



**LOUISVILLE METRO GOVERNMENT, LOUISVILLE, KENTUCKY  
PHASE II OF TECHNICAL SUPPORT FOR LOUISVILLE'S 100% RENEWABLE ENERGY GOALS**

**I. BACKGROUND**

Louisville, KY (Louisville) adopted a 100% renewable resolution in early 2020. That resolution set goals for Louisville to reach 100% renewable electricity use for Metro Government operations by 2030, a 100% clean energy goal for Metro Government by 2035, and 100% clean energy goal community-wide by 2040. As part of its planning to meet these goals, Louisville has reached out to the Department of Energy's National Renewable Energy Laboratory (NREL) for technical assistance and analytic support to understand options and pathways for meeting these goals, with a specific focus on the 2030 goal.

NREL is the only DOE national laboratory solely dedicated to advancing energy efficiency (EE) and renewable energy (RE) technologies and applications (<https://www.nrel.gov/>). Since its inception, NREL has supported both the public and the private sectors in implementing EE and RE systems, developing strategies to lower energy use, and evaluating options for meeting energy goals and targets. NREL is a sought-after resource for EE, RE, transportation, conventional power systems, combined heat and power, and resilience expertise. Over the past several decades, NREL has provided hundreds of local jurisdictions with data-driven modeling and analytics to help these jurisdictions understand their options in meeting energy and climate goals and targets. The approach NREL takes in supporting local government jurisdictions combines a state-of-the-art suite of decision-supportive tools and data with real-world advisory support to empower policymakers and other stakeholders to make informed energy decisions.

In April 2021, NREL and Louisville Metro Government executed a Technical Services Agreement (TSA-21-17556-0) for US \$30,000 representing "Phase I" of a planned broader effort for NREL to support the Louisville Metro Government in mapping out concrete pathways to meeting its clean energy aspirations. Phase I activities were organized under two (2) key tasks.

Under Task 1 of Phase I, NREL conducted a series of interviews with Louisville Metro Government staff, and also conducted significant desk-based research, in order establish a baseline understanding of the energy situation in Louisville and provide a high-level mapping of potential demand and supply-side solutions to meeting the city's 2030 goal to use 100% renewable electricity for municipal operations. This task culminated in the creation of a slide deck that was presented to a cross-functional working group within Louisville Metro Government, as well as community stakeholders through the Louisville Sustainability Council.

Under Task 2 of Phase I, NREL led a process of collaboration with Louisville Metro Government staff to develop a more detailed scope of work and project plan for an expanded analysis of pathways to achieve 100% renewable electricity for Metro Government by 2030. This task focused on prioritizing Metro Government needs and defining the exact analytical tools, data sets, and modelling approaches that must be brought to bear to better understand energy options for Metro Government. This document represents the formal output of that collaborative effort.

## **II. SCOPE OF WORK**

Phase II will examine the costs, benefits and practical/implementation related considerations of various energy pathways for Metro Government, helping to provide an analytical basis for future energy decisions. NREL shall provide staff and technical expertise, including data collection and formatting, modeling and analysis, and project management to support Louisville with three primary activities under this scope of work.

Due to financial resource constraints, we are unable to fully analyze all possible options. Instead, this SOW represents a prioritized set of activities that will provide high level guidance for policymakers.

## **III. DESCRIPTION OF TASKS**

The project tasks shall include the following activities under Phase II.

### ***1. Issue Brief on of Louisville Gas & Electric / Kentucky Utilities Green Tariff [\$35,000]***

Louisville Gas & Electric (LG&E) offers a voluntary [Green Tariff](#) program which is available as a rider to customers via a special contract which must be filed and approved by the Kentucky Public Service Commission.<sup>1</sup> NREL will perform a desk and interview based research and analysis process to characterize the practical function, cost implications, and potential co benefits of this option to decarbonize the city's electricity supply. Given that exact rates for the Green Tariff are bilaterally negotiated between LG&E and prospective customers, Metro Government will make a good faith effort to facilitate investigatory discussions between NREL and LG&E, as well as other local entities that have participated or attempted to participate in the Green Tariff program (e.g., University of Louisville, Toyota/DOW Chemical).

NREL will produce an issue brief which discusses:

- What are the various potential interpretations of Metro Government's 2030 target for renewable electricity?

---

<sup>1</sup> For more detailed information, see: <https://lge-ku.com/sites/default/files/regulatory/LGE-Electric-Rates-081721.pdf>

- What are the considerations in determining the feasibility of the Green Tariff option for Metro Government? How could the Green Tariff help to meet Metro Government's 2030 target for renewable electricity under different interpretations of the target?
- Under what circumstances could the Green Tariff make financial sense for Metro Government?
  - Is there any financial hedging value of the Green Tariff option? What are the potential social or environmental co-benefits of the Green Tariff option?
- Will the Green Tariff result in the offset of fossil fuel generation and a commensurate air emissions reduction? Is there any quantifiable "cost of carbon" (reduction) that can be analyzed for the Green Tariff option?

## **2. Municipal Building Energy Efficiency Measure Prioritization Analysis [\$125,000]**

Through Phase I activities with NREL, Metro Government has identified energy efficiency in municipal buildings as a principal means for achieving 2030 renewable electricity goals in a cost-effective manner. Metro Government is currently in the process of setting up an energy efficiency savings reinvestment fund for its municipal buildings, where the dollar value of 80% of measured energy savings will be set aside by the Office of Management and Budget each year for continued investment in building efficiency. In that context, Metro Government has expressed a desire for support in identifying and targeting energy efficiency measures across its fleet of buildings with the highest possible return on investment (ROI).<sup>2</sup>

NREL's high level objectives for this task are to accelerate Metro Government's progress toward their 2030 goals through the following forms of assistance: (1) helping to identify and prioritize near-term capital investment opportunities for the efficiency savings reinvestment fund based on available data and institutional knowledge; (2) streamlining the process through which building control data are used to identify and execute no- or low-cost operational improvements; and (3) working with Metro Government to build up the necessary data collection/management/analysis infrastructure to improve and automate these processes in the future.

