. In addition, Jim Atwell, past Chair of the Efficiency Maine Board, Maine State Chamber of Commerce, and E2Tech Board of Directors, will participate on the Steering Committee. Mr. Atwell has more than 40 years' experience in environmental and energy engineering, including project management and director roles. www.efficiencymaine.com.

The ***Maine Technology Institute (MTI)*** is an industry-led, publicly-funded, nonprofit corporation that offers early-stage capital and commercialization assistance in the form of competitive grants, loans and equity investment for the research, development and application of technologies that create new products, processes and services, generating high-quality jobs across Maine. Every $1 of MTI funds received generates an additional $14 in non-MTI funding and, since 2000, MTI has funded more than 1300 technology projects in Maine at a financial commitment of $106 million that has leveraged an additional $173 million. Martha Bentley is MTI's Cluster Initiative Program and Maine Technology Asset Fund Program management contractor, as well as point person for Blackstone Accelerators Growth. www.mainetechnology.org

The ***NECEC Institute***, a 501(c)(3), leads New England's regional programs focusing its efforts on innovation, cluster research, economic development, education and workforce development. Kim Herb is Innovation Program Manager and brings experience as a business owner and policy analyst and many years of expertise in the clean energy industry. She is the lead on implementing components of the Institute's Cleantech Navigate program. Peter Rothstein is Executive Director of the NECEC Institute and its sister organization, the New England Clean Energy Council. www.cleanenergycouncil.com

***Maine Ocean and Wind Industry Initiative (MOWII)*** has created online wind- and ocean- energy supply chain products and business search portal for use by national and international project developers, equipment manufacturers and other business entities. It identifies the capacity of the Maine wind and ocean energy industry and the resources, partners and suppliers for companies interested in doing business in the Northeast United States. MOWII's work with E2Tech to convert this system for use by E2Tech in building this capacity and portal for the broader State clean energy community, including solar, geothermal, biomass, energy efficiency, smart grid, CHP, conservation companies and their supply chains, will be critical to the Phase I Baseline Development work. www.mainewindindustry.com.

The ***Midcoast Regional Redevelopment Authority (MRRA)*** is developing a Renewable Energy Center at Brunswick Landing, a former naval air station in Maine with state-of-the-art technologies, systems, facilities, and its own electric grid. Tom Brubaker, public works and utilities manager, is leading this project.

***Other Maine energy leaders, technical advisors, educators and program champions*** that will be working on the Steering Committee and Task Force include Central Maine Power

(Maine's largest electric utility); ReVision Energy (Maine's largest solar company, with microgrid and distributed energy projects); Ocean Renewable Power Company (leading global tidal energy company); and many others.

### *3.2.6 Stakeholders and plan for engagement*

This project will capitalize on stakeholder engagement at every phase of the project and through every task and deliverable. Participants possess a core commitment to stakeholder, constituent, member and client engagement. The project's Steering Committee and Task Force will be comprised of a wide variety of representatives from public and private organizations involved in energy. This will assure diverse stakeholder input throughout the process.

Since 2002, E2Tech has built a reputation for holding forums and workshops on key topics of interest to the sector. In 2014, E2Tech held 17 events with more than 1700 attendees and cohosted partners' events with hundreds more; matched companies with business and economic opportunities; advised regional partners on Maine policy initiatives; developed reports, white papers & recommendations on Maine's energy sector; all while increasing the size of its membership and network significantly. E2Tech convened forums and brought together experts on energy and environmental policies; petroleum markets and technologies; biobased materials; creation of renewable energy centers; offshore wind projects; pulp, paper, and forest products; electricity grid and natural gas pipeline infrastructure; climate change adaptation; distributed generation and microgrids; business and technology acceleration; cleantech startups; solid waste; innovation engineering; and political forums, among others.

E2Tech will utilize its network of over 2500 contacts across the State and its experience hosting events to maximize stakeholder input. These engagements will include workshops, forums, and meetings that include a cross-section of experts in energy markets and systems, technology, business acceleration, economic development, policy, finance and other disciplines to formulate and achieve consensus on roadmap goals and milestones, identify gaps, determine priorities, and assign tasks.

The goals of stakeholder engagement will be to:

- Eliminate duplication of efforts and increase efficiencies of process.
- Identify barriers and develop technology and economic pathways to overcome obstacles.
- Develop implementation strategies and priorities.
- Bring experts together to build consensus and generate strong support for the Roadmap.

Stakeholders, partners and resources for development and implementation of the Roadmap will include, but are not limited to, the entities listed in Table 3-2.

### *3.2.7 Information and data needs, including any modeling resources*

Maine GEO, E2Tech, and their partners have readily-available information and data resources compiled under other projects, both past and ongoing, as well as from team partners, Steering Committee and Task Force member organizations.

Under a MTI grant focused on growing Maine's Cleantech business sector, additional data is being collected on the roughly 750 companies and organizations with energy and environmental products, services, or technologies. E2Tech uses the National Establishment Time-series (NETS) database to gather additional information on its companies. The NETS database contains a wide

**Table 3-2**
**Stakeholders, Partners, and other Resources**

| | |
|---|---|
| **Business Development, Accelerators, and Incubators** | Blackstone Accelerates Growth, Maine Center for Entrepreneurial Development, Maine Small Business Development Centers |
| **Economic Development** | Maine and Company, Maine Economic Growth Council, Maine International Trade Center, Maine Rural Development Authority, Midcoast Regional Redevelopment Authority |
| **Educational Institutions** | Maine Community College System; University of Maine System; and private colleges such as Bates, Bowdoin, Colby, and Unity |
| **Energy Efficiency, Environmental, and Renewable Energy Groups** | Alliance to Save Energy, American Council for an Energy-Efficient Economy, Natural Resources Council of Maine |
| **Government Agencies** | Efficiency Maine, Maine Department of Economic & Community Development, Maine Department of Environmental Protection, Maine PUC, U.S. Department of Energy |
| **Information & Outreach Resources** | Greenenergymaine.com, Maine Energy Education Program |
| **Investment Community** | Blackstone Accelerates Growth, Coastal Enterprises, Inc., Finance Authority of Maine, Maine Angels, Maine banks and credit unions, Small Enterprise Growth Fund |
| **Manufacturers, Natural Gas, Construction** | Bath Iron Works, Cianbro, Fairchild Semiconductor, LL Bean, Maine Manufacturing Extension Partnership, Reed & Reed, Maine Manufacturers Association, Summit Natural Gas |
| **Regional Partners** | ACTION – Association of Cleantech Incubators of New England, Environmental Business Council of New England, New England Clean Energy Council |
| **Renewable Energy & Energy Efficiency Companies** | Energy efficiency contractors, Maine Energy Systems, Interphase Energy, Ocean Renewable Power Company, ReVision Energy |
| **Trade Associations** | Maine State Chamber of Commerce, Maine Renewable Energy Association, Maine Energy Marketers Association |
| **Utilities** | Emera Maine, Central Maine Power, Maine Natural Gas, Bangor Natural Gas, Unitil, Summit |

variety of data about employment, location, industry classification, estimated annual sales, and type of establishment. In a related project, E2Tech is using existing methodology to display energy sector data. Under this project, E2Tech will use interviews and online research to compile information on energy policies, markets, technologies, workforce, and other key data. A modified Porter's Five Forces modeling tool may be used to evaluate energy policy and strategic options, as well as market opportunity and competitive advantage analysis: 1) Supplier power (*e.g.,* electricity and heating providers); 2) Buyer power (*e.g.,* industrial and residential ratepayers using Efficiency Maine programs; 3) competitive rivalries (*e.g.,* natural gas and renewables as alternatives to the dominant heating fuel market); 4) Threat of substitution (*e.g.,* more efficient boilers); 5) and threat of new entry (*e.g.,* increased use of renewables under RPS requirements). *Efficiency Maine*[1] implements most of the energy efficiency, natural gas, and alternative energy programs in Maine's residential, low-income, commercial, and industrial areas including lighting upgrades, building sealing and insulation, development of high performance buildings, appliance upgrades and replacements, energy training and certification, and public

[1] Efficiency Maine's Executive Director will be on the project Steering Committee and Task Force.

education. It is also a critical source of energy and cost savings data, systems penetration, and programmatic results and uses various energy savings program modeling based on energy usage.

## 3.3 Summary Table

A project Summary Table for the Maine Energy Planning Roadmap is presented in Appendix A to this Technical Volume.

## 3.4 Technical Scope Summary

The following subsections outline the overall project scope and approach. Detailed descriptions of the tasks and subtasks are provided in the Work Breakdown Structure (Appendix B).

### *3.4.1 Phase I – Baselining*

The first phase of this project will include the following tasks:

**Task 1.0 - Steering Committee.** A Steering Committee of experts will be convened to advise and support the Project Team from start to finish. The Steering Committee will develop a Charter in its first meeting and will meet at a minimum of once per quarter for the 2-year duration of the project. Further description of this committee and a list of its proposed members are presented in Subsection 3.2.5 and in Subsection 3.8, Project Management.

**Task 2.0 - Baseline Data Development.** This task will include researching and gathering information on the current state and regional energy landscape and the factors that affect it, including demographics, supply chain, workforce, and policies and programs. Data gathering will rely on work previously done by E2Tech and new work to be performed by E2Tech, Innovation Policyworks, and University of Maine. Under a separate project, E2Tech is developing databases to characterize energy firms and assets by key variables such as age, size in revenues and employment, location by zip codes, products and services. These demographics are important to understanding challenges that Maine's energy sector may be facing. The Project Team will analyze the data and compile the information into a Baseline Development Report.

Mapping supply chains for state and regional clusters or sectors is valuable for energy and economic development strategy development because it can help pinpoint areas of strength and also opportunities to fill in gaps in the supply chains. In the case of Maine, many companies are relatively far down most energy supply chains, or are primarily involved in implementation and installation, but not in the manufacturing of primary components. To validate this hypothesis, or disprove it, the Project Team needs to understand the supply chains for each of the components of the subsectors. The Project Team already has a deeper understanding of the on- and off-shore wind power supply chain developed by the Maine Ocean and Wind Industry Initiative (MOWII) but will need to develop a similar level of detail for other energy subsectors to help complete the Roadmap in this project.

The Project Team will use secondary data but also interview and survey companies in the sector to completely understand the interactions and networks that exist. The Project Team will work with the MOWII supply chain tool to provide a geographic map of the sector and to publish the information. E2Tech's online energy-Maine supply-chain product and business locator will help equipment manufacturers, project developers, and professional service providers identify potential business partners and supply chain suppliers through name and specification search tools. This convenient online locator will expedite the Maine energy supply chain search process to increase sales contacts, uncover new supply opportunities, and demonstrate Maine's

expanding energy supply chain capabilities nationally and globally. Under the competitive SEP award, E2Tech and its partners will be able to work with its industry partners to modify and use this database tool to encompass the broader energy sector and its supply chain, populate the tool with data across the energy sector, and share the tools and results with state, regional and national stakeholders as part of Phase III.

While some work has been done on workforce availability, the Project Team will focus on workforce development capacity and identify areas of strength and areas of opportunity. This information is readily available through both secondary and primary sources. The Project Team needs to learn to what extent is the potential growth of the sector being constrained by the availability of skilled labor, and what programs exist and what curricula may be needed to bridge the gaps.

This task will culminate in a report of findings, which will be vetted through the Steering Committee. Input received through this process will be incorporated into the final report.

**Task 3.0 – Competitive Advantage and Market Opportunity Analysis.** The University of Maine found in its June 2013 study "*Business Climate for Maine's Clean Technology Sector* that, including multiplier effects, Maine's clean technology sector has an annual statewide economic impact of an estimated $2.3 billion in output, 20,401 full- and part-time jobs, and $689 million in labor income. Every $1 of revenue in the sector supports a total of $1.66 in statewide economic activity and the economic activity associated with each person directly employed in the cleantech sector supports a total of 1.67 Maine jobs. A 2014 MTI report finds that the alternative energy sector grew nearly 12% since 2007 and that the clean energy technology sector is growing faster than the other technology sectors in Maine. An analysis of the baseline data collected to date, and augmented by current work, will enable the Project Team to better assess Maine's competitive advantage. Maine's traditional economy is based on forestry, fishing, and agriculture. Manufacturing industries like paper production and textiles thrived until recently. Alternative energy, on the other hand, is an emerging sector of the Maine economy, made up of firms and organizations engaged in activities ranging from renewable energy production and generation to technology system distribution and installation to weatherization and efficient building construction and retrofits.

Maine is well positioned to play a key role in developing expertise in the sector and advancing the Plan. The University of Maine launched the nation's first offshore floating wind turbine. Ocean Renewable Power Company in Eastport is operating the first grid-connected tidal power system in the Northern Hemisphere. Maine has more than 11 wind farms that can generate 443.5 megawatts of power, which is enough energy to supply 250,000 homes. The State has extensive hydropower capacity that can generate 750 megawatts of clean energy. Thermal biomass systems take advantage of Maine's significant forestry industry and the use of wood pellet systems reduce heating bills by an average of 40 % while creating jobs and keeping investment dollars in the State. The Project Team will compile these resources and describe Maine's abundant land and offshore wind-power and biomass resources, innovative and traditional energy efficiency industries, research assets, and program and investment needs to describe Maine's unique and meaningful assets. The Baseline Development phase will also prioritize the energy economic potential beyond the State of Maine and map areas of competitive advantage within broader value chains, with particular importance attached to critical components or enabling technologies.

For example, an E2Tech/MOWII analysis of Maine's wind and ocean energy industry supply chain found that investment in the wind and ocean energy industry in Maine developed local expertise that will be in high demand as an export product to the active regional, national and international markets for a variety of industries across the State. Similarly, an understanding of Maine's competitive advantage informs a discussion of the market opportunities in the state and beyond. For instance, Maine is by far New England's largest wind producer but now accounts for only a small fraction of total U.S. output. According to the American Wind Energy Association, the U.S. wind industry totaled 51,630 megawatts of cumulative wind capacity through the end of September 2012. There is tremendous opportunity for the State to increase its capacity.

The Roadmap will provide a clear, concise and comprehensive energy strategy and a plan that can be validated, refined and improved upon. The real measure of any roadmap is how well it serves to connect a present baseline with future goals and plans. Growth in the energy sectors have been captured by a number of indicators, including facilities expansion and equipment purchase and projected revenue increases. This effort will help provide information on the following factors:

- size of the market
- demographics (e.g., revenues, jobs)
- characteristics/sectors (e.g., production/generation, delivery, storage, consumption)
- business climate
- technology readiness
- supply chain (e.g., suppliers, distributors, customers)
- natural resources
- competitive advantages, market opportunities, and limitations
- trends and projections
- environmental information
- status and requirements of existing laws, regulations, policy directives and other rules
- political and policy trends or outlook

**Task 4.0 – National, Regional, State, and Local Energy Policies and Programs.** A solid, data-driven baseline of existing and proposed energy policies is a crucial piece of the project's data baseline. This task will take a comprehensive inventory of current Maine energy policies, regulations, and programs that influence residential, industrial, and commercial heating and electricity use; renewables; natural gas; electricity reliability, resiliency, transmission and distribution; transportation; greenhouse gas emissions and pollution; and state government energy use. The Project Team will also take into account legislative proposals, stakeholder energy policy priorities, and federal regulatory initiatives. Finally, they will evaluate other states' policies and programs that may be models for Maine.

