

Mitigation Work Group – Buildings Panel

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The above panelists have compiled collective answers on the posed questions for the working group discussion on the emissions contributions of buildings in Maryland. Many of these topics were discussed during the in-person meeting on Tuesday, April 16, 2019.

1. *In your professional opinion, what is an effective and achievable target for decreasing emissions from residential and/or commercial buildings in Maryland?*

This target should take into consideration reasonably available technology; current or potential incentives available for retrofits, upgrades, and new construction; and Maryland’s GHG emission reduction goals. Targets may be general or you may recommend a specific focus on one or more categories such as: annual building retrofit targets; specific energy efficiency targets; a timeline for requiring all buildings to be carbon neutral; and a timeline for replacing fossil-fuel heating systems with electric heating or other low-carbon systems.

Maryland’s 2020 goal was to reduce emissions 25% over 2006 levels, which is equivalent to 34.66 MMtCO₂e. Based on the 2015 update ([Greenhouse Gas Emissions Reduction Act Plan Update, 2015](#)), emission reductions totaled 38.37 MMtCO₂e, which exceeded the original 2020 goal. Emission reductions came from the following categories:

GHG Reductions by Major Program Groups.

Program	Projected 2020 GHG Emission Reductions (MMtCO ₂ e)
EmPOWER Maryland	7.24
The Maryland Renewable Energy Portfolio Standard (RPS)	4.13
The Regional Greenhouse Gas Initiative (RGGI)	3.60
Other Energy Programs	0.14
Transportation Technologies	6.88
Public Transportation	1.85
Pricing Initiatives	1.99
Forestry and Sequestration	4.55
Ecosystems Markets	0.68
Building and Trade Codes in Maryland	3.15
Zero Waste	1.48
Leadership-By-Example	1.78
Maryland’s Innovative Initiatives	0.21
Future or Developing Programs	0.02
Land Use Programs	0.64
Outreach and Public Education	0.03
Total Reductions	38.37
GGRA 2020 Emission Reduction Goal	34.66
Meeting the 2020 Goal?	Yes. 3.71 MMtCO₂e above goal reductions.

Building and trade codes in MD accounted for 8.2% of the overall emissions reductions. Buildings overall (including EmPOWER, energy programs, and innovation initiatives) accounted for 28%, or 10.7 MMtCO₂e - nearly 1/3 of all emission reductions achieved. This

reduction is equivalent to approximately 74 trillion Btu (based on electricity consumption only).

In 2016, MD consumed a total of 1,359 trillion Btu. 61.2%, or 832 trillion Btu, was consumed for the operation of residential and commercial buildings. The 74 trillion Btu reduction noted above only accounts for an 8% reduction in commercial and residential building consumption.

Energy reductions on the order of 65 – 80% need to be achieved in the building sector to reach net zero conditions and substantive GHG emissions. Achieving a 70% energy reduction in the building sector would equate to a savings of 582 trillion Btu, or 120 MMtCO_{2e} – equivalent to nearly all emissions from 2006 levels.

As such, a similar, if not more aggressive emissions reduction goal for the building sector should be targeted moving forward. Such targets cannot be met, however, if more support, policies and funding are not provided.

2. *What specific mechanisms would you recommend for decreasing emissions from residential and commercial buildings to achieve this target?*

This may include: 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.

We recommend that the MCCC explore the following opportunities. More research is needed to identify the best suite of solutions, but the following concepts should be considered in future modeling for GHG emissions reductions assessment. In order of our perceived priority:

A. Maximize the effectiveness of EmPOWER Maryland.

- i. EmPOWER Maryland contributed the largest percentage of emissions reductions per the 2015 update (18.9% of total emission reductions, see above). Acknowledge that, since EmPower Maryland currently has the most traction, achieving the greatest emission reduction in the suite of GHG strategies and that as the leading GHG tool, it is subordinate to the overall GHG plan and not just an electricity generation or grid strain reduction plan any longer. *The reach of the program and the guidelines for its implementation should align with the overall GHG strategy for the state,* including fuel switching for the electrification of the building stock. In other words, the design intent of the EmPOWER program should be reviewed, and any changes made to the program should be inline with the design intent, as well as the overall GHG strategy for the state.
- ii. Acknowledging that the Public Service Commission (PSC) stated in its 2016 that market saturation for high efficiency appliance and LED lighting will likely reduce the effectiveness of EmPOWER Maryland over the next decade, a more robust Deep Energy Retrofit strategy to transform the housing stock will be needed to provide the benefits currently being reported. Maximizing the effectiveness of EmPOWER funding NOW is the top recommendation to reduce the uncertainty bands in the current modeling scheme. This *new strategy is needed* to maintain or increase savings rates. As such, changes to the program may include:

1. Acknowledge that EmPOWER is not just a Demand side - peak load reduction program – it is the key linchpin in the GGRA suite of programs. Remove restrictions that are still or are only aligned with the demand reduction or peak load, like the restriction to provide shell measures in fossil fuel homes with no central air conditioning.
 - a. This is cumbersome to the network and only exists to offset a perceived impropriety.
 - b. In performing audits on thousands of homes under AARA, significant spikes in electricity usage have been observed at peak load because the low-income customer who received their oil in November ran out by the end of January and they reverted to electric space heaters. Or worse still, the customer often mixes in unvented Kerosene space heaters, which emit carbon monoxide.
2. Establish a clearing house to provide a comprehensive view and analysis. Take stock of all properties that apply for permitting in new construction greater than 50,000 ft² an aggregated 200,000 ft² for residential communities. Coordinate with existing efforts (MACO) to catalog energy upgrades in state/county buildings across the state (possibly private industry too); give those projects access and funding to engineering professionals to maximize energy efficiency measures and ensure commissioning is conducted; consultation may also include evaluation of available utility rate structures and coordinating directly with the utility to provide incentive to building owners for making smart energy choices or enabling grid integration/demand response/resilient systems and RE ready infrastructure this includes EV charging capability.
3. Acknowledge that the Building stock transformation is the actual energy conservation measure and that the business case developed for the justification for funding will include the useful life of the Building rather than the useful life of the suite of proposed measures. With this adjustment, the Primary property loan and the energy conservation loan products mature at the same time.
4. Provide incentives for energy conservation engineering guidance services for all public purpose projects or planned urban development that meet the above criteria especially as it relates to Affordable Housing.
5. Provide loan capital for the construction of properties that meet the “Passive House” or Net Zero certification. Include additional points in the LIHTC Qualified Allocation Plan (QAP) and Multifamily Rental Housing Program for these types of programs as well, similar to the way PA has written this into their QAP.
6. Review previous “Home Performance with Energy Star” properties that did not move forward with recommended efficiency upgrades. Re-engage with them through new/modified incentives. For example, inform such participants that rebates have increased from \$2,000 to \$7,500. Furthermore, enable the utility companies and/or other strategic groups to reach out to these participants directly, rather than having all communication come through contractors that may or may not have established trust with the homeowner.
7. Provide LLR to mitigate the risk or buy down rates of commercial banks, Pace, or on-bill financing.

8. Consider savings from lighting upgrades previously undertaken by a property owner as Phase or tier one of a comprehensive retrofit and include those savings in the overall staged retrofit plan for grant funding of a particular property or organization's strategy.
9. Account for the anticipated Health benefit from the deep energy retrofit in the cost benefit analysis. DOE has data that indicates that there is a \$3 return on investment in health and productivity savings for every \$1 spent on weatherization projects. Enable EmPOWER funds to be used for indoor air quality efforts in addition to energy savings since such improvements would reduce medical expenses and positively impact the living environment/community. This is especially relevant given the impending drastic increase in asthma related incidents anticipated in DHMH presentation.
10. Consider the HVAC system to be the last transformer in the distribution – transmission line and allow for the funding of the incremental upgrade cost of equipment that is 2 steps above code to be eligible for funding from transmission line or other funds like RGGI. For low income and affordable housing projects, up to 50% of the cost-effective upgrade by EmPOWER ratepayer funds and 50% by transmission line or other funds like RGGI.
11. Remove restrictions from the EmPOWER program that require properties to have electric heat, heat pumps or central air conditioning in order for the project to be fully eligible for assistance with shell measures or HVAC upgrades.
12. Develop a better means to address rental property improvements. Split incentives for EE upgrades are an issue for this building sector. Tenants often pay the utilities, so there's no incentive for the owner of the property to upgrade older inefficient equipment as long as it's operating. The recommendation would be where applicable for aged systems to provide a given percentage (a capital contribution) from ratepayer funds to incentivize replacement of this older equipment. The percentage of incentive could increase as the efficiency shell increases.
13. Take a deeper look at the energy burden on low-income residences, as well as for society at large. Implementing energy savings measures for low-income properties can help to reduce current subsidy funding provided by the state to pay for utility expenses while further improving the living conditions of the residents.

B. Develop/support a consistent state-wide framework for the PACE funding mechanism.

- i. Remove the varying eligibility and/or requirements that are not consistent with the design intent of the overall funding mechanism.
- ii. Remove requirement for an energy audit for categorically eligible measures that are included on a prescriptive list.
- iii. Engage with current deployment vehicles to get their lessons-learned and disseminate information through the eco-Work group.

