Request for Consultant Proposals

NLC – HVAC Toolkit

Issued by Efficiency Forward, Inc.:
April 4, 2024

Questions Due Before:
April 22, 2024

Proposals Due:
May 1, 2024

Efficiency Forward/DesignLights Consortium® Background

Efficiency Forward (EF)/the DesignLights Consortium (DLC) is an independent non-profit organization providing decision makers with data and resources on quality lighting, controls, and integrated building systems to reduce energy, carbon, and light pollution. We envision a net zero future where lighting, controls, and integrated building systems enable energy savings, decarbonization, and sustainability for all people and the environment.

We collaborate with utilities, energy efficiency programs, manufacturers, lighting designers, building owners, and government entities to create rigorous criteria for lighting performance that keeps up with the pace of technology. Through these partnerships, the DLC establishes product quality specifications, facilitates thought leadership, and provides information, education, tools, and technical expertise.

Project Objective

The DesignLights Consortium (DLC) is a non-profit organization that creates resources to help our member energy efficiency (EE) programs design and implement incentive programs for commercial and industrial lighting. As the lighting baseline evolves, EE programs will need to move from incentives for simple, uncontrolled LED lighting components to incentives for lighting systems that are connected with other building systems. This project will build tools to help DLC members better support networked lighting control (NLC) integration with HVAC controls. This work builds on the DLC study on connected lighting for grid resilience released in 2023, which explored the potential value of connected lighting systems for DLC members and identified integration with HVAC control systems as the biggest opportunity.

In 2023, the DLC hosted the External Systems Integration Working Group (ESI WG23), which consisted of a diverse group of industry experts across the lighting, HVAC, and utility industries. The working group identified non-communication between people working on lighting controls and people working on HVAC controls as a major market barrier; and suggested that the DLC produce the documents described herein, to address that barrier. For instance, equipment for lighting and HVAC is manufactured by different people in different companies. Incentive programs for lighting and for HVAC in the same organization have different application forms and are administered by different people in different departments, to serve different trade allies. NLC-HVAC integration is rarely specified; and when it is, lighting or HVAC installation contractors rarely have the information they need to produce successful results.

The tools created by this project will provide a foundation that will enable DLC member efficiency programs to create or expand incentives for NLC-HVAC integration. Without these new incentives, commercial lighting retrofit incentive programs and their trade allies are likely to see a sharp decline in activity within the next few years, as LED lighting becomes baseline and limits or eliminates lighting-only incentives. These tools will enhance the DLC's relevance to our members by supporting their transition from an LED focus to NLC focus, rather than a transition from LED focus to no lighting at all. The DLC has assembled a cross-functional industry advisory group (AG) that will help guide this project, including reviewing and commenting on the draft deliverables.

Definitions

- **NLC systems** are defined as the combination of sensors, network interfaces, and controllers that effect lighting changes in luminaires, retrofit kits, or lamps.
- **Luminaire Level Lighting Control (LLLC)** is a subset of NLC, with sensing for occupancy and daylight on every networked luminaire.
- A **connected lighting system** is an NLC system with external communication to at least one other building system such as HVAC control—via API, BACnet, comprehensive Bluetooth NLC mesh, or dry contact.
- **Interoperability** is the ability of systems or system components to transmit, receive, interpret, and/or react to data and/or power and function in a defined manner.
- In this document, we distinguish between these two kinds of "communication". Both are very important.
    - **Sharing of information:** between people
    - **Communication protocols:** between machines
- **Contractors** or **trade allies** are people who install lighting and/or HVAC.
- **RFP-respondent** is the entity fulfilling this RFP.
- **Occupied standby** is a third mode of HVAC control, in addition to **occupied** and **unoccupied**. **Occupied** setpoints are designed for occupant comfort. **Unoccupied** setpoints are designed to save energy while maintaining integrity of the building and contents, at times when the building is scheduled to be unoccupied. **Occupied standby** setpoints are designed for times when a building is scheduled to be occupied, but occupancy sensors in a zone of the building do not currently detect any occupants. The setpoints are wider than **occupied** to save energy, but typically narrower than **unoccupied** so that the **occupied** setpoints can be achieved quickly whenever the zone becomes occupied. Some recent building codes require **occupied standby** in HVAC zones where occupancy control is required for lighting. Occupancy data may be provided by various sources including occupancy sensors in an HVAC network or a NLC network. (This ad hoc definition should be replaced with a standardized definition in the final Toolkit.)

