



VT Energy Storage: Policy, Planning, and Deployment

REV Annual Conference

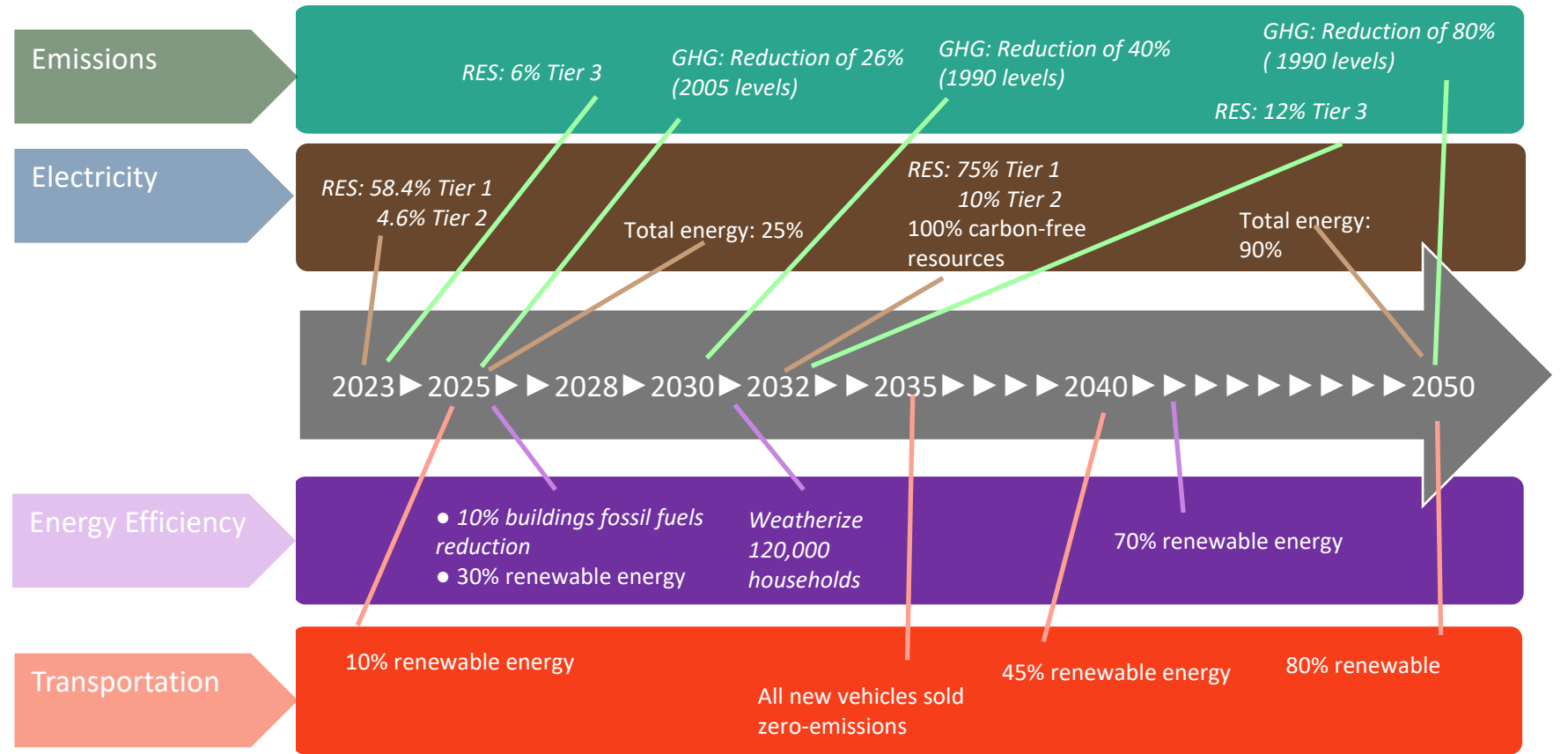
October 19, 2023

Anne Margolis, Deputy Planning Director

October 19, 2023

1

VT Energy Policy Goals



Italics indicate statutory requirements/goals

Title 30, Section 202a:

