CENTRAL MAINE POWER

April 6, 2023

Maine Energy Utilities and Technology Committee

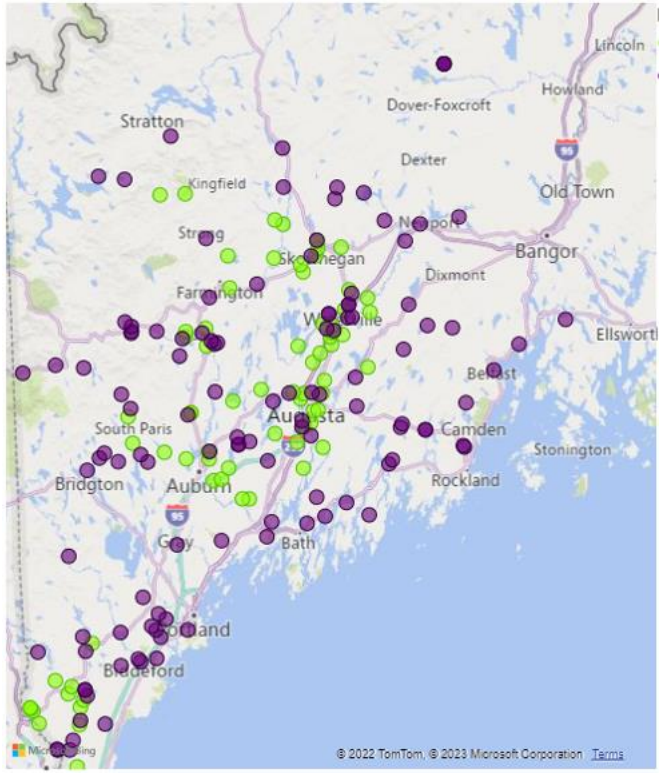
Distributed Generation

CENTRAL MAINE POWER
An AVANGRID Company

Making Connections
DISTRIBUTED GENERATION

Presentation Overview

- Distribution and Transmission Electrical System
- Interconnection Process
- Study Process
- System Considerations
- DG Execution
- NEB Stranded Costs



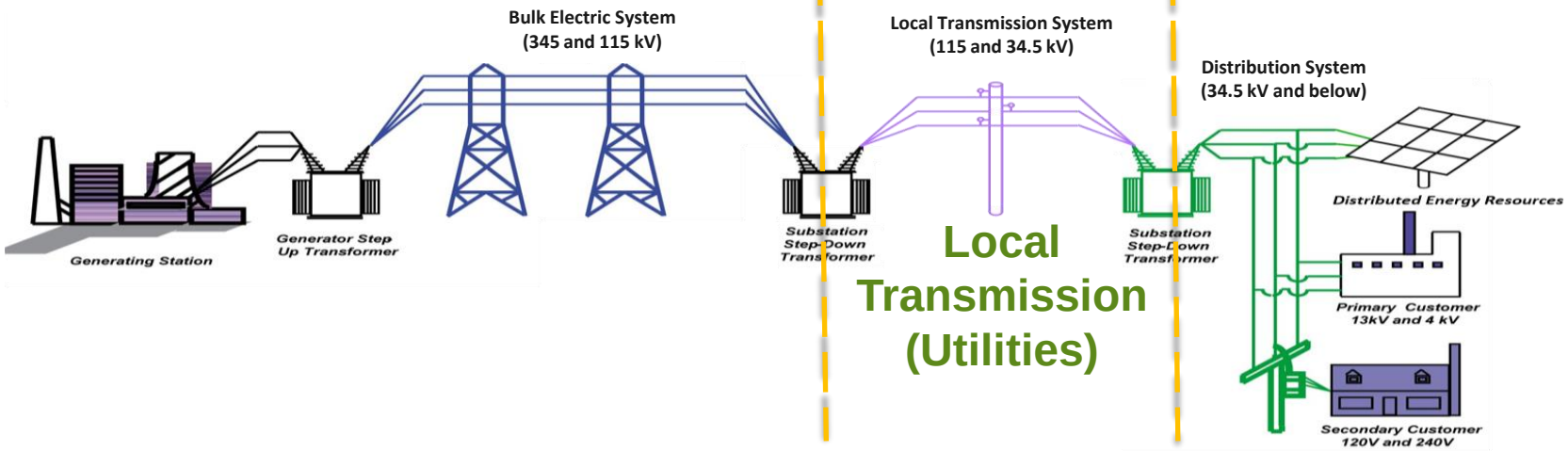
Distribution and Transmission Electrical System

The electric system is generally divided into two parts: **Transmission and Distribution**

- Distribution system provides power to the customers.
- Transmission system interconnects with the nation's electrical grid.

