Distributed Energy and Distribution Network Impacts

NYU Center for Policy Integrity

March 4, 2022

MINNESOTA
PUBLIC UTILITIES COMMISSION

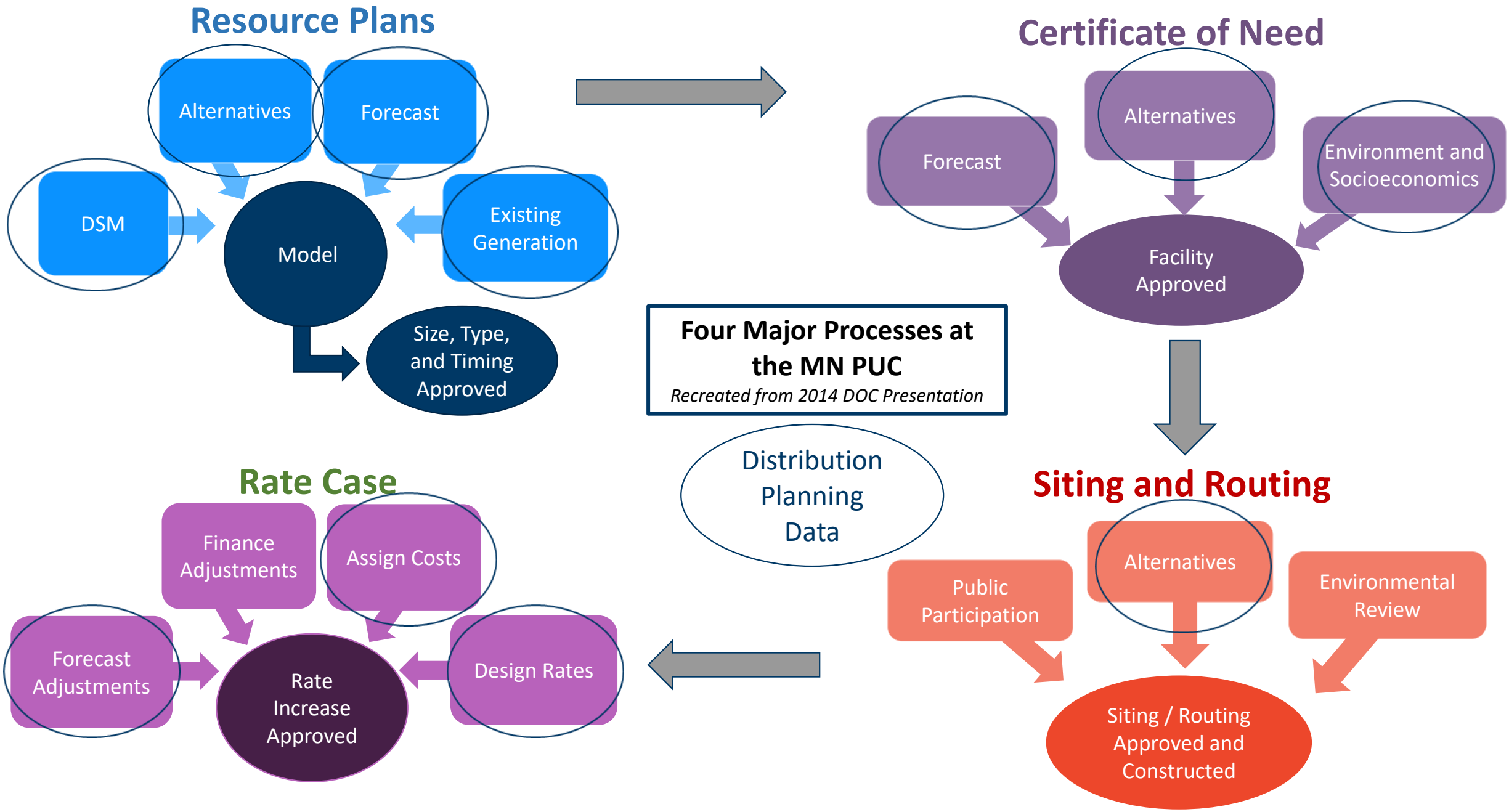
https://mn.gov/puc

