

ATTACHMENT D: DECARBONIZATION ASSESSMENT FRAMEWORK

Note: This attachment was created for the Decarbonization Pathways Pilot, a separate MassCEC pilot. It is provided for the Electrify Northampton-Easthampton RFP for reference only. For example, we are not requiring Applicants to this RFP to use the same software tools.

Assessment Protocol

The table below provides a comparison of the components of a Mass Save® Home Energy Assessment (“HEA”) and Decarbonization Assessment, demonstrating how the visit types complement and overlap with one another. In situations where a Mass Save® Assessment is not needed or has already been completed, all steps in the Mass Save® column need to be completed except for the Mass Save® work scope, modeling software, and report.

The Mass Save® portion of the assessment will require the use of Mass Save®’s standard software tools (i.e., WFA Uplight). The Decarbonization Assessment will be conducted using a new software tool: Zero Energy Retrofit Optimization (“ZERO”) created by Zero, a Massachusetts-based start-up. More details on the ZERO tool are below.

Table 1: Assessment Protocol

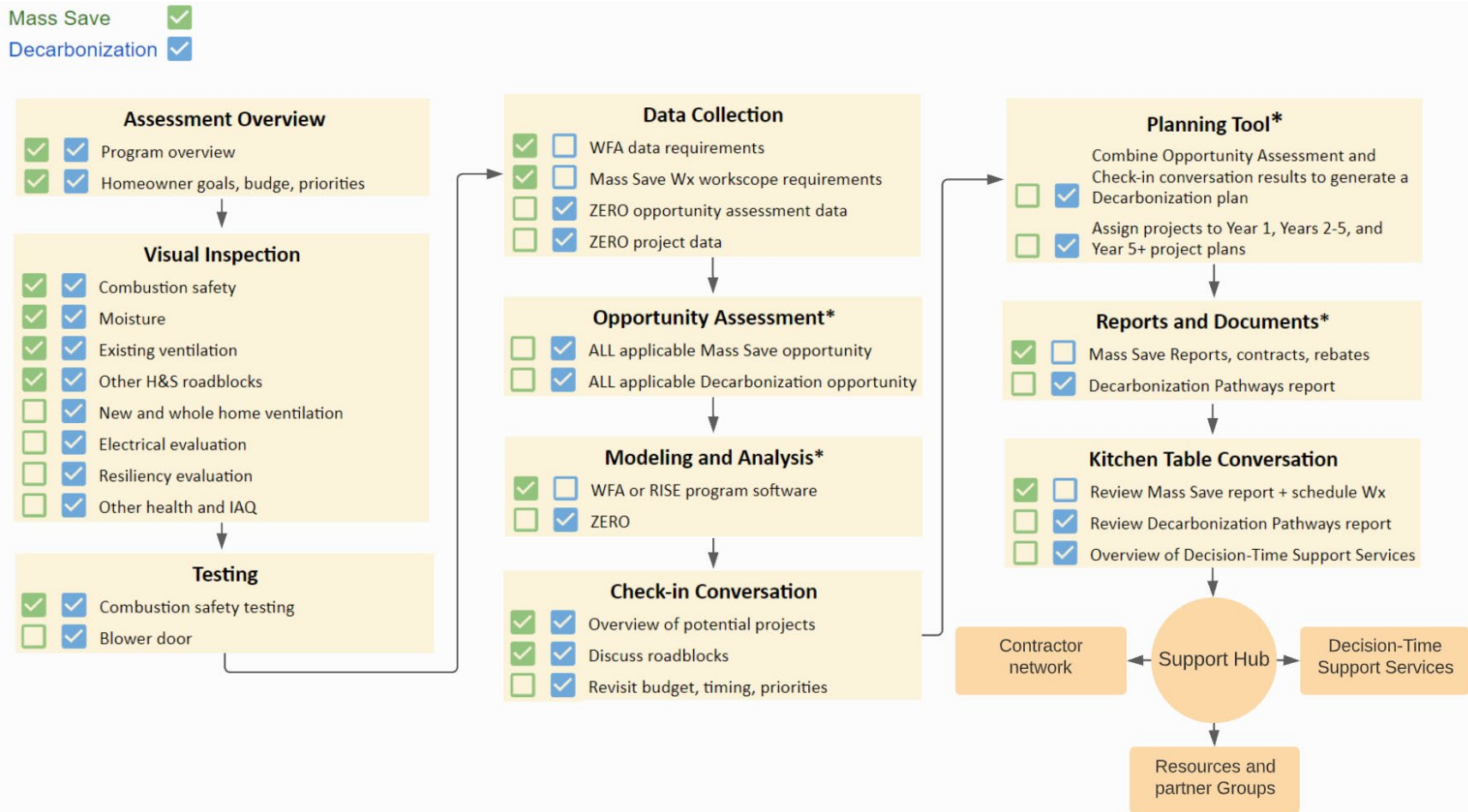
Task	Mass Save® Tasks	Decarbonization Pathways Tasks	Est. Time
Assessment Overview	<ul style="list-style-type: none"> • Introductory conversation and overview of Mass Save and Decarbonization Pathways visit goals • Review of homeowner goals, planned projects, recently completed projects, etc. • Discuss high-level budget, timing, and priority questions • Obtain utility and fuel usage data (if not completed prior to the visit) 		20 Min
