Demand-side Management Tests

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Demand-side Management

• 14 load serving entity
  – 5 students in load pocket
  – 9 students in other areas

• Profit $\Pi$

$$\Pi = p_{\text{regulated}} \min(q_{\text{purchase}}, q_{\text{actual}}) - \rho q_{\text{purchase}} - p_{\text{contract}} (q_{\text{actual}} - q_{\text{purchase}}) u$$

$$u = \begin{cases} 
1 & \text{if } q_{\text{actual}} < q_{\text{purchase}} \\
0 & \text{otherwise}
\end{cases}$$

– $p_{\text{regulated}} = $110/MWh and $140/MWh
– $p_{\text{contract}} = $140/MWh and $160/MWh
LMP contour – Period 1

Inelastic load

Demand-side management
LMP contour – Period 2

Inelastic load

Demand-side management
LMP contour – Period 3

Inelastic load

Demand-side management
LMP contour – Period 5

Inelastic load

Demand-side management
LMP contour – Period 6

Inelastic load

Demand-side management
LMP contour – Period 7

Inelastic load

Demand-side management
LMP contour – Period 8

Inelastic load

Demand-side management
LMP contour – Period 9

Inelastic load

Demand-side management
LMP contour – Period 10

Inelastic load

Demand-side management
LMP contour – Period 13

Inelastic load

Demand-side management
LMP contour – Period 14

Inelastic load

Demand-side management
Inelastic load

Demand-side management

LMP contour – Period 15
LMP contour – Period 17

Inelastic load

Demand-side management
LMP contour – Period 19

Inelastic load

Demand-side management
LMP contour – Period 20

Inelastic load

Demand-side management
LMP contour – Period 21

Inelastic load

Demand-side management
LMP contour – Period 22

Inelastic load

Demand-side management
LMP contour – Period 23

Inelastic load

Demand-side management
LMP contour – Period 24

Inelastic load

Demand-side management
LMP contour – Period 25

Inelastic load

Demand-side management
LMP contour – Period 26

Inelastic load

Demand-side management
LMP contour – Period 27

Inelastic load

Demand-side management
LMP contour – Period 28

Inelastic load

Demand-side management
LMP contour – Period 29

Inelastic load

Demand-side management
LMP contour – Period 30

Inelastic load

Demand-side management
LMP contour – Period 31

Inelastic load

Demand-side management
LMP contour – Period 32

Inelastic load

Demand-side management
LMP contour – Period 33

Inelastic load

Demand-side management
LMP contour – Period 34

Inelastic load

Demand-side management
LMP contour – Period 36

Inelastic load

Demand-side management
LMP contour – Period 37

Inelastic load

Demand-side management
LMP contour – Period 38

Inelastic load

Demand-side management
LMP contour – Period 39

Inelastic load

Demand-side management
LMP contour – Period 41

Inelastic load

Demand-side management
LMP contour – Period 42

Inelastic load

Demand-side management
LMP contour – Period 43

Inelastic load

Demand-side management
LMP contour – Period 46

Inelastic load

Demand-side management
LMP contour – Period 47

Inelastic load

Demand-side management
LMP contour – Period 49

Inelastic load  Demand-side management
Comparison I: Dispatch
Comparison II: System cost
Summary

• DSM test with human subjects
• Off-peak period
  – Dispatch: purchase more than needed
  – LMP: low
    → System cost increases
• Peak period
  – Dispatch: curtail load
  – LMP: high
    → System cost decreases significantly
→ needs storage devices