Testimony before House Energy and Technology Committee

Net Metered Solar Power Policy

Bob Amelang 2/7/2017

Introductory remarks

Qualifications

My testimony focuses only on solar power generation

Re: PSB Rule 5.100 Net Metering policy (currently up to 500 kW)

Solar is 96% of existing net metered generation capacity

Applies also to other solar power payment methods, larger projects 500 to 20,000 kW

Contracts for Non-utility units (Standard Offer or PURPA)

Utility owned

My general suggestions

Slow down pace of solar development to meet renewable energy goals

Vermont is paying a high cost for its rapid growth in solar net metering

Let California, Hawaii, Massachusetts etc. be the leaders

Obtain better information

To date the legislature and public has been informed mostly by biased, pro-solar sources

DPS 2014 Net-Metering Report exaggerated value of solar net metering

DPS over-active in promoting solar while under Shumlin

GMP corporate policy is to promote solar

REV members include many lawyers and consultants who work for solar developers

PSB Final Report to Legislature 1-20-2017 is a good start, but we need more analysis

PSB cited GMP analysis from 2015 filing that needs updating

First, GMP is biased information source

Second, ISO-NE power market data has changed since 2015

PSB requirement to do periodic investigations is a good thing

I suggest a new study by DPS or qualified consulting firm

Major areas that need rigorous analysis and reporting

Cost of solar net metered projects

Declining costs: actual to date and forecasted

Cost per watt for rooftop vs. large solar net metered projects (150-500 kW)

Value of solar net metered projects

Law of diminishing returns (value declines as solar capacity increases)

Peak shifting to later hours of the day reduces capacity/infrastructure benefits -- transmission benefit reduction already occurred in last two years

Interconnection costs

Installing the next big block of solar power capacity will require grid upgrades to handle high reverse power flows (from distribution system back to transmission system, reverse of normal flows)

New grid scale batteries are a solution but expensive

We already are facing big upgrade costs

Weybridge substation (New Haven solar project PSB proceedings, current GMP Solar Map red colored distribution lines)

Grid integration costs

These costs are very technical to explain – I suggest you request a VELCO representative to provide testimony on this

My specific suggestions

PSB is correct in that net metered solar energy is the most expensive source of solar energy

Thus, the only reason to promote net metered solar is due to other benefits

Maintain solar installer employment

Capture small benefit of location generation as close to load as possible

I suspect the PSB's estimate of ratepayer overcharge of $21 Million may be too low, since it is based on 2015 analysis, when New England spot market prices were higher (These costs are predominately based on natural gas prices, which have seen large price reductions. Also capacity benefits have declined as well, due to peak shift impact)

Net Metering policy needs to balance needs of electric customers and in-state solar firms

Net Metering incentives need to be reduced to limit rate increases

But incentives cannot be reduced too much so as to hurt in-state solar employers

Disallow net metering for large solar farms

Typically 150 – 500 kW, some are 15 to 150 kW

Allow exception for locating large solar net metered projects at sites where customer is high enough to absorb the power from that solar farm

For large net metered solar projects remote from load, current policy provides excessive incentives, since:

Large projects have much lower cost per watt, so don't need same incentive as smaller rooftop solar projects

Smaller rooftop solar projects require more labor to install, so provide more employment benefits than smaller projects

Large projects have negative infrastructure benefits, i.e., require more infrastructure than small rooftop units (e.g. new transformers, with sufficient concentration, grid upgrades may be needed)

Large projects have negative impact on system losses, in cases where such projects are concentrated (e.g. Weybridge substation/New Haven area)

Remove any provision associated with Renewable Energy Credits (RECs)

REC prices are very volatile since they are based on both market forces and potential changes in state laws

VT REC policy needs to be re-examined as separate issue

Providing incentive and penalty of 3 cents/kWh assumes that REC value will continue at that level, when there is high probability that REC value is much less

