

Electrifying Transportation: Testing the 2030/2040 Goals

Tom Soldini

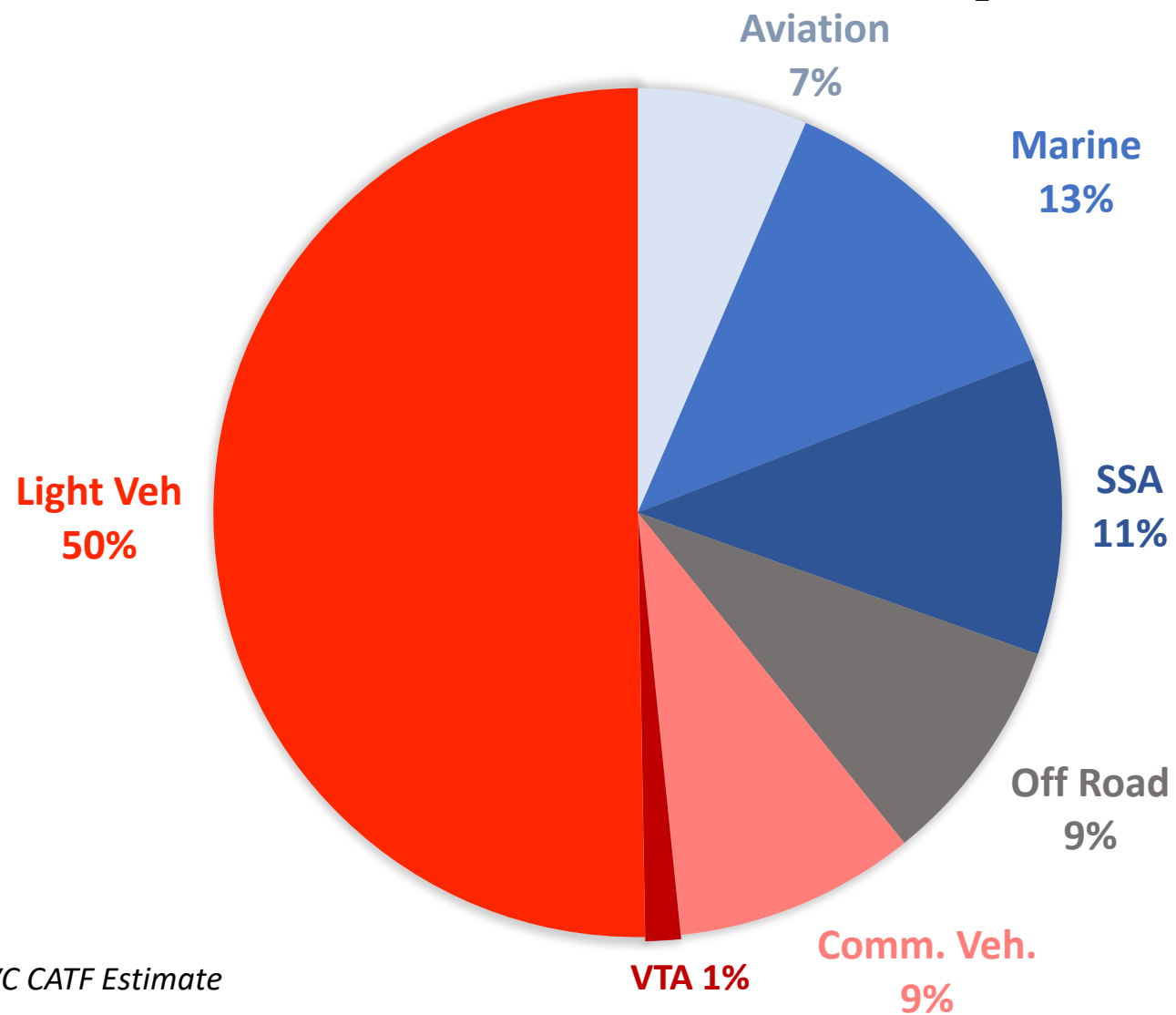
Alan Strahler

Today's Agenda

- MV Transportation in 2018
- Possibilities and Challenges by Sector
- The *Very Optimistic* Scenario
- Conclusions