### *3.4.2 Phase II –Time-Horizon and Regional Development Goals*

The second phase of the Roadmap project will focus on setting the goals and objectives of the actual Roadmap, which will be written and circulated for input in Phase III.

**Task 5.0 – Set Time Horizons and Regional Development Goals.** Phase II will begin by establishing the Maine Energy Planning Roadmap Task Force with members of the Steering Committee plus representatives from key energy and economic development entities. E2Tech will facilitate the Task Force. While the Steering Committee provides high-level strategic guidance and advice on the entire project, the Task Force will be more focused on specific tasks that include the following:

- Define the audience for the Roadmap – policymakers, regulatory agencies, media, economic development agencies, private-sector companies, non-profit organizations, utilities, and the general public, among others.
- Set a clear and concise set of goals that, if achieved, will result in the desired outcome of a strong, robust energy sector with sustainability and tracked progress.
- Set milestones for achieving the goals with specific dates (*e.g.,* increase alternative energy funding by 20% in 2 years; increase access to biomass heating systems and heat pumps by 10% in 2020 and 2025).
- Outline potential gaps and obstacles in the Roadmap, including technology limitations, market barriers and political and policy issues.
- Develop action items and strategies to address gaps and barriers (*e.g.*, creation of financing mechanisms to overcome the barriers of first costs for alternative energy systems, business start-ups, project development, or business expansion).
- Prioritize the most important actions to achieve the goals within the timeframes.

Goals will reflect the challenges about what is needed to achieve the collective goals of meeting projected electricity and natural gas demand, addressing energy assurance concerns, promoting economic development, reducing or mitigating ratepayer costs, identifying energy resource constraints (e.g., supply, transport, transmission, delivery), and increasing the Maine business content of the energy sector. Tangible goals will have specific time-horizons – in this case 2020 and 2025 – and will incorporate regional goals of other states through New England. Task force members will participate in modeling and scenario analysis to develop the vision and long-term goals of the Roadmap. This phase may include workshops or other gatherings to consider trends driving energy markets and economic opportunities, examining the baseline data gathered earlier, making scenario forecasts for future development, and setting long-term goals and objectives for growth.

### *3.4.3 Phase III - Action/Implementation Plan – Roadmap Development*

The final phase is the core of the project and Maine GEO and E2Tech will be highly engaged in all Roadmap tasks and soliciting input from all levels and sectors of the energy sector in Maine.

**Task 6.0 - Policy and Strategic Options by Energy Sector**: Based on goals established in Phase II, and the research already completed and to be done under Phase I, the Task Force will develop a set of policy and strategic options for broader discussion in the stakeholder community. These options will likely cover a range of energy and economic development strategies from how to better attract and recruit companies to move to Maine, how to better equip existing companies in the sector to compete globally and to take advantage of market opportunities, how to build and diversify Maine's energy portfolio, and how to promote the commercialization of Maine technologies through innovation and entrepreneurial support.

**Task 7.0 – Draft Roadmap Preparation**. Although listed separately for budgeting and planning purposes, preparation of the Roadmap (Task 7.0) and the Stakeholder Process (Task 8.0) will be conducted concurrently. The project team will bring together the data, analysis, graphics and results from stakeholder consultations and workshops to prepare a document with the elements of a comprehensive, compelling roadmap. The draft Roadmap will be shared among participants (*e.g.,* project team, steering committee) and Maine GEO and E2Tech will collect and assess comments and incorporate strengthening input into the document. A revised draft will be prepared and reviewed with a wider distribution and integrating with a series of stakeholder

meetings and informational forums as well as a formal period for stakeholder input. A final Roadmap will be prepared with extensive consultation with Steering Committee Members.

At the end of the two-year project, the Project Team will launch the roadmap and put in place the tracking system that will measure and evaluate the following metrics:

- Progress of the energy and economic development strategy specified in the roadmap.
- Results of energy policies and programs.
- Development, growth and evolution of the clean-energy products, services, industrial efficiency improvement of companies and assets described in the roadmap.
- Performance of the sector/cluster in light of the state and regional assets, market circumstances and expectations, public policy, and other influences.

**Task 8.0 Stakeholder Process.** E2Tech will plan and execute a process to solicit input to the Roadmap from all demographics and geographic areas of the state. E2Tech will continue to use its vast network of contacts to assure that a variety of workshops, forums, facilitated brainstorming, and individual sessions are well advertised and attended. Events will be structured to help participants react to the policy and strategic options, edit, amend or create new options, and come to an understanding about the best direction for Maine. These sessions may entail different groups for different workshops – investors, utilities, providers, policymakers. Workshops will be structured around objectives, expected outcomes and outputs, structured questions and facilitation, scope and boundaries, and participants and their expertise. Formal and informal input to the Roadmap will be considered and incorporated as appropriate, based on the objectives and the guidance of the Task Force and Steering Committee.

**Task 9.0 Final Roadmap and Launch.** A final Roadmap will be prepared with extensive consultation among project team and Steering Committee members. The project team will launch the Roadmap and put in place an implementation and tracking system to measure and evaluate progress. For example, Maine GEO and E2Tech may apply the Roadmap to Maine's growing biomass industry. Maine is the most heavily forested state in the nation, resulting in Maine having the #3 nameplate capacity in the US for power generation from biomass – generating 2.1 million kilowatt hours of electrical power per year. Maine's well-established forest products industry is ideally prepared for further expansion of biomass energy with unmatched infrastructure, equipment, knowledge, management practices and trained labor force. Maine is a leading research hub for forest biofuels in conjunction with Maine's highly respected pulp and paper industry. Maine has four active and successful wood pellet manufacturing facilities with two more in the works. Maine is the first U.S. State to accept European Union emissions testing for world-class clean-burning wood pellet boilers. The northeastern U.S. has been targeted as a major market for wood pellet heating systems, but there are serious concerns in the industry that there needs to be a more robust energy policy to increase penetration of boilers and stoves into Maine's homes and businesses. Perceived wood pellet shortages have exacerbated the problem. Maine GEO and E2Tech could plan to facilitate a stakeholder meeting of wood pellet manufacturers, biomass boiler distributers and installers, regional, economic development officials, investors, and policymakers to use the Roadmap to develop a policy and promotion strategy for this industry and the companies that serve it. As one of the first tests of the Roadmap and its application to Maine's energy sector, the Roadmap could be applied to the electric and thermal biomass industry to promote Maine and New England as a regional hub for clean energy businesses and technologies, including their development and commercialization, manufacturing

facilities and other partner businesses and/or organizations with experience in designing, financing, developing and constructing biomass energy infrastructure and customer bases that are consistent with the assets in Maine and throughout New England.

### 3.5 Work Breakdown Structure and Task Descriptions

A Work Breakdown Structure (WBS) for the Maine Energy Planning Roadmap project is provided in Appendix B to this Technical Volume.

### 3.6 Milestone Summary

A summary of milestones for this project is presented in Appendix C to this Technical Volume.

### 3.7 Project Schedule

A Project Schedule is presented in Appendix C to this Technical Volume.

### 3.8 Project Management

Subsection 3.2.5, Project Team, Roles and Structure, outlines the major partners, organizations, and stakeholders needed to successfully develop the Maine Energy Planning Roadmap. The following provides additional information on their experience and capabilities and how they will develop and support the Roadmap.

The *Maine GEO* and Director Patrick Woodcock will be the primary point of contact for interagency discussions and will provide executive-level leadership needed to promote efforts to develop the plan. Lisa Smith will be the primary grant administrator and will be responsible for quarterly reports to the Department of Energy.

*E2Tech* will be the primary sub-contractor on the project and will work with its diverse membership and partners to compile and evaluate background data, create the Roadmap, manage the process, and maximize the likelihood for its implementation. Executive Director Jeff Marks and Senior Planner Bonnie Frye Hemphill will work with policymakers; energy sector decision makers; business and financial representatives; non-governmental organizations; and other stakeholders to develop the goals, milestones, gap and barrier analyses, action items, priorities and timelines to ensure the Roadmap is developed, implemented and tied to achieve the desired outcome. Cynthia Talbot, an independent contractor who works regularly with E2Tech, will be responsible for document preparation, E2Tech's subcontractor grant management, and reporting to the Maine GEO.

The Maine GEO and E2Tech will work closely on all tasks and deliverables and will establish regular project management meetings. Maine GEO and E2Tech will co-chair Steering Committee meetings. They will coordinate their financial and project tracking practices and will be jointly responsible for project risk management, including identifying substitutes for meetings, tasks, and personnel if necessary; employing project best practices; following detailed project management criteria; filling vacancies on the Steering Committee; and project reporting.

Members of E2Tech's Board of Directors, Strategic Planning Committee, and Executive Committee will also provide strategic guidance on this project, including oversight of financial outlays, objectives, and time and staffing needs and resources.

# 4.0 Technical Qualifications and Resources

## 4.1 Project Team Qualifications and Expertise

Roles and responsibilities of key members of the Project Team are outlined in Table 4-1 and further detailed in the following subsections.

### *4.1.1 Maine Governor's Energy Office*

The Maine GEO is responsible for developing and coordinating energy policies across state government; forming public-private partnerships to execute energy priorities; and advising the Governor, Legislator, media, state agencies, private sector, and the general public on energy policies and their impacts. Maine's Governor appointed Director Patrick Woodcock in 2013. Mr. Woodcock worked for United States Senator Olympia Snowe as senior advisor to the Senator on energy and environmental issues, in which he was responsible for developing Senator Snowe's legislative agenda including the "Cut Energy Bills at Home Act." Lisa Smith, Senior Planner, will be the day-to-day lead on this project. If this grant is awarded, a half-time Planner-level employee will be added to the GEO to assist with data collection and evaluation tasks, as well as coordinating stakeholder events.

### *4.1.2 Environmental & Energy Technology Council of Maine*

E2Tech is the state's leading energy, environmental and clean technology business and economic development organization acting as catalyst, a change agent and a resource center to promote Maine companies; support their robust and sustainable acceleration; and help them compete in national and international markets. Executive Director Jeff Marks has more than 16 years of experience preparing strategic plans and roadmaps, policy reports and recommendations, regulatory comments, testimony and legislation, and other documents; leadership in developing and executing effective strategies based on corporate, federal, state and international climate, sustainability and energy initiatives, including managing Task Forces, work groups, committees and coalitions to achieve common objectives; and state energy planning experience for State of Maine in the areas of renewable energy, energy efficiency, electricity T&D, natural gas, heating fuels, energy assurance and emergency management. Before joining E2Tech, he was Deputy Director of the Maine Governor's Energy Office and Director, Energy & Environmental, Health and Safety Policy for United Technologies Corporation (UTC). He served as the political and policy liaison for Carrier (heating, air conditioning, refrigeration); Hamilton Sundstrand (aerospace, industrial products); Otis (elevators); Pratt & Whitney (aircraft engines, power systems); Sikorsky (helicopters); UTC Fire & Security (fire protection, security systems); UTC Power (fuel cells, renewable energy); and UTRC (research and development) and served on several energy-related boards, task forces, and committees.

Bonnie Frye Hemphill serves as E2Tech's Senior Planner and Maine Innovation and Cleantech Connector, linking energy and environmental startups across New England. She has a decade of experience helping entrepreneurs and executives advocate together for practical and profitable climate and energy solutions. Prior to E2Tech, Ms. Frye Hemphill launched Maine Businesses for Climate Action, a project of the Natural Resources Council of Maine. Similarly, she helped run a network called Business Leaders for Climate Solutions in Seattle, where she increased membership from 125 to 1,200+ in her three years in the Northwest. Her master's thesis at the Yale School of Forestry & Environmental Studies examined the role of philanthropy in US climate advocacy. Brianna Courneya, E2Tech Project Associate, will provide assistance with

**Table 4-1**
**Project Team Roles and Responsibilities**

| Task | Responsible Organization and Key Personnel |
|---|---|
| **All Phases** | |
| Administration and Reporting | • Maine GEO: Patrick Woodcock and Lisa Smith |
| Project Management | • Maine GEO: Lisa Smith<br>• E2Tech: Jeff Marks<br>• CJTalbot Services: Cynthia Talbot |
| **Phase I - Baselining** | |
| Task 1.0 Steering Committee | • Maine GEO: Patrick Woodcock<br>• E2Tech: Jeff Marks |
| Task 2.0 Baseline Data Development | • E2Tech: Jeff Marks and Bonnie Frye Hemphill<br>• Innovation Policyworks: Catherine Renault |
| Task 3.0 Competitive Advantage & Market Opportunity Analysis | • E2Tech: Jeff Marks and Bonnie Frye Hemphill<br>• University of Maine: Jeff Thaler, Todd Gabe, Caroline Noblet |
| Task 4.0 National, Regional, State, & Local Energy Policies/Programs | • E2Tech: Jeff Marks and Bonnie Frye Hemphill |
| **Phase II – Time Horizons and Regional Development Goals** | |
| Task 5.0 Set Time Horizons and Regional Development Goals | • Maine GEO: Patrick Woodcock and Lisa Smith<br>• E2Tech: Jeff Marks and Bonnie Frye Hemphill<br>• Steering Committee: Efficiency Maine; Innovation Policyworks; Maine PUC; MTI; MRRA; MOWII; NECEC; University of Maine; Sevee & Maher Engineers<br>• Task Force: Public, private, and non-profit energy leaders. |
| **Phase III: Action/Implementation Plans – Roadmap Development** | |
| Task 6.0 Policy and Strategic Options by Energy Sector | • Maine GEO: Patrick Woodcock and Lisa Smith<br>• E2Tech: Jeff Marks and Bonnie Frye Hemphill<br>• Steering Committee & Task Force |
| Task 7.0 Roadmap Preparation | • Maine GEO: Patrick Woodcock and Lisa Smith<br>• E2Tech: Jeff Marks and Bonnie Frye Hemphill<br>• CJTalbot Services: Cynthia Talbot<br>• Steering Committee & Task Force |
| Task 8.0 Stakeholder Process | • Maine GEO: Patrick Woodcock and Lisa Smith<br>• E2Tech: Jeff Marks and Bonnie Frye Hemphill<br>• Steering Committee & Task Force |
| Task 9.0 Final Roadmap & Launch | • Maine GEO: Patrick Woodcock and Lisa Smith<br>• E2Tech: Jeff Marks and Bonnie Frye Hemphill<br>• CJTalbot Services: Cynthia Talbot |

stakeholder and Task Force meetings, including development of materials and documents, as well as general administration for the project.

### *4.1.3 Other Team Members*

***Innovation Policyworks, Inc.*** Principal Dr. Catherine Renault will conduct strategic planning and facilitation activities as part of the Steering Committee using well-established academic research and methodologies. She will assist E2Tech in monitoring the Roadmap development process for its effectiveness and efficiency to made sure the team is making the best use of scarce resources, that the objectives and milestones are being met. Through Innovation Engineering practices, she will have a role in facilitating the Task Force and stakeholder roundtables and conducting research on Maine's energy workforce.