Disclaimer

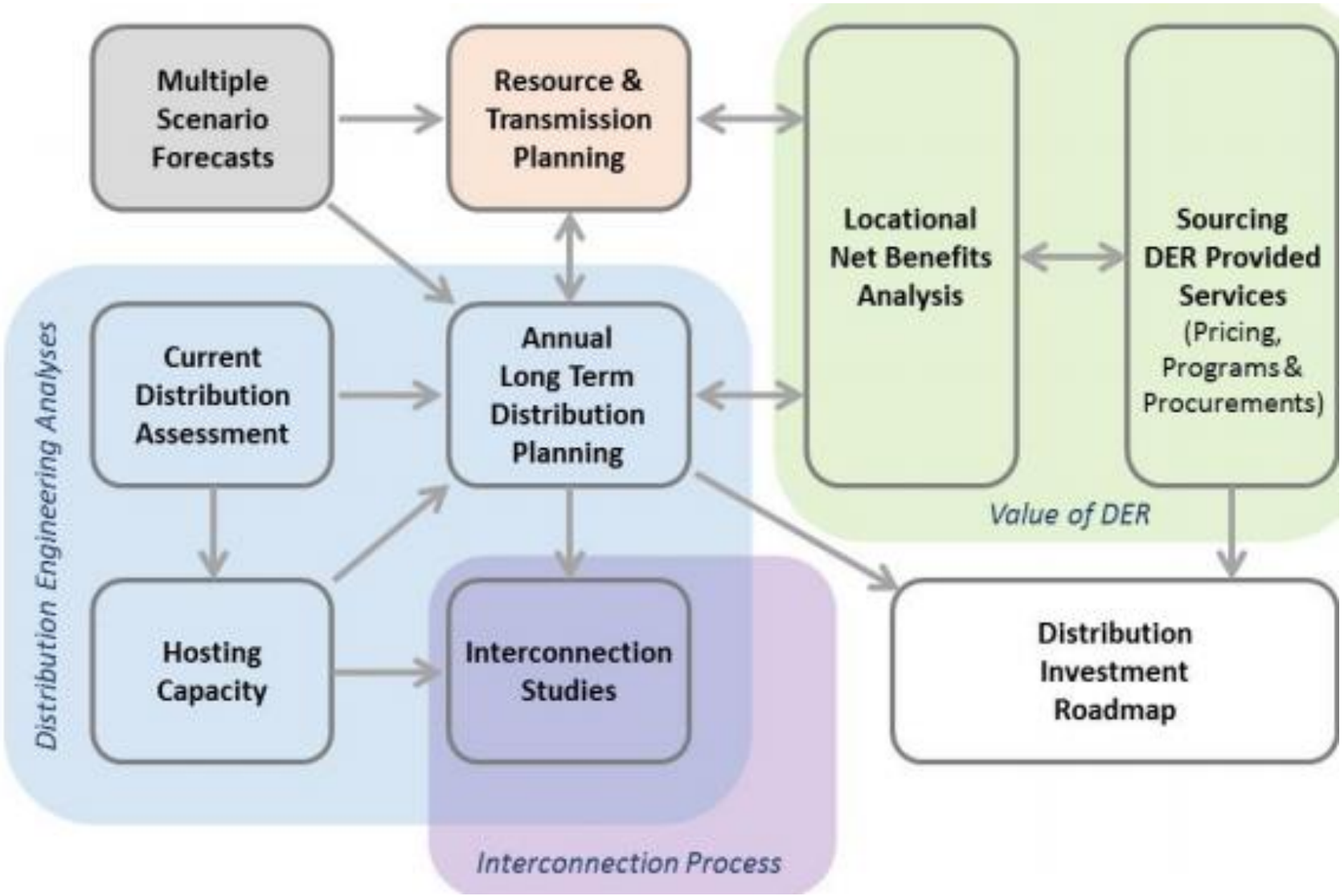
The ideas expressed are the views of the presenter, and not the Minnesota Public Utilities Commission. The Commission speaks through its Orders.