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

In a manner that is **adequate, reliable, secure, and sustainable**

Ensuring **affordability** and encouraging the state's **economic vitality**

Using energy resources **efficiently** and managing demands **cost effectively**

In a manner that will **achieve greenhouse gas reductions requirements**

Storage Reports & Rule-making



Act 53 Report:
A Report to the Vermont General Asser
of Deploying Storage on the Vermont Electric
Transmission and Distribution System

Final Report – November 15, 2017



“...we view energy storage as a means to an end – rather than an end in and of itself – and thus many of our recommendations focus on pursuit of storage within the broader pursuit of a clean, efficient, reliable, and resilient grid in the most cost-effective manner for ratepayers.”

ACT 31 STORAGE
REGULATION - FINAL
RECOMMENDATIONS

January 9, 2020



- Provide a clear path to permitting storage projects
- Ensure storage projects and their operations do not adversely impact the grid or ratepayers; and
- Provide public and environmental safety

<https://publicservice.vermont.gov/content/2019-energy-storage-regulatory-recommendations-2017-energy-storage-study>

• PUC Case No. 21-3883-RULE:
Proposed creation of a Vermont Public Utility Commission Rule Concerning Energy Storage

- Process & criteria for storage \geq 100 kW and $<$ 100 kW
- Electrical & fire safety, power quality, interconnection, metering, and decommissioning
- Aggregators and operation of aggregations
- ES paired with other resources
- Five-workshop series with Sandia National Laboratories starts Nov. 2

Planning Framework

	Number of Peaks	Approximate Hours to Hit Peak	Approximate Dollars Saved per MW
VT Monthly	12	340	\$144,000
ISONE Yearly	1	60	\$80,000
Total	13	400	\$224,000

Figure 5.4.3.A VEC estimated hours needed to hit peaks and estimated dollars saved

INITIAL VERMONT CLIMATE ACTION PLAN

2021 Vermont Long-Range Transmission Plan

2022 Vermont Comprehensive Energy Plan
 • Electricity • Thermal • Transportation

2022 INTEGRATED RESOURCE PLAN

EXECUTIVE SUMMARY

2021 Integrated Resource Plan

“Each regulated electric or gas company shall prepare and implement a least-cost integrated plan for the provision of energy services to its Vermont customers...” -30 V.S.A. § 218c(b)

2022 Integrated Resource Plan

2022 Integrated Resource Plan

2022 Integrated Resource Plan

Storage Plan

VEC performed an analysis of locations suitable for a battery near or at VEC substations based on locational impacts, and system constraints. Through this process we identified a potential of an additional 31 MW of utility scale storage that it could site. However, given the cost constraints identified throughout this section, it is unlikely we will be able to site batteries at all these locations.