Bulk Electric System Transmission (ISO-NE and Utilities)

Distribution (Utilities)



Transfer electricity across the State and into New England

County/City level

Street level directly to customers

Road/Highway System Analogy

"Turnpike" – heavy traffic

"Route" – med traffic

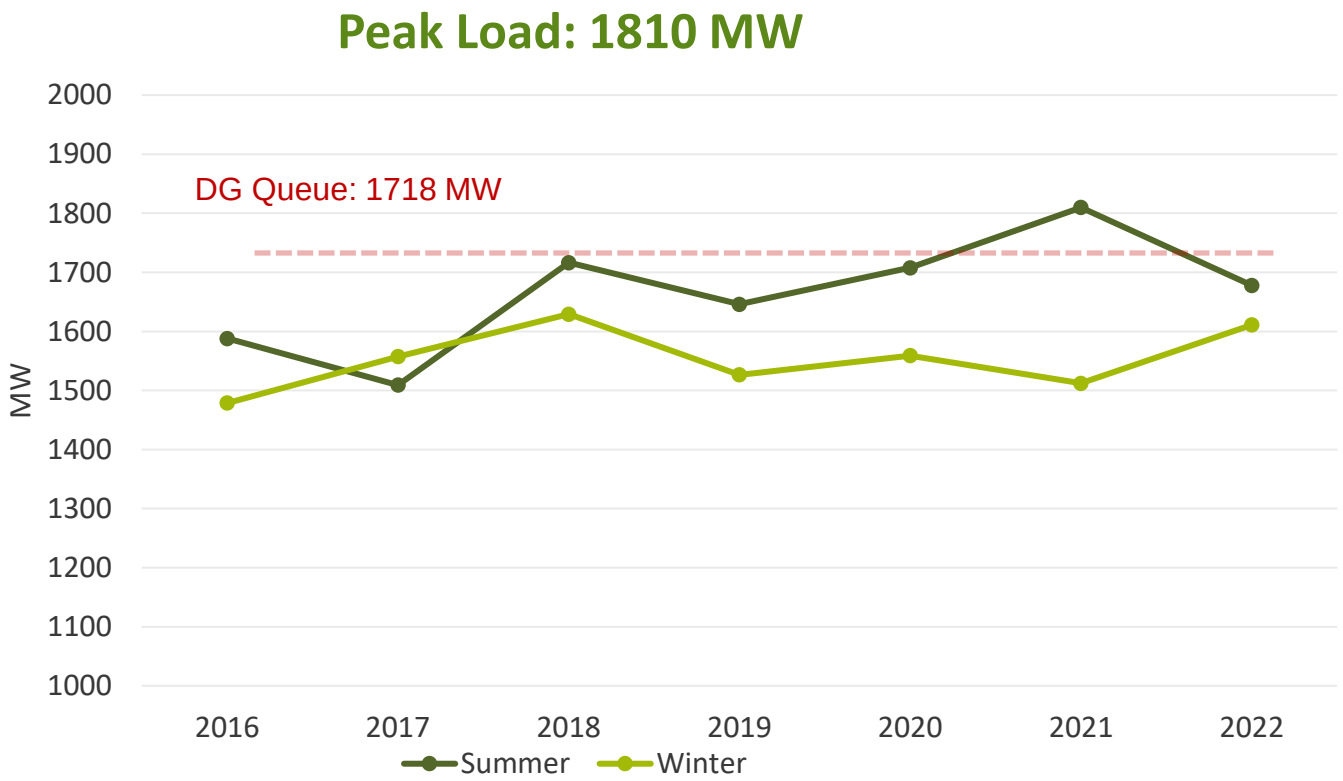
"Local road" – light traffic

Distribution and Transmission Electrical System

Central Maine Power Company serves approximately > 650,000 electricity customers

We service an 11,000 square-mile service area in central and southern Maine

Our system is comprised of 25,000 miles of power lines and 250 substations

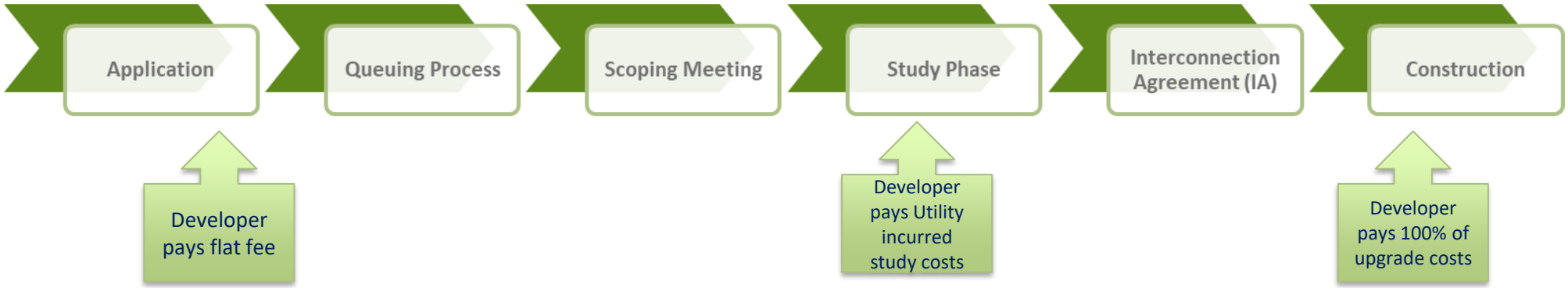


DG Interconnection Process

- Governed by Legislation, MPUC Chapter 324 Rule and Interconnection Agreements state interconnections

- Various types of MPUC Interconnections:
  - Level 1 – 25kW or less (screening process)
  - Level 2 – Greater than 25kW up to 2MW (screening process)
  - Level 3 – Non-exporting not greater than 10MW
  - Level 4 – All generators not subject to FERC jurisdiction (anything requiring a study)

