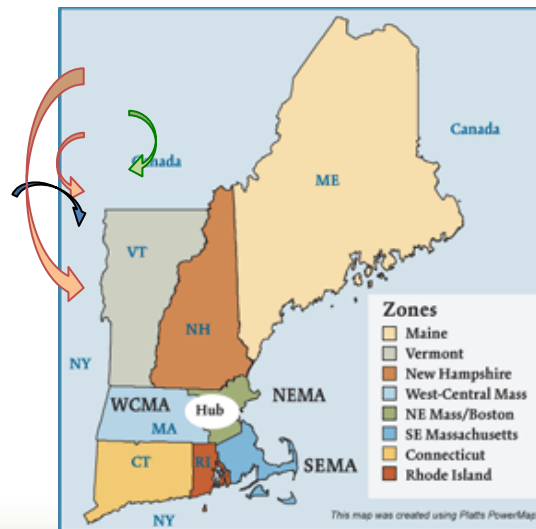


# New England Infrastructure Initiative

## Status Update and VT Power Import Alternatives

Operating Committee

May 15, 2014



Prepared for: *VELCO Board of Director*

MOVING **POWER**. MOVING **FORWARD**.



# Presentation Overview

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## 1. Current State of Affairs

- Regional Infrastructure Initiative
- Regional Transmission Development Activities
- VELCO's Role

## 2. Transmission Project Development Models

## 3. VT Transmission Alternatives

- Project Configurations
- Proposed Evaluation Methodology
- Preliminary System Impact Review
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## 4. Proposed Next Steps

- Remaining Activities

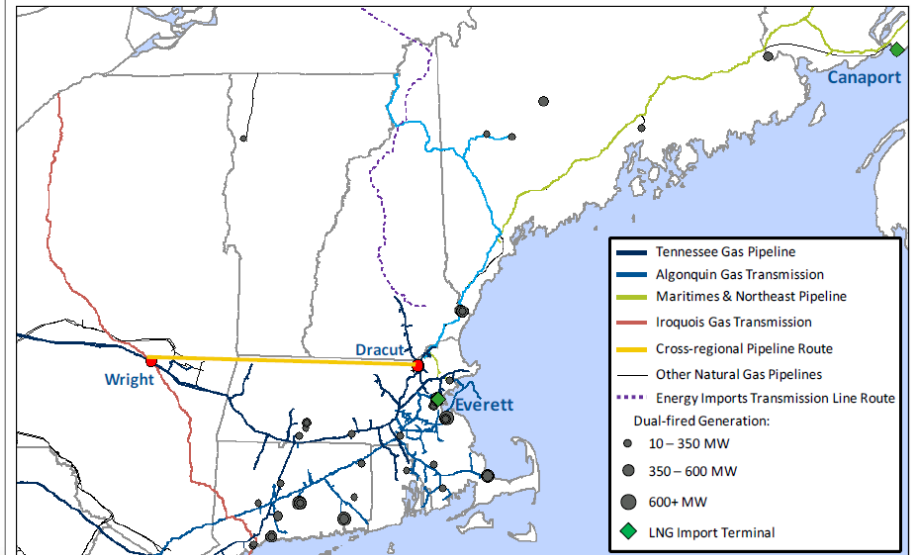
# Current State

## Regional Infrastructure Development Initiative

- **NE states, NESCOE and ISO-NE are pursuing a two-part regional infrastructure initiative intended to address:**
  - System reliability issues due to lack of generation when it's most needed in winter
  - Anticipated retirement of 4,000MW of generation in next five years, which will exacerbate problems
  - Electricity price spikes tied to use of oil/coal-fired generation resulting from gas-fired generation deficiency
  - Statutory RPS/GHG requirements, primarily those of CT and MA
- **Stakeholders engaged in initiative include:**
  - States' regulators and governor's staffs
  - NESCOE with assistance of Black & Veatch
  - ISO-NE
- **NESCOE request of ISO-NE:**
  - Provide technical planning and related support to secure 1,200MW to 3,600MW of new hydro/wind power, and 1,000 mmcf/day above 2013 levels of additional firm natural gas pipeline capacity
  - Provide regulatory assistance to develop and file any changes needed to ensure that an "appropriate" allocation of costs amongst New England states

