

Renewable Integration Initiative Visibility Update

Smart Grid Working Group

April 12, 2011

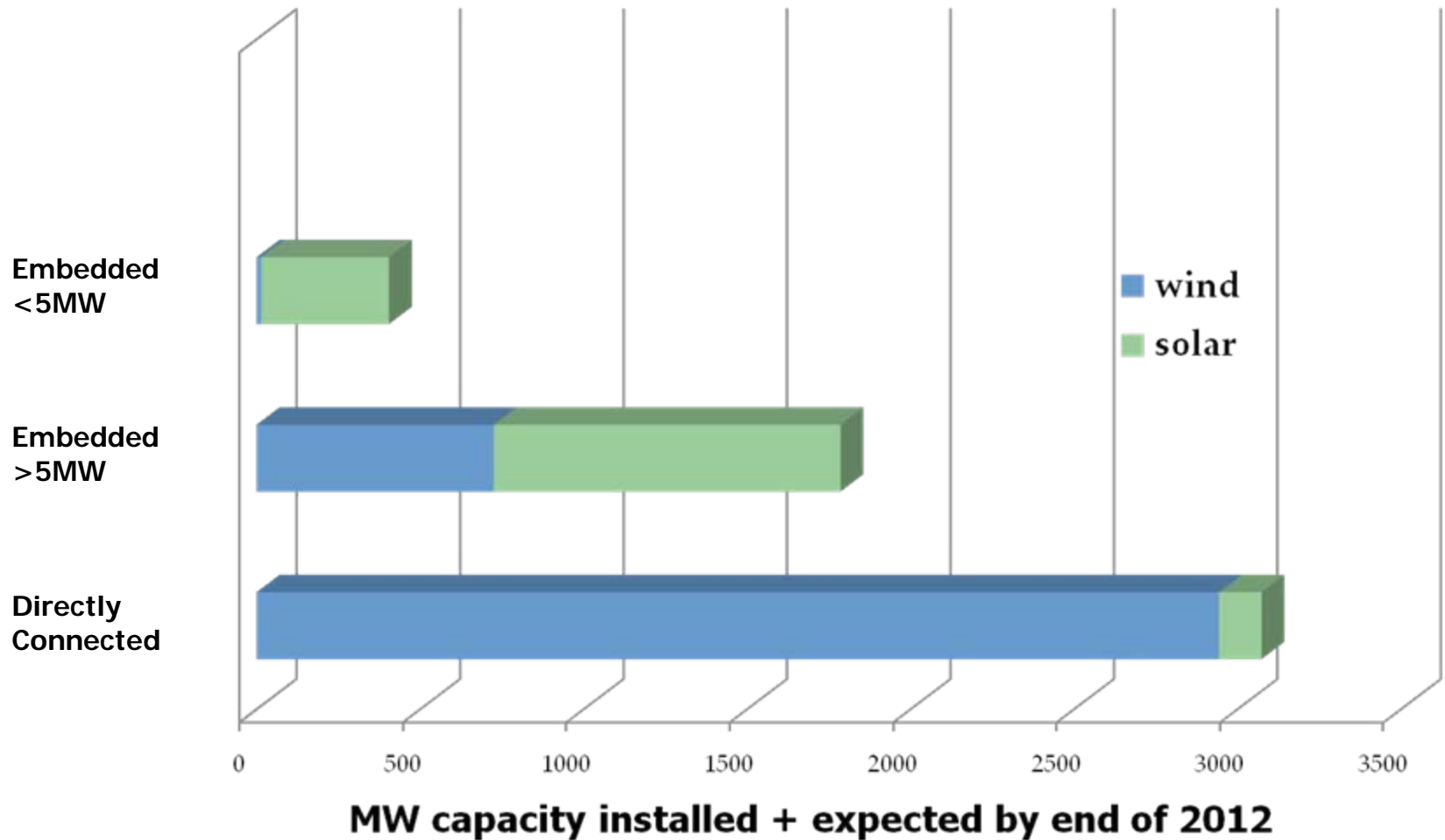


Ontario's Long Term Energy Plan reinforces the investment focus on renewable generation.

