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Strategic Partnership Projects

Funds-In Agreement No. FIA-21-17442

Modification No. 2

Contractor: Alliance for Sustainable Energy, LLC

Operator of the National Renewable Energy Laboratory

Sponsor: Port of Seattle

Period of Performance: 5/11/21 through 12/31/23

This modification adds 12 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 Funds-In 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.

Block 2, Estimated Performance Period is amended to reflect a new completion date of 12/31/23.

Block 3, Financial is hereby amended as follows:

Cost Estimate Modification No. 2 \$200,000.00

DOE Administrative Charge \$0.00

TOTAL Modification No. 2 \$200,000.00

Prior Cost Estimate: \$350,000.00

Prior DOE Administrative Charge \$0.00

Total Cost to Sponsor \$550,000.00

Block 6, Agreement Terms and Conditions is modified to reflect the addition of "Appendix A – Statement of Work for Modification 2 to Funds-In Agreement No. FIA-21-17442"

"Appendix A – Statement of Work for Modification 2 to Funds-In Agreement No. FIA-21-17442" is hereby added to the Agreement.

"Appendix C-1 – Rights in Technical Data for Modification 2 to Funds-In Agreement No. FIA-21-17442" is hereby added to the Agreement solely for the work under this Modification 2.

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

Accepted: Accepted:

Sponsor Contractor

By: By:

Name: Name: Anne Miller

Title: Title: Director, Technology Transfer

Date: Date:

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Alliance for Sustainable Energy, LLC

manager and operator of the

National Renewable Energy Laboratory

Strategic Partnership Projects

Funds-In Agreement—FIA-21-17442-2

Appendix A for Modification No. 2 – Statement of Work

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. Project Title: Passenger mode choice model and traffic microsimulation model integration

II. Non-Proprietary Description of Project:

Integrate the passenger mode choice model that National Renewable Energy Laboratory (NREL) previously created for the Port with the Port's existing traffic microsimulation model.

III. Parties to this agreement:

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: Port of Seattle (Port). Sponsor has a facility at 2711 Alaskan Way, Seattle, WA 98121.

IV. Background:

The Ground Transportation Access Plan (GTAP) is SEA Airport's (SEA's) programmatic planning initiative that seeks to balance and address policy challenges related to ground transportation at SEA, namely (a) greenhouse gas emission reduction, (b) congestion reduction, (c) ground transportation revenues, (d) customer choice and (e) equity. These policy priorities were formally adopted by Commission in June 2019 (Resolution 3759).

To accurately predict and measure the potential effects of potential policies and initiatives on passenger mode choice, SEA worked with the National Renewable Energy Laboratory (NREL) to develop a survey-based Mode Choice Simulator model (MCS). This model was completed in 2022. However, the MCS is not currently able to predict changes in demand on airport access roads or congestion on SEA roadways. Doing so requires integrating the MCS with SEA's existing traffic microsimulation model. Integration of these tools will allow for an iterative process to determine the impact of changes in traffic congestion resulting from predicted mode shift and the effect of this congestion on travel time and resulting adjustments to predicted mode shift. This will enable a more accurate assessment of potential mode shift from various policy initiatives and resulting evaluation of the impacts on GHG emissions, equity, revenue, and curbside traffic congestion.

V. Statement of Work - Task Descriptions, Deliverables, and Estimated Completion Dates:

a. Task Descriptions

The primary goal of this task is to build a tool that allows for seamless, automated communication between the MCS and the traffic microsimulation model. This connection, that

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NREL describes as a "master function", will allow the MCS to automatically launch traffic simulations based on output parameters generated by the MCS.

To this end, the NREL team will complete the following tasks:

Task 1. Data Preparation. The NREL team will communicate with SEA on the geographic extent of the microsimulation model and the data sources needed for enabling the master function. Besides the existing microsimulation model and the passenger demand profile, the NREL team will work with Port staff to estimate traffic volume entering the simulation area on major access roads, background traffic demand (e.g., recirculating traffic, employee commuting, etc.), bypassing traffic volume on major access roads, and the distribution of passenger origins and destinations inside the airport (e.g., terminals, curb segments, etc.). The NREL team will seek other open sources (such as TomTom API) for any inputs that are not currently available to the Port staff.

Task 2. Script an interface with the Port's microsimulation model in Python. The NREL team will build the interface for the traffic microsimulation models provided by the Port so the functions and parameters of the traffic microsimulation set within the simulation software can be manipulated via a Python script. The interface will be designed with sufficient flexibility that it could be adapted to work with different VISSIM models in the same geographic simulation area in the future.

Task 3. Master Function. The NREL team will create a master function that digests the output of the MCS to feed it into and automatically launch the traffic microsimulation model. This master function will use the outputs of the mode choice simulator and change the simulation configuration automatically to reflect the influence of mode choice on traffic congestion.

Task 4. Sensitivity Analyses. The NREL team will use the master function to run a series of VISSIM simulations under different demand levels to test the reliability of the simulation model with increasing travel demand.