### Proposed Cross-Regional Gas Pipeline

*Early estimate from B&V Gas report indicated a \$1.2B investment which appears to be very low for a greenfield pipeline project.*



**Proposed Pipeline Capacity Expansion Project (Yellow)**

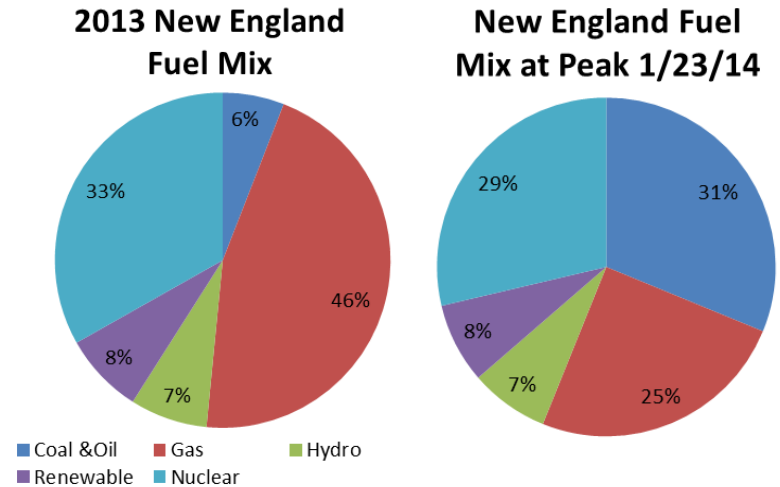
# Current State

## Regional Infrastructure Development Initiative

- **ISO-NE's Position:**

- Colder 2013/2014 winter weather created market electricity spikes due to deficiency in natural gas pipeline supply deliverability – \$1.1B in unexpected incremental energy costs in January 2014.
- Winter reliability program was key *“in keeping the lights on”* during coldest days of January when generation shifted from gas to oil and coal.
- ISO-NE has reiterated reliability risks associated with anticipated generation plant retirements in region (4,100MW, including 660MW in Vermont), *“The region is in a precarious position for the next several winters as major non-gas resources retire and proposed market enhancements and energy infrastructure improvements are years away.”*
- In light of this winter's operating conditions, ISO-NE may continue its winter reliability program and believes regional infrastructure initiative is best alternative to resolve reliability issues related to fuel supply and generation deficiency.

Fuel Generation Mix during Winter Peak vs. Average



| Total MW Retiring in New England* |                 |
|-----------------------------------|-----------------|
| Connecticut                       | 528 MW          |
| Maine                             | 159 MW          |
| Massachusetts                     | 2,682 MW        |
| New Hampshire                     | 56 MW           |
| Rhode Island                      | 64 MW           |
| Vermont                           | 666 MW          |
| <b>Total</b>                      | <b>4,155 MW</b> |

\*Megawatts based on relevant Forward Capacity Auction (FCA) summer qualified capacity (NOTE: total includes full and partial generator and demand response Non-Price Retirement (NPR) requests for Capacity Commitment Period (CCP) 2013-2014 through CCP 2017-2018)

Source: Status of Non-Price Retirement Requests; December 20, 2013

# Current State

## Regional Infrastructure Development Initiative

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- **New England Regulators:**

- States' technical/policy staffs convening teleconferences every week and in-person meetings every two or three weeks seeking agreement on how to solicit and pay for proposals to build electric and gas transmission
- In addition to ensuring reliability and eliminating price spikes, some states driven by opportunity to expand gas service
- The only cost/benefit metric criteria being utilized is LMP suppression; project cost allocation continues to serve as the largest obstacle to agreement
- Current timeline is tied to passage of legislation in MA and NEPOOL agreement process with an RFP issued in October 2014 timeframe

