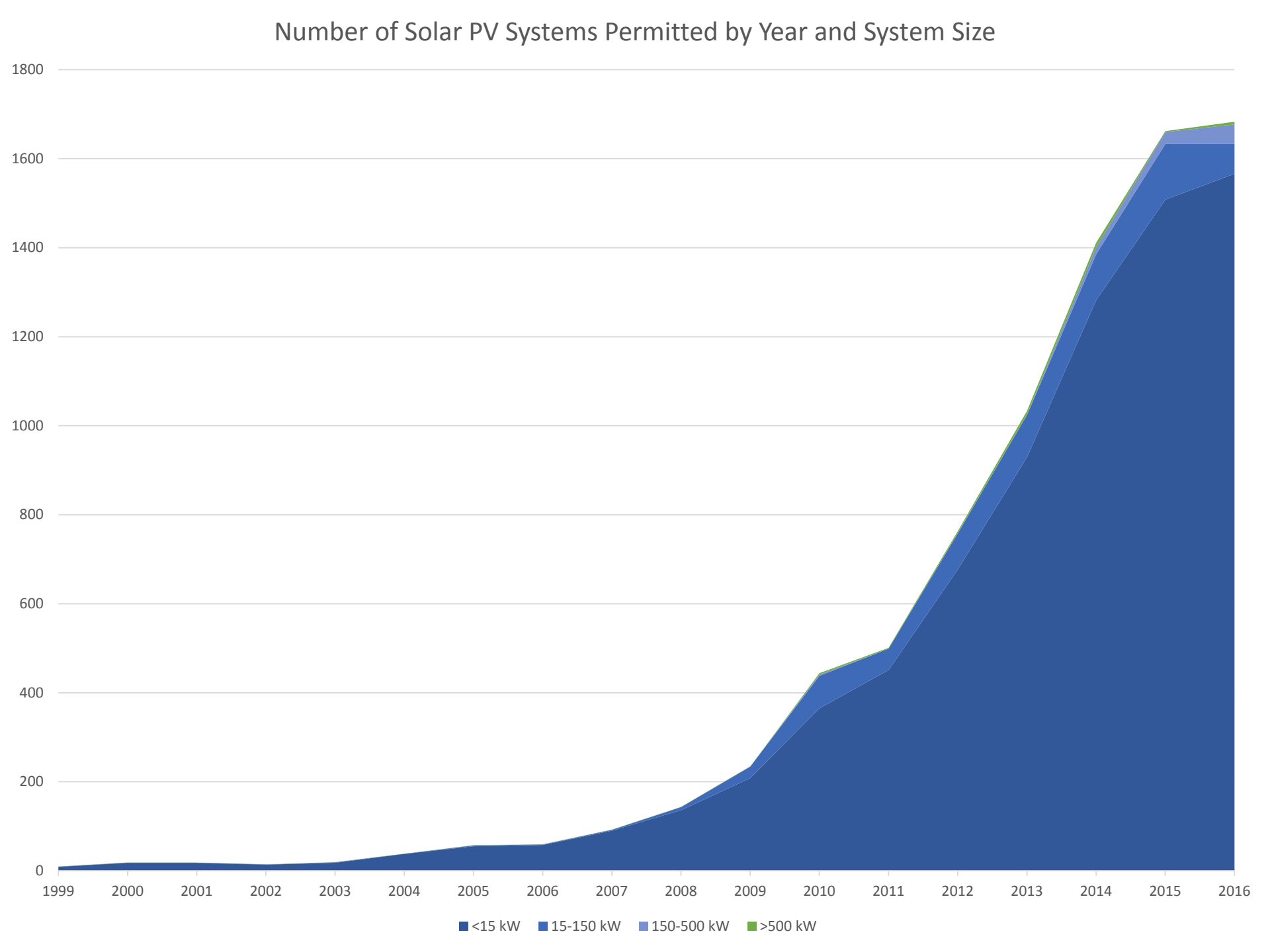
The Next Generation of Solar in Vermont

VT Department of Public Service


Number of Solar PV Systems Permitted by Year and System Size
1800
1600
1400
1200
1000
800
600
400
200
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
<15 kW
15-150 kW
150-500 kW
>500 kW

