



HVDC Development in Alberta, Canada

Presented by Wes Kwasnicki, P.Eng., Ph.D.

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Agenda

- Alberta Long-term Transmission System Plan
- HVDC Project Strategy
- Technical Specification



Long-term Transmission System Plan

- Based on 10-year load forecast and 20-year generation build plan
- Staged in large increments
- High capacity transmission lines to minimize land impact
- Upgraded and new interties
- Critical components total cost is \$8 billion dollars

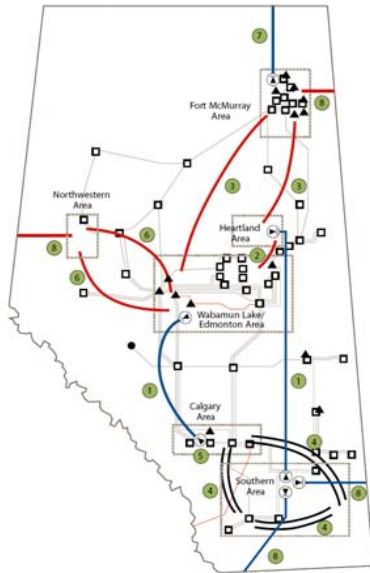


Note: For illustrative purposes only; does not depict actual line routes or substation locations



Long-term Transmission System Plan

Critical transmission development

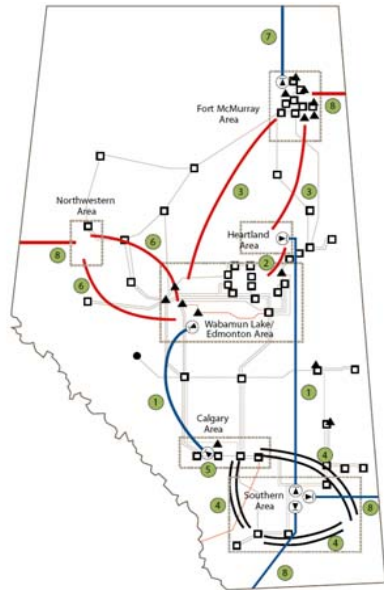


- **Two 500 kV HVDC high capacity lines** from the Edmonton area to the Calgary and South regions.
- One 500 kV double circuit AC line from the Edmonton area into the Industrial Heartland area
- Two 500 kV AC lines from the Wabamun Lake/Edmonton and Heartland areas to the Fort McMurray area.
- Two double circuit 240 kV lines and a new 500/240 kV substation in the South region to interconnect a significant renewable generation source (wind power).
- A 240 kV substation in the south Calgary area.



Long-term Transmission System Plan

Additional transmission development



- Two 500 kV AC lines connecting Wabamun Lake/Edmonton area and the Northwest region to accommodate large-scale biomass or low-emission generation.
- **An HVDC line** or equivalent AC line to a potential major hydroelectric generation facility in the Northeast region.
- Options for new interties to neighbouring jurisdictions are currently being assessed:
 - ▶ Southern Alberta to the U.S. Pacific Northwest (HVDC)
 - ▶ Southern Alberta to Saskatchewan/Manitoba (HVDC)
 - ▶ Northern Alberta and northern B.C.
 - ▶ Northern Alberta and northern Saskatchewan



HVDC Project Strategy

- The Alberta Provincial Energy Strategy was released in January 2009.
- System plan includes two +/-500kV D.C. lines from Edmonton to Calgary
- The Government's goal is to start construction by the end of 2010.
- AESO has hired Teshmont to carry out the front end system studies required for a HVDC technology solution.
- AltaLink has formed the HVDC Task Force to provide support to the project and to ensure delivery of a satisfactory product. The primary goal of the team is to have a full technical and commercial specification ready for tender in early 2010.

