



Invitation for Proposals: Triple Decker Design Challenge
FY2021-TripleDecker-01

Date of Issue: July 16, 2020

Proposals Due: November 6, 2020

Total Funding Available: \$150,000

All proposals must be submitted to:
TripleDeckerChallenge@masscec.com

I. SUMMARY

The Massachusetts Clean Energy Center (“MassCEC”) seeks design proposals for Triple Decker, all-electric energy retrofit approaches. Competitive proposals will be replicable and scalable, including construction and operational costs.

All-electric buildings contribute to meeting the Commonwealth’s 2050 net zero emissions goal by reducing, and ultimately eliminating emissions. While current grid electricity delivers reduced emissions in an all-electric building, emissions are eliminated entirely with 100% carbon free electricity, be it through on-site renewables, purchased clean energy, or a 100% carbon-free electric grid.

The design competition includes two tracks:

- 1) “Triple Decker Retrofit Design”, focused on retrofitting a typical triple decker building using the existing building square footage; and/or
- 2) “3+ Retrofit Design” focused on retrofitting a typical triple decker while also adding additional unit/units.

Applicants may utilize one of the two representative triple decker buildings provided by MassCEC as part of their application or may bring their own triple decker to act as the basis of their proposal.

Triple Decker Design Competition

Prize money available for replicable and scalable triple decker retrofit designs that help Massachusetts meet its 2050 GHG emission goals

**Applications Due:
November 6, 2020**

**Total Funding Available:
\$150,000**

**Award Range:
\$5,000 to \$25,000**

**Design Competition Tracks
Triple Decker Retrofit Design
3+ Retrofit Design**

**Baseline Triple Decker Options
MassCEC Example Building A or B
Bring Your Own Building**

II. ABOUT MASSCEC

The Massachusetts Clean Energy Center (“MassCEC”) is a publicly-funded agency dedicated to accelerating the success of clean energy technologies, companies and projects in the Commonwealth—while creating high-quality jobs and long-term economic growth for the people of Massachusetts. Since it began operating in 2009, MassCEC has helped clean energy companies grow, catalyzed emerging clean energy sectors, and invested in residential and commercial renewable energy installations, creating a robust marketplace for innovative clean technology companies and service providers.

III. PROGRAM GOALS AND DESCRIPTION

Triple deckers are one of the most dominant, widely recognized, and iconic residential building typologies in Massachusetts. Tens of thousands of triple deckers were built during the late 19th and early 20th centuries across New England. There are an estimated 8,900 triple deckers in Boston, 4,000 in Fall River, 4,000 in Worcester, and many others in Lowell, Lawrence, and other communities. They served as an economical means of housing the thousands of newly arrived immigrant workers who filled factories across the region. These typically three story, wood, balloon-framed structures consist of three apartments with generally identical floor plans, exterior porches, and a mix of flat and gable roofs.

Many are owner occupied, some are investor-owned, and many have been converted to condominiums. But all share energy retrofit challenges and opportunities.

Replicable Designs for a Low Carbon Triple Decker

In order to meet aggressive, long term carbon reduction goals in the building sector, substantial efficiency improvements in building envelope and equipment electrification must be coupled with a low- to zero-carbon grid. In alignment with that vision, **the competition requires proposals to feature fully electrified triple deckers.**

In pursuing this design, applicants will find a trade-off between the level of upfront investment (in weatherization, efficient equipment, etc.) and the operating costs for the building. One of the primary goals of this competition is to identify designs with broad potential for replicability that balance low upfront costs and low operating costs.

