NTA Study Group Presentation

to the

VELCO Operating Committee

November 15, 2012

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The short story…

- Central VT problem does not appear to require a T solution now.
  - Core resources (supply and demand-side) of an NTA solution are already being procured via existing VT initiatives and policies.
  - Must gain buy-in from ISO-NE on the assumptions.
- If the assumptions about load or resources change, we have credible tools available to respond.
  - Feasible (i.e., not speculative); could procure if we need to.
- Need to reach closure based on economic analysis and ISO input, to support a final assessment and decision by managements.
- In the meantime, must address potential for additional standard offer exempt from cap.

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Central VT deficiency

- 115 kV lines and Coolidge autotransformer overloaded due to N-1-1 contingency.

Overloads	Vermont load (MW)	New England load (MW)
Coolidge autotransformer	1050	28200
K-32 (18.2mi Coolidge-Cold River)	1010	27100
K-35 (5.6mi Cold River-North Rutland)	1045	28000

- Transmission solution for K-32 & K-35.
  - Construct a new 345 kV line at $157MM (2016$$)
  - Coolidge Auto ($23MM) would be deferred if new 345 kV line is built, but needed soon otherwise.

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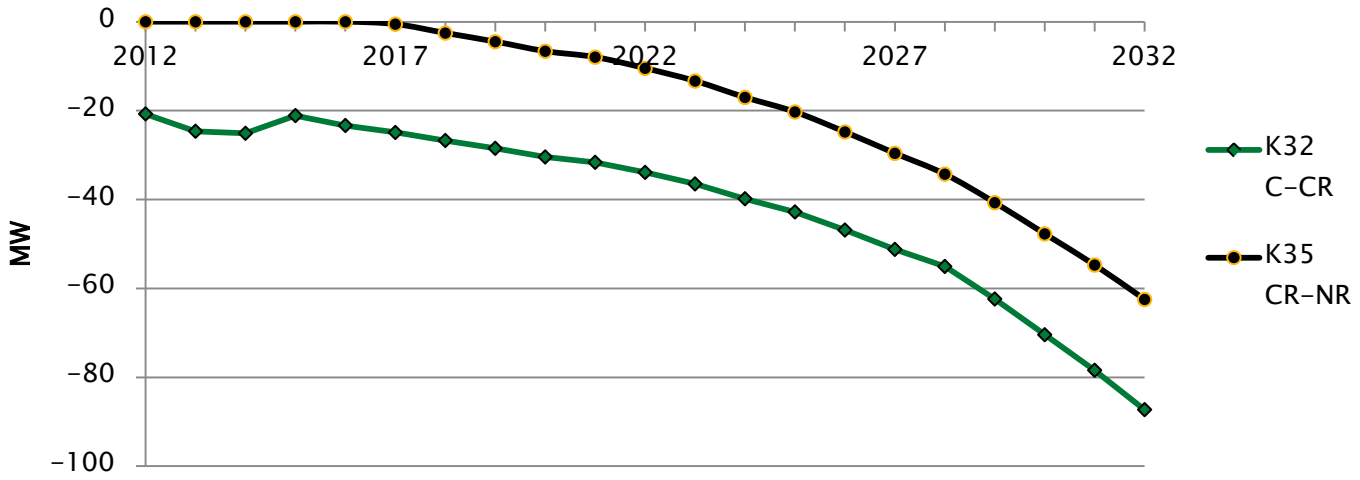
Reliability margin by line section



- Negative margin => reliability gap, upgrade/resources needed.
- Coolidge-Cold River is the most immediate Central VT need; defines need date for the T solution.
  - Assumes 2nd K31 line, and Coolidge transformer upgrades that do not have NTA potential.
- Most NTA locations that addresses the Coolidge-Cold River need will also address the other Central VT needs.
- T-solution for Coolidge-Cold River line would increase flows to other Central VT lines and lines in NW VT.
  - Increase reliability gap associated with these other lines.