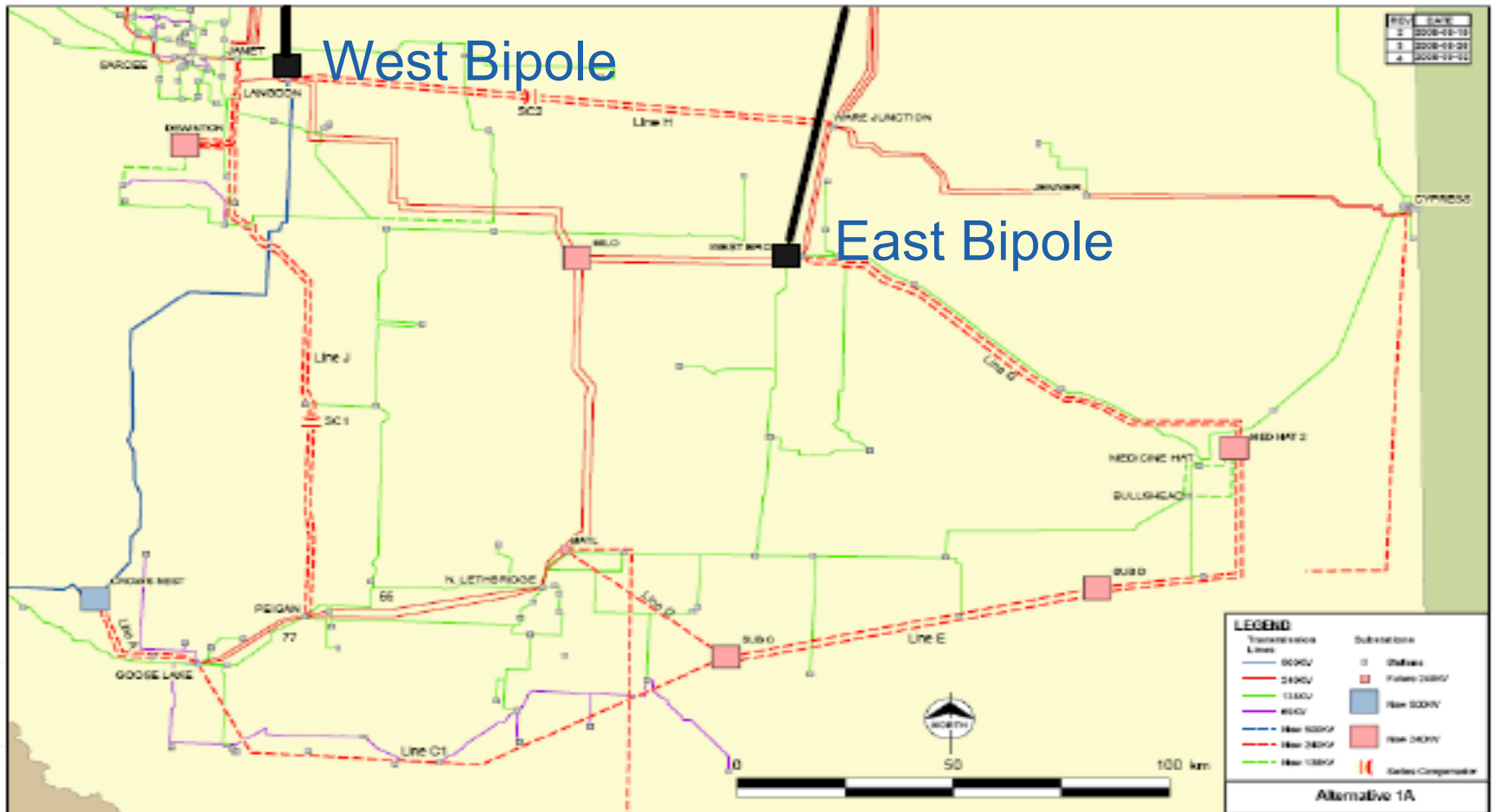


Technical Specification

- Two HVDC Bipoles:
 - ▶ **West:** from Genesee to Langdon; approximately 350 km
 - ▶ **East:** from Heartland to West Brooks; approximately 550 km
- Voltage: +/- 500 kV
- Initial capacity: 2000 MW (may increase to 3000 MW in Stage 2)
- DC line designed to the minimum of 3000 MW
- Metallic return considered due to the extensive pipeline network in the area
- Coordination of controls: two bipoles, SVCs, reverse powerflow

