

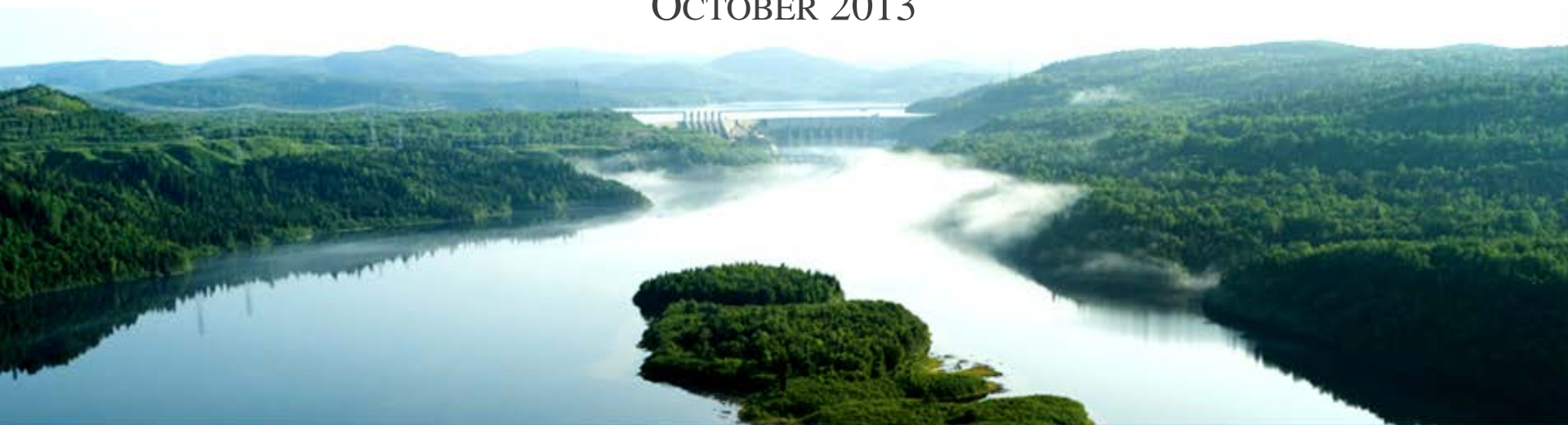


CHAMPLAIN HUDSON POWER EXPRESS

***Cost and Feasibility Analysis of a Third Converter Terminal for the Champlain
Hudson Power Express Project***

Prepared by TRC Solutions for Transmission Developers Inc

OCTOBER 2013



Potential Third Converter Terminal

Timeline:

- October 2012 Assemblyman Cahill , then Chair of the Assembly Energy Committee, requests TDI to evaluate the feasibility of locating additional converter stations along the route of the CHPE Project.
- November 2012 TDI retains Siemens Power Technologies International to evaluate the impact of a 3rd HVDC converter station for the proposed CHPE Project on the reliability of the New York State Transmission System (Power Flow Analysis).
- January 2013 Completed Siemens report. Provided copies to Assemblyman Cahill and Senator George Maziarz, Chair of the Senate Energy Committee.
- January 2013 Senator Maziarz requests cost/benefit analysis of 3rd converter station options that might alleviate regional transmission congestion.
- March 2013 TDI requests TRC Solutions to perform a cost/benefit analysis of adding a 3rd HVDC converter station.
- August 2013 TDI requests Siemens to review additional options.
- October 2013 Completed TRC report.

Siemens Power Flow Analysis

Power Flow Analysis (PFA) performed by Siemens Power Technologies International (Siemens PTI)

Purpose:

- Evaluated the anticipated impacts on New York's electric grid from adding a third 1,000 megawatt (MW) converter terminal to CHPE.
- Examined a number of potential locations for such a converter.

Siemens Power Flow Analysis

Study Criteria:

- Close proximity to CHPE
- Relieve congestion
- Ability to tie into electric system
- Maximize cost/benefit
- Not to level of ISO review; CARIS; STARS

Siemens Power Flow Analysis

Siemens PTI Conclusions:

- A third converter terminal could be located at the following locations:
 - **Option 1** - In the vicinity of the 345 kilovolt (kV) substation in the Town of New Scotland, Albany County, New York
 - **Option 2** - In the vicinity of the 345 kV substation in the Town of Leeds, Greene County, New York.
 - **Option 3** - In the vicinity of Marcy, Oneida County. Choosing this location would require substantial additional transmission infrastructure to be completed.

TRC Cost/Benefit Analysis

Option 1 – New Scotland Interconnection:

- Tapping into the Marcy – New Scotland line is physically feasible.
- **Capital cost** to do so: \$200 million
 - Converter terminal: \$175 million
 - Interconnection: \$25 million
- **Capacity and energy benefits:** \$75
- **Lifetime costs** of ownership: \$319 million
 - operation, maintenance, insurance and property taxes at 5% of first cost escalated by inflation (assumed to be 2% annually). TRC assumed a 40 year life for the facilities and straight line depreciation. The cost of capital was assumed to be 10%.

TRC Cost/Benefit Analysis

Option 1 - New Scotland Interconnection Analysis:

- Adding a converter terminal in New Scotland would allow power producers in Northeastern NY access to the New York market through the CHPE line.
- The cost of the New Scotland Tap would exceed the anticipated benefits of the upgrade.