The Triple Decker Design Challenge goals include:

- Exploration of replicable approaches to achieve electrification in existing residential buildings
- Identification of scalable designs for an all-electric retrofit that balance upfront costs, long-term operational costs, and embodied carbon of building materials
- Showcase local design and engineering excellence through innovation approaches to retrofitting one of the region's most recognizable housing typologies
- Identify regulatory barriers to implementing triple decker retrofits which will help launch important conversations with relevant local economic development, planning, and building code officials about how to support and accelerate high performance retrofit projects, and will inform future state and utility building energy performance policy, program, and incentive structures
- Catalyze collaboration between MassCEC, Mass Save, State Agencies, and Municipalities to discuss implementing proposed retrofit approaches
- Through the 3+ Retrofit Design pathway, demonstrate an innovative energy retrofit approach that delivers additional value and income to the building owner through the addition of new square footage while meeting widely recognized regional housing supply shortages

IV. ELIGIBILITY

Eligible Entities

Applicants may be an individual company, organization, institution, or team of such entities. Examples of potential applicants include but are not limited to: design-build and architecture firms, general contractors, remodeling contractors, real estate developers, students, and any other qualified applicant. Each proposal should have one entity that serves as the lead applicant (“Lead Applicant”) and may include partner organizations or individuals. Applicants may be part of more than one proposal. Applicants/teams must have the ability to provide realistic market cost estimates for proposed changes to the building. General contractors and remodeling contractors typically have the ability to provide cost estimating services that would be needed as part of a qualified submission.

Application Collaboration

In order to facilitate collaboration between different entities, MassCEC has set up an online forum using the Slack platform to facilitate team formation and discussion. Slack includes a “general” public group discussion channel, the option for members to generate private group discussion channels (that users can create and invite others of their choosing to join), and private direct messaging. Slack includes immediate user-assistance through the help feature “slackbot.”

Potential Applicants may outline their ideas and request collaborators or suggestions for collaborators. Potential Applicants with similar ideas may also use the forum to discuss combining efforts to submit a joint proposal. Entities that do not intend to apply but would be interested in volunteering input or technical assistance for proposals may also volunteer their feedback through this forum. Participation in this forum is entirely voluntary. Applicant Teams may use

Embodied Carbon of Building Materials

While improving energy efficiency and adding renewables to buildings will help the Commonwealth achieve its carbon reduction objectives, we must also consider the carbon content of building materials themselves. The manufacture of building materials comprises an estimated 11% of total global greenhouse gas emissions and, in some cases, the emissions associated with the manufacture and installation of building materials can exceed operational emissions of high-performance buildings over a 30 year life cycle.

But what can you do about it?

The integration of an embodied carbon calculator into this design challenge will help focus attention on carbon intensive building materials and help begin to change the way that architects and builders think about embodied carbon. For example, some types of foam insulation (most notably extruded polystyrene) use blowing agents with very high global warming potential.

However, high-performing alternatives exist. Products that utilize fast growing plants or wood by-products, like cellulose insulation or engineered lumber, can actually sequester carbon.

To help designers and builders choose lower embodied carbon materials, MassCEC is customizing the Builders for Climate Action Embodied tool to use during this competition.

other means to organize themselves. Contact TripleDeckerChallenge@masscec.com with any questions.

Join the Triple Decker Slack Channel here: <https://bit.ly/TripleDeckerSlack>.

V. ESTIMATED TIMELINE

Milestone	Date
Release Date	July 16, 2020
Webinar on Design Competition	August 4, 2020
Written Questions Due	August 17, 2020, 5 P.M.
Responses Posted	September 1, 2020
Submissions Due	November 6, 2020, 5 P.M.
Proposals Selected	January 15, 2021

This timeline is subject to change at MassCEC’s discretion. An awards event and poster display of high-ranking awardees is anticipated in early 2021.

VI. PROPOSAL GUIDELINES

Information for Applicants

Applicants may utilize one of two sample triple decker buildings provided by MassCEC to develop their design proposal, available in Appendix A. Basic information for these two “typical” triple deckers includes:

- “As Built” drawings
- Existing conditions including HERS (Home Energy Rating System) rating, air tightness, insulation levels, existing equipment, condition of siding etc. in the Design Inputs tab of the spreadsheet
- Zoning and Code Analysis to inform potential additions to the triple decker (i.e. zoning variance, special permit, fire suppression requirements etc.)

Applicants may choose to design their proposal submission using one of the assessed “typical” triple deckers or they may bring their own triple decker property and develop their own baseline information for a triple decker of their choosing.

