

V S P C

Vermont System
Planning Committee

All grid solutions considered

Quarterly Meeting
July 23, 2014
9:30 a.m.–4:00 p.m.
Capital Plaza
Montpelier, VT

Agenda & proposed order of business

Morning

- ▶ Welcome & introductions
- ▶ Approval of April meeting minutes
- ▶ Update on Govs' Infrastructure Initiative
 - ▶ Status report on NESCOE RFP
 - ▶ Report of Public Participation Subcommittee discussion
 - ▶ VSPC role regarding GII
- ▶ Subcommittee reports
 - ▶ Geographical Targeting
 - ▶ Forecasting
 - ▶ Public Participation
 - ▶ Coordinating
- ▶ 2015 VT Long-Range Plan scope & schedule

Afternoon

- ▶ Regional update
 - ▶ Pay for performance
 - ▶ DG Forecast Working Group update
 - ▶ VT/NH needs study update
 - ▶ Winter 2014-2015
 - ▶ Capacity zone proposal approved by FERC
- ▶ Project updates
 - ▶ GMP: Rutland; St. Albans/E. Fairfax; St. Albans distribution; Colchester; Hartford/Ascutney
 - ▶ VELCO: Newport; CT River Valley; Northern area; PV-20 cable replacement; IBM area

Agenda link: http://www.vermontspc.com/library/document/download/4435/20140723_agenda_final.pdf

Governors' Infrastructure Initiative and power import alternatives

Public Participation

Subcommittee GII discussion

- ▶ Subcommittee met July 1 to discuss public participation and public information implications of GII given significant potential costs and implications.
- ▶ Reviewed current status and VSPC context
- ▶ Considered VSPC role and concluded:
 - ▶ Concurrence with straw proposal that VSPC not take a position on pros and cons of the concept, recognizing issue of “mission creep” and diversity of interests within VSPC.
 - ▶ But ... appropriate roles may include: (1) providing information to stakeholders; (2) keeping VSPC updated on new developments; and (3) looking for opportunities to promote broader use of NTAs within the region.
- ▶ Conclusion for now: not enough is known currently to engage the public, but the VSPC (particularly Public Participation Subcommittee) should continue to monitor and be prepared to discuss further, and potentially to engage in the fall when more details are known.

VSPC role in regard to GII

Motion adopted at April 30 VSPC meeting to develop a proposal to July VSPC meeting concerning the VSPC's role in commenting on the regional infrastructure initiative. The following proposal was developed in consultation with the Coordinating Subcommittee:

- ▶ Public Participation Subcommittee met and crafted an approach to continuing discussion of public engagement issues regarding the GII. (See Public Participation Subcommittee report.)
- ▶ VSPC should continue to stay informed through quarterly updates and electronic information dissemination between meetings regarding the progress of this effort.
- ▶ VSPC should not take a public position regarding the merits of the initiative. It is unlikely that there is or will be a unified position on the initiative. Details of the proposal are still developing.
- ▶ VSPC scope to focus on the need for full, fair and timely consideration of non-transmission alternatives before approval of transmission solutions to address future reliability deficiencies.
 - ▶ The idea of securing commitment to an effective, region-wide NTA analysis requirement has already been suggested in the context of the initiative. VSPC would be supporting a proposal already on the table informally.
 - ▶ Vermont session law already requires utilities and regulators to advocate for non-transmission alternatives at the regional level. In other words, the issue is already Vermont public policy. Proposed stance has a foundation in VT policy/law
 - ▶ Some time ago, NESCOE, with assistance from LaCapra Associates, developed a [proposal for a region-wide NTA analysis requirement](#). That proposal provides some shape to region-wide NTA analysis requirements, though the proposal didn't address how to pay for a least-cost NTA solution.
 - ▶ The NTA proposal would not directly address the infrastructure initiative RFP, but rather would seek support for full NTA consideration for future reliability projects. A very large additional investment is expected in reliability projects around New England in the next several years, apart from the regional initiative. In an environment of declining or stable loads and increasing distributed generation, it seems more important than ever to identify the least-cost option before building a transmission line.