Subtasks for this effort will be defined as follows:

### **2.1 - Scoping assessment of current practices for building data collection, data management, and building efficiency improvement prioritization and implementation strategies (\$10k).**

- Assess availability of relevant building data, including building type, size, footprint, vintage, efficiency investment data, load data, etc.
- Work with Metro Government staff to articulate relevant performance metrics (e.g., energy savings, energy cost savings, emissions reductions, etc.) in order to inform development of future data collection and management strategy.
- Document/evaluate current process and operational philosophy for identifying, prioritizing, and implementing efficiency strategies (both capital investments and no-/low-cost operational improvement).

---

<sup>2</sup> Notably, Metro Government retains the right to use these funds to offer capital matching to state and federal grants that may shift the economics of specific measures from the Metro Government perspective.

- Identify known/perceived data related or institutional barriers to more efficient data collection, management, and analysis workflows.
- Characterize past/present efficiency improvement strategies/investments.

*Deliverable(s)*

- Concise memorandum (2 3pp) containing summary of findings

**2.2 - Ad Hoc Support for Identification and Prioritization of Near-term Efficiency Opportunities (\$15k).**

- NREL will support Metro Government in identifying near term, “quick win”, practically feasible investment opportunities that can be identified without in depth building analysis. This will enable Metro Government to invest in building efficiency in a timely manner in advance of more a formalized building data collection, management and analysis infrastructure being set up.
- NREL will provide strategic input and technical review for any requests for information (RFI) or requests for proposal (RFP) documents that Metro Government decides to draft as a result of this activity.
- Among other near term opportunities, NREL may provide support (as appropriate, mutually agreed upon, and within subtask budget) in the following ways
  - (1) Assess/modify existing processes for proven efficiency upgrades (start with LED lighting).
  - (2) Establish a clear protocol for portfolio wide LED lighting replacement/retrofit. This will likely represent a modification to existing protocols that will leverage efficiency reinvestment funds to accelerate this process.
  - (3) Establish a protocol for seasonal setpoint setback that addresses potential issues and opportunities in a systematic way.
  - (4) Work with Metro Government to identify and prioritize up to 2 3 candidate buildings for near term HVAC updates/replacements.
  - (5) Evaluate/update existing methods for identifying/implementing no /low cost operational improvements.

*Deliverable(s)*

- Concise memorandum (1 2pp) containing summary of activities and opportunities
- In the event that Metro Government seeks to move forward with an RFP for energy efficiency measures identified during this activity, NREL will also provide technical input into procurement documents.
- Depending on the scope and nature of NREL’s support, additional deliverables – as mutually agreed upon between Metro Government and NREL – could include:
  - Technical specifications for equipment/systems related to specific energy efficiency projects
  - Draft process/protocol language for general operational improvement strategies and/or specific control strategies

### **2.3 - Strategic planning of long-term data collection, management, and analysis strategies to support automated efficiency investment prioritization analysis (\$30k).**

- Document known data gaps (detailed system parameters, window-to-wall ratio, interval data, cost data, breakdown of energy consumption by end use, etc.) which must be filled in order to conduct efficiency investment prioritization analysis.
- Identify opportunities to fill data gaps given budget and staff availability constraints (e.g., installing smart thermostats in small and medium facilities).
- Identify any additional staffing requirements to support building efficiency activities
- Map projected data availability and management strategies to potential analysis tools and approaches to streamline efficiency investment prioritization analysis, while also accounting for skills requirements for Metro Government staff to utilize potential analysis tools.
- As informed by the aforementioned activities and Subtask 1 findings, create an integrated plan for data collection, management, and analysis which reflects current and future data availability and feasible analytical pathways and solutions.

#### *Deliverable(s)*

- Concise memorandum (5-6pp) containing proposal for long-term integrated data collection, management, and analysis plan to inform future efficiency investment prioritization activities by Metro Government. Memorandum may include:
  - Description and recommendations related to potential data collection, management, and analysis strategies, including assessment of relevant software tools

### **2.4 - Implementation Support for Integrated Data Collection, Management, and Analysis (70k)**

- In alignment with the proposal for long-term integrated data collection, management, and analysis plan, NREL will support Metro Government in migrating known building information (including building characteristics and utility data) to a central database to streamline future data collection and management and enable portfolio-wide investment prioritization analysis.<sup>3</sup>
- NREL will work with Metro Government to identify and demonstrate free, open-source, feasible-to-use, DOE-funded building efficiency screening tool(s) capable of facilitating “lite” building analysis<sup>4</sup> to prioritize candidate buildings for follow-on data collection and analysis (e.g., on-site assessments, energy audits, etc.).
- NREL will collaborate with Metro Government to identify follow-on data collection and analysis workflow(s) to leverage pre-screening results to make appropriate efficiency

---

<sup>3</sup> This will include an effort to synchronize data with the Metro Government’s existing EnergyCap™ energy management and utility bill accounting software.

<sup>4</sup> Fully-automated workflows to generate detailed building energy models do not currently exist. As well, at this stage, NREL staff opine that bespoke/detailed building energy modeling exercises will be too time- and resource-intensive relative to the value they provide for this application. Thus, NREL proposes automation of a “lite” analysis workflow which will provide valuable pre-screening insights. Furthermore, the underlying data storage format being used will be designed to support fully-automated functionalities as they become available.

investment decisions. Data collection approaches could include phone interviews with building operators, on site assessments (i.e., walk throughs), or detailed energy audits. In most cases, detailed energy modeling would not be part of the decision making process.