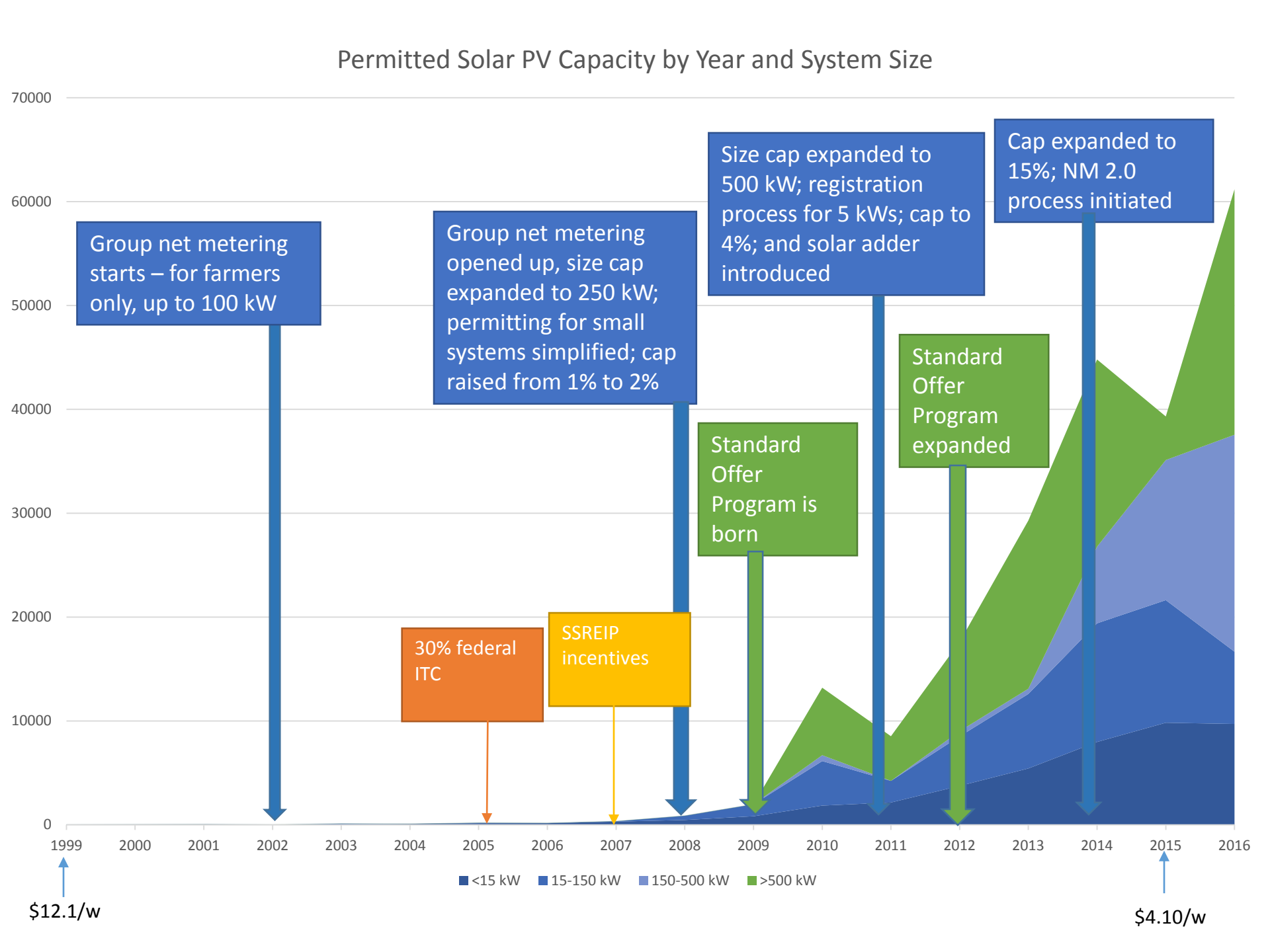