Task 5. Congestion Evaluation. The NREL team will create an evaluation function to summarize the traffic microsimulation outputs automatically for all model runs. The evaluation function will include travel time for different passenger cohorts, which will feed into the mode choice simulator. Any traffic delays detected relative to a base scenario will be documented in the existing evaluation framework in the MCS.

Task 6. User Interface. The NREL team will develop a user interface for running traffic microsimulation models with new MCS outputs. This interface will allow Port staff without any programming experience to run the integrated tool MCS – microsimulation tool.

Task 7. Other work at the direction of the partner, consistent with the scope and subject to the availability of funding.

b. Deliverables and Estimated Completion Dates

Task Deliverable Schedule from
modification
effective date

1. Data preparation List of data from Port End of Month 2
2. Script interface a) Model scripts End of Month 4
b) Demonstrate model to SEA staff
3. Master function a) Model methodology memo End of Month 6
b) Demonstrate model to SEA staff

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4. Sensitivity analyses Brief memo summarizing the End of Month 7
sensitivity analyses
5. Congestion Brief memo summarizing results End of Month 8
evaluation
6. User interface Model dashboard End of Month
10

VI. Schedule:

The anticipated period of performance for this work is 12 months.

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Alliance for Sustainable Energy, LLC,
manager and operator of the
National Renewable Energy Laboratory
Strategic Partnership Projects
Funds-In Agreement—FIA-21-17442-2
Appendix C-1 – Rights in Technical Data for Modification 2
(Alternative I - unlimited rights/nonproprietary - software)

1. The following definitions shall be used.

A. "Generated Information" means information produced in the performance of this Agreement or any Contractor's subcontract under this Agreement.

B. "Proprietary Information" means information which is developed at private expense, is marked as Proprietary Information, and embodies (1) trade secrets or (2) commercial or financial information which is privileged or confidential under the Freedom of information Act (5 USC § 552 (b)(4)).

C. "Unlimited Rights" means the right to use, disclose, reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, in any manner and for any purpose, and to have or permit others to do so.

D. "Computer Software" means (i) computer programs that comprise a series of instructions, rules, routines, or statements, regardless of the media in which recorded, that allow or cause a computer to perform a specific operation or series of operations; and (ii) recorded information comprising source code listings, design details, algorithms, processes, flow charts, formulas, and related material that would enable the computer program to be produced, created, or compiled.

2. For work performed at the DOE facility, the Sponsor agrees to furnish to the Contractor or leave at

the facility that information, if any, which is (1) essential to the performance of work by the Contractor personnel or (2) necessary for the health and safety of such personnel in the performance of the work. Any information furnished to the Contractor shall be deemed to have been delivered with Unlimited Rights unless marked as Proprietary Information. The Sponsor agrees that it has the sole responsibility for appropriately identifying and marking all documents provided containing Proprietary Information

3. The Sponsor, Contractor, and the Government shall have Unlimited Rights in all Generated Information, except for information which is disclosed in a Subject Invention disclosure being considered for patent protection.

4. The Government and Contractor agree not to disclose properly marked Proprietary Information 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).

5. The Sponsor is solely responsible for the removal of all of its Proprietary Information from the facility by or before termination of this Agreement. The Sponsor may request the Contractor to return or destroy all of the Sponsor's Proprietary Information subject to paragraph (2) above. The Government and Contractor shall have Unlimited Rights in any information which is not removed

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from the facility by termination of this Agreement. The Government and Contractor shall have Unlimited Rights in any Proprietary Information which is incorporated into the facility or equipment under this Agreement to such extent that the facility or equipment is not restored to the condition existing prior to such incorporation.

6. The Sponsor agrees that the Contractor will provide to the Department of Energy a nonproprietary description of the work performed under this Agreement.

7. COPYRIGHT: The Parties may assert Copyright in any of their Generated Information. Subject to the other provisions of this clause including Computer Software generated by the Contractor below, and to the extent copyright is asserted, the Government reserves for itself and others acting in its behalf, a paid-up, world-wide, irrevocable, non-exclusive license for Governmental purposes to publish, distribute, translate, duplicate, exhibit, prepare derivative works, and perform any such copyrighted works.

For Computer Software generated by the Contractor under this agreement, the Contractor grants to the Sponsor a royalty-free, nontransferable, non-exclusive, irrevocable worldwide copyright license for its own use.

When the Contractor asserts copyright in its Computer Software developed under this Agreement, the Government has for itself and others acting on its behalf, a royalty-free, nontransferable, nonexclusive, irrevocable worldwide copyright license to reproduce, prepare derivative works, and perform publicly and display publicly, by or on behalf of the Government (narrow-license). After the Contractor abandons or no longer commercializes the Copyrighted Computer Software, the Government has for itself and others acting on its behalf, a royalty-free, nontransferable, nonexclusive, irrevocable worldwide copyright license to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, by or on behalf of the Government (broad-license).

A separate copyright license may be necessary in Contractor Computer Software developed outside of this Agreement and used to perform the work in this Agreement, such as creating derivative works.

8. The terms and conditions of this Clause shall survive the Agreement, in the event that the Agreement is terminated before completion of the Statement of Work.

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