Compel DPS and GMP to provide better information on net metering

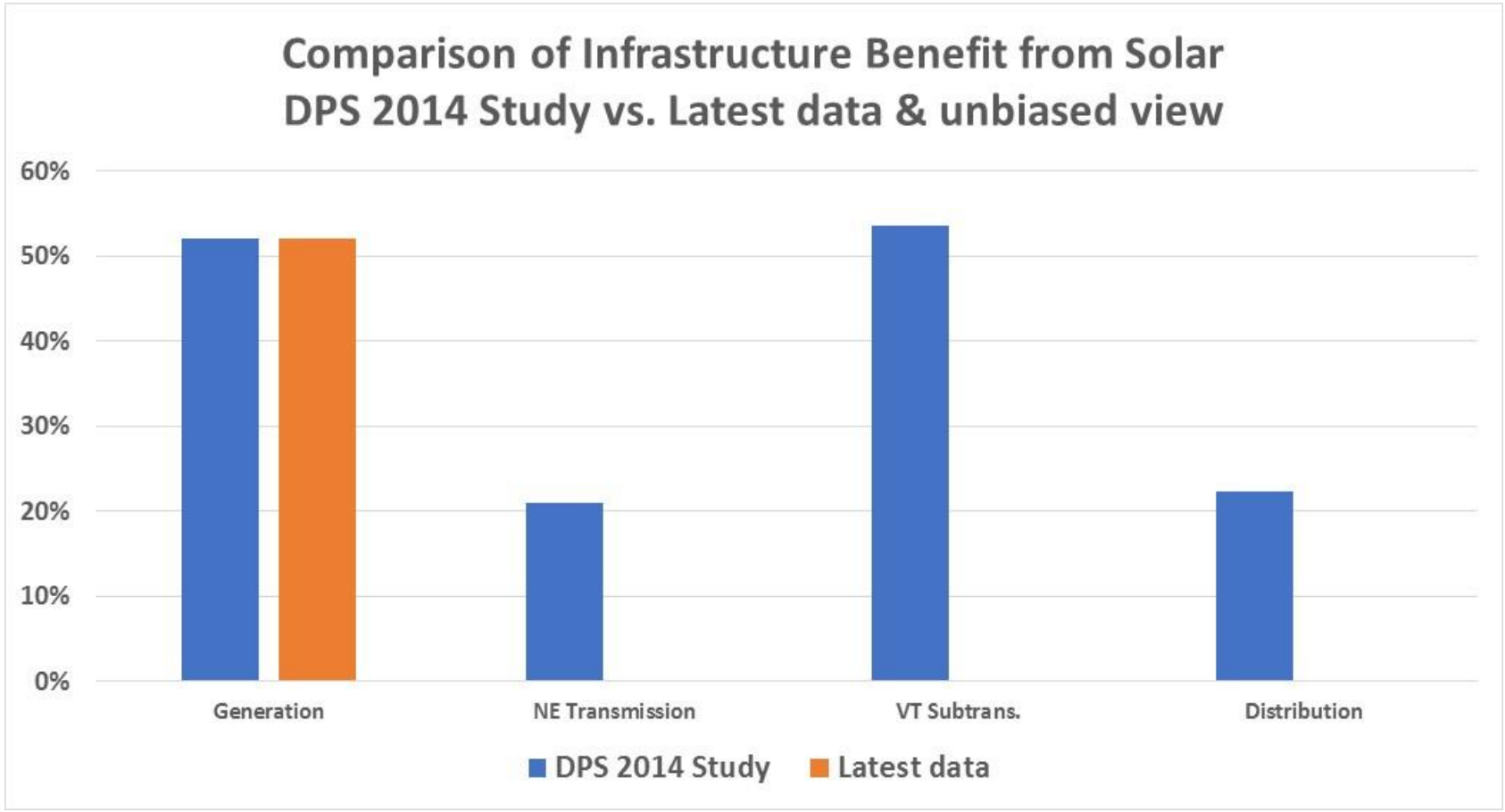
Collect data on projects by installation, not application date

Collect and publish hourly, monthly & annual energy production

- Detailed energy production data has many uses
  - Update hourly model used in solar value analysis
  - Validate that actual production matches forecast
  - Provide future solar customers better data with which to make decisions
    - Production data by type of mounting, orientation, panel type etc.
    - E.g. south vs/ west facing roofs, fixed vs. tracking