Geographical Targeting Subcommittee

Meeting of May 13, 2014

- ▶ Consistent with requirements in Screening Framework and Guidelines adopted by PSB in D. 7873, GMP presented all reliability deficiencies
 - ▶ Including those that screened out of further NTA analysis using 6290 or 7081 tool as recommended by GMP
 - ▶ <http://www.vermontspc.com/library/document/download/4382/GMP-GT-Areas5-13-14.xlsx>
- ▶ Note—process applies to distribution constraints and is assigned to VSPC

GMP Infrastructure deficiencies summary

Constraint	Load Growth related (Y/N)	Year of need	Further screening (Y/N)
Susie Wilson Substation Area	Yes	2037	No Continue to Monitor
Wilder - White River Junction Area	Reliability and Load Growth	2015	No
Waterbury	Reliability	2015	No
Winooski 16Y3 Feeder	No	2015	No
Hinesburg	Yes	2016	No
Dover Haystack	Yes	2015	No
Stratton	Reliability	2015	No
St Albans	Reliability and Load Growth	>10 years	Reliability Plan filed 4/2/14, Continue to Monitor
Miton	Yes	>10 years	No Continue to Monitor
Brattleboro	Yes	>10 years	No Continue to Monitor
Southern Loop	Yes	>10 years	No Continue to Monitor
Danby	Reliability and Load Growth	2016	No
Granite-Whetmore	Asset Management	2016	No
South Brattleboro	Reliability	2016	No
3309 Transmission	Reliability	2014	No Continue to Monitor / Refine the analysis
Rutland Area	Reliability	Existing Constraint	Reliability Plan filed 4/2/14, additional analysis required
Windsor Area	Reliability	2017	No

Approach

- ▶ Approach to list all deficiencies supported by Subcommittee
 - ▶ Transparency of process
 - ▶ Maintenance of a combined statewide list useful for information transfer, broader view of what we are avoiding
 - ▶ Continue listing annually all projects—update annually only at summary level
- ▶ Summary level info previous slide, more detailed info also appropriate (and provided for in GT template)
 - ▶ E.g. , critical load level, estimated cost, etc.
- ▶ Improvements to the template discussed, will be proposed at next meeting

Significant project discussion

- ▶ Hinesburg area—originally screened out, however a number of questions were posed re: DG possibly addressing the deficiency
 - ▶ More data to make the case available and necessary to do so
- ▶ 3309 transmission line—operational procedures may be appropriate, however, VELCO analysis had shown a bigger issue than described. GMP shared analysis
- ▶ Rutland—reliability plan in progress; more in-depth analysis at next subcommittee meeting

Other utility projects

- ▶ Need other utilities to comply with D. 7873 Screening Framework and participate in VSPC GT Subcommittee process
- ▶ Utility GT process checklist (to ease process for utilities) was drafted but not discussed



Forecasting Subcommittee

VSPC Forecasting Subcommittee Update

- ▶ The subcommittee has been doing a lot of work to inform VELCO's long range transmission plan (LRTP). The committee expects much of the research and analysis results will be incorporated in the LRTP forecast.
- ▶ Data sharing library discussions are ongoing and the subcommittee is getting closer to launching a data repository on VSPC website.

Factors influencing VT forecast

- ▶ Changes in Vermont's energy and economic landscape including improved and new technologies, code updates, economic projections necessitate adjustments to the LRTP forecast. Examples of these changes include:
 - Increase in heat pump saturations
 - Increase in LED saturations
 - Changes in appliance and lighting codes and standards
 - Increase in electric vehicles sales
 - Increase in solar net-metering
 - Potential changes in significant economic variables factored into the LRTP model
 - ▶ # households, household income, employment, GDP, manufacturing output...
 - Introduction of distributed generation

Plans for data sharing on VSPC website

- ▶ Goal is to make data available to committee members and other VSPC members on historical trends and data impacting forecast for more informed quality inputs into forecasting process.