- **Vermont Regulators:**

- Conditions of support for regional initiative: benefits must exceed costs (LMP suppression); region-wide NTA requirement for reliability projects; better project cost discipline
- Counting on VELCO/DUs to ascertain proposed project system impacts and costs
- Counting on VELCO/DU to negotiate and secure majority of value for Vermont out of any successful project

- **FERC's reaction:**

- Reportedly reacted negatively to concept of including natural gas infrastructure development costs in RNS rates
- Reportedly less concerned with contemplated cost recovery for transmission projects consistent with Order 1000

# Current State

## Regional Transmission Development Activities

- **Available Hydro Resources:**

- Based on Black and Veatch's report, approximately 2,000MW of new resources will be available on Hydro Quebec's System by 2022. This may be inadequate supply to support all proposed projects

- **Multiple transmission projects proposed by independent developers in New England:**

- **Grand Isle Intertie (GII)** in NY & NE (400MW from NY to Essex, Anbaric)
- **New England Clean Power Link (NECPL)** (1,000MW from HQ to Coolidge, Blackstone)
- **Green Line Project** (1,000MW from Maine to Greater Boston, Anbaric/Cianbro/Powerbridge)

- **New England TO/HQ engaged in development of transmission projects:**

- **Northeast Energy Link (NEL)** (1,100MW from Canada/Maine to South NE, NGrid/Emera)
- **Northern Pass (NPT)** (1,200MW from HQ to Deerfield, Northeast Utilities)
- **Highgate Expansion** (425MW from HQ to Essex, Hydro Quebec)



Note: HQ Hydro Resource

# Current State

## VELCO's role as Vermont's Transmission Operator

- **VELCO's Responsibilities as Interconnecting Utility**

- Participate in interconnection studies as part of ISO-NE review process to ensure no adverse impact on system reliability or operability, which studies currently include GII, NPT, NECPL, HQ and NU for a total of **3,525MW**
- Perform other interconnection services pursuant to ISO Three-Party Interconnection Agreement, including making system improvements required to support new interconnection (paid for by developer)
- Developer is responsible for capital investment as well as on-going maintenance of system upgrades/reinforcements identified in studies (operating and maintenance expense billed back to developer)
- System studies are critical to adequately address future operation/maintenance needs and anticipate future system restrictions and limitations

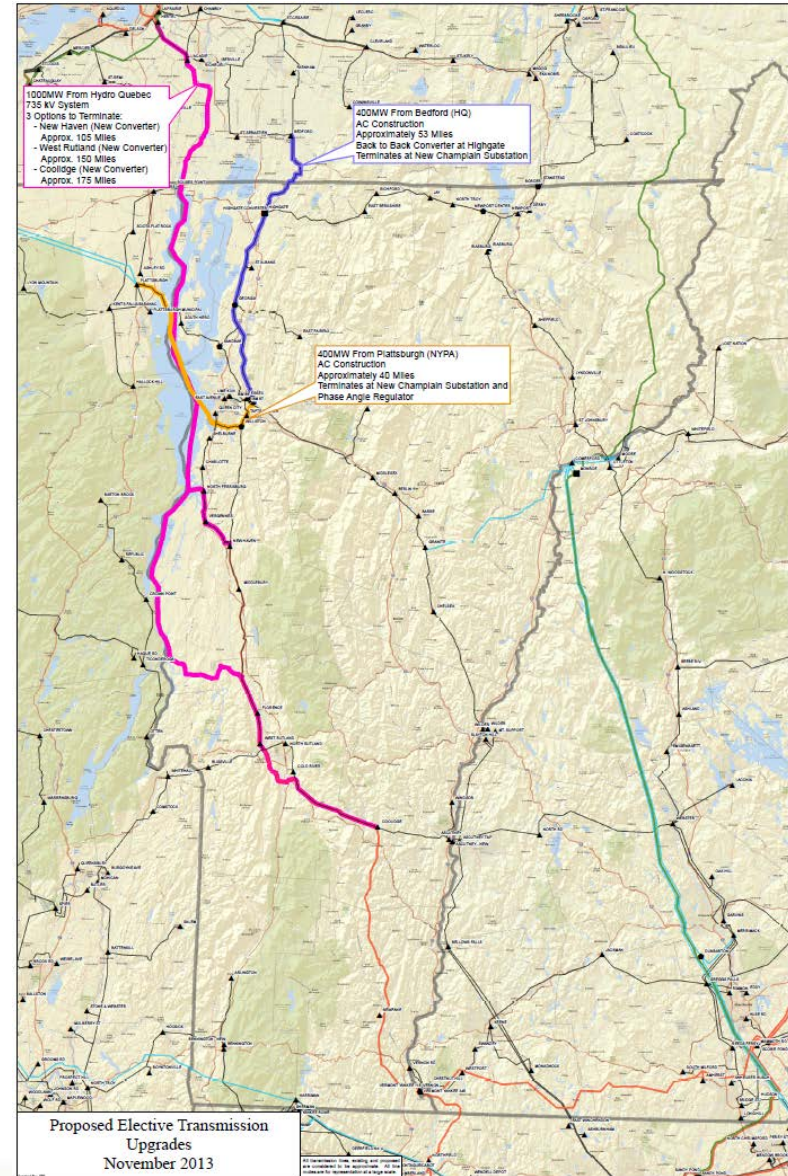
- **VELCO's Responsibility as VT's transmission resource**