Project Deliverables

This project shall create an **NLC-HVAC Control Integration Toolkit** with the following components:

1. **Handbook:** An easy-to-use handbook for sharing information between people in lighting and HVAC silos, including glossary; lessons learned; and popular system types, network architectures and communication protocols.
2. **Project Template:** A project-specific NLC-HVAC control integration project template, which may include key contacts, details about control points, communication protocols, latency

requirements, etc. The template will support a consistent approach, for better communication between the various roles on an integration project, for better results from less effort.

3. **Incentive Template:** Efficiency program-specific NLC-HVAC control incentive template, an easy-to-use template with clear instructions, to be filled out by efficiency program personnel to provide the information that a contractor needs to obtain rebates or incentives for an NLC-HVAC control integration project.
4. **Decision Tree:** A decision tree to evaluate projects to predict whether a project is a good candidate for NLC-HVAC integration. Each branch will provide information about the feasibility of NLC-HVAC integration, the expected range of energy savings, relevant case studies, one or more viable paths of integration, etc.
5. **Case Study Spreadsheet:** A spreadsheet with data relevant to the Decision Tree.

Description of Deliverables:

The above tools will help lighting and HVAC specialists and efficiency programs share information, choose appropriate projects for NLC-HVAC integration, and identify appropriate case studies.

Format of final documents:

- The documents shall be delivered as editable versions in case the DLC chooses to edit or borrow content after project completion.
- Blank templates shall be Excel spreadsheets with some cell contents locked and other cells blank and unlocked, with restrictions on input such as text or URL.
- The DLC will make the documents available to DLC efficiency program members through the DLC Member Portal, with opportunities for efficiency program members to co-brand the documents with the DLC. The handbook and decision tree documents will probably be posted on the portal in PDF format.

Handbook and templates to support communication between NLC and HVAC personnel:

The NLC and HVAC areas of expertise are siloed in many aspects of a project, from manufacturers and efficiency program staff to salespeople and installers. These silos need information about each other to communicate in general; and information from each other about project details. To facilitate successful communication, a handbook will describe the basic information that each group needs to know, with references to relevant standards. In addition, blank templates will support the sharing of information specific to projects and programs. The DLC expects the RFP Respondent to revise these requirements based on their integration experience, in coordination with the DLC.

- The handbook shall help people in various roles explore NLC-HVAC integration including, but not limited to, efficiency program managers and engineers, manufacturers, specifiers and designers, contractors (general, electrical, and mechanical), and integrators of controls for lighting and for

HVAC. The content shall be well-organized so that a person in each role can easily find the information that is most pertinent to their own role; while also exploring information pertinent to other roles, in order to better understand people in other roles.

- The handbook shall facilitate sharing information from various industry perspectives. For example, the information sharing needs for lighting and HVAC efficiency programs are different from the information sharing needs of electrical and mechanical contractors.

Example references for handbook:

The handbook shall promote interoperability and refer to existing North American standards and specifications where feasible, including but not limited to the following examples. The handbook shall recommend digital protocols and mention common analog protocols briefly when necessary, without elaborating on the arcane art of debugging analog systems.

- NLC Digital Interoperability
    - ANSI C137.4 https://webstore.ansi.org/standards/nema/ansic1372019-2392109
    - ANSI C137.5 https://webstore.ansi.org/standards/nema/ansic1372021
    - ANSI C137.6 https://webstore.ansi.org/standards/nema/ansic1372021-2449810
    - Bluetooth NLC https://www.bluetooth.com/learn-about-bluetooth/use-cases/lighting-control/
    - DALIplus https://www.dali-alliance.org/daliplus/
- Building System Data Ontology
    - Ontology Alignment Project https://oap.cloud.buildingsiot.com/1.1/
    - MQTT https://mqtt.org/
    - ASHRAE 223P https://bacnet.org/working-groups/si-wg/
    - Project Haystack https://project-haystack.org/
    - Brick Schema https://brickschema.org/
    - BACnet https://bacnet.org/
- Standards of Practice
    - IES LP-16 https://store.ies.org/product/lp-16-22-lighting-practice-documenting-control-intent-narratives-and-sequences-of-operations/?v=7516fd43adaa
    - ASHRAE Guideline 13 https://www.ashrae.org/technical-resources/bookstore/ashrae-guideline-13-2015-specifying-building-automation-systems
    - CSI Division 25 https://www.ashb.com/wp-content/uploads/2021/10/IS-2021-228.pdf
- DLC Qualified Products Lists (after signing into your free account)
    - SSL https://qpl.designlights.org/qpl/solid-state-lighting
    - NLC https://qpl.designlights.org/qpl/networked-lighting-controls