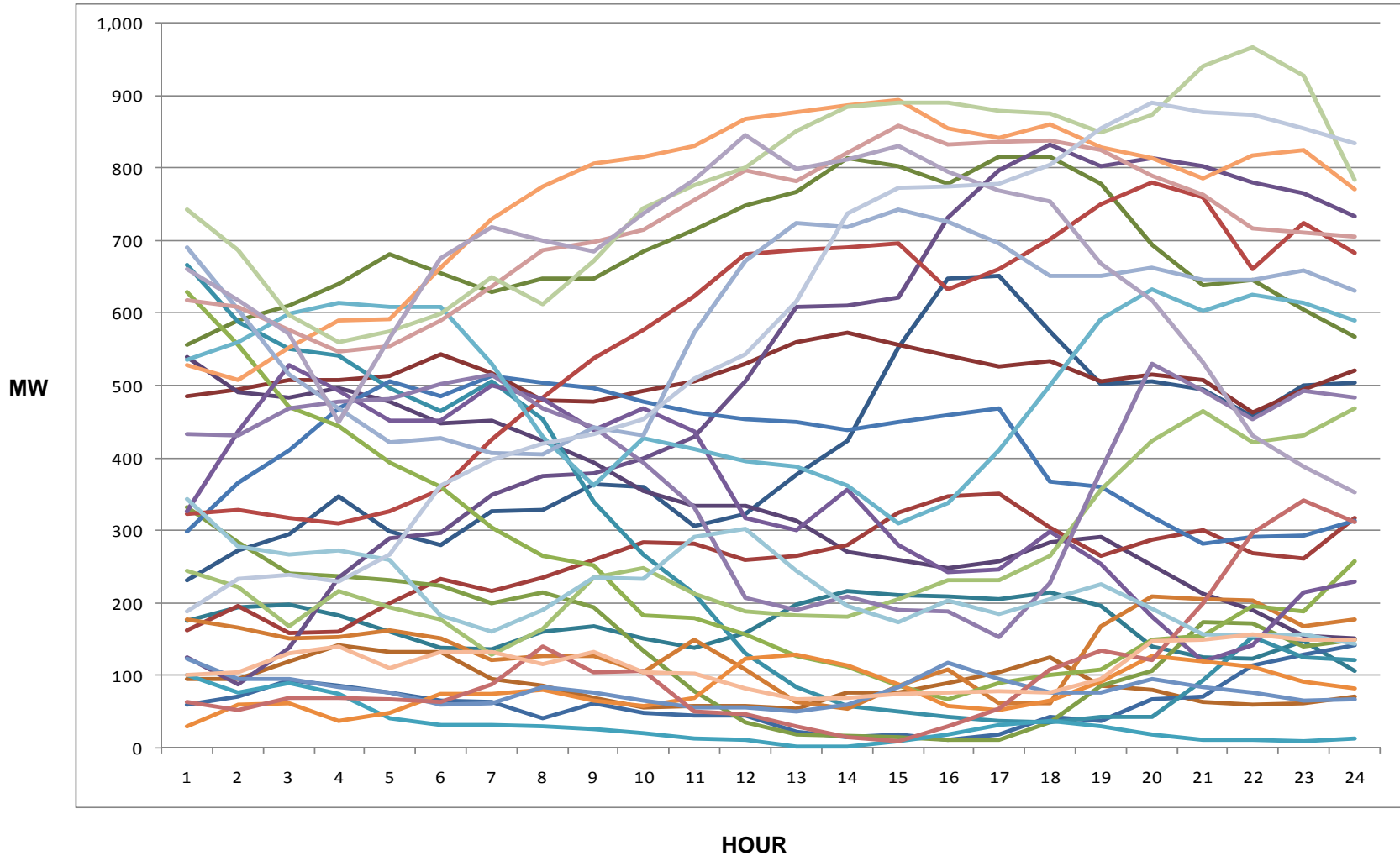
5,800MW of variable generation projects are underway and are expected to be in commercial operation by the end of 2012, with 10,700MW targeted for 2018.

SE-91 is a stakeholder initiative that established 11 Design Principles to guide the IESO's Renewable Integration Initiative (RII).

Growth in Variable Generation



Ontario Hourly Wind Output: January 2010



Variable resources such as wind and solar energy were once a minor contributor to meeting Ontario's generation needs, but will soon represent a significant portion of the province's generation fleet.

Significant amounts of new variable resources can create operational challenges that are difficult to manage. IESO is evolving our rules, systems and processes to ensure reliable and efficient integration of these variable resources.

Currently all generators directly connected to the ICG must register with the IESO as market participants and provide **visibility**.

