

# The Potential for Load Flexibility in Northern States Power's Service Territory

PRESENTED TO

Peak Load Management Alliance (PLMA)  
2019 Spring Conference

Minneapolis, MN

PRESENTED BY

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THE **Brattle** GROUP

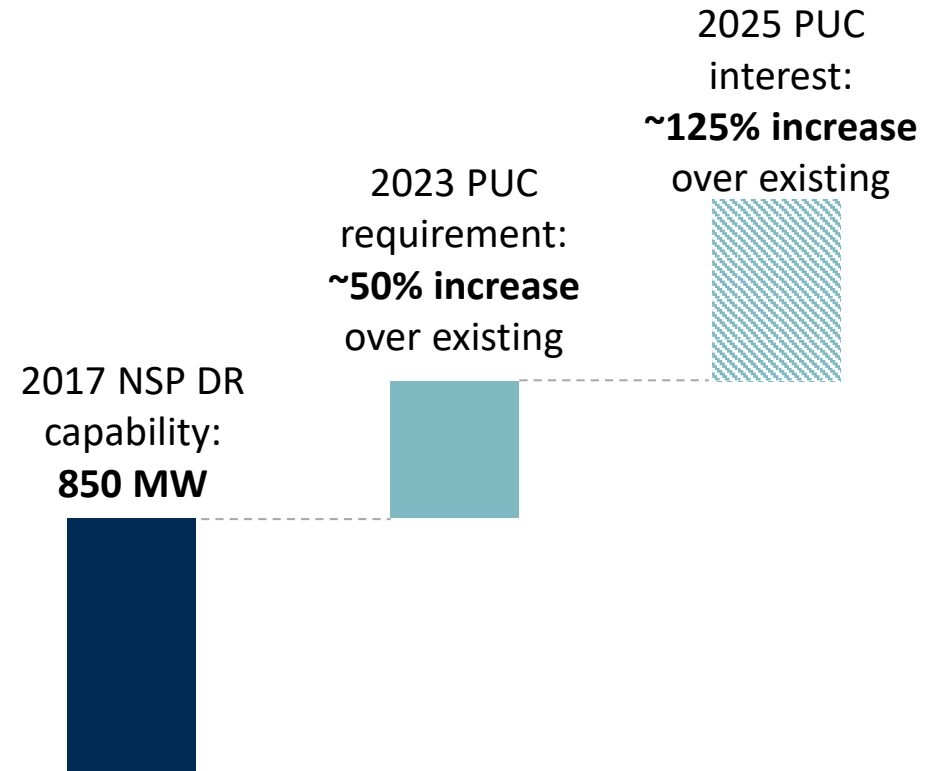
# Why assess load flexibility potential?

## Regulatory mandate

- Procure 400 MW by 2023
- Explore 1,000 MW by 2025

## 2019 Integrated Resource Plan

## Rapidly emerging DR opportunities



Note: Required DR procurement levels differ from stated amounts in the PUC Order due to several factors. For further discussion, see "The Potential for Load Flexibility in Northern States Power's Service Territory," prepared by The Brattle Group, January 2019.