Example topics for handbook, by audience:

General:

- Introduction that includes the savings potential of integrated controls, background context on the DLC, incentive programs and roles of each party involved in an integrated controls project.
- Describe popular system types and communication protocols and their functionality for lighting and for HVAC. A lighting example would be a wireless-communication NLC system with a Bluetooth mesh network of controllers and sensors that detect occupancy/vacancy and estimate light levels, with a mobile app GUI for system configuration and remote operation. An HVAC example would be a centralized chiller with VAV boxes and electric reheat managed via BACnet over ethernet, with system configuration programmed in BACnet code, and an online energy dashboard GUI for remote operation.
- Possibly list some less-popular system types and protocols with references.
- General guidelines about how to obtain efficiency incentives for NLC, for HVAC controls, and for NLC-HVAC integration, with references to the Incentive Template (described below).
- General guidelines about how to specify NLC-HVAC control integration.

Contractor or project developer:

- Lessons learned from challenges or issues at previous sites. As a starting point, the DLC will provide a list of lessons learned, extracted from online case studies.
- Popular network architectures and communication protocols on the two sides (lighting and HVAC), written for a contractor with nitty gritty details.
- Guidelines about how to specify integration, with references to the Project Template (described below).
- Guidelines on how to obtain efficiency incentives, with references to the Incentive Template.
- How and when to hire an integrator. Qualifications/skills/certifications to look for, organization memberships to check, etc.

Specifiers and designers:

- Guidelines on how to specify integration on a project with energy incentives.
- Details on system communication and integration methods, defined data sets and points lists, and advanced/integrated sequences of operation to achieve energy and operational efficiency increases for NLC-HVAC connected systems, with references to the Project Template.
- What information is needed, how it will be delivered, and how to interpret that information.

Efficiency programs and program implementers:

- How can an efficiency program best support systems integration?
    - Complete the Incentive Template, to harmonize with this Toolkit.

- Harmonize lighting and HVAC application forms?
- Incentivize the expense of systems integration during planning, installation, configuration, and commissioning?
- Require that most incentivized lighting projects and HVAC projects be integration-ready?

- What does "integration-ready" mean for the various branches of the decision tree? For example, Consumers Energy's NLC program requires that eligible systems provide remote interface and control capability via BACnet or LONworks.

Project-specific NLC-HVAC control integration template ("Project Template"):

This template shall be easy to use and understand, with clear instructions and blanks to be filled in with project-specific data by specifiers, contractors, or integrators, to help them share information more easily and successfully with one another. It shall cover engineers' and contractors' roles and responsibilities for integration, including handoffs and coordination responsibilities. It shall provide value and validation for commissioning, LEED verification, energy/utility/code program compliance.

Example topics for project template:

Topic	Details
How a project will flow	Who is responsible for success in key steps, key contacts
Control points	Number of points for each side, naming/mapping convention, definitions of points, master for overriding each point
Protocols to be used	Are protocols open? Cybersecurity concerns?
User Interface and Building Management System (BMS)	Requirements to monitor, edit, track/trend, and report on the integrations.
Input and output control signals of each system	With sufficient technical detail, for example: what should a Dry Contact interface look like?
Latency requirements	On all signals between systems

Efficiency program-specific NLC-HVAC incentive template ("Incentive Template"):

Rebates and incentives for energy efficiency are organized in different ways by different efficiency programs. The application process, eligibility rules, and incentive amounts are often different for lighting projects versus HVAC projects, even within a single utility. For instance, an efficiency program might have an online lighting and NLC application with a list of measures; and a separate online HVAC application with a list of measures; and a phone number for preauthorization of custom projects such as NLC-HVAC integration.