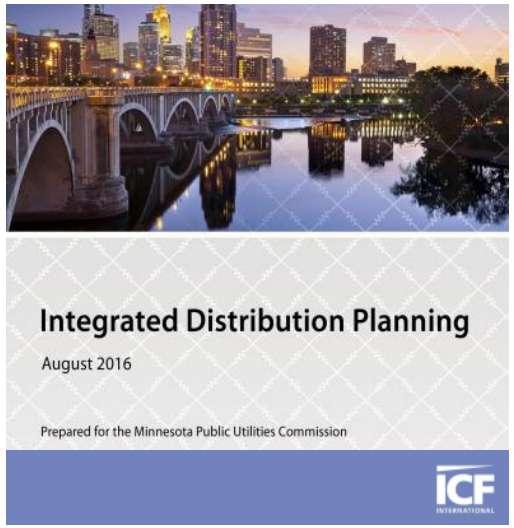
State Commissions

- State Regulatory Framework and Commissions vary.
  - Vertically integrated and restructured (Generation, Transmission, and Distribution)
  - Appointed and elected Commissioners
  - Staff structure (advisors and advocates)
  - Economic regulation, industries regulated, and state laws
- Commissions are quasi-judicial
  - Decisions are based on a docket's record and relevant statute, rules, etc.
  - Orders speak for the Commission (*subject to appeal*)
  - Ex-parte rules may apply
- State and Federal Jurisdiction requires shared responsibilities, collaboration & coordination

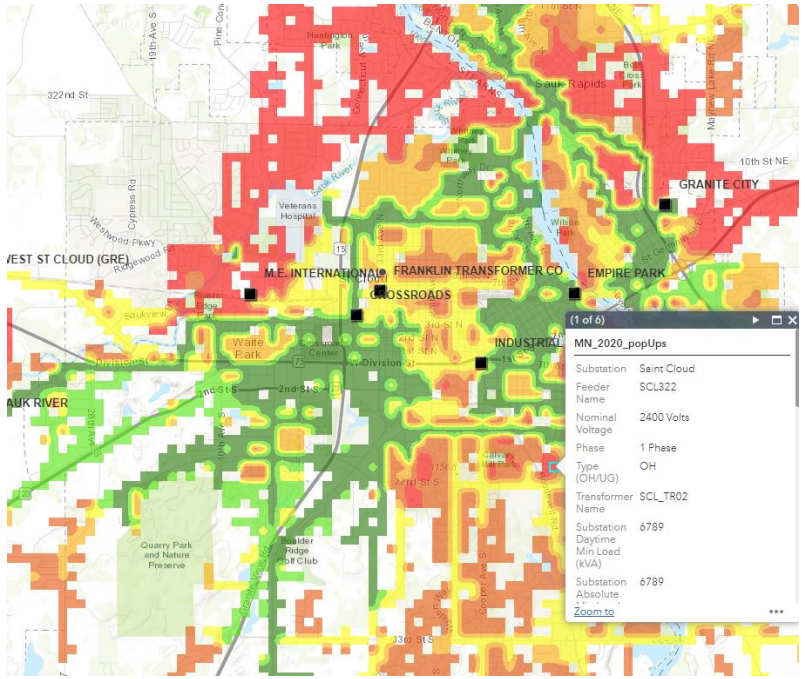

Resource Plans
Alternatives
Forecast
DSM
Model
Existing Generation
Size, Type, and Timing Approved
Certificate of Need
Forecast
Alternatives
Environment and Socioeconomics
Facility Approved
Four Major Processes at the MN PUC
Recreated from 2014 DOC Presentation
Distribution Planning Data
Siting and Routing
Public Participation
Alternatives
Environmental Review
Siting / Routing Approved and Constructed
Rate Case
Finance Adjustments
Assign Costs
Forecast Adjustments
Rate Increase Approved
Design Rates

