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MISO MTEP15 Futures and Demand Side Management Review

Erik Winsand
Economic Planning
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Overview

- Review of terms (DSM/EE/DR/etc…)
- MTEP15 Future assumptions
- Applications of Demand Side Management in PROMOD
- ATC Economic Planning Demand Side Management review

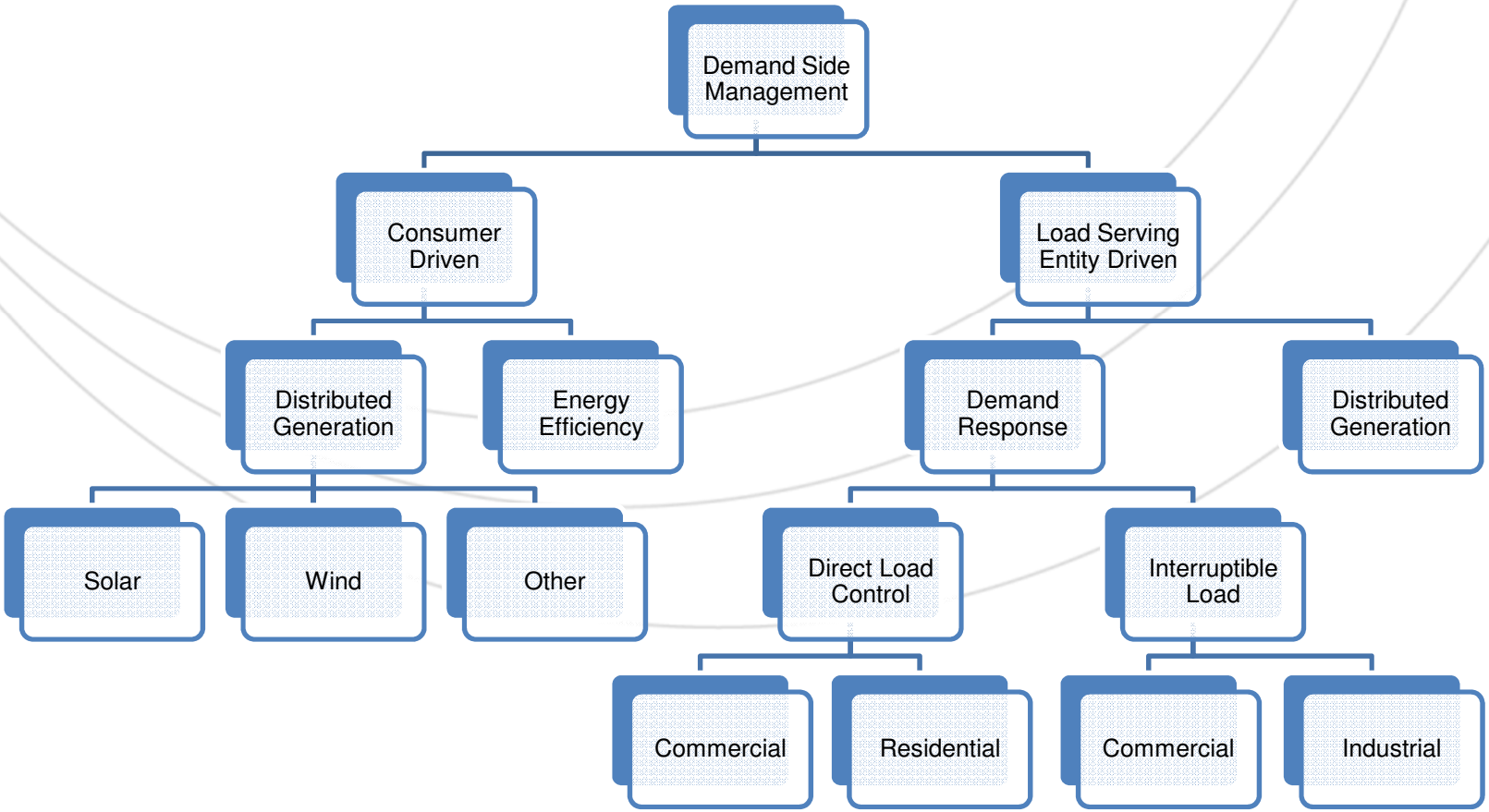
Definition of Terms – Electricity Consumption

- Demand – The amount of electricity consumed in a single moment (e.g. Every instant a CFL bulb consumes 12 Watts). The term “Load” is often used interchangeably with Demand.
- Energy – The amount of demand consumed over a period of time (e.g. When a light bulb runs for two hours, it consumes 24 Watt × hours)

Definition of Terms - DSM

- Demand Side Management (DSM) – The modification of energy consumption by either the amount of consumption and/or time of consumption through financial, environmental, and/or other incentives.
  - ATC has no ability to implement a demand side management program. ATC is a transmission-only company and has the obligation to plan, construct, operate and maintain the transmission system.
  - ATC & MISO incorporates DSM programs in planning models.

