

State goals and analysis of future solar development

Addison County RPC

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Comprehensive Energy Plan

Why create it?

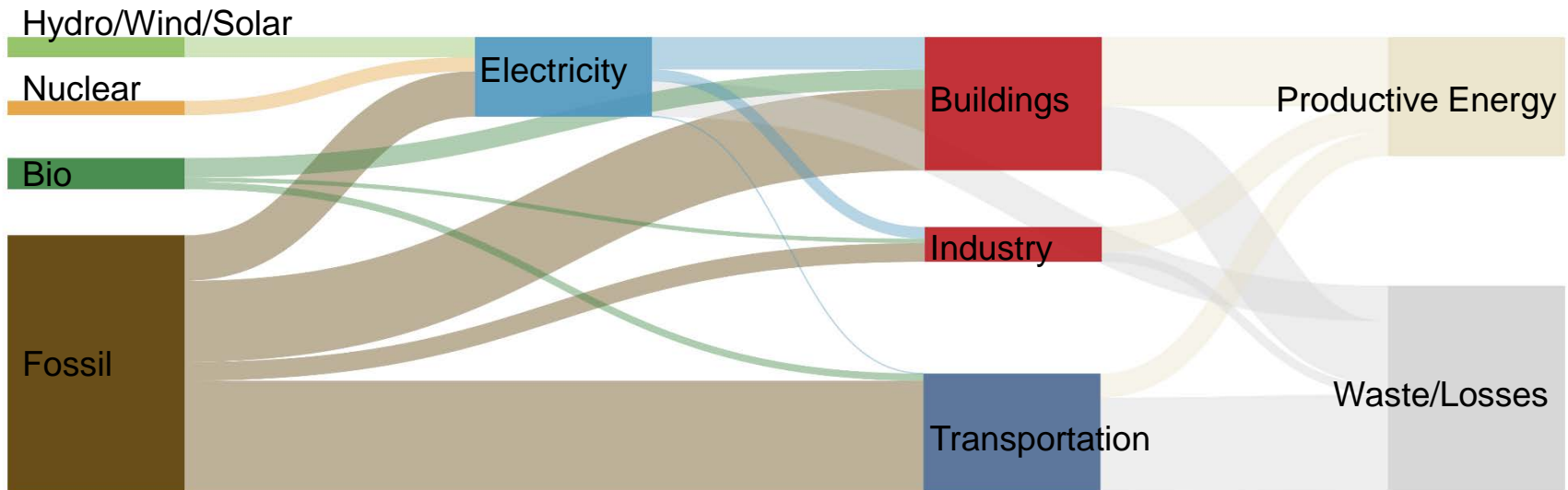
Title 30, Section 202a:

To assure, to the greatest extent practicable, that Vermont can meet its energy service needs:

- In a manner that is **adequate, reliable, secure and sustainable**
- Assuring **affordability** and encouraging the state's **economic vitality**
- **Using** energy resources **efficiently** and managing demands cost effectively
- Employing **environmentally sound** practices

Recommendations based upon all state law on the subject: e.g., GHG reduction goals, renewable energy goals

Energy Flows: 2015



Renewable % today, by service:

- Heat: 20%
- Mobility: 6%
- Power: 45%

Overall: 16% renewable

Guiding goals

- ❖ **A vibrant and equitable economy**
- ❖ **Healthy ecosystems and a sustainable environment**
- ❖ **Healthy Vermonters**

Economic, environmental, and human health ideals can be in conflict and implementation of a particular policy or program requires striking balances.

When there is consistency and an action positively impacts all of these areas, it deserves greater priority.

