

## NEW CONSTRUCTION

### Residential

1. **Continue to grow the pipeline of new multi-family (5+ units) Passive House projects by increasing participation and workforce training.**
  - a. [Include specific targets and goals](#)
  - b. [Run demonstrations to address centralized water heating barriers](#)
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2. **Investigate opportunities for promoting zero-energy modular homes based on DOER’s Zero Energy Modular Affordable Housing Initiative (ZE-MAHI)**
3. **Better characterize the non-energy impacts of fossil-free new construction.**
  - a. Prioritize/accelerate evaluation activities that quantify health and equity-related non-energy impacts of gas stoves and other in-home fossil fuel combustion so that findings are available for review and inclusion in the 2022-2024 Plan.
4. The PAs should provide tools and training to promote the use of variable refrigerant flow (VRF) and ground-source heat pump HVAC systems.
5. **Develop one to four unit -all-electric program offers.**
  - a. Develop and implement an education and outreach strategy for all relevant participant segments (customers, builders, developers etc.)
6. **Develop connected home requirements.**
  - a. Include a broad range of active demand measures and opportunities, including Wifi thermostats, home energy management systems and/or connected equipment such as HVAC and hot water equipment, and electric vehicle charging.
  - b. As part of this connected home effort, the PAs should leverage opportunities to actively recruit new homeowners to participate in the PAs’ active demand management (ADM) efforts, and more seamlessly integrate already available storage, EV-charger, and PV incentives into the program.

## C&I

- 1. Increase thresholds for participation and increase incentives to push for deeper efficiency, ensuring significant impacts on building energy use through investments in very high efficiency building envelopes and electrification to avoid more costly future deep energy retrofits.**
  - a. Ensure EUI baselines used for Paths 1 and 2 are stringent enough to drive projects towards the highest efficiency achievable with modern construction practices.
  - b. Emphasize Path 1 (ZNE ready) as often as possible – including with smaller buildings that are motivated to achieve ZNE status. Include bonus incentives for electrification and reduced thermal loads by focusing on high-performance building envelope.
  - c. Address barriers to and find means for consistently shifting new construction to all electric buildings to avoid more costly deep energy retrofits in the future.
  - d. Enhance pathways for smaller buildings to participate in ZNE offerings
  - e. Increase use of performance monitoring and monitoring-based commissioning, particularly in Path 2.
- 2. Actively promote projects with small or mid-size customers in the less comprehensive new construction Paths 3 & 4 that utilize modern building envelopes and high performance HVAC systems such as Variable Refrigerant Flow or Ground Source Heat Pumps paired with Dedicated Outdoor Air Systems.**
  - a. Include commissioning and operator training, and actively promote performance monitoring and monitoring-based commissioning
  - b. Study project impacts on energy and non-energy benefits including: energy and cost savings, lifetime carbon emissions, indoor air quality and occupant comfort.
- 3. Develop Connected Buildings offerings for all four C&I new construction paths that build ADM capabilities into the design of new buildings of all sizes.**
  - a. Leverage controls for end uses like lighting and HVAC in new buildings, for active demand management (ADM) from early in the design process, tailoring approaches to address sophistication and size of customers.
  - b. Expand marketing for ADM and co-market EE and ADM for all customers
  - c. The U.S. Department of Energy has coined the term “Grid Interactive Efficient Buildings”, which integrates technologies ranging from EE, to ADM, to distributed generation and EV charging. Integrate the themes of this concept into the New Construction programs.
  - d. Develop an approach that supports campuses in overcoming compatibility issues that otherwise could limit their investment in modern control systems in new buildings.