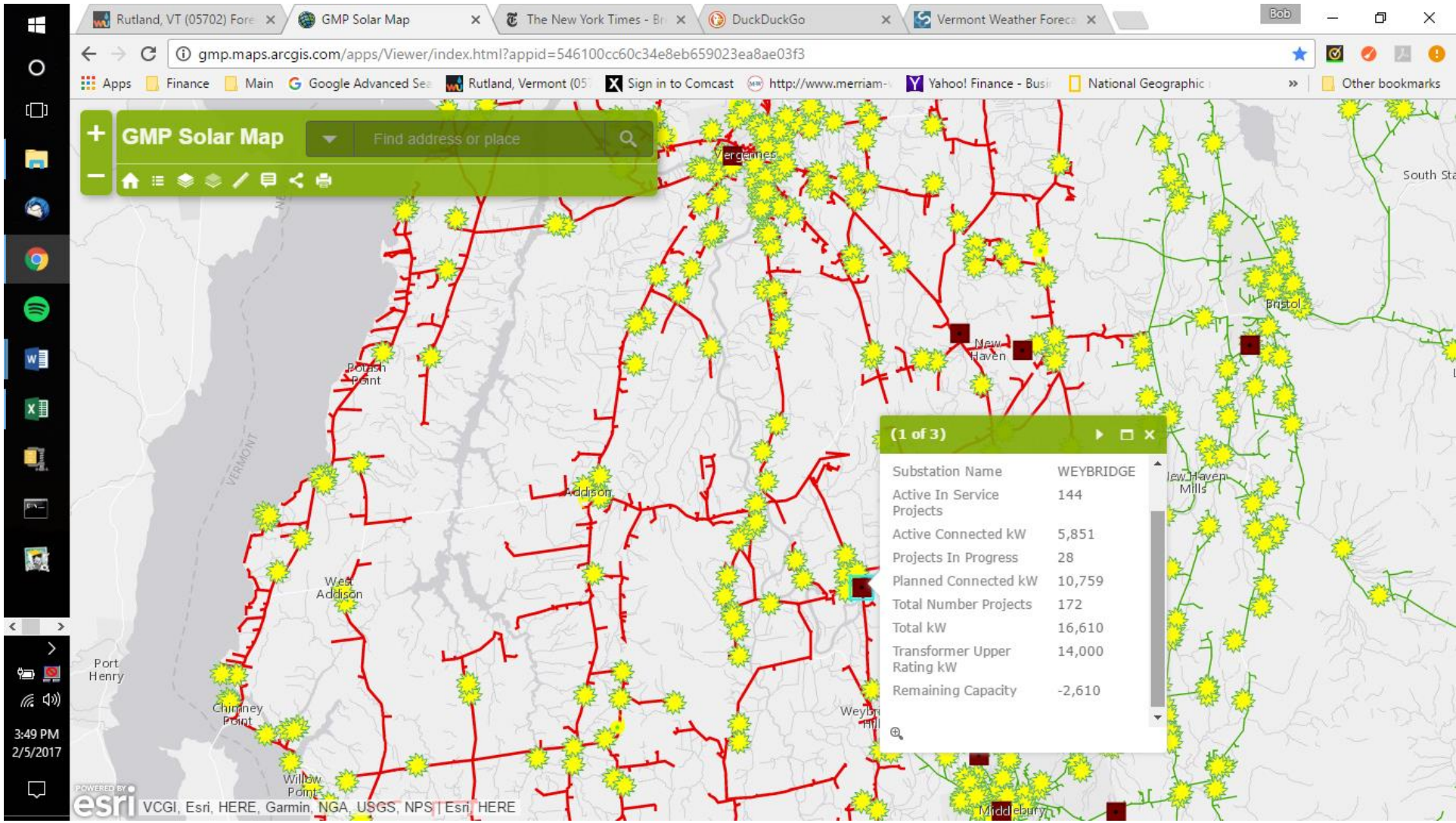
Solar value calculation:

- DPS 2014 Study vs. my calculations
- My calculations agree qualitatively with 1-2017 PSB Report
  - More analysis needs to be done


Comparison of Infrastructure Benefit from Solar
DPS 2014 Study vs. Latest data & unbiased view
60%
50%
40%
30%
20%
10%
0%
Generation
NE Transmission
VT Subtrans.
Distribution
DPS 2014 Study
Latest data