Visual Inspections	<p>Combustion Safety</p> <ul style="list-style-type: none"> • Combustion appliance visual inspection • Working CO detector <p>Moisture</p> <ul style="list-style-type: none"> • Bulk water/major moisture • Mold-like substance <p>Ventilation</p> <ul style="list-style-type: none"> • Unvented dryer • Unvented bath fans, kitchen hood vented into attic <p>Other H&S</p> <ul style="list-style-type: none"> • Recessed lights • Asbestos like material • Knob and tube wiring • Structural concerns • Lead paint 	<p>Ventilation</p> <ul style="list-style-type: none"> • Evaluate existing ventilation <ul style="list-style-type: none"> ○ Bath, kitchen hood, whole home, etc. ○ Recommend venting to outside and adding spot ventilation as needed ○ Calculate the “Dwelling-Unit Ventilation Results” for each pilot home using Red Calcs ASHRAE 62.2 2016 calculator Recommend continuous ventilation as needed or recommend a follow-up blower door test based on the decarbonization plan <p>Electrical Evaluation</p> <ul style="list-style-type: none"> • Evaluate panel condition, main breaker size, # of available breakers, etc. to recommend a panel upgrade or sub-panel <p>Resiliency Evaluation</p> <ul style="list-style-type: none"> • Prior to visit, look up home in flood tracking database • With homeowner, assess risk of flooding in severe weather and recommend high-level strategies that apply to the home <p>Other H&S</p> <ul style="list-style-type: none"> • Identify other potential health and indoor air quality risk factors that may be exacerbated by recommended improvements (e.g. combustion sources, chemicals, Radon, etc.) 	25 Min