This template will help efficiency program administrators promote NLC-HVAC control integration to their lighting and HVAC trade allies by presenting information about their application process, eligibility rules and incentive amounts in a uniform way that is shared by all the documents in this Toolkit. Some trade allies will probably figure out how to use the Toolkit even in regions where completed Incentive

Templates are not available—but using the Toolkit will be considerably easier in regions where completed Incentive Templates are available.

This template shall be easy for efficiency program personnel to complete, to provide the information that a contractor needs to get rebates or incentives for an NLC-HVAC control integration project that makes use of the various tools in this Toolkit.

The Incentive Template shall cover topics such as the following:

Required	Field
Yes	utility name
Yes	program URL(s)
Yes	project type/size eligibility
Yes	Incentive amount
	program name
	measure name(s)
	product qualification
	application process
	commissioning/verification requirement
	data sharing requirement

Decision Tree to determine project feasibility:

The energy that can be saved by using NLC occupancy signals to support HVAC control with occupied-standby mode has been documented in several case studies, but the energy savings from each project are highly variable. Certain project attributes can strongly influence the difficulty of integration and the magnitude of energy savings. This decision tree will help a project stakeholder decide whether a particular project is a good candidate for NLC-HVAC integration—and if it is, the range of energy savings that is likely to be realized. The tables below show a sample of project attributes that are likely to make NLC-HVAC integration more feasible. The DLC expects the RFP respondent to revise these tables based on their integration experience, in coordination with the DLC.

The decision tree will be valuable to anyone interested in NLC-HVAC integration including efficiency programs, building owners, specifiers and designers, contractors. It will help identify appropriate projects, ignore inappropriate projects, and make rough predictions of potential energy savings on some of the appropriate projects. It will also help manufacturers tailor their products, to support NLC-HVAC integration in appropriate applications without wasting resources on products for inappropriate applications.

The decision tree shall include initial technical criteria, followed by financial criteria for projects that have passed the technical phase.

Technical project attributes that affect NLC-HVAC control integration feasibility:

Technical Topic	Explanation
Building type	Is this a type of building that tends to have a variable occupancy pattern and is suitable for variable space conditioning? For instance, cold storage is not suitable.
Operations	Do the operations of the current occupants of this space suggest a variable occupancy pattern? If the occupancy pattern is regular and well-defined, and the lights and HVAC are scheduled to match, then no further work is needed. If the schedule is improperly programmed, could a maintenance contract for HVAC and NLC address the problem, or is NLC-HVAC integration needed?
Size	Is the project large enough to justify hours of customized software development? Over 50,000 sf is probably good. What additional factors make some smaller projects worthwhile, and not others?
HVAC age and efficiency	Is the HVAC system older and less efficient? Newer systems will have higher efficiency and may possibly include occupancy controls that will limit the savings potential through NLC integration.
HVAC zone size	Are the HVAC zones small enough so that some zones are unoccupied while others are occupied? For example, under 1,000 sf per zone is probably good and over 10,000 sf is probably bad. Do some space-types support variable occupancy in larger zones than other space-types?
HVAC distribution	Does the HVAC distribution system use variable air volume (VAV) or constant air volume (CAV)? For CAV systems, will integration be worthwhile based on energy savings from widened thermal setpoints, without energy savings from reduced ventilation?
BMS or occupancy input	Does the building have a Building Management System (BMS)? If so, does the programming language match the integration staff's expertise? If not, does the building have rooftop unit(s) or heat pump(s) that each has an input for occupancy data via digital remote control or dry contact?

Financial project attributes that affect NLC-HVAC control integration feasibility:

Financial Topic	Explanation
Electricity rate	What level of energy efficiency investment is justified by the local price of electricity?
Efficiency incentives	What local efficiency incentives are available for NLC, for HVAC, and for NLC-HVAC integration?
Equity incentives	Are any equity-based incentives available, such as in an economically disadvantaged zone?
Energy performance policy	Is the building subject to any financial penalties for wasting energy, such as buildings in New York City with energy bills in the highest 20% of their category?
Expected remaining lifetime of present HVAC equipment?	When will the present HVAC equipment be replaced? Will integration pay back before then?
Occupant sustainability metrics	Does the occupant have any corporate sustainability metrics such as reducing GHG emissions? If so, what benefit would be offered by NLC-HVAC integration?
Owner's priority	Do the building owner's values, needs, costs, resources align with an integration project? (This may constitute a third phase of the decision-making process, after the technical and financial aspects have been presented to the building owner)

These topics tend to favor large buildings where NLC-HVAC integration is more common, and national accounts where sustainability metrics are more common. The DLC is very interested in adding any options where integration is feasible in small and medium-sized buildings which may not have a BMS. For example, in a small commercial space, LLLC luminaires could provide more robust occupancy data compared to a single occupancy sensor embedded within a smart wall-mounted thermostat. Is any plug-and-play technology available yet to support that scenario?