Glaring example of high concentration of distributed generation, primarily solar, from GMP Solar Map

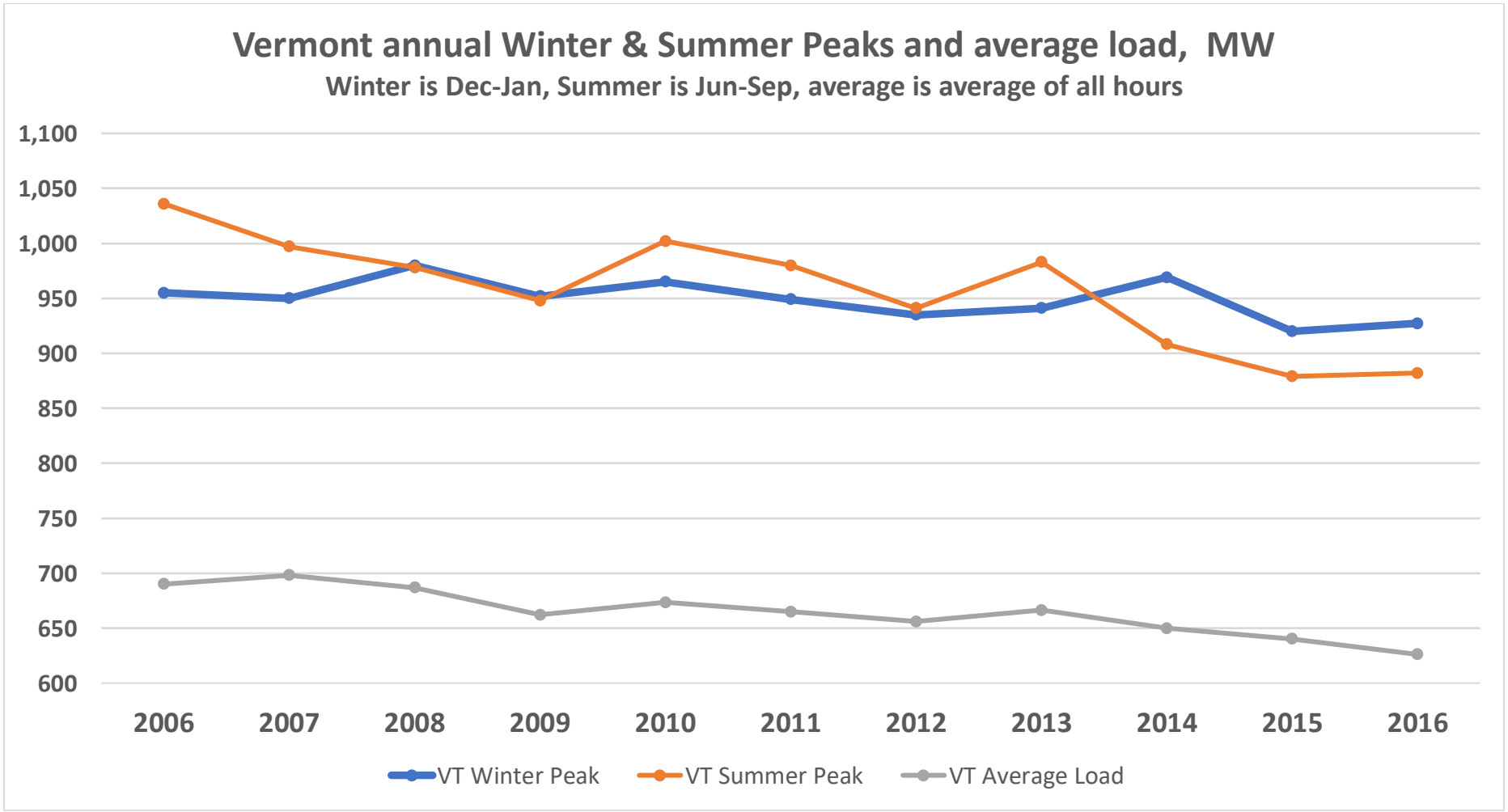
Due in part to large net metered solar projects