*Deliverable(s)*

- Concise memorandum (5-6pp) documenting the agreed upon approach to integrated data collection, management, and analysis. Corresponding demonstration(s) of workflows and functionality will be recorded and shared where appropriate.
- As relevant to the chosen implementation path, additional NREL deliverables may include:
  - Drafting of relevant documents for LMG staff describing standardized data collection practices, data management practices, and/or processes to utilize building efficiency screening tool(s)
  - Migration of known/relevant building information to mutually agreed upon platform(s), in collaboration with LMG staff
  - Provision of live demonstrations and/or training for DOE developed tools.
  - Training documents for data collection
  - Joint development of internal cost data collection and management system
  - Technical input into request for information or request for proposal documents
  - Recommendations on training requirements to collect data

### ***3. Ad Hoc Technical Support on Topics of Interest [\$40,000]***

NREL will provide TA on a mutually agreed upon basis to support 2030, 2035 or 2040 goal achievement. Possible issues include energy benchmarking, green leases, municipal lighting, solar program design, and others.

Strategic Partnership Projects  
**Technical Services Agreement No. TSA-21-17556**  
**Modification No. 3**

**Contractor:** Alliance for Sustainable Energy, LLC  
Operator of the National Renewable Energy Laboratory

**Sponsor:** Louisville Metro Government

**Period of Performance:** 04/09/2021 through 04/08/2024  
**This modification adds 24 months to the period of performance and adds \$200,000 to the value of the agreement.**

Except as stated herein, all terms and conditions of the Technical Services Agreement shall remain in full force and effect without change. In the event of any conflict between the terms of the subject Agreement and this Modification, the provisions of this Modification shall take precedence.

**Section (a) Description of Work** is amended to include the following: Appendix A Statement of Work for Modification No. 3.

**Section (b) Deliverables** is amended to include the following: Appendix A Statement of Work for Modification No. 3.

**Section (c) Period of Performance** is amended to reflect a completion date of 04/08/2024. It is hereby acknowledged and agreed that existing work under TSA Mod 3 may continue to be performed by Contractor until 04/08/2024.

**Section (g) Contractor Cost Estimate** is amended as follows:

Cost Estimate Modification No. 3	\$200,000.00
DOE Administrative Charge Modification No. 3	\$00.00
TOTAL Modification No. 3	\$200,000.00
Prior Cost Estimate:	\$30,000.00
Prior DOE Administrative Charge	\$00.00
TOTAL Prior Cost Estimate	\$30,000.00

**Section (h) TOTAL Cost Estimate** is modified as follows:

TOTAL Cost Estimate, including Modification No. 3     \$230,000.00

The parties have indicated their acceptance of this Modification to Agreement No. TSA-21-17556 between Sponsor and Contractor by signature below.

**Accepted:**

**Sponsor**

DocuSigned by:  
By: Jeff O'Brien  
3A145C9A77EE47D...

Name: Jeff O'Brien

Title: Chief of Louisville Forward

Date: 2/18/2022

**Accepted:**

**Contractor**

DocuSigned by:  
By: Anne Miller  
52B278BC96374C3

Name: Anne Miller

Title: Director Technology Transfer

Date: 2/21/2022



Alliance for Sustainable Energy, LLC  
operator of the  
National Renewable Energy Laboratory

Strategic Partnership Projects  
**Technical Services Agreement**  
**No. TSA- 21-17556**

Prepared by the National Renewable Energy Laboratory  
1/20/2022

**Appendix A – Statement of Work for Modification No. 3**

I. **PROJECT TITLE:** Technical Support for Louisville Renewable Energy Phase II

II. **BACKGROUND:**

Parties to this agreement are:

Contractor: Alliance for Sustainable Energy, operator of the National Renewable Energy Laboratory (NREL) under Prime Contract No. DE-AC36-08GO28308 for the U.S. Department of Energy (DOE). Contractor has a facility at 15013 Denver West Parkway, Golden, CO 80401.

Sponsor: Louisville Metro Government, a local government entity, is located at 611 W. Jefferson St., Louisville, KY 40202

In Phase I, NREL supported LMG in mapping out concrete pathways to meeting its clean energy goals. Phase II will examine the costs, benefits, and practical/implementation-related considerations of various energy pathways for LMG, helping to provide an analytical basis for future energy decisions.

III. **SCOPE OF WORK**

NREL will provide staff and technical expertise, including data collection and formatting, modeling and analysis, and project management to support LMG with three primary activities under this scope of work.

**Task Descriptions, Deliverables, and Estimated Completion Dates:**

The project tasks shall include the following activities under Phase II.

**Task 1: *Issue Brief on of Louisville Gas & Electric / Kentucky Utilities Green Tariff***

Louisville Gas & Electric (LG&E) offers a voluntary Green Tariff program which is available as a rider to customers via a special contract which must be filed and approved by the Kentucky Public Service Commission. NREL will perform a desk and interview-based research and analysis process to characterize the practical function, cost implications, and potential co-benefits of this option to decarbonize the city's electricity supply. Given that exact rates for the Green Tariff are bilaterally negotiated between LG&E and prospective customers, LMG will make a good faith effort to facilitate investigatory discussions between NREL and LG&E, as well as other local entities that have participated or attempted to participate in the Green Tariff program.

NREL will produce an issue brief which discusses:

- What are the various potential interpretations of LMG's 2030 target for renewable electricity?
- What are the considerations in determining the feasibility of the Green Tariff option for LMG? How could the Green Tariff help to meet LMG's 2030 target for renewable electricity under different interpretations of the target?
- Under what circumstances could the Green Tariff make financial sense for LMG?
  - Is there any financial hedging value of the Green Tariff option? What are the potential social or environmental co-benefits of the Green Tariff option?
- Will the Green Tariff result in the offset of fossil fuel generation and a commensurate air emissions reduction? Is there any quantifiable "cost of carbon" (reduction) that can be analyzed for the Green Tariff option?

### ***Task 2: Municipal Building Energy Efficiency Measure Prioritization Analysis***

Through Phase I activities with NREL, LMG has identified energy efficiency in municipal buildings as a principal means for achieving 2030 renewable electricity goals in a cost-effective manner. LMG is currently in the process of setting up an energy efficiency savings reinvestment fund for its municipal buildings, where the dollar value of 80% of measured energy savings will be set aside by the Office of Management and Budget each year for continued investment in building efficiency. In that context, LMG has requested support in identifying and targeting energy efficiency measures across its fleet of buildings with the highest possible return on investment (ROI).

