



**2009 IRP Update**  
**Basic Assumptions**  
**(Transmission)**

**May 7, 2009**

**REDACTED**



# IRP Update Basic Assumptions - Transmission Design Requirements

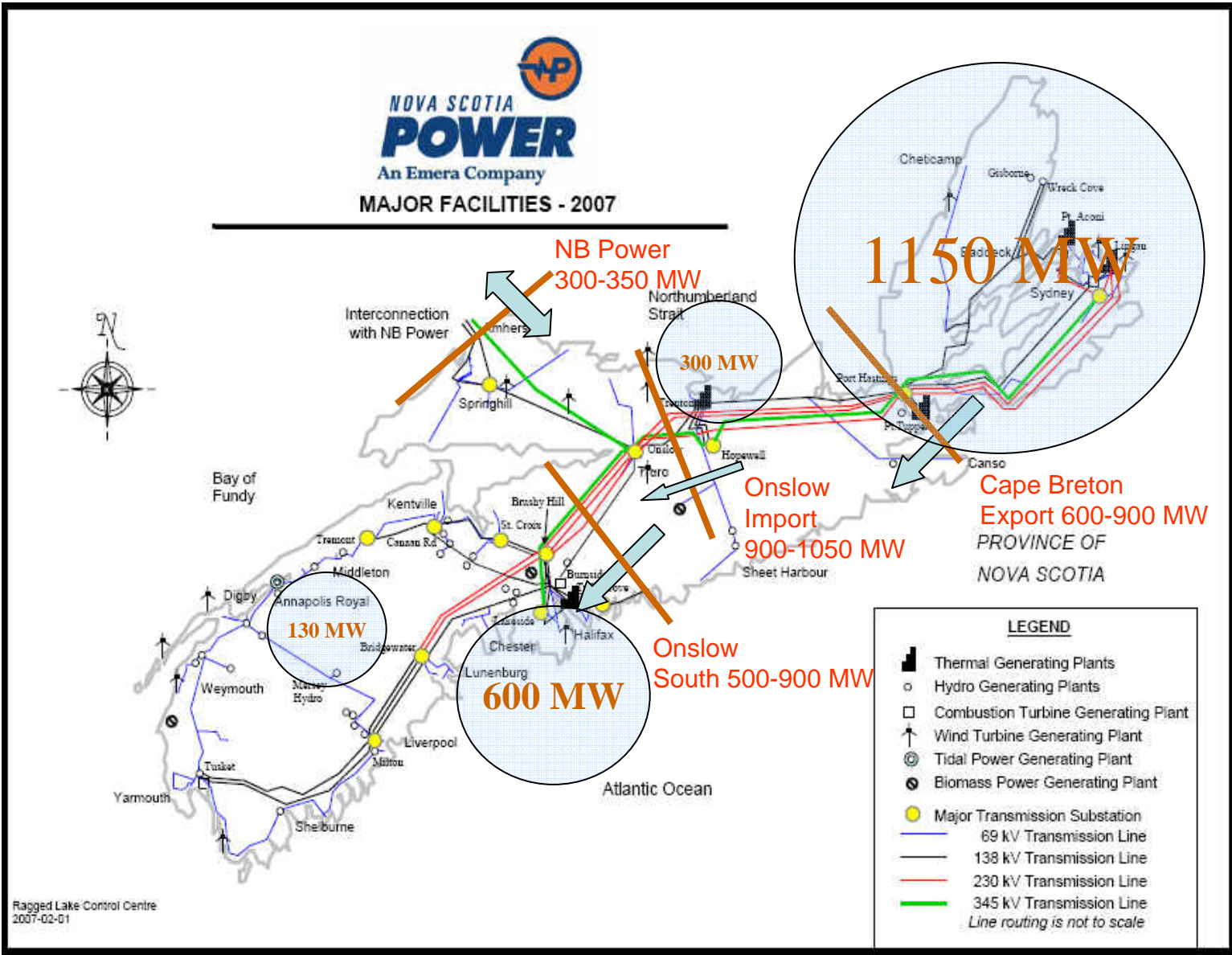
- System Reliability
  - System must be designed to comply with NPCC and NERC criteria
  - System must be designed to be dynamically balanced and remain stable for Defined Contingencies
  - Transmission Capacity must be maintained to deliver reserve for load fluctuations, real time capacity reserve for loss of generation, and meet reserve sharing agreements with NBSO
    - o Spinning Reserve 36 MW (2009 levels)
    - o 10 Minute Reserve 174 MW
- Lines must be operated within their Design Ratings
- Voltage and Frequency standards must be maintained