Vermont is a winter peaking electrical system

VT's transmission system must be built to serve the winter peak as well as summer peak

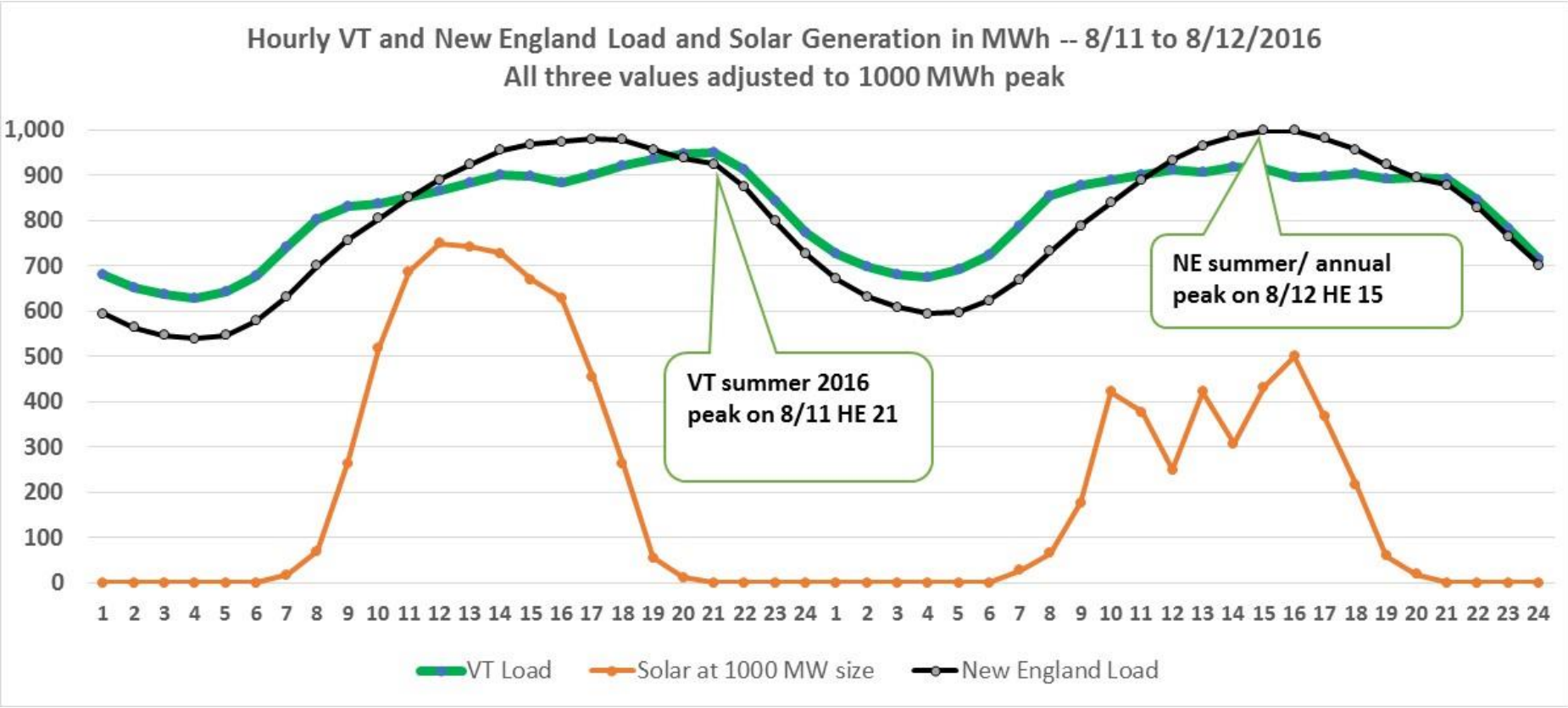
But solar projects do not generate in the evening with VT load reaches its peak



Impact of VT Solar generation on two August days in which first Vermont peaked, then New England

Vermont peaked much later in the day than New England, because of more relative solar generation