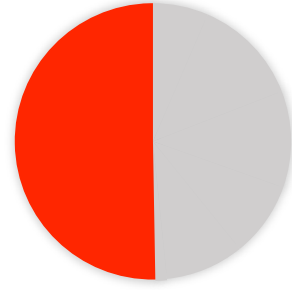
MV CO₂ Emissions from Transportation in 2018

Total = 115,792 Metric Tonnes CO₂



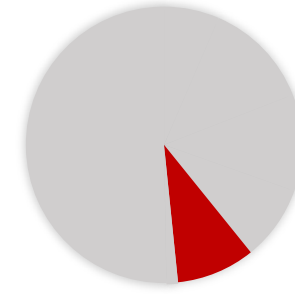
Source: MVC CATF Estimate

Possibilities and Challenges Light Vehicles



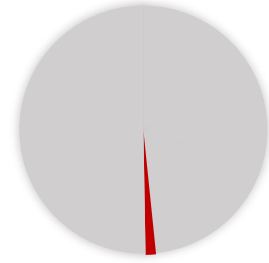
- EV automobiles are viable today for many driving applications
 - Should be almost fully competitive in cost and range by 2022-24
 - Light trucks follow by 2-3 years
- “Range anxiety” and access to charging will be main impediments in near term
 - MV needs a public charging strategy for visitors and multi-tenant residences
- Average age of light vehicle in USA = 12 years old
- Education, Experience, Ease of Access are needed to overcome discomfort with new technology

Possibilities and Challenges Commercial Vehicles



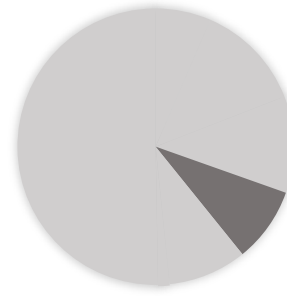
- Early production models of box trucks available today
 - Commitments by UPS, Amazon, FedEx for large scale purchases
- Prototypes of heavy trucks in market today with commercial plans underway.
- High buyer concentration on Martha's Vineyard
 - Education task becomes less daunting
- Charging availability is key to acceptance
 - Large fleet charging facilities could tax electric grid if not anticipated
 - Shared inductive charging stations could be helpful on MV

Possibilities and Challenges Mass Transit



- VTA is implementing plan to go 100% EV by 2027
 - Currently 12 Electric buses operating
 - Inductive charging stations needed for longer runs
- Can VTA system be expanded long term?
- Can school bus system be electrified by 2030?

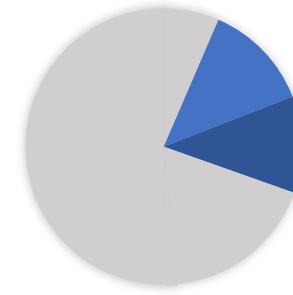
Possibilities and Challenges Off-Road Vehicles



- ORVs are a diverse collection of working vehicles:
 - Excavators, loaders, farm tractors, garden tractors, transporters, UTVs, and ATVs
 - Challenging education and awareness task
- All of these are available in early electric versions in smaller, lighter sizes, but penetration is low.
- Charging is an issue, as equipment is often left at work sites.

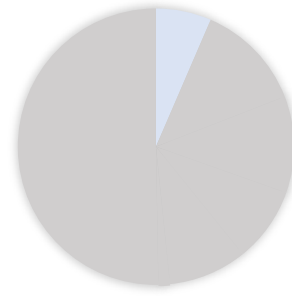
Possibilities and Challenges

Maritime



- Hybrid and battery electric ferries in use today in Scandinavia
 - Limits to range and/or capacity, but close to MV requirements
- Washington State Ferries commitment for all-hybrid by 2040
- Primary issue for SSA will be to raise large amount of capital
- Minimal industrial commitment to other maritime applications
- Lifecycles for recreational boats >30 years
- Alternative fuels and more efficient engines are probably best solution in next two decades

Possibilities and Challenges Aviation



- Most of fossil fuel consumed on MV is jet fuel
 - Not much industrial work in electrifying this performance category
- Cape Air has agreement to be lead customer to Eviation *Alice* electric plane
- Median age of small private prop aircraft ~ 40 years
- Alternative fuels and more efficient engines are probably best solution in next two decades