- ▶ Data library will include:
 - Historical rates and rate revenue
 - Historical loads
 - Statewide sales
 - Population
 - Economic data
 - Solar data: total capacity, solar impacts
 - End-use saturations and savings





Coordinating Subcommittee

Updating subcommittee
membership & contact information
2015 meeting dates

Updating subcommittee membership

- ▶ Membership of subcommittees is by self-selection
- ▶ Lists have not been updated since new members appointed except by request
- ▶ New website provides tools for tracking communication preferences
- ▶ Staff developing survey to update/verify preferences for subcommittee participation and communication preferences

Proposed 2015-2016 meeting dates

- ▶ April 29, 2015—Randolph
- ▶ July 22, 2015—Montpelier
- ▶ October 14, 2015—Rutland
- ▶ January 20, 2016—Burlington

Dates previously set

Oct 8, 2014	Quarterly meeting Holiday Inn, Rutland
Jan 28, 2015	Quarterly meeting VT Tech, Randolph



Public Participation Subcommittee

Subcommittee input on VT Long-Range Transmission Plan public outreach

- ▶ Subcommittee reviewed 2012 outreach approach
- ▶ 4 forums in 2012 – 45 total attendees from the public (lots of effort for minimal attendance)
- ▶ Presentations to 7 of the 13 RPCs
- ▶ Thoughts for 2015
 - ▶ Google hangout/social media
 - ▶ Two forums plus a public hearing in Montpelier
 - ▶ Invite for RPCs again
 - ▶ More robust online tools leveraging new website
 - ▶ Invites to other groups (using smart grid communications group list selectively)
 - ▶ Leverage VECAN to reach out
 - ▶ Legislators and other public officials will be invited

Scoping the 2015 Vermont Long-Range Transmission Plan

Outline

- ▶ Study plan
 - ▶ VT planning process
 - ▶ Overview of 2015 study plan
- ▶ Criteria and assumptions
 - ▶ Comparison between 2015 and 2012
- ▶ Next steps