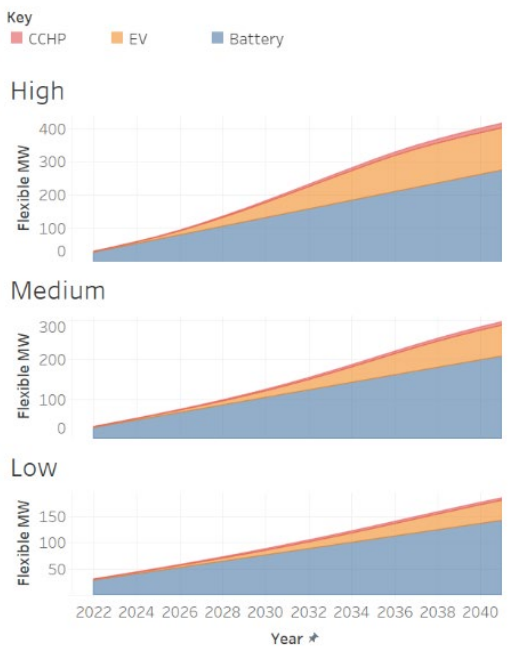
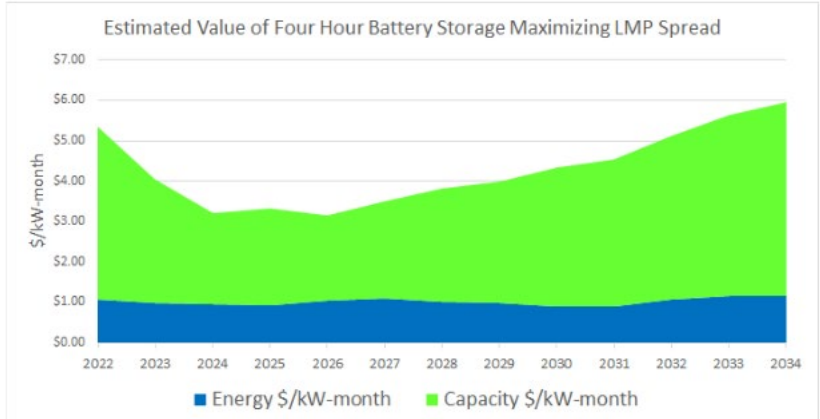
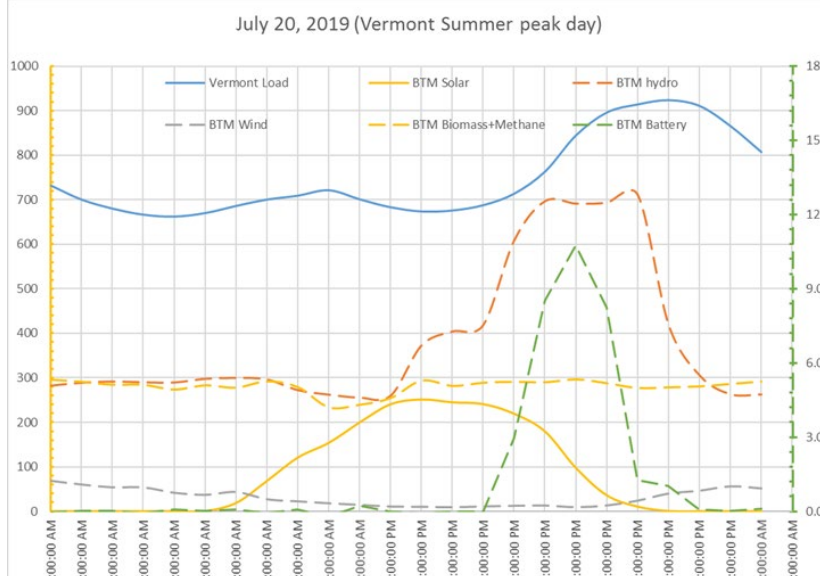
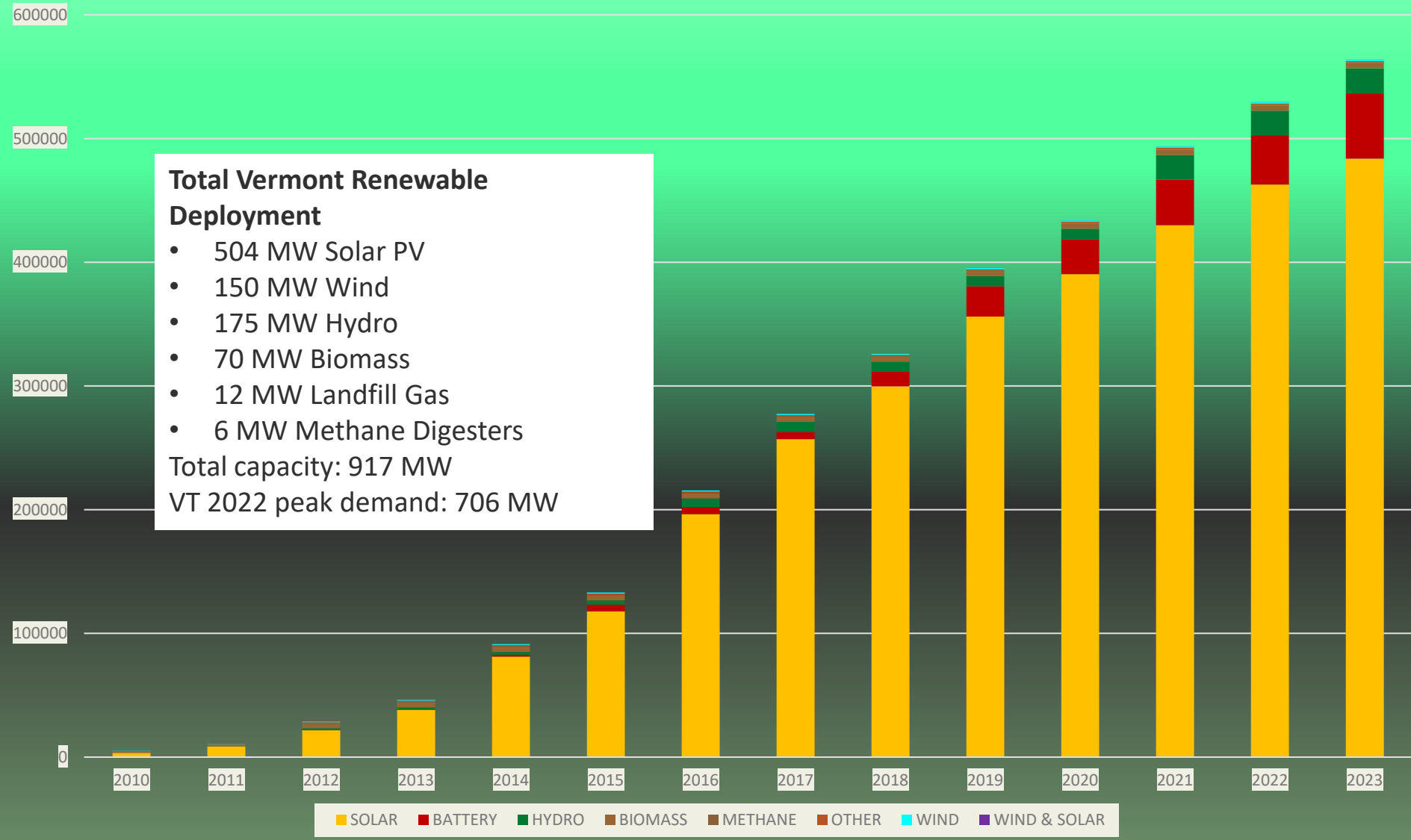