NREL's high level objectives for this task are to accelerate LMG's progress toward their 2030 goals through the following forms of assistance: (1) helping to identify and prioritize near-term capital investment opportunities for the efficiency savings reinvestment fund based on available data and institutional knowledge; (2) streamlining the process through which building control data are used to identify and execute no or low cost operational improvements; and (3) working with LMG to build up the necessary data collection/management/analysis infrastructure to improve and automate these processes in the future.

2.1 NREL will scope an assessment of current practices for building data collection, data management, and building efficiency improvement prioritization and implementation strategies.

- Assess availability of relevant building data, including building type, size, footprint, vintage, efficiency investment data, load data, etc.
- Work with LMG staff to articulate relevant performance metrics (e.g., energy savings, energy cost savings, emissions reductions, etc.) to inform development of future data collection and management strategy.
- Document/evaluate current process and operational philosophy for identifying, prioritizing, and implementing efficiency strategies (both capital investments and no-/low-cost operational improvement).
- Identify known/perceived data-related or institutional barriers to more efficient data collection, management, and analysis workflows.
- Characterize past/present efficiency improvement strategies/investments.

*Deliverable(s)*

- Concise memorandum (2-3pp) containing summary of findings

2.2 Ad Hoc Support for Identification and Prioritization of Near-term Efficiency Opportunities.

- NREL will support LMG in identifying near-term, “quick win”, practically feasible investment opportunities that can be identified without in-depth building analysis. This will enable LMG to invest in building efficiency in a timely manner in advance of more a formalized building data collection, management and analysis infrastructure being set up.
- NREL will provide strategic input and technical review for any requests for-information (RFI) or requests-for-proposal (RFP) documents that LMG decides to draft because of this activity.

*Deliverable(s):*

- Concise memorandum (1-2pp) containing summary of activities and opportunities

Optional support:

Among other near-term opportunities, NREL may provide support as mutually agreed upon and subject to available funding.

- (1) Assess/modify existing processes for proven efficiency upgrades
- (2) Establish a clear protocol for portfolio-wide LED lighting replacement/retrofit. This will likely represent a modification to existing protocols that will leverage efficiency reinvestment funds to accelerate this process.
- (3) Establish a protocol for seasonal setpoint setback that addresses potential issues and opportunities in a systematic way.
- (4) Work with LMG to identify and prioritize up to 2-3 candidate buildings for near-term HVAC updates/replacements.
- (5) Evaluate/update existing methods for identifying/implementing no-/low-cost operational improvements.

Optional deliverables:

- In the event that LMG seeks to move forward with an RFP for energy efficiency measures identified during this activity, NREL will also provide technical input into procurement documents.
- Depending on the scope and nature of NREL's support, additional deliverables – as mutually agreed upon between LMG and NREL – could include:
- Technical specifications for equipment/systems related to specific energy efficiency projects
- Draft process/protocol language for general operational improvement strategies and/or specific control strategies

2.3 NREL will assist with strategic planning of long-term data collection, management, and analysis strategies to support automated efficiency investment prioritization analysis

- Document known data gaps (detailed system parameters, window-to-wall ratio, interval data, cost data, breakdown of energy consumption by end use, etc.) which must be filled to conduct efficiency investment prioritization analysis.
- Identify opportunities to fill data gaps given budget and staff availability constraints (e.g., installing smart thermostats in small and medium facilities).
- Identify any additional staffing requirements to support building efficiency activities.
- Map projected data availability and management strategies to potential analysis tools and approaches to streamline efficiency investment

prioritization analysis, while also accounting for skills requirements for LMG staff to utilize potential analysis tools.

- As informed by the aforementioned activities and Subtask 1 findings, create an integrated plan for data collection, management, and analysis which reflects current and future data availability and feasible analytical pathways and solutions.

*Deliverable(s):*

- Concise memorandum (5-6pp) containing proposal for long-term integrated data collection, management, and analysis plan to inform future efficiency investment prioritization activities by LMG.

## 2.4 Implementation Support for Integrated Data Collection, Management, and Analysis.

- In alignment with the proposal for long-term integrated data collection, management, and analysis plan, NREL will support LMG in migrating known building information (including building characteristics and utility data) to a central database to streamline future data collection and management and enable portfolio-wide investment prioritization analysis. This will include an effort to synchronize data with the LMG existing EnergyCap™ energy management and utility bill accounting software.
- Fully automated workflows to generate detailed building energy models do not currently exist. NREL will work with LMG to identify and demonstrate free, open-source, feasible-to-use, building efficiency screening tool(s) capable of facilitating a high-level building analysis which will provide valuable pre-screening insights.
- Prioritize candidate buildings for follow-on data collection and analysis (e.g., on-site assessments or energy audits by LMG staff or contractors).
- NREL will collaborate with LMG to identify follow-on data collection and analysis workflow(s) to leverage pre-screening results allow LMG to make efficiency investment decisions.

*Deliverable(s):*

- Concise memorandum (5-6pp) documenting the agreed upon approach to integrated data collection, management, and analysis. Corresponding demonstration(s) of workflows and functionality will be recorded and shared where appropriate.

Optional Deliverables:

As relevant to the chosen implementation path, additional NREL deliverables may include:

- Drafting of relevant documents for LMG staff describing standardized data collection practices, data management practices, and/or processes to utilize building efficiency screening tool(s)
- Migration of known/relevant building information to mutually agreed upon platform(s), in collaboration with LMG staff
- Provision of live demonstrations and/or training for DOE-developed tools.
- Training documents for data collection
- Joint development of internal cost data collection and management system
- Technical input into request-for-information or request-for-proposal documents
- Recommendations on training requirements to collect data

**Task 3: Ad Hoc Technical Support on Topics of Interest**

NREL will provide other technical assistance.

