

Transforming the Island's Energy System

- A roadmap for resilience, a response to climate change -



**MVC Climate Action Task Force
Energy Working Group**

- Summary Report – April 2021 -

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Objective

- **Summarize the work of the Energy Working Group in modeling and analyzing the Island's energy system**
- **Outline the challenges of reducing greenhouse gas emissions by eliminating fossil fuels and converting to an all-electric energy system over the next two decades**

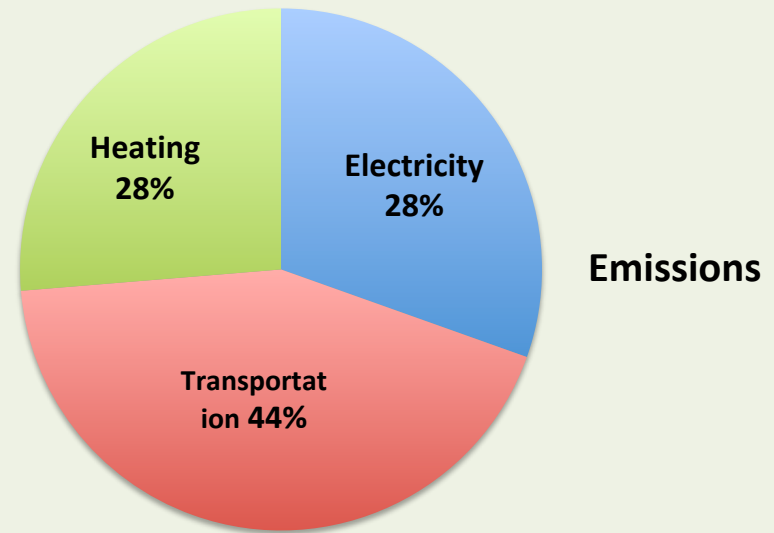
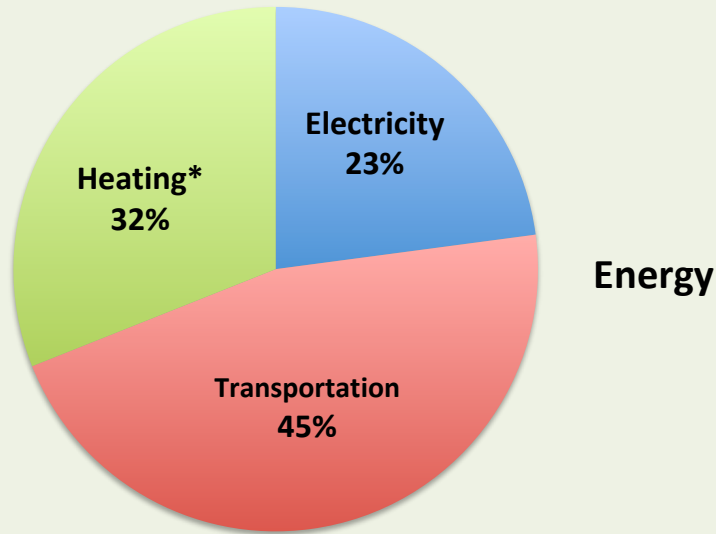
Working Group Accomplishments

- **Established a 2018 energy use and greenhouse gas (GHG) baseline for Martha's Vineyard**
- **Updated and codified this progress measurement approach for 2019 and beyond**
- **Created a detailed model of the Island energy system**
- **Developed and published working papers in three key sectors**
 - **Transportation**
 - **Building heating and cooling**
 - **Electricity supply and use**
- **Developed an initial set of recommendations at the town and regional level**

Energy System Transformation Goals

- **Reduce fossil fuel use on the Island, from a 2018 baseline:**
 - 50% by 2030
 - 100% by 2040
- **Increase the fraction of our electricity use that is renewable:**
 - To 50% by 2030
 - To 100% by 2040
- **Ensure that our energy supply is both adequate and resilient in response to the impacts of climate change**

Energy Use and Carbon Emissions as of 2018



	Million gallons
Transportation	
Gasoline	7.23
Diesel	3.02
SSA Marine diesel	1.46
MVY Jet fuel	0.70
MVY Aviation gas	0.09

	Millions gallons
Buildings	
Fuel Oil	2.49
Propane	7.88

← **Fossil Fuel Use** ↑

* Includes cooking, etc.