- Assess the impact of proposed projects on current and future use of VELCO's right of ways and ensure appropriate compensation for collocated infrastructure
- Review transmission cost impact to protect VT's ratepayers
- Assist the Vermont PSD and PSB in evaluating transmission alternatives
- Evaluate the technical and economic merit of projects to be included in regional transmission service rates

# Active Interconnection Requests

## Current Proposed Elective Transmission Upgrades (ETU)

1. NY-VT: **Grand Isle Intertie**
  - **400 MW** Capacity
  - HVDC Transmission Tie
  - Target In Service Date: 6/2017
2. HQ-VT: **New England Clean Power Link**
  - **1,000 MW** Capacity
  - HVDC Transmission Tie
  - Target In Service Date: 12/2018
3. HQ-VT: **Hydro Quebec**
  - **425 MW**
  - HVDC Transmission Tie
  - Target In Service Date: 06/2018
4. HQ-VT **Northeast Utilities**
  - **1200 MW**
  - HVDC Transmission Tie
  - Target In Service Date: 2017
5. HQ-VT **Northeast Utilities**
  - **500 MW**
  - HVDC Transmission Tie
  - Target In Service Date: 2017

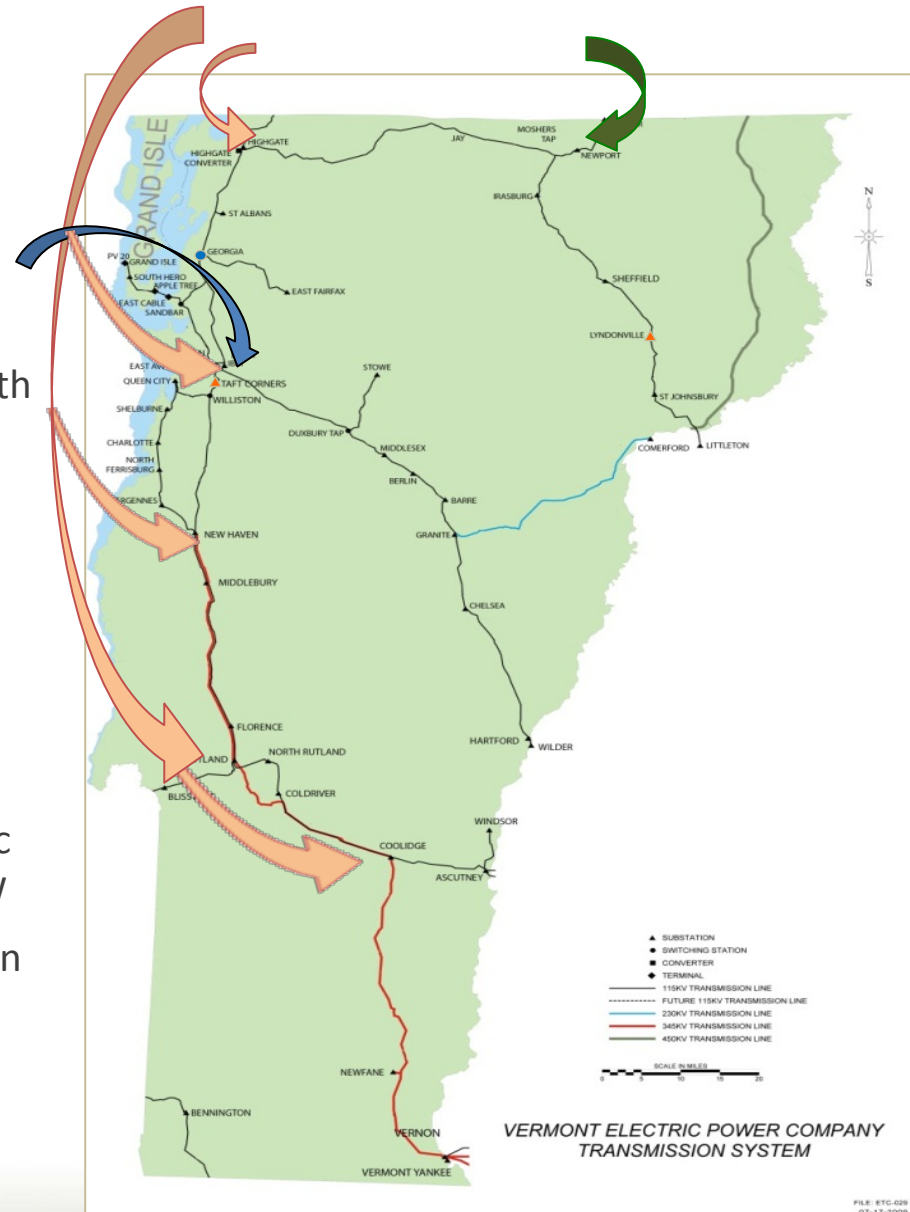




# Vermont Transmission Alternatives

## Potential Project Configurations

- VELCO is evaluating three major VT Import alternatives with a total of 12 technical configurations:
  - **New York Imports:** Power delivered to a new Champlain substation near Essex (400MW)
  - **Western Hydro Quebec Imports:** From Quebec on the northwest side of the state with 5 alternative delivery points
    - Highgate (425 MW)
    - Champlain (425 MW)
    - New Haven (600 MW / 1,000 MW)
    - West Rutland (1,000 MW)
    - Coolidge (1,000 MW)
  - **Eastern Hydro Quebec Imports:** From Quebec via Newport at 100MW, 200MW and 400 MW
- All alternatives would require ancillary transmission upgrades to address reliability concerns
- Alternatives include AC and DC technologies depending on location, import levels and technical requirements