DG Interconnection Process

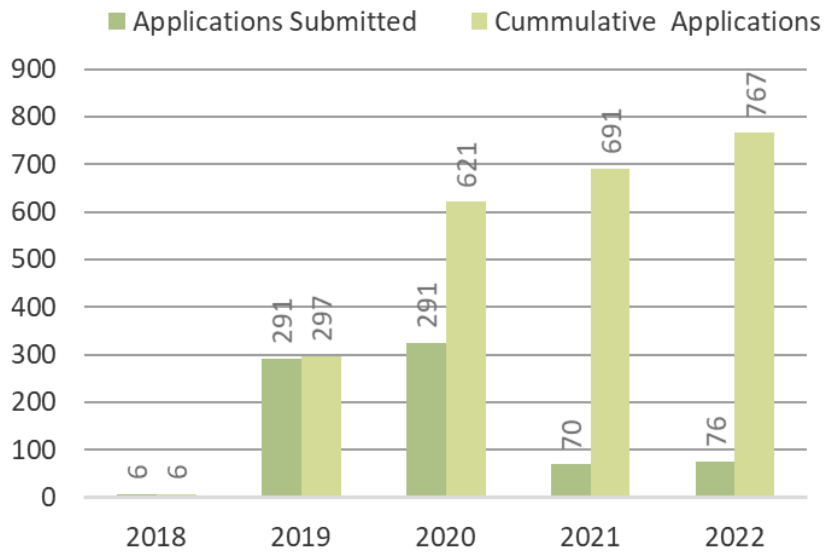


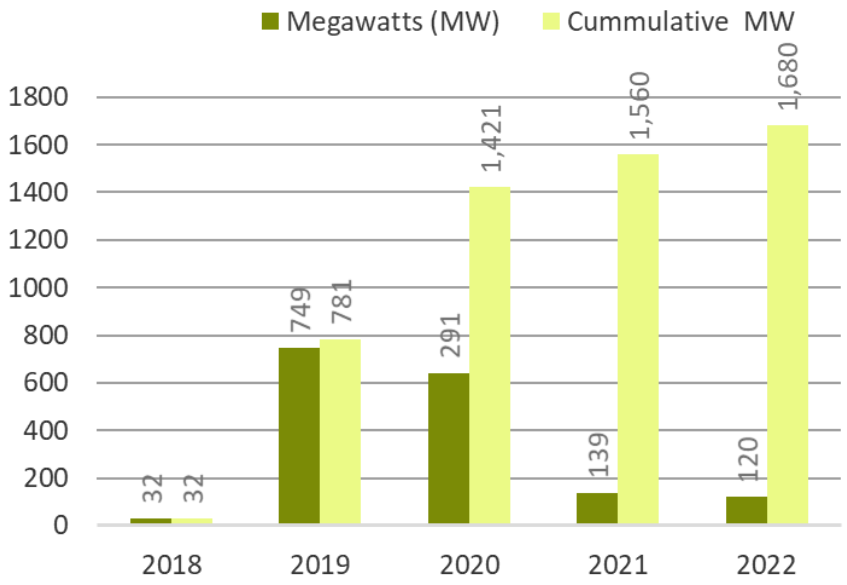
Level 4 Interconnection Process

1. Application through CMP on-line portal
2. If not the first application at substation: hold until prior project(s) execute Interconnect Agreement
3. When first queued, scoping meeting kicks off project evaluation phase
4. Distribution Study Phase – determination of adverse effects and mitigating upgrades
    - I.3.9 study process (Independent System Operator of New England (ISO-NE) approval to operate)
5. Interconnection Agreement execution