Goals for 2025 and beyond

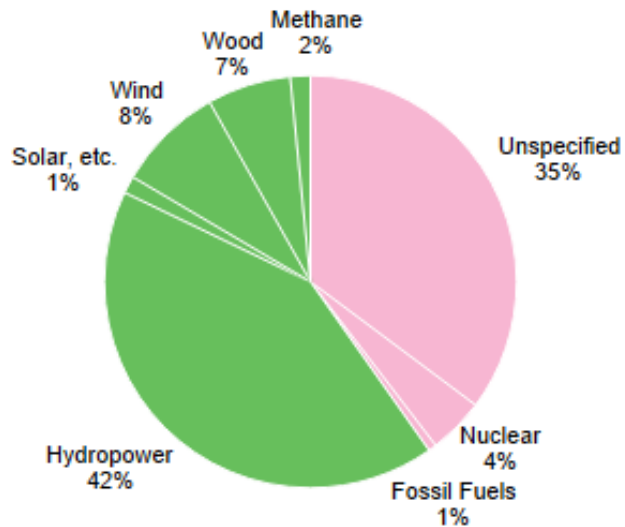
- Reduce total energy consumption per capita by 15% by 2025, and by more than one third by 2050.
- Meet 25% of the remaining energy need from renewable sources by 2025, 40% by 2035, and 90% by 2050.

Renewable Energy Standard

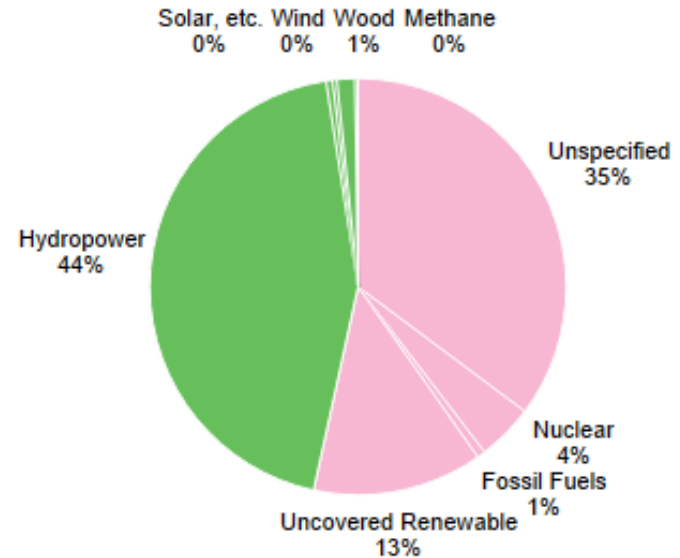
- **Tier 1:**
 - **55% renewable in 2017, rising to 75% in 2032**
- **Tier 2:**
 - **New distributed generation (< 5 MW) online after 7/1/2015**
 - **1% in 2017, rising to 10% in 2032**
- **Tier 3:**
 - **Energy transformation (reduction in fossil fuel use)**
 - **Likely to result in increased electric sales**