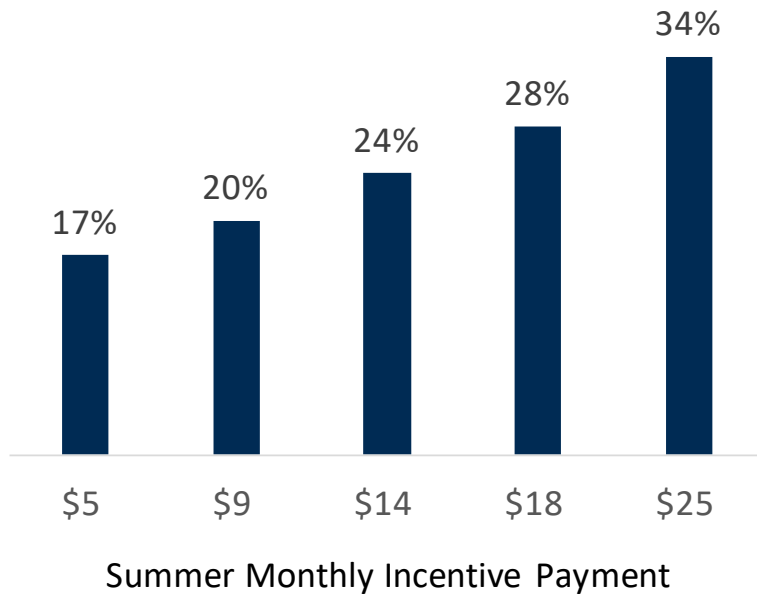
# Key Challenges

- What is the optimal participation level?
- How to account for “stacked benefits”?
- How to model advanced value streams?
  - Ancillary services
  - Geo-targeted distribution deferral

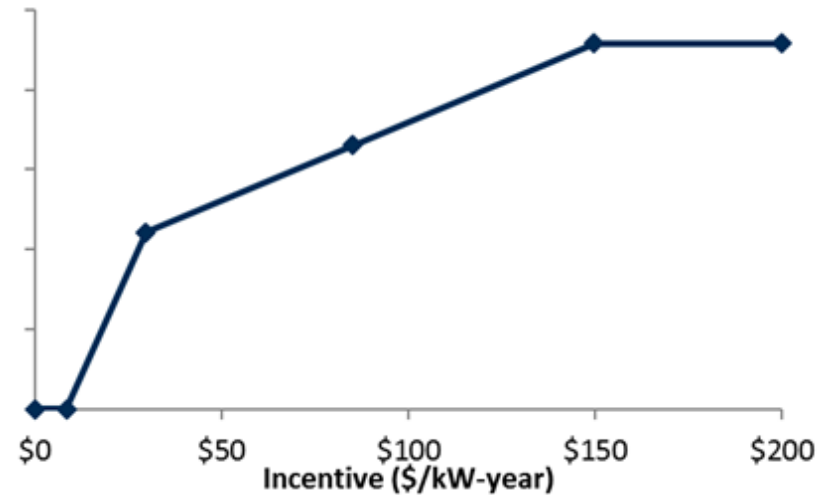
# Participation

Customer surveys determined sensitivity of enrollment to incentive payments

**Likely New Enrollment – Direct Load Control**



**DLC Participation Function**



# Impacts

Impacts were derived from 70+ studies and simulated using the LoadFLEX model

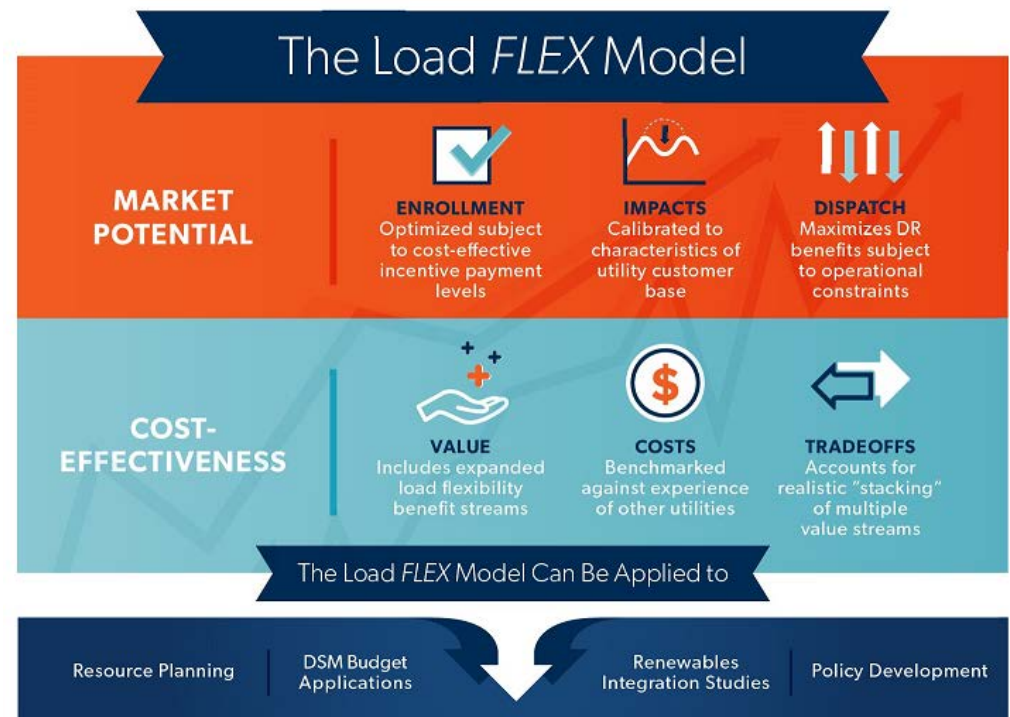
## 40+ load flexibility measures analyzed:

### Conventional

- Direct Load Control
- Interruptible Tariffs
- Etc.

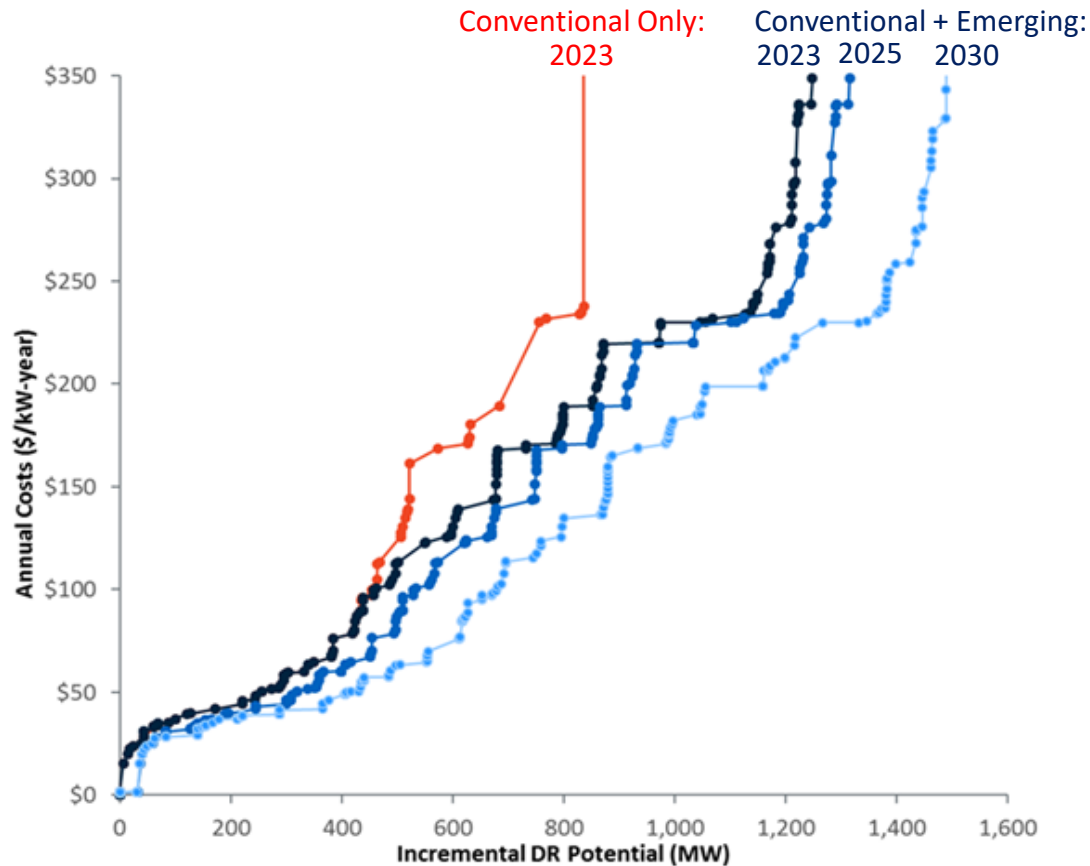
### Emerging

- Smart water heating
- Time-varying rates
- Behavioral DR
- Etc.