## ACTIVE DEMAND

1. **Direct Load Control (DLC):** Increase participation in existing DLC offerings, incorporate new end uses, and increase participation of low income customers.
  - a. Increase wifi thermostat DLC penetration through tactics including bundling wifi thermostats and DLC with heating and cooling system installations including heat pumps, and comarketing and delivery coordination of DLC with in-home audits and wifi thermostat rebates. Increase enrollment and penetration of wifi thermostats in DLC, e.g. from 3% of wifi thermostats to 15% (residential and small business).
  - b. Incorporate new end uses by expanding or adding EV charging and pool pumps, and revisit the cost-effectiveness and potential addition of appliance DLC opportunities such as water heaters and dehumidifiers.
  - c. Increase the participation of low income customers in the DLC offerings.
  - d. Include a target date for the implementation of the National Grid EV charging effort.
2. **C&I Load Curtailment:** Grow the C&I load curtailment resource through integration with normal program and market sales channels and with the new construction program. Before 2022, assess the eligibility for new CHP/generators to participate in C&I load curtailment for the 2022-2024 Plan, including an assessment of GHG emissions impacts, ~~and~~ Also consider phasing out existing CHP/generators that are currently enrolled during the 2022-2024 period.
3. **Storage:** Significantly expand the program behind-the-meter (BTM) storage targets to contribute to the Commonwealth's overall storage goal of 1,000 MWh by 2025 (or 500 MW with storage duration of 2 hours). Revise the program outreach and integration processes to enable increased and broader participation of customers and storage/inverter providers. Identify and highlight other value streams. Help integrate the storage program offerings into a statewide framework that leverages SMART and the Clean Peak Standard, possibly including through co-delivery.
4. **Electric Vehicle (EV) Charging and Mobility:** Increase enrollment and participation of EV chargers in the bring-your-own-device (BYOD) ADM program offering including payment of pay-for-performance incentives. Develop and implement co-marketing and targeted incentives for newer-technology EV chargers, and for EV chargers for some customer segments to provide equitable opportunities to benefit from transportation electrification. Implement co-marketing or co-delivery integration with other state EV and charger programs including potential co-funding sources. Develop and implement a state-wide program for BYOD for EV chargers and/or vehicle-controlled charging if feasible to be implemented by a specific date.
  - a. Explore possible co-marketing or program support for other mobility solutions beyond individual automobile approaches.
- 4.5. **Winter Demand Management:** Revisit the performance and cost-effectiveness of winter ADM by mid-2021 after the AESC 2021 study is complete. Consider combining summer and winter efforts into an annual ADM offering. Continue winter ADM efforts in the interim in 2020-2021 by leveraging investments in summer ADM to increase utilization in winter.
- 5.6. **Gas Demand Management.** Assess the potential benefits and costs of gas ADM, building on the preliminary analysis of Eversource and National Grid. Develop and implement a gas ADM program offering that complies with the DPU orders in the Eversource and National Grid gas rate cases that direct the PAs to pursue gas ADM through the EE programs.

## INCOME ELIGIBLE

### Increasing heat pump installations and introducing new measures

1. Increase cold climate heat pump installations, by identifying and prioritizing cost-effective applications for IES customers, developing protocols to standardize decision-making, identifying and addressing barriers to participation and installation, and working to increase customer education and support for operation and maintenance.
  - a. The overall heat pump goals should increase over the three-year term and also be broken out to include goals for by all heat pumps, whole house conversions, partial displacement, and heat pump water heaters. Progress on goals should be reported within the PA quarterly reports.
  - b. Provide education to customers on the viability and benefits of electrification, as well as on current market pricing; provide training to operators on maintenance and operations of heat pump systems.
  - ~~b.c. Insert Steve Cowell request to e~~Ensure proper sizing of heat pumps by continuing to complete any necessary air sealing and weatherization work prior to heat pump installation completed first.
2. Develop heat pump expertise to include at least one specialist at each Community Action Program partnership (CAP).
3. Increase participation in active demand management programs, including developing and implementing protocols for appropriate installation of WiFi thermostats for energy efficiency and demand management. Include follow-up, when necessary, to provide customer support.
4. Collect and report data on the number, type, and location of barriers including those related to installation (e.g., building code violations) as well as those related to participation. Use this data to inform program delivery.

## Ensuring adequate budgets

1. **Ensure that income eligible budgets reflect expected increases in the number of new low-income households due to COVID impacts, and reflect revised measure mixes, including increased installation of heat pumps, and improved protocols.**
  - a. Collect data on and report to EEAC if and when there are deferrals or delays in service (in whole or in part) due to budget constraints.