With a few exceptions, embedded generators are not required to provide visibility to the IESO.

The IESO established the Visibility Technical Working Group (VTWG) to develop new visibility requirements for directly connected and embedded variable generators.

Like Market Participants, all distribution connected wind and solar generators greater than 5MW will (with the help of a MR change) provide visibility to the IESO.

Improving upon today's visibility picture will enable IESO RII projects:

- State-of-the-art forecasting
- Variable generation dispatch
- Control room situational awareness

Currently the IESO formally allows 2 methods of communicating data – an RTU connection (DNP3) and ICCP.

The IESO is investigating alternative methods of communication. Any new method will require testing to ensure that they meet IESO requirements for reliability, security and data update and refresh rates.

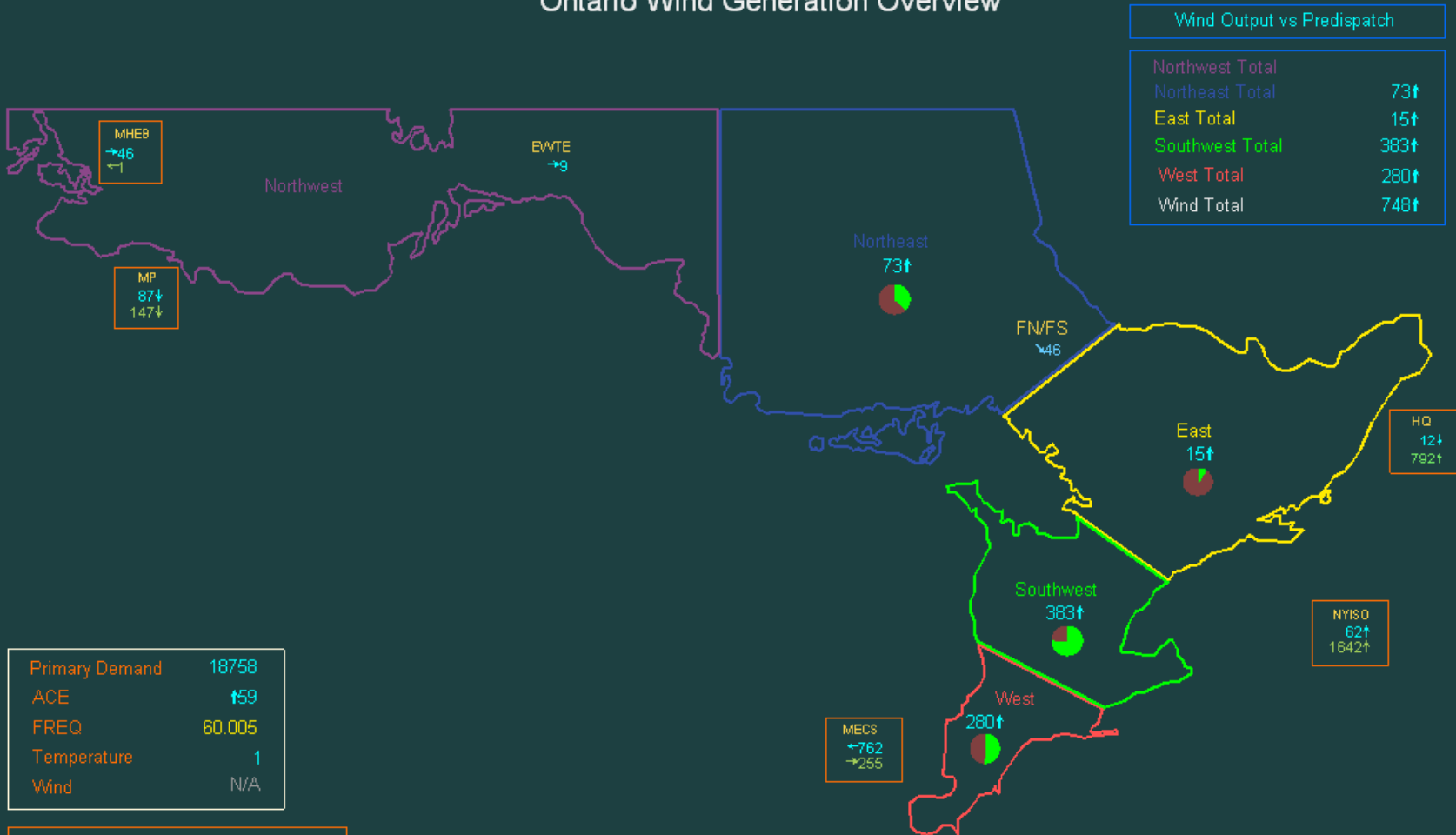
The IESO is proposing that where no other IESO requirement stipulates a higher level of performance, variable generators shall be designated as medium performance per Market Rule Appendix 4.19 IESO Monitoring Requirements: Generator Performance Standards.