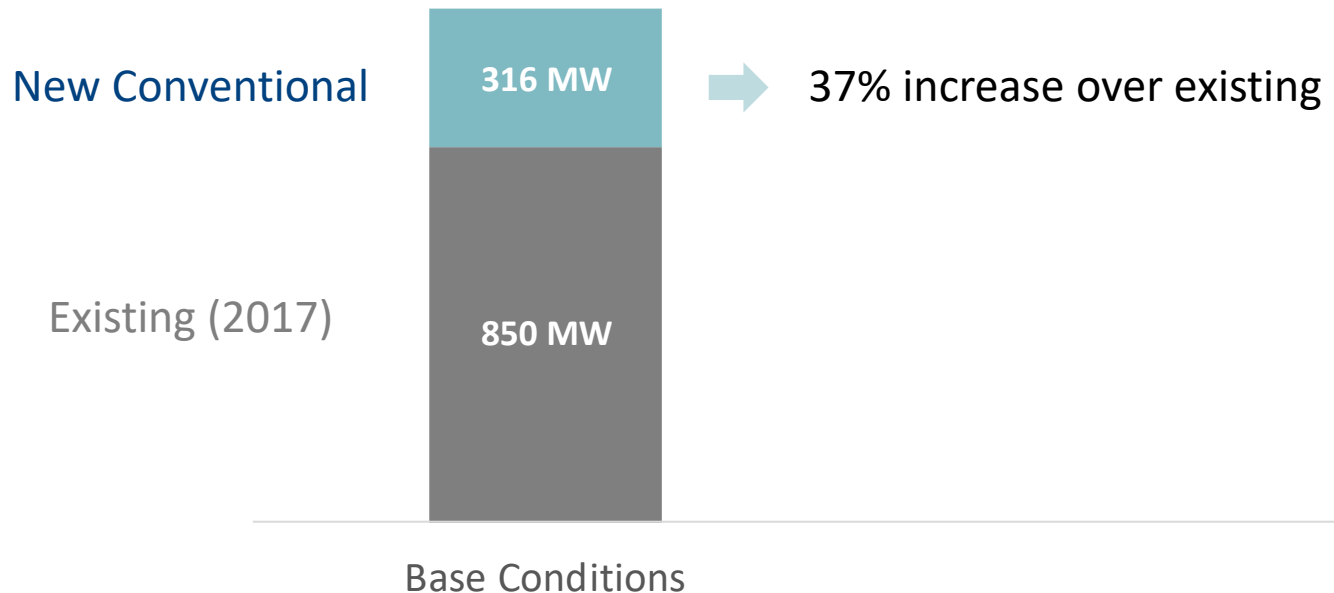
# Load Flexibility Supply Curve

Measures & incentives are organized into a “supply curve” for Resource Planning



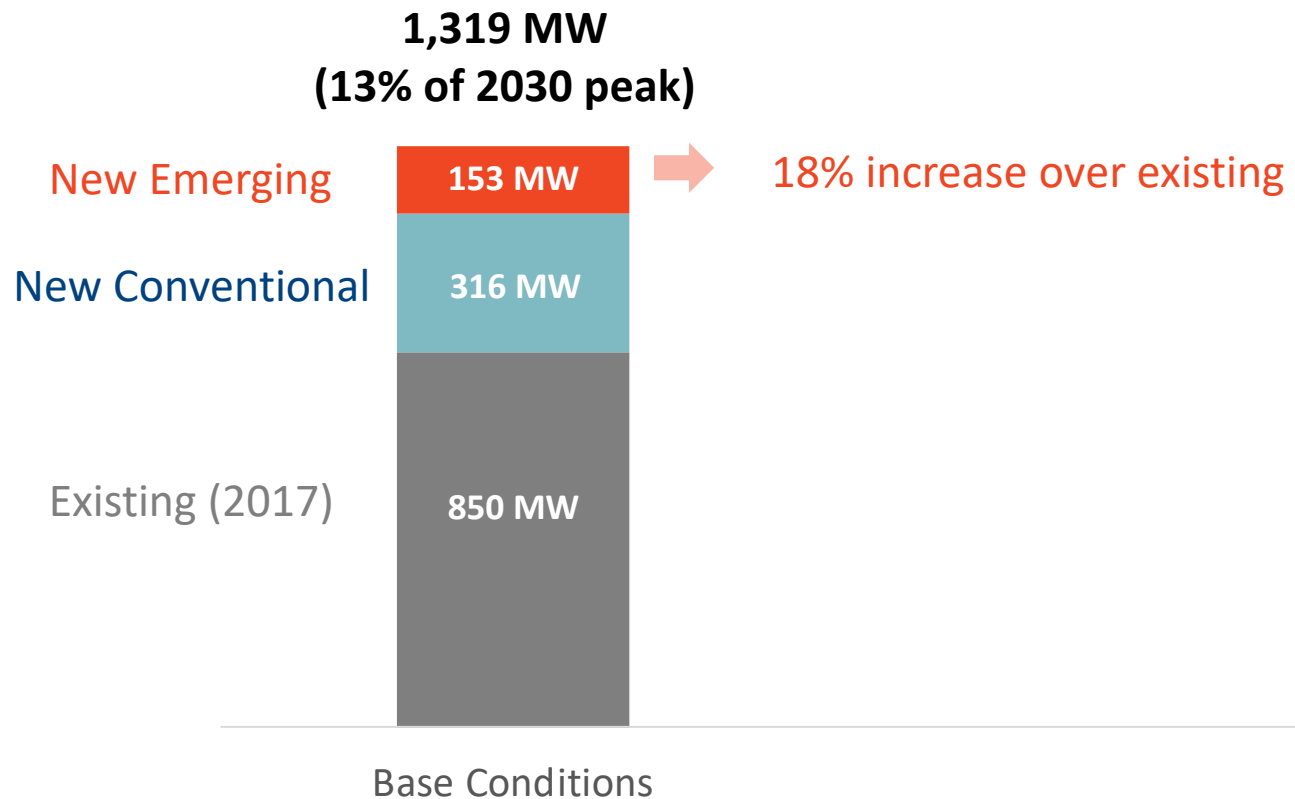
# Cost-effective Potential (2030)