2014 Electric Portfolio

Without Adjustments for REC Holdings

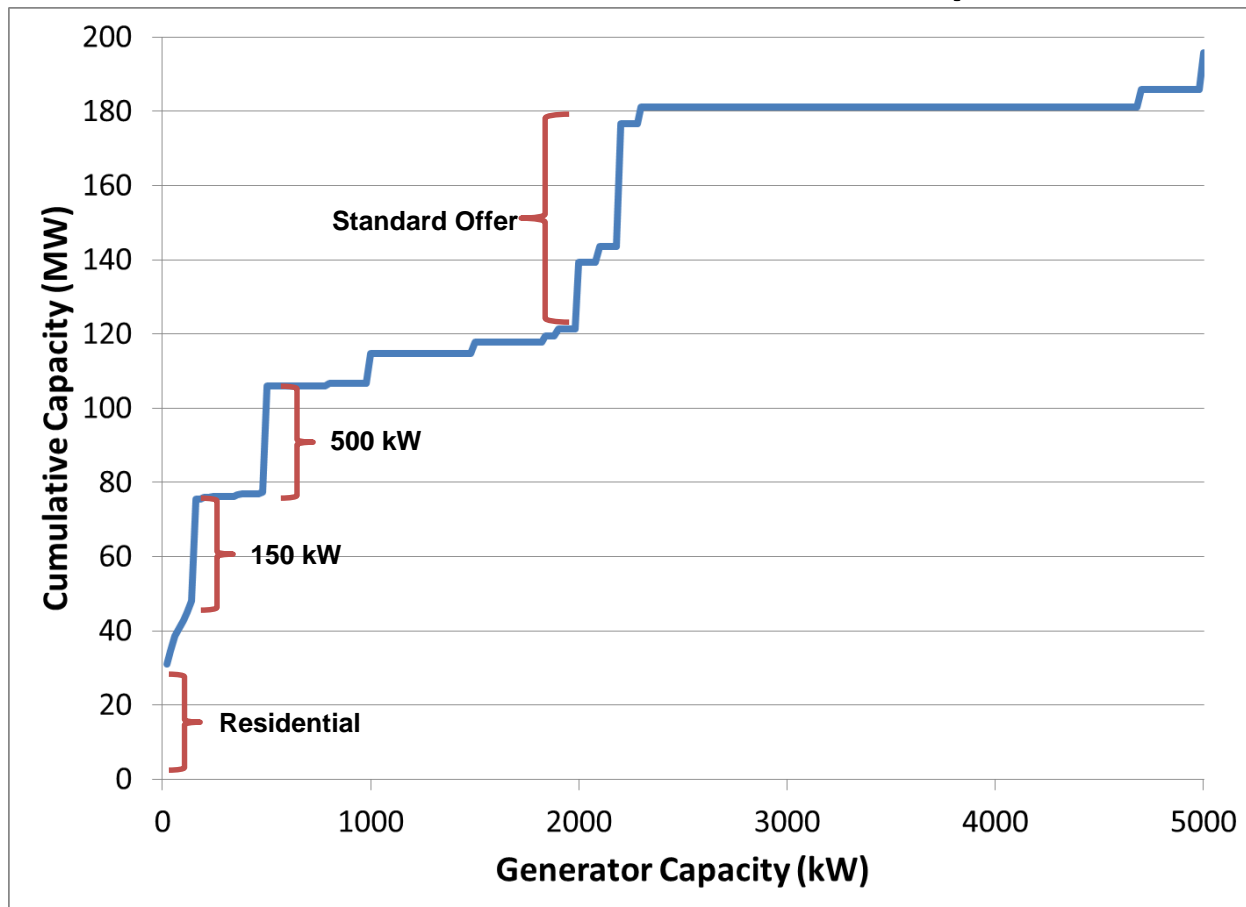


With Adjustments for REC Holdings