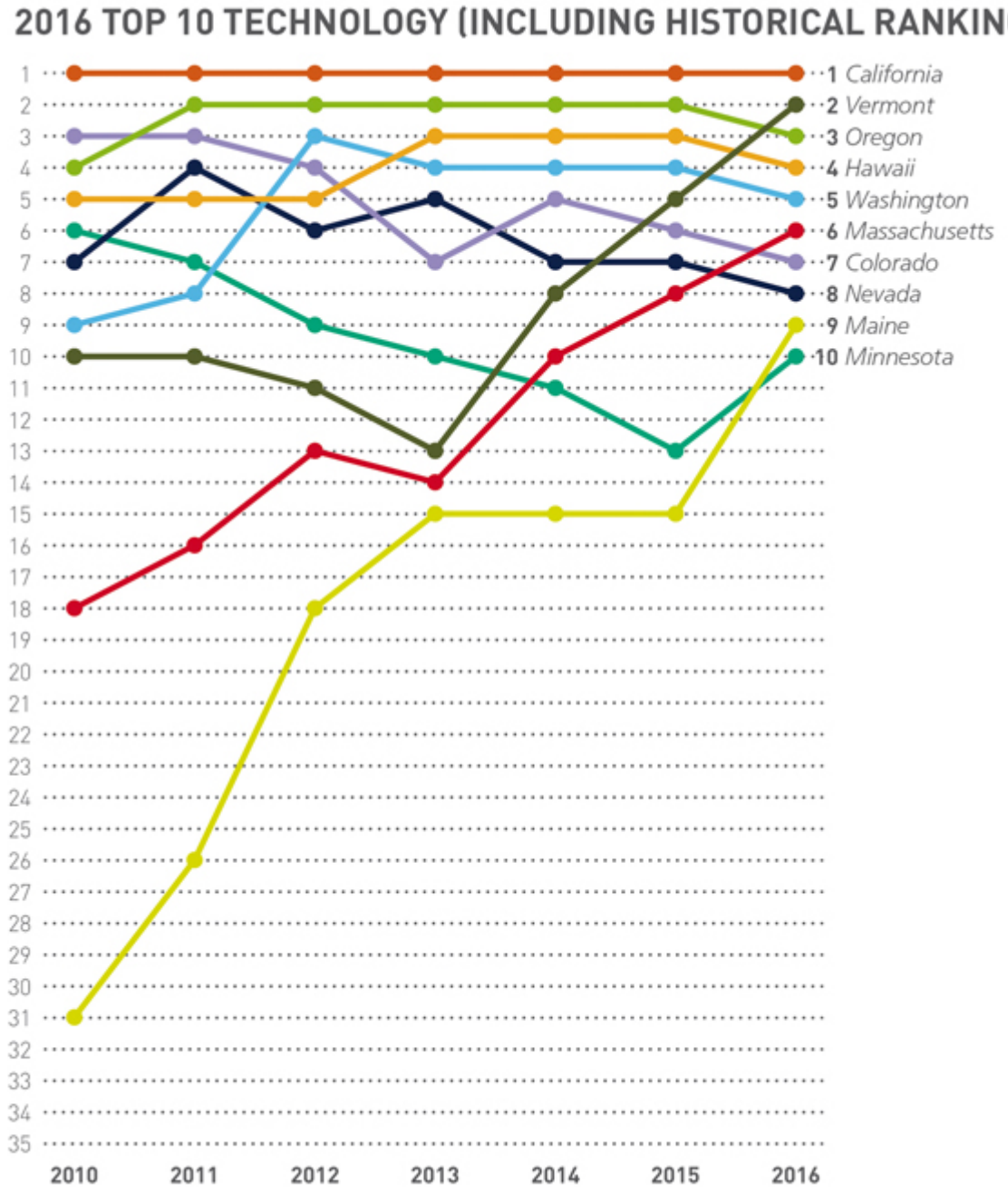