Testing	<ul style="list-style-type: none"> • Combustion safety test (CST) 	<ul style="list-style-type: none"> • Blower door test - if applicable <ul style="list-style-type: none"> ○ Determine air leakage rates ○ Identify air leakage pathways ○ Calculate ASHRAE 62.2 ventilation rates • IR scan – Include when inside and outside temperature delta allows 	15 Min
Data Collection	<ul style="list-style-type: none"> • Refer to Table 2 and Table 3 for data collection requirements • Some of the data collected will require multiple entries in Uplight’s WFA and ZERO. 		30 Min
Opportunity Assessment	<ul style="list-style-type: none"> • ZERO can be used to ensure all Mass Save program opportunities are considered and recorded <ul style="list-style-type: none"> ○ Mass Save weatherization (Wx) ○ Heating and cooling rebates ○ DHW rebates ○ Appliance rebates 	<ul style="list-style-type: none"> • ZERO can be used to ensure all decarbonization opportunities are considered and recorded <ul style="list-style-type: none"> ○ Deeper envelope measures ○ Heating and cooling ○ DHW ○ Ventilation ○ Appliances and cooking ○ Renewables and battery storage ○ Transportation ○ Outdoor power equipment 	20 Min
Modeling and Recommendations	<ul style="list-style-type: none"> • Standard process using Uplight’s WFA or RISE program software <ul style="list-style-type: none"> ○ Scope Wx work ○ Recommend rebates • Will generate a Massachusetts Home Energy Scorecard 	<ul style="list-style-type: none"> • ZERO will be used to model all projects and plans for year 1, years 2-5, and years 5+ and will be included in their project plan • ZERO will generate modeled savings and CO2 reduction • ZERO will estimate up-front cost ranges, incentive amounts across all available incentives, and out of pocket cost estimate ranges 	40 Min
Check-in Conversation	<ul style="list-style-type: none"> • Provide an overview of potential projects spread over a multi-year plan framed around the customer’s goals and priorities • Discuss any roadblocks found during the visual inspection, testing, and electrical evaluation • Revisit high-level budget, timing, and priority questions using the data collected and to prepare to map projects to Year 1, Years 2-5, and Year 5+ project plans 		15 Min

<p>Planning Tool</p>	<ul style="list-style-type: none"> • ZERO will surface all relevant Mass Save and Decarbonization projects based on the opportunity assessment questions and other home characteristics collected • Projects will be grouped by the Home Decarbonization Advisor under one of three plans (Year 1, Years 2-5, and Year 5+) • Assigning a project to a plan will be based on customer goals, priorities, budget, timeline, available incentives, and estimated useful life • Dependencies across projects will also influence the Home Decarbonization Advisor’s recommended project plans (e.g. types of contractors needed, order of install, prerequisites to install) • Cost estimating will be required for most projects and ZERO will have ranges of cost estimates embedded in it, provided by the Lead Technical Consultant 		<p>30 Min</p>
<p>Reports and Documents</p>	<ul style="list-style-type: none"> • HEA report • Wx contracts and disclosures • Rebate materials • Home Energy Scorecard 	<ul style="list-style-type: none"> • ZERO report • Mass CEC Rebate materials for Decarbonization incentives • Additional one-pagers and resources to be provided by the Lead Technical Consultant 	<p>15 Min</p>
<p>Kitchen Table Conversation</p>	<ul style="list-style-type: none"> • Review the ZERO report and explain the recommended decarbonization pathway(s) for the customer • Review the Mass Save Wx workscope and encourage scheduling • Review incentives for Mass Save and Decarbonization Pathways • Review additional resources and one-pagers • Overview of Decision-Time Support services and how to access • Overview of the preferred contractor network and how to access 		<p>20 Min</p>
<p>Total Estimated Time</p>			<p>3 hours and 50 minutes</p>

Image 1. Assessment Protocol

The image below is a visual summary of the information above in Table 1.



ZERO: An Opportunity Assessment and Retrofit Planning Tool

The ZERO tool will provide an **opportunity assessment**, capturing project opportunities for the home under both Mass Save® and the Decarbonization Pathways Pilot/Triple Decker Retrofit Pilot. The ZERO tool will do basic **energy modeling** and can be used to generate a **customized decarbonization plan** for each Participant. The ZERO tool is still under development.

The ZERO tool will allow the Home Decarbonization Advisor to prioritize and group projects found in the home with the goal of providing a simple overview and roadmap to decarbonization for each customer.