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Main criteria for evaluating NTA vs T solutions

- Availability: Be able to perform as long as the emergency event exists.
  - For study purposes assumed:
    - Five 6-hour days (30 hours) every ten years
    - Based on failure probability of limiting contingencies.
- Cost-effectiveness: be less costly than the preferred transmission solution.
  - Evaluate using both societal & ratepayer tests.
- Longevity: Be able to resolve the reliability concern for a sufficient duration.
  - And be able to respond to changes, if/when they occur, without compromising the system.

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NTA longevity requirements

- Main factors affecting longevity.
  - The scale and growth of the reliability concern.
    - Year 1 reliability gap is relatively small (closer to 10 MW as opposed to 100 MW or more).
    - Effective NTAs can be drawn from a relatively large area (e.g., covering 50% of the state's load).
    - Gap projected to grow slowly for first 15 years (Slide 3).
      - For Central VT, the gap is growing at less than 5 MW per year.
    - Initial gap and growth rate shown in earlier slides do not reflect ongoing and planned programs that are growing.
      - Standard offer SPEED generation.
      - Net metering generation.
- These factors indicate a good opportunity for an NTA solution.

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Effectiveness of NTA resources

- Depends in part on resource type.
  - Technical characteristics.
  - Coincidence with VT summer peak.
- Values assumed in NTA study.
  - Farm Methane – 50%
  - Run-of-river hydro – 10%
  - Solar – 50%
  - Wind – 5%

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Effectiveness also depends on location

Load Zone	Load zone name	Relative Effectiveness Factors (for Central Vermont deficiency)
A	Newport	41%
B	St. Albans	62%
C	Johnson	57%
D	Morrisville	37%
E	Montpelier	59%
F	St. Johnsbury	18%
G	BED	82%
H	Essex/IBM	78%
I	Burlington GMP	79%
J	Middlebury	92%
K	Central	22%
L	Florence	100%
M	Rutland	98%
N	Ascutney	7%
O	Southern	-2%
P	Highgate	60%