2016 Report Recommendation





Hosting Capacity



Hosting Capacity Analysis – Public Map and Pop-Up Details

Substations with Capacity Constraints (≥90% XFMR Rating)	Feeders with Capacity Constraints (≥90% Feeder Rating)	Feeders with Aggregate DER ≥ DML	Feeders that have received Notices to date
Xfmr Rating: The maximum apparent power the substation transformer is capable of operating under. The summation of daytime minimum load and generation on the transformer cannot exceed this value	Feeder Rating: The maximum apparent power the feeder is capable of operating under at its origin point at the substation. The summation of daytime minimum load and generation on the feeder cannot	Any project connecting to feeders where the aggregate DER is greater than or equal to the Daytime Minimum Load (DML) will likely fail the initial review per MN DIP screen 3.2.1.2.	Types of Notices: Pre-MNDIP Substation or Specialized Study MNDIP System Impact Study Phase II Notice MNDIP Dedicated Feeder Notice
Capacity Constrained Substations: 63	**Capacity Constrained Feeders: 64**	**Feeders with Aggregate DER ≥ DML: 172**	**"No Capacity Notice" Feeders: 12**
% of Total Substations: 26.14%	**% of Total Feeders: 5.54%**	**% of Total Feeders: 14.88%**	**% of Total Feeders: 1.04%**
% Constrained Last Month: 25.31%	**% Constrained Last Month: 5.10%**	**% of Total Feeders Last Month: 14.97%**	**% Constrained Last Month: 0.87%**
ALB	ALB023	ALB021	BRO021
ALT	ALT021	ALB022	CHI311
ATW	AVR081	ALB023	CTF022
AVR	BIS001	ALT021	DGC061
BRO	BRO021	ANN021	DOC211
BUR	BUR032	ATW061	FAB063
CHI	CGR063	AVN021	LAF001
CKG	CHI311	AVR081	LCR311
CLC	CKG041	BEG001	LOW021
COK	CLC221	BEL061	MTW021
CTF	CTF021	BEL062	SCL322
DGC	DOC031	BFL021	WEF071

Public Interconnection Queue and Substation/Feeder Information

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Thank You!

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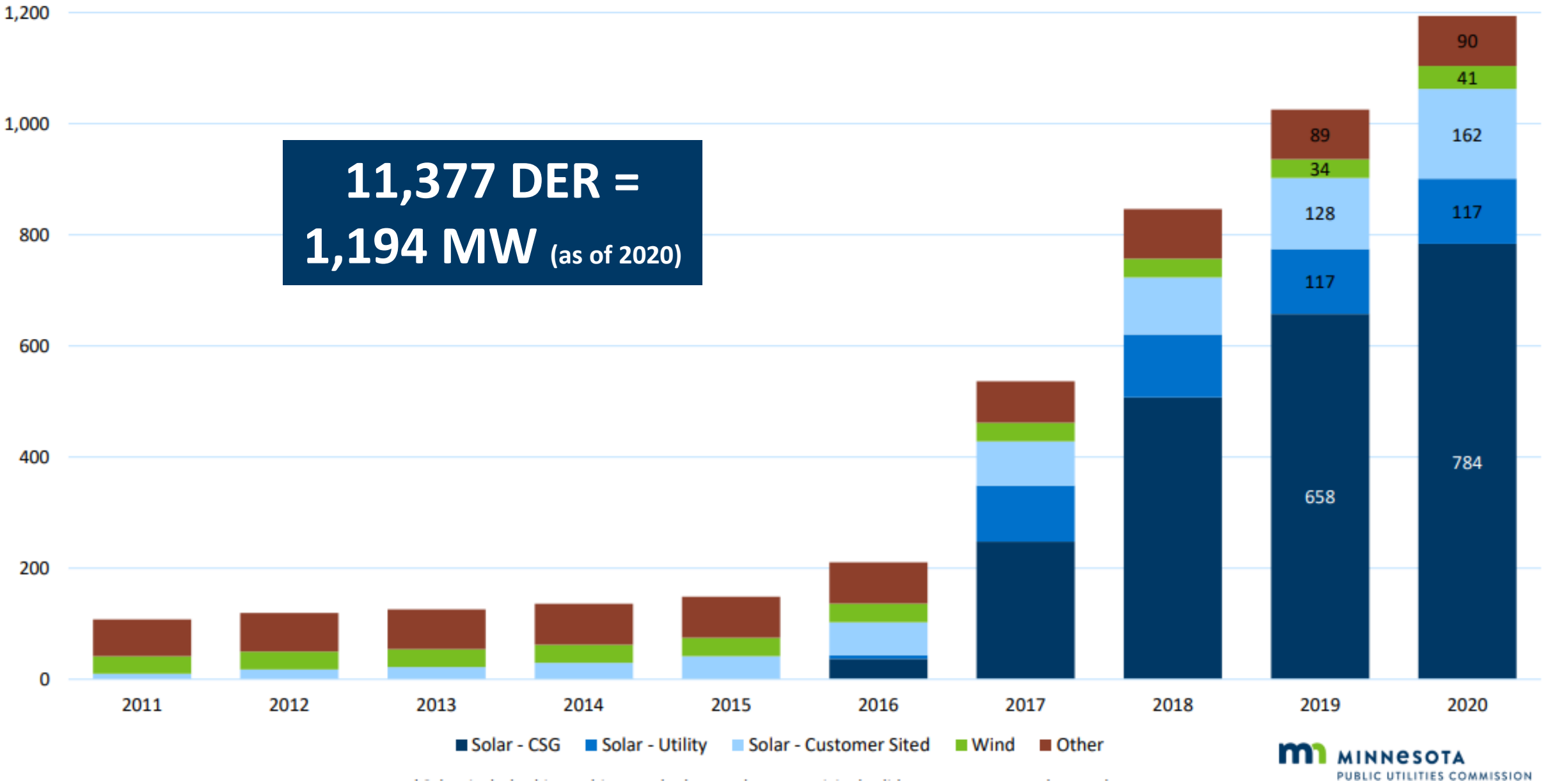
Background Slides