6. Construction – begins when project has Interconnection Agreement and I.3.9 approval

CMP Distributed Generation Growth

~4,750% growth in Level 4 DG applications 2019 vs 2018
~5,300% growth in Level 4 DG applications 2020 vs 2018





Distribution System Impact Studies & Transmission Cluster Studies

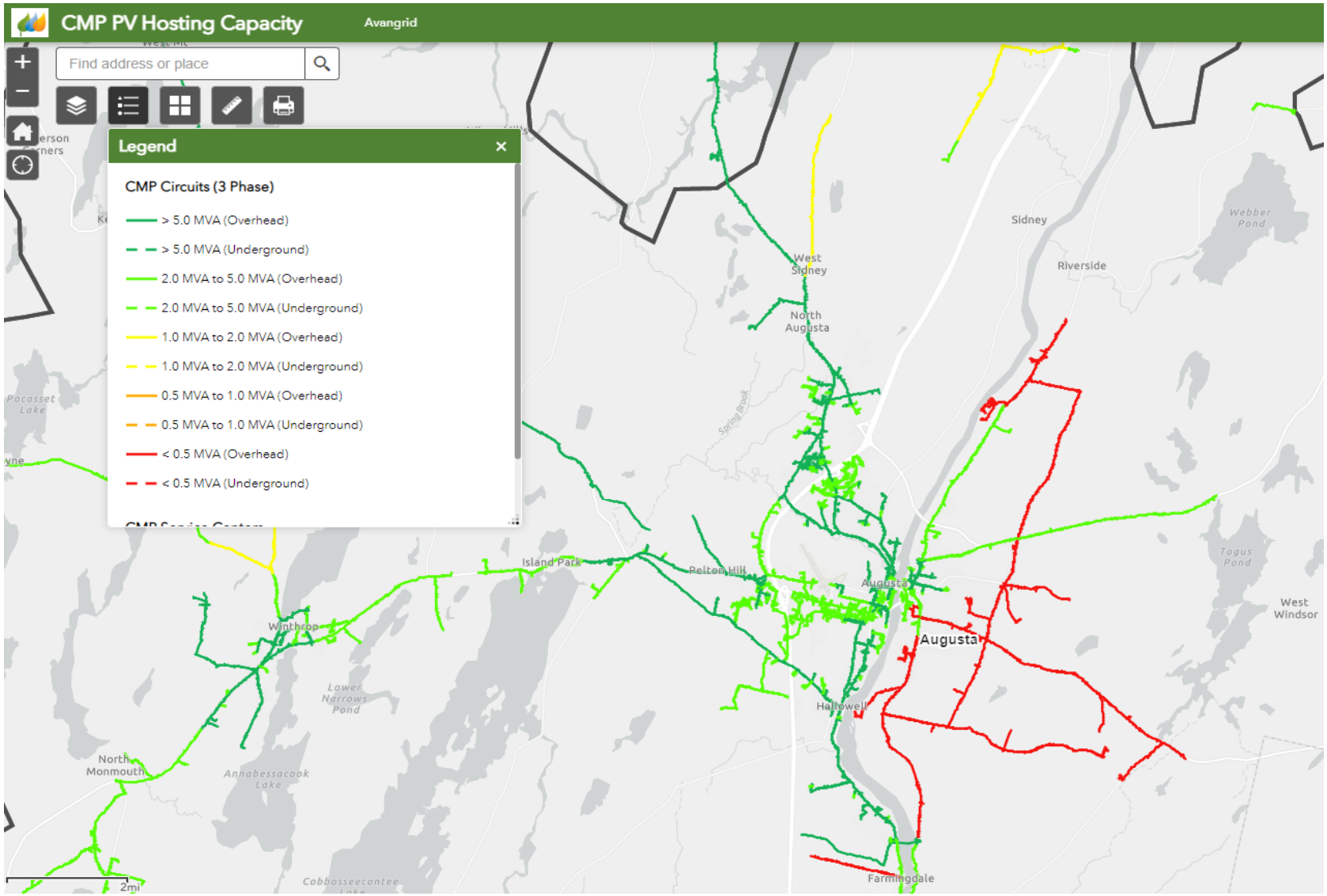
A **Distribution (D) System Impact Study** (Maine) and a **Transmission (T) Cluster Study (ISO)** evaluate the effects of the proposed DG interconnections on the operation and performance of the electric transmission and distribution systems.