Inputs

- The primary inputs to the tool are data collected during the site visit and conversation with the homeowner. (See Table 2 below for more details on data collection.)
- Once data collection is complete ZERO will surface all relevant Mass Save and Decarbonization projects based on the opportunity assessment questions and other home characteristics collected
- Projects will be grouped under one of three plans (Year 1, Years 2-5, and Year 5+)
- Assigning a project to a plan will be based on customer goals, priorities, budget, timeline, available incentives, and estimated useful life
- Dependencies across projects will also influence the recommended project plans (e.g. types of contractors needed, order of install, prerequisites to install)
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Outputs

- High level overview of Customer's decarbonization path and the potential impact/benefits
- Roadmap of the Year 1 Plan, Years 2-5 Plan, and Year 5+ Plan
- A financial overview of all Plans
- Detailed summary of all projects and plans with estimated cost ranges, incentives, savings, greenhouse gas reduction, and remaining useful life

Additional Details on Data Collection

Table 2 provides a more detail list of the data collection needed for the Decarbonization Assessments. Field names will vary depending on the tool but the inputs are very similar. Not all fields shown below are required for every home and use will depend on the individual home being assessed.

Table 2: Data Collection

Data Collection Field Category	Example fields	Zero		WFA
		Opportunity Assessment Fields	Analysis/Modeling Fields	Mass Save Software Fields
Customer Info	<ul style="list-style-type: none"> - Location - Contact info - Income eligibility 	3	3	3
Customer Interest	<ul style="list-style-type: none"> - Moving plans - Completed or planned construction projects - Completed or planned major purchases 	3		
General Building	<ul style="list-style-type: none"> - Conditioned Area - Floors above grade - Number of Bedrooms - Blower door test ACH50 	1	11	10
Occupant	<ul style="list-style-type: none"> - Number of Occupants - Thermostat Type - Thermostat Heating Setpoint 		3	3
Utility Bills	<ul style="list-style-type: none"> - Electricity Provider - Monthly Electricity Bills - Heating Fuel Provider - Monthly Heating Fuel Bills 		4	
Foundation	<ul style="list-style-type: none"> - Foundation Type - Foundation R-value - Basement Square Feet 		3	1
Framed Floor	<ul style="list-style-type: none"> - Basement Ceiling Insulated - Basement Ceiling R Value - Crawlspace Ceiling Insulated - Crawlspace Ceiling R Value 		4	1
Framed Wall	<ul style="list-style-type: none"> - Wall Exterior Finish Material - Wall Exterior Finish Material Age (Years) - Wall Construction - Wall Cavity Insulation 		6	2
Ceiling/Roof	<ul style="list-style-type: none"> - Attic Type - Roof Material Age - Attic Floor Insulated - Attic Floor R Value 	1	9	2

Window & Door	<ul style="list-style-type: none"> - Window Pane Type - Front Window Count - Window Age - Number of Skylights 	3	13	5
Heating and Cooling	<ul style="list-style-type: none"> - Number of Heating Systems - Heating System Type - Heating System Fuel - Heating Unit Efficiency (%) 	2	6	8
Domestic Hot Water	<ul style="list-style-type: none"> - DHW Type - DHW Fuel - DHW Age 	1	3	2
Ventilation	<ul style="list-style-type: none"> - Appropriate Kitchen Ventilation - Appropriate Bath Ventilation - ASHRAE 62.2 2016 required ventilation 		4	
Appliances and Lighting	<ul style="list-style-type: none"> - LED Bulb Percentage - Cooktop Type - Cooktop Age 	5	9	9
Electrical and PV	<ul style="list-style-type: none"> - Existing PV System - Electrical Panel Capacity - Number of Open Breaker Slots 	1	3	1
Vehicles	<ul style="list-style-type: none"> - Number of Vehicles - Vehicle Fuel Type - Average Miles per year 	1	4	
Miscellaneous	<ul style="list-style-type: none"> - Pool Heating Fuel - Well Pump 		6	2
Health & Safety	<ul style="list-style-type: none"> - Knob and Tube Wiring - Radon System 		6	1
Total Fields		21	97	50