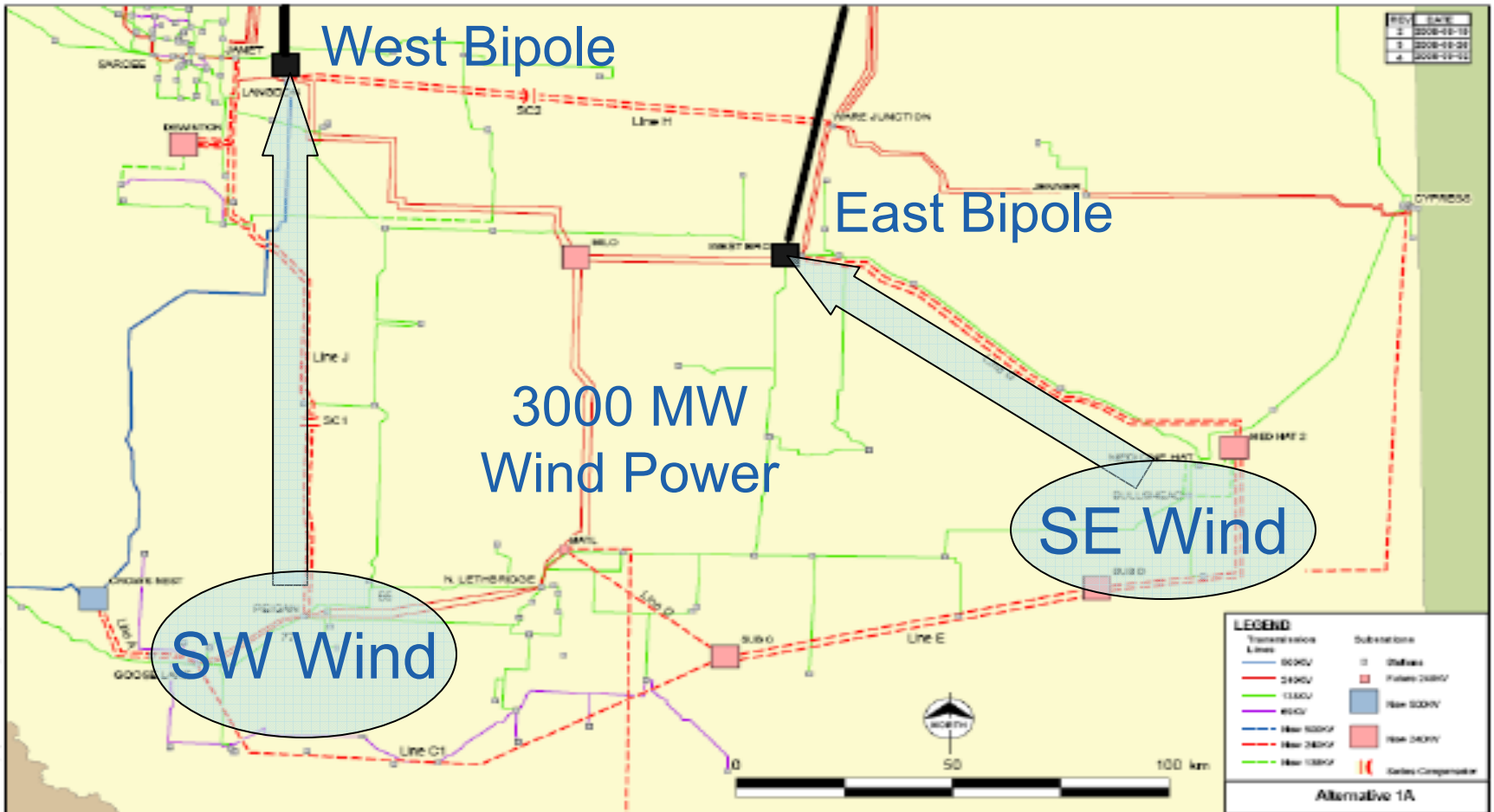


East & West Bipoles Proposed South Termination Sites