Study characteristics:

- Includes the following detailed simulations and analyses:
  - Load Flow (T&D)
  - Short Circuit (T&D)
  - Effective Grounding (D)
  - Stability (T)
  - Harmonics (D)
  - Risk of Islanding (D)
  - Power-System Computer-Aided Design (PSCAD) (T)
  - Mitigation & Cost Estimates (T&D)
- Transmission Cluster Studies must include a sufficiently broad range of system conditions including generation patterns (on/off-line scenarios), load levels (peak, shoulder, light, minimum), and system contingencies (unplanned outage events) to ensure a comprehensive assessment.
- Study Timelines:
  - D: 25-45 business days, depending on study selected by Customer
  - T: ISO-driven timelines, dependent on large generation's study schedules, upgrades, and withdrawals

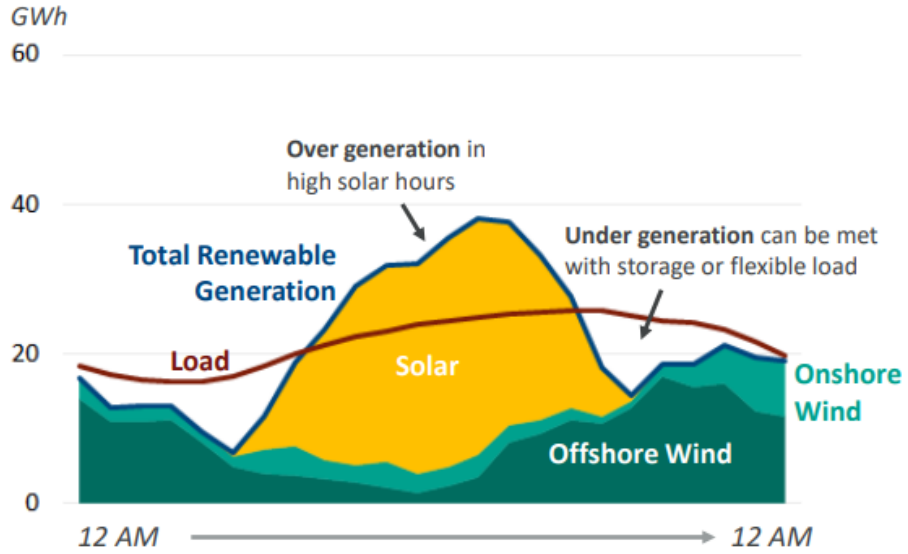
Generation Hosting Capacity Mapping

- Hosting Capacity maps on the CMP website show available generation capacity on our Distribution System



