

Ramping Data for APPrO Proposal

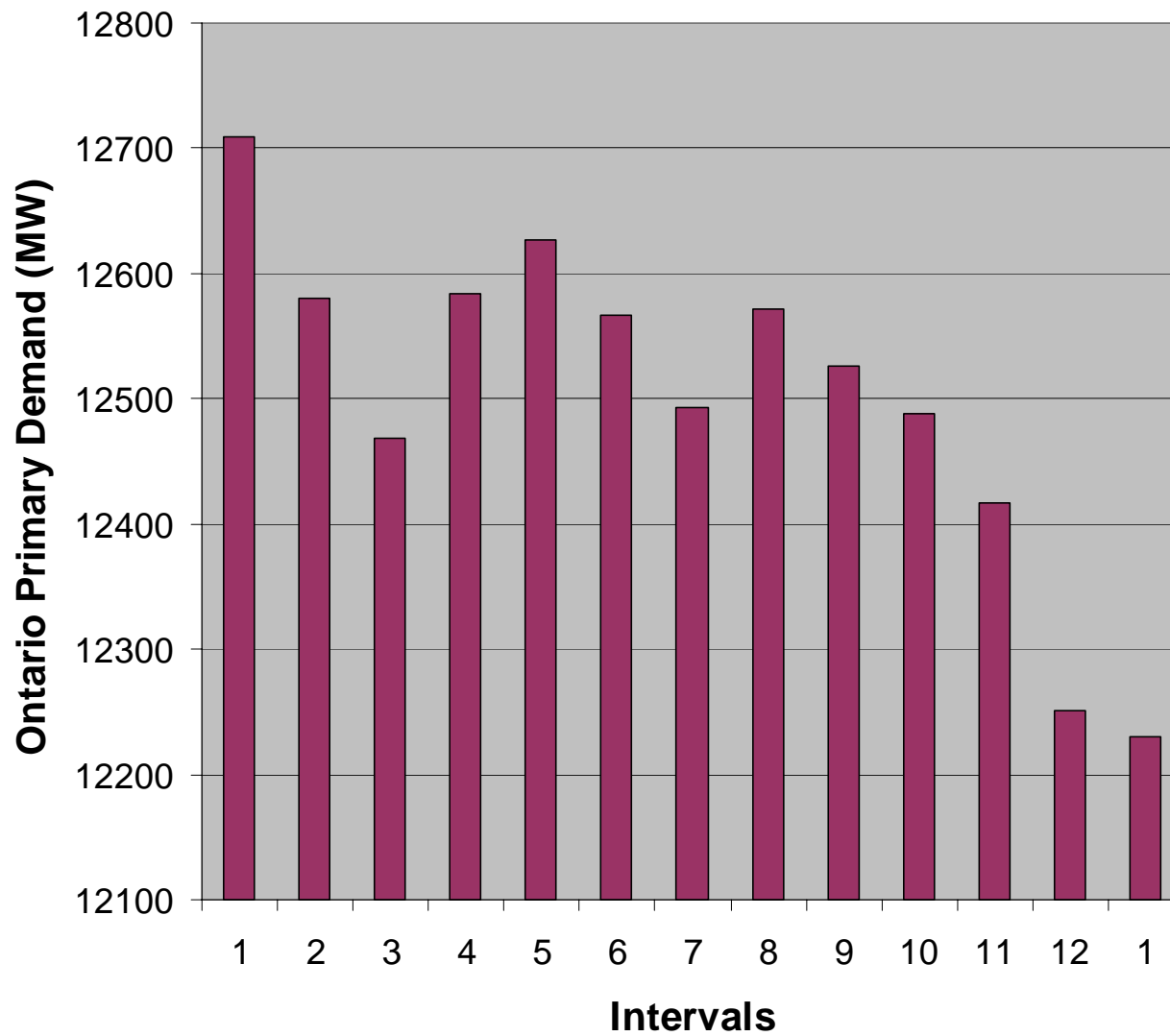
MPWG – April 7th, 2006 - **REVISED**
Toronto, ON



Real Data from a Day in 2005

- Hour 3, Interval 1: 12 709 MW
- Hour 4, Interval 1: 12 230 MW
479 MW
- Over the course of an hour, demand decreased by **479 MW**
- However, looking interval-to-interval, there was **950 MW** of DEMAND CHANGE over the same period.

Intra-Hour Demand Fluctuation



- It is the **950 MW** result that you see listed under the **DEMAND CHANGE** column
 - Reflects Ontario Generation + Imports – Exports (Ontario Primary Demand)
 - Based on operational meter readings at the end of each 5 minute interval
- The **RAMP** column is the change in dispatch of all individual resources
 - 5 minute interval data
 - Based on constrained quantities
 - Is larger than Demand Change, because the DSO has dispatched some units down and other units up.
- For this particular hour, there was **1615 MW** of RAMP

Generator A

Interval	Dispatch (MW)	Ramp (MW)
1	20	
2	30	10
3	15	15
4	35	20
5	40	5

Generator B

Interval	Dispatch (MW)	Ramp (MW)
1	30	
2	20	10
3	35	15
4	15	20
5	10	5

- Imagine these are the only two generators
- Over this period, the RAMP is 100 MW, even though demand is flat.

Ramp By Month, 2005

	DEMAND CHANGE (MW)	RAMP (MW)
Jan-05	722,372	1,554,475
Feb-05	629,283	1,349,578
Mar-05	653,486	1,452,811
Apr-05	682,264	1,402,146
May-05	693,364	1,404,551
Jun-05	822,586	1,724,689
Jul-05	859,699	1,782,216
Aug-05	838,124	1,717,173
Sep-05	787,350	1,548,614
Oct-05	701,973	1,457,941
Nov-05	735,621	1,449,364
Dec-05	751,027	1,566,042
Totals	8,877,149	18,409,600

- Sources of RAMP: 43% hydro, 42% fossil, 9% combined cycle, 3% dispatchable load
- 18.41 million MW of RAMP was used in 2005
- 2.07 times more RAMP was used than theoretically needed to meet DEMAND CHANGE
- Contributing factors: intertie schedule changes, MIO dispatch, joint optimization, bid/offer changes, etc.
- The RAMP figures exclude imports, exports, self-scheduled, and intermittent.

Average Ramp By Hour (Jan, Apr, Jul - 2005)