Defining DER

Distributed Energy Resources (DER) is defined as "supply and demand side resources that can be used throughout an electric distribution system to meet energy and reliability needs of customers; can be installed on either the customer or utility side of the electric meter." This definition for this filing may include, but is not limited to: distributed generation, energy storage, electric vehicles, demand side management, and energy efficiency.

(Source: IDP Filing Requirements as adopted in 2018. Based on See *Minnesota Staff Grid Modernization Report, March 2016* and ICF Report, Integrated Distribution Planning, August 2016, prepared for Minnesota Public Utilities Commission, Docket No. E999/CI-15-556)

Cumulative Installed DER Capacity (MW)



11,377 DER = 1,194 MW (as of 2020)

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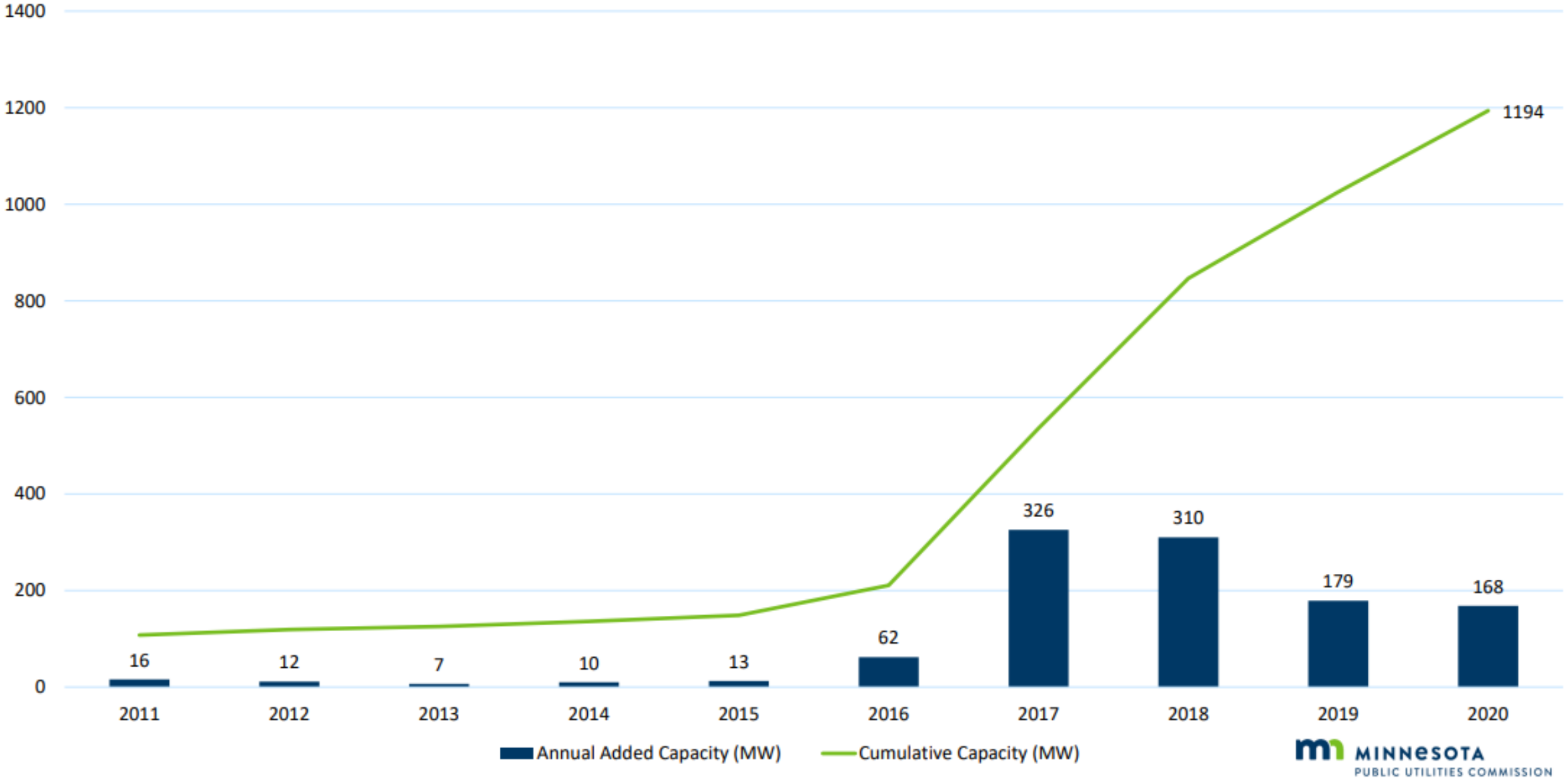
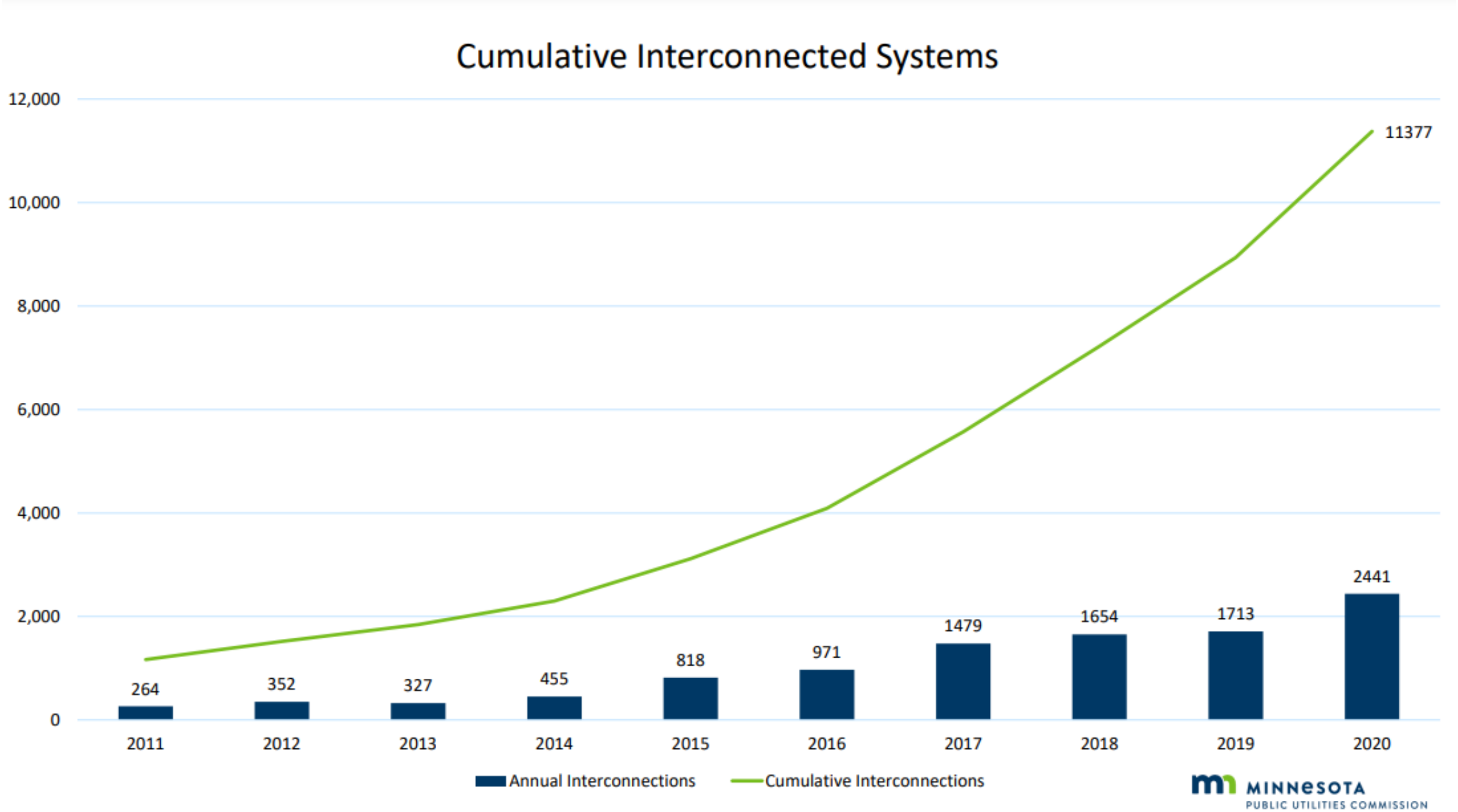
*Other includes biogas, biomass, hydro, methane, municipal solid waste, storage, and natural gas