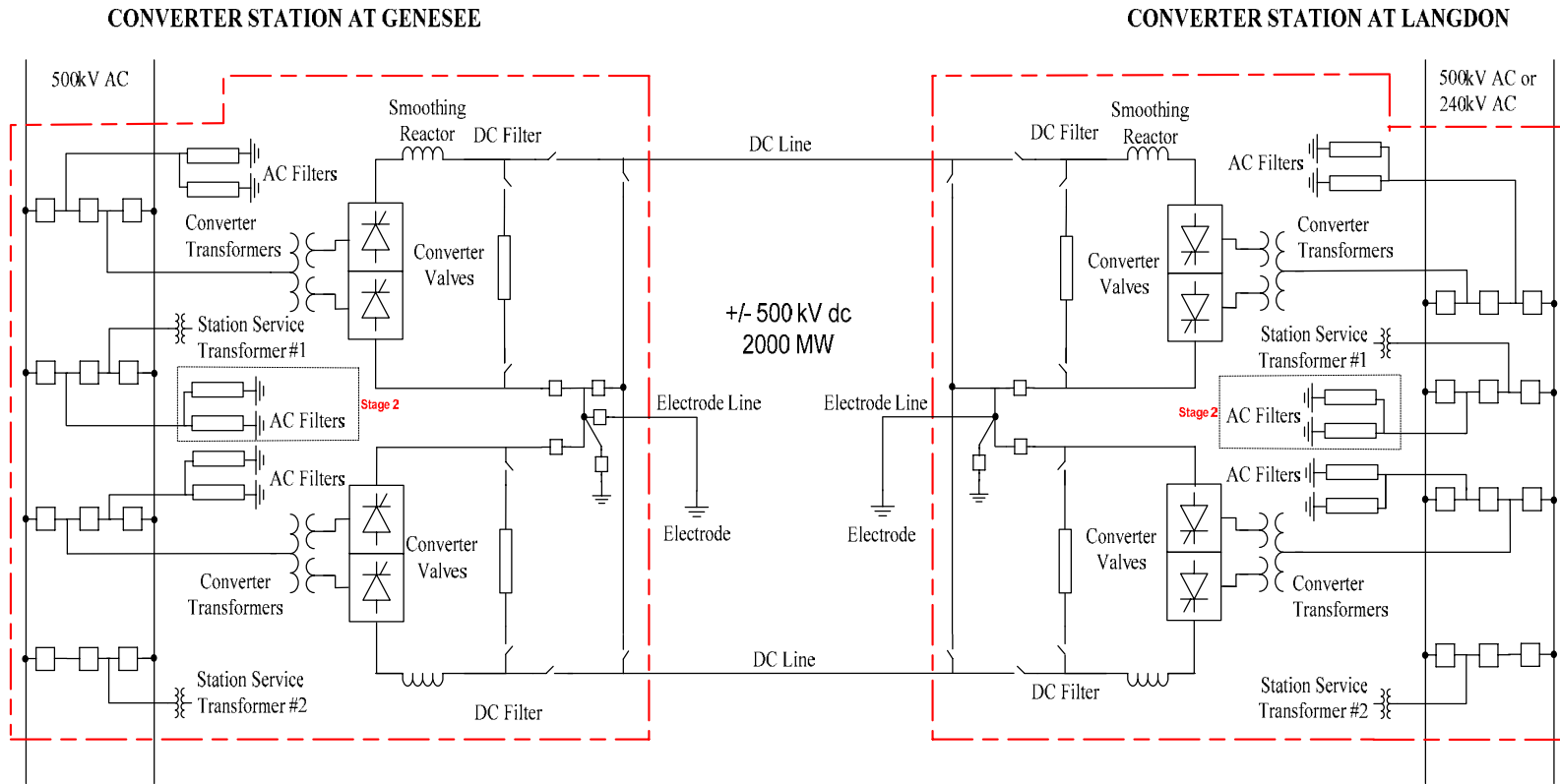


East & West Bipoles Southern Area Wind Power





West Bipole – Ground Electrode Scheme