Expanding conventional programs would increase DR capability by 37%



# Cost-effective Potential (2030)

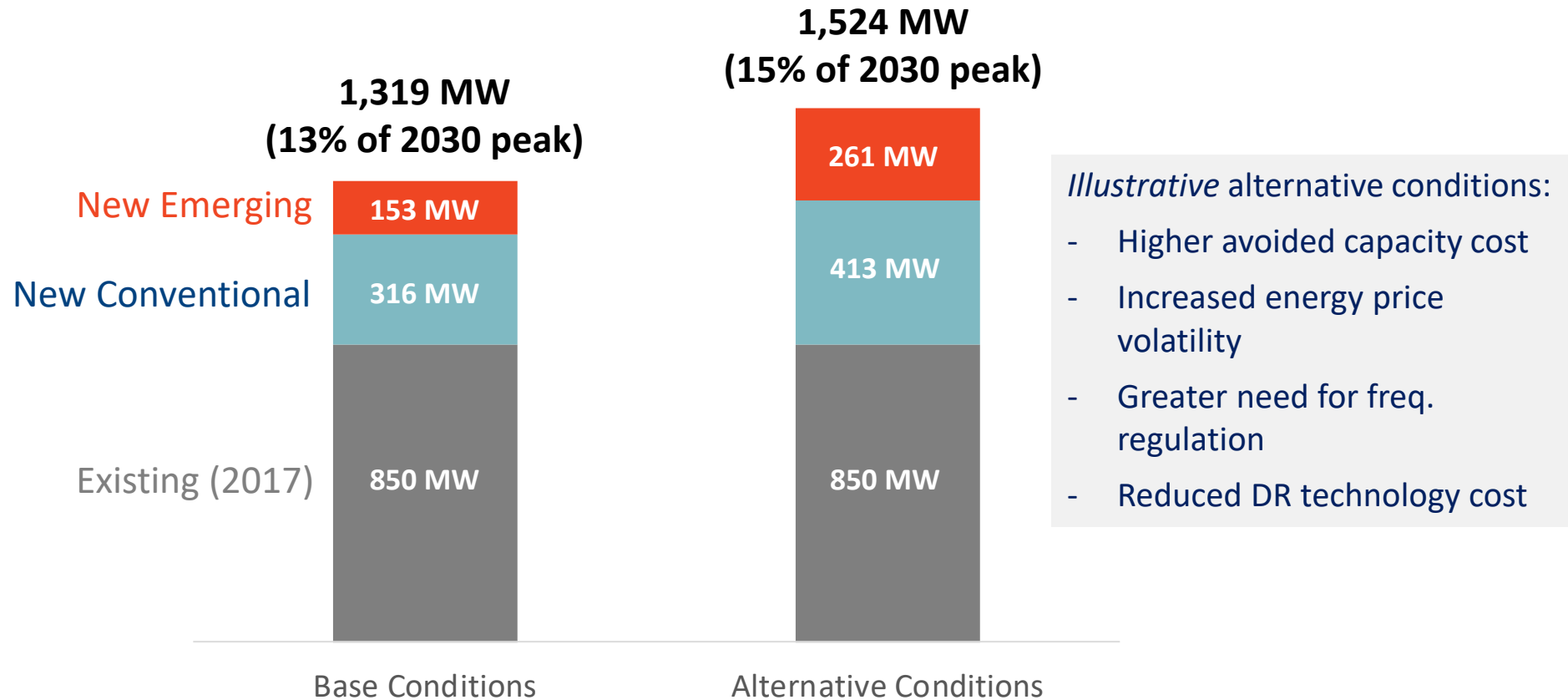
Emerging load flexibility programs could further increase DR capability by 18%