Cumulative MW of Interconneted Systems




Cumulative Interconnected Systems
12,000
10,000
8,000
6,000
4,000
2,000
0
11377
264
352
327
455
818
971
1479
1654
1713
2441
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Annual Interconnections
Cumulative Interconnections
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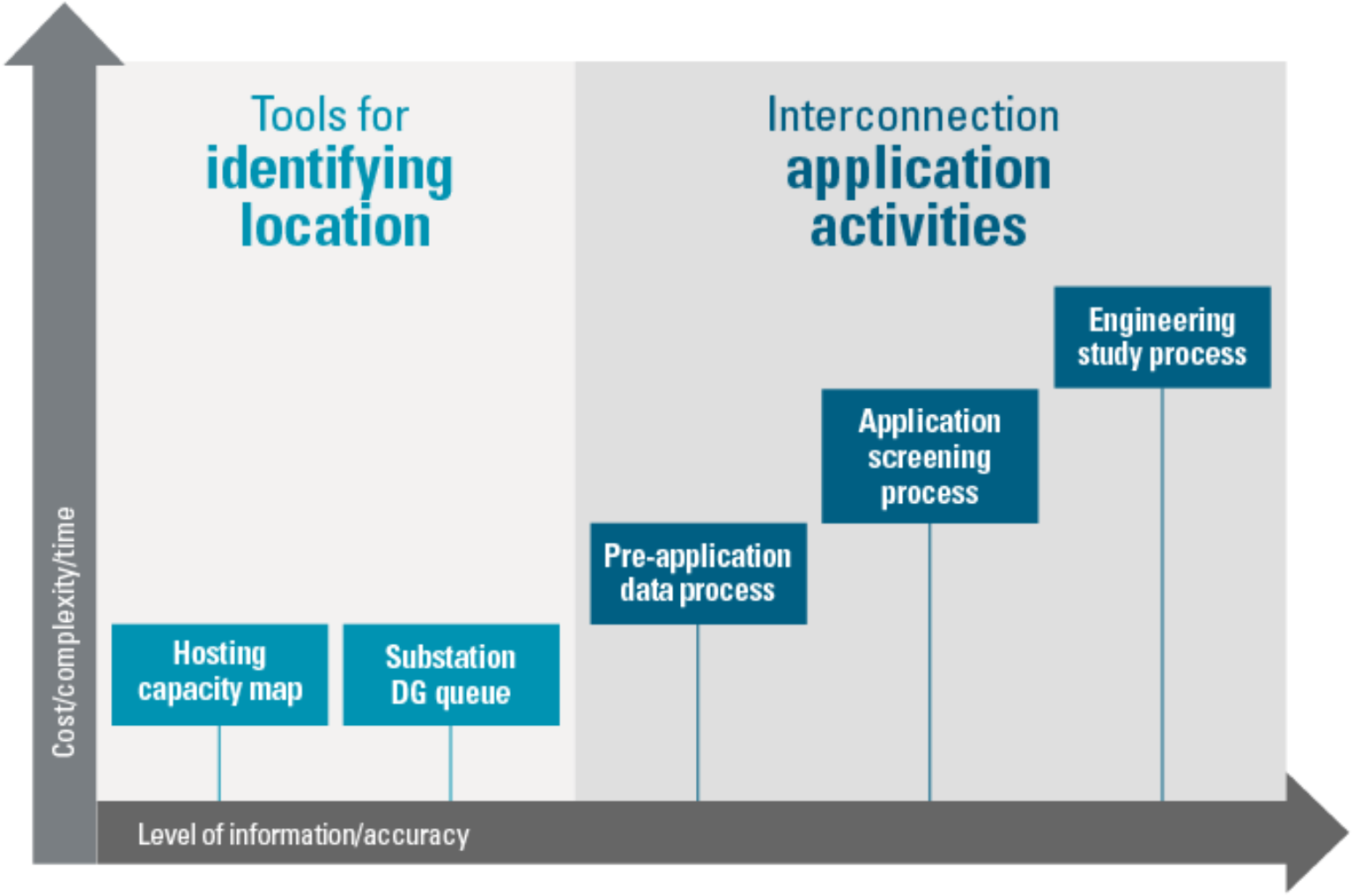
Data information (2020 Data)