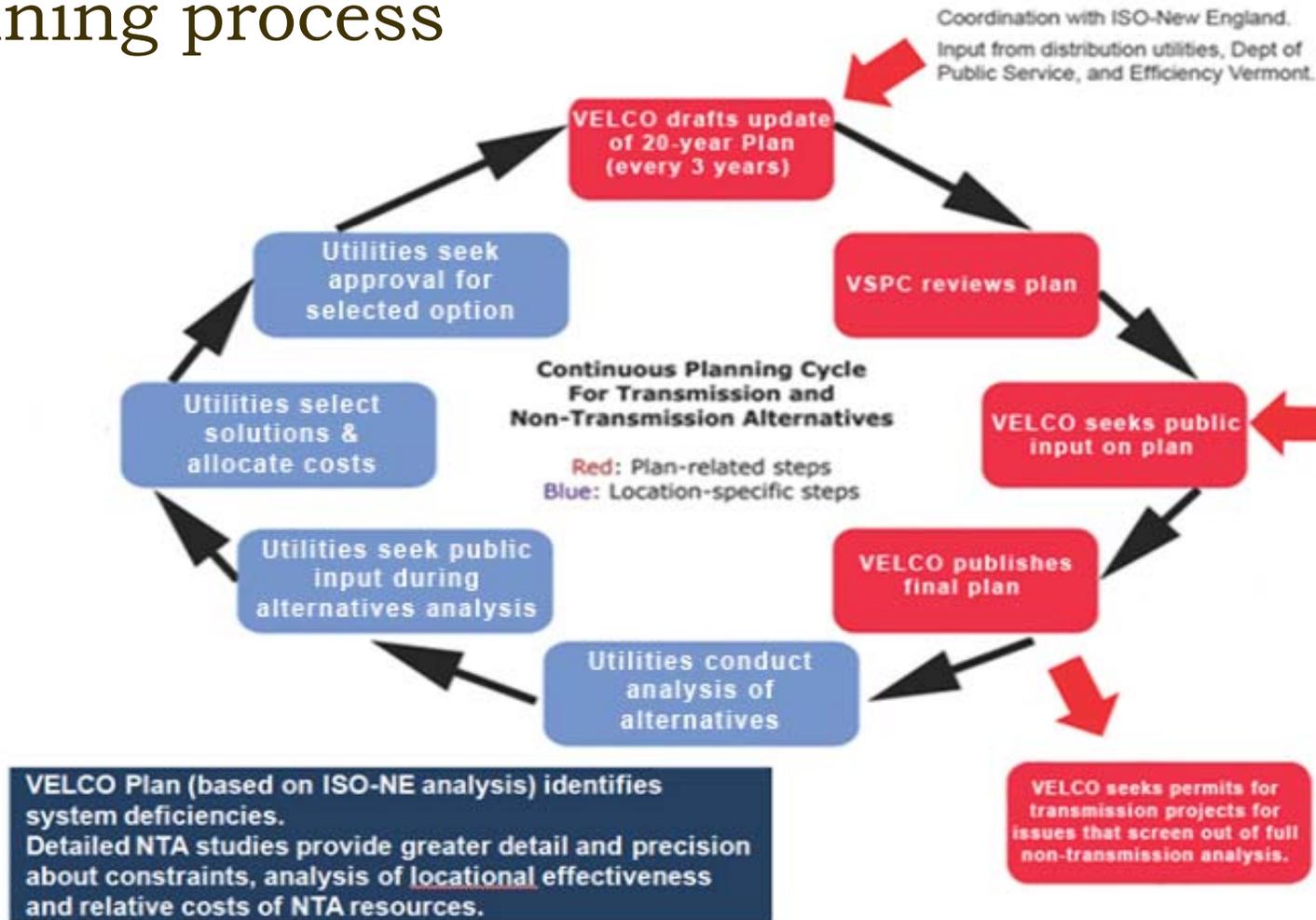
Vermont study history

- ▶ **Before 2005** (pre-Docket 7081)—VELCO performed long-range studies as needed prior to 7081 MOU
 - ▶ Northwest Reliability Project (NRP) originated from the 2001 long-range study, which used the Public Service Department load forecast
- ▶ **2005**—VT Legislature required VELCO to file a long-range plan looking out at least 10 years and to update every three years [Act 61 amendments to 30 V.S.A §218c(d)]
- ▶ **2006**—VELCO published 10-year long-range plan using the PSD load forecast
- ▶ **2007**—VT Public Service Board approved Docket 7081 MOU, establishing a 20-year planning horizon
- ▶ **2009**—VELCO published the 20-year Vermont Long-Range Transmission Plan
 - ▶ VELCO prepared its own forecast with VSPC assistance

Vermont study history, continued

- ▶ **2011**—ISO-NE completed the 10-year VT/NH 2010 needs assessment
- ▶ **2012**—ISO-NE updated 10-year needs assessment
 - ▶ For the first time, ISO-NE studies incorporated future EE that had not yet cleared the Forward Capacity Market (FCM)
- ▶ **2012**—VELCO published 20-year long-range plan
- ▶ **2014**—ISO-NE currently updating the 10-year needs assessment
- ▶ **June 2014**—VELCO starting the 2015 long-range plan study process

High-level overview of Vermont planning process



Plan development timeline

Milestone		Timeframe
1	In conjunction with VSPC Forecasting Subcommittee, work with Eric Fox/Itron on forecast model for initial Vermont forecast, incorporating net metering, DG, etc.	1/30/14 - 4/30/14
2	Seek DU input on sub-transmission issues	3/1/14 - 6/30/14
3	Obtain input from VSPC Plan scope	7/1/14 - 7/31/14
4	ISO-NE 2023 VT/NH needs assessment and solutions report finalized	9/30/14
5	Complete initial VT load forecast	9/30/14
6	Prepare draft plan with ISO-NE coordination	9/30/14 - 12/31/2014
7	Conduct sub-transmission and years 11-20 analysis	8/1/14 - 10/1/14
8	Update load forecast with VSPC, DPS, EVT	11/30/14
9	Issue VSPC draft	1/2/15
10	VSPC input period	1/2/15 - 3/30/15
11	Incorporate VSPC input	3/30/15 - 4/20/15
12	Issue public draft	4/20/15
13	Public input period (including public hearings)	4/20/15 - 6/1/15
14	Incorporate public input	6/1/15 - 6/30/15
15	Submit final plan to PSB and DPS	7/1/15