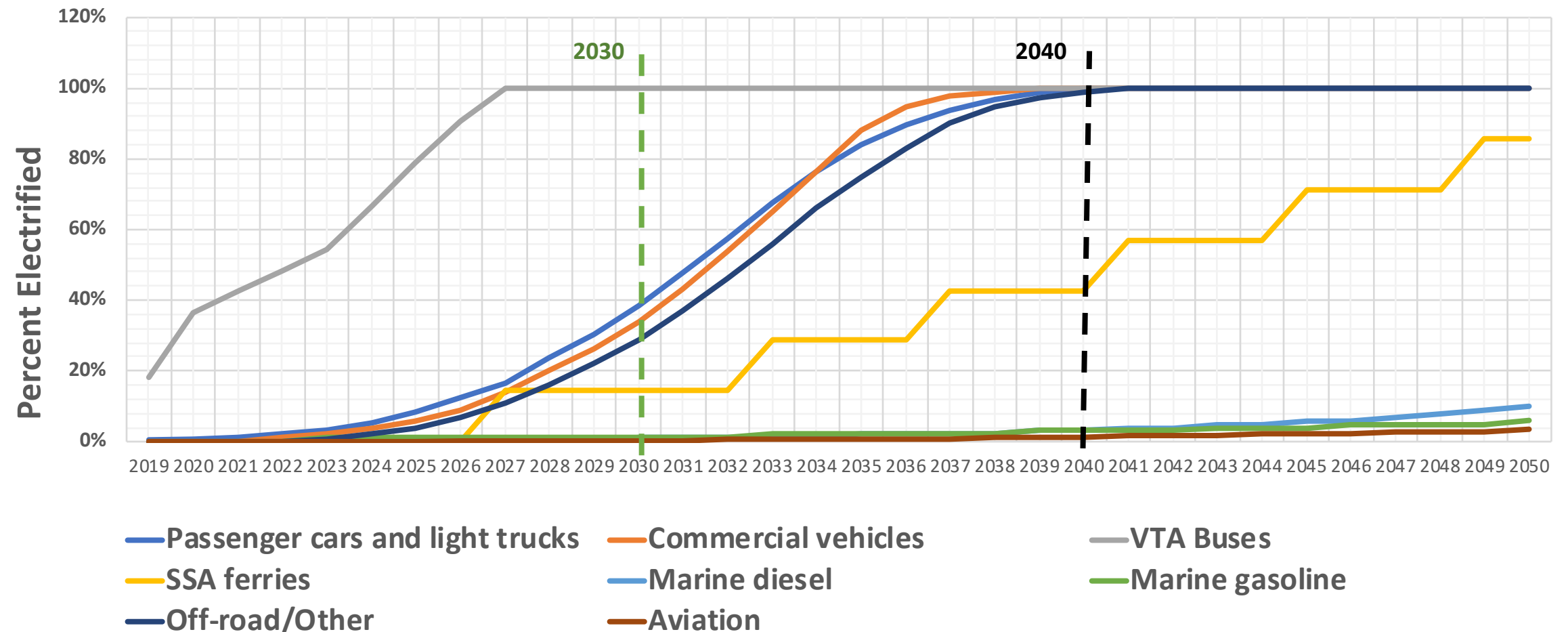
Goals and Scenarios

- Goal:
 - Renewable electric power: 50% by 2030, 100% by 2040
 - Replacing fossil fuels by electricity: 50% by 2030, 100% by 2040
- Possible scenarios include:
 - ***Business as Usual***: Island follows US or MA pathways and rates
 - ***Optimistic***: Island takes extra actions and moves more rapidly toward our energy goals
 - ***Very Optimistic***: Island takes more actions and moves rapidly enough to meet energy goals
- Starting with ***Very Optimistic***, to test the goal