Permitted Solar PV Capacity by Year and System Size
70000
60000
50000
40000
30000
20000
10000
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
Group net metering starts – for farmers only, up to 100 kW
Group net metering opened up, size cap expanded to 250 kW; permitting for small systems simplified; cap raised from 1% to 2%
Size cap expanded to 500 kW; registration process for 5 kWs; cap to 4%; and solar adder introduced
Cap expanded to 15%; NM 2.0 process initiated
Standard Offer Program is born
Standard Offer Program expanded
30% federal ITC
SSREIP incentives
<15 kW
15-150 kW
150-500 kW
>500 kW
$12.1/w
$4.10/w

Table ES-1. Solar Electric Capacity in the Top 10 Solar States (ranked by cumulative capacity per resident; data from Solar Energy Industries Association/GTM Research's *U.S. Solar Market Insight*)

State	Cumulative Solar Electric Capacity per Capita 2015 (watts/person)	2015 Rank	2014 Rank
Nevada	421	1	3
Hawaii	394	2	1
California	338	3	4
Arizona	337	4	2
North Carolina	208	5	9
New Jersey	182	6	5
Vermont	181	7	7
New Mexico	175	8	6
Massachusetts	153	9	8
Colorado	99	10	10

VT rose from 10th place in 2010 (6.4 watts/person) to 7th place in 2015 (181 watts/person)

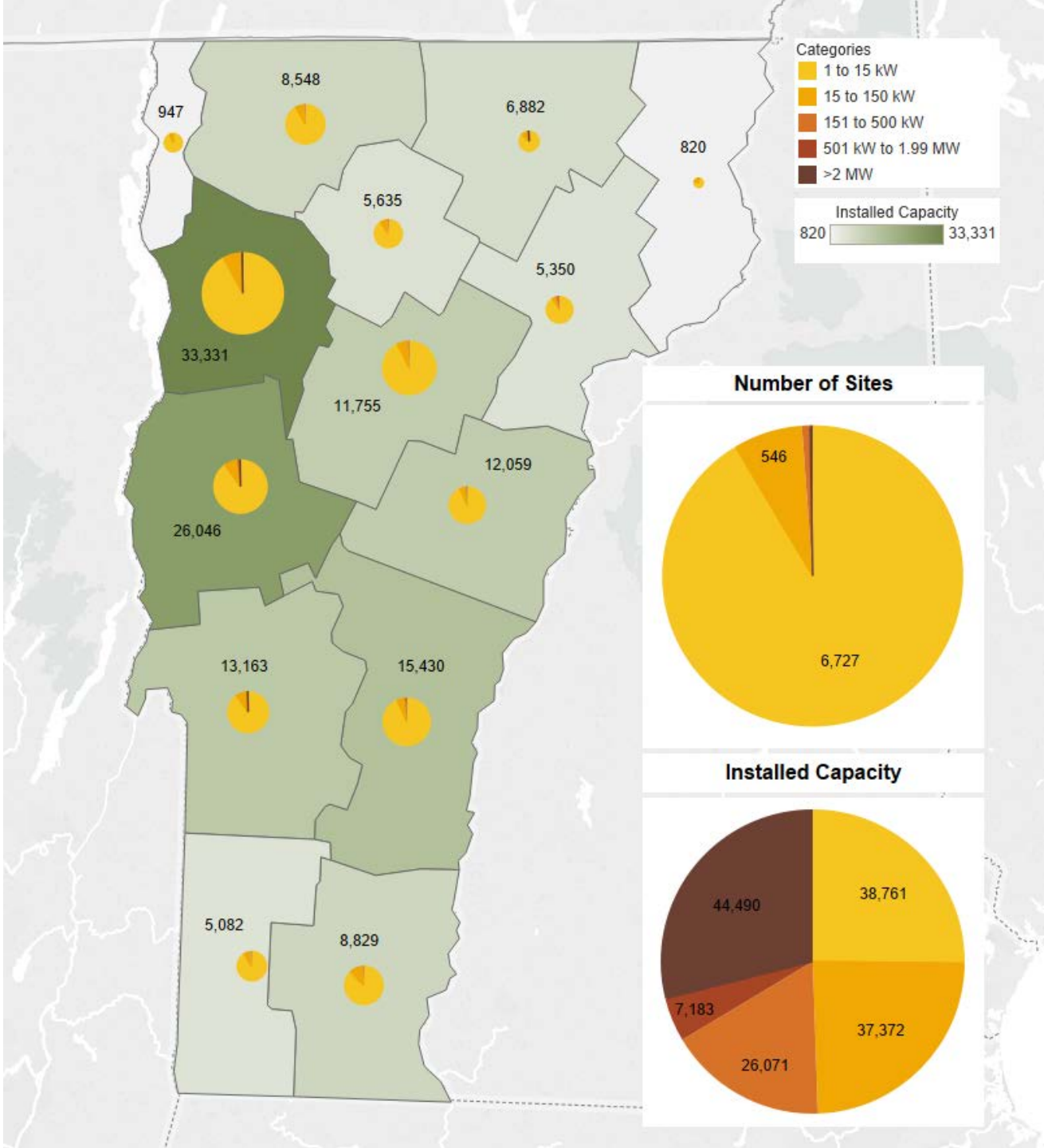
Source: *Lighting the Way IV*, Environment America