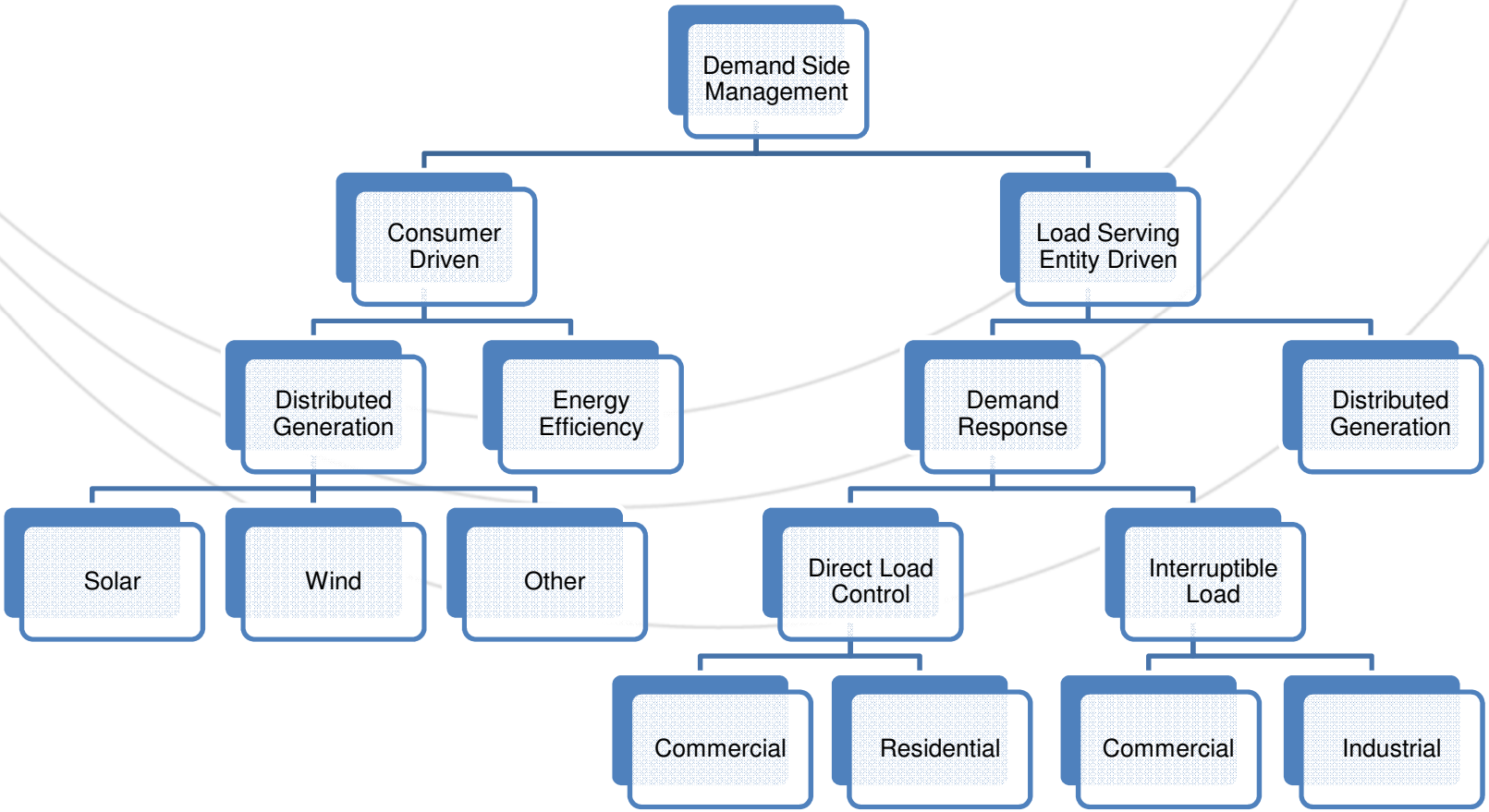
Demand Side Management Alternatives



Definition of Terms – Consumer Driven DSM

- Energy Efficiency – Using less energy to perform the same task (e.g. compact fluorescent vs. incandescent bulb).
- Distributed Generation – Small scale generation based on various fuel sources, most commonly solar; also includes wind, geothermal, biomass and other sources.
  - ATC and MISO rely on Load Serving Entities (LSEs) to provide load forecasts that include current and future load projections that incorporate these consumer activities.