***University of Maine Schools of Economics and Law,*** Jeffrey Thaler is Visiting Professor Energy Policy, Law & Ethics where he creates and teaches courses on renewable energy law, policy and technology; energy and economics; climate change law and policy; administrative law; and a skills-building course on regulatory processes in general and wind power in particular. He is also University Counsel for Energy, Environmental and Sustainability on UMaine's offshore wind projects, landfill gas proposal, MPUC proceedings, and other matters. Jeff Thaler will work with researchers at the University of Maine on market opportunity and competitive advantages as well as assist with Roadmap development, as he has done extensive roadmapping for the wind, hydrokinetics, and renewable energy industry. Professor Todd Gabe specializes in regional and community economic development and public finance. Researcher Caroline Noblet conducts research on environmental and energy economics, education and marketing.

***CJTalbot Services/Cynthia Talbot.*** Ms. Talbot is an independent contractor who provides project management, technical writing and editing, and data management and presentation services to energy and environmental businesses and non-profits. Ms. Talbot has supported E2Tech for over 3 years and has also worked for Efficiency Maine. She has over 30 years experience in technical project management and marketing functions.

## 4.2 Project Team's Existing Equipment and Facilities

The Maine GEO occupies offices in the state complex in Augusta. As a state agency, they have access to state facilities for meetings, workshops, videoconferences, etc. E2Tech has offices in the Think Tank, a business incubator, office-sharing, and technology hub in Portland, Maine. E2Tech also has access to facilities offered by member organizations throughout the state. The location of these two offices will facilitate the Project Team's connections with state agencies and policymakers in Augusta, and with business leaders in Portland. The Maine GEO utilizes all the resources of Maine's State Government, including computer systems, hardware and software. Electronic security is provided by the State. E2Tech relies on laptop computers and utilizes a cloud server contracted to DropBox and backed up by Carbonite. Project team members will be allowed access to project files on E2Tech's server as needed and authorized by E2Tech.

## 4.3 Project Team's Previous Efforts and Innovations Applicable to this Project

The Maine GEO recently updated the State of Maine Comprehensive Energy Plan in February 2015, and envisions this project will enhance that work with a vigorous baselining, stakeholder engagement, and roadmapping process that touches on critical state and regional energy issues and participants. In addition to the State Energy Plan, the Maine GEO has developed reports and updates on hydropower, oil reduction strategies, wind energy development assessments, state energy facts, long-term contracting for ocean energy projects, biofuels, waste-to-energy, geothermal, combined-heat-and-power and distributed generation, and the State of Maine Energy

Assurance and Emergency Management Plan. E2Tech and its partners have performed detailed analyses of the clean technology sector in Maine – defining and describing the sector, evaluating its economic impact, developing specific recommendations to expand the sector, and creating teams and partnerships to engage in business and economic development activities.

### 4.4 Project Team's Time Commitment

Details of the time commitment for each key project team member are shown in the Budget Justification for this application and the following table shows the average commitment for key personnel over the entire two-year project duration.

| Individual | Affiliation | Average Weekly Time Commitment (hours) |
|---|---|---|
| Patrick Woodcock | Maine GEO | 4 |
| Lisa Smith | Maine GEO | 4 |
| Planner | Maine GEO | 2 |
| Jeff Marks | E2Tech | 14 |
| Bonnie Frye Hemphill | E2Tech | 18 |
| Project Associate | E2Tech | 9 |
| Catherine Renault | Innovation Policyworks | 1.75 |
| Jeffrey Thaler/Researchers | University of Maine | 2 |
| Cynthia Talbot | CJTalbot Services | 5.5 |

# Appendix A
# Summary Table

# MAINE ENERGY PLANNING ROADMAP
# PROJECT SUMMARY TABLES FOR STATE ENERGY ASSESSMENT

## SUMMARY TABLE: AREA OF INTEREST 1

| | Summary Table: Area of Interest 1 | | | | | | |
|---|---|---|---|---|---|---|---|
| **Applicant State** | **States Involved in Project** | **Sectors Covered** | **Potential Impact** | **Electric utility profile** | **Inclusion of Renewables** | **Potential Leverage and/or Financing** | **Stakeholders and Partners** |
| Maine | New England Clean Energy Council (NECEC) will serve on the Steering Committee, representing Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont companies. Work with NH & VT on economic development and ISO New England on energy issues as part of task force process. | Target for energy efficiency measures – residential, commercial and industrial as well as institutional, transportation, state government, and utilities. | State projects to achieve: energy savings; cost savings; reduced oil consumption; increased renewable and alternative energy; increased distributed generation and CHP systems; improved natural gas capacity ; increased electric grid reliability and resiliency, energy assurance; increased energy efficiency and conservation; | Maine Net Electricity Generation (Dec 2014):<br>• Natural gas-fired: 280 GWh<br>• Coal: 9 GWh<br>• Hydroelectric: 296 GWh<br>• Other Renewable: 428 GWh<br>Number and type of electric generating units in the State:<br>• 1 coal-fired unit representing 0.5% of generation<br>• 6 natural gas units representing 36.05% of generation | Strategy will include increasing renewable generation: tidal, on- and off-shore wind, solar, biomass. | The project applicants will match federal funding with cost-share financing through MTI/E2Tech related projects, and with funding from E2Tech private-sector members and partners. No private capital envisioned. | Project Team, Steering Committee, & Task Force Partners (support & commitment letters included):<br>• Central Maine Power<br>• Cianbro<br>• Dead River Company<br>• Eaton Peabody<br>• E2Tech<br>• Efficiency Maine Trust<br>• Innovation Policyworks<br>• Interphase Energy<br>• Maine Composites Alliance<br>• Maine Governor's |

| | Summary Table: Area of Interest 1 | | | | | | |
|---|---|---|---|---|---|---|---|
| **Applicant State** | **States Involved in Project** | **Sectors Covered** | **Potential Impact** | **Electric utility profile** | **Inclusion of Renewables** | **Potential Leverage and/or Financing** | **Stakeholders and Partners** |
| | | | reduced greenhouse gas and other air pollution emissions; robust economic development; targeted business development, especially for small companies, startups, & entrepreneurs. | • 8 oil-fired units representing 2.81% of generation<br>• 86 units of renewable energy representing 60.62% of generation. | | | Energy Office<br>• Maine Manufacturing Extension Partnership<br>• Maine Ocean and Wind Industry Initiative<br>• Maine Public Utilities Commission<br>• Maine Technology Institute<br>• Midcoast Regional Redevelopment Authority<br>• NECEC Institute<br>• New England Clean Energy Council<br>• Perkins Thompson<br>• ReVision Energy<br>• U.S. Senator Angus King<br>Sevee & Maher Engineers<br>University of Maine |

| | Summary Table: Area of Interest 1 | | | | | | |
|---|---|---|---|---|---|---|---|
| Applicant State | States Involved in Project | Sectors Covered | Potential Impact | Electric utility profile | Inclusion of Renewables | Potential Leverage and/or Financing | Stakeholders and Partners |
| | | | | | | | Other task force partners may include:<br><br>Association of Cleantech Incubators of New England; ISO New England; Maine Department of Environmental Protection; Maine International Trade Center; Maine Economic & Community Development; other energy-related companies & organizations. |

# Appendix B
# Work Breakdown Structure

# Maine Energy Planning Roadmap

# Work Breakdown Structure

**Technical Summary**

The Project Team, consisting of the Maine Governor's Energy Office (Maine GEO), the Environmental & Energy Technology Council of Maine (E2Tech) – and a Steering Committee of leaders from the utility, regulatory, energy, environmental, university, economic development, and regional partner network – will prepare a Maine Energy Planning Roadmap (Roadmap).

The Project Team will develop the Roadmap in three distinct phases over a two-year period:

1. Phase I – Baselining
2. Phase II – Time Horizon and Regional Development Goals
3. Phase III – Action/Implementation Plan – Roadmap Development

These phases, and the tasks within each phase, have been planned to assure that the Roadmap employs the very best data from all possible sources and considers lessons learned from within and outside of Maine. With a complete baseline, input from stakeholders across the state will be gathered and incorporated into the Roadmap, assuring that the final product is both economically and socially justifiable, employs the resource mix and infrastructure specific to Maine, and meets the unique needs of Maine.

The final Roadmap deliverable will contain a clear and concise set of goals that, if achieved, will result in the desired outcome of a strong, robust energy sector with sustainability and tracked progress. The Roadmap will set milestones for achieving the goals with specific dates; outline potential gaps and obstacles, including technology limitations, market barriers and political and policy issues; develop action items and strategies to address gaps and barrier; and prioritize the most important actions to achieve the goals within the timeframes.

The Maine GEO, the Maine Legislature, E2Tech, and others will use the Roadmap to establish public/private partnerships and develop and implement policies and strategies designed to achieve energy security, economic development, and environmental protection results for Maine.

## Phase I: Baselining

### Task 1.0 Steering Committee Formation (Month 1)

**Task Summary:** The Project Team will create and convene a Steering Committee, which will meet at least quarterly for the duration of the Project and more often as needed during critical phases. The Steering Committee is envisioned to be composed of between 10 and 12 members.

**Task Details:** Formation of the Steering Committee will assure that the project team is informed by a wide range of voices in the state and regional energy sector, both private and public. Without broad guidance, the project team could miss a key component of baseline development or development of the Roadmap.

The GEO and E2Tech will co-chair the Steering Committee and facilitate the Steering Committee meetings. GEO, E2Tech, and Steering Committee members will collaborate on meeting materials, documents, presentations and agenda. The Steering Committee will follow modified Roberts Rules of Order in the conduct of meetings, motions, discussion, and voting.

At each meeting, whether by conference call or in person, project status will be reported to the Committee by the Co-Chairs using an agenda outline.

| Task 1.0 Milestones and Deliverables | |
|---|---|
| **Description** | **Completion** |
| M.1.1: Quarter 1 Steering Committee Meeting | Q1 |
| D.1.1: Steering Committee Charter | Q1 |

### Task 2.0 Baseline Data Development (Month 1 – 6)

**Task Summary:** The Project Team will gather and assess data on the current state and regional energy landscape and the factors that affect it, including demographics, supply chain, workforce, competitive advantages, market opportunities, and existing policies and programs.

**Task Details:** Utilizing data from past and ongoing projects, the Project Team will assemble, catalog, and assess a body of data on which to base Maine's Energy Planning Roadmap. Where data cannot be gathered from existing sources, surveys and interviews will be employed to assure a complete data set, including information on renewable energy and energy efficiency programs; state policies on electricity transmission, energy assurance, fuel supply, and economic development; energy production/generation facilities, service providers, supply chains, research and development capacity, industrial and business resources, infrastructure, and workforce development resources.

### Subtask 2.1 Compile, Verify, and Update Demographics and Supply Chain Data (Month 1 – 5)

**Subtask Summary:** E2Tech will compile data on private, public and non-profit entities across the renewable energy, energy efficiency, environmental services, electricity, natural gas, transportation and alternative fuels, advanced materials, and other energy-related sectors. The objective is to have a comprehensive portfolio of energy-related companies, products, services, and infrastructure in Maine to be used in Phases II and III. E2Tech is working under a separate project on a list of approximately 750 firms and assets to develop databases to characterize energy companies and assets by key variables such as age, size in revenues and employment, location by zip codes, products and services. These demographics are important to understanding what challenges that Maine's energy sector may be facing.

**Subtask Details:** Detailed demographics and supply chain data does not currently exist in a usable and aggregated format. The Project Team must avoid duplication of other efforts to collect and aggregate this information. To avoid this risk, E2Tech will leverage database development work from the Maine Cleantech Business and Economic Development Project (MTI CIP 161), NECEC Institute, Cleantech Navigate Northeast, University of Maine (UMaine), Maine Technology Institute, Battelle, Maine Ocean and Wind Industry Initiative, and other resources to complete this subtask. E2Tech will ensure that the populated databases are current and accessible.

Also, the energy sector does not lend itself to neat categorization into Standard Industrial Codes (SIC) or North American Industry Classification System (NAICS) codes. So, while we currently know the economic impact from the extensive work done by Brookings and the University of Maine, there is no detailed knowledge of the demographics of the sector in Maine. E2Tech will

ensure that data is verified and updated on specific capabilities, products and services and other information.

### Subtask 2.2 Research Workforce Data (Month 1 – 5)

**Subtask Summary:** E2Tech will work with subcontractors from the University of Maine and Innovation Policyworks to analyze Maine's existing energy workforce, as well as workforce development needs (e.g., training, recruitment, education, and skills) in Maine's energy sector.

**Subtask Details:** Direct employment in the clean technology sector has been estimated at 12,212 in Maine, but there are many occupations included in this figure, including many that are not limited to the sector, such as executive management, sales and marketing, administrative, etc. There are 46 occupations that are mainly found in the clean technology sector. The University of Maine and Innovation Policyworks will perform research on the current workforce in the energy sector as a necessary component of a baseline report.

### Subtask 2.3 Energy Demographics and Supply Chain Stakeholder Communication (Month 6)

**Subtask Summary:** E2Tech will work with demographic and supply chain databases and tools updated in Subtask 2.1 to provide a geographic map of the energy sector and to communicate the existence and promote the use and updating of the online databases to Maine and New England energy stakeholders, including state agencies, members of the Steering Committee, E2Tech members and partners, and potential members of the Task Force (see Subtask 5.1). E2Tech will do this by distributing links and access information to the databases to all stakeholders. Communicating this data will help equipment manufacturers, project developers, and professional service providers identify potential business partners and supply chain suppliers through name and specification search tools. This convenient online locator will expedite the Maine energy supply chain search process to increase sales contacts, uncover new supply opportunities, and demonstrate Maine's expanding energy supply chain capabilities nationally and globally.

**Subtask Details:** While E2Tech and its industry partners are building demographics and supply chain databases, no process is in place to communicate this information to energy stakeholders or instruct stakeholders as how to use and update the information. This subtask will overcome the barriers to communication by disseminating key demographic/supply chain information in advance of the Roadmap Development phase. E2Tech will do this by communicating directly with the companies and organizations in the database, but also by working closely with the GEO, trade associations, and other supporting organizations to transmit the information to their constituents, members, and clients.

| Task 2.0 Milestones and Deliverables | |
|---|---|
| **Description** | **Completion** |
| M.2.1: Demographics/Supply Chain Stakeholder Updates | Q2 |
| M.2.2: Workforce Data Research Complete | Q2 |
| M.2.3: Quarter 2 Steering Committee Meeting | Q2 |
| D.2.1: Launch Online Energy Supply Chain Tool | Q2 |

## Task 3.0 Competitive Advantage and Market Opportunity Analysis (Month 4 - 8)

**Task Summary:** E2Tech, Innovation Policyworks, and UMaine will analyze baseline data collected to enable the Project Team to better assess Maine's energy market opportunities and competitive advantage. This task will also prioritize the energy economic potential beyond the State of Maine and map areas of competitive advantage within broader value chains, with particular importance attached to critical components or enabling technologies.

**Task Details:** Maine's traditional economy is based on forestry, fishing, and agriculture and manufacturing industries like paper production and textiles thrived until recently. Energy, especially clean energy technology, however, is an emerging sector of the Maine economy. This sector is made up of firms and organizations engaged in activities ranging from renewable energy production and generation to technology system distribution and installation to weatherization and efficient building construction and retrofits. UMaine and Innovation Policyworks will compile Maine's energy resources and describe the state's abundant land and offshore wind-power, biomass, solar, tidal, hydropower, energy efficiency, and other resources. The information will be identified, researched, and compiled in parallel with the data collected in Tasks 2.0 and 4.0 and will supplement the data on innovative and traditional businesses, research assets, public policies and programs, and investment needs to describe Maine's unique and meaningful assets.