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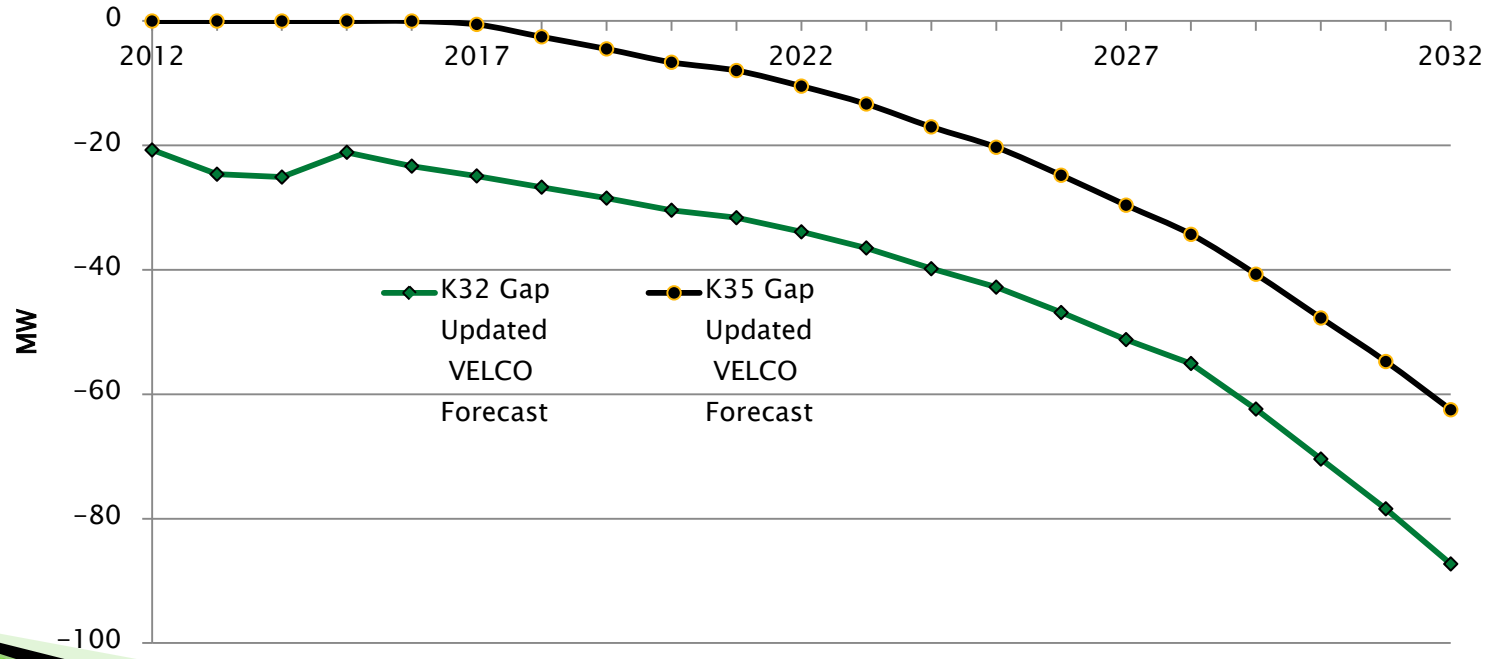
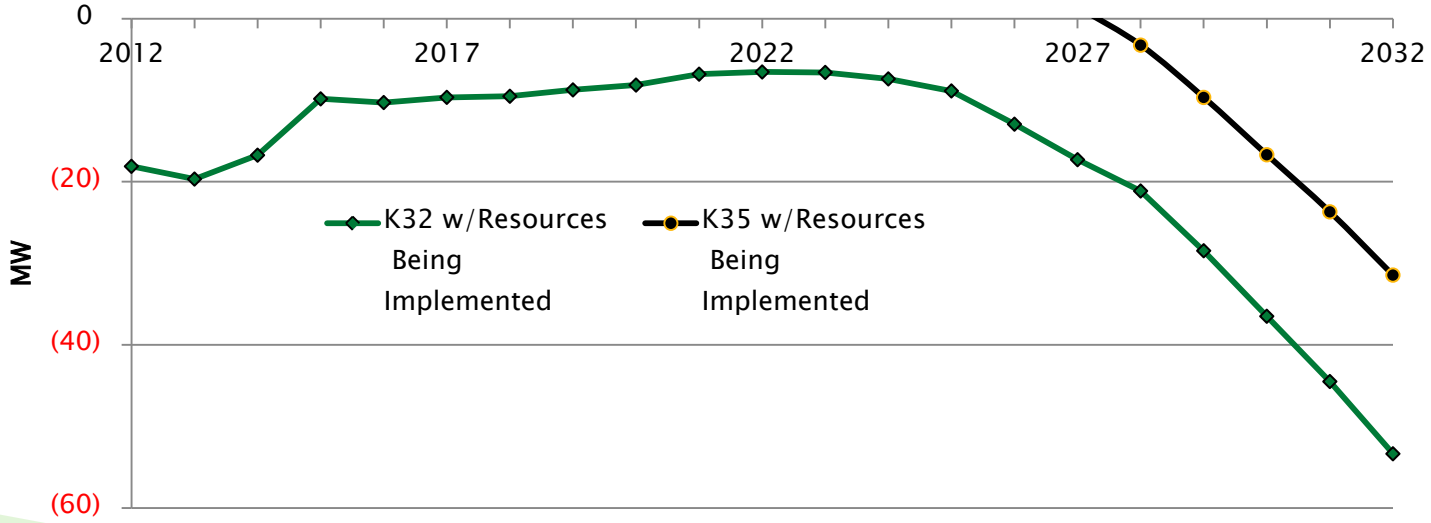
Updated VELCO load forecast

- Performed October 2012 by Itron.
- LRP methodology; updated economic assumptions (e.g., VT GDP growth).
- Resulting reliability gaps for Central:



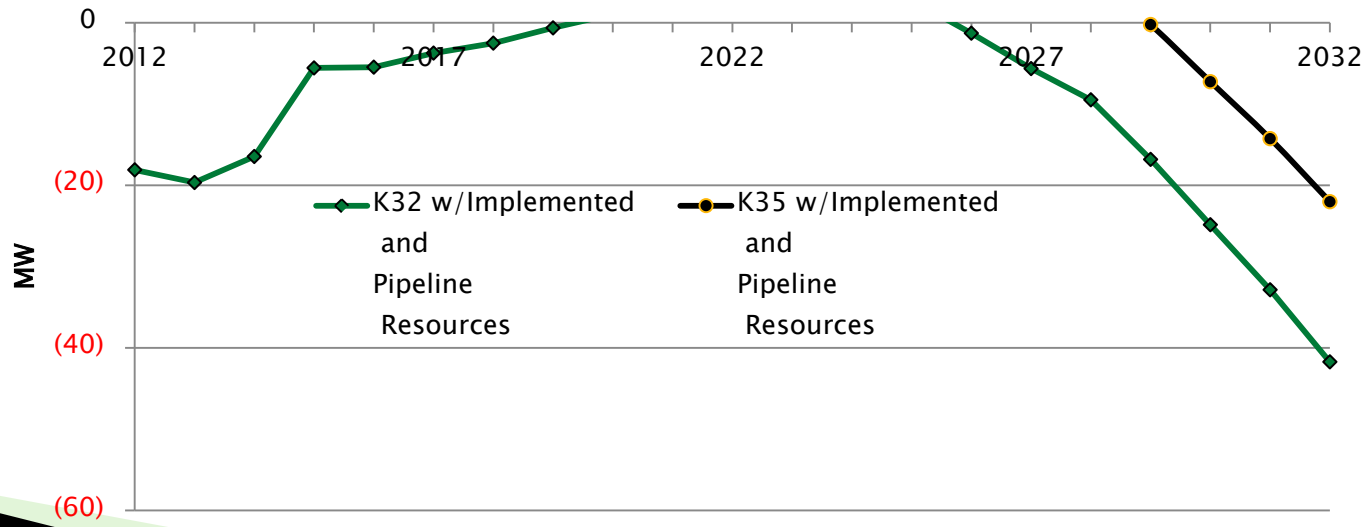
Resources already being implemented

- Standard offer contracts; net metering not in load forecast; GMP's CEED Fund (electric).
- Resulting effective resources (through 2025):
  - 33.9 MW Coolidge – Cold River
  - 31.0 Cold River – North Rutland



Other initiatives in pipeline now (not yet in full implementation)

- Smart grid-enabled DR & retail rate plans; GMP's "Solar Capital" program
- Additional effective resources (through 2025)
  - 13.3MW Coolidge – Cold River
  - 11.3MW Cold River – North Rutland



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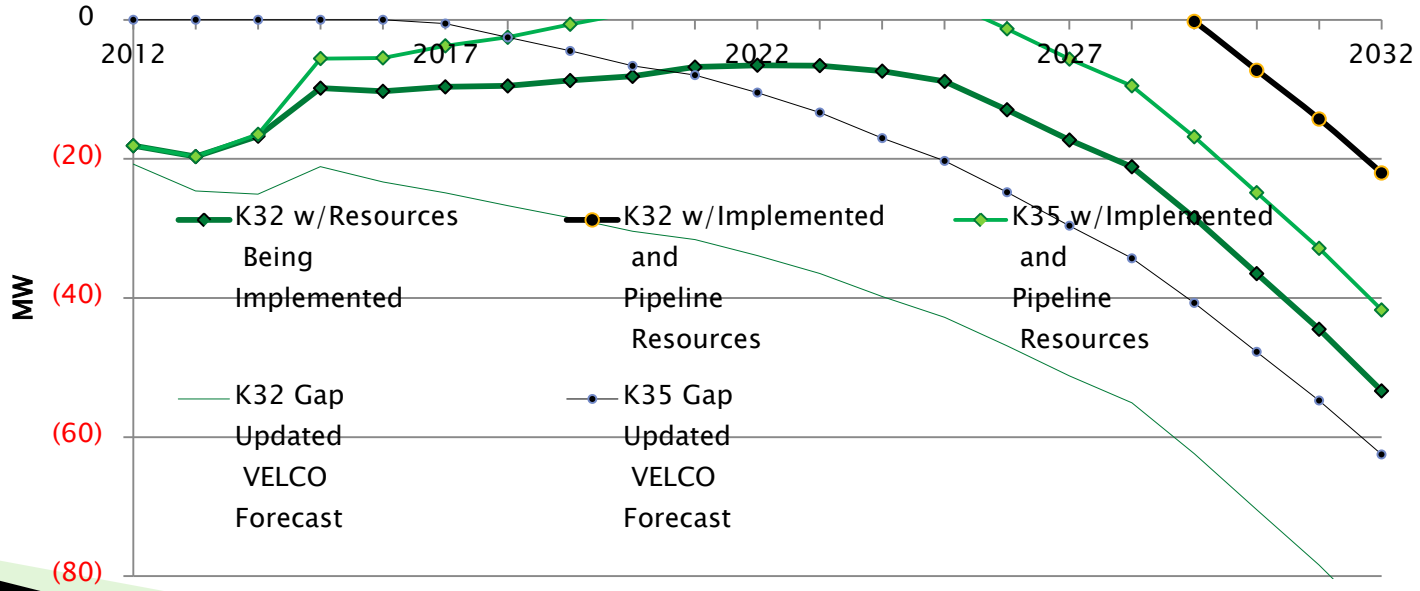
Conclusions