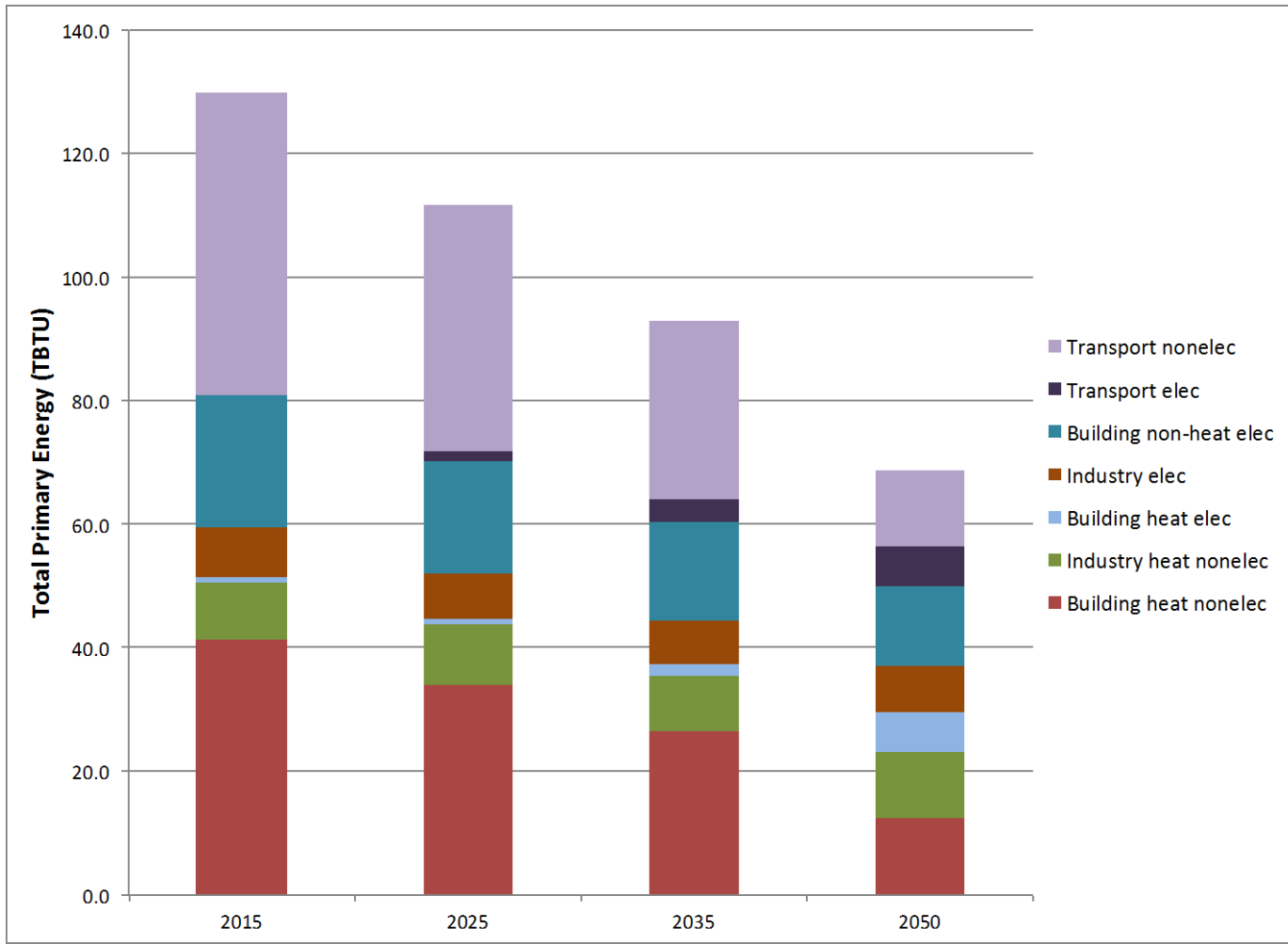
Solar today

- ~ 120 MW built, and 75 MW in process

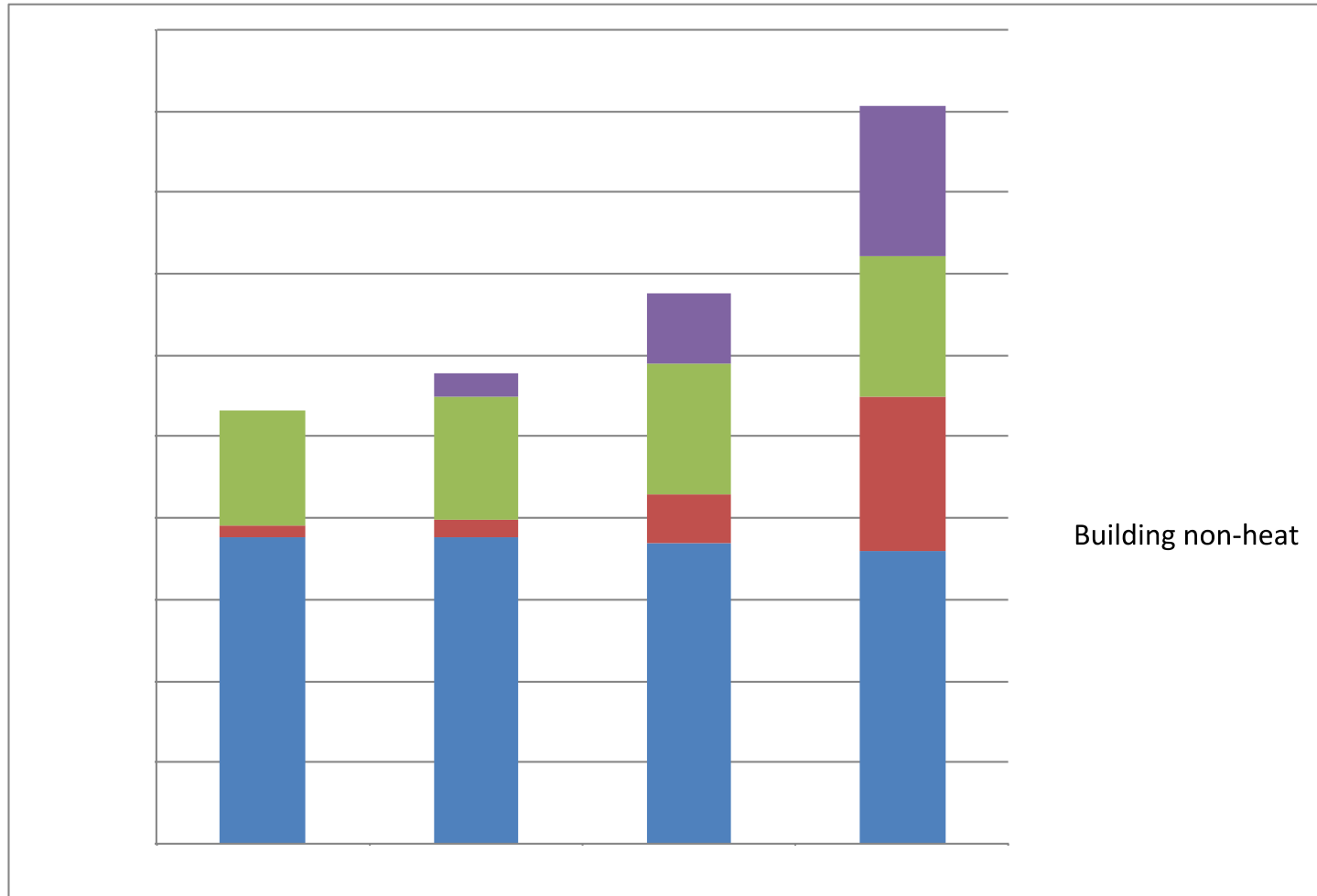