### Subtask 3.1 Market Opportunity and Competitive Advantage Analysis for Energy Sectors (Month 4 – 6)

**Subtask Summary:** E2Tech will work with Innovation Policyworks, the Maine Ocean Wind and Industry Initiative (MOWII), and the Maine Composites Alliance to collect information and analysis of Maine's wind and ocean energy resources, market opportunities, and competitive advantage. E2Tech will apply the process used by MOWII to other energy sectors in Maine, including solar, hydropower, biomass, and energy efficiency sectors. This will entail working with energy organizations in the State to develop an understanding of Maine's competitive advantage with these other resources to inform a discussion of the market opportunities in the state and beyond. The resources and partners identified will advance and inform this evaluation process.

**Subtask Details:** MOWII has done extensive industry supply chain development work that finds investment in the wind and ocean energy industry in Maine develops local expertise that will be in high demand as an export product to the active regional, national and international markets in a variety of industries. To avoid duplication, E2Tech will work with MOWII, MCA, IPW, and possibly UMaine to reconstruct this analysis for other energy sectors.

### Subtask 3.2 Demographics, Supply Chain, Workforce, Market Opportunity and Competitive Advantage Analysis Baseline Development Report (Month 6 – 8)

**Subtask Summary:** E2Tech will compile information from Subtasks 2.1, 2.2, 3.1 into a DRAFT Baseline Development Report.

**Subtask Details:** At this point, the information compiled in Tasks 2.0 and 3.0 will be ready to be included in a draft baseline report and include size of the energy market; demographics (e.g., revenues, jobs); characteristics/sectors (e.g., production/generation, delivery, storage, consumption); business climate; technology readiness; supply chain (e.g., suppliers, distributors, customers); workforce; market opportunities and limitations; trends and projections;

environmental information; and facilities expansion and equipment purchase and projected revenue increases. In Task 4.0, the Project Team will assemble status and requirements of existing laws, regulations, policy directives and other rules along with political and policy trends or outlook.

| Task 3.0 Milestones and Deliverables | |
|---|---|
| **Description** | **Completion** |
| M.3.1: Market Opportunity and Competitive Advantage Analysis Complete | Q2 |
| D.3.1: Energy Demographics, Supply Chain, Workforce, Market Opportunity, and Competitive Advantage Forum | Q3 |
| M.3.2: Quarter 3 Steering Committee Meeting | Q3 |
| D.3.2: DRAFT Demographics, Supply Chain, Workforce, Market Opportunity and Competitive Advantage Baseline Report | Q3 |

### Task 4.0 National, Regional, State, and Local Energy Policies and Programs. (Months 7 – 9)

**Task Summary:** E2Tech, with assistance from the GEO, will take a comprehensive inventory of existing and proposed state and federal policies, regulations, and programs as a baseline for identification of policy and strategic options in the Roadmap Development phase. The Project Team will also take into account legislative proposals, stakeholder energy policy priorities, and federal regulatory initiatives. Finally, the Project Team will include other states' policies and programs that may be models for Maine. This task will be critical for the Roadmap Development Phase, as no comprehensive and updated inventory of policies and programs currently exist.

**Task Details:** The inventory will cover residential, industrial and commercial heating and electricity use; renewables; natural gas; electricity reliability, resiliency, transmission and distribution; transportation; greenhouse gas emissions and pollution; and state government energy use. Because Maine's 127$^{th}$ Legislature ends in the 2$^{nd}$ Quarter of 2016, and Congress and other state legislatures are in varying stages of sessions, E2Tech will ensure data gathered is as recent and complete at the close of the milestone period.

### Subtask 4.1 Existing Program and Policy Analysis (Months 7 - 8)

**Subtask Summary:** E2Tech will identify and document existing national, regional, state and local energy laws and programs.

**Subtask Details:** The Project Team will research and inventory the most relevant Maine energy laws, policies, and programs applied to residential, commercial, utility, and industrial entities. Because this list could be overwhelming, the Project Team will develop criteria for inclusion of the laws, policies and programs with the greatest impacts on energy generation, transmission, and distribution; energy resource extraction and development; energy project development; energy assurance; and economic development. The Project Team will work with the Maine GEO, Efficiency Maine, Maine PUC, and other agencies with energy-related programs. E2Tech will cite federal regulatory authorities, including the Department of Energy, Environmental Protection Agency, and the Federal Energy Regulatory Commission. E2Tech will also research model energy laws in other States. Because this list could be overwhelming, E2Tech will

develop criteria for inclusion of the laws, policies and programs. E2Tech will focus on other Northeastern States and will work with partners, including the New England Clean Energy Council, Environmental Business Council, and others.

**Subtask 4.2 Pending and Proposed Policy and Program Analysis (Month 7 - 8)**

**Subtask Summary:** E2Tech will research and inventory proposed policies, legislation, regulations, and initiatives.

**Subtask Details:** Because this list could be overwhelming, E2Tech will develop criteria for inclusion of the proposals with the greatest impacts on energy generation, transmission, and distribution; energy resource extraction and development; energy project development; energy assurance; and economic development.

**Subtask 4.3 Energy Policy and Program Baseline Report (Month 9)**

**Subtask Summary:** E2Tech and CJTalbot Services will incorporate the energy policy and program information into the baseline development report.

**Subtask Details:** The Report will compile all information from Subtasks, 4.1 and 4.2.

| Task 4.0 Milestones and Deliverables | |
|---|---|
| **Description** | **Completion** |
| M.4.1: Compilation of Existing Energy Policies | Q3 |
| D.4.1: Energy Policy White Paper | Q3 |
| M.4.2: Energy Policy and Program Research Complete | Q3 |
| D.4.2: Final Baseline Development Report | Q3 |
| M.4.3: Release Baseline Development Report | Q3 |
| D.4.3: Energy Policy Forum | Q3 |

## Phase II: Time Horizons and Regional Development Goals

**Task 5.0 Set Time Horizons and Regional Development Goals (Months 10 – 12)**

**Task Summary:** The Project Team will begin Phase II by establishing the Maine Energy Planning Roadmap Task Force with members of the Steering Committee as well as key energy companies throughout the energy sector. The Task Force will define the audience for the Roadmap and set a clear and concise set of goals and time-specific milestones.

**Task Details:** The Project Team will pull together a Task Force of leaders in Maine and New England with expertise in clean energy, energy efficiency, electricity, natural gas, economic development and policy. The Task Force will define the audience for the Roadmap and set a clear and concise set of goals and milestones that, if achieved, will result in the desired outcome of a strong, robust energy sector with sustainability and tracked progress. The challenge will be to ensure that the appropriate private, public, and non-profit are engaged and that the participants are drawn from a diverse pool of energy leaders that can bring their experience to a process that entails working toward a common goal and set of strategies for the State.

### Subtask 5.1 Establish Task Force (Month 10)

**Subtask Summary:** The Project Team and Steering Committee will create and convene the Maine Energy Planning Roadmap Task Force.

**Subtask Details:** The Task Force will include members of the Steering Committee, E2Tech Members, and E2Tech Members, including key energy utilities and companies. While the Steering Committee provides high-level strategic guidance and advice on the entire project, the Task Force will be more focused on specific tasks, including Subtasks 5.2 and 5.3 and Task 6.0.

### Subtask 5.2 Define the Audience for the Roadmap. (Month 10)

**Subtask Summary:** The Project Team and Steering Team, with advice of the Task Force, will define the audience for the Roadmap.

**Subtask Details:** The defined audience will likely include policymakers, regulatory agencies, media, business and economic development agencies, private-sector companies, non-profit organizations, utilities, and the general public, among others.

### Subtask 5.3 Setting Goals and Milestones. (Months 11 – 12)

**Subtask Summary:** The Project Team and Task Force will set a clear and concise set of goals for the Roadmap that, if achieved, will result in the desired outcome of a strong, robust energy sector with sustainability and tracked progress.

**Subtask Details:** These goals will reflect the best thinking about what is needed to achieve Maine's collective goals of meeting projected electricity and natural gas demand, addressing energy assurance concerns, promoting economic development, reducing or mitigating ratepayer costs, identifying energy resource constraints (e.g., supply, transport, transmission, delivery), and increasing the Maine business content of the clean energy sector.

Tangible goals will have specific time-horizons – in this case 2020 and 2025 – and will incorporate regional goals of other states throughout New England. Task Force members will participate in modeling and scenario analysis to develop the vision and long-term goals of the Roadmap. This phase may include workshops or other gatherings to consider trends driving energy markets and economic opportunities, examining the baseline data gathered earlier, making scenario forecasts for future development, and setting long-term goals and objectives for growth.

The Task Force will set milestones for achieving the goals with specific dates (*e.g.,* increase clean energy applications to business innovation and commercialization programs and funds by 20% in 2 years; increase access to biomass heating systems and heat pumps by XX units in 2020 and 2025).

| **Task 5.0 Milestones and Deliverables** | |
|---|---|
| **Description** | **Completion** |
| M.5.1: Establish Task Force and Hold 1st Meeting | Q4 |
| M.5.2: Compilation of Time Horizon & Regional Development Goals | Q4 |
| M.5.3: Quarter 4 Steering Committee Meeting | Q4 |
| D.5.1: Set Time Horizon and Goals | Q4 |

# Phase III: Action/Implementation Plans – Roadmap Development

## Task 6.0 Policy and Strategic Options by Energy Sector (Month 13 – 17)

**Task Summary:** To identify policy and strategic options, the Project Team will engage the Task Force of leaders in Maine and New England with expertise in electric power, renewable energy, natural gas, energy efficiency, economic development (see Subtask 5.1). The Baseline Development Report and the 2015 Maine Energy Plan will serve as the basis for these discussions and meetings, white papers will be developed for each meeting, and an expert speaker/facilitator will be assigned.

**Task Details:** The Task Force will have major two charges. One is to set goals and milestones for the Roadmap (see Subtask 5.3) Based on these goals, and the research already completed and to be done under this project, the Task Force's second charge is to develop a set of alternative policy and strategic options for broader discussion in the stakeholder community. These options will likely cover a range of energy and economic development strategies (*e.g.,* how to better equip existing companies in the sector to compete globally and to take advantage of the market opportunities, how to build and diversify Maine's energy portfolio, how to increase natural gas capacity to meet projected demand, or how to promote the commercialization of Maine technologies through innovation and entrepreneurial support). With a diverse set of Members, it may be difficult to focus the group on the task at hand, which is to develop a broad-based Roadmap that serves a diverse set of interests. The GEO (representing Maine constituents across the residential, commercial, industrial, non-profit, and public sectors) and E2Tech (representing Maine businesses, organizations, and institutions in the energy, environmental and clean technology sectors) will need to ensure diversity of opinion, efficient facilitation of meetings, and effective policy and strategy option discussions and prioritization.

### Subtask 6.1 Electric Power Sector (Month 13)

**Subtask Summary:** E2Tech will convene the Task Force for a half-day workshop to examine policy and strategy options for the electric power sector and report on preferred and alternative options.

**Subtask Details:** The workshop will include Task Force members and consult with experts in the electric power sector, including Central Maine Power, Emera Maine, ISO New England, and the Public Utilities Commission, among others.

### Subtask 6.2 Renewable Energy Sector (Month 14)

**Subtask Summary:** E2Tech will convene the Task Force for a half-day workshop to examine policy and strategy options for the renewable energy sector and report on preferred and alternative options.

**Subtask Details:** The workshop will include Task Force members and consult with experts in the renewable energy sector, including renewable energy companies (*e.g.,* ReVision Energy, Ocean Renewable Power Company, Maine Energy Systems) and organizations (e.g., Maine Renewable Energy Association, New England Clean Energy Council).

### Subtask 6.3 Natural Gas Supply and Transportation Sector (Month 15)

**Subtask Summary:** E2Tech will convene the Task Force for a half-day workshop to examine policy and strategy options for the natural gas sector and report on preferred and alternative options.

**Subtask Details:** The workshop will include Task Force members and consult with experts in the natural gas sector, including Summit Natural Gas, Unitil, Maine Natural Gas, the Maine PUC, other states energy offices, and others.

### Subtask 6.4 Energy Efficiency and Conservation Sector (Month 16)

**Subtask Summary:** E2Tech will convene the Task Force for a half-day workshop to examine policy and strategy options for the energy efficiency and conservation sector and report on preferred and alternative options.

**Subtask Details:** The workshop will include Task Force members and consult with experts in the energy efficiency and conservation sector, including Efficiency Maine Trust, Maine Housing Authority, home and building owners and builders, and weatherization companies.

### Subtask 6.5 Economic Development Opportunities (Month 17)

**Subtask Summary:** E2Tech will convene the Task Force for a half-day workshop to examine economic development policy and strategy options and report on preferred and alternative options.

**Subtask Details:** The workshop will include Task Force members and consult with experts in the economic development field, including regional economic development organizations, Maine Department of Economic and Community Development, business development support organizations, and others.

| Task 6.0 Milestones and Deliverables | |
|---|---|
| **Description** | **Completion** |
| M.6.0: Quarter 5 Steering Committee Meeting | Q5 |
| M.6.1: Electric Power Sector Task Force Meeting | Q5 |
| M.6.2: Renewable Energy Sector Task Force Meeting | Q5 |
| M.6.3: Natural Gas Sector Task Force Meeting | Q5 |
| M.6.4: Energy Efficiency Sector Task Force Meeting | Q6 |
| M.6.5: Economic Development Sector Task Force Meeting | Q6 |
| M.6.6: Quarter 6 Steering Committee Meeting | Q6 |
| D.6.1: Draft Policy and Strategic Options for each Energy Sector | Q6 |

## Task 7.0 Draft Roadmap Preparation (Month 18 - 19)

**Subtask Summary:** E2Tech will compile the data, analysis, graphics and results from Task Force workshops to prepare a document with the elements of a comprehensive, compelling roadmap. The draft Roadmap will be shared among participants (*e.g.,* Project Team and champions, steering committee, stakeholders) and Maine GEO and E2Tech will collect and assess comments and incorporate strengthening input into the document. A revised draft will be

prepared and reviewed with a wider distribution in Task 8. E2Tech and CJTalbot, in consultation with the Steering Committee and Task Force, will prepare a draft of the Roadmap to use in stakeholder sessions.

**Subtask Details:** The draft Roadmap will contain a set of priorities and alternative options – e.g., policies, financial and technical assistance to early-stage clean energy companies, low-income households, renewable energy generators; marketing of the region, its companies and assets to national and international audiences – that are needed over the initial years to achieve the roadmap's goals and objectives. The draft Roadmap will be structured for efficient and effective use in stakeholder meetings.

