

# REALIZE Industrialized Retrofits

## Building Envelope Partner Request for Qualifications

### 1. Introduction & Background

Buildings account for 70% of electricity use and 39% of emissions in the United States (US). Of these buildings, there are 125 million existing residential units. According to the Net Zero Energy Coalition (NZEK) 2017 Residential Zero Energy Inventory, only 13,906 homes across the US and Canada are currently operating at zero net energy. This presents a massive opportunity to drive down carbon emissions from existing homes. Currently, the construction and renovation sector has not created a mass-scale solution to addressing energy inefficiency in existing buildings.

REALIZE is an effort inspired by an innovative model from the Netherlands, known as Energiesprong, developed to catalyze mass-scale, zero-energy retrofits. Energiesprong, a public-private partnership in the Netherlands, has implemented thousands of zero-energy retrofits over the past three years, with another 100,000 planned across Europe. To get a sense of their innovative approach see the following [video](#).

The project is a collaborative effort led by Rocky Mountain Institute (RMI) and inclusive of partners such as the United State Department of Energy (DOE), New York State Research and Development Authority (NYSERDA), Passive House Institute US (PHIUS), Net Zero Energy Coalition (NZEK), and private sector parties such as The Levy Partnership, Re:Vision Architecture, Staengl Engineering and various manufacturers.

RMI, PHIUS, and NZEK have received a DOE grant to design, engineer, manufacture, and monitor an integrated, prefabricated envelope and mechanical system on a pilot building. We will be selecting a 30- to 50-unit multifamily building in a major metro area for this first pilot. The pilot will be strategically selected to represent a much larger building stock in order to allow for replicability of the solution at scale. Concurrently, the State of New York has launched the RetrofitNY program, with six demonstration projects of this model currently in incubation, and an additional 12 to 16 demonstration projects in the pipeline.

REALIZE plans to develop and implement a holistic, all-electric retrofit solution for low-income housing in the Northeast, Mid-Atlantic, or Midwest. This retrofit solution will address the envelope (windows, walls, roof, foundation), mechanical, electrical, and plumbing (MEP) systems, heating, ventilation, and air conditioning (HVAC) systems, domestic hot water, and, potentially, solar photovoltaic (PV) systems. The retrofit solution is designed to minimize tenant disruption and apply as much of the package as possible from the outside-in. Ideally, the façade and mechanical solutions will be integrated into a prefabricated unit that can be installed without excessive site pre-work.

#### 1.1. Fabricator Partnership

The team is seeking a partner to collaborate on the design, engineering, and manufacturing of prefabricated envelope solutions that can be applied to the exterior wall and roof of existing buildings. The vision is that panels will incorporate pre-installed windows and doors so that full panels can be placed over existing window and door openings (existing doors and windows will be removed). The goal of this project is to fully encase the existing building with a new shell inclusive of insulation, cladding, roofing, windows, and doors. Roof panels will be installed directly over existing roof sheathing and these roof panels should tightly integrate with the wall panels to create a continuous enclosure that manages water flow, air flow, vapor diffusion, and heat flow.

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Ideally, the manufacturer will also coordinate delivery and installation of the panels to maintain a high level of quality assurance.

This pilot project presents an opportunity for all members of the team to test the solution and process, while demonstrating successful implementation in order to attract larger contracts and commitments across the nation. We are seeking to engage a fabricator who will work with the team to invest in engineering of this new solution, with the open and innovative spirit required to create something groundbreaking and impactful.

### 1.2. Pilot Case Study Building

For the purposes of this RFP, respondents should use the following assumptions for the project bid:

- Five-story, stand-alone building, with roughly 50 units (average of 850 square feet per unit; assume approximately 15% additional common area)
- Brick exterior wall in good condition
- Flat roof
- Length to width aspect ratio of 2.7
- 20% window to wall ratio
- Sufficient clearance around the perimeter to allow for expansion of the envelope by six to twelve inches
- Simple mid-rise building with no ornate architectural features, a basement, and structurally suited for rooftop PV panels
- A sketch up model with additional detail will be provided with the RFP
- Assume Boston, MA as the pilot location (for delivery cost estimate)

## 2. Envelope Solution Functional Needs

The purpose of the panel system is to improve both the energy performance and thermal control of the building while delivering an elegant, cost-effective, scalable, and simplified retrofit solution. The project includes functional requirements that must be met, while others are preferred, as described below. The specific requirements to meet are outlined in Table 1.