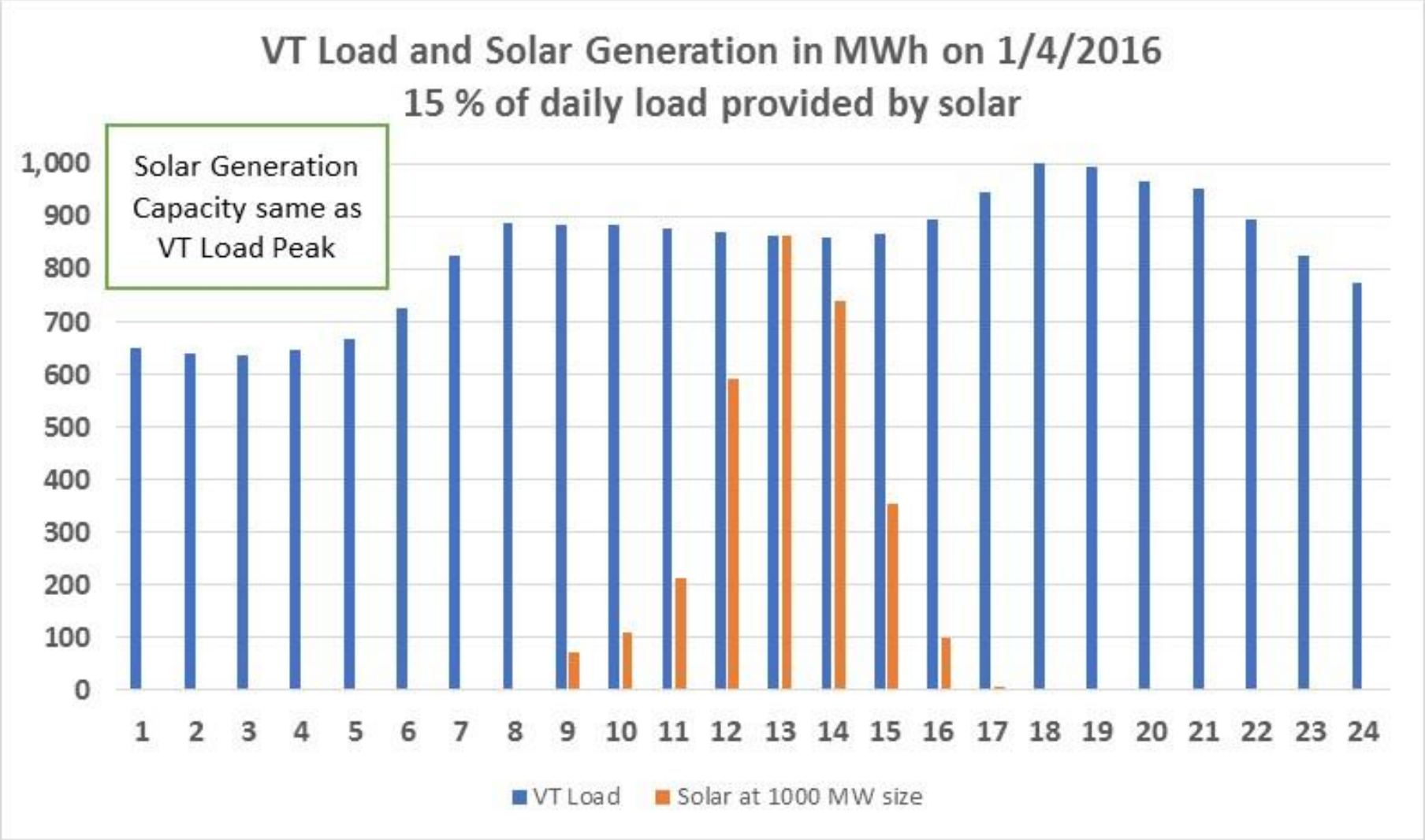
Graphs based on 1000 MW peak or solar capacity rating, for illustrative purposes only (VT peak close to 1000 MW)