- Under Minn. Stat. 216B.1611 Minnesota utilities submit an annual report on distributed generation interconnected with the utility's distribution system.
- Utilities should report systems that are:
  - Interconnected with the distribution system
  - Less than 10 MW in size
  - Operate in parallel with the utility
- These reports are filed annual in dockets ending in -10 (ex, 20-10, 21-10). Data here reflects reports filed in Docket 21-10
- This data includes all systems through Dec. 31, 2020 as reported by all Minnesota utilities
- There may be unreported systems if a utility did not file a report in a given year
- For additional information, including details on data specifics and a raw dataset, please refer to the DER Data Webpage: mn.gov/puc/energy/distributed-energy/data/
- Contact: Hanna Terwilliger, Hanna.Terwilliger@state.mn.us

Resources for Interconnection Customers



MN DIP Interconnection Review

Initial Review Screens

for Simplified and Fast Track Applications

Supplemental Review

when Application fails Initial Review screens

System Impact Study

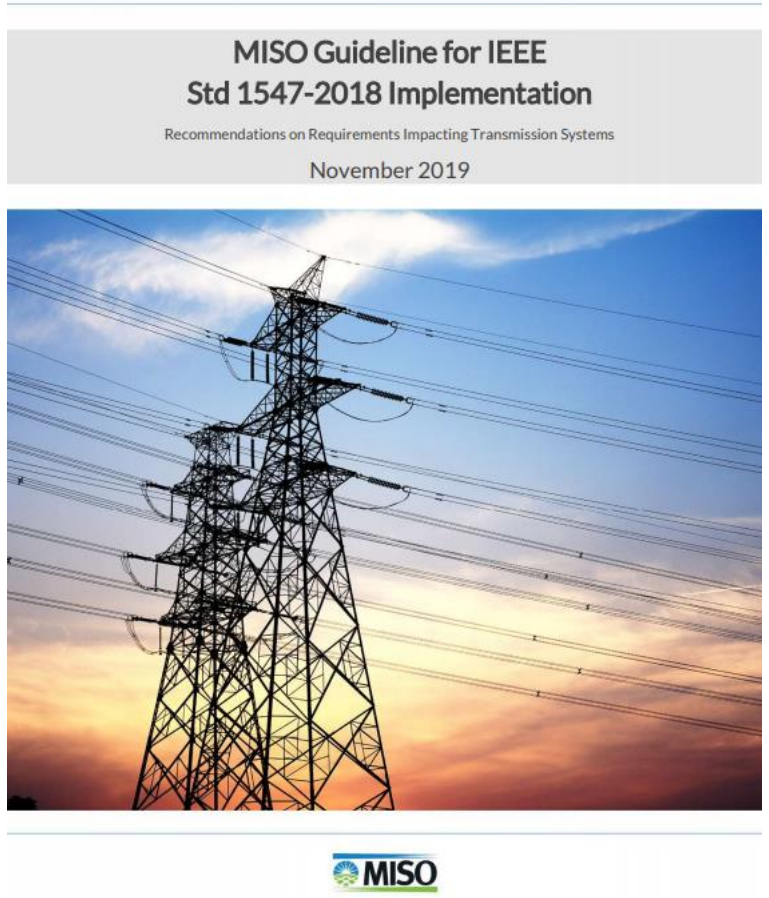
for Applications that fail Supplemental Review or do not qualify or choose Fast Track Review

Affected System Study or Transmission Impact Study

if potential impacts extend beyond utility's distribution grid

Facilities Study may also be conducted.

Bulk Power System reliability topics



DER Data Collection

MISO & NERC SPIDER

Modeling & studies

Cybersecurity