VT rose from 10th place in 2010 to 2nd place in 2016 in the Clean Technology category (clean energy, clean transportation, and energy intelligence & green building)

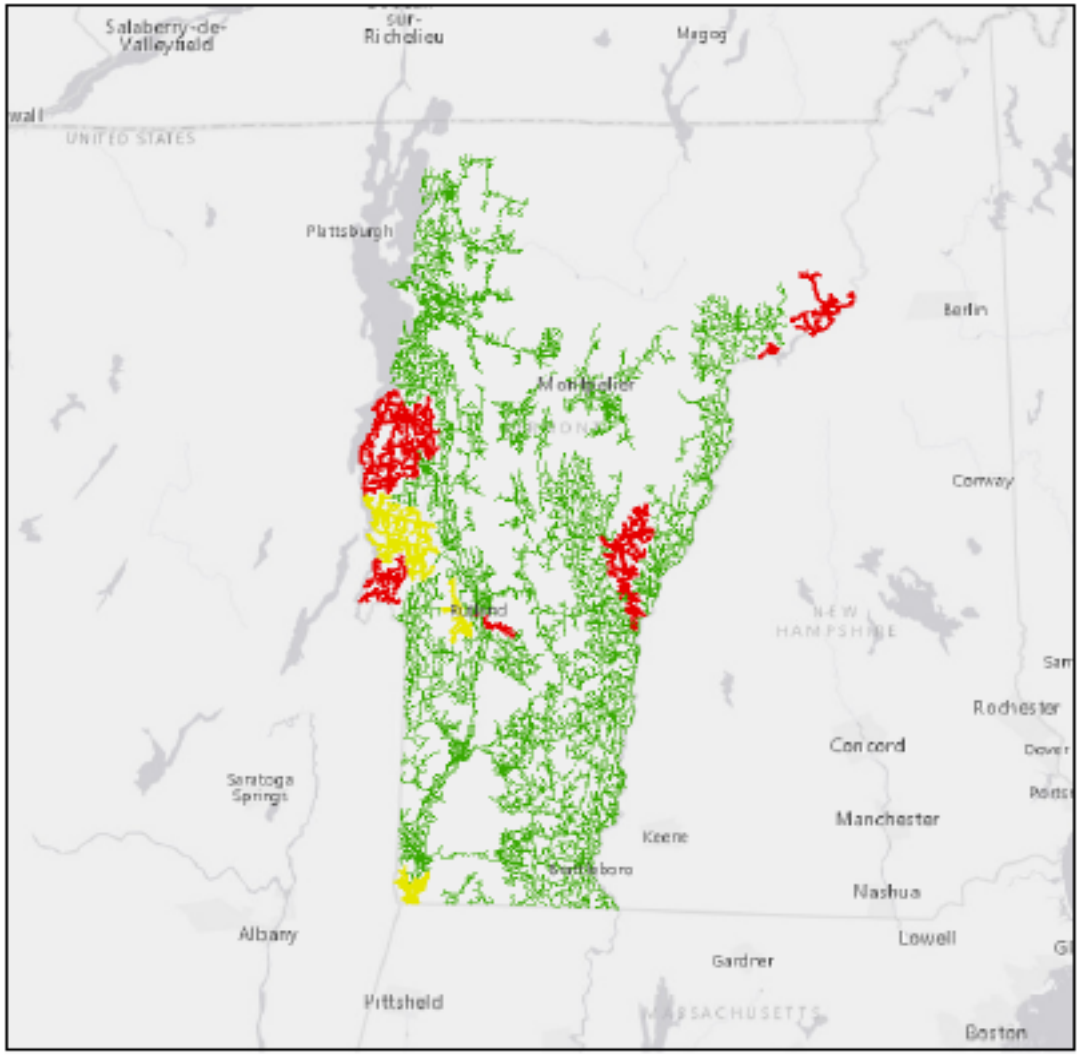
Source: *U.S. Clean Tech Leadership Index*, Clean Edge, Inc.