Standard defines when data must be available at the IESO communications interface.

#	Measurement Type	Unit of Measure	Height of Measurement	Precision (to the nearest...)
1	Wind Speed	Metres per Second	Hub height	0.1 m/s
2	Wind Direction	Degrees from True North	Hub height	1 degree
3	Ambient Air Temperature	Degrees Celsius	Hub height or 2m	0.1 °C
4	Barometric Pressure	Hectopascals	Hub height or 2m	60 Pa
5	Relative Humidity	Percentage	Hub height or 2m	1.0%
6	MW output (per facility)	Megawatt	N/A	0.1 MW
7	Available Megawatts	Megawatt	N/A	0.1 MW

Control Room Visibility Example

Ontario Wind Generation Overview



SAMPLE RESOURCE DETAIL PAGE

Control Room Visibility Example

PORT BURWELL DETAILS

NAMEPLATE CAPACITY: 99 MW TURBINE MODEL: 66 x GE 1.5sle (1.5 MW)

Ontario Wind Total 717↑

WIND OVERVIEW

CURRENT OUTPUT



17↑

WIND SPEED



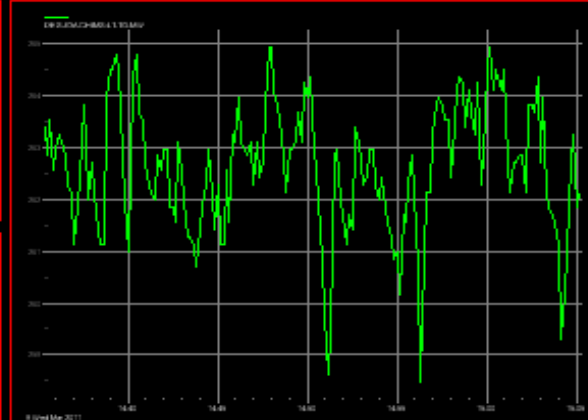
WIND DIRECTION

TEMPERATURE

0.3 (°C)

AVAILABLE CAPACITY

99



HOURLY FORECAST

NOTE: Hourly Forecast may be displayed in tabular format in the future.

CURRENT FORECAST	HE+1	HE+2	HE+3	HE+4	HE+5	HE+6	HE+7	HE+8	HE+9	HE+10	HE+11	HE+12

TRIPOUT CONDITIONS

CURRENT WIND SPEED	CUT-IN THRESHOLD	INST CUT-OUT LIMIT	AVG SPEED (10 MIN)	10 MIN CUT-OUT LIMIT	AVG SPEED (1 MIN)	1 MIN CUT-OUT LIMIT	SECONDS UNTIL CUT-OUT	INST CUT-BACK-IN LIMIT	10 MIN CUT-BACK-IN LIMIT	SECONDS UNTIL CUT-BACK-IN
	3.5 m/s	30 m/s		25 m/s		28 m/s		?? m/s	22 m/s	

NOTE: 3.5 m/s = 12.6 km/h, 22 m/s = 79.2 km/h, 25 m/s = 90 km/h, 28 m/s = 100.8 km/h, 30 m/s = 108 km/h

METEOROLOGICAL DATA

	WIND SPEED (m/s)	WIND DIRECTION	AIR TEMP (°C)	BAROMETRIC PRES (kPa)	RELATIVE HUMIDITY	ICING CONDITIONS
MET 1						
MET 2						
MET 3						

MR-00362: Centralized Forecasting for Variable Generation. The main components of the rules package:

- (i) Cost recovery of vendor costs
- (ii) Static & dynamic data obligations (i.e. visibility)

Proposed timelines:

– Cost recovery:

- Targeting IESO Board approval in June 2011

– Static and dynamic data obligations:

- Present rules package to TP April 19th
- Target for Board approval as early as June, no later than September

Effective dates – as early as 22 days after Board approval

Questions?