“Very Optimistic” Scenario

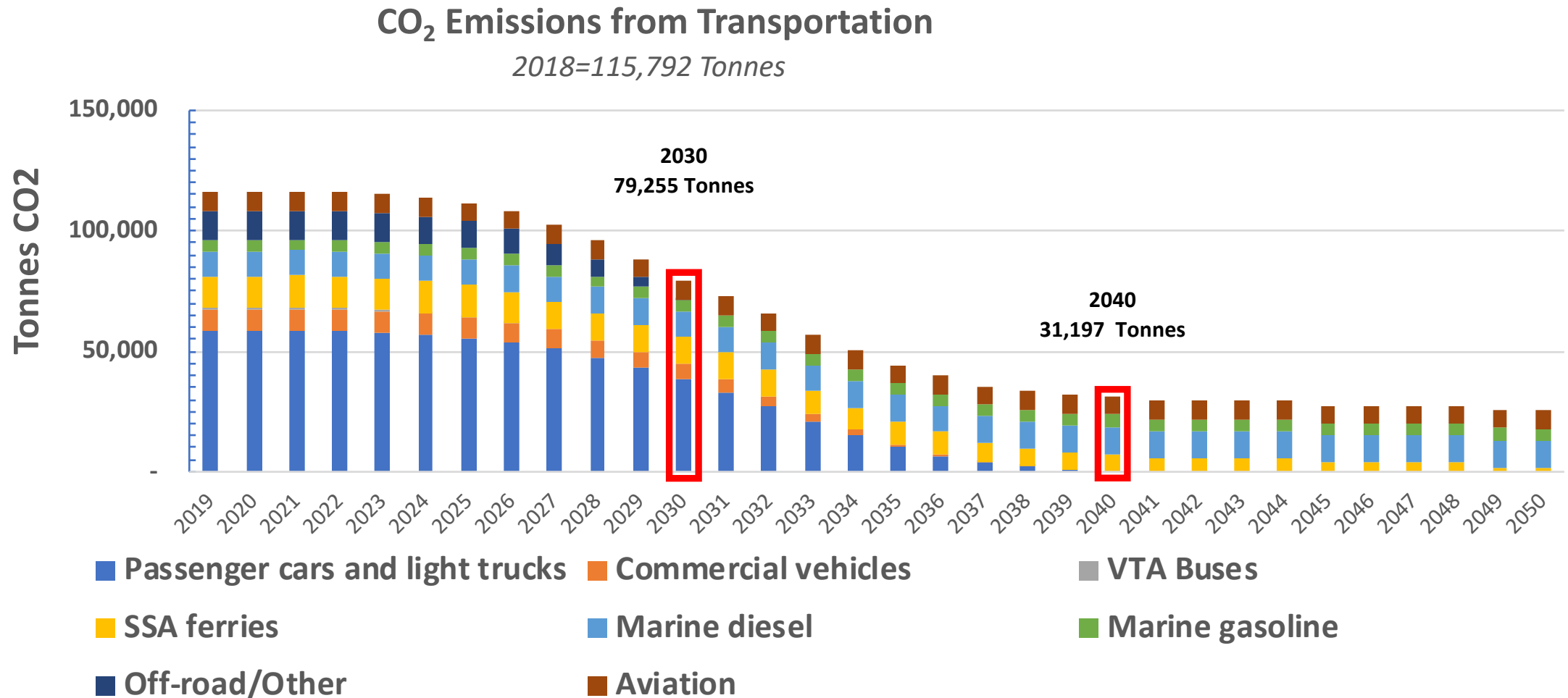
EV Penetration

Progress Toward Electrification (by Mode)



