# Mitigation Work Group

## Buildings Ad Hoc Work Plan – Discussion Draft

### Background

The Mitigation Working Group (MWG) co-chairs agreed on April 28, 2020, to create a subgroup focused on developing recommendations for decarbonizing buildings in Maryland. The Buildings Subgroup's primary objectives, which come from the MWG's 2020 Work Plan, are to:

- Analyze and determine specific targets and timelines for decreasing emissions from residential and commercial buildings (or, information needed to determine such targets and timelines), including: annual building retrofit targets; specific energy efficiency targets; a timeline for requiring all new buildings be carbon neutral; and a timeline for replacing fossil-fuel heating systems with electric heating or other low-carbon systems.
- Analyze and identify specific mechanisms for decreasing emissions from residential and commercial buildings (or, information needed to determine appropriate mechanisms), including: expanding programs that support upgraded electric heating and cooling system; new programs to encourage combined heat and power; incentives and other strategies that support the replacement of fossil-fuel heating with electrical systems.

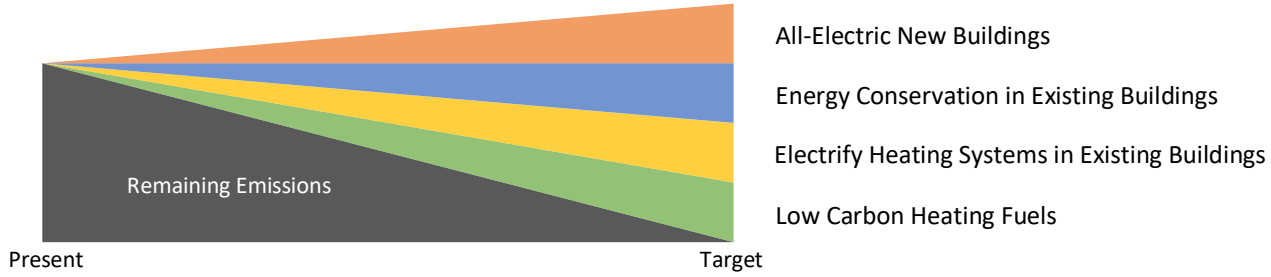
The Buildings Subgroup's secondary objectives are not defined in the MWG's 2020 Work Plan but come from the subgroup itself. They include:

- Consider how mechanisms for mitigating emissions from residential and commercial buildings could influence the industrial sector's opportunities and costs for mitigating emissions.
- Analyze and identify specific mechanisms for reducing and eventually neutralizing the carbon intensity of fuels delivered to buildings.

### Work Plan

The Buildings Subgroup will base its work on existing technical studies, plans, and policies for decarbonizing buildings. A literature review suggests that four mechanisms are most effective for addressing this challenge at scale:

**Conceptual Overview of Emissions Mitigation Mechanisms for Decarbonizing Buildings***




* Not meant to accurately show proportional impact of each mechanism.

Using current best practices as a starting point, the subgroup will structure its work around answering critical questions about applying emissions mitigation mechanisms to the buildings sector in Maryland. Answers to the following questions will help the subgroup develop its recommendations.

## Guiding Questions

1. By what date should the buildings sector in Maryland – as measured by residential, commercial, and industrial (RCI) fuel use – achieve net-zero emissions to support the State's current or potential Greenhouse Gas Reduction Act (GGRA) goals?
2. What is our vision for a carbon neutral buildings sector in Maryland?

## Questions about All-Electric New Buildings

1. Studies show that all-electric new buildings have lower construction and energy costs than conventional new buildings in several markets. Is that true for residential and commercial buildings in Maryland given current and projected equipment, labor, and energy rates?
2. Should new residential buildings be required to be all-electric? If so, by what date?
3. Should new commercial buildings be required to be all-electric? If so, by what date?
4. Are there exemptions to an all-electric requirement that should be given to specific commercial or residential new buildings? If so, what would qualify for an exemption? Commercial cooking equipment? Commercial buildings with specific high-heat applications?
5. Should the State consider an on-site renewable energy generation (or shade tree) requirement or incentive for new buildings?
6. Should the State consider a ground source heat pump incentive for new buildings, especially for new neighborhoods, large commercial/multifamily buildings, campuses, etc.?

7. Should new buildings be required to have electric vehicle charging infrastructure? If so, by what standard and by what date?