C. Allow opportunity for new technology development and demonstration

- i. Focus on windows, doors, attic insulation; invite groups like Energiesprong to demonstrate their capabilities in the city and across the state.

- ii. Enable market-ready technologies to be introduced and adopted by the market through incentive support or other means (i.e. advanced heat pumps, storage technologies, renewables, etc.)
- iii. Support/continue incentives for electric vehicles (EVs) and building electricity storage integration.
- iv. Support electrification of end uses.
- v. Conduct a demonstration program to evaluate new technologies in Baltimore residences.

D. Conduct a thorough code review and consider a code upgrade program

- i. Review the code and ensure it maximizes energy efficiency requirements, includes energy code design review, and commissioning activities.
- ii. Determine effective methods to enforce the code and have more energy professionals involved throughout the design and construction process.
- iii. Consider a model like Germany, requiring upgrades to code compliant levels for air infiltration and ventilation, HVAC equipment and thermal envelope systems at the time of sale for properties.
- iv. Increase code requirements to require multistage HVAC for new construction.

E. Reassess energy generation sources and costs. (Not directly building related)

- i. Provide information to the working groups pertaining to net metering, level of excess energy provided by renewable sources, etc. such that the working groups can assess the potential gain for the state to make changes in energy cost structures including combined heat and power (CHP) and on-site generation.
- ii. Analyze the benefit of providing higher resale rates for stored electricity. This energy is essentially once generated and twice used. For example, if 55% of the produced electricity is now the net productive product, then storing part of the currently wasted generation has an intrinsically higher value than the standard portion.
- iii. Provide additional compensation for current grandfathered generation facilities to transition their property to large scale storage facilities if the capital improvement to alternate high-efficiency generation sources is cost prohibitive. Explore the revenue potential of changing a property's use to a viable entity that under the current configuration is likely to have declining revenue. Alternatively, or in conjunction, consider alternative tax structures and/or financial arrangements to enable coal and other fossil fuel plants to repurpose their facilities for large scale storage and/or renewable generation. For example, allow for deferment of tax payment to provide the necessary capital to make such modifications. Recollect the tax amortized over a period of time after modifications have been made.
- iv. Support electrification of end uses.
- v. Recouple other renewable energy generation.
 - 1. Consider balancing the playing field for Calvert / Cliffs with RE / EE incentives.
 - 2. More wind in Western MD and off shore
 - 3. Supporting/continuing renewable energy incentives, such as promoting PV installations for homes, where feasible.

F. Identify the "Major Funding Sectors" that are providing significant emissions reduction.

- i. Provide credit for such efforts by limiting exposure to increased burden while considering new options and funding mechanisms, such as a carbon tax. Sectors may include:
 - 1. Ratepayers in the EmPOWER utility areas.
 - 2. The utility companies themselves, who are currently providing the lion's share of the work.
 - 3. RGGI
 - 4. Government
 - 5. The Transportation Sector, which is the remaining large-scale area that is underfunded and the area with the widest uncertainty band.
- i. Diverting funds generated through a transportation-centric mechanism to renewable deployment areas such as those being developed by MDE for EV and solar deployment may achieve the enhanced RPS goals without actually mandating them on the backs of the utilities who are already doing so much.

G. Jobs

- i. The EE / RE industry has surpassed the Airline industry in GDP. There is significant potential to generate new workforce in Maryland. Furthermore, these are good jobs:
 - 1. EE/RE: for every 10-20 employees, there is a business owner.
 - 2. Accountants
 - 3. Certified professionals (Certified Energy Manager, Certified Building Energy Modeler, etc.)
 - 4. EMV and other compliance officers
 - 5. Product distribution logistics and manufacturing
 - 6. HVAC, plumbing and electrical tradesmen

H. Support development of resilient buildings and communities.

- i. Mitigate the imminent risk to the economic vitality of Maryland from severe weather events by encouraging the enhancement of communities towards resilient properties developed in a "Coast Smart Way".
 - 1. Invest in additional Mapping of vulnerable areas including inundation from flooding in and around the flood plain, river waterways, and anticipated sea level rise.
 - 2. Transfer risk through a comprehensive effort to insure properties including subsidized flood insurance in tiers as risk increases in more vulnerable areas outside of mandated flood insurance zones. Use buying power to buy down the rates. This could be the single most constructive strategy measure to ensure that the overall climate change strategy remains a net positive economic value.

In general, the panelists encourage further evaluation of the energy and emissions challenges in buildings in Maryland and support a deeper understanding of possible solutions through detailed and careful engineering analysis.