Decision tree deliverable:

A description of the decision tree with three or more examples of applying it to case studies.

- A document that describes a series of questions about a potential NLC-HVAC integration project. After the user has answered the questions, they get an estimate of the project feasibility, in terms of an estimated range of the expected energy savings and project cost or payback with caveats about the variability in prices of materials and labor, etc.
- The goal is to eliminate non-viable integration projects with as few questions as possible. The first few questions should eliminate many of the non-viable projects. Additional questions would refine expectations for projects that might be worthwhile.

- If needed, the deliverable could include a spreadsheet with equations and/or Look Up Tables to calculate results based on numerical inputs.
- Where possible, recommend a viable path of integration.
- Ideally, a concise version of this process can be included as text and/or graphics in the handbook.
- If ranges are not definable, then perhaps a few simple thresholds. For instance, Project A is likely to save more than 10% of the HVAC energy and payback in less than 5 years. Project B is likely to save less than 10% of the HVAC energy and payback in more than 5 years, if ever.
- Ultimately, we imagine programming an app that asks a series of questions and computes a result based on the answers. For this project, the deliverable is a description with a few examples of how such an app would work. *It is not the app itself*.

Decision Tree: Expected Users and Value:

	Evaluate projects to ID candidates for integration	**Predict energy savings**	**Upsell project**	**Specify integration path**	**Implement integration**
Efficiency programs	Y	Y			
Specifiers	Y	Y	Y	Y	
Contractors	Y	Y	Y	Y	Y
Integrators	Y	Y		Y	Y

Case Study Spreadsheet Deliverable:

An expanded case study spreadsheet with data from case studies.

The DLC has begun to compile a spreadsheet of case studies of NLC-HVAC integration projects in the USA and Canada. While the amount of data varies between case studies, each project offers useful information. The goals of this project are to:

1. Expand the list by finding additional case studies, and extracting data that matches criteria in the Decision Tree.
2. Align the data with the Decision Tree, so that when a project is deemed feasible by the Decision Tree, any case studies of similar projects are easily identified. "Similar" projects would be selected based on space-type, and ideally also additional criteria in the Decision Tree.
3. To help plan potential new case studies, identify types of projects that are viable for NLC-HVAC integration, but have no case studies yet.

Deliverables & Schedule

Deliverable	Schedule
Kickoff meeting and work plan	Late May/early June, week after contracting
Handbook, Project Template, Program Template	
Draft to DLC	July 12
Reviewed from DLC	July 26
Final	September 20
Decision Tree and Case Study spreadsheet	
Draft	August 23
Reviewed from DLC	September 6
Final	September 27

Budget

This is a time and materials project with budget determined by task not to exceed $50,000. Budget criteria will be based on hourly rates for the purposes of procurement.

Contact and Communications

All communications between bidders and EF are to be directed to:

- Stephen White, Chief Operating Officer, swhite@designlights.org

Bidders' Questions and Responses

Bidders may submit questions on this RFP via email. All questions submitted prior to April 22, 2024 will be answered to the best of our ability.

RFP Submittal Deadline and Format

Bidders are required to submit their proposal by May 1, 2024 via email to Stephen White, COO, swhite@designlights.org.

- The proposals should be submitted in both Microsoft Word and PDF format.
- A confirmation of receipt will be sent to those who submit proposals on time.
- Late submittals will be rejected.
- Bidders are **not** required to submit print copies of their proposals.
- The transmittal letter contained in the proposal package must have an electronic signature and must be signed by a person who is authorized to bind the proposing firm.

EF reserves the right to reject as non-responsive any proposals that do not contain the information requested in this RFP. EF is not liable for any costs incurred by any person or firm responding to this RFP or participating in best and final interviews.