Insights from modeling: Total energy

Total Energy Study showed that 90% by 2050 is both affordable and achievable.



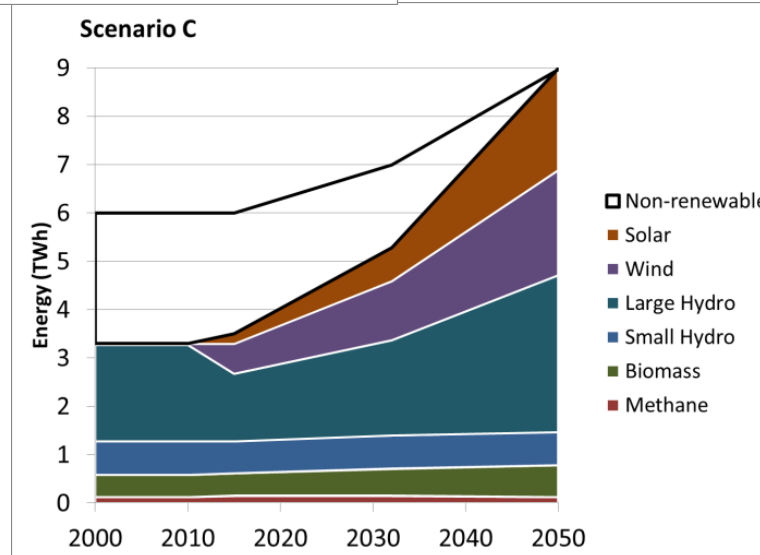
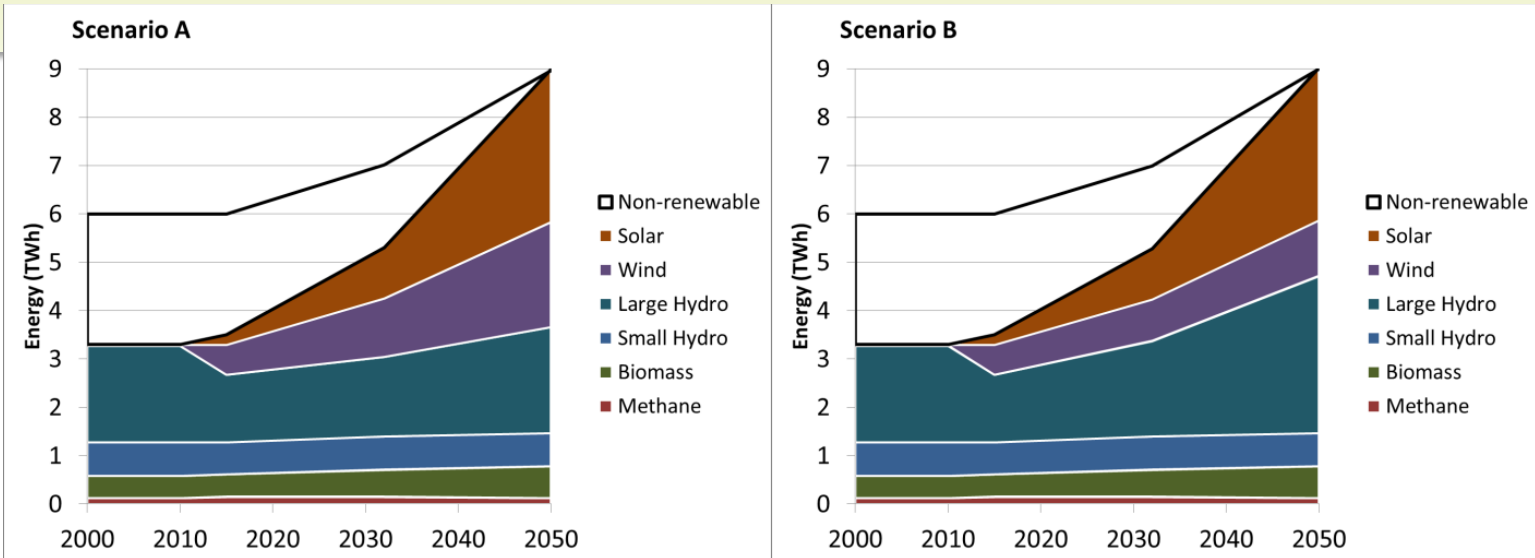
Insights from modeling: Electric demand growth