**Requirements:** Factors that must be met in order to qualify as a project partner and manufacturer. These are non-negotiable in order to meet our overall project goals and to demonstrate a net zero energy solution that is scalable.

**Project Goals and/or Preferred Targets:** Factors that are to be taken into consideration, recognizing that off-the-shelf solutions may not meet these targets or the ability to meet them is unknown at this time.

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**Table 1. Envelope Solution Functional Needs**

Functional Need	Requirements	Project Goals and/or Preferred Targets
<b>Energy Performance</b>	<ul style="list-style-type: none"> <li>• Wall subsystem thermal resistance is configurable from R-18 to R-28</li> <li>• Roof subsystem thermal resistance is configurable from R-24 to R-28</li> <li>• Foundation perimeter subsystem thermal resistance is configurable from R-12 to R-24</li> </ul>	
<b>Thermal Bridging</b>	<ul style="list-style-type: none"> <li>• Continuous insulation</li> </ul>	
<b>Air Tightness</b>		<ul style="list-style-type: none"> <li>• The goal for overall post-retrofit, whole-building air leakage at pressure test is 0.06 cfm50 per square foot of envelope area</li> <li>• Panel systems with pre-installed windows and doors may use nearly all of this leakage budget</li> <li>• Opaque-only panel systems must be tighter to allow for some leakage at field-installed windows and doors</li> </ul>
<b>Moisture Management</b>	<ul style="list-style-type: none"> <li>• The proposed panel system must meet, or be compatible with the field installation checklist of items for water-managed wall and roof assemblies from the <a href="#">Energy Star Certified Homes program</a></li> <li>• Vapor control strategy must be suitable for the type of assembly, for climate zones 4A and 5A; see <a href="#">PHIUS Certification Guidebook</a> for details</li> </ul>	

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Functional Need	Requirements	Project Goals and/or Preferred Targets
	<ul style="list-style-type: none"> <li>Condensation resistance for windows &amp; doors meets PHIUS project certification requirements; see PHIUS Certification Guidebook section 3.4.2 and <a href="#">associated calculator</a></li> </ul>	
<b>Code</b>	<ul style="list-style-type: none"> <li>Must meet International Building Code and International Fire Code requirements for buildings over 40 feet in height for Types I-IV construction</li> </ul>	<ul style="list-style-type: none"> <li>Location-specific code may require modifications for specifics projects</li> </ul>
<b>Attachment</b>	<ul style="list-style-type: none"> <li>Must include attachment to existing exterior wall</li> <li>Attachment should minimize thermal bridging</li> <li>Refer to Pilot Building Case Study section for a description of the existing building conditions</li> </ul>	<ul style="list-style-type: none"> <li>Manufacturer is responsible for calculating the overall effective R-value of the panel with attachment system</li> <li>The goal is to produce the thinnest panel that meets the R-value performance criteria established above</li> <li>Thermal bridging will impact the effective R-value and bridging should be reduced as opposed to increasing the wall panel insulation to overcome the bridging and meet the effective R-value targets</li> </ul>
<b>Dimensions &amp; Weight</b>	<ul style="list-style-type: none"> <li>Panels must not exceed 10 psf for walls and 5 psf for the roofs</li> </ul>	<ul style="list-style-type: none"> <li>Thin and light; ideally panels are less than 12 inches in overall thickness</li> </ul>
<b>Cladding</b>	<ul style="list-style-type: none"> <li>A panel design with integral cladding is highly desirable, but if the cladding needs to be applied on-site it should be in pre-assembled panels</li> </ul>	<ul style="list-style-type: none"> <li>A variety of cladding options from which to choose for any one panel is very desirable</li> </ul>

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Functional Need	Requirements	Project Goals and/or Preferred Targets
<b>Embodied Energy/Carbon Footprint</b>		<ul style="list-style-type: none"> <li>Materials with low embodied energy/carbon footprint preferred</li> </ul>
<b>MEP Considerations</b>	<ul style="list-style-type: none"> <li>Roof panels should be able to accommodate solar systems</li> </ul>	<ul style="list-style-type: none"> <li>Additional mechanical chase panels for MEP equipment</li> </ul>
<b>Transport Considerations</b>		<ul style="list-style-type: none"> <li>Panels should be designed for same day delivery and installation</li> <li>There will likely be minimal site area storage</li> </ul>

### 3. Project Schedule

Table 2 outlines key milestones for the pilot project:

**Table 2. Pilot Project Schedule**

Task	Description	Timing
<b>Pilot Site Selection</b>	Formal request for proposals for candidate buildings	Q2 and Q3 2018
<b>Final Site Selection</b>	Includes interviews and site visits to inform final pilot selection	Q4 2018
<b>Final Design</b>	Formal owner acceptance of the retrofit design	June 2019
<b>Construction Documents</b>	Development of construction documents	Q3 2019
<b>Construction Commences</b>		Q1 2020
<b>Monitoring</b>	Performance testing and monitoring	Period of one year after completion

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### 4. Proposal Requirements

All firms are requested to provide the following information in each proposal. Please do not exceed 15 pages, excluding exhibits and attachments (e.g., specifications).