Docket 7081 MOU steps for VSPC input

- ▶ VELCO consults with DUs, PSD and ISO-NE during plan development
- ▶ VELCO provides draft to VSPC
 - ▶ Minimum 60-day review period
 - ▶ Input on content
 - ▶ Specific review of system level determinations and NTA screenings
 - ▶ Formal memo of response to VELCO
- ▶ VELCO incorporates VSPC input or provides rationale why not

Overview of public outreach plan

- ▶ Identify targeted stakeholders
- ▶ Develop plan for public meetings
- ▶ Secure media coverage
- ▶ Develop website
- ▶ Conduct public meetings
 - ▶ At least two geographically diverse “open houses”
 - ▶ Public hearing in Montpelier
 - ▶ Presentation at meetings of groups as invited
- ▶ Compile public input
 - ▶ Statute requires transcript of public comments
- ▶ Incorporating Public Participation Subcommittee recommendations:
 - ▶ Considering use of additional social media as an input tool, such as Google Hangout
 - ▶ More robust online tools using the new VSPC website
 - ▶ Continuing outreach to Regional Planning Commissions
 - ▶ Using the outreach list developed by the Smart Grid Communications Group to target additional interested groups (selectively)
 - ▶ Leverage VT Energy & Climate Change Action Network for outreach
 - ▶ Inviting public officials, such as legislators and agency personnel, particularly to Montpelier hearing

Steps in developing 2015 long-range plan update

- ▶ ISO-NE's VT/NH needs and solutions assessments will be used as bulk system analysis for years 1-10
- ▶ VELCO will analyze sub-transmission system for years 1-10
- ▶ VELCO proposes not to perform load flow analyses for years 11-20 due to long-range forecast uncertainties and projections of flat or declining load
 - ▶ Plan address years 11-20 by examining significant risks and trends, and identifying areas where distributed resources and energy efficiency may help defer long-term, load-driven upgrades
- ▶ VELCO has requested DU input on subsystem analyses
- ▶ Plan will be non-CEII public document based on underlying technical analysis, as in 2009 and 2012
- ▶ VELCO will update the load forecast by November 2014 as needed

Transmission planning criteria relevant to 2015 plan

- ▶ NERC planning standards
 - ▶ TPL-001—No outages
 - ▶ TPL-002—Outage of one element
 - ▶ TPL-003—Outage of two or more elements
 - ▶ TPL-001—Four Newly approved, replacing above TPL standards

- ▶ ISO-NE planning standards
 - ▶ N-0, N-1, N-1-1
 - ▶ Stressed conditions
 - ▶ Extreme weather load (90/10)
 - ▶ Two significant resources unavailable
 - ▶ Maximize regional power transfers

NERC = North American Electric Reliability Council

ISO-NE = Independent System Operator of the New England electric system

90/10 = 90% chance that the actual load will be at or lower than the forecast, 10% chance that it will exceed the forecast

Transmission outages examined

- ▶ Single-element outages
 - ▶ Line, transformer, generator, Essex STATCOM, Highgate HVdc terminal
- ▶ Multi-element outages
 - ▶ DCT, breaker failure, Sandy Pond HVdc terminal
- ▶ First single-element outage, then system adjustment, then another outage is tested
 - ▶ Prior studies tested a subset of elements as the first outage
 - ▶ In this study, all transmission lines and Highgate HVDC tested as first outage
 - ▶ NERC BES definition now in effect
 - ▶ NERC TPL-001-4 was approved in 2013

DCT = Double circuit tower outage that disconnects two lines supported by the same poles
Breaker failures = outage that disconnects elements adjacent to a breaker

Transmission performance criteria

	Thermal criteria	Voltage criteria	
System event	For all facilities	For 115 kV facilities	For 230 kV and above
NERC Category A (All-lines-in)	At or below normal rating	At or above 0.95 pu and At or below 1.05 pu	At or above 0.98 pu and At or below 1.05 pu
Category B, C, & D (single or multi-element outages) N-1 and N-1-1	At or below LTE rating	At or above 0.95 pu and At or below 1.05 pu Delta V no greater than 10%	At or above 0.95 pu and At or below 1.05 pu Delta V no greater than 5%