- NTA appears viable for Coolidge – Cold River
  - Amount & timing of any additional resources required will depend in part on resources in the pipeline
  - Any ISO revisions to VT forecast
- Cold River – North Rutland
  - Gap addressed with resources being implemented



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Strategy to meet projected gap

- Nature of reliability gap.
  - Relatively modest and ‘flat.’
- Gap will evolve based on several factors.
  - Changing VT peak forecast.
  - Shape & timing of the peak.
  - Pace & shape of multiple arriving NTA resources.
  - “New” type of resources: EE, DG, rate design etc.
- Departure from historic conditions.
  - Steadier growth over a longer term.
  - Primary variable was the inherent peak growth rate.
  - Build-out with conventional G & T resources.

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Strategy to meet projected gap

- To manage the evolving gap over time:
  - Seek ‘flexible’ solutions.
    - Ability to ramp up (perhaps down).
    - Avoid major long-term investments unless/until required.
  - Ongoing monitoring.
- Re-evaluate in future LRPs (or if major changes are observed between LRPs).
  - Refine solution.
  - Build the ‘right’ resources in the ‘right’ areas.
  - Select amounts to achieve/exceed planning criteria.

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Apply strategy to projected gap

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Reliability Gap	18	20	17	10	10.3	9.6	9.5	8.7	8.1	6.8
Gap w/ Initiatives	18	20	16	6	5.5	3.7	2.5	0.6		

- Gap decreasing over time.
- Attributes of a good resource "fit" would be:
  - Bring on-line by 2016
  - Flexible
  - 'N-1-1' infrequent event => 30 Hours over 10 yrs
    - Look more like a capacity resource
    - As opposed to a base-load generator

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Apply strategy to projected gap

Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Total MW-Yrs 2016-2021	NTA ($MM) $86/kW-Yr
K32 Gap Implemented	18	20	17	10	10.3	9.6	9.5	8.7	8.1	6.8	53.1	4.6
K32 Gap Implement + In-pipeline	18	20	16	6	5.5	3.7	2.5	0.6			12.4	1.1

- Variable amount of DR in combination with resources being implemented and in-pipeline appear to meet criteria for over 10 years.
- An emerging hybrid solution.
  - Construct 2nd Coolidge Auto ($23M, in 2016$$)
  - NTA resources defer new 345kV line from Coolidge-N. Rutland
- $1 to $5MM of DR would help to defer:
  - $157MM - $23MM = $134MM net Transmission, <u>all PTF</u>

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Next steps

- Meet With ISO Nov 27.
  - Present a viable NTA solution.
- Complete NTA study.
  - Evaluate EE potential & cost.
  - Economic analysis.
  - Address uncertainties.
- Brief DU management teams
- Finalize NTA study & action plan in 2013
  - After ISO updates the VT needs assessment ??