## Ensuring equitable service

1. **Determine if there are differences in service by CAP territory, PA territory, or PA program (gas or electric) that are not warranted by differences in proportions of low-income households.**
  - a. Develop and implement strategies to correct unwarranted service differences, including additional resources to CAP agencies.
2. **Expand efforts to enroll customers newly eligible for IES services as a result of the COVID-19 pandemic, including ~~by coordinating~~ by coordinating with the outreach efforts the PAs have taken, and continue to take, to promote payment plans, arrearage management programs, and discount rates.**

## Strengthening multifamily pipelines and protocols

1. **Increase and improve service to multifamily buildings, including naturally occurring affordable housing (NOAH).** Strategies should include:
  - a. Working with the Massachusetts Department of Housing and Community Development (DHCD), the U.S. Department of Housing and Urban Development, and public housing authorities to identify and reach out to owners and managers of small multifamily buildings that are part of the certificate-based Section 8 program.
  - b. Utilizing PA account data to identify multifamily buildings.
2. **Provide more flexibility for multifamily building owners undergoing scheduled rehabilitation, renovation, or refinancing, to enable deeper energy-savings.**
  - a. Collaborate with affordable housing developers and key stakeholders to establish a workable pay-for-savings approach which promotes deep energy retrofit projects including air leakage or blower door testing.
3. Develop and implement protocols to combine income eligible and non-income eligible services and streamline delivery of such services to building owners of ~~packaged delivery of service to multi-family building owners~~ buildings with a mix of income eligible and market rate units.
- ~~3.4.~~ Develop and implement protocols to require blower-door testing for air leakage rates of multifamily buildings to ensure health and comfort of residents.

## **Improving data and systems for program assessment and improvement**

1. **Strengthen regular reporting in order to identify areas of improvement and resources needed to support comprehensive and equitable service to all submarkets.** Reporting should provide insight into specific program activities and buildings served, as well as identify where program designs are working well or need modification. Quarterly reporting to the EEAC should allow differentiation of program activities by more granular parameters, including:
  - PA and CAP territory
  - Program (gas, electric)
  - Service type (Appliance Management Program (AMP), weatherization, heating system)
  - Building size (number of units)
  - Resident status (owner or renter)
  - Ownership (public housing, subsidized affordable housing, private)
2. **Develop and implement a statewide computerized audit tool by the third quarter of 2022 that can provide regular, timely, and consistent information to support identification of best practices and needed continuous improvement as well as reporting to the Council and providing data for EM&V.**

## C&I EXISTING BUILDINGS

### Lighting Controls

1. **End support for non-dimmable TLEDs by the end of 2021 across all program pathways.** To receive support, dimmable TLEDs should be installed and commissioned to deliver some combination of initial wattage tuning, daylight harvesting, occupancy controls and dimming capabilities. Refocus upstream product offerings on “smart” dimmable and controllable TLEDs and DLC qualified luminaire-level lighting controls.
2. **Drive customers towards luminaire-level lighting controls** wherever possible using performance lighting and other more comprehensive pathways. Improve the ease of participation for the Performance Lighting Plus program, particularly for existing buildings.
3. **Increase investments in lighting controls training for contractors/installers and customers;** expand training efforts to include commissioning for contractors/installers, sales strategies for distributors/contractors, operation and maintenance best practices for facility managers, and customer education on energy and non-energy benefits of controls.
- 3.4. Continue to transition all state and municipal, and company owned streetlights to LEDs including incorporating streetlighting controls at the time of conversion.