Information for “Bring Your Own Building” Applicants

Applicants bringing their own triple decker building to the competition will need to document the existing building with the same level of detail as provided to applicants using the “typical” triple decker assessments provided by MassCEC in the Design Inputs tab of the Design Inputs and Construction Cost Spreadsheet. Applicants bringing their own building must provide “As Built” drawings in CAD or similar. A base HERS rating is required using an Ekotrope model with

documentation of blower door input testing. These base model characterizations must be submitted with the applicant's proposal for changes.

Technical Submission Requirements for all Applicants:

Submissions must also follow these design requirements:

- The property is assumed to be owned by a single decision-maker (as opposed to a condominium ownership structure).
- Applicants using the sample buildings provided must assume retrofit work will be conducted while tenants are in place and the building is occupied. Provision can be made for relocating tenants for several days at a time, but applicants should not assume complete relocation of occupants for the entire renovation would be an affordable option for an owner of a triple decker.
- Applicants bringing their own building may propose relocation of tenants. Note, however, that lost rent or relocation costs may hurt the proposal's score due to the added cost for an owner.
- Front porches may not be enclosed.
- A permanent air-conditioning system that serves the whole unit must be included (such as a ductless or ducted air source heat pump or air-conditioner as opposed to window air-conditioning units).
- This design competition focuses on envelope and mechanical upgrades to buildings. For retrofits within the existing units, kitchen and bathroom renovations are allowed but will not be included in costs, nor will other interior finish upgrades since this is not the focus of the competition.
- Proper ventilation must be included, even if not required by code, to ASHRAE 62.2 levels of 51 cfm continuous. Consider heat recovery ventilation.

VII. HOW TO APPLY

Interested parties must submit a proposal to MassCEC by the date and time specified in Section V. The submission must be in electronic form, including a scanned signature page, submitted via email to TripleDeckerChallenge@masscec.com. Please submit Attachments A, D, E, and F in PDF format. Attachment B and C should be submitted as Excel spreadsheets. The words "Triple Decker Design Challenge" should appear in the email subject line.

Each proposal must include the following information:

1. **Attachment A: Application Form:** The application form includes the Authorized Signature and Acceptance, signed by the Lead of the Applicant's Team and the design proposal narrative (no more than 5 pages).
2. **Attachment B: Design Input and Construction Cost Spreadsheet:** Complete "Design Input" Tab and "Estimated Construction Costs" Tab.

3. **Attachment C: Builders For Climate Action Material Emissions Calculator:** Applicants should email TripleDeckerChallenge@masscec.com to obtain access to the tool. We recommend requesting access by September 1, 2020 to ensure technical assistance is available.
4. **Attachment D: Design Drawings:** If proposing an addition, include elevations.
5. **Attachment E: Digital Poster Design:** 24" x 36" landscape orientation in PDF format to be used for public presentation and voting to award the People's Choice award. The digital poster should highlight the vision and key components of the proposal. Applicants may choose what information to include. MassCEC will produce 2 copies of high-ranking applicant's posters: 1 for the applicant to keep and 1 for public display in various forums throughout the state.
6. **Attachment F: Triple Decker Baseline (only for "Bring Your Own Building" applicants):** Include baseline building drawings and information, as provided for the MassCEC sample buildings. Include HERS reports for both the baseline and retrofit building conditions.

MassCEC will not accept responses past the deadline. Applicant's proposal information will be reviewed by a third party architect and HERS rater contracted by MassCEC to ensure appropriate expectations in terms of design expectations, cost, and performance.

VIII. SELECTION CRITERIA

To be considered, submissions must propose an all-electric building and meet current building code. MassCEC will accept proposals that assume certain zoning allowances or variances will be granted, assuming they are reasonable requests. These must be explicitly detailed in the application. Submissions will be judged on the following criteria. MassCEC reserves the right to award points at MassCEC's discretion.

