Distribution Systems Planning (DSP)

and the Grid

Community Energy Project, Inc., believes that everyone deserves a safe, healthy, efficient home regardless of income.