Strategic Partnership Projects  
**Technical Services Agreement No. TSA-21-17556**  
**Modification No. 1 – No Cost Time Extension**

**Contractor:** Alliance for Sustainable Energy, LLC  
Operator of the National Renewable Energy Laboratory

**Sponsor:** City of Louisville

**Period of Performance:** 04/09/2021 through 01/08/2022  
**This modification adds 3 months to the period of performance.**

Except as stated herein, all terms and conditions of the Technical Services Agreement shall remain in full force and effect without change. In the event of any conflict between the terms of the subject Agreement and this Modification, the provisions of this Modification shall take precedence.

**Section (e) Period of Performance** is amended to reflect a completion date of 01/08/2022.

The parties have indicated their acceptance of this Modification between Sponsor and Contractor by signature below.

**Accepted:**

**Sponsor**

DocuSigned by:  
By:   
B4B46603FB3A42D

Name: Joel Neaveill

Title: Director of Procurement

Date: 9/17/2021

**Accepted:**

**Contractor**

DocuSigned by:  
By:   
52B278BC96374C3...

Name: Anne Miller

Title: Director Technology Transfer

Date: 9/17/2021

**Certificate Of Completion**

Envelope Id: 878BC36FB26646BD85E0CB68B88AE907

Status: Completed

Subject: Please DocuSign: Agreement with NREL TSA-21-17556-1

Classify Envelope:

Source Envelope:

Document Pages: 2

Signatures: 2

Envelope Originator:

Certificate Pages: 3

Initials: 0

Sherri Scarpello

AutoNav: Enabled

15013 Denver West Parkway

Envelope Stamping: Enabled

Golden, CO 80401

Time Zone: (UTC-07:00) Mountain Time (US &amp; Canada)

Sherri.Scarpello@nrel.gov

IP Address: 96.43.153.8

**Record Tracking**

Status: Original

Holder: Sherri Scarpello

Location: DocuSign

9/15/2021 11:33:11 AM

Sherri.Scarpello@nrel.gov

Security Appliance Status: Connected

Pool: FedRamp\_FedProd-FedProdPrime

Storage Appliance Status: Connected

Pool: National Renewable Energy Laboratory

Location: DocuSign

**Signer Events**

Joel Neaveill

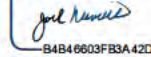
Joel.Neaveill@louisvilleky.gov

Director of Procurement

Louisville / Jefferson County Metro Government

Security Level: Email, Account Authentication  
(None)**Signature**

DocuSigned by:



B4B46603FB3A42D

**Timestamp**

Sent: 9/16/2021 10:48:12 AM

Viewed: 9/17/2021 10:32:57 AM

Signed: 9/17/2021 10:33:19 AM

Signature Adoption: Uploaded Signature Image

Using IP Address: 199.201.216.104

**Electronic Record and Signature Disclosure:**

Accepted: 9/17/2021 10:32:57 AM

ID: 8d5dbd0c-52a3-4090-8e6b-8e42ffc6718

Anne Miller

Anne.Miller@nrel.gov

Technology Transfer Director

National Renewable Energy Laboratory

Security Level: Email, Account Authentication  
(None)

DocuSigned by:



52B2780C96374C3

Sent: 9/17/2021 10:33:21 AM

Viewed: 9/17/2021 10:34:36 AM

Signed: 9/17/2021 10:34:50 AM

Signature Adoption: Pre-selected Style

Using IP Address: 192.174.37.51

**Electronic Record and Signature Disclosure:**

Not Offered via DocuSign

**In Person Signer Events****Signature****Timestamp****Editor Delivery Events****Status****Timestamp****Agent Delivery Events****Status****Timestamp****Intermediary Delivery Events****Status****Timestamp****Certified Delivery Events****Status****Timestamp****Carbon Copy Events****Status****Timestamp**

Diana Alvey

diana.alvey@louisvilleky.gov

Buyer II

Law Enforcement Services Inc.

Security Level: Email, Account Authentication  
(None)**COPIED**

Sent: 9/16/2021 10:48:13 AM

Viewed: 9/17/2021 11:04:34 AM



<b>Carbon Copy Events</b>	<b>Status</b>	<b>Timestamp</b>
---------------------------	---------------	------------------

**Electronic Record and Signature Disclosure:**  
Not Offered via DocuSign

<b>Witness Events</b>	<b>Signature</b>	<b>Timestamp</b>
-----------------------	------------------	------------------

<b>Notary Events</b>	<b>Signature</b>	<b>Timestamp</b>
----------------------	------------------	------------------

<b>Envelope Summary Events</b>	<b>Status</b>	<b>Timestamps</b>
--------------------------------	---------------	-------------------

Envelope Sent	Hashed/Encrypted	9/15/2021 11:37:02 AM
Certified Delivered	Security Checked	9/17/2021 10:34:36 AM
Signing Complete	Security Checked	9/17/2021 10:34:50 AM
Completed	Security Checked	9/17/2021 10:34:50 AM

<b>Payment Events</b>	<b>Status</b>	<b>Timestamps</b>
-----------------------	---------------	-------------------

<b>Electronic Record and Signature Disclosure</b>
---

## STATEMENT FOR ELECTRONIC CONSENT AND DISCLOSURE

In order to transact electronic business with NREL as well as receive related documents electronically, you must read, understand and agree to the following terms and conditions.

You agree to receive and sign the forms relating to your agreement/authorization electronically.

This Disclosure applies to those forms, disclosures, notices or other documents that may be given to you and in some cases signed and returned to NREL as part of an agreement/authorization transaction (“Communications”). By agreeing to the terms and conditions of this Disclosure, you are agreeing you have the authority to receive and where indicated, sign these documents electronically on behalf of your organization.

1. All Communications that NREL provides to you in electronic form will be provided either (1) via e-mail; or (2) by your accessing a website that NREL will designate in an e-mail notice NREL will send to you at the time the information is available;

2. Requesting Paper Copies. You can obtain a paper copy of any Communication provided to you electronically by printing it yourself or by requesting that NREL mail you a paper copy. Requests for paper copies must be made within a reasonable time after we first provided the electronic Communication to you.