Transformation Strategy

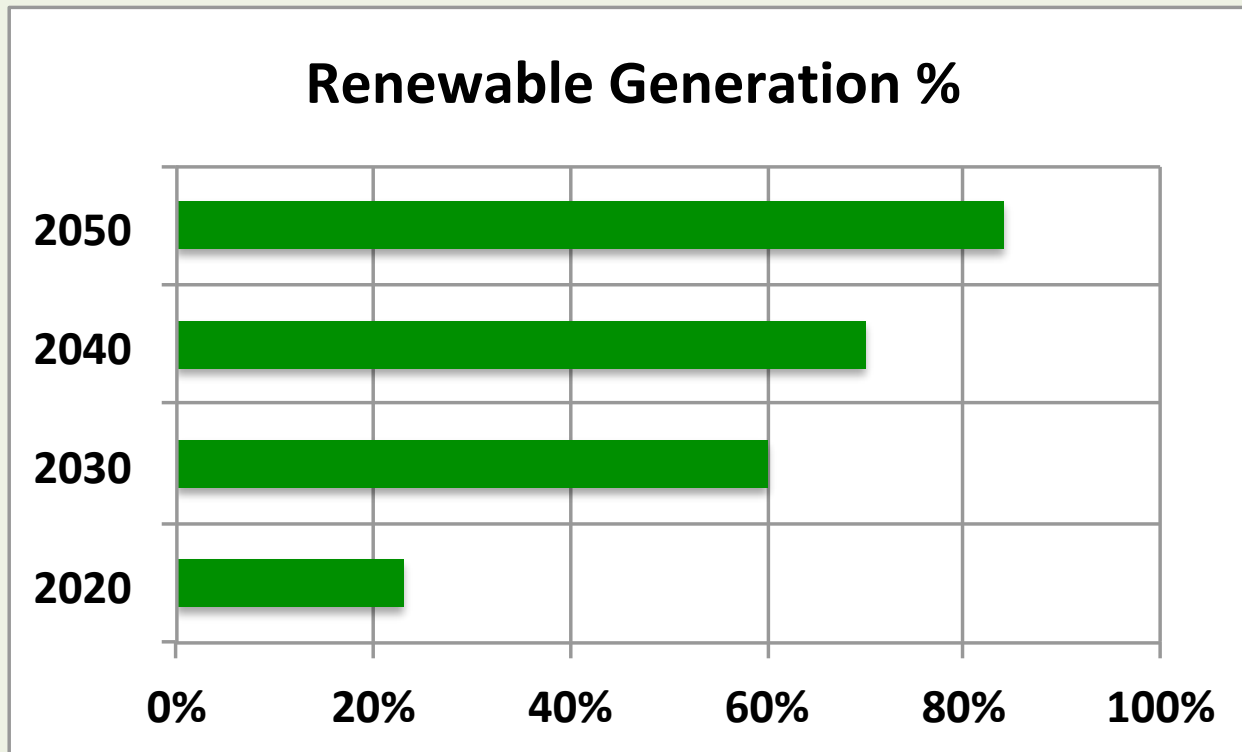
- Electrify all end uses of energy
- Make both imported and on-Island electricity renewable
- Increase resilience of supply and distribution

“Green the Grid”



Greening the Grid

Under current state mandates:



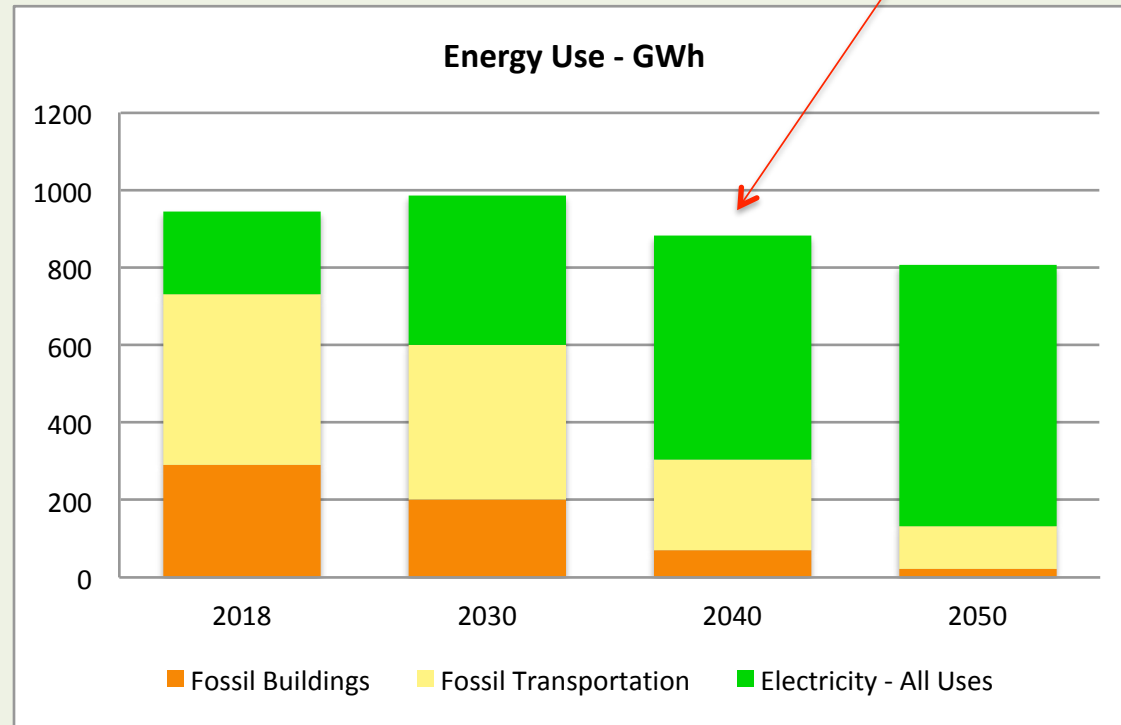
The Economics of Electrification

- **Electric vehicles**
 - 30+ models available today, many more in near future
 - Life cycle costs are significantly lower than fossil-fuel vehicles (energy cost, maintenance)
- **Building heating and cooling**
 - ASHPs already have lower capital cost than fossil fuels for new construction, and have equivalent service life
 - Lower energy costs by 40% v. propane
 - Many options for retrofits
- **Heat pump water heaters**
 - For a family of four, an energy savings of more than \$350/year
 - Initial cost ~\$1100 v. ~\$300 for conventional
 - Payback time of 3+ years
- **Solar PV systems pay back in 4 – 5 years (25 year life)**