3 scenarios for 9 TWh of renewable electricity in 2050

Fuel	Scenarios: MW of Generation Capacity		
	A	B	C
Solar	2250	2250	1500
Wind	750	400	750
Methane	15	15	15
Biomass	100	100	100
Sm. Hydro	175	175	175
Lg. Hydro	250	370	370

3 scenarios continued



Solar land use in 3 scenarios

- Assume 7 acres per MW
 - this will shrink over time as modules become more efficient
- In 2032, scenarios have 500-750 MW of solar PV
 - Assume 200-250 MW on structures
 - Remaining land use:
 - 300 MW → 2000 acres
 - 500 MW → 3500 acres
- In 2050, scenarios have 1500-2250 MW of solar PV
 - Assume 350 MW on structures
 - Remaining land use:
 - 1150 MW → 8000 acres
 - 1900 MW → 13,000 acres
- Currently about 1,000 acres, so pace of 7-12,000 more acres, over 35 years → 200 to 350 acres per year

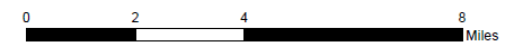
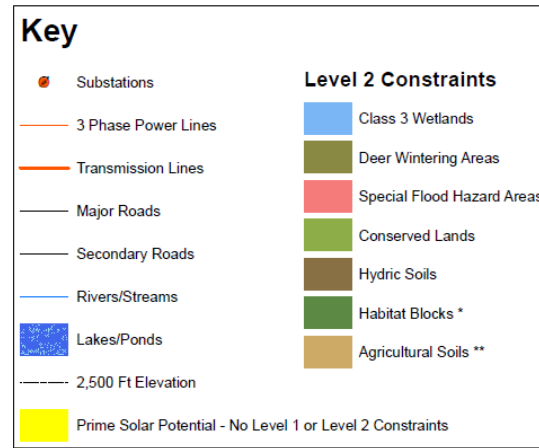
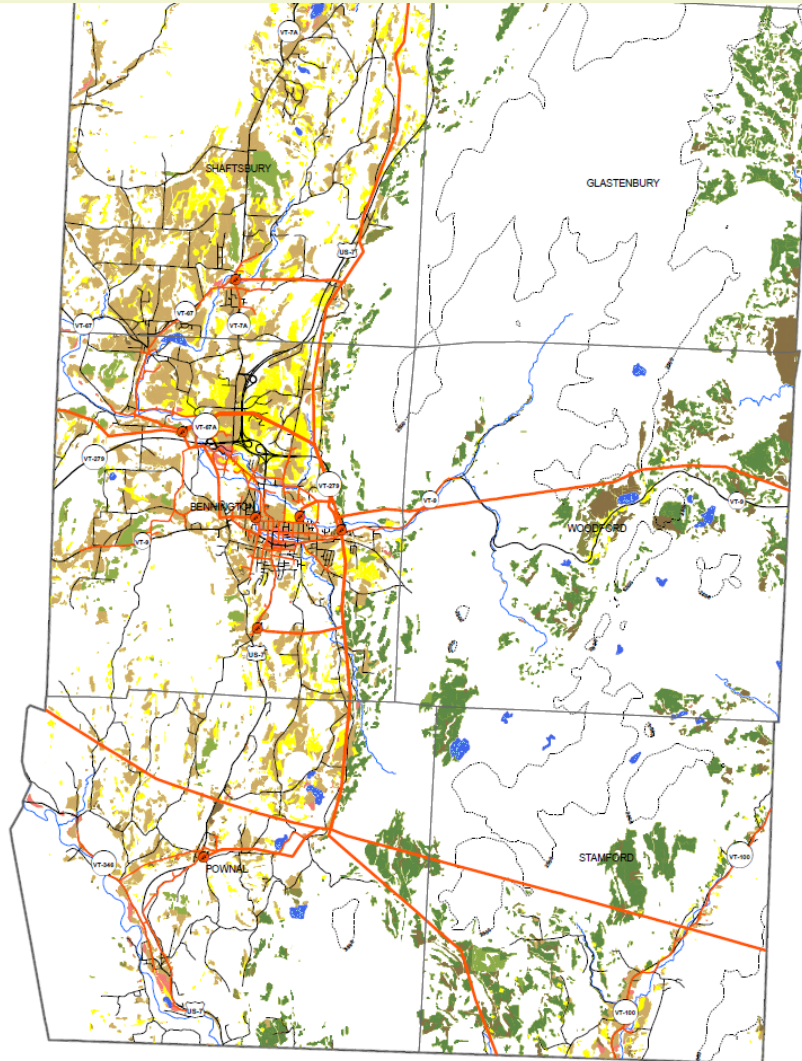
How big is what?

- Vermont has 5.9 million acres of land
 - Divided into 255 towns, cities, villages and gores that average 23,137 acres
- Vermont has an estimated 160 million sq. ft. of commercial buildings
 - About 3,650 acres
- 14,266 miles of road, 25 feet wide, is 43,200 acres
- “Prime ag” soils: 381,000 acres
 - “Statewide” soils: 961,000 acres
- Neighbor comparison: Massachusetts
 - 5 million acres
 - 923 MW of solar PV deployed
 - 6400 acres if 7 acres/MW

RPC land use mapping to date

- RPC project has measured that statewide there are 342,480 acres that have no:
 - FEMA floodways, river corridors, federal wilderness areas, rare and irreplaceable natural areas (RINAs), vernal pools, class 1, 2, and 3 wetlands, deer wintering areas, special flood hazard areas, conserved lands, hydric soils, habitat blocks > 2,000 acres, or local, prime or statewide-classified agricultural soils
- In 3 RPCs where analysis is complete, 33,350 acres (or 42% of the above limited area) is within 1 mile of a 3 phase power line
- Just the 14 towns in Bennington RPC have more than 14,500 acres with no level 1 or level 2 constraints.

Bennington area example



Level 2 Constraint Description

* Habitat Blocks only includes areas of 2,000 acres or greater of contiguous forest and other natural habitats that are unfragmented by roads, development, or agriculture.

** Agricultural Soils include local, prime and statewide classifications.

This map was created as part of a Regional Energy Planning Initiative being conducted by the Bennington County Regional Commission, Northwest Vermont Regional Planning Commission, Two Rivers-Ottawaquechee Regional Commission, and the Vermont Public Service Department.