3. Communications in Writing. All Communications in either electronic or paper format from NREL to you will be considered “in writing.” You should print or download for your records a copy of all electronic Communications, this Disclosure and any other document that is important to you.

**By selecting “Yes, I agree to the terms and conditions” and then “Continue,” you are agreeing to the terms and conditions set forth in this Disclosure and you are confirming that you are able to receive the Communications.**

Alliance for Sustainable Energy, LLC  
operator of the  
National Renewable Energy Laboratory

Strategic Partnership Projects  
**Technical Services Agreement**  
**No. TSA- 21-17556-0**

**Notice:** By signing this Agreement, the Sponsor acknowledges in advance that its entity name and the title and non-proprietary description of the project are available for public release by the Contractor without further notice.

**I. Parties to the Technical Services Agreement.**

Alliance for Sustainable Energy, LLC as Management and Operating (M&O) Contractor for the National Renewable Energy Laboratory ("Contractor" or "NREL"), under U.S. Department of Energy Contract No. DE-AC36-08GO28308, has been requested by the "Sponsor" to perform the services set forth in the Scope of Work below.

<b>Sponsor</b>	Louisville Metro Government	Contact name	Diana Alvey
Address	611 W. Jefferson St.	Phone #	502-574-3751
	Louisville, KY 40202	Email	diana.alvey@louisvilleky.gov

<b>Contractor</b>	Alliance for Sustainable Energy, LLC	Contact name	Katheryn Lennon
Address	15013 Denver West Parkway	Phone #	303-384-7378
	Golden, CO 80401	Email	katheryn.lennon@nrel.gov

**II. Statement of Work.**

Pursuant to the Technical Services Agreement and subject to the attached terms and conditions, Contractor will assign a duly authorized employee to perform the work agreed to as follows:

<b>(a) Project Title:</b> Louisville Renewable Energy Planning, Phase I			
<b>(b) Non-proprietary Description of Project:</b> Develop a roadmap to achieve 100% renewable energy for municipal operations by 2030 and city-wide by 2040. This road map will provide guidance and policy for resiliency and renewable energy readiness. NREL will identify solar PV rooftop and ground-mounted generation capacity of Louisville municipal operations and community at large and provide integrated scientific energy analysis including policy, market, regulatory, economic, environmental, social, system, and behavioral.			
<b>(c) Statement of Work:</b> See Appendix A Field of Use for potential license: N/A			
<b>(d) Deliverables:</b> See Appendix A			
<b>(e) Period of Performance:</b> (not to exceed 36 months)	6 months	<b>(g) Contractor Cost Estimate</b> DOE Administrative Charge (3%)	\$ 30,000.00 \$ 00.00
<b>(f) Cost basis:</b> Labor hours and materials		<b>(h) TOTAL Cost Estimate</b> (not to exceed \$500,000) Advance payment:	\$ 30,000.00 \$ 30,000.00

**III. Acceptance of Technical Services Agreement.**

**Sponsor Acceptance**

DocuSigned by:

*Jeff O'Brien*

3/16/2021

Signature

Date

Name: Jeff O'Brien

Title: Co-Chief, Louisville Forward

**Contractor Acceptance**

DocuSigned by:

*Anne Miller*

3/16/2021

Signature

Date

Name: Anne Miller

Title: Director Technology Transfer

cc: Contracting Officer, DOE Golden Field Office

## Terms and Conditions for Technical Services Agreement

**ARTICLE I. Scope of Technical Services.** Subject to the following terms and conditions, Alliance for Sustainable Energy, LLC (herein also “Contractor” or “NREL”) agrees to provide Technical Services to the Sponsor in the defined work areas identified in the Scope of Work attached and incorporated herein. It is understood by the Parties that, except for the intellectual property provisions of this Agreement, Contractor is obligated to comply with the terms and conditions of the Department of Energy (herein also “DOE” or “Government”) M&O Contract when providing goods, services, products, processes, materials, or information to the Sponsor under this Agreement. The Parties understand that DOE has authorized the Contractor to use this Technical Services Agreement when appropriate and that the total cost to Sponsor will not exceed \$500,000.

**ARTICLE II. Term and Termination of Agreement.** The Contractor’s estimated period of performance for completion of the Scope of Work is the term of this Agreement. The term shall be effective as the later date of (1) the date on which this Agreement is signed by the last of the Parties thereto, or (2) the date on which the Contractor receives advance payment from the Sponsor and funds are allocated to this Agreement. This Agreement may be terminated, in whole or in any part, at any time by either Party, without liability, upon giving ten (10) days written notice to the other Party. In the event of termination, the Sponsor shall be responsible for the Contractor’s costs (including closeout costs) through the effective date of termination, but in no event shall the Sponsor’s cost responsibility exceed the total cost to the Sponsor as described in the Scope of Work.

**ARTICLE III. Costs.** The Contractor has no obligation to continue or complete performance of the work at a cost in excess of its estimated cost. The Contractor agrees to provide at least thirty (30) days written notice to the Sponsor if the actual cost to complete performance will exceed Contractor’s estimated cost.

**ARTICLE IV. Funding and Payment.** This Technical Services Agreement is based on full cost recovery and the Contractor is required by the Government to receive advance funding before beginning work. The Sponsor shall provide sufficient funds in advance to reimburse the Contractor for costs to be incurred in performance of the work described in this Agreement, and the Contractor shall have no obligation to perform in the absence of adequate advance funds. If the estimated period of performance exceeds 90 days and the estimated cost exceeds \$25,000, the Sponsor may, with the Contractor's approval, advance funds incrementally. In such a case, the Sponsor shall provide to the Contractor, prior to any work being performed, an advance payment sufficient to cover anticipated work that will be performed for the first billing cycle. In addition, the Sponsor shall provide additional funding to ensure that funds remain available for work during subsequent billing cycles (collectively the advance payment of \$30,000 as set forth in Block II (h) of the attached cover page for this Agreement). Following Sponsor’s remittance of the advance payment, the Contractor will invoice the Sponsor each billing cycle (or as necessary) to maintain a balance of funding sufficient to cover anticipated work. Sponsor’s payment shall be due no later than thirty (30) days after receipt of Contractor’s invoice. Upon termination or completion, any excess funds shall be refunded by the Contractor to the Sponsor.