- 4.1. Company Background** - Information about company's focus, philosophy, products, and services as they pertain to this scope.
- 4.2. Company Qualifications** - Description of most comparable projects completed by company.
- 4.3. Specifications & Response to Functional Needs** - As noted above, this is a new specification for a demonstration project, therefore inability to meet all of the Functional Needs may not necessarily be disqualifying, but do take care to respond to all points and submit all the requested documentation. Respondents must provide the following in response to the Functional Needs outlined in Section 2.
  - 4.3.1. Written responses demonstrating how Functional Needs will be met via any of the following: 1) an existing solution, 2) approach your team would take to making customizations to an existing solution, 3) examples of past projects that included this requirement, or 4) if this cannot be provided, why
  - 4.3.2. Specifications of standard product with potential customizations to meet Functional Needs highlighted
  - 4.3.3. Conceptual designs, shop drawings and/or design details as-needed to demonstrate ability to meet Functional Needs
- 4.4. Cost Estimate** - Present a full project budget for the Pilot Case Study Building described in Section 1. Project budget to include:
  - 4.4.1. Freight-on-Board (FOB) - high level estimate breakdown for fabrication (labor + materials) of each of the product components FOB
  - 4.4.2. Delivery and Installation - please indicate if this is done in-house or by another contractor
  - 4.4.3. Scaling - at what volumes are there expected cost reductions, and what is the typical percentage reduction
  - 4.4.4. Cost Share Comments - to be competitive for this high-profile pilot project, we anticipate that the successful vendor will be working at cost, potentially with some cost share

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**4.5. Schedule and Process** - Please include:

- 4.5.1. Estimated timeline for design (you should anticipate a collaborative design with the project partners), fabrication, delivery, and installation
- 4.5.2. If additional partners or subcontractors will be used for installation, please specify and describe which party will be responsible for coordination and accountability
- 4.5.3. Notes on any portions of manufacturer’s process that are not explicitly covered in other portions of the proposal, but should be taken into consideration

**4.6. Process & Partnership** - Given the pilot is underway with work being done to create relationships with large portfolio owners, cities, and states, we fully expect to support this disruptive solution to continue to break open this latent market opportunity for all involved. Please describe why your company is aligned with the mission and goals of this initiative beyond the scope of the pilot, what unique capabilities position you for a longer-term partnership, and what types of commitments you plan to make to invest in potential future business.

**4.7. RFP Timeline**

Table 4 below outlines the scheduled milestones for the RFP process.

**Table 4.** REALIZE Manufacturers’ RFP Timeline

Milestone	Due Date	Notes
<b>RFP Release</b>	7/12/2018	RFP issued and available online along with additional RFP materials at: <a href="http://www.rmi.org/REALIZE">www.rmi.org/REALIZE</a> .
<b>Question and Answer Period Ends</b>	7/30/2018	During this period, submit any questions via email to <a href="mailto:realize@rmi.org">realize@rmi.org</a> .  Questions and Answers related to missing or incorrect information in the RFP will be issued as addenda to all respondents, and will be available on the website referenced above. Strategy or approach questions will be answered directly and kept confidential.
<b>Intent to Apply Due</b>	7/30/2018	Send an email indicating your intent to submit a proposal. Emails should be directed to the project team at <a href="mailto:realize@rmi.org">realize@rmi.org</a> .
<b>Proposal Deadline</b>	08/24/2018	All final proposals are due by email to be submitted to the project team at <a href="mailto:realize@rmi.org">realize@rmi.org</a> .

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<b>Milestone</b>	<b>Due Date</b>	<b>Notes</b>
<b>Interviewees Notified</b>	08/31/2018	All respondents will be notified of whether they qualify for the next level of consideration in the process. If so, phone interviews will be scheduled.
<b>Interview Period Ends</b>	09/14/2018	All phone interviews complete.
<b>Selection</b>	09/28/2018	All finalists will be notified of selection decision.

Thank you for your interest in the REALIZE project and we look forward to learning more about your organization.