Systems Considerations

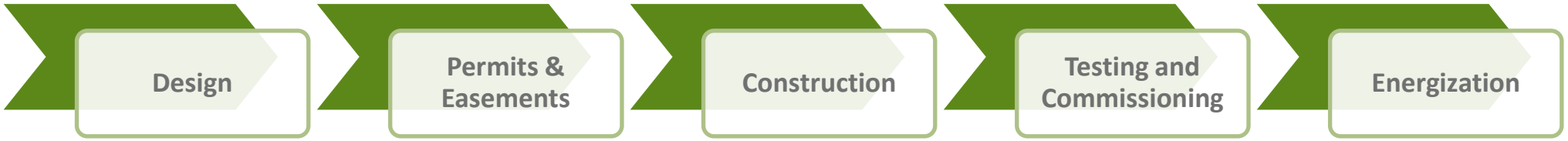
- **DG vs Load:** Summer peak load is approx. 1,800 MW, Winter peak load is approx. 1,600 MW, and “shoulder” peak load is approx. 1,300 MW. Distributed Generation seeking to interconnect is approx. 1,750 MW.
  - Balancing system reliability impacts and renewable generation interconnection
  - Reconciling intermittency of generation with load demand profile



- **System Upgrades:** cluster studies that indicate needed transmission-level system upgrades, e.g., rebuild a transmission line, add new equipment, etc.
- **Increasing Study Complexities:** evolving ISO-NE large generator interconnection queue and project attrition with identified system upgrades, e.g. 300 MW recently approved by ISO-NE

Graph Source: *The Brattle Group, New York Electric Grid Evolution Study, 2020*

DG Execution Process

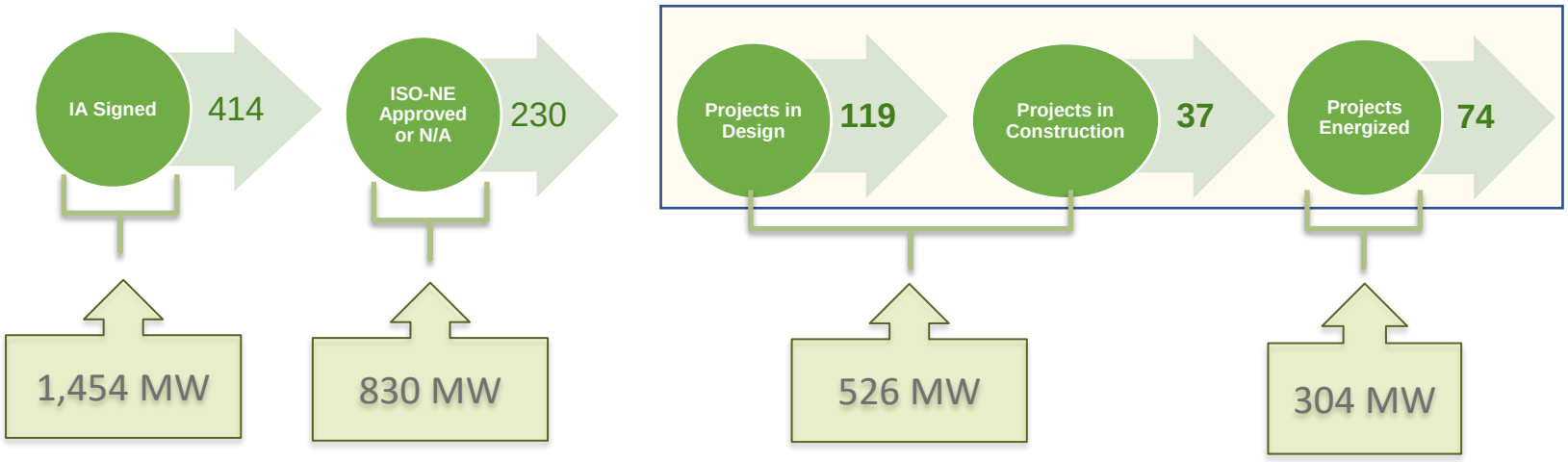


1. CMP designs distribution lines and substation improvements
   - Required by MPUC Rule, developers pay 25% to begin design and 75% before construction
2. Developer secures permits/easements and then starts construction
3. CMP makes distribution line and/or substation improvements
4. CMP and developer test facility; commissioning
5. Facility connects to CMP energy grid

CMP Active and Energized Projects

520 active or energized projects in queue - **1,718 MW**

- Executed Interconnection Agreement – 414 projects (1,454 MW)



NEB Program Costs

The Legislature directed cost recovery for this program to occur through the Stranded Cost Filings at MPUC – Active Case