The draft Roadmap will be used as the discussion document in stakeholder sessions. The Roadmap will be prepared in a manner to maximize efficiency and effectiveness of the stakeholder sessions.

| Task 7.0 Milestones and Deliverables | |
|---|---|
| **Description** | **Completion** |
| M.7.1: Quarter 7 Steering Committee meeting | Q7 |
| D.7.1: Draft Roadmap | Q7 |

### Task 8.0 Stakeholder Process (Month 4 – 21)

**Task Summary:** Gaining consensus among Maine Stakeholders is a very critical part of the Project. E2Tech will use a wide variety of workshops, forums, facilitated brainstorming, and individual sessions to help participants react to the policy and strategic options, edit, amend or create new options, and come to an understanding about the best direction for Maine. The Task Force and stakeholder meetings will be the platform for development of the Roadmap.

**Task Details:** Stakeholder sessions will entail different sets of groups for different workshops – investors, utilities, technology providers, policymakers, etc. Workshops will be structured around objectives; expected outcomes and outputs; structured questions and facilitation; scope and boundaries; participants and their expertise.

Actual mechanisms of priority project initiative implementation and management are beyond the scope of this award; however, Maine GEO, E2Tech and stakeholders have an obligation to engage those who will address the near-term priorities as the first step in implementing the roadmap. The Steering Committee or a subsection of its members may have a key role in implementation. The final Roadmap will be shared among participants (e.g., project team and champions, steering committee, Task Force, and stakeholders) and Maine GEO and E2Tech will collect and assess comments and incorporate strengthening input into the document.

### Subtask 8.1 Stakeholder Meetings (Month 20 - 21)

**Subtask Summary:** E2Tech will schedule and facilitate stakeholder meetings in three locations to provide access across the State of Maine.

**Subtask Details:** Proposed locations: Bangor, Augusta, and Portland with a potential fourth session in Lewiston/Auburn if the Project Team and Steering Committee designate necessary.

### Subtask 8.2 Energy Supply Chain, Workforce and Policy Forums (Months 4 - 21)

**Subtask Summary:** E2Tech will hold a series of forums on energy demographics, supply chain, workforce development, and energy policy.

**Subtask Details:** E2Tech's forums will include experts on the energy sector, including supply chain, workforce development, and public policy.

| Task 8.0 Milestones and Deliverables | |
|---|---|
| **Description** | **Completion** |
| M.8.1: Bangor Stakeholder Meeting | Q7 |
| M.8.2: Augusta Stakeholder Meeting | Q7 |
| M.8.3: Portland Stakeholder Meeting | Q7 |
| M.8.4: Decide on Additional Stakeholder Meetings in Lewiston/Auburn and/or Houlton | Q7 |

### Task 9.0 Final Roadmap and Launch (Month 22 – 24)

**Task Summary:** A final roadmap will be prepared with extensive consultation among Project Team and Steering Committee Members. At the end of the two-year project, the Project Team will launch the Roadmap and put in place the tracking system that will measure and evaluate:

- Progress of the energy and economic development strategy specified in the roadmap;
- Development, growth and evolution of the clean-energy products, services, industrial efficiency improvement of companies and assets described in the roadmap;
- Performance of the sector/cluster in light of the state and regional assets, market circumstances and expectations, public policy, and other influences.

**Subtask Details:** The Roadmap launch will be targeted with a focus on making intended policymakers and energy businesses, partners, and citizens that will benefit from the strategies outlined in the Roadmap aware of its existence (if not already) and the opportunities and assistance provided through its recommendations. Marketing of the roadmap will include press releases, electronic and print distribution, and availability and promotion at high-profile event.

### Subtask 9.1 Incorporate Changes (Month 22)

**Subtask Summary:** E2Tech will incorporate feedback from the Steering Committee and Task Force and feedback from the stakeholder sessions into the Roadmap.

**Subtask Details:** E2Tech will include feedback on electric sector, renewable energy, natural gas, energy efficiency, and economic development in the Roadmap.

### Subtask 9.2 Finalize Roadmap (Month 23)

**Subtask Summary:** E2Tech and CJTalbot Services, in consultation with the Steering Committee, will prepare a final Roadmap document.

**Subtask Details:** The Roadmap will be go through an extensive review and approval process with the GEO and Steering Committee members before finalization.

### Subtask 9.3 Launch Roadmap (Month 24)

**Subtask Summary:** At the end of the two-year project, the Project Team will launch the roadmap.

**Subtask Details:** The Roadmap launch will be targeted with a focus on making intended policymakers and energy businesses, partners, and citizens that will benefit from the strategies outlined in the Roadmap aware of its existence (if not already) and the opportunities and assistance provided through its recommendations. Marketing of the roadmap will include press releases, electronic and print distribution, and availability and promotion at high-profile and industry events.

| Task 9.0 Milestones and Deliverables | |
|---|---|
| **Description** | **Completion** |
| M.9.1: Quarter 8 Steering Committee Meeting | Q8 |
| M.9.2: Project Team/Steering Committee Finalize Roadmap | Q8 |
| D.9.1: Final Roadmap | Q8 |
| M.9.3: Roadmap Launch | Q8 |
| D.9.2: Implementation Plan | Q8 |

# Appendix C
# Milestone Summary Table

# Maine Energy Planning Roadmap

| Milestones Summary Table | | | | | | |
|---|---|---|---|---|---|---|
| Recipient Name: | Maine Governor's Energy Office (Maine GEO) | | | | | |
| Project Title: | Maine Energy Planning Roadmap | | | | | |
| Task Number | Task or Subtask Title | Milestone Number | Milestone Description | Deliverable(s) | Anticipated Date (months from start of project) | Anticipated Quarter (quarters from start of project) |
| **PHASE I - BAESLINING** | | | | | | |
| **1.0** | **Steering Committee Formation** | | | | | |
| 1.0 | Steering Committee Formation | M.1.1 | Q1 Steering Committee Meeting | D.1.1 Steering Committee Charter | 3 | Q1 |
| **2.0** | **Baseline Data Development** | | | | | |
| 2.1 | Compile, Verify, and Update Demographics and Supply Chain Data | M.2.1 | Demographics/Supply Chain Stakeholder Updates | | 5 | Q2 |
| 2.2 | Research Workforce Data | M.2.2 | Workforce Data Research Complete | | 5 | Q2 |
| 2.3 | Energy Demographics and Supply Chain Stakeholder Communication | M.2.3 | Q2 Steering Committee Meeting | D.2.1 Launch Online Energy Supply Chain Tool | 6 | Q2 |
| **3.0** | **Competitive Advantage and Market Opportunity Analysis** | | | | | |
| 3.1 | Market Opportunity & Competitive Advantage Analysis for Energy Sectors | M.3.1 | Market Opportunity and Competitive Advantage Analysis Complete | | 6 | Q2 |

| Milestones Summary Table | | | | | | |
|---|---|---|---|---|---|---|
| Recipient Name: | Maine Governor's Energy Office (Maine GEO) | | | | | |
| Project Title: | Maine Energy Planning Roadmap | | | | | |
| **Task Number** | **Task or Subtask Title** | **Milestone Number** | **Milestone Description** | **Deliverable(s)** | **Anticipated Date (months from start of project)** | **Anticipated Quarter (quarters from start of project)** |
| 3.2 | Demographics, Supply Chain, Workforce, Market Opportunity, & Competitive Advantage Baseline Development Report | M.3.2 | Q3 Steering Committee Meeting | D.3.1 Draft Demographics, Supply Chain, Workforce, Market Opportunity, and Competitive Advantage Baseline Report<br>D.3.2 Energy Demographics, Supply, Chain, Workforce, Market Opportunity, and Competitive Advantage Forum | 8 | Q3 |
| **4.0** | **National, Regional, State, and Local Energy Policies and Programs** | | | | | |
| 4.1 | Existing Program and Policy Analysis | M.4.1 | Compilation of Existing Energy Policies | D.4.1 Energy Policy Whitepaper | 8 | Q3 |
| 4.2 | Pending and Proposed Policy and Program Analysis | M.4.2 | Energy policy and program research complete. | D.4.2 Final Baseline Development Report | 8 | Q3 |
| 4.3 | Energy Policy and Program Baseline Report | M.4.3 | Release Baseline Development Report | D.4.3 Energy Policy forum | 9 | Q3 |
| **PHASE II – TIME HORIZONS AND REGIONAL DEVELOPMENT GOALS** | | | | | | |
| **5.0** | **Set Time Horizons and Regional Development Goals** | | | | | |
| 5.1 | Establish Task Force | M.5.1 | Establish Task Force and hold first meeting | | 10 | Q4 |

| Milestones Summary Table | | | | | | |
|---|---|---|---|---|---|---|
| Recipient Name: | Maine Governor's Energy Office (Maine GEO) | | | | | |
| Project Title: | Maine Energy Planning Roadmap | | | | | |
| **Task Number** | **Task or Subtask Title** | **Milestone Number** | **Milestone Description** | **Deliverable(s)** | **Anticipated Date (months from start of project)** | **Anticipated Quarter (quarters from start of project)** |
| 5.2 | Define Audience for Roadmap | M.5.2 | Compilation of Time Horizon and Regional Development Goals | | 11 | Q4 |
| 5.3 | Set Goals and Milestones | M.5.3 | Q4 Steering Committee Meeting | D.5.1 Set Time Horizons and Goals | 12 | Q4 |
| **PHASE III – ACTION/IMPLEMENTATION PLANS – ROADMAP DEVELOPMENT** | | | | | | |
| **6.0** | **Policy and Strategic Options by Energy Sector** | | | | | |
| 6.0 | Engage Task Force, Develop White Paper, Assign Facilitators | M.6.0 | Q5 Steering Committee Meeting | | 13 | Q5 |
| 6.1 | Electric Power Sector | M.6.1 | Electric Power Sector Task Force Meeting | | 13 | Q5 |
| 6.2 | Renewable Energy Sector | M.6.2 | Renewable Energy Sector Task Force Meeting | | 14 | Q5 |
| 6.3 | Natural Gas Supply and Transportation Sector | M.6.3 | Natural Gas Sector Task Force Meeting | | 15 | Q5 |
| 6.4 | Energy Efficiency and Conservation Sector | M.6.4 | Energy Efficiency Task Force Meeting | | 16 | Q6 |
| 6.5 | Economic Development Opportunities | M.6.5 | Economic Development Task Force Meeting | | 17 | Q6 |

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| Milestones Summary Table | | | | | | |
|---|---|---|---|---|---|---|
| Recipient Name: | Maine Governor's Energy Office (Maine GEO) | | | | | |
| Project Title: | Maine Energy Planning Roadmap | | | | | |
| **Task Number** | **Task or Subtask Title** | **Milestone Number** | **Milestone Description** | **Deliverable(s)** | **Anticipated Date (months from start of project)** | **Anticipated Quarter (quarters from start of project)** |
| 6.5 | Economic Development Opportunities | M.6.6 | Q6 Steering Committee Meeting | D.6.1 Draft Policy and Strategic Options for each Energy Sector | 18 | Q6 |
| **7.0** | **Draft Roadmap Preparation** | | | | | |
| 7.0 | Draft Roadmap Preparation | M.7.1 | Q7 Steering Committee Meeting | D.7.1 Draft Roadmap | 19 | Q7 |
| **8.0** | **Stakeholder Process** | | | | | |
| 8.1 | Stakeholder Meeting | M.8.1 | Bangor Stakeholder Meeting | | 20 | Q7 |
| 8.1 | Stakeholder Meeting | M.8.2 | Augusta Stakeholder Meeting | | 20 | Q7 |
| 8.1 | Stakeholder Meeting | M.8.3 | Portland Stakeholder Meeting | | 20 | Q7 |
| 8.1 | Stakeholder Meeting | M.8.4 | Possible Additional Stakeholder Meetings in Lewiston/Auburn and/or Houlton | | 20 | Q7 |
| **9.0** | **Final Roadmap and Launch** | | | | | |
| 9.1 | Incorporate Changes | M.9.1 | Q8 Steering Committee Meeting | | 22 | Q8 |
| 9.2 | Finalize Roadmap | M.9.2 | Project Team and Steering Committee Finalize Roadmap | D.9.1 Final Roadmap | 23 | Q8 |
| 9.3 | Launch Roadmap | M.9.3 | Roadmap Launch | D.9.2 Implementation Plan | 24 | Q8 |

*Milestone numbering convention should align with Task and Subtask numbers, as appropriate. For example, M1.1, M3.2, etc.

*Note 1:* Each project is required to have at least one milestone per quarter for the entire project duration. It is not necessary that each task have one milestone per quarter.

*Note 2*: All milestones should follow the SMART rule of thumb: Specific, Measureable, Achievable, Relevant, and Timely.

# Appendix D

# Project Schedule

Project Schedule

# Maine Energy Planning Roadmap
## Phase I - Baselining

Control No. 1222-1523

| Task | Start | End |
|---|---|---|
| PHASE I BASELINING | 10/1/15 | 6/30/16 |
| 1.0 Steering Committee Formation | 10/1/15 | 12/31/15 |
| M 1.1 Q1 Steering Committee Meeting | 12/15/15 | 12/15/15 |
| D 1.1 Steering Committee Charter | 12/31/15 | 12/31/15 |
| 2.0 Baseline Data Development | 10/1/15 | 3/31/16 |
| 2.1 Demographics and Supply Chain Data | 10/1/15 | 2/29/16 |
| M 2.1 Demographics and Supply Chain Stakeholder Updates | 2/15/16 | 2/15/16 |
| 2.2 Workforce Data | 10/1/15 | 2/29/16 |
| M 2.2 Workforce Data Research Complete | 2/15/16 | 2/15/16 |
| 2.3 Energy Demographics and Supply Chain Stakeholder Communication | 3/1/16 | 3/31/16 |
| M 2.3 Q2 Steering Committee Meeting | 3/15/16 | 3/15/16 |
| D 2.1 Launch Online Energy Supply Chain Tool | 3/31/16 | 3/31/16 |
| 3.0 Competitive Advantage and Market Opportunity Analysis | 1/1/16 | 5/31/16 |
| 3.1 Energy Sectors | 1/1/16 | 3/31/16 |
| M 3.1 Market Opportunity and Competitive Advantage Analysis Complete | 3/31/16 | 3/31/16 |
| 3.2 Demographics, Supply Chain, Workforce | 3/1/16 | 5/31/16 |
| M 3.2 Q3 Steering Committee Meeting | 5/31/16 | 5/31/16 |
| 4.0 National, Regional, State and Local Energy Policies and Programs | 4/15/16 | 6/30/16 |
| 4.1 Existing Policy and Program Analysis | 4/15/16 | 6/14/16 |
| M 4.1 Compilation of Existing Energy Policies | 5/15/16 | 5/15/16 |
| D 4.1 Energy Policy Whitepaper | 5/31/16 | 5/31/16 |
| 4.2 Pending and Proposed Policy and Program Analysis | 4/15/16 | 6/14/16 |
| M 4.2 Energy Policy and Program Research Complete | 5/15/16 | 5/15/16 |
| D 4.2 Final Baseline Development Report | 5/31/16 | 5/31/16 |
| 4.3 Energy Policy and Program Baseline Report | 6/1/16 | 6/30/16 |
| M 4.3 Release Baseline Development Report | 6/15/16 | 6/15/16 |
| D 4.3 Energy Policy Forum | 6/30/16 | 6/30/16 |

