100% Renewable Maryland: Exploring Our Clean Energy Future

May 9, 2018

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Today’s energy system

- Generally Reliable - but Lack of Choices
- Unaffordable for many
- Inflexible, Inefficient and Polluting
- Difficult for democratic control, and frequent conflicts over petroleum
Electricity generation

Cattenhom nuclear power plant

John Amos coal-fired plant
Inefficiency

Less than one-tenth of the energy in the fuel is converted to light (best case)
Automobiles with internal combustion engines

Typical gasoline vehicle: 75 to 82 percent waste (not including oil production, pipeline, and refining losses)
Leaky homes

- Fans and Vents: 4%
- Windows: 10%
- Floors, walls, and ceilings: 31%
- Electrical Outlets: 2%
- Ducts: 15%
- Doors: 11%
- Plumbing Entries: 13%
- Fireplace: 14%
Maryland’s Renewable Energy Sources

We have at least 10x more than needed
Electrification + solar + wind are the keys.

Maryland Energy-related GHG emissions, 2014, 85.4 mn mt

- Electricity: 40%
- Res/Comm/Ind: 18%
- Transportation: 39%
- Fossil fuel industry: 12%
- Cement: 1%
Renewable energy evolution in Maryland for 100% in 2035
MWh/year
Buy the label or the real thing?

- It is essential to ensure that new renewable energy facilities are created when we set renewable energy targets.
- Power Purchase Agreements and requirements for in-state solar and wind installations can do that.
- Continuing with unbundled RECs, i.e., buying the label but not the power, would send about 2 billion dollars out of state over time just for the labels without ensuring that any renewable energy facilities are actually created just for a 25% RPS under the present system. Going to PPA’s saves those dollars.
- Maryland imports 40 percent of its electricity and all of its oil and gas and almost all of the fuel for its electric power plants.
- Mandating in-state solar and offshore wind will keep a lot of those dollars in-state.
- It will result in well over 10,000 steady long-term jobs.
Acquiring Solar

Megawatt block sizes, MW

- Block 4
- Block 3
- Block 2
- Block 1

Utilitiescale (more than 2 MW AC per installation)
- Community solar, MW (up to 2 MW AC per installation)
- Commercial, MW (up to 2 MW AC per installation)
- Residential, MW (up to 25 kW AC/ installation)
MW block program incentives, $/watt

Megawatt block incentives, $/watt

- Block 4
- Block 3
- Block 2
- Block 1

Utility-scale incentive $/watt
Community incentive $/watt AC
Commercial incentive $/watt AC
Residential incentive $/watt AC
Household bill, fiscal, and combined impact, $/month

 BILL, FISCAL IMPACT, AND NET COST (SAVINGS), $ PER MONTH/HOUSEHOLD

- Ratepayer cost increase (decrease)
- Fiscal impact, cost (stimulus)
- Net impact, rates+fiscal stimulus
CO2 emissions – BAU and 100% Act

Electric Sector CO2 emissions, million metric tons

BAU CO2 emissions
100% Act CO2 emissions
Payroll ($52.9K/job) and GDP ($148.8K/job) generated by offshore and wind jobs (MD averages)
Grid-of-the-Future
Renewable, Resilient, Democratized

- Solar and wind mainstays of energy system
- Increase efficiency
- Storage, CHP, microgrids
- Demand response
- Control consumption to minimize bills
- Electrified transportation and HVAC
- Provide services to the grid, including via V2G and local storage ownership
Five elements for reliability with 100% renewables

- Solar and wind in seasonal balance
- Storage
- Demand response
- Peaking generation with renewable hydrogen
- Smart grid

With storage, demand response, smart grid, and peaking generation forming a system to ensure that the load is met at all times.
Energy costs can be 10-20% or more of a low-income family’s income versus 3-4% for an average income Maryland family.

Solution: Limit energy burdens to 6% of gross income for eligible low-income households.

**WHY?**

1. Energy needs don’t decline much with income
2. Low-income households use 50% MORE energy per square foot for heating, on average
3. Low-income households tend to have less energy-efficient appliances
4. Many elderly or ill people need warmer homes in the winter
Conclusions

- We can have a **healthy, affordable, reliable, and emissions-free electricity by 2035**
- This is also the basis for reducing emissions in space and water heating and transportation – electrifying them and supplying the electricity using solar and wind
- We must begin now
- Affordability is the key for low-income households