Delta V for shunt switching with all lines in: 2.5% for below 230 kV, 2% for 230 kV and above

Delta V for shunt switching with a line out: 5% for below 230 kV, 4% for 230 kV and above

Thermal = That which is related to current flow

Normal rating = Nearly continuous current capacity of a piece of equipment, such as a line, a transformer

LTE rating = Long-term (4 to 12 hours) emergency current capacity of a piece of equipment

Voltage = That which is needed to allow current to flow. The higher the voltage, the lower the current for the same power level

pu = per unit voltage, which is the ratio of the calculated voltage over the nominal/operating voltage level, such as 115 kV, 46 kV

Delta V = change in voltage before and after an outage

Sub-transmission performance screening approach

System event	Thermal limit	Voltage limit
NERC Category A (All-lines-in)	At or below rating	At or above 0.95 pu and At or below 1.05 pu
NERC Category B (single-element outages) N-1	At or below rating	At or above 0.90 pu and At or below 1.05 pu Delta V no greater than 10%

- Will record system performance for single loss of:
 - Transmission facility
 - Also with a transmission facility already out of service
 - Step-down transformer (115 kV to a lower voltage)
 - Loss of load for radial transformers will be considered acceptable unless affected DUs state otherwise
 - Sub-transmission facility
 - Breaker to breaker and line-end open scenarios
- DUs will determine whether study results outside the above screening limits need to be resolved

Assumptions—comparison with 2012 analysis

2012 Analysis	2015 Analysis
<p>Regional input: ISO-NE performs 10-yr study with VELCO and other TOs</p>	<p>Regional input: ISO-NE performs 10-yr study with VELCO and other TOs</p>
<p>Transfer assumptions: NY-NE flow: +/-1200 MW East-West flow: -1000 & 3500 MW</p>	<p>Transfer assumptions: NY-NE flow: +/-1200 MW East-West flow: -2200 & 3500 MW</p>
<p>Load assumptions: 2022 forecast: 1134 MW 2032 forecast: 1245 MW (estimated based on 2030 forecast of 1221 MW) Adjusted for DSM forecast</p>	<p>Load assumptions: 2025 forecast: ? MW 2035 forecast: ? MW Adjusted for DSM forecast</p>
<p>Demand Resource assumptions: ISO-NE 10-yr study: does not include future EE that has not cleared the market VELCO timing includes all VEIC EEF</p>	<p>Demand Resource assumptions: ISO-NE 10-yr study: includes future EE that has not cleared the market VELCO timing to include all VEIC EEF</p>

ISO-NE = Independent System Operator in New England

TO = Transmission Owner

NY-NE = New York to New England power transfer interface

East-West = East to West power transfer interface

Assumptions—comparison with 2012 analysis, continued

2012 Analysis	2015 Analysis
<p>Generation assumptions: All-lines-in: 55 MW With one facility out: 150 MW</p>	<p>Generation assumptions: All-lines-in or with one facility out: 200 MW (note 1)</p>
<p>PV20 flow assumptions: 0 MW</p>	<p>PV20 flow assumptions: 0 MW and 100 MW (Note 2)</p>
<p>Generation outages: VY retired or in service Two resources out in VT, NH and MA: AES Granite Ridge and Merrimack 2 AES Granite Ridge and McNeil AES Granite Ridge and Northfield 1&2</p>	<p>Generation outages: VY retired Two resources out in VT, NH and MA: AES Granite Ridge and Merrimack 2 AES Granite Ridge and McNeil McNeil and Berlin GT</p>

Note 1 = Amount of generation in limiting cases. McNeil is out of service in some cases that are not limiting.

Modeling assumptions: 10% hydro, 5% wind, solar and other small DG embedded in load, 80% combustion turbine, 100% other thermal units (methane, biomass)

Note 2 = PV20 flow is modeled at 0 MW in most cases.

Load assumptions

- ▶ Forecast will be reviewed at the next forecast committee meeting on August 5 at VPPSA
- ▶ Will model 90/10 loads in all cases tested
- ▶ Newport block load supplied from Vermont
- ▶ Load power factor constant at 0.97 in all cases
 - ▶ Assumes ongoing power factor correction on the distribution and sub-transmission systems
- ▶ NY load will remain constant in all cases
- ▶ New England forecast will not extend beyond 10 years

Power factor = Measure of real power in relation to reactive power, which are perpendicular to each other.