Figure 2-37. Total Flexible Capacity Due to CCHP, EV, and Residential Energy Storage



Electric Resource Deployment

Cumulative BTM (< 5 MW) Capacity by Technology (kW) – August 2023



Storage Deployment & Dockets

	MW	MWh*	Proceeding	Type
GMP Powerwall & BYOD pilots/tariffs	25	67.5	19-3167-TF, 19-3537-TF, 21-5254-TF, 22-0955-TF, 23-1355-TF	GMP tariffs approved June 2020; 2851 installations thru 8/31; various pilots ongoing
VEC BYOD pilot	0.45	1.2	VEC Tier III program offering	Installations in BYOD program thru 9/28
GMP Stafford Hill Solar + Storage, Rutland	2	3.4	Docket 8098	First utility storage project in VT (GMP, permitted 2014). Actually 4 MW but inverter-limited to 2 MW.
Panton Storage	1	4	Case No. 17-2813-PET	GMP battery co-located with solar; amended to enable islanding
Essex Solar + Storage	2.1	8	Case No. 18-2902-PET	GMP JV Solar + Storage
Milton Solar + Storage	2	8	Case No. 17-5003-PET	GMP JV Solar + Storage
Ferrisburgh Solar + Storage	2.1	8	Case No. 17-5236-PET	GMP JV Solar + Storage
Dynapower	1.5	6	N/A	Backup power only
E. BarreCo Barre	4.999	20	Case No. 18-1658-PET	ESA with GMP
Viridity Hinesburg	1.9	5.3	18-3088-PET	ESA with VEC
Georgia Storage	4.99	10	21-1042-PET	ESA with GMP
Springfield Storage	4.99	10	21-1254-PET	ESA with GMP
Bristol Solar & Storage	2.958	11.83	21-0974/5-PET	Co-located (but not integrated) with 2.2 MW Standard Offer solar project
<i>Pittsford Solar & Storage</i>	<i>0.498</i>	<i>2</i>	<i>21-0100-NMP</i>	<i>Net metered project with integrated storage behind the inverter</i>
<i>Royalton Storage</i>	<i>4.9</i>	<i>19.6</i>	<i>21-2114-PET</i>	<i>ESA with GMP</i>
<i>S. Hero Storage</i>	<i>4.99</i>	<i>14.94</i>	<i>21-5049-PET</i>	<i>ESA with VEC. On hold as of 9/28</i>
<i>E.R. South St. Storage</i>	<i>2</i>	<i>8</i>	<i>21-3022-PET</i>	<i>ESA with GMP</i>
<i>N. Troy Storage</i>	<i>3</i>	<i>12</i>	<i>22-4009-PET</i>	<i>GMP & VEC Joint owners. Under construction as of 9/28</i>
<i>Rochester Brandon Mountain Solar</i>	<i>2</i>	<i>8</i>	<i>23-1639-PET</i>	<i>3rd party project selected by GMP for "Rochester Resiliency Zone," paired with 1 MW solar</i>
	73.38	227.77		*Assumes all systems are 4 hours