**Project Schedule**

**Maine Energy Planning Roadmap**
**Phase II - Time Horizons and Regional Development Goals**

**Control No. 1222-1523**

2016

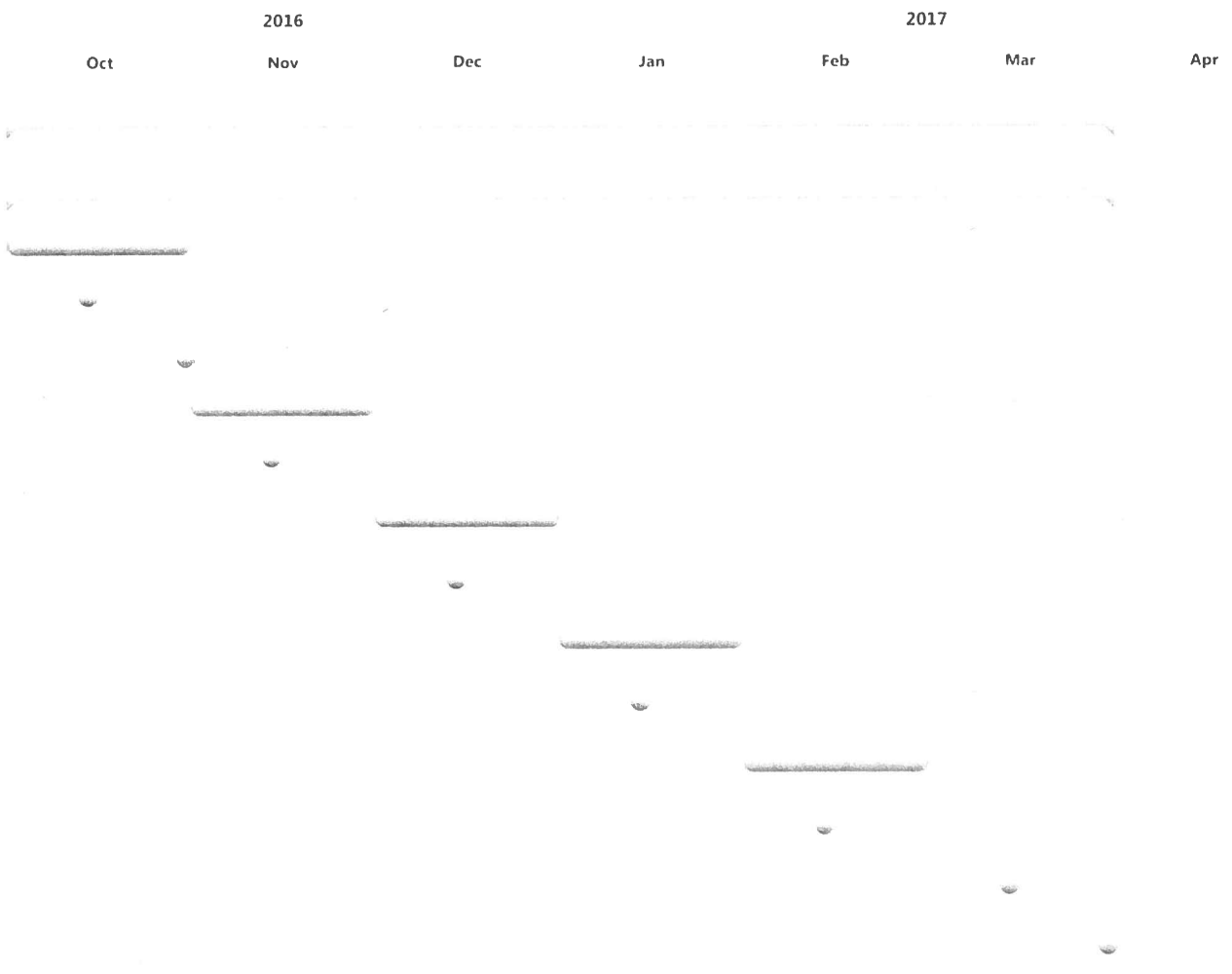
| Task | Start | End | Jul | Aug | Sep | Oct |
|---|---|---|---|---|---|---|
| PHASE II - TIME HORIZONS AND REGIONAL DEVELOPMENT GOALS | 7/1/16 | 9/30/16 | | | | |
| 5.0 Set Time Horizons and Regional Development Goals | 7/1/16 | 9/30/16 | | | | |
| 5.1 Establish Task Force | 7/1/16 | 7/31/16 | | | | |
| M.5.1 Establish Task force and hold first meeting | 7/15/16 | 7/15/16 | | | | |
| 5.2 Define the Audience for the Roadmap | 7/1/16 | 7/31/16 | | | | |
| M.5.2 Compilation of Time Horizon and Regional Development Goals | 8/15/16 | 8/15/16 | | | | |
| 5.3 Setting Goals and Milestones | 8/1/16 | 9/30/16 | | | | |
| M.5.3 Q4 Steering Committee Meeting | 9/15/16 | 9/15/16 | | | | |
| D.5.1 Set Time Horizons and Goals | 9/30/16 | 9/30/16 | | | | |

**Project Schedule**

**Maine Energy Planning Roadmap**
**Phase III - Action/Implementation Plans - Roadmap Development**

**Control No. 1222-1523**

| Task | Start | End |
|---|---|---|
| PHASE III - ACTION/IMPLEMENTATION PLANS - ROADMAP DEVELOPMENT | 10/1/16 | 3/31/17 |
| 6.0 Policy and Strategic Options by Energy Sector | 10/1/16 | 3/31/17 |
| 6.1 Electric Power Sector | 10/1/16 | 10/31/16 |
| M.6.0 Q5 Steering Committee Meeting | 10/15/16 | 10/15/16 |
| M.6.1 Electric Power Sector Task Force Meeting | 10/31/16 | 10/31/16 |
| 6.2 Renewable Energy Sector | 11/1/16 | 11/30/16 |
| M.6.2 Renewable Energy Sector Task Force Meeting | 11/15/16 | 11/15/16 |
| 6.3 Natural Gas Supply and Transportation Sector | 12/1/16 | 12/31/16 |
| M.6.3 Natural Gas Sector Task Force Meeting | 12/15/16 | 12/15/16 |
| 6.4 Energy Efficiency and Conservation Sector | 1/1/17 | 1/30/17 |
| M.6.4 Energy Efficiency Task Force Meeting | 1/15/17 | 1/15/17 |
| 6.5 Economic Development Opportunities | 2/1/17 | 2/28/17 |
| M.6.5 Economic Development Task Force Meeting | 2/15/17 | 2/15/17 |
| M.6.6 Q6 Steering Committee Meeting | 3/15/17 | 3/15/17 |
| D.6.1 Draft Policy and Strategic Options for each Energy Sector | 3/31/17 | 3/31/17 |

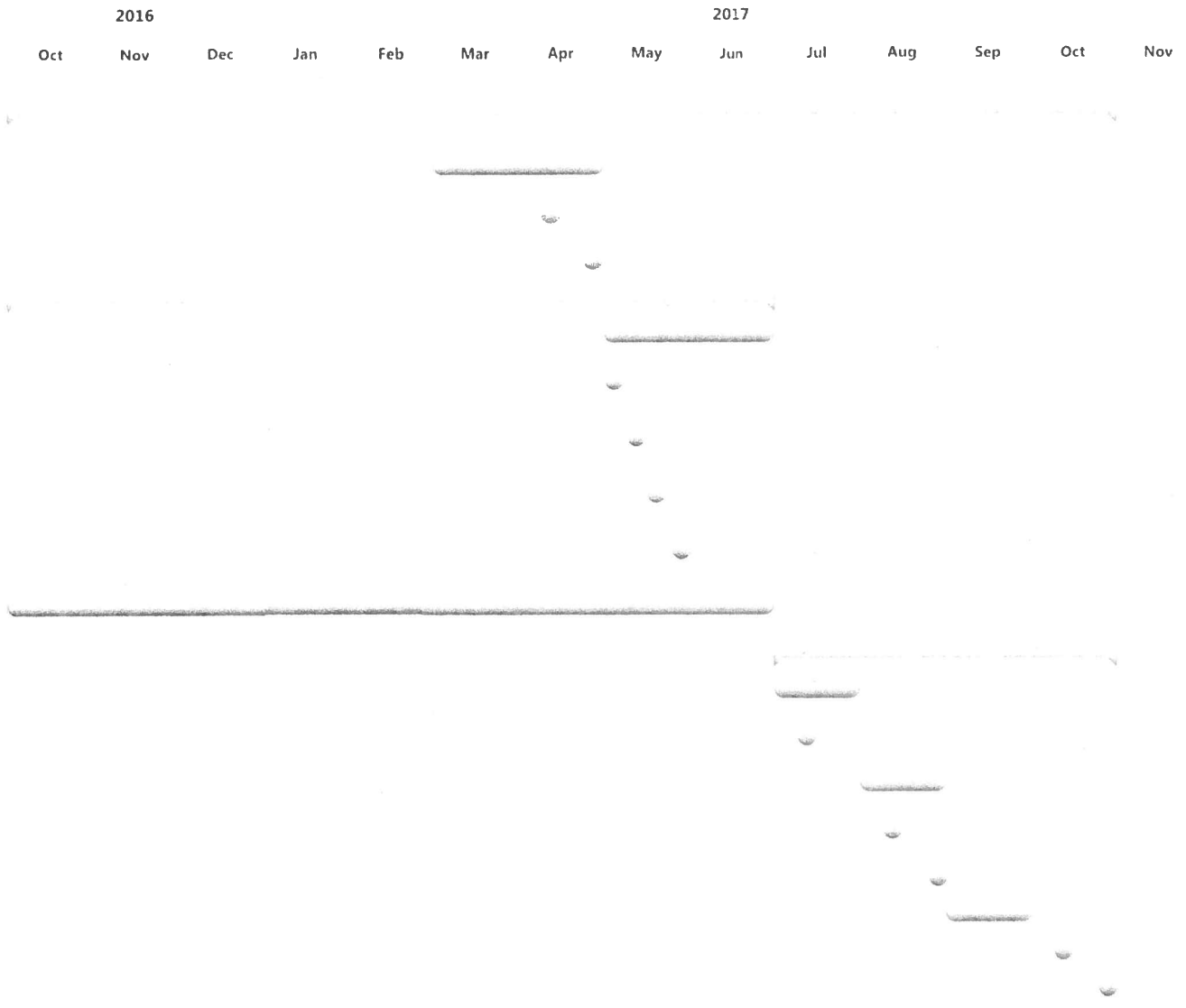


Project Schedule

# Maine Energy Planning Roadmap
## Phase III - Action/Implementation Plans - Roadmap Development
## (Phase III continued from previous page)

Control No. 1222-1523

| Task | Start | End |
|---|---|---|
| PHASE III - ACTION/IMPLEMENTATION PLANS - ROADMAP DEVELOPMENT | 10/1/16 | 10/31/17 |
| 7.0 Draft Roadmap Preparation | 3/1/17 | 4/30/17 |
| M.7.1 Q7 Steering Committee Meeting | 4/15/17 | 4/15/17 |
| D.7.1 Draft Roadmap | 4/30/17 | 4/30/17 |
| 8.0 Stakeholder Process | 10/1/16 | 6/30/17 |
| 8.1 Stakeholder Meetings | 5/1/17 | 6/30/17 |
| M.8.1 Bangor Stakeholder Meeting | 5/7/17 | 5/7/17 |
| M.8.2 Augusta Stakeholder Meeting | 5/15/17 | 5/15/17 |
| M.8.3 Portland Stakeholder Meeting | 5/22/17 | 5/22/17 |
| M.8.4 Other Stakeholder Meetings as needed | 5/31/17 | 5/31/17 |
| 8.2 Energy Supply Chain, Workforce and Policy Forums | 10/1/16 | 6/30/17 |
| 9.0 Final Roadmap and Launch | 7/1/17 | 10/31/17 |
| 9.1 Incorporate Changes | 7/1/17 | 7/31/17 |
| M.9.1 Q8 Steering Committee Meeting | 7/15/17 | 7/15/17 |
| 9.2 Finalize Roadmap | 8/1/17 | 8/31/17 |
| M.9.2 Project Team and Steering Committee Finalize Roadmap | 8/15/17 | 8/15/17 |
| D.9.1 Final Roadmap | 8/31/17 | 8/31/17 |
| 9.3 Launch Roadmap | 9/1/17 | 9/30/17 |
| M.9.3 Roadmap Launch | 10/15/17 | 10/15/17 |
| D.9.2 Implementation Plan | 10/31/17 | 10/31/17 |



OMB Number: 1910-5162
Expiration Date: 01/31/2015

# Instructions and Summary

**Award Number:** DE-FOA-0001222
**Award Recipient:** Maine Governors Energy Office

**Date of Submission:** 3/31/2015
**Form submitted by:** Maine GEO
(May be award recipient or sub-recipient)

**Please read the instructions on each page (worksheet) before starting.**
**If you have any questions, please ask your DOE contact. It will save you time!**

**On this form, provide detailed support for the estimated project costs identified for each Category line item within each worksheet (budget items under different tabs).**

- **The dollar amounts on this page must match the amounts on the associated application.**
- The award recipient and each sub-recipient with estimated costs of $100,000 or more must complete this form and ensure it matches the application.
- The total budget presented on this form and on the application must include both Federal (DOE), and Non-Federal (cost share) portions, thereby reflecting TOTAL PROJECT COSTS proposed.
- **For costs in each Object Class Category, complete the corresponding worksheet on this form (tab at the bottom of the page). Include a brief narrative explanation of the costs in the "Additional Explanations/Comments" section to justify the costs.**
- **All costs incurred by the preparer's sub-recipients, vendors, contractors, consultants 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.**

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

## SUMMARY OF BUDGET CATEGORY COSTS PROPOSED

(Note: The values in this summary table are from entries made in each budget category sheet.)

| CATEGORY | Budget Period 1 Costs | Budget Period 2 Costs | Budget Period 3 Costs | Total Costs | Project Costs % | Comments (Add comments as needed) |
|---|---|---|---|---|---|---|
| a. Personnel | $19,271 | $29,806 | $0 | $49,077 | 13.7% | |
| b. Fringe Benefits | $0 | $0 | $0 | $0 | 0.0% | |
| c. Travel | $1,730 | $1,597 | $0 | $3,327 | 0.9% | |
| d. Equipment | $0 | $0 | $0 | $0 | 0.0% | |
| e. Supplies | $0 | $0 | $0 | $0 | 0.0% | |
| f. Contractual | | | | | | |
| Sub-recipient | $131,172 | $143,479 | $0 | $274,651 | *76.8%* | |
| Vendor | $0 | $0 | $0 | $0 | *0.0%* | |
| FFRDC | $0 | $0 | $0 | $0 | *0.0%* | |
| Total Contractual | $131,172 | $143,479 | $0 | $274,651 | 76.8% | |
| g. Construction | $0 | $0 | $0 | $0 | 0.0% | |
| h. Other Direct Costs | $0 | $0 | $0 | $0 | 0.0% | |
| Total Direct Costs | $152,172 | $174,882 | $0 | $327,055 | | |
| i. Indirect Charges | $14,327 | $16,465 | $0 | $30,792 | 8.6% | |
| Total Project Costs | $166,500 | $191,347 | $0 | $357,847 | | |

**Additional Explanations/Comments (as necessary)**

Budget Period 1: Phases I and II, assumed to be Oct. 1, 2015 through Sept. 30, 2016.
Budget Period 2: Phase III, assumed to be Oct. 1, 2016 through Sept. 30, 2017.

