# Current Distribution Systems

## Questionnaire Section C



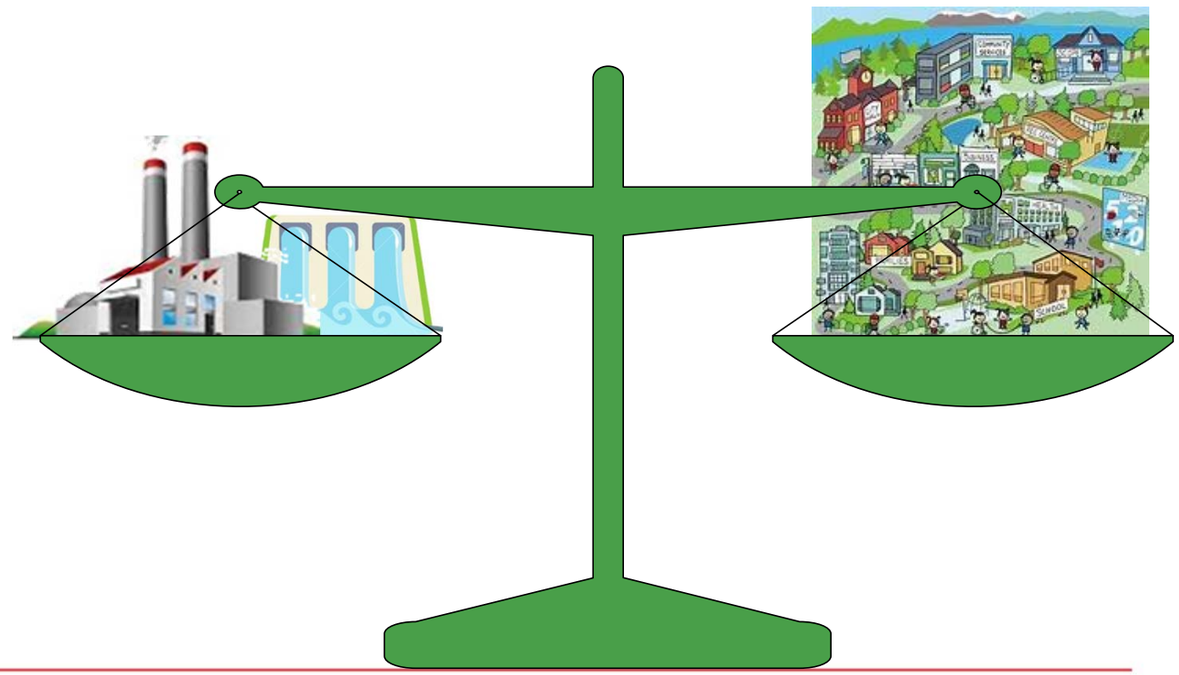



PACIFIC POWER

POWERING YOUR GREATNESS

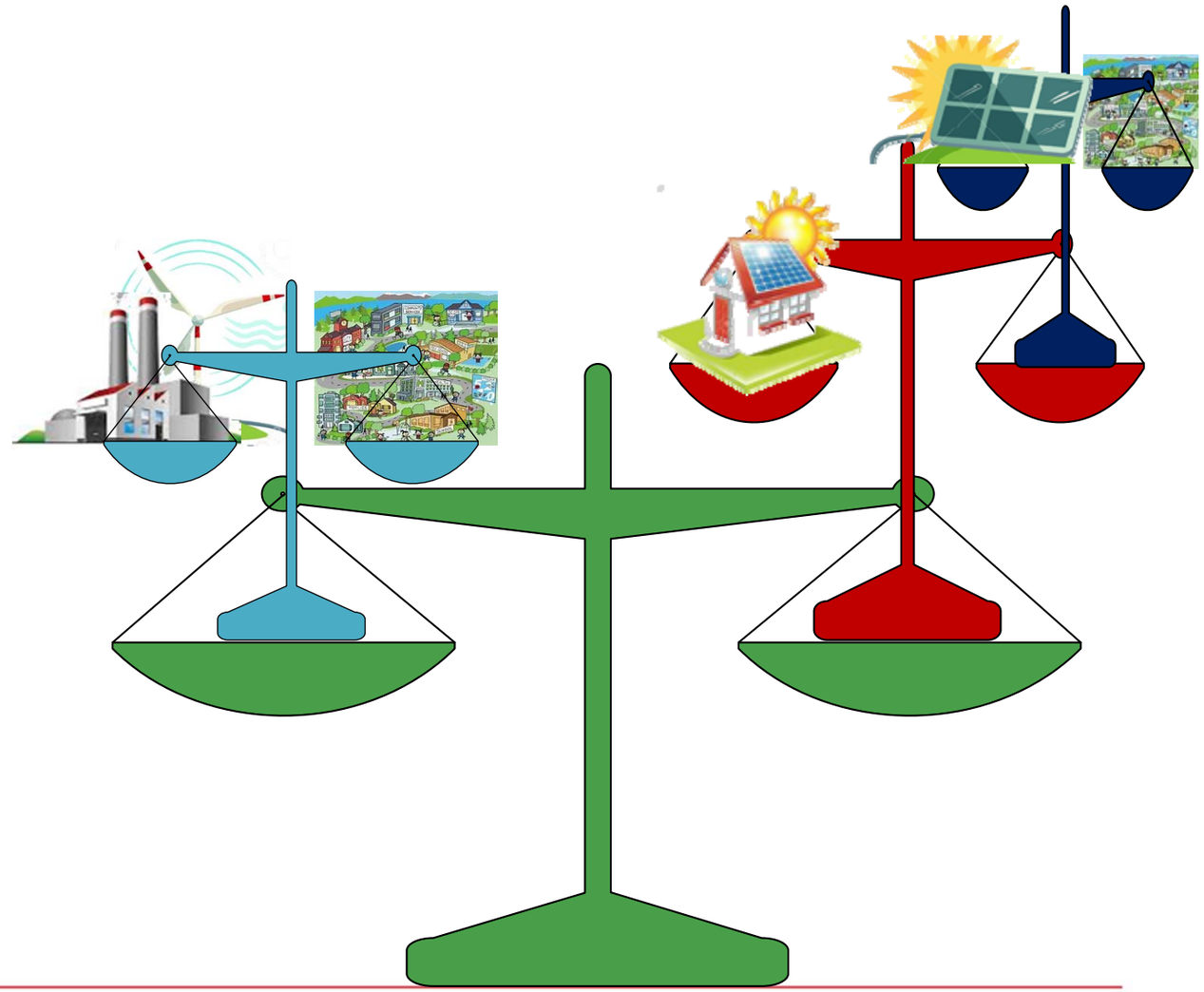
# Legacy System – Economic Efficiency

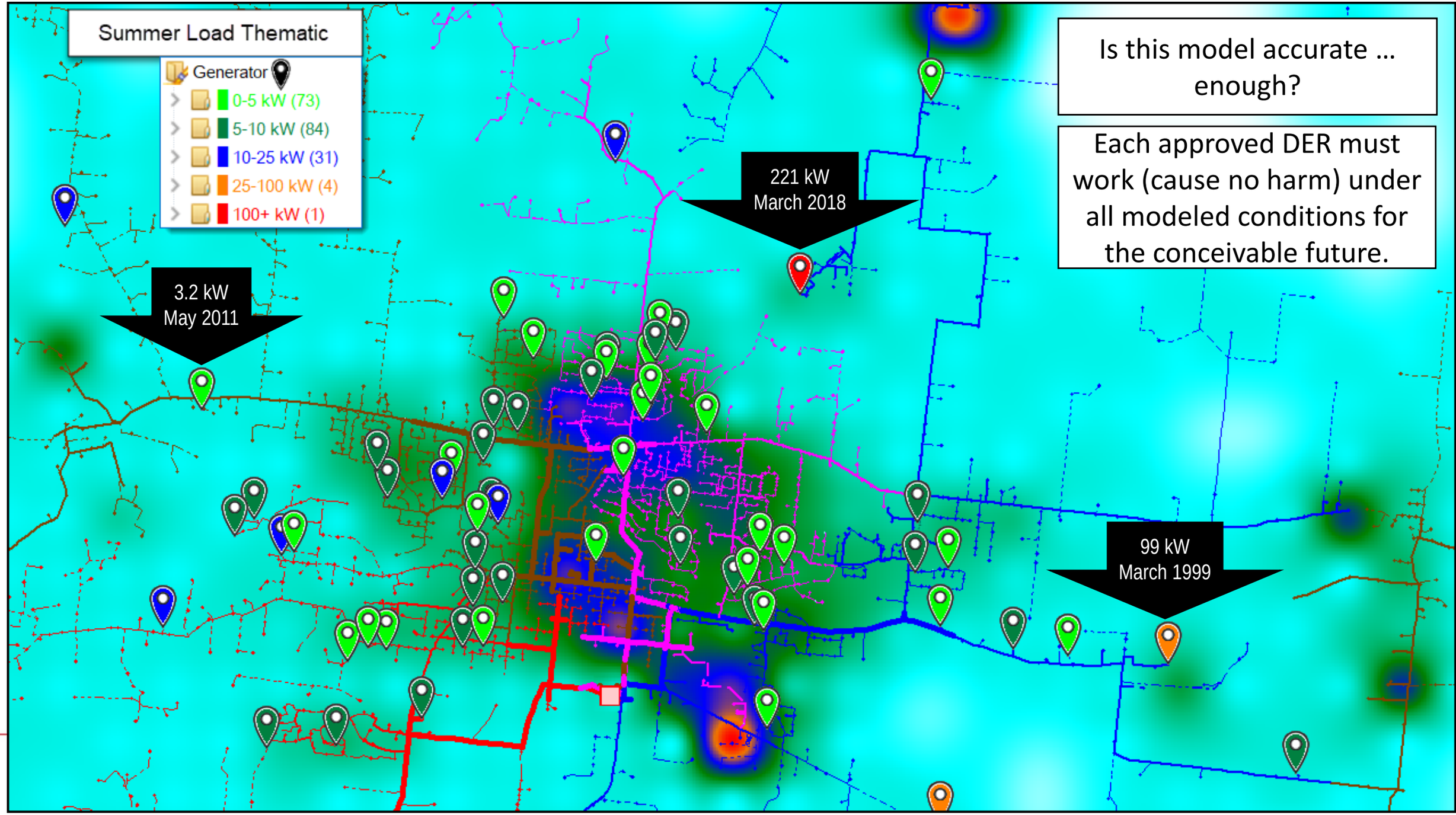
- Grow via Larger Generation Plants & ONE-WAY Power Flow
  - Generation sources typically upstream of transmission network
  - Substation transformer was primary monitoring point
  - Limited SCADA or monitoring points
  - Many circuit breakers were electromechanical (limited data collection capability)
  - Vintage billing meter at customer
  - Peak loading cases for winter & summer



# Current System – Increasingly “Smarter”

- Grow via Complexity & Bi-directional Power Flow
  - Complex studies, balancing resources
  - Generation sources, including renewables, dispersed throughout network