Milestone Schedule

To allow adequate time for proposal submission and evaluation, the schedule below will be followed:

RFP Issued	April 4, 2024
Questions & Responses	April 22, 2024
Proposals Due	May 1, 2024
Anticipated Notification to Successful Bidder	May 15, 2024
Contract Awarded	May 22, 2024
Kickoff	June 3, 2024

Minimum Qualifications

A single firm or a team of firms under a single primary contractor may submit bids. At least one key staff member must have demonstrated expertise in energy efficiency programs for non-residential lighting and energy efficiency objectives. Changes in proposed key staff members may not be made during the execution of the work without written approval of EF.

Modifications to the RFP

EF may modify the RFP prior to the proposal submission deadline by the issuance of an addendum.

Post Proposal Negotiation and Awarding of Contracts

EF reserves the right to negotiate both price and non-price factors during any post-proposal negotiations with a finalist. EF has no obligation to enter into an agreement with any respondent to this RFP and may terminate or modify this RFP at any time without liability or obligation to any respondent.

Acceptance of Terms and Conditions

EF will utilize its standard Consulting Agreement to contract for the services outlined in this RFP.

All proposals submitted to EF pursuant to this RFP shall become the exclusive property of EF and may be used for any reasonable purpose by EF.

Response Guidelines and Requirements

Proposals should provide straightforward and concise descriptions of the bidder's ability to satisfy the requirements of this RFP. Omissions, inaccuracies, or misstatements will be sufficient cause for rejection of a proposal. Proposals not submitted as indicated may be rejected.

EF is looking for proposals demonstrating creativity, expertise, and experience in how bidders approach the work scope – not necessarily a detailed final approach. Once the consultant is selected, an initial task will be to review the scope and deliverables with EF and finalize a Scope of Services.

Bidders are requested to provide a concise yet complete description of the bidder's approach and capabilities for satisfying the required services outlined in this RFP. Excessive length is discouraged. In addition, bidders are encouraged to proactively present additional information and responses, not specifically requested, that help demonstrate understanding of this project's objectives and needs as well as bidder's creativity, experience, and/or expertise.

Proposals must include the following:

- Proposal Cover
- Signed Cover/Transmittal Letter
- Table of Contents
- Executive Summary
- Work Scope and Schedule
- Staffing and Subcontracting Plan
- Qualifications and Experience
- Budget and Billing Rates
- Exceptions to Contract Terms (if needed)
- Conflicts of Interest (if needed)
- Appendix – Resumes of Key Staff

The proposal cover must indicate the RFP name, the proposal date, bidder's name, and list of subcontractors. The transmittal letter must also state that the person signing the letter is authorized to commit the bidding organization to the proposed work scope, budget, and rates; that the information in the proposal is accurate; and that the proposal is valid for 90 days from the date of submittal.

Supplier Diversity

It is the policy of Efficiency Forward Inc. DBA DesignLights Consortium (DLC) to ensure full and equitable economic opportunities to all persons and businesses that compete for business with the DLC. To that end, the DLC's Supplier Diversity efforts are a key criteria in bid scoring.

Suppliers representing that they are diverse should be certified as such from a recognized certifying state and/or federal authority. For this purpose, the categories of diverse businesses include: Minority (MBE: African-American, Hispanic, Native American, Asian, Indian/Pacific), Women (WBE), Veterans

(VBE-including Service Disabled), and Disadvantaged Business Enterprises (DBE/SDB). Such suppliers may be formed as a sole proprietorship, partnership, limited liability company (LLC), joint venture or corporation.

Evaluation of Proposals

EF will base their evaluation of proposals on the scoring matrix below. As noted above, the qualifications of key staff assigned to lead this project and the amount of time they commit to the project will be weighed heavily.

RFP Evaluation Criteria/Scoring Matrix:

Part A: General Approach • Proposal quality: comprehension and clarity regarding meeting project objectives and quality of proposed approach for meeting those objectives • Thoroughness and practicality of approach • Creativity of approach
Part B: Management Approach • Dedicated resources • Demonstrated management competence of key staff • Approach to use and management of subcontractors (if applicable)
Part C: Qualifications and Experience • Demonstrated competence and experience of key staff and firm(s) • References
Part D: Supplier Diversity • Demonstrated certification with MBE, WBE, VBE, DBE program
Part E: Cost • Hourly rates and total project cost