Sponsor shall enter this Agreement number on the check made payable to the Alliance for Sustainable Energy, LLC and mail payment to the following address:

Alliance for Sustainable Energy, LLC  
Manager of the National Renewable Energy Laboratory  
ATTN: Finance – Mailstop RSF041  
15013 Denver West Parkway, Golden, CO 80401

**ARTICLE V. Source of Funds.** The Sponsor hereby warrants and represents that, if the funding it brings to this Technical Services Agreement has been secured through other agreements, such other agreements do not have any terms and conditions (including intellectual property) that conflict with the terms and conditions of this Technical Services Agreement.

**Article VI. Tangible Personal Property.** Upon termination of this Agreement, tangible personal property or equipment produced or acquired in conducting work under this Agreement shall be owned by the Sponsor. Tangible personal property or equipment produced or acquired as part of this Agreement will be accounted for and maintained during the term of the Agreement in the same manner as Department of Energy property or equipment. Costs incurred for disposition of property shall be the responsibility of the Sponsor and included in costs allocated in Article III or paid separately by the Sponsor.

**ARTICLE VII. Prepublication Review.** The Parties agree to secure prepublication approval from each other, which shall not be unreasonably withheld or denied beyond thirty (30) days.

**ARTICLE VIII. Legal Notice.** Any technical paper, article publication, or announcement of advances generated in connection with work done under this Technical Services Agreement, during the period of performance of the Agreement or in the future, shall give credit to the Sponsor as a sponsor of the work and shall contain the following legal notice: "The National Renewable Energy Laboratory, 15013 Denver West Parkway, Golden, CO 80401, is a national laboratory of the U.S. Department of Energy managed by the Alliance for Sustainable Energy, LLC for the U.S. Department of Energy under Contract Number DE-AC36-08GO28308."

**ARTICLE IX. Disclaimer.** THE GOVERNMENT AND CONTRACTOR MAKE NO EXPRESS OR IMPLIED WARRANTY AS TO THE CONDITION OF THE TECHNICAL SERVICES; OR ANY INTELLECTUAL PROPERTY; OR PRODUCT MADE OR DEVELOPED UNDER THIS TECHNICAL SERVICES AGREEMENT; OR THE OWNERSHIP, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE OF THE TECHNICAL SERVICES OR RESULTING PRODUCT. THE GOVERNMENT OR CONTRACTOR WILL NOT BE LIABLE FOR SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES.

**ARTICLE X. General Indemnity.** To the extent permitted by Kentucky State law, the Sponsor agrees to indemnify and hold harmless the Government, the Contractor, and persons acting on their behalf from all liability, including costs and expenses incurred, to any person, including the Sponsor, for injury to or death of persons or other living things or injury to or destruction of property arising out of the performance of the Agreement by the Government, the Contractor, or persons acting on their behalf, or arising out of the use of the services performed, materials supplied, or information given hereunder by any person including the Sponsor, and not directly resulting from the fault or negligence of the Government, the Contractor, or persons acting on their behalf.

**ARTICLE XI. Product Liability Indemnity.** To the extent permitted by Kentucky State law, except for any liability resulting from any negligent acts or omissions of the Contractor or the Government, the Sponsor agrees to indemnify the Government and the Contractor for all damages, costs, and expenses, including attorney's fees, arising from personal injury or property damage occurring as a result of the making, using, or selling of a product, process, or service by or on behalf of the Sponsor, its assignees, or licensees, which was derived from the work performed under this Technical Services Agreement. In respect to this Article, neither the Government nor the Contractor shall be considered assignees or licensees of the Sponsor, as a result of reserved Government and Contractor rights. The indemnity set forth in this paragraph shall apply only if the Sponsor shall have been informed as soon and as completely as practical by the Contractor and/or the Government of the action alleging such claim and shall have been given an opportunity, to the maximum extent afforded by applicable laws, rules, or regulations, to participate in and control its defense, and the Contractor and/or the Government shall have provided all reasonably available information and reasonable assistance requested by the Sponsor. No settlement for which the Sponsor would be responsible shall be made without the Sponsor's consent unless required by final decree of a court of competent jurisdiction.

**ARTICLE XII. Notice and Assistance Regarding Patent and Copyright Infringement.** The Sponsor shall report to the DOE and the Contractor, promptly and in reasonable written detail, each claim of patent or copyright infringement based on the performance of this Technical Services Agreement of which the Sponsor has knowledge. The Sponsor shall furnish to the DOE and the Contractor, when requested by the DOE or the Contractor, all evidence and information in the possession of the Sponsor pertaining to such claim.

**ARTICLE XIII. Patent Rights—Use of Facilities.**

The terms and conditions of this Technical Services Agreement are not intended to be used for research and development, software development, or where there is a possibility of any intellectual property being conceived or created.

**ARTICLE XIV. Rights in Technical Data—Use of Facilities.** Subject to the provisions of this article, Sponsor shall have the right to use, release to others, reproduce, distribute, or publish any data first produced under this Agreement. Data produced under this Agreement will be provided to the Sponsor who will be solely responsible for marking the data and removing the data from the facility by or before termination of this Agreement. The DOE and the Contractor shall have the right to publish and use any data provided to or generated by Contractor, and to permit others to do so unless such data is marked as "Proprietary Information" by the Sponsor. The Government and the Contractor agree not to disclose properly marked Proprietary Information to anyone other than the Sponsor without written approval of the Sponsor, except to Government employees who are subject to the statutory provisions against disclosure of confidential information set forth in the Trade Secrets Act (18 USC 1905). The Government shall have unlimited rights in technical data (including Proprietary Information) that are not removed from the facility by or before termination of this Agreement.. Sponsor agrees to deliver to persons acting on behalf of DOE a non-proprietary description of the work to be performed under this Agreement.