VT Solar PV Sites & Capacity (by County)



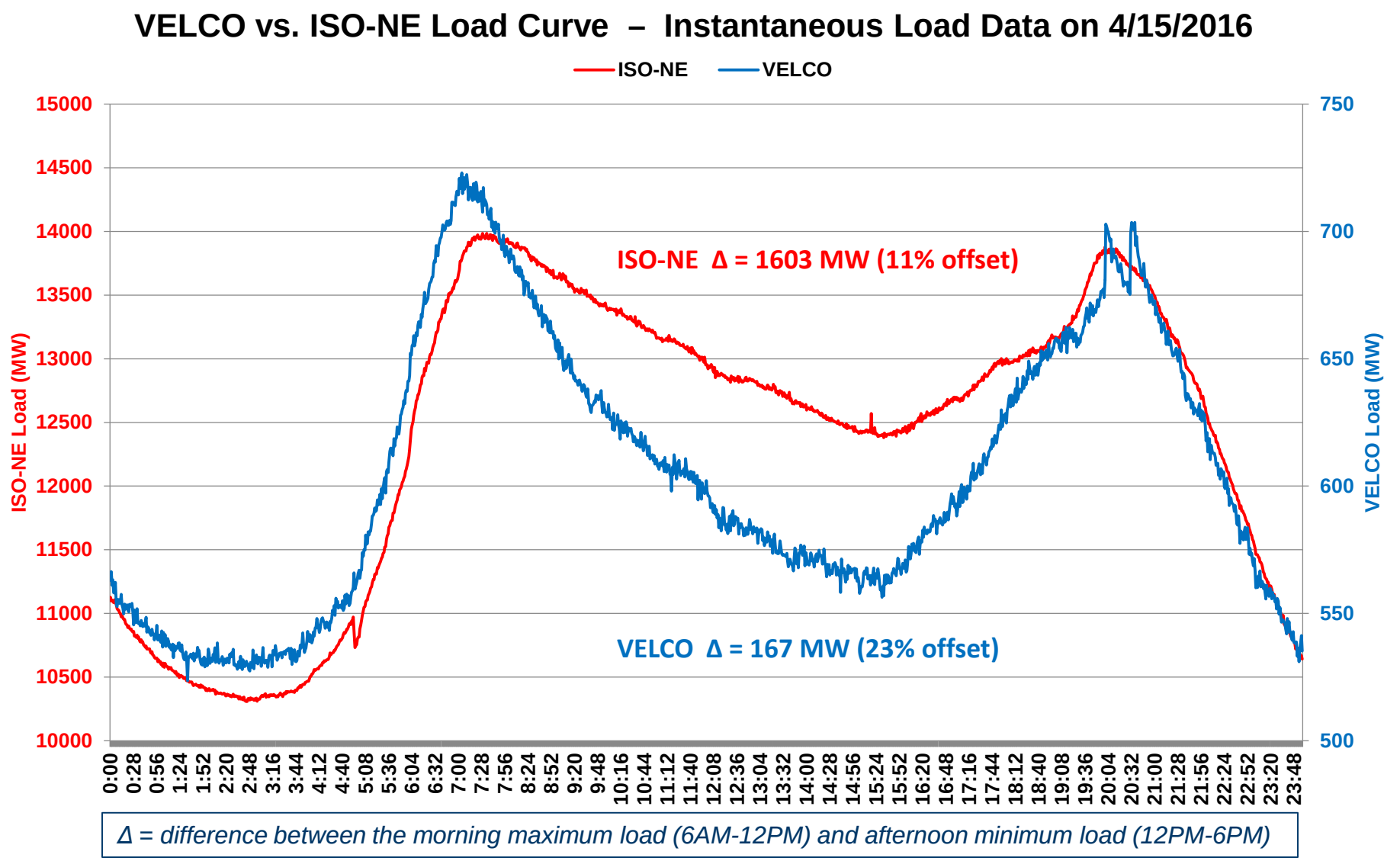
Source: EAN Dashboard
http://www.vtenergydashboard.org/90-by-2050/detail/energy-atlas-stats