# Vermont Transmission Alternatives

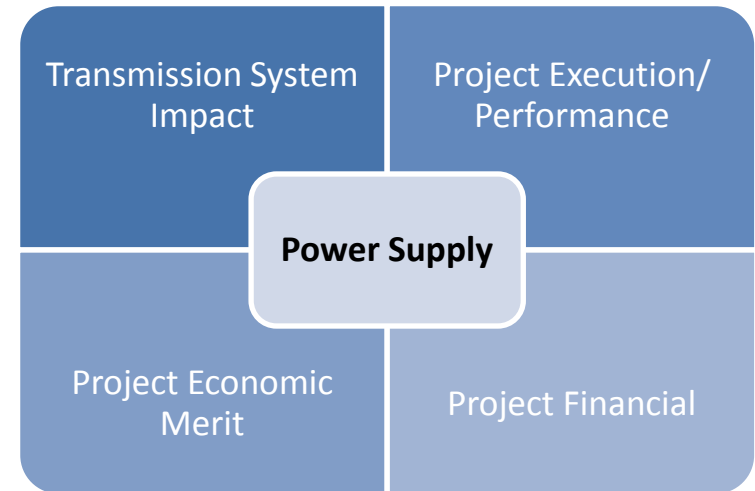
## Proposed Evaluation Methodology

- **Evaluation and Screening Criteria**

- Evaluation criteria developed in consultation with VT PSD and shared with VDUs for their input, with the objective of performing an evaluation of anticipated project performance, including:
  - Power Supply: Regional diversity, energy capacity, state renewable goals, regional RPS, LMP benefit, etc. Power supply information is not included currently and will be completed based upon information received from distribution utilities
  - Transmission System Impact: Regional and local reliability, operability, interface limit relief and other impacts/benefits
  - Project Execution: Permitting and constructability
  - Economic/Project Costs: Order of magnitude project cost analysis, including preliminary estimate of ancillary upgrades

- **Objective of this evaluation**

- Understand implications of these projects, determine their costs and benefits and assess the value to the Vermont DUs, VELCO and the state
  - In order to assess project value, analytic work is essential to quantify expected costs and benefits
  - Transmission upgrades need to be evaluated against other solutions
  - Methodology can be leveraged to evaluate other proposed solutions in New England
  - Process requires transparency and collaboration with all regional stakeholders
  - Anywhere from \$8B to \$10B in infrastructure investments have been proposed across New England. A comprehensive assessment is critical to ensure that potential benefits are realized



**Note:** Transmission Alternative Evaluation Matrix

# Vermont Transmission Alternatives

## Preliminary System Impact Review

- **Objective and Scope of this review**
  - Develop a better understanding of impacts of interconnecting potential projects to VELCO's transmission system
- **Preliminary study findings**
  - Under normal transmission operating conditions, network cannot accommodate full dispatch of existing **local generation resources**
  - The following areas have been identified as requiring reinforcements under different import scenarios
    - **Zone 1** - Highgate to Champlain area for imports from Highgate
    - **Zone 2** - Champlain to New Haven area for imports from Highgate, Champlain and Newport 400MW
    - **Zone 3** – Northern VT area for imports from Newport
    - **Zone 4** – New Haven to Coolidge area for imports from New Haven and West Rutland
- **Currently excluded from this review**
  - Impact on sub-transmission system
  - N-1-1 contingencies
  - Dynamic performance and impact on neighboring systems



# Vermont Transmission Alternatives

## Preliminary Technical Project Performance/ Cost Review

- **Preliminary technical review findings**

- Technology selected (AC vs. DC) plays a critical role in system performance. The team identified flaws in some proposed technical solutions
- Level of import creates significant shifts in system current power flows and will require detailed studies

- **Economic review**

- Preliminary estimates indicate all alternatives exceed \$600M without contingency
- Understanding ancillary upgrades required for each alternative is critical as these may double a project's cost
- Estimates for some alternatives are as high as \$3B without contingency
- Some ancillary upgrades are estimated as high as \$1B for reviewed alternatives
- Submarine/ underground cables carry very high cost premium
- Some technologies are extremely expensive compared to traditional transmission reinforcement (HVDC technology)

- **Project permitting & execution review**

- Right-of-way alignment and line configurations will be key in defining project impact
- Some proposed projects may require corridor expansion
- Benefits to Vermont need to be clearly identified, quantified and prioritized

# Vermont Import Transmission Evaluation

## Next Steps

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- **Proposed actions to complete evaluation**
  - Finalize Preliminary Evaluation
    - Incorporate Vermont Distribution Utilities' input
    - Complete conceptual cost estimate and economic review
    - Complete initial risk analysis
    - Share preliminary results with state regulators