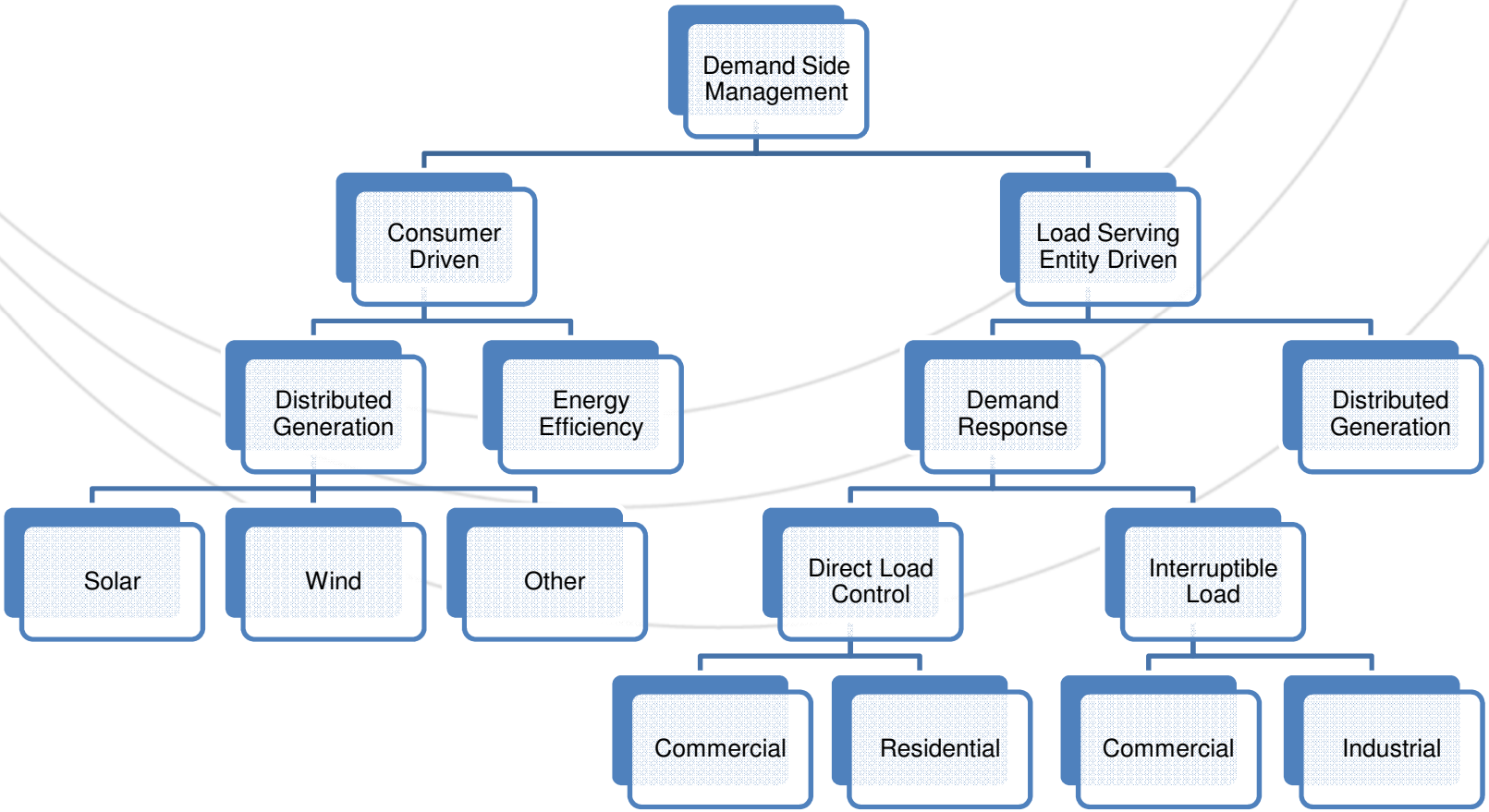
Demand Side Management Alternatives



Definition of Terms – Load Serving Entity DSM

- Demand Response – Intentional modifications to electricity consumption patterns that are intended to alter the time of electric demand, the level of electric demand, or total energy consumption.
  - Different types of programs exist in different utility footprints and states. Generally there are two types of Demand Response options: direct load control and interruptible load contracts.
- Distributed Generation – Small scale generation based on fossil or other fuel sources, most commonly diesel placed at strategic locations to avoid reliability issues.
  - ATC currently models approximately 20 units representing a max capacity of ~75 MW.