## Questions about Energy Conservation

1. Are the State's current energy conservation programs sufficient to achieve building decarbonization goals?
2. Which energy conservation measures are most effective and lowest cost for reducing heating demand?
3. Replacing old combustion equipment (furnaces, boilers, CHP, etc.) with new higher efficiency equipment reduces emissions in the short term but does it hinder the State's abilities to meet its long term GGRA goals? Could it also expose owners to higher energy costs in out-years if heating fuel prices increase from carbon taxes/fees or a low carbon fuel standard?

## Questions about Electrifying Heating Systems in Existing Buildings

1. Which types of existing heating systems are easiest to electrify? Which are the hardest?
2. How many of Maryland's existing homes and businesses are unlikely to replace existing heating equipment with electrified heat equipment (heat pumps) because of space/cost limitations?
3. How can a heat pump system, which provides heating and cooling, become the lowest cost option for building owners who typically replace heating and cooling systems one at a time?
4. How does a heat pump program overcome the barrier that most heating and air conditioning equipment is replaced when the existing system fails, causing an emergency replacement?
5. Would electric transmission lines need to be upgraded to meet increase electric heating demand in existing neighborhoods? If so, what demand response programs could help reduce peak demand?
6. California is incentivizing the installation of smart heat pump water heaters that act as energy storage by using surplus (cheap) electricity to heat water, which can reduce (expensive) electricity consumption during peak demand. Would this program make sense for Maryland's electricity utility companies?

## Questions about Low Carbon Heating Fuels

1. Can Maryland achieve carbon neutrality in its buildings sector without achieving carbon neutrality for heating fuel deliveries?

2. How should Maryland define carbon neutral fuels? Would it only include fuels produced from renewable sources? Would it include fossil fuels if the portfolio of fuel deliveries achieves a net carbon intensity score of zero including carbon offsets?
3. What renewable fuels could be utilized in Maryland? What are the costs and supply limitations of those fuels?
4. If carbon offsets could be used to reduce the carbon intensity of fuel deliveries, then should those offsets come from within Maryland? If not, where else could offsets be located?
5. How would natural gas and heating oil rates change in response to a low carbon or carbon neutral fuel standard?
6. Based on that rate schedule, when does CHP become more expensive than electrified systems?

## Other Questions

1. What are the total costs per ton of emissions mitigation for each of the aforementioned electrification, energy conservation, and low carbon fuel mechanisms?
2. How much of the State's heating demand is currently met with electricity versus heating fuels?
3. How would electric utilities meet increased wintertime electricity demand due to increased electrification of heating?
4. What effect would electrification of heating demand have on electricity rates?
5. What effect would decreased gas distribution system throughput have on gas rates?
6. How can the State streamline the process for contractors and/or building owners to finance and implement energy conservation and electrification measures all at once?
7. How many and what type of jobs would be created by implementing these mechanisms?

## Timeline

The Buildings Subgroup will aim to develop recommendations during the summer of 2020 and present a final set of recommendations to the MWG in early fall 2020. On this timeline, the subgroup's recommendations could be considered for inclusion in the Maryland Commission on Climate Change's Annual Report, due November 15, 2020, and the State's final GGRA Plan, due by the end of 2020. The subgroup will meet monthly. Work between meetings will be required to meet this timeline.

## Draft Agendas

The following are draft agendas for meetings of the Buildings Subgroup. Agendas will be modified as needed to best meet the subgroup's objectives.

**Meeting 1: Introductions and Work Plan Review (June)**

- Introductions and Guiding Questions
- Overview of the Topic
- Work Plan Review and Discussion

**Meeting 2: New Buildings (July)**

- Review compilation of member recommendations on new buildings.
- Previous and current efforts to modify construction standards for new buildings
- Construction and energy costs for all-electric vs conventional new buildings
- Discussion of an all-electric requirement
- Discussion of exemptions to an all-electric requirement
- Discussion of on-site renewable, shade tree, and ground source heat pump requirements or incentives
- Ask members for recommendations on existing buildings

**Meeting 3: Existing Buildings (August)**

- Review compilation of member recommendations on existing buildings
- Heat pump utilization – current and potential
- Making heat pump retrofit the lowest installation cost option
- Coupling heat pump installation with energy performance measures
- Incentivizing HVAC contractors
- Electric utility demand response, wintertime peak, and rate implications
- Ask members for recommendations on low carbon heating fuels

**Meeting 4: Low Carbon Heating Fuels (September)**

- Review compilation of member recommendations on low carbon heating fuels
- Why electrifying heating loads is the first priority
- Why addressing the carbon intensity of heating fuels might be an essential backstop
- Discussion of low carbon fuel programs and application in Maryland

**Meeting 5: Final Recommendations (October)**

- Review and finalize the subgroup's recommendations