**ARTICLE XV. Assignment.** Neither this Technical Services Agreement nor any interest therein or claim thereunder shall be assigned or transferred by either Party, except as authorized in writing by the other Party to this Technical Services Agreement, provided, the Contractor may transfer it to DOE, or its designee, with notice of such transfer to the Sponsor, and the Contractor shall have no further responsibilities except for the confidentiality, use, and/or nondisclosure obligations of this Technical Services Agreement. The obligation of the Contractor shall apply to any successor in interests continuing the management and operation of the DOE facility involved in this Technical Services Agreement.

**ARTICLE XVI. Similar or Identical Services.** The Government and/or the Contractor shall have the right to perform similar or identical services in the Statement of Work for other Sponsors as long as the Sponsor's Proprietary Information is not utilized.

**ARTICLE XVII. Non Competition.** The Sponsor states that, to the best of the Sponsor's knowledge, the Contractor is not in competition with the domestic private sector by performing these Technical Services.

**ARTICLE XVIII. Export Control.** Each Party is responsible for its own compliance with laws and regulations governing export control.

**ARTICLE XIX. Entire Agreement.** It is expressly understood and agreed that this Technical Services Agreement and its attachments contain the entire Agreement between the Parties. Any agreement to materially change any of the terms and conditions of this Technical Services Agreement or the attachments shall be valid only if the changes are made in writing and executed by the Parties herein.

Alliance for Sustainable Energy, LLC  
operator of the  
National Renewable Energy Laboratory

Strategic Partnership Projects  
**Technical Services Agreement**  
**No. TSA- 21-17556**

Prepared by the National Renewable Energy Laboratory  
2/9/2021

**Appendix A – Statement of Work**

I. **PROJECT TITLE:** Technical Support for Louisville's 100% Renewable Energy Goals

II. **BACKGROUND:**

Parties to this agreement are:

Contractor: Alliance for Sustainable Energy, operator of the National Renewable Energy Laboratory under Prime Contract No. DE-AC36-08GO28308 for the U.S. Department of Energy (DOE). Contractor has a facility at 15013 Denver West Parkway, Golden, CO 80401.

Sponsor: Louisville Metro Government, a local government entity, is located at 611 W. Jefferson St., Louisville, KY 40202

The City of Louisville, KY (Louisville Metro Government or LMG) adopted a 100% renewable resolution in early 2020. This resolution set goals for Louisville to reach 100% renewable electricity use for LMG operations by 2030, 100% clean energy goal for LMG by 2035 and 100% clean energy community-wide by 2040. As part of its planning to meet these goals, LMG has requested technical assistance and analytic support for options and pathways of meeting this goal from NREL.

Phase I represents a planned, broader effort for NREL to support LMG in mapping out concrete pathways to meeting its clean energy goals. Current funding is only provided for the Phase 1 activities described below. Any additional effort envisioned under this Agreement is dependent upon additional funding and the development of a detailed SOW for future efforts.

III. **SCOPE OF WORK**

NREL will provide staff and technical expertise, including data collection and formatting, modeling and analysis and project management to support LMG with three primary activities under this scope of work:

## **Phase 1 Effort**

- **Task 1: Baseline and Solution Mapping** Compile data on LMG baseline energy usage, costs, building stock inventory, retail tariff structures and other relevant information that might inform future decisions, and thereafter, provide a high-level mapping of potential components of a broader strategy to meet LMG 2030 renewable electricity goals. LMG will be responsible for providing any data to NREL that is not publicly available, and NREL's work is contingent upon receiving such data.
- **Task 2: Development of Phase II Scope of Work, Budget and Milestones** Based on outputs of Task 1 and in collaboration with LMG staff, develop a project plan for a Phase II study that analyzes the costs and benefits of various pathways to 100% renewable electricity for LMG.

## **Optional Phase 2**

- Potential activities under Phase 2 may be developed to help implement the efforts outlined and developed under Task 2 above.

## **Task Descriptions, Deliverables, and Estimated Completion Dates:**

The project tasks will include the following activities under Phase 1.

### **Task 1. Compile Baseline Data and Solution Mapping**

Under this task, NREL will work directly with LMG staff to compile baseline energy usage, cost, retail tariff structures, building and fleet inventory, franchise information, internal goals and policies and other relevant materials. Thereafter, NREL will develop a high level "menu" of components of a broader clean electricity strategy. Sub-tasks include:

1. Conduct initial interviews with LMG staff to understand data availability and discuss foreseen data needs
2. Assemble energy data request and work with LMG staff to collect such data
3. Collate all relevant energy data provided by LMG staff
4. Conduct interviews with various governmental and non-governmental stakeholders, as informed by data, to uncover potential components of city-wide clean electricity strategy (e.g., direct procurement of renewable energy, community, and behind-the-meter solar, energy efficiency and demand management options, market participation options, Louisville Gas & Electric related options, etc.)
5. Present all information and initial findings to relevant LMG staff

Deliverable: NREL will develop a slide deck to present findings of Task 1. Estimated Completion Date - Month 4

### **Task 2. Development of Phase 2 Scope of Work, Budget and Milestones**

Under this task, NREL will lead a process in collaboration with LMG staff to develop a more detailed scope of work and project plan for an expanded analysis of energy pathways for LMG operations by 2030. While the exact details of Phase II are not yet known, Phase II will examine the costs, benefits and practical/implementation-related considerations of various energy pathways for the LMG, helping to provide an analytical basis for future energy decisions. This task



will focus on defining the exact analytical tools, data sets, and modelling approaches that must be brought to bear to better understand energy options for the LMG.

Deliverable: Documentation of data collected, and Phase 2 scope of work as described in Task 2 above. Estimated Completion Date - Month 5