  - Advanced metering infrastructure
  - Smarter devices, automation controllers
    - Remotely operable line switches
    - Electronic relays with SCADA, fault locating logic
    - Intelligent meters, reclosers
  - Multiple loading cases, both peak and light cases




Summer Load Thematic
Generator
0-5 kW (73)
5-10 kW (84)
10-25 kW (31)
25-100 kW (4)
100+ kW (1)
Is this model accurate … enough?
Each approved DER must work (cause no harm) under all modeled conditions for the conceivable future.
221 kW
March 2018
3.2 kW
May 2011
99 kW
March 1999

# DER Integration Process Considerations


1. Accurate quality output requires… accurate, quality input
   - Complex interdependencies in software and hardware systems, including delays as the system grows
   - "Guaranteed" output is easier to study than "sometimes" output
2. Regional load growth and DER forecasts are unlikely to fit into feeder specific forecasts of same (more static in "high resolution" data than when aggregated)
3. Perception that KWH generation must be "always helpful/valuable" misses KW complexities like time of day, unreliable output, etc.
4. Utility system must "keep on ticking" when customers…
   - change habits and values over time
   - move in/out at their convenience
   - add load and generation

Overcoming these barriers to create a hosting capacity and interconnection application handling system would require substantial time and investment.

(In addition to local planning issues, DSM integration may raise additional issues not noted here, including legal/jurisdictional issues as well as cost and reliability issues on the wider system.)