Real power = Part of the electrical power that does the work, i.e. heat, lighting

Reactive power = Part of the electrical power needed for the system to function properly. By-product of alternating current.

Risks of the 7081 methodology

- ▶ 7081 MOU envisions a linear process
 - ▶ Reliability concern → NTA screening → full NTA or T&D upgrade
 - ▶ If conditions do not warrant a T&D upgrade, an NTA is not pursued
- ▶ Characteristics of our time
 - ▶ Utilities do not proceed with load growth related T&D upgrades unless concerns are within 10 years and projected to remain
 - ▶ Environment of emerging and disruptive technologies, as well as policies, e.g. EE, DG, EV, Governors' Initiative, significantly affecting load and resources
 - ▶ Rapid change and resulting uncertainty of forecasts beyond 10 years
- ▶ For system issues that “screen out” but are on the margin, changes in a few assumptions could result in criteria violations
- ▶ Issues that screen out in the short term may need attention and long-term development of EE and DG to mitigate risk
- ▶ How we may be able to mitigate the risk
 - ▶ Examine multiple scenarios in long-range plan
 - ▶ Continue to use geographical targeting subcommittee to identify areas where DG and EE can help mitigate

Next steps

- ▶ Review VSPC comments on scope
- ▶ Perform analysis and consult DUs on results
- ▶ Present draft report at January meeting

Regional/ISO-New England Updates

Pay for Performance FERC compliance filing

DG Forecast Working Group update

Status of ISO-NEVT/NH needs study update

Winter 2014-2015 reliability

Capacity zone proposal approved by FERC

DG Forecast Working Group (DGFWG) recap

- ▶ Formed in the fall of 2013 to estimate the expected rapid growth of DG in New England and understand impact on grid
- ▶ Participation from state reps, TOs, DUs, advocates
- ▶ Originally to be used for transmission planning and resource adequacy
- ▶ Focus on PV as that is the growth area
- ▶ PV forecast developed and included with CELT

ISO-NE DGFWG PV Forecast

States	Annual Total MW (MW, AC nameplate rating)											Totals
	Through 2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
CT	73.8	46.2	39.3	53.0	34.7	34.7	13.1	13.1	13.1	13.1	11.6	345.4
MA	361.6	168.5	117.4	110.5	103.6	98.7	98.7	98.7	32.9	32.9	32.9	1,256.4
ME	8.1	2.0	1.9	1.8	1.6	1.6	1.6	1.6	1.6	1.6	1.6	25.2
NH	8.2	2.5	2.3	2.2	2.0	2.0	2.0	2.0	2.0	0.7	0.7	26.7
RI	10.9	7.3	5.4	3.7	1.2	1.2	1.2	1.2	1.2	1.2	1.2	35.5
VT	36.1	20.1	13.4	7.0	6.5	6.5	6.5	6.5	6.5	6.5	1.7	117.3
Annual	498.7	246.5	179.6	178.1	149.6	144.8	123.1	123.1	57.3	56.0	49.7	1,806.5
Cumulative	498.7	745.2	924.8	1102.9	1252.5	1397.3	1520.4	1643.6	1700.9	1756.9	1806.5	1,806.5

**Estimated Summer Seasonal Claimed Capability (SCC), In MW; Based on 35% of AC Nameplate Rating
[Assume Winter SCC equal to zero]**

Annual Summer SCC (MW)	174.5	86.3	62.9	62.3	52.4	50.7	43.1	43.1	20.1	19.6	17.4	632.3
Cumulative Summer SCC (MW)	174.5	260.8	323.7	386.0	438.4	489.0	532.1	575.2	595.3	614.9	632.3	632.3

That's a lot of PV!