Criteria	Points (out of 100)	Description
Replicability and Scalability in Design	20	<ul style="list-style-type: none"> • Demonstration that design can apply broadly and cost effectively to triple deckers across the state • Utilization of commercially and widely available building materials and equipment • Building modifications can be implemented by existing workforce or with modest investments in workforce training • Innovative models proposed (e.g. how to finance improvements, using a strategy not otherwise addressed in this Invitation for Proposals) • Minimized time related to tenant relocation

		<ul style="list-style-type: none"> • For 3+ Retrofit only, MassCEC’s calculation of the positive difference between rent revenue and financed cost
Minimized Upfront Construction Cost	20	<ul style="list-style-type: none"> • Proposed upfront construction costs • Proposed cost estimates are reasonable based on MassCEC evaluation
Minimized 30 Year Energy Operating Cost	20	<ul style="list-style-type: none"> • MassCEC’s calculation of energy operational costs based on Applicant’s design inputs
Compartmentalization, Sizing, and Comfort	15	<ul style="list-style-type: none"> • Attention to compartmentalization to reduce air transfer between units • Improved indoor air quality • Appropriate HVAC design, including: <ul style="list-style-type: none"> ○ Distribution – entirety of living space is adequately conditioned; ○ Sizing – heating and cooling capacity is properly matched to heating and cooling load; and ○ Ventilation – for buildings with a very tight envelope (<3ACH50), sufficient fresh air should be delivered • Reduction in noise and other tenant satisfaction outcomes • Additional climate change mitigation and adaptation
Embodied Carbon Impact of Proposed Building Materials	15	<ul style="list-style-type: none"> • Low embodied carbon score in the embodied carbon tool • Demonstration of retaining or re-using existing building materials, when possible • Demonstration of use of low embodied carbon building materials or materials that sequester carbon, when possible
Design Excellence and Aesthetics	10	<ul style="list-style-type: none"> • Utilizes building components to elegantly integrate passive and active systems, climate responsive design, and overall aesthetics • Preservation of existing building details and historic building characteristics, where applicable • For 3+ Retrofit, carefully considers scale and proportion relative to formal massing, building access and interaction from the street, and neighboring context to create an engaging contribution to the streetscape

Applicants will find there are clear tradeoffs in different scoring criteria categories. For example, adding solar PV will add construction costs and might lower the score for “Minimized Upfront Construction Costs.” However, solar PV will increase applicant scores in the “Minimized 30 Year Operating Cost” since payback can be short and will decrease the 30-year operating cost of the buildings. Similarly, if an applicant selects induction cooking ranges and/or EV chargers, there will be a modest increase in construction costs, but the tenant satisfaction will likely be higher and would increase the score in Compartmentalization, Sizing, and Comfort.” Grand prize winners in each category and runners-up will demonstrate the best combination of strategies to achieve the highest scores.

XI. BUDGET

The overall budget for prizes in the Triple Decker Design Challenge is anticipated to be \$150,000. MassCEC anticipates making the awards in the following table. A prize winner in another category may also receive the People’s Choice prize. Lead applicants can receive no more than two prizes total, excluding the People’s Choice Winner.

Prize Category	Prize
Triple Decker Retrofit Design	\$25,000
3+ Retrofit Design	\$25,000
Bring Your Own Building	\$25,000
Runner-Up	\$15,000
People’s Choice	\$10,000
Student Prize	\$5,000
Total	\$150,000

X. QUESTIONS AND WEBINAR

Please submit all application questions via email to TripleDeckerChallenge@masscec.com. “Triple Decker Design Challenge Application Question” should appear in the subject line. Please submit questions by August 17, 2020. Answers will be posted publicly to the Triple Decker Design Challenge Program webpage on a regular basis.

MassCEC will host an informational webinar on the Triple Decker Design Challenge on August 4, 2020. Please submit questions in advance of webinar to TripleDeckerChallenge@masscec.com. “Solicitation Questions” should appear in the subject line.

XII. GENERAL REQUEST FOR PROPOSALS CONDITIONS

NOTICE OF PUBLIC DISCLOSURE

As a public entity, MassCEC is subject to Massachusetts' Public Records Law, codified at Chapter 66 of the Massachusetts General Laws. Thus, any documentary material, data, or other information received by MassCEC from an applicant is a public record subject to disclosure. Applicants shall not send MassCEC any confidential or sensitive information in response to this Solicitation.