## HVAC

1. **Increase electric and gas HVAC savings from existing buildings** by improving realization rates, increasing ~~participation, participation, streamlining the custom application process,~~ addressing system optimization, including envelope upgrades and providing benchmarking services, commissioning ~~projects from project~~ concept through operations ~~and including envelope upgrades.~~
  - a. Improve realization rates for implemented HVAC projects by consistently including third party commissioning to ensure the Massachusetts ratepayers and Incorporate standardized benchmarking across PAs (using ENERGY STAR Portfolio Manager) as a pre-post component of project implementation ~~the customers investing in HVAC retrofits have accurate savings estimates that are realized.~~
  - b. Increase participation in custom HVAC projects and pursue system optimization to increase savings per project. System optimization includes right-sizing, eliminating pinch-points and by-passes, adding energy and heat recovery, implementing optimal sequences of operations and commissioning.
  - c. Consistently prioritize support for building envelope assessments and upgrades including air sealing, insulation and incremental improvements to siding and windows when investments in thermal envelope are planned.
  - ~~d. Incorporate standardized benchmarking across PAs (using ENERGY STAR Portfolio Manager) as a pre-post component of project implementation and capture benchmark data in PA tracking databases.~~
  - d. Align timing of interventions with planned infrastructure upgrades to support deeper, more comprehensive upgrades.
  - e. Develop a pathway for public buildings that emphasizes HVAC and building envelope measures with enhanced incentives. Conduct a study specific to public buildings to establish baselines for this customer segment.
  - e.f. Explore additional financing opportunities for capital-intensive HVAC projects
  - ~~f. Undertake evaluation study that addresses barriers to adoption, site-level realization rates and reasons for differences in verified vs reported savings.~~
2. **Increase and drive demand for electrification projects**, including conversions to variable refrigerant flow (VRF), air source and ground-source heat pump systems paired with Dedicated Outdoor Air Systems (DOAS) and providing operator and occupant training.
  - a. Establish increasing target for electrification projects by fuel type.
  - b. Establish target for heat-pump water heating.
  - c. Provide training to customers on the viability and benefits of electrification; provide training to operators on maintenance and operations of heat pump systems.
3. **Undertake a Deep Energy Retrofit Pilot** including working with customers to leverage planned replacements to achieve cost-effective deep energy retrofits that result in balanced investment in envelope, HVAC and other improvements. Engage private and public customers with significant real estate portfolios to identify potential buildings and undertake integrated design with scenario modeling, lifecycle and financial analysis to identify the optimum investments. Completed retrofits should reduce energy use by at least 40%<sup>1</sup> to move participants toward ZNE and renewable-ready buildings. Use the pilot to build the supply chain and workforce including

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<sup>1</sup> DOE Deep Energy Retrofit Challenge <https://www.energy.gov/management/spo/articles/doe-s-sustainability-performance-office-announces-deep-energy-retrofit>

identifying existing market actors with the skills best suited to delivering successful projects and training providers. Document project characteristics in promotional materials.

- a. Work with customers with significant real estate portfolios to identify buildings suitable for inclusion in the pilot with a target of 50 participant buildings. Help customers realize the full benefits of holistic lifecycle cost analysis by working with them to plan how they will replace equipment, systems and envelope components nearing end of life in order to move buildings towards lowest required energy inputs for HVAC operation.
  - b. Use an integrated design approach incorporating early retirement of existing equipment, systems, and components to ensure comprehensiveness and to identify the optimal package of integrated energy efficiency measures for the client; consider electrification in every package. Incorporate envelope improvements including assessments of the addition of insulated exterior cladding and upgrading windows to triple glazed units at the time of replacement.
  - c. As part of the process assess which service providers are best suited to support customers and the PAs in pursuing Deep Energy Retrofits.
  - d. Document project costs, savings, benefits and measured results in case studies and other promotional materials.
4. **Expand delivery of services and savings relating to building automation and energy management information systems including legacy system upgrades and replacements and portfolio optimization.** Require the use of and provided incentives for independent third-party commissioning in the existing building sector to improve savings.
- a. Work with customers to upgrade legacy systems and optimize HVAC system performance. For customers with significant real estate holdings, work to ensure interoperability and optimization across their portfolio by helping them bring existing systems up to modern standards when new buildings or systems are added.
  - b. Require existing building commissioning to use independent third-party commissioning providers who participate in the project from kick-off through Measurement and Verification and include operator training.
5. **Increase support for and participation in Energy Management Information Systems (EMIS) measures and monitoring-based commissioning (MBCx).**
- a. Include participation rates, estimated savings, achieved savings and project costs in quarterly reports to the Council.
  - b. Evaluate EMIS and MBCx to identify market barriers, identify proven programmatic approaches that addressed those barriers in other jurisdictions and assess the market actor competency in delivery EMIS and MBCx services.