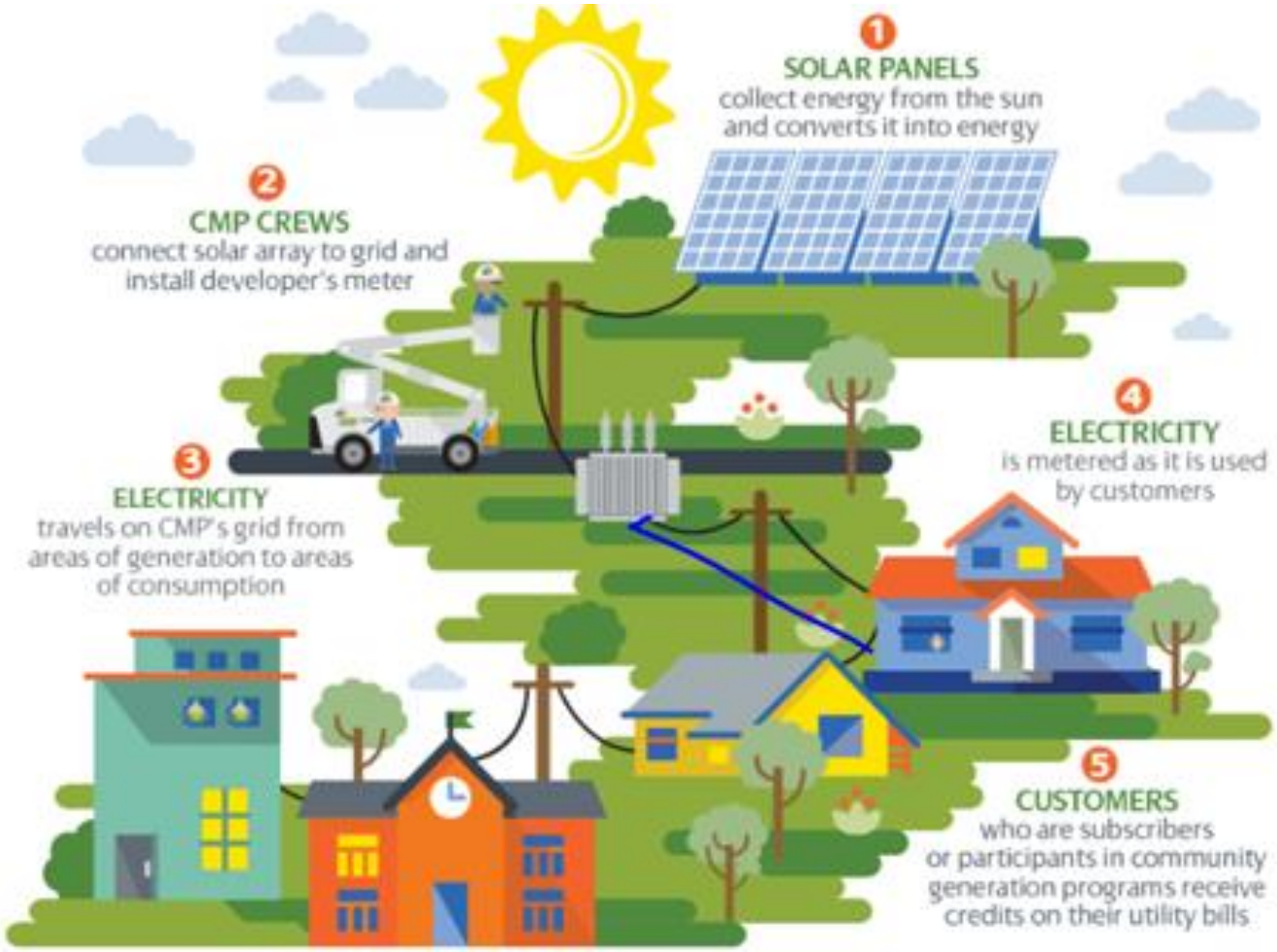
- Net Energy Billing Stranded Cost –
  - Net Energy Billing: $106M

- NEB Projections to be Included for First Time in the Stranded Cost Proceedings

- Customers will pay the actual cost of the program – not more or less. CMP does not earn on this program – we are the billing agent for the program.

- CMP is told to buy this energy at a set price and resell it.

Questions


1
SOLAR PANELS
collect energy from the sun and converts it into energy
2
CMP CREWS
connect solar array to grid and install developer's meter
3
ELECTRICITY
travels on CMP's grid from areas of generation to areas of consumption
4
ELECTRICITY
is metered as it is used by customers
5
CUSTOMERS
who are subscribers or participants in community generation programs receive credits on their utility bills