DISCLAIMER & WAIVER AUTHORITY

This Solicitation does not commit MassCEC to award any funds, pay any costs incurred in preparing an application, or procure or contract for services or supplies. MassCEC reserves the right to accept or reject any or all applications received, waive minor irregularities in submittal requirements, modify the anticipated timeline, request modification of the application, negotiate with all qualified Applicants, cancel or modify the Solicitation in part or in its entirety, or change the application guidelines, when it is in its best interests.

This Solicitation has been distributed electronically using MassCEC's website. It is the responsibility of Applicants to check the website for any addenda or modifications to a Solicitation to which they intend to respond. MassCEC accepts no liability and will provide no accommodation to Applicants who submit an application based on an out-of-date Solicitation document.

CONTRACT REQUIREMENTS

Upon MassCEC's authorization to proceed with the proposal, MassCEC and the awarded applicant(s) will execute a contract which will set forth the respective roles and responsibilities of the parties.

APPENDIX A: Sample Triple Decker Buildings: Building A and Building B

Please see separate PDFs for Building A and Building B.

APPENDIX B: Instructions for Completing Design Input and Construction Cost Spreadsheet and Builders for Climate Action Material Emissions Calculator Tool

DESIGN INPUT AND CONSTRUCTION COST SPREADSHEET

“Design Inputs” Tab

Enter the anticipated design inputs of your proposed design in Column G. For example, enter the expected air infiltration rate of a blower-door test at ACH50 after your proposed air sealing measures are complete. Your estimates of R-Value or other inputs may be revised by MassCEC’s technical consultant team during the judging process if the inputs do not seem realistic or representative based on the proposed work scope. These inputs will be used to calculate finalists’ expected energy use after the retrofit and will be important to the scoring of your project’s 30 year energy operating cost compared to other applicant designs.

(If applicable) If you are bringing your own building, please enter the design inputs in Column F.

(If applicable) If you are applying for the 3+ Retrofit Design and your design inputs are significantly different for an addition, please enter the addition inputs into Column H.

“Estimated Construction Costs” Tab

Enter estimated costs for the proposed design. Utilize a team member with experience in residential remodeling and construction to develop these cost estimates. Your estimates may be revised by MassCEC’s technical consultant team during the judging process if costs do not seem realistic or representative. Applicants who are proposing to keep the current square footage of the building should only fill out the Existing Space Cost Schedule Table. You may add lines and categories to the Estimated Construction Cost tab, rearrange categories, and adapt the tab to your cost estimating process. More detail and categories are generally better than less detailed break outs. Because this competition is focused on envelope and mechanical systems, please do not include costs for non-energy upgrades such as kitchen finish and layout upgrades, flooring upgrades, changes in interior layout, etc. Final total for construction costs in this tab will automatically feed into the summary sheet.

If you are adding space to the existing building, break out addition construction costs in the Additional Unit/s Cost Schedule table. Costs of the addition should include all costs including any kitchen, bath, foundation, etc.

Think about staging of this work and associated relocation cost and complete an estimate of number of days to relocate tenants. For example, if extensive roof work is being proposed, indicate the number of days for temporarily housing upper unit tenants elsewhere for the period where roof construction is most intrusive. In the Estimated Construction Costs tab there is a field for you to enter the number of days of relocating tenants and we will assume \$100 per day relocation costs. If you propose a complete gut and plan to move tenants out for the entire construction period, include total number of months (entered as days) of lost rent for each empty unit in order to calculate relocation cost.

BUILDERS CLIMATE ACTION MATERIAL EMISSIONS CALCULATOR TOOL

Instructions for the Builders for Climate Action Material Emissions Calculator Tool

Applicants interested in applying to the competition should email TripleDeckerChallenge@masscec.com to obtain access to the Builders for Climate Action tool to inform choices about the embodied carbon of building material options. We recommend asking for this tool by September 1, 2020 in order to ensure technical assistance is available for any questions you might have in completing and using the tool before the competition deadline.