Vermont Solar Map



Source: GMP

Vermont's ~~duck~~ Champ curve is deepening



Δ = difference between the morning maximum load (6AM-12PM) and afternoon minimum load (12PM-6PM)

Source: VELCO

Net Metering 2.0

- Four categories of NM systems, plus hydro
  - Category I: 15 kW and under
  - Category II: 15-150 kW on preferred sites
  - Category III: 150-500 kW on preferred sites
  - Category IV: 15-150 kW not on preferred sites
  - Hydroelectric
- Note that there is no place for 150-500 kW outside of preferred sites
- No cap
- Compensation based on whichever is lower, the utility's blended residential rate or the statewide average blended residential rate

Preferred Sites

- On a pre-existing structure
- Parking lot canopies
- Previously developed land
- Brownfields
- Landfills
- Gravel pits
- Town-designated sites
- Superfund sites
- On the same parcel as an customer taking 50% or more of the output

Adjustors: Siting and RECs

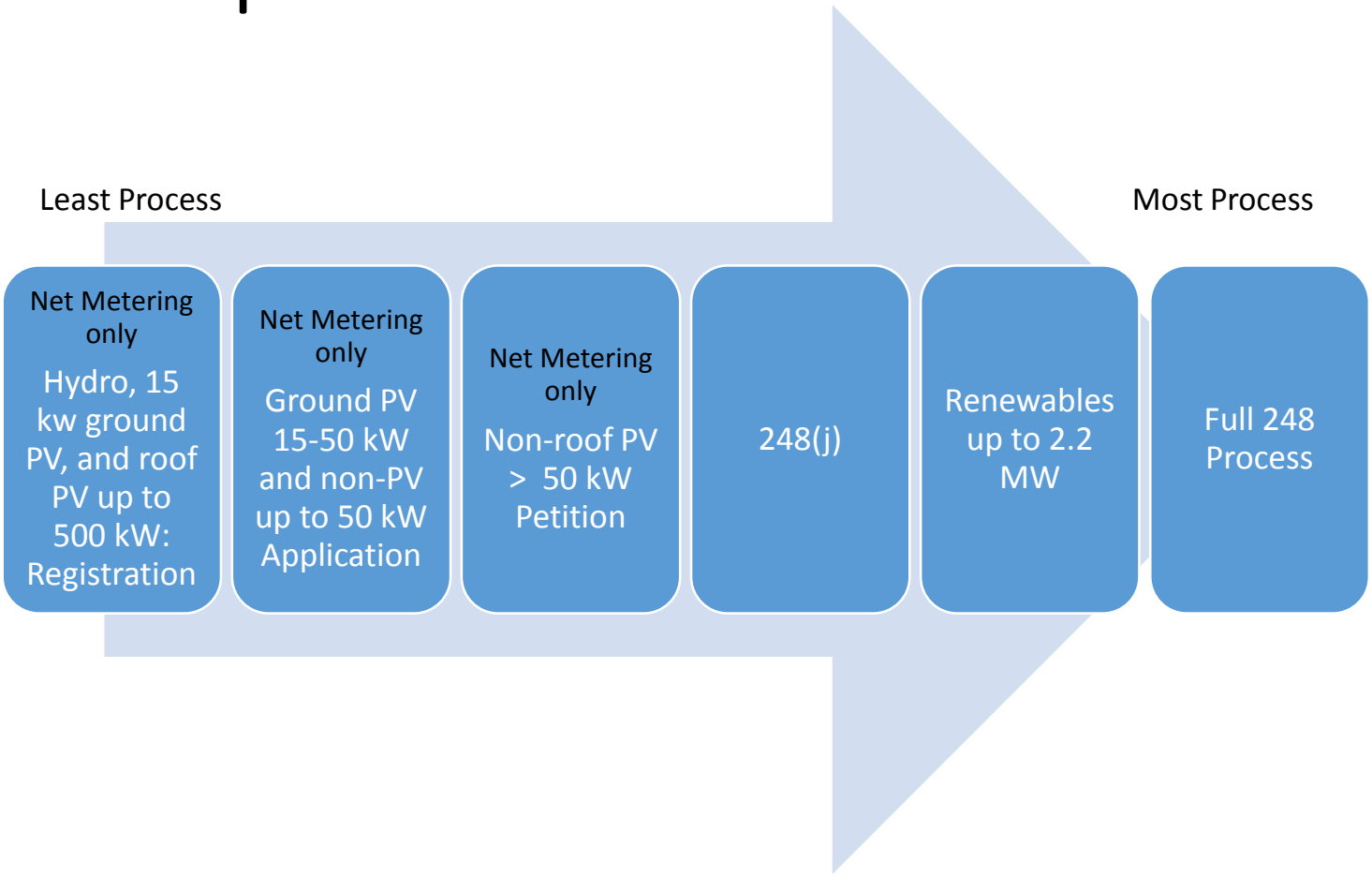
- REC adjustors:
  - +3 cents/kWh credit for ten years if RECs go to utility
  - -3 cents/kWh (debit) for the life of the system if RECs are held by the generator
  - Expected to result in all projects assigning RECs to the utility
- Siting:
  - By Category
    - I and II: +1 cent/kWh for 10 years
    - III: -1 cent/kWh (debit) for lifetime
    - IV: -3 cents/kWh (debit) for lifetime
    - Hydro: 0 cents/kWh
- Biannual proceeding to revisit adjustors, category definitions, and levels of compensation
  - Changes to be informed by the pace of development of different types of NM