## Industrial/Process Savings

1. **Continue to identify and eliminate barriers that are preventing project implementation** and savings already identified through the Industrial Initiative.
  - a. Continuously check back regularly with customers to see if circumstances have changed, or what it would take to move forward. Once a project has been identified, and quantified, the incremental support to cause a project to move forward should be less than the effort and cost to identify a new potential project.
  - b. Provide sales training to Industrial Initiative contractors.
  - c. Use the Massachusetts Pro Forma tool to provide cash flow analysis, rate of return, and other project financial information to the customer CFO to sell the project.
  - d. Report to the EEAC on work being done to reduce barriers for industrial process savings.
2. **Expand Strategic Energy Management (SEM) to a full program offering for all industrial customers.**
  - a. Pair SEM with implementation of traditional Industrial Initiative to drive more capital projects. Track any increases in capital projects to assess the impact of SEM participation in Massachusetts. SEM may be the most valuable marketing tool available to target manufacturers.
  - b. Reassess the measure life for Strategic Energy Management operational savings.
  - c. Support Energy Management Information Systems through financial cost sharing.
3. **Identify customer segments where there are still appreciable non-lighting savings opportunities and construct targeted initiatives to address these markets.** Examples include:
  - Smaller/distributed telecom sites, including cabinets and other unoccupied structures.
  - Cannabis cultivators with substantial process savings from dehumidification ~~CO<sub>2</sub> extraction and environmental controls~~.

## CHP

1. **Reassess-Assess** incentives for natural gas fueled CHP
  - a. Analyze ~~lifetime~~**lifecycle** greenhouse gas impacts of CHP in the context of the Global Warming Solutions Act climate goals
  - b. Complete a dedicated CHP impact **and net to gross** evaluation no later than 2022. ~~Ensure this report differentiates between new CHP systems and retrofit/replacement of existing systems. and reassess incentive levels based on this evaluation. Ensure this report includes an update to free ridership, spill-over and net to gross ratios and differential between. Study new CHP systems and retrofit/replacement of existing systems separately. -Cover all eligible CHP technologies including reciprocating engines, turbines, and fuel cells with thermal output.~~
2. **For all CHP projects, conduct detailed lifecyclelifetime emissions analysis** using an impartial and agreed upon forecast of ISO New England's emissions intensity ~~between now and 2050. Conduct a project-by-project economic analysis that determines whether a given CHP project needs Mass Save support to generate a 5-year positive cash flow.~~ Prioritize and offer enhanced incentives for lower carbon systems such as renewable fuel CHP systems that run on anaerobic digester gas.

## Residential Existing Building Market Rate Recommendations

1. **Establish separate, higher heat pump unit goals to reflect EEAC priorities and report progress within the PA quarterly reports. Goals should be broken out by all heat pumps, whole house conversions, partial displacement, and heat pump water heaters.**
2. **Bolster program support and market promotion of heat pump technologies for primary heating including the addition of incentives and HEAT Loan eligibility for ground-source heat pumps by January 2022:**
  - Enhance HVAC contractor technical competencies for heat pump system selection, design, installation and maintenance
  - Enhance customer education efforts
  - [Develop program design and incentives to encourage weatherization prior to heat pump installation when feasible and practical](#)
  - Co-deliver with other energy efficiency and active demand management measures
3. **Recognizing climate goals and the market transformation that has occurred with respect to fossil fuel systems, update current fossil fuel space heating incentives to limit incentives only to technologies and installations where clear cost-effective savings remain.**
  - a. By January 2022, for market rate customers with existing gas or propane equipment: remove incentives for customers replacing existing condensing systems and maintain incentives for customers replacing non-condensing with condensing systems ,
  - b. For market rate customers, cease incentives and HEAT loans for oil-fired heating equipment as of January 2022; handle as custom measure, especially for multifamily buildings.
  - c. Study low and moderate income customer impacts and needs to determine appropriateness of the application of A and B for these customer groups.
4. **Phase out fossil fuel water heating incentives.**
  - a. Cease incentives and HEAT Loans for oil and propane water heating equipment by January 2023, using a phased approach if necessary to support an orderly market transition.
  - b. Cease incentives and HEAT Loans for storage and indirect natural gas water heaters as of January 2022, but retain for more efficient tankless and condensing gas systems.
  - c. Study low and moderate income customer impacts and needs to determine the appropriateness of the application of A and B for these customer groups.
5. **Supplement RCD with new, custom performance-based offer modeled after DOER’s Home MVP pilot that incentivizes customers to both weatherize and install heat pumps.**
- 5-6. **Implement state of art communication and data management practices to increase effectiveness of customer interactions, including but not limited to:**
  - Review/refresh Mass Save and PA websites
  - Carry through updated messaging strategies to customer emails, social media, and other communication channels