Island Energy Model Base Case*

* Current statutes and policies, current market forecasts

*Electricity use 2.7X;
total energy use lower
by 7%*

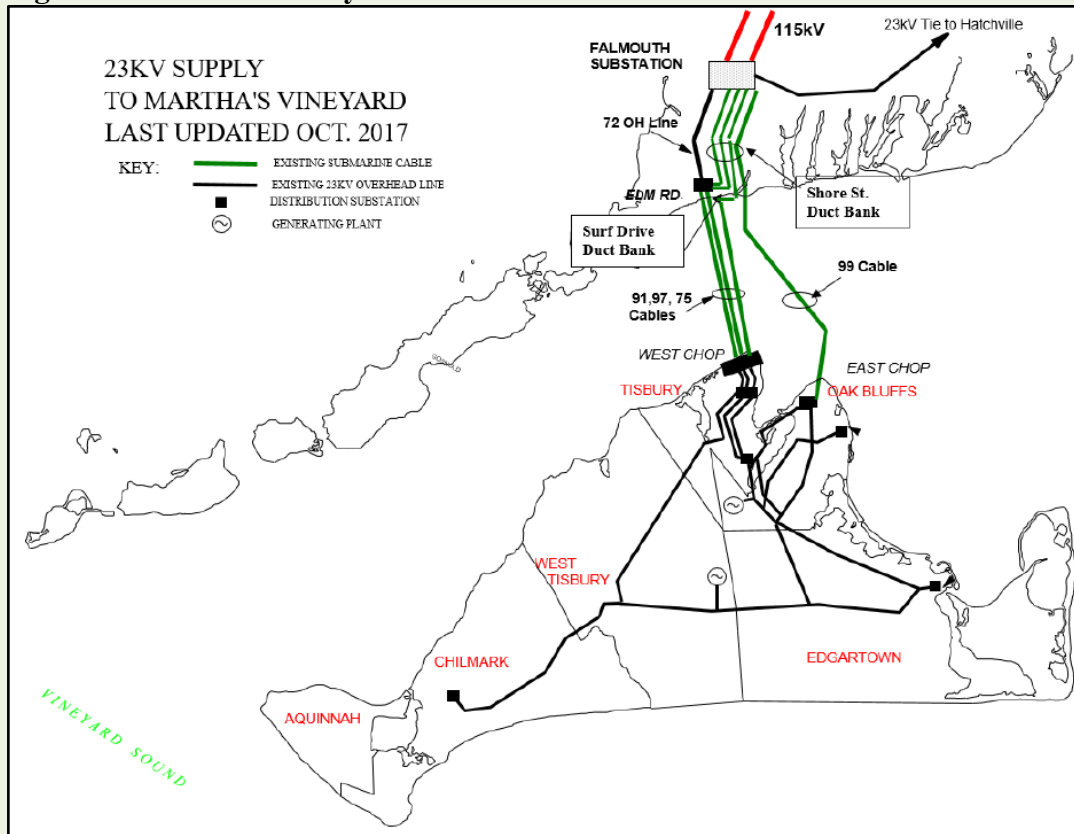


*Fossil fuel reduction: 21% by 2030
59% by 2040*

*Electricity renewable fraction: 60% by 2030
70% by 2040*

The Island Grid Today

Figure 2. Martha's Vineyard 23 kV Distribution Facilities

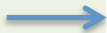


Source: Exh. EV-1, at 13.

- We interconnect to the mainland via 4 submarine cables
- The cables are near capacity today
- By 2030, our needs will increase by ~60%
- 3 of the cables are near or beyond their design life

The Future Island Grid : Robust and Resilient

- **Upgrades in power supply**
 - Additional cables of higher capacity
 - Upgraded shore infrastructure – both sides
 - Increased on-Island solar generation + storage
- **Upgrades for resilience**
 - Smart metering and control (grid IT infrastructure)
 - Microgrid build out for critical services by 2026
 - Strengthened distribution infrastructure
 - Underground distribution for vulnerable areas



On-Island Solar Generation (percent of total load)	
2018	7.7%
2019	9.1%
2030 (goal)	18%
2040 (goal)	25%

Key Takeaways

- **Market forces favor electrification, but we need to accelerate the process**
- **As we do this, the Eversource grid will be challenged**
 - Supply capability must more than double by 2040
 - The on-Island infrastructure needs to be strengthened for resilience
- **What do we need to do?**
 - Education and outreach
 - Policy evolution
 - Projects, at both the town and Island level
 - Partnerships - collaboration with Eversource, CLC/CVEC, Vineyard Power, and the SSA