Sample graphs of hourly VT load and solar generation

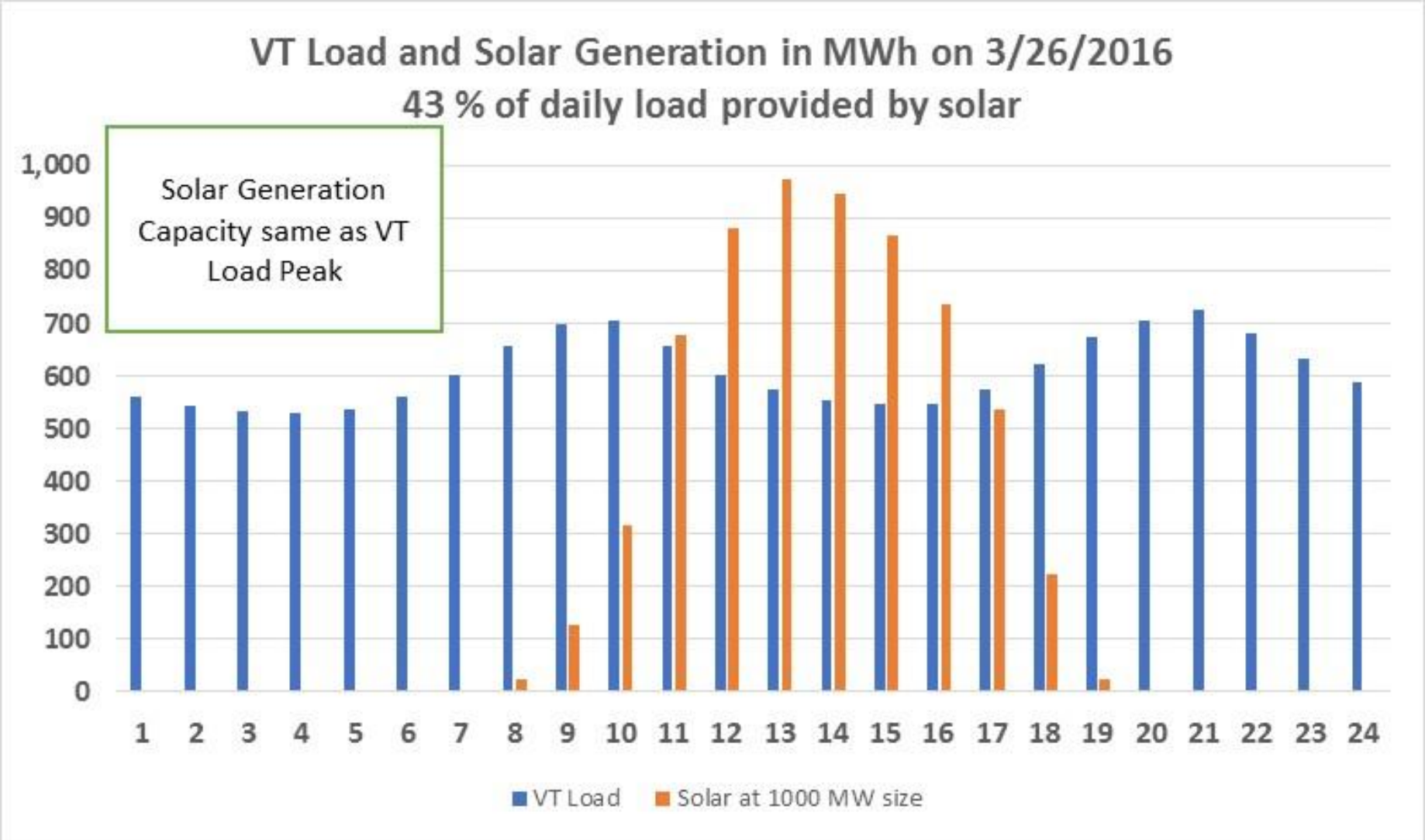
VT load peak and solar capacity both adjusted to 1,000 MW

Solar provides no benefit to VT transmission system and no reduction in New England transmission costs



Day with high solar output and low load

Result is excess energy that requires battery storage or other grid upgrades



Solar production at time of monthly VT load determines New England transmission infrastructure benefit

New England transmission costs have increased greatly in past decade, at times exceed generation costs

This graph shows how hour of monthly peak has shifted to later in day when darkness occurs

DPS 2014 Report used average data back to 2003 which overstated solar benefit

Solar peak shift impact started 2012-2013, was pronounced by 2016