“Very Optimistic” Scenario

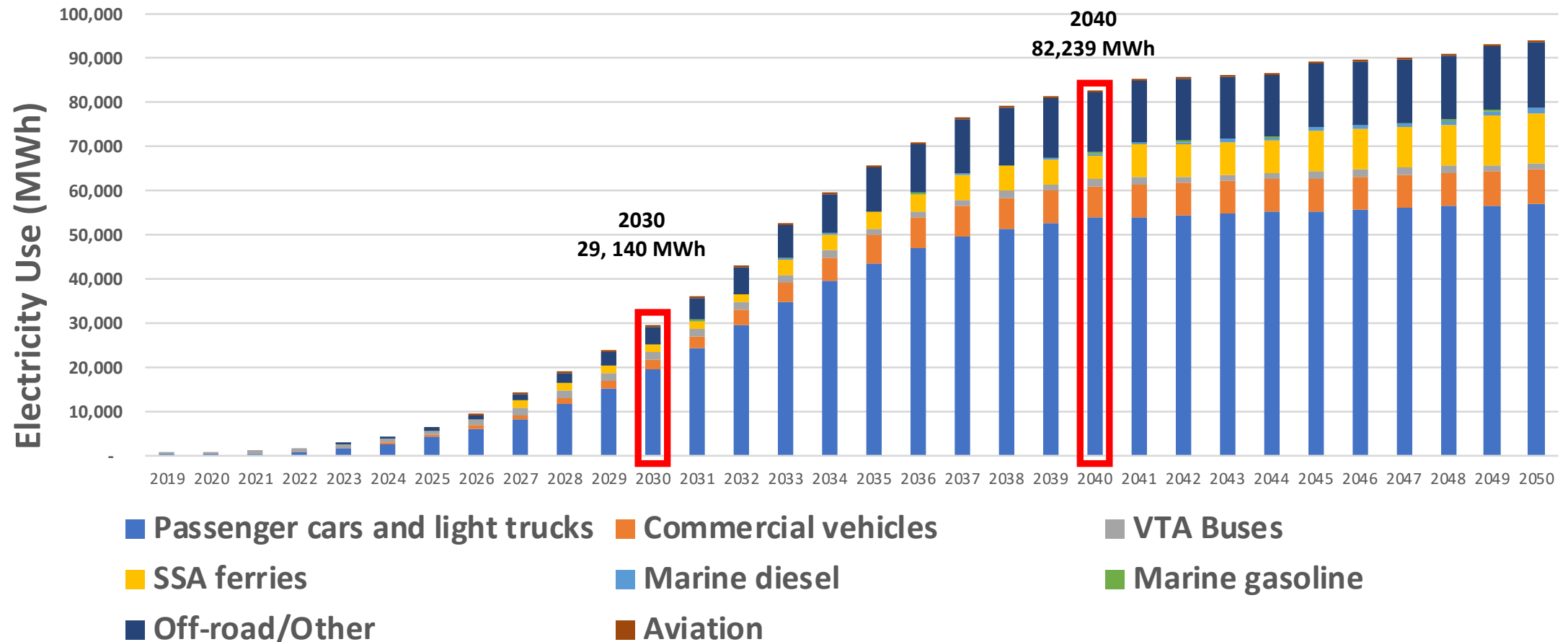
CO₂ Reduction



“Very Optimistic” Scenario

Increased Demand for Electricity

Electricity Used for Transportation



Conclusions:

- ***Global trends will mostly determine ability to rapidly reduce fossil fuel consumption***
 - Government and industrial commitment to reduce emissions
 - Progress on compelling low-emission vehicles, vessels, and aircraft
 - Global price of crude oil
 - The pace of global economic recovery
- ***Martha's Vineyard can be in front of the wave by doing the following:***
 - Education, education, education.
 - Reduce travel, and travel more efficiently
 - Provide local incentives to residents and visitors for EV usage.
 - Development of a strategy for public EV charging stations.
 - A commitment to invest in mass transit on land, and in the SSA.
 - Work with Eversource to prepare the Island electric grid.

Appendix

Assumptions for “Very Optimistic” Scenario

- Population growth of 0.6% per year, driving transportation demand by a similar percentage.
- Constant transportation miles travelled per capita per year.
- Continued global industrialization of electric vehicles/vessels for all modes of transportation.
- Commitments by governments and industries to continue or accelerate incentives for some period of transition time.
- No significant breakthrough in electric aviation for large commercial passenger airplanes.
- Eversource evolves the Island electric grid to meet the new demand for electric transportation.
- Continually increasing availability of electrical capacity from renewable sources, including offshore wind and Island-based solar.

“Very Optimistic” Scenario

EV Penetration

Sector	2030 % Electrified	2040 % Electrified
Light Vehicles	38%	100%
Commercial Vehicles	34%	100%
Mass Transit	100%	100%
Off-Road	29%	100%
Maritime	SSA – 14% Other Maritime – 1%	SSA – 34% Other Maritime – 3%
Aviation	<1%	1%