New England Context

State	Goal	Milestone	2023 summer peak (MW)	Goal as % of 2023 summer peak	2023 deployed storage (MW)	Current % of peak
CT	1000 MW x 2030	300 MW x 2024	5864	17	12	0.2
ME	400 MW x 2030	300 MW x 2025	1762	23	63	3.6
MA	1000 MW x 2025	N/A	11843	8	330	2.8
NH	N/A	N/A	2428			
RI	N/A	N/A	1792			
VT	N/A	N/A	706		53	7.5 (10.3 including under construction/in permitting)

Federal Funds & Other Drivers

COVID Relief (ARPA) Funding:

- \$7M for Energy Storage Access Program to improve low-income household access to energy storage and increase flexible load management by Vermont's distribution utilities (in progress – est. ~130 homes, 10 municipal buildings)

Building Infrastructure Law (BIL)/ Infrastructure Investment and Jobs Act (IIJA) - Competitive Funding Applications:

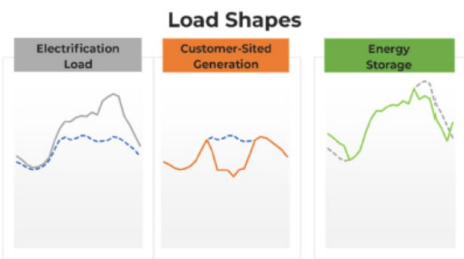
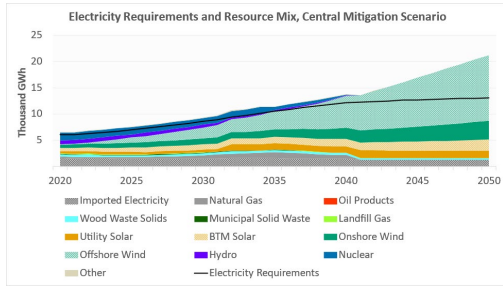
- Grid Resilience & Innovation Partnerships (GRIP) Program (Dept of Energy):
 - State submitted an application for \$100M to support residential, distribution, and transmission scale storage (awaiting decision – est. 35 MW distributed and 40 MW commercial/utility-scale storage)
 - Utilities separately applied for > \$100M to support distributed and commercial/utility-scale storage (awaiting decision – est. > 50 MW)
 - Potential further opportunities for Resilience & Innovation Grants'

Miscellaneous:

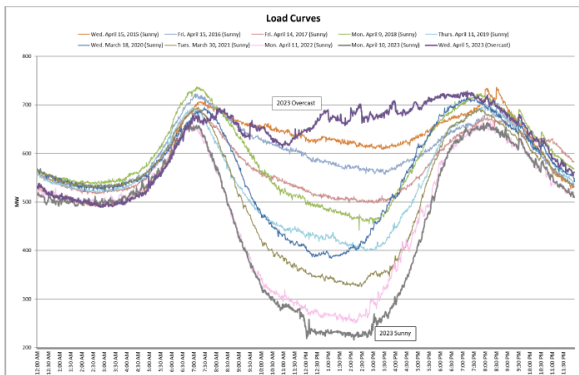
- BGS Municipal Energy Resilience Program
- EVT FLM initiatives
- RES Tier III
- Regional initiatives e.g., FERC Order 2222, SATOA,
- Federal ITC
- Other utility initiatives (e.g., LDES demonstration award, VEC/VELCO radio backup sites, VPPSA & GMP RFPs)



