

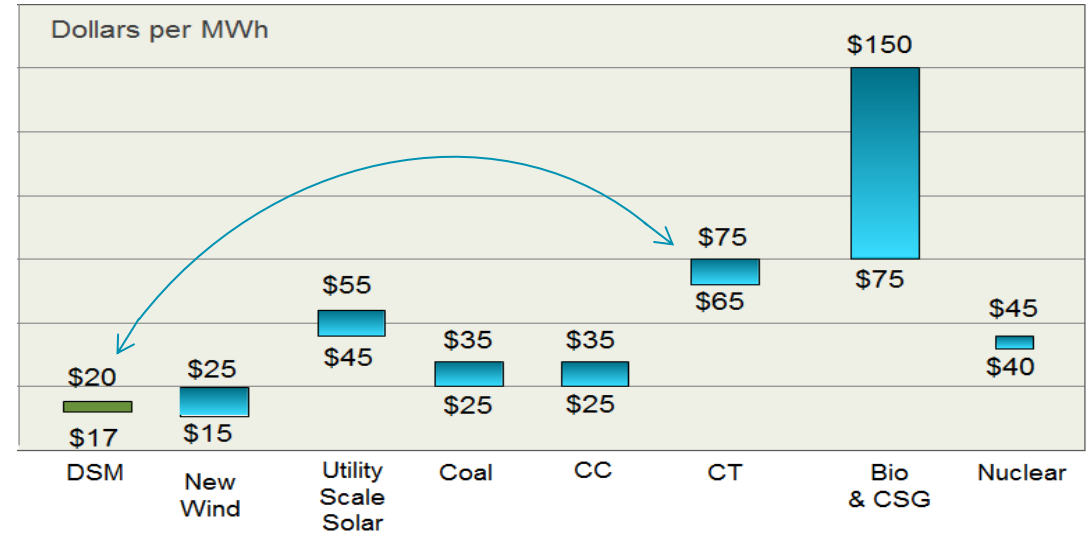
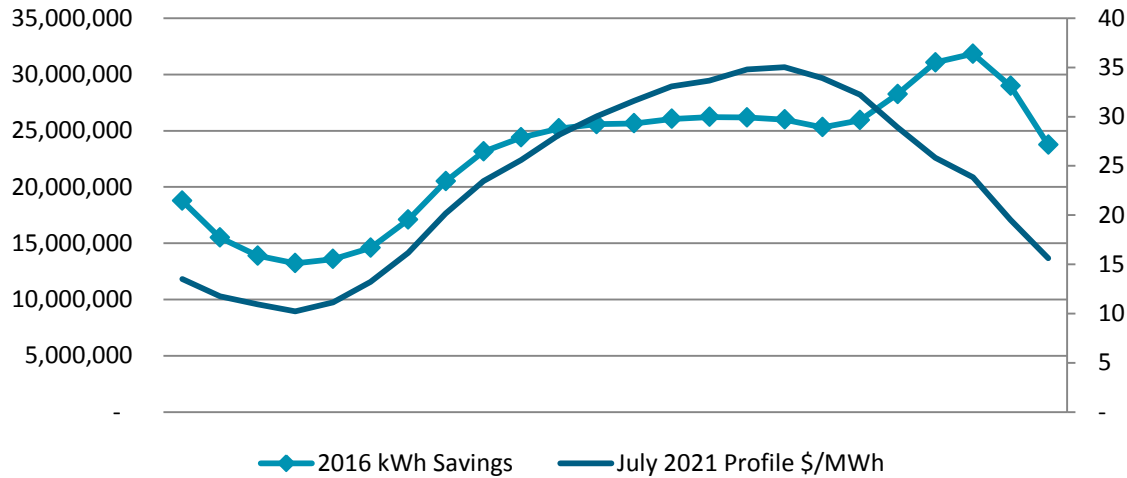


# Does DSM/CIP Work in a Carbon Free World?

- Economics
  - Marginal Fuel Cost
  - Avoided Capacity
  - Avoided Transmission & Distribution
  - Should we compare to renewable generation?
- Policy Objectives
  - Save customers money
  - Reduce Emissions
  - Provide choice and control of energy

Create a dynamic portfolio based on optimized energy/demand usage and savings.

MN DSM vs 2021 Marginal Energy Profile



Plan (avg.)	Spend	GWh	Societal Net Benefits	System NB (Soc. – Enviro – O&M)
2010-2012	\$84M	473.6	\$285.4M	\$262.8M
2013-2016	\$90M	507.3	\$251.5M	\$175.2M
2017-2019	\$95M	433.9	\$128.5M	\$64.1M
2020-2022	\$95M	433.9	\$107.5M	\$40.7M

# DSM 5 Years From Now

- If we stay the course
  - Neutral benefits vs. costs
  - Many residential technologies fail cost/benefit tests
  - DSM raises rates for customers
- Time value approach to DSM
  - Incentive customers to save high value energy
  - Expanded demand response/reduction programs
  - Load shifting technology and controls

# DSM 10 Years From Now

- Operationalize DSM
  - Through incentives and controls, dispatch efficiency at the times of greatest need (generation, transmission, distribution, and emissions)
  - Targeted savings leads to increasing societal net benefits
  - Programs that cover spectrum from install and forget to customize customer control
- Increased Benefits
  - Programs tied to policy objectives
    - Lower cost for customers
    - Lower emissions
    - Cost effective

# DSM Transformation

- Does DSM have to save energy?
  - Load shifting
  - Time-varying value of efficiency – LBNL, June 2017
  - Strategic electrification
- What value will new technology unlock?
  - Grid Modernization Technology
    - AMI & supporting technology
    - DRMS (Demand Response Management System)
  - Renewable Forecasting Accuracy
  - Battery Pilots
  - Wireless technology (Smart homes, IoT, Smart Appliances)