# IRP Update

## Basic Assumptions - Transmission

### Current Transmission Interface Limits - with Existing Sources



- The existing transmission system has dynamic limitations and constraints.
- With current generation options and dispatch patterns interface limits are often reached with existing transmission facilities.
- Any additional generation in Cape Breton stresses the Cape Breton Export interface beyond criteria on single contingencies. Additional generation in both Cape Breton and Eastern Mainland stresses the Onslow South interface.
- Increasing east – west power flows necessitates reactive power compensation to meet voltage criteria in HRM.
- Additional generation in the West Mainland improves load flows and reduces system losses but the transmission system requires system upgrades to handle the additional capacity and contingencies.
- Increased usage of the NB intertie for imports, increases the risk of under-frequency load shedding of firm load for contingency loss of the 345kV tie plus reserve commitments must be able to be delivered at all times.

# IRP Update

## Basic Assumptions - Transmission - Common Transmission Facilities

Transmission Facility estimates were completed as if resource options were independent of each other. This table captures where transmission facilities are common between options.

Note 1: Back-up and Load Following for non-dispatchable renewables is assumed to be provided within NS and not included in Network Upgrades cost estimates. If back-up source is external to NS then second tie would be required.

Common Transmission Facilities	Additional 345kV NS/NB Tie Line	Brushy Hill Substation Additions	Onslow 345 Breaker Addition and Node Swap	345 Kv Line + 79N Bus Hopewell-Brushy Hill	New Spider Lake Substation additions	345kV Line 3C P.H. - Spider Lake	3C Port Hastings 345kV, substation	Canso 345kV Crossing	Common Western /Valley Improvements
<b>Large Generator 250MW-350MW</b>									
<b>Location</b>									
HRM									
Pt. Tupper Area									
Eastern Shore									
<b>Tidal (75MW x 5 blocks)</b>									
block one Total 75MW									
block two --Total 150MW									
block three -- Total 225 MW									
block four and five -- Total 375MW									
<b>Wind</b>									
Mainland wind (100MW x 5 blocks)									
block one									
block two	Note 1								
block three	Note 1								
block four	Note 1								
block five	Note 1								
Cape Breton Wind (100MW x 2 blocks)									
block one	Note 1								
block two	Note 1								
<b>Bio-mass</b>									
60 MW bio-mass									
<b>CAES Compressed Air Energy Storage</b>									
175MW CAES site									
<b>Offshore Wind 100MW</b>									
NS on-land transmission									
<b>Large Non-emitting 300MW Import</b>									
Import through NB									
East into NS									
NS Transmission + Upgrades									





## IRP Update Basic Assumptions - Transmission - Summary

- Network Upgrades, of some level, will be required for all incremental generation capacity
  - Network Upgrade Level varies with interconnection location
  - Network Upgrade Level varies with the size and sequencing of interconnections
  - Increased level of east to west flows causes greatest degrees of network upgrades
- Transmission Loss Factors increase as generation is interconnected further east of HRM and decrease as interconnected further west of HRM
- Increased capacity on the NS-NB intertie to allow more import, export, or load following capacity requires significant upgrades to the 345kV systems in both NS and southern NB
- System Impact Studies are needed to fully determine all Network Upgrade requirements