# Cost-effective Potential (2030)

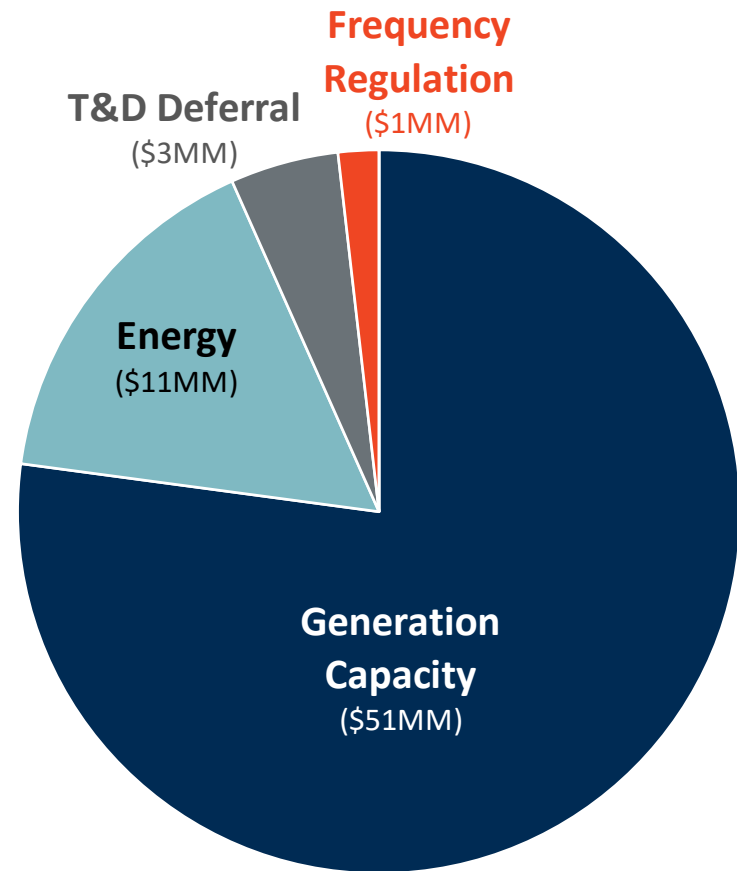
Alternative market conditions could result in higher potential



# Benefits

- Load flexibility benefits and potential are system-specific
- Considerations include:
  - AMI deployment
  - Renewables adoption
  - Electrification
  - Supply mix
  - Existing DR capability
  - Technology cost
  - Customer experience
  - Capacity needs
  - Etc...

## NSP Annual Load Flexibility Benefits (2030)




# For more information...

The Potential for Load Flexibility in Xcel Energy's Northern States Power Service Territory

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Ryan Hledik specializes in regulatory and planning matters related to the emergence of distributed energy technologies. He received his M.S. in Management Science and Engineering from Stanford University, and his B.S. in Applied Science from the University of Pennsylvania, with minors in Economics and Mathematics.