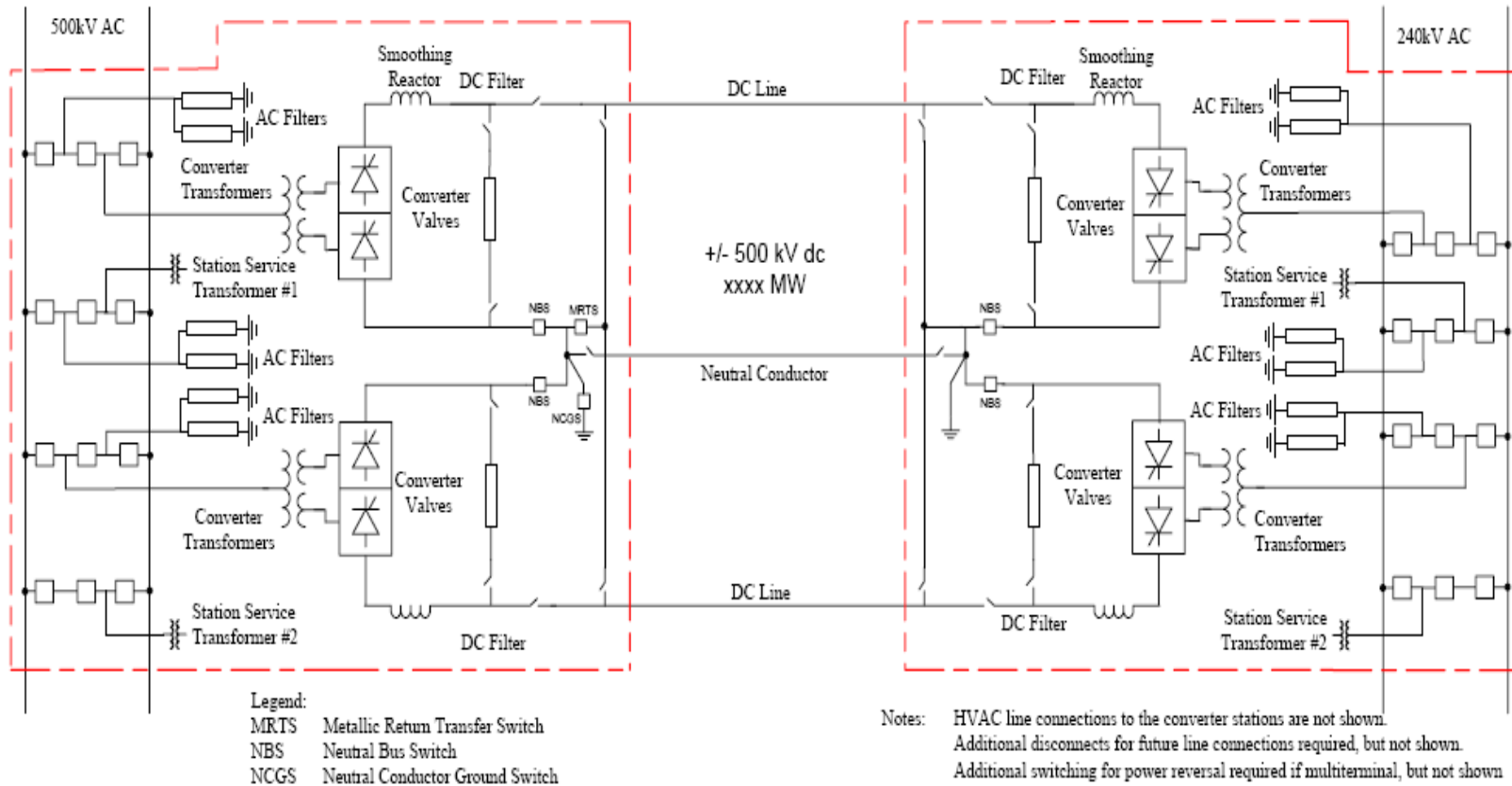
Note: HVAC line connections to the converter stations are not shown.