# a. Personnel

PLEASE READ!!!

**List costs solely for employees of the entity completing this form (award prime recipient or sub-recipient with costs over $100,000). All other personnel costs (for prime's subrecipients or other contractual efforts of the entity preparing this budget) must be included under f. Contractual. This includes all consultants and FFRDCs.**

**Identify positions to be supported. Key personnel should be identified by title. All other personnel should be identified either by title or a group category. State the amounts of time (e.g., hours or % of time) to be expended, the base pay rate (or composite base pay rate for group category), total direct personnel compensation, and identify the rate basis (e.g., actual salary, labor distribution report, technical estimate, state civil service rates, etc.).**

Add rows as needed. Formulas/calculations will need to be entered by the preparer of this form. Please enter formulas as shown in the example.

**Include a brief narrative explanation of the costs in the "Additional Explanations/Comments" section to justify the costs.**

| Task # and Title | Position Title | Budget Period 1 | | | Budget Period 2 | | | Budget Period 3 | | | Project Total Hours | Project Total Dollars | Rate Basis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Time (Hours) | Pay Rate ($/Hr) | Total Budget Period 1 | Time (Hours) | Pay Rate ($/Hr) | Total Budget Period 2 | Time (Hours) | Pay Rate ($/Hr) | Total Budget Period 3 | | | |
| 1. Generation 2A Receiver Design | | 10000 | | $423,000 | 600 | | $24,000 | 800 | | $31,000 | 11400 | $478,000 | Actual Salary |
| EXAMPLE | Sr. Engineer | 2000 | $85.00 | $170,000 | 200 | $50.00 | $10,000 | 200 | $50.00 | $10,000 | 2400 | $190,000 | Actual Salary |
| ONLY!!! | Electrical engineers | 6200 | $35.00 | $217,000 | 400 | $35.00 | $14,000 | 600 | $35.00 | $21,000 | 7200 | $252,000 | Actual Salary |
| | Technician | 1800 | $20.00 | $36,000 | 0 | $0.00 | $0 | 0 | $0.00 | $0 | 1800 | $36,000 | Actual Salary |
| **1.0 Steering Committee** | | | | | | | | | | | | | |
| | Director | 48 | $54.34 | **$2,608** | | | **$0** | | | **$0** | **48** | **$2,608** | Actual Salary |
| | Senior Planner | 48 | $41.06 | **$1,971** | | | **$0** | | | **$0** | **48** | **$1,971** | Actual Salary |
| | Planner | | $35.00 | **$0** | | | **$0** | | | **$0** | **0** | **$0** | Technical Est. |
| | | | | | | | | | | | | | |
| **2.0 Baseline Data Development** | | | | | | | | | | | | | |
| | Director | 12 | $54.34 | **$652** | | | **$0** | | | **$0** | **12** | **$652** | Actual Salary |
| | Senior Planner | 20 | $41.06 | **$821** | | | **$0** | | | **$0** | **20** | **$821** | Actual Salary |
| | Planner | 40 | $35.00 | **$1,400** | | | **$0** | | | **$0** | **40** | **$1,400** | Technical Est. |
| | | | | | | | | | | | | | |
| **3.0 Competitive Advantage and Market Opportunity Analysis** | | | | | | | | | | | | | |
| | Director | 20 | $54.34 | **$1,087** | | | **$0** | | | **$0** | **20** | **$1,087** | Actual Salary |
| | Senior Planner | 20 | $41.06 | **$821** | | | **$0** | | | **$0** | **20** | **$821** | Actual Salary |
| | Planner | 40 | $35.00 | **$1,400** | | | **$0** | | | **$0** | **40** | **$1,400** | Technical Est. |
| | | | | | | | | | | | | | |
| **4.0 National, Regional, State, and Local Energy Policies and Programs** | | | | | | | | | | | | | |
| | Director | 40 | $54.34 | **$2,174** | | | **$0** | | | **$0** | **40** | **$2,174** | Actual Salary |
| | Senior Planner | 40 | $41.06 | **$1,642** | | | **$0** | | | **$0** | **40** | **$1,642** | Actual Salary |
| | Planner | 24 | $35.00 | **$840** | | | **$0** | | | **$0** | **24** | **$840** | Technical Est. |
| | | | | | | | | | | | | | |

| Task # and Title | Position Title | Budget Period 1 | | | Budget Period 2 | | | Budget Period 3 | | | Project Total Hours | Project Total Dollars | Rate Basis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Time (Hours) | Pay Rate ($/Hr) | Total Budget Period 1 | Time (Hours) | Pay Rate ($/Hr) | Total Budget Period 2 | Time (Hours) | Pay Rate ($/Hr) | Total Budget Period 3 | | | |
| **5.0 Set Time Horizons and Regional Development Goals** | | | | | | | | | | | | | |
| | Director | 36 | $54.34 | **$1,956** | | | **$0** | | | **$0** | **36** | **$1,956** | Actual Salary |
| | Senior Planner | 36 | $41.06 | **$1,478** | | | **$0** | | | **$0** | **36** | **$1,478** | Actual Salary |
| | Planner | 12 | $35.00 | **$420** | | | **$0** | | | **$0** | **12** | **$420** | Technical Est. |
| | | | | | | | | | | | | | |
| **6.0 Policy and Strategic Options by Energy Sector** | | | | | | | | | | | | | |
| | Director | | | **$0** | 60 | $54.34 | **$3,260** | | | **$0** | **60** | **$3,260** | Actual Salary |
| | Senior Planner | | | **$0** | 60 | $41.06 | **$2,464** | | | **$0** | **60** | **$2,464** | Actual Salary |
| | Planner | | | **$0** | 40 | $35.00 | **$1,400** | | | **$0** | **40** | **$1,400** | Technical Est. |
| | | | | | | | | | | | | | |
| **7.0 Draft Roadmap Preparation** | | | | | | | | | | | | | |
| | Director | | | **$0** | 24 | $54.34 | **$1,304** | | | **$0** | **24** | **$1,304** | Actual Salary |
| | Senior Planner | | | **$0** | 20 | $41.06 | **$821** | | | **$0** | **20** | **$821** | Actual Salary |
| | Planner | | | **$0** | 10 | $35.00 | **$350** | | | **$0** | **10** | **$350** | Technical Est. |
| | | | | | | | | | | | | | |
| **8.0 Stakeholder Process** | | | | | | | | | | | | | |
| | Director | | | **$0** | 96 | $54.34 | **$5,217** | | | **$0** | **96** | **$5,217** | Actual Salary |
| | Senior Planner | | | **$0** | 96 | $41.06 | **$3,942** | | | **$0** | **96** | **$3,942** | Actual Salary |
| | Planner | | | **$0** | 0 | $35.00 | **$0** | | | **$0** | **0** | **$0** | Technical Est. |
| | | | | | | | | | | | | | |
| **9.0 Final Roadmap and Launch** | | | | | | | | | | | | | |
| | Director | | | **$0** | 96 | $54.34 | **$5,217** | | | **$0** | **96** | **$5,217** | Actual Salary |
| | Senior Planner | | | **$0** | 96 | $41.06 | **$3,942** | | | **$0** | **96** | **$3,942** | Actual Salary |
| | Planner | | | **$0** | 54 | $35.00 | **$1,890** | | | **$0** | **54** | **$1,890** | Technical Est. |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | **Total Personnel Costs** | **436** | | **$19,271** | **652** | | **$29,806** | **0** | | **$0** | **0** | **$49,077** | |

**Additional Explanations/Comments (as necessary)**

Hourly rates indclude fringe and are either actual salaries or an estimate of the salary for the anticipated position.

| Task # and Title | Position Title | Budget Period 1 | | | Budget Period 2 | | | Budget Period 3 | | | Project Total Hours | Project Total Dollars | Rate Basis |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Time (Hours) | Pay Rate ($/Hr) | Total Budget Period 1 | Time (Hours) | Pay Rate ($/Hr) | Total Budget Period 2 | Time (Hours) | Pay Rate ($/Hr) | Total Budget Period 3 | | | |
| | | | | | | | | | | | | | |

## b. Fringe Benefits

Please Read!!!

**Fill out the table below by labor type (add additional rows if necessary). If all employees receive the same fringe benefits, you can show "Total Personnel" in the Labor Type column instead of listing out all personnel separately. If necessary, you can use the box below to provide additional explanation regarding your fringe rate calculation.**

The rates and how they are applied should not be averaged to get one fringe cost percentage.

The fringe benefit rate should be applied to both the Federal Share and Recipient Cost Share.

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer. Please enter formulas as shown in the example.

| Labor Type | Budget Period 1 | | | Budget Period 2 | | | Budget Period 3 | | | Total Project Fringe Benefit Costs |
|---|---|---|---|---|---|---|---|---|---|---|
| | Personnel Costs | Rate | Total | Personnel Costs | Rate | Total | Personnel Costs | Rate | Total | |
| EXAMPLE ONLY: Sr. Engineer | $170,000 | 20% | $34,000 | $10,000 | 20% | $2,000 | $10,000 | 20% | $2,000 | $38,000 |
| | | | $0 | | | $0 | | | $0 | $0 |
| | | | $0 | | | $0 | | | $0 | $0 |
| | | | $0 | | | $0 | | | $0 | $0 |
| Total: | $0 | | $0 | $0 | | $0 | $0 | | $0 | $0 |

69

**A federally approved fringe benefit rate agreement, or a proposed rate supported and agreed upon by DOE for estimating purposes is required if reimbursement for fringe benefits is requested. Please check (X) one of the options below and provide the requested information. Calculate the fringe rate and the Total should calculate automatically (if adding rows, ensure the formulas are updated).**

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

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

***When this option is checked, the entity preparing this form shall submit a rate proposal in the format provided at the following website, or a format that provides the same level of information; and the rate proposal must support the rates being proposed for use in performance of the proposed project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select Sample Rate Proposal.**

# c. Travel

PLEASE READ!!!

**Provide travel detail as requested below, identifying total Foreign and Domestic Travel as separate items. Purpose of travel are items such as professional conference, DOE sponsored meeting, project management meeting, etc. The Basis for Estimating Costs are items such as past trips, current quotations, Federal Travel Regulations, etc.**

All listed travel must be necessary for performance of the Statement of Project Objectives.

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

| Purpose of travel | Depart From | Destination | No. of Days | No. of Travelers | Cost per Traveler | Cost per Trip | Basis for Estimating Costs | RT Mileage |
|---|---|---|---|---|---|---|---|---|
| **Budget Period 1** | | | | | | | | |
| **Domestic Travel** | | | | | | | | |
| EXAMPLE ONLY!!! Visit to PV cell mfr. to set up vendor agreement | | | 2 | 2 | $650 | $1,300 | Internet prices | |
| Project Team Meeting | Augusta | Portland | 1 | 1 | $64 | $64 | RT mileage = 112 mi | 112 |
| Project Team Meeting | Augusta | Portland | 1 | 1 | $64 | $64 | RT mileage = 112 mi | 112 |
| Project Team Meeting | Augusta | Portland | 1 | 1 | $64 | $64 | RT mileage = 112 mi | 112 |
| Project Team Meeting | Augusta | Portland | 1 | 1 | $64 | $64 | RT mileage = 112 mi | 112 |
| NASEO Annual Meeting Sept. 2016 - location TBD | Augusta | ? | 4 | 1 | $1,472 | $1,472 | | |
| | | | | | | $0 | | |
| | | | | | | $0 | | |
| | | | | | | $0 | | |
| Domestic Travel subtotal | | | | | | $1,730 | | |
| **International Travel** | | | | | | | | |
| | | | | | | $0 | | |
| International Travel subtotal | | | | | | $0 | | |
| **Budget Period 1 Total** | | | | | | **$1,730** | | |

| Purpose of travel | Depart From | Destination | No. of Days | No. of Travelers | Cost per Traveler | Cost per Trip | Basis for Estimating Costs | RT Mileage |
|---|---|---|---|---|---|---|---|---|
| **Budget Period 2** | | | | | | | | |
| **Domestic Travel** | | | | | | | | |
| Project Team Meeting | Augusta | Portland | 1 | 1 | $64 | $64 | RT mileage = 112 mi | 112 |
| Project Team Meeting | Augusta | Portland | 1 | 1 | $64 | $64 | RT mileage = 112 mi | 112 |
| Project Team Meeting | Augusta | Portland | 1 | 1 | $64 | $64 | RT mileage = 112 mi | 112 |
| Project Team Meeting | Augusta | Portland | 1 | 1 | $64 | $64 | RT mileage = 112 mi | 112 |
| Stakeholder Meeting | Augusta | Portland | 1 | 2 | $64 | $129 | RT mileage = 112 mi | 112 |
| Stakeholder Meeting | Augusta | Lewiston | 1 | 2 | $40 | $81 | RT mileage = 112 mi | 70 |
| Stakeholder Meeting | Augusta | Bangor | 1 | 2 | $86 | $173 | RT mileage = 112 mi | 150 |
| Stakeholder Meeting | Augusta | Houlton | 2 | 2 | $479 | $958 | 1 overnight included | 384 |
| | | | | | | $0 | | |
| | | | | | | $0 | | |
| | | | | | | $0 | | |
| Domestic Travel subtotal | | | | | | $1,597 | | |
| **International Travel** | | | | | | | | |
| | | | | | | $0 | | |
| International Travel subtotal | | | | | | $0 | | |
| **Budget Period 2 Total** | | | | | | **$1,597** | | |
| **Budget Period 3** | | | | | | | | |
| **Domestic Travel** | | | | | | | | |
| | | | | | | $0 | | |
| | | | | | | $0 | | |
| | | | | | | $0 | | |
| | | | | | | $0 | | |
| | | | | | | $0 | | |
| | | | | | | $0 | | |
| | | | | | | $0 | | |
| Domestic Travel subtotal | | | | | | $0 | | |
| **International Travel** | | | | | | | | |
| | | | | | | $0 | | |
| | | | | | | $0 | | |
| | | | | | | $0 | | |
| | | | | | | $0 | | |
| International Travel subtotal | | | | | | $0 | | |
| **Budget Period 3 Total** | | | | | | **$0** | | |
| **PROJECT TOTAL** | | | | | | **$3,327** | | |

**Additional Explanations/Comments (as necessary)**

Travel mileage based on 2015 Federal rate of $0.575/mile. Federal Per Diem Rate (Sept. 2015): Standard Maine = $83 lodging and $46 meals and expenses. Portland = $124 lodging and $56 meals and expenses. Montpelier, VT: $110 lodging and $61 meals. Washington, DC = $222 lodging and $71 meals. Assumed airfare = $300 rt. NASEO Annual Meeting assumed Washington, DC travel costs.

# d. Equipment

PLEASE READ!!!

**Equipment is generally defined as an item with an acquisition cost greater than $5,000 and a useful life expectancy of more than one year. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs .**

**List all proposed equipment below, providing a basis of cost such as vendor quotes, catalog prices, prior invoices, etc.; and briefly justify its need as it applies to the Statement of Project Objectives. If it is existing equipment, and the value of its contribution to the project budget is being shown as cost share, provide logical support for the estimated value shown. If it is new equipment which will retain a useful life upon completion of the project, provide logical support for the estimated value shown.**

For equipment over $50,000 in price, also include a copy of the associated vendor quote or catalog price list.