Financial changes from the current program

- Small rooftop system compensation is almost unchanged (falling by 3% or so)
- ~150 kW-scale projects will be compensated at 10-30% less than the current program (10% less for preferred sites; 30% less for other sites)
- ~500 kW-scale projects will be compensated about 20% less than the current program, and must be on preferred sites

- The rules grandfather existing systems under their existing financial regime until they are 10 years old; after 10 years, production is credited at the blended residential rate and credits may not be applied toward non-bypassable charges

Process Updates



- Registration form now available to all roof-mounted PV systems and hydro, as well as systems under 15 kW (all technologies, not just PV)
- Application form for systems up to 50 kW (down from 150 kW)
- Larger systems use a version of the full Section 248 process

Renewable Energy Standard

1. Total renewable energy (55% to 75%)
   - Capture low-value RECs not claimed elsewhere in New England
   - High renewable % for use in electrification
2. Distributed generation (1% to 10%, carve-out of Tier 1)
3. Energy transformation (2% to 12%, not a carve-out)
   - Measured on fossil-fuel-reduction basis
   - Address challenges in building heat and transportation through weatherization and electrification (heat pumps, EVs)
     - Or additional DG
   - Encourage utilities to expand business models, build partnerships

Distributed Generation: Tier 2

Distributed generation (1% to 10%, carve-out of Tier 1)

- Drive new “Vermont-scale” distributed generation on our grid
- Depending on generation mix, corresponds to about 25-30 MW of new generation smaller than 5 MW per year
- Expect Standard Offer to make up 7.5-10 MW of this until 2023
- The rest will be some mix of net metering and utility-owned or PPA projects

Looking ahead……

- 90 x 2050 and strategic electrification
- Visibility/controllability of behind-the-meter projects to utilities, VELCO, ISO-NE
- Cannibalism
- Energy storage – particularly daily/seasonal
- Disruptive technology developments (e.g. “solar everywhere”)
- Act 250
- Standard Offer, PURPA, PPAs, utility ownership, net metering
- Act 174
- LiDAR

Questions?

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