West Bipole – Metallic Return Scheme

CONVERTER STATION AT HEARTLAND

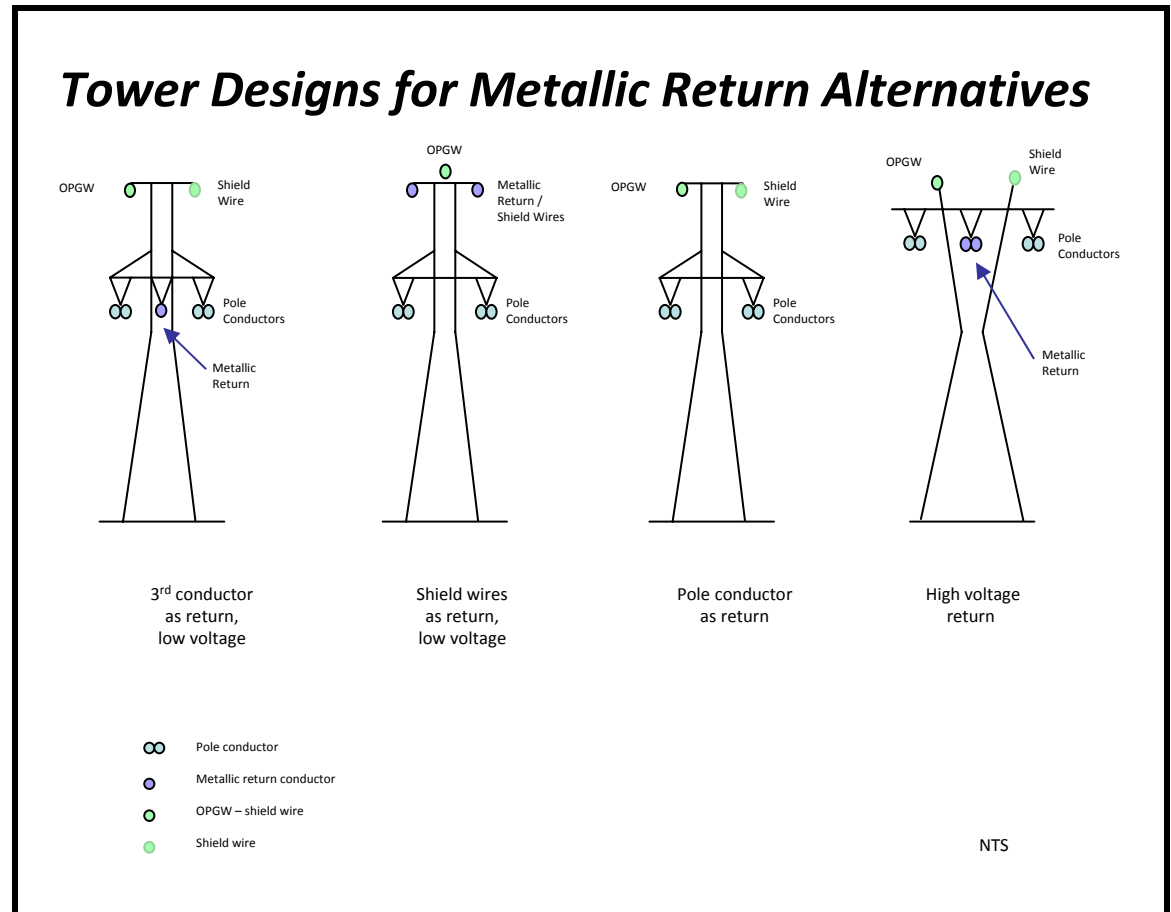
CONVERTER STATION AT WEST BROOKS





Metallic Return Alternatives

- 3rd conductor metallic return, low voltage
- shield wires as metallic return, low voltage
- pole conductor as metallic return
- high voltage return conductor.





Summary

- 500kV HVDC transmission system has been proposed to reinforce power transmission between Edmonton and Calgary as part of the long-term **Alberta Provincial Energy Strategy**
- The Government's goal is to start construction by the end of 2010 and complete the West Bipole in 2013 and the East Bipole in 2014



Questions ????

Any further questions or comments please forward to:

Wes Kwasnicki, P.Eng., Ph.D.

Chair, HVDC Task Force

AltaLink Management Ltd

2611-3rd Ave. SE

Phone: (403) 267-4268

E-mail: wes.kwasnicki@altalink.ca