Emerging Challenges

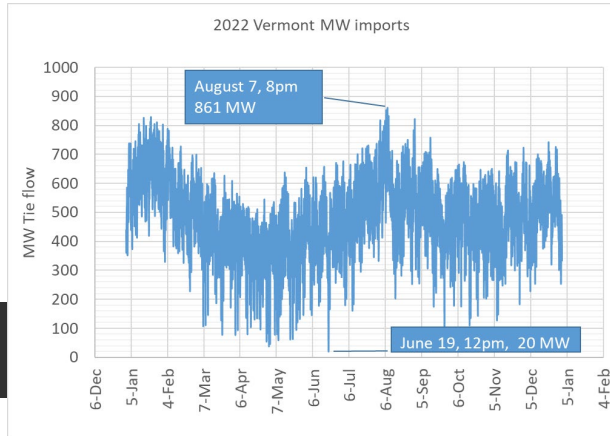


Solar PV Offset



Renewability Metrics, by Month, Scenario 2

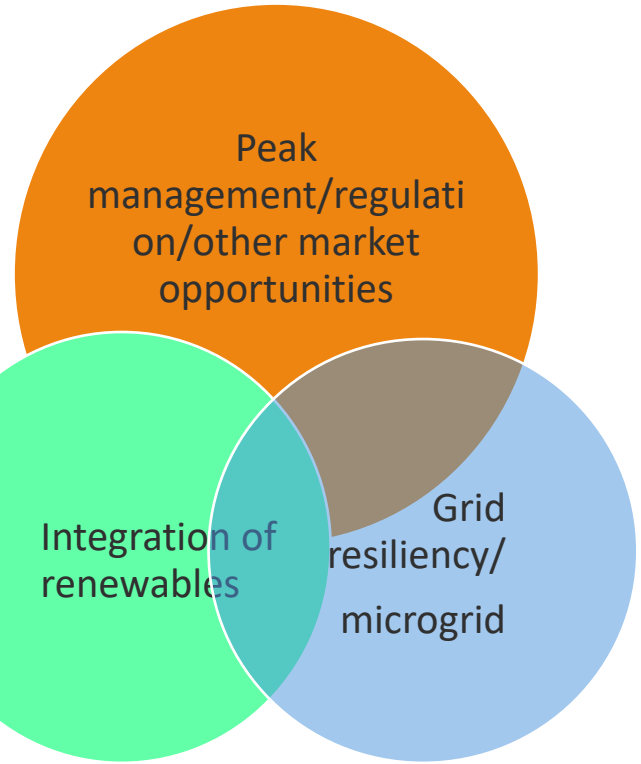
Month	Total Surplus or (Deficit) (MWh)	Max hourly surplus (MW)	Surplus/ load during max surplus	Max hourly deficit (MW)	Deficit/ load during max deficit
1	(35,014)	801	69%	(695)	-43%
2	45,736	1,038	91%	(665)	-42%
3	194,457	1,310	144%	(552)	-37%
4	(53,216)	949	128%	(864)	-67%
5	6,826	1,073	171%	(756)	-64%
6	151,807	1,217	187%	(590)	-48%
7	136,158	1,158	185%	(655)	-51%
8	91,284	1,144	176%	(693)	-53%
9	(18,445)	874	130%	(816)	-66%
10	(151,666)	693	90%	(882)	-67%
11	(300,349)	484	55%	(1,069)	-72%
12	(67,578)	670	65%	(741)	-44%



LOCATION OF TRANSMISSION CONSTRAINTS AS A RESULT OF HIGH SOLAR PV



Location matters just as much for storage as it does for generation and load.



Damaging storm knocks out power to nearly 90,000 GMP customers, more coming

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