- Improve the home energy audit report
- Improve behavior reports
- Enhance use of technology
- Enhance sales training to program contractors, including -call center staff, who interact with customers

#### **6.7. Increase participation and conversion rate in RCD :**

- Increase savings and participation from weatherization measures.
- Improve customer access through simplified customer experience such as, reduction in number of steps to participate, increased opportunities for immediate action, additional facilitated support-, and single point of contact for customers~~etc. streamlined customer support.~~
- Increase data-driven targeted marketing and outreach efforts.
- More seamlessly integrate already available storage, EV-charger, and PV incentives into the program.
- Reassess Home Performance Contractor compensation models as needed to reflect changes in lighting measures offered during home energy assessments.

## Consultant Team Workforce Development Recommendations

*NOTE: The Equity Working Group (EWG) Workforce recommendations will be included with the full list of EWG recommendations in a separate document.*

1. **Deliver targeted training for emerging and/or critically important technologies including building automation systems and heat pumps.**
  - Expand investment in targeted trainings for field assessment, installation, and commissioning of various heat pump technologies for residential, income eligible, and commercial sectors.
  - Fund efforts that grow the field of qualified building automation system technicians and commissioning specialists in the commercial and multifamily sectors.
  - Expand building operator training for large, complex facilities to ensure that investments made in new technologies deliver on their full savings potential.
2. Complete an independent Mass Save workforce study with a first report to be completed by September 2022. Report on jobs resulting from Mass Save Program investments, statistics on workforce demographics prioritized by the Equity Working Group, and ongoing identification of areas for strategic workforce investments that drive future program success. Coordinate with MassCEC on its annual Clean Energy Industry Report.
  - Assess the overall quality and quantity of the workforce that directly and indirectly deliver the Mass Save program (PA staff, PA contracted vendors, and firms that operate through the PAs open market programs).
  - Include demographic information on workforce outlined in the recommendations from the Equity Working Group.
  - Continually identify deficiencies and needs for greater investment for various programs and technologies.
3. **Expand investments in workforce development including but not limited to funding apprenticeships and internships, training and upskilling for incumbent workers, and outreach to draw new and diverse workers into the Mass Save ecosystem. Develop a budget to support significant expansion of workforce development efforts based on Equity Working Group Recommendations and Recommendation 10 above.**
  - Encourage significant, steady and sustained ramp-up of spending incrementally throughout the 2022-2024 plan (for example, 0.8% in 2022, 1.6% in 2023, 2% in 2024).
  - Develop a bottom-up budget that includes workforce development initiatives including trainings and continuing education for existing workers, certification programs, direct investment in trade school and community college programs, stipends for internships, outreach to new/diverse prospective EE workers, support for trade ally diversity, equity and inclusion policy development, and tracking and reporting on EE workforce demographics.
  - Expand the level of detail included in quarterly reporting to the Council on workforce development spending to ensure investments are effectively delivering on objectives developed by all stakeholders.
  - ~~Coordinate and collaborate with other initiatives~~