- ▶ 2023—13% of energy in some hours
- ▶ ISO now **NOT** willing to include in resource adequacy determinations
 - ▶ States and some utilities urging ISO to not ignore these benefits
- ▶ ISO extremely concerned about interconnection requirements—state standards need to be updated
- ▶ ISO planning to use in transmission planning studies (and assume that interconnection concerns will be addressed)

Summary of interconnection issues— 7/11 PAC/DGFWG meeting (1)

- ▶ Most DG is connected onto distribution system through inverters
- ▶ ISO recommends that tech specifications be revised for inverter-interfaced DG to incorporate “grid-support” functionalities—“smart inverters” could provide in autonomous manner
 - ▶ High/low frequency and voltage ride through
 - ▶ Default and emergency ramp rate limits
 - ▶ Voltage support
 - ▶ Communications capability to activate/deactivate DG
- ▶ Benefits include avoidance of retrofits, improved performance of distribution and power system

Summary of Interconnection Issues— 7/11 PAC/DGFWG meeting (2)

- ▶ Avoid Germany Experience of retrofitting after the fact—\$\$\$
- ▶ IEEE 1547a allows for ride-through and output control
- ▶ Experience from CA smart-inverter working group—already going through experience

Use of PV forecast in long-term planning

- ▶ Proposed that PV be discounted to 26% of capacity in planning studies
 - ▶ Reviewed PV output during summer reliability hours (2-6PM)
 - ▶ Median value varies between 18% and 33% at hour ending 17 and 18
- ▶ Recognized challenge of geographic distribution of forecast
 - ▶ MA DG distributed via available distribution interconnection queues, SREC data
 - ▶ DG equally distributed in other states—VELCO requested ISO-NE refer to SPEED web-site for better data
 - ▶ ISO will review impacts on critical load levels in VT and MA studies
- ▶ Significant discussion on treatment of existing DG in forecast—ISO: existing “water under the bridge”

Use of PV forecast in transmission planning

States	Annual Total MW (MW, AC nameplate rating)											Totals
	July-Dec 2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
CT	18.8	46.2	39.3	53.0	34.7	34.7	13.1	13.1	13.1	13.1	11.6	280.4
MA	129.6	168.5	117.4	110.5	103.6	98.7	98.7	98.7	32.9	32.9	32.9	1,024.4
ME	3.1	2.0	1.9	1.8	1.6	1.6	1.6	1.6	1.6	1.6	1.6	20.2
NH	3.2	2.5	2.3	2.2	2.0	2.0	2.0	2.0	2.0	0.7	0.7	21.7
RI	4.9	7.3	5.4	3.7	1.2	1.2	1.2	1.2	1.2	1.2	1.2	28.6
VT	11.1	20.1	13.4	7.0	6.5	6.5	6.5	6.5	6.5	6.5	1.7	82.3
Annual	170.7	248.6	178.8	178.1	148.8	144.8	123.1	123.1	67.3	68.0	48.7	1478.6
Cumulative	170.7	417.2	688.8	774.8	824.6	1068.3	1182.4	1315.8	1372.9	1428.8	1478.6	1,478.6
Final Annual Value after Discount Based on 26% Performance Factor for Planning Studies	44.4	64.1	46.7	46.3	38.9	37.6	32.0	32.0	14.9	14.6	12.9	384.4
Final Cumulative Value after Discount Based on 26% Performance Factor for Planning Studies	44.4	108.5	155.2	201.5	240.4	278.0	310.0	342.0	357.0	371.5	384.4	384.4

Next steps

- ▶ PSD to get stakeholders together to discuss interconnection issues
 - ▶ NPCC standard for frequency ride through (all other states use)
- ▶ States considering continuing to push on inclusion for resource adequacy (if “water under the bridge” then count it and save ratepayer \$)
 - ▶ http://nescoe.com/uploads/NESCOE_LoadForecast_InclusionSolar_13June2014.pdf
- ▶ Provide as much data to ISO as possible
- ▶ Update PV forecast—MW (e.g., VT 15% net metering cap, standard offer, etc.)

PAC/DGFWG materials—7/11

- ▶ Includes presentations from EPRI, SDG&E, CA PUC, Enphase Energy, and ISO
- ▶ http://www.iso-ne.com/committees/comm_wkgrps/prtcpnts_comm/pac/mtrls/2014/jul112014/index.html