TRC Cost/Benefit Analysis

TRC Conclusions – Option 2 – Leeds, Columbia County Connection:

- It is physically possible to connect the line at this location
- **Capital cost** to do so: >\$175 million
 - Converter terminal: \$175 million
 - Interconnection: >\$0 million but less than \$25 million
- **Capacity and energy benefits:** \$1
- **Lifetime costs** of ownership: >\$280 million

TRC Cost/Benefit Analysis

Option 2 - TRC Conclusions Leeds Interconnection:

- Adding a converter terminal in Columbia County would allow power producers in the Capital District and Hudson Valley access to the New York market and would reduce the transfer capacity from Western and Central New York to Eastern New York.
- The costs of the Leeds interconnection would exceed the expected benefits of the upgrade.

TRC Cost/Benefit Analysis

Option 3 - TRC Conclusions Marcy Area Interconnection:

- Tapping into the Marcy – New Scotland line is physically feasible, although would be more costly based on the need to build new transmission infrastructure.
- **Capital cost** to do so: > \$240 million
 - Converter terminal: \$175 million
 - Interconnection: >\$65 million
- **Capacity and energy benefits:** \$115 million
- **Lifetime costs** of ownership: >\$ 384 million

TRC Cost/Benefit Analysis

Option 3 - TRC Conclusions Marcy Interconnection:

- Adding a converter terminal in the Marcy Area would allow power producers in Northern, Western and Central NY to access the New York market by through the CHPE line.
- The costs of the Marcy interconnection would exceed the expected benefits of the upgrade.

TRC Cost/Benefit Analysis

Location	Lifetime Costs (millions\$)	Capacity and Energy Benefits (millions\$)	Net Benefit (millions\$)
New Scotland	\$319	\$75	(\$244)
Leeds	>\$280	1	<(\$279)
Marcy	>\$384	\$115	<(\$269)

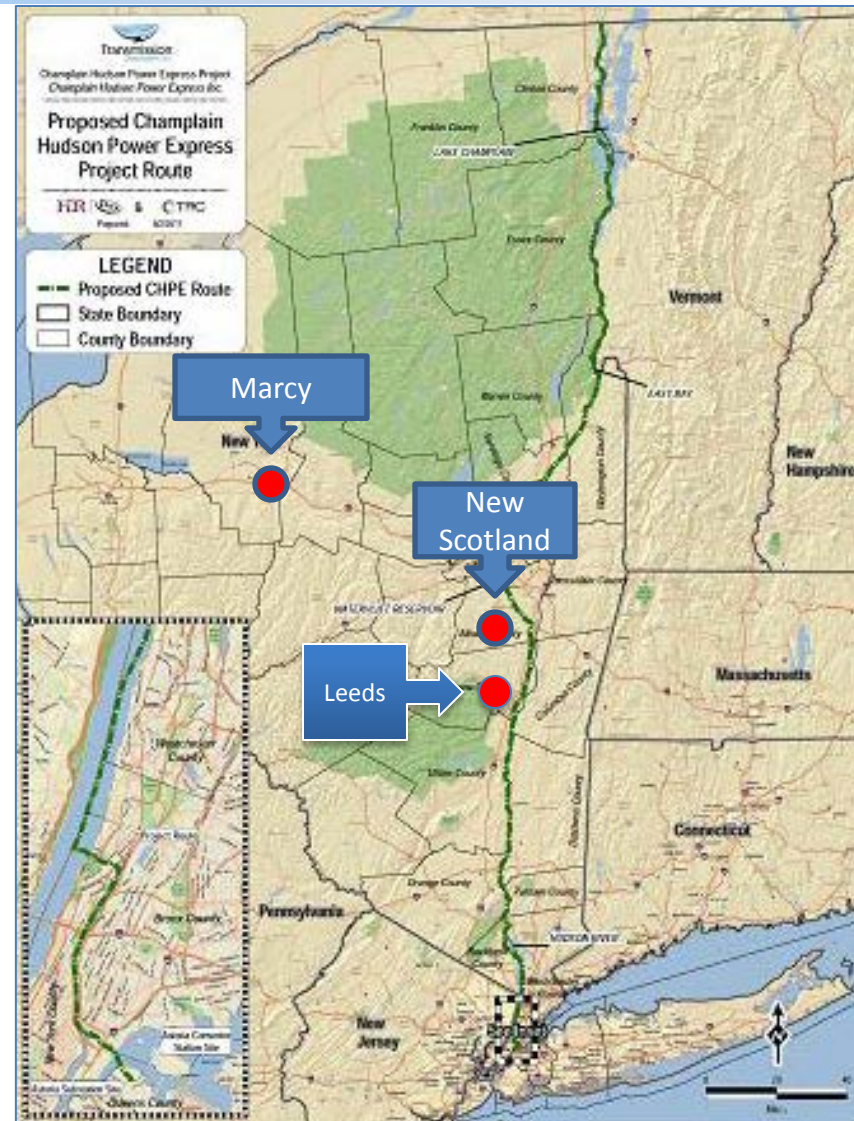
Potential Third Converter Conclusions

Conclusions:

It is feasible from an engineering standpoint to locate a 3rd Converter Station near New Scotland, Leeds or Marcy.

The costs of adding the 3rd converter station would far exceed the expected benefits.

While the New Scotland Tap offers the best alternative, the costs still exceed the expected benefits.



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