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

| Equipment Item | Qty | Unit Cost | Total Cost | Basis of Cost | Justification of need |
|---|---|---|---|---|---|
| **Budget Period 1** | | | | | |
| **EXAMPLE ONLY!!!** Thermal shock chamber | 2 | $20,000 | $40,000 | Vendor Quote | Reliability testing of PV modules- Task 4.3 |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| **Budget Period 1 Total** | | | $0 | | |
| **Budget Period 2** | | | | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| **Budget Period 2 Total** | | | $0 | | |

| Equipment Item | Qty | Unit Cost | Total Cost | Basis of Cost | Justification of need |
|---|---|---|---|---|---|
| **Budget Period 3** | | | | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| **Budget Period 3 Total** | | | $0 | | |
| **PROJECT TOTAL** | | | **$0** | | |

**Additional Explanations/Comments (as necessary)**

| |
|---|
| |

# e. Supplies

PLEASE READ!!!

**Supplies are generally defined as an item with an acquisition cost of $5,000 or less and a useful life expectancy of less than one year. Supplies are generally consumed during the project performance. Further definitions can be found at 10 CFR 600 found on the PMC Recipient Resources Forms page at https://www.eere-pmc.energy.gov/Forms.aspx#regs.**

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

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

| General Category of Supplies | Qty | Unit Cost | Total Cost | Basis of Cost | Justification of need |
|---|---|---|---|---|---|
| **Budget Period 1** | | | | | |
| **EXAMPLE ONLY!!!** Wireless DAS components | 10 | $360.00 | $3,600 | Catalog price | For Alpha prototype - Task 2.4 |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| **Budget Period 1 Total** | | | **$0** | | |
| **Budget Period 2** | | | | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| **Budget Period 2 Total** | | | $0 | | |

| General Category of Supplies | Qty | Unit Cost | Total Cost | Basis of Cost | Justification of need |
|---|---|---|---|---|---|
| **Budget Period 3** | | | | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| | | | $0 | | |
| **Budget Period 3 Total** | | | $0 | | |
| **PROJECT TOTAL** | | | **$0** | | |

**Additional Explanations/Comments (as necessary)**

| |
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| |

# f. Contractual

**PLEASE READ!!!**

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

**Sub-recipients (partners, sub-awardees):**

**For each sub-recipient with total project costs of $100,000 or more, a separate budget form and justification must be submitted. These sub-recipient forms may be completed by either the sub-recipients themselves or by the preparer of this form. The budget totals on the sub-recipient's forms must match the sub-recipient entries below.**

The preparer of this form need only provide further support of the completed sub-recipient budget forms as they deem necessary. The support to justify the budgets of sub-recipients with estimated costs less than $100,000 may be in any format, and at a minimum should provide what Statement of Project Objectives task(s) are being performed, the purpose/need for the effort, and a basis of the estimated costs that is considered sufficient for DOE evaluation.

**Vendors (includes contractors and consultants):**

List all vendors, contractors and consultants supplying commercial supplies or services used to support the project. The support to justify vendor costs (in any amount) should provide the purpose for the products or services and a basis of the estimated costs that is considered sufficient for DOE evaluation.

**Federal Research and Development Centers (FFRDCs):**

For FFRDC partners, the award recipient will provide a Field Work Proposal (if not already provided with the original application), along with the FFRDC labor mix and hours, by category and FFRDC major purchases greater than $25,000, including Quantity, Unit Cost, Basis of Cost, and Justification. The award recipient may allow the FFRDC to provide this information directly to DOE.

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

| Sub-Recipient Name/Organization | Purpose/Tasks in SOPO | Budget Period 1 Costs | Budget Period 2 Costs | Budget Period 3 Costs | Project Total |
|---|---|---|---|---|---|
| **EXAMPLE ONLY!!!** XYZ Corp. | Partner to develop optimal fresnel lens for Gen 2 product - Task 2.4 | $48,000 | $32,000 | $16,000 | **$96,000** |

| Sub-Recipient Name/Organization | Purpose/Tasks in SOPO | Budget Period 1 Costs | Budget Period 2 Costs | Budget Period 3 Costs | Project Total |
|---|---|---|---|---|---|
| E2Tech | Responsible for Project Management, oversight, management of the grant, research, recordkeeping, oversight of baseline development, developing the road map and coordinating subcontractors and stakeholders. Please refer to Subawardee Budget Justification, submitted separately, for details. | $131,172 | $143,479 | | **$274,651** |
| | | | | | **$0** |
| | | | | | **$0** |
| | | | | | **$0** |
| | | | | | **$0** |
| | | | | | **$0** |
| | | | | | **$0** |
| | | | | | **$0** |
| | **Sub-total** | **$131,172** | **$143,479** | **$0** | **$274,651** |

| Vendor Name/Organization | Product or Service, Purpose/Need and Basis of Cost (Provide additional support at bottom of page as needed) | Budget Period 1 Costs | Budget Period 2 Costs | Budget Period 3 Costs | Project Total |
|---|---|---|---|---|---|
| **EXAMPLE ONLY!!!** ABC Corp. | Vendor for developing custom robotics to perform lens inspection, alignment, and placement (Task 4 ). Required for expanding CPV module mfg. capacity. Cost is from competitive quotes. | $32,900 | $86,500 | | $119,400 |
| | | | | | **$0** |
| | | | | | **$0** |
| | | | | | **$0** |
| | | | | | **$0** |
| | | | | | **$0** |
| | | | | | **$0** |
| | | | | | **$0** |
| | **Sub-total** | **$0** | **$0** | **$0** | **$0** |

| FFRDC Name/Organization | Purpose | Budget Period 1 Costs | Budget Period 2 Costs | Budget Period 3 Costs | Project Total |
|---|---|---|---|---|---|

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| Sub-Recipient Name/Organization | Purpose/Tasks in SOPO | Budget Period 1 Costs | Budget Period 2 Costs | Budget Period 3 Costs | Project Total |
|---|---|---|---|---|---|
| | | | | | $0 |
| | | | | | $0 |
| | | | | | $0 |
| | Sub-total | $0 | $0 | $0 | $0 |
| Total Contractual | | $131,172 | $143,479 | $0 | $274,651 |

AdditionalExplanations/Comments (as necessary)

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f. Contractual

# g. Construction

PLEASE READ!!!

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

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

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

**Overall description of construction actiivities:**

Example Only!!! - Build wind turbine platform

| General Description | Cost | Basis of Cost | Justification of need |
|---|---|---|---|
| **Budget Period 1** | | | |
| Three days of excavation for platform site EXAMPLE ONLY!!! | $28,000 | Engineering estimate | Site must be prepared for construction of platform. |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| **Budget Period 1 Total** | **$0** | | |
| **Budget Period 2** | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| **Budget Period 2 Total** | $0 | | |

| General Description | Cost | Basis of Cost | Justification of need |
|---|---|---|---|
| **Budget Period 3** | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| **Budget Period 3 Total** | $0 | | |
| **PROJECT TOTAL** | **$0** | | |

**Additional Explanations/Comments (as necessary)**

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# h. Other Direct Costs

PLEASE READ!!!

**Other direct costs are direct cost items required for the project which do not fit clearly into other categories. These direct costs must not be included in the indirect costs (for which the indirect rate is being applied for this project). Examples are: equipment costs less than $5000, meetings within the scope of work, printing costs, etc. which can be directly charged to the project and are not duplicated in indirect costs (overhead costs).**

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

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

| General description | Cost | Basis of Cost | Justification of need |
|---|---|---|---|
| **Budget Period 1** | | | |
| **EXAMPLE ONLY!!!** Grad student tuition | $16,000 | Established UCD costs | Support of graduate students working on project |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| **Budget Period 1 Total** | $0 | | |
| **Budget Period 2** | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| **Budget Period 2 Total** | $0 | | |
| **Budget Period 3** | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| **Budget Period 3 Total** | $0 | | |
| **PROJECT TOTAL** | **$0** | | |

**Additional Explanations/Comments (as necessary)**

## i. Indirect Costs

Please Read!!!

**Fill out the table below to indicate how your indirect costs are calculated. If necessary, you can use the box below to provide additional explanation regarding your indirect rate calculation.**

The rates and how they are applied should not be averaged to get one indirect cost percentage.

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

Add rows as needed. If rows are added, formulas/calculations may need to be adjusted by the preparer. Please enter formulas as shown in the example.

| | Budget Period 1 | Budget Period 2 | Budget Period 3 | Total | Explanation of BASE |
|---|---|---|---|---|---|
| **Provide ONLY Applicable Rates:** | | | | | |
| Overhead Rate | 0.0% | 0.0% | 0.0% | | |
| General & Administrative (G&A) | 9.4% | 9.4% | 0.0% | | |
| FCCM Rate, if applicable | 0.0% | 0.0% | 0.0% | | |
| OTHER Indirect Rate | 0.0% | 0.0% | 0.0% | | |
| **Indirect Costs (As Applicable):** | | | | | |
| Overhead Costs | $0 | $0 | $0 | **$0** | |
| G&A Costs | $14,327 | $16,465 | $0 | **$30,792** | |
| FCCM Costs, if applicable | $0 | $0 | $0 | **$0** | |
| OTHER Indirect Costs | $0 | $0 | $0 | **$0** | |
| **Total indirect costs requested:** | **$14,327** | **$16,465** | **$0** | **$30,792** | |

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

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

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

***When this option is checked, the entity preparing this form shall submit an indirect rate proposal in the format provided at the following website, or a format that provides the same level of information and which will support the rates being proposed for use in performance of the proposed project. Go to https://www.eere-pmc.energy.gov/forms.aspx and select Sample Rate Proposal.**

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

**Additional Explanations/Comments (as necessary)**

Please see attached documentation of Maine GEO's federally approved indirect rate.

# Cost Share

PLEASE READ!!!

**A detailed presentation of the cash or cash value of all cost share proposed for the project must be provided in the table below. Identify the source & amount of each item of cost share proposed by the award recipient and each sub-recipient or vendor.** Letters of commitment must be submitted for all third party cost share (other than award recipient).

**Note that "cost-share" is not limited to cash investment. Other items that may be assigned value in a budget if incurred as part of the project budget and are necessary to the performance of the project. Items that may be considered as cost share include: contribution of services or property; donated, purchased or existing equipment; donated, purchased or existing supplies; and/or unrecovered personnel, fringe benefits and indirect costs, etc. For each cost share contribution identified as other than cash, identify the item and describe how the value of the cost share contribution was calculated.**

Funds from other Federal sources MAY NOT be counted as cost share. **This prohibition includes FFRDC sub-recipients. Non-Federal sources include private, state or local Government, or any source not originally derived from Federal funds. Documentation of cost sharing commitments must be provided, if not already provided with the original application and they have not changed since its submission.**

**Fee or profit will not be paid to the award recipients or subrecipients of financial assistance awards. Additionally, foregone fee or profit by the applicant shall not be considered cost sharing under any resulting award. Reimbursement of actual costs will only include those costs that are allowable and allocable to the project as determined in accordance with the applicable cost principles prescribed in 10 CFR 600.127, 10 CFR 600.222 or 10 CFR 600.317. Also see 10 CFR 600.318 relative to profit or fee.**

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

| Organization/Source | Type (cash or other) | Cost Share Item | Budget Period 1 Cost Share | Budget Period 2 Cost Share | Budget Period 3 Cost Share | Total Project Cost Share |
|---|---|---|---|---|---|---|
| ABC Company **EXAMPLE ONLY!!!** | Cash | Project partner ABC Company will provide 40 PV modules for product development at 50% off the of the retail price of $680 | $13,600 | | | **$13,600** |
| Maine Technology Institute through E2Tech | Cash | E2Tech is currently the recipient of two Cluster Initiative Program grants from MTI: CIP 161: Maine Cleantech Business and Economic Development and CIP 164: Cleantech Navigate Northeast: Navigate Maine. Revenues for these grants during this project total $93,250. Because many, if not all, of the tasks in the CIP projects will provide baseline data needed for this project, the work under the MTI grants will serve to reduce the personnel and contractor time needed to complete the Maine Energy Planning Roadmap. As a conservative estimate, E2Tech and Maine GEO have assumed that 50% of the work on the MTI grant will be directly used in this project. A letter from MTI committing to the funding for the CIP grants is provided in the Letters of Committment portion of this application. | $46,625 | | | **$46,625** |
| E2Tech | Cash | E2Tech funds monthly forums, which will be used to gain stakeholder input on various aspects of this project. Cost sharing is based on hosting 4 project-related forums in Budget Period 1 and 12 project-related forums in Budget Period 2. The cost share portion is based on an average cost of $1700/event. | $6,800 | $20,400 | | **$27,200** |

| Organization/Source | Type (cash or other) | Cost Share Item | Budget Period 1 Cost Share | Budget Period 2 Cost Share | Budget Period 3 Cost Share | Total Project Cost Share |
|---|---|---|---|---|---|---|
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | | | | | $0 |
| | | Totals | $53,425 | $20,400 | $0 | $73,825 |

**Total Project Cost: $357,847** **Cost Share Percent of Award: 20.6%**

**Additional Explanations/Comments (as necessary)**

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| |

Applicant Name: Maine Governors Energy Office  Award Number: DE-FOA-0001222

# Budget Information - Non Construction Programs

OMB Approval No. 0348-0044

**Section A - Budget Summary**

| Grant Program Function or Activity (a) | Catalog of Federal Domestic Assistance Number (b) | Estimated Unobligated Funds | | New or Revised Budget | | |
|---|---|---|---|---|---|---|
| | | Federal (c) | Non-Federal (d) | Federal (e) | Non-Federal (f) | Total (g) |
| 1. Budget Period 1 | | | | $113,075 | $53,425 | $166,500 |
| 2. Budget Period 2 | | | | $170,947 | $20,400 | $191,347 |
| 3. Budget Period 3 | | | | $0 | $0 | $0 |
| 4. | | | | | | $0 |
| 5. Totals | | $0 | $0 | $284,022 | $73,825 | $357,847 |

**Section B - Budget Categories**

| 6. Object Class Categories | Grant Program, Function or Activity | | | | Total (5) |
|---|---|---|---|---|---|
| | Budget Period 1 | Budget Period 2 | Budget Period 3 | (4) | |
| a. Personnel | $19,271 | $29,806 | $0 | | $49,077 |
| b. Fringe Benefits | $0 | $0 | $0 | | $0 |
| c. Travel | $1,730 | $1,597 | $0 | | $3,327 |
| d. Equipment | $0 | $0 | $0 | | $0 |
| e. Supplies | $0 | $0 | $0 | | $0 |
| f. Contractual | $131,172 | $143,479 | $0 | | $274,651 |
| g. Construction | $0 | $0 | $0 | | $0 |
| h. Other | $0 | $0 | $0 | | $0 |
| i. Total Direct Charges (sum of 6a-6h) | $152,172 | $174,882 | $0 | $0 | $327,055 |
| j. Indirect Charges | $14,327 | $16,465 | $0 | | $30,792 |
| k. **Totals** (sum of 6i-6j) | $166,500 | $191,347 | $0 | $0 | $357,847 |
| 7. Program Income | | | | | $0 |

Previous Edition Usable

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