APPENDIX C: Choosing the right Mass Save Program for your Triple Decker Redesign Project

Additional Guidance on Potential Mass Save Incentives

There are two paths a market rate triple decker retrofit might pursue under Mass Save programs for retrofit incentives.

1. Any project adding space, completely rebuilding a roof, or opening (as in a gut renovation) and rebuilding interior walls is likely to trigger the [Mass Save Renovation and Additions Program](#). This is a program that rewards modelled energy savings from the base model using an Ekotrope energy model. Qualified HERS Raters usher projects through this program. Units with an individual heating system can receive up to \$10,000 per unit. Thus, a triple decker might be able to improve energy performance enough to receive \$30,000 in total. A proposal adding a unit might be able to receive up to \$40,000 in incentives.
2. Retrofits that are less aggressive and do not expose wall cavities, completely replace the roof, or add space may be eligible for a 90% subsidy for insulation upgrades through a [Mass Save Energy Assessment](#). Following the assessment, a Mass Save-approved insulation contractor installs wall cavity and roof cavity cellulose insulation (when cost effective, possible, and advisable under the program). Some limited air sealing would also be available under this incentive pathway.

As an example, Triple Decker A's existing structure begins with a HERS rating for each unit of approximately 180. The HERS rating for each unit could be reduced to between 62 and 67 and be eligible for approximately \$20,000 total incentive for the building retrofit under the Renovations and Additions Program with the following scope:

- Fill wall cavity with cellulose to an R-24
- Fill roof cavity with cellulose to R-40
- Air seal and compartmentalize to reduce ACH50 level from 23 to 7
- Replace windows with better double-glazed windows
- Add mineral wool to basement ceiling to R-24
- Use open-cell foam on rim joints to R-20
- Replace heating and cooling equipment with individual heat pumps
- Replace lighting with 100% LED

More aggressive retrofit approaches could be eligible for higher incentive levels if they reduce modeled energy savings more.

Choosing the right Mass Save program for your Triple Decker redesign project

	Renovations & Additions Path https://bit.ly/reno_add	Existing Homes Path https://bit.ly/existing_retrofit
Project attributes that fit well	Proposed addition or proposed demolition and replacement of portions of exterior walls (in excess of 500 square feet; e.g. drywall removed, building framing repaired, wall board removed for wiring updates)	Retrofit projects that don't involve removing siding or exposing studs. No cost energy assessment, which includes the installation of some efficiency measures, as well as identification of other opportunities, including weatherization.
How incentive is determined	<p>The existing condition of triple decker prior to renovation is modeled in Ekotrope by a HERS rater and compared to an energy model of improvements after redesign. Incentive eligibility depends on whether the triple decker meets minimum energy savings requirements. Incentive amount is determined by the amount of electric savings, fuel savings (natural gas, propane, or oil), and overall performance compared to baseline. Incentives are structured as pay for savings, so the greater kWh and/or therms savings achieved through the renovation/addition efficiency updates compared to the baseline, the more incentive is earned. To calculate multi-family savings the following equation is used:</p> <p>A) Annual Electric Savings x \$0.35/kWh B) Annual Fuel Savings x \$35/MMBtu C) Savings Percentage x \$2,000</p> <p>Incentive is capped at \$10,000 per primary heating account/meter- so for 3 units with individual heating systems, the maximum incentive would be \$30,000.</p> <p>https://bit.ly/calculate_incentive</p>	<p>Incentives are 100% of air sealing and 90% incentive for insulation if all three units are treated. 100% insulation incentive is available if 2 or more unit households are below 80% of State Median Income. No cost installation of water savings measures, advanced power strips, and LEDs (replacing incandescents) occurs during the energy assessment. Work is limited to program-approved measures which have fixed pricing. Work must be completed by an approved Home Performance Contractor or Independent Insulation Contractor. Primary insulation measures are blown in cellulose, with some batt and rigid board applications. Incentives for other measures are available under "Residential Rebates" at MassSave.com.</p>
Efficiency upgrades covered		
Insulation	x- note: can include spray foam projects	x-note: cannot include spray foam projects
Air and Duct Sealing	x	x
HVAC	x	x
Water Heating	x	x
Lighting	x	x