Demand Side Management Alternatives



Definition of Terms – Demand Response

- Direct Load Control – Residential or commercial demand that can be controlled by LSE system operators to reduce demand, typically A/C units, during specific times, often coupled with financial incentives for program participants.
- Interruptible Load – Demand that can be interrupted by the LSE system operator, typically for larger commercial and industrial loads. Contracts often detail a special rate for interruption and list circumstances that must be met before service can be interrupted.

Real-Time and Planning Modeling

- DSM programs that exist today are modeled by MISO and ATC for planning studies.
- MISO and ATC also implement future DSM programs in their planning models.

MISO MTEP15 Futures Review

Future	Demand and Energy	Retirements	Natural Gas Price	Renewable Portfolio Standards	CO2	Demand Side Management
Business as Usual	0.8%	12.6 GW Coal	$4.30	7 GW wind / 2.3 GW Solar	None	6,800 GWh / 18 MW
High Growth	1.5%	12.6 GW Coal	$5.16	10 GW wind / 2.5 GW Solar	None	7,800 GWh / 20 MW
Limited Growth	0.14%	12.6 GW Coal	$3.44	4 GW wind / 2 GW Solar	None	6,000 GWh / 16 MW
Generation Shift	0.8%	12.6 GW Coal + 11.6 GW age-related + add'l coal to achieve 40%	$4.30	28 GW wind / 7 GW Solar	$10 cost	26,100 GWh / 2,200 MW
Public Policy	0.8%	Min 23 GW Coal; 25% of energy from coal in 2033	$4.30	43 GW wind / 18 GW Solar	$50-$75 cost	26,100 GWh / 2,200 MW

Source: MISO 2-19-2014 PAC Meeting (https://www.misoenergy.org/Events/Pages/PAC20140219.aspx)

MISO DSM Modeling

- MISO MTEP15 futures model two types of DSM:
  - Energy Efficiency – MISO models varying levels of reduced energy, which they represent a low of 6,000 GWh and high of 26,100 GWh.
  - Demand Response (DR) – MISO models varying levels of demand response capacity, which they represent a low of 16 MW and high of 2,200 MW.

MISO DSM Modeling

- MISO models existing Direct Load Control Management programs in load serving entity service areas.
  - In the MTEP13 models, about 230 MW of DLCM program capacity was modeled in the ATC footprint.
- MISO models Interruptible Load contracts as well.
  - In the MTEP13 models, about 800 MW of Interruptible Load capacity was modeled in the ATC footprint

ATC DSM Modeling

- All MISO DSM modeling is also used as the starting point in ATC economic planning studies.
- In addition, ATC models Distributed Resources (DR). Distributed Resources model demand response and other distributed technologies that may serve to offset load.

ATC – Distributed Resources Modeling

- DR are modeled throughout the ATC system at all distribution interconnection points with at least 5 MW of demand.
- DR capacity is modeled as 50% of demand at each distribution interconnection point.
- In the ATC 2013 economic planning study, 646 Distributed Resources modeled; representing a total capacity of 6,405 MW.
- A similar amount of DR is expected in the ATC 2014 Economic Study (an exact amount TBD)

Source: ATC Economic Planning Website (http://www.atc10yearplan.com/wp-content/uploads/2014/03/5-ATC-Distributed-Resources.pdf)

DSM Modeling Summary - ATC Footprint DSM

DSM Type	Modeled By	Number of Units Modeled	MW Capacity / GWh Energy
Distributed Fossil Fuel Generators	MISO/ATC	20 units	75 MW
Energy Efficiency	MISO/ATC	N/A	6,000 – 22,100 GWh
Demand Response	MISO/ATC	N/A	16-2,200 MW
DLCM Programs	MISO/ATC	N/A	230 MW
Interruptible Load	MISO/ATC	N/A	800 MW
Distributed Resources	ATC Only	646 units in 2013	6,405 MW in 2013

Questions?

- ATC Economic Planning
- Dale Burmester
  - dburmester@atcllc.com
  - (608) 877-7109
- Erik Winsand
  - ewinsand@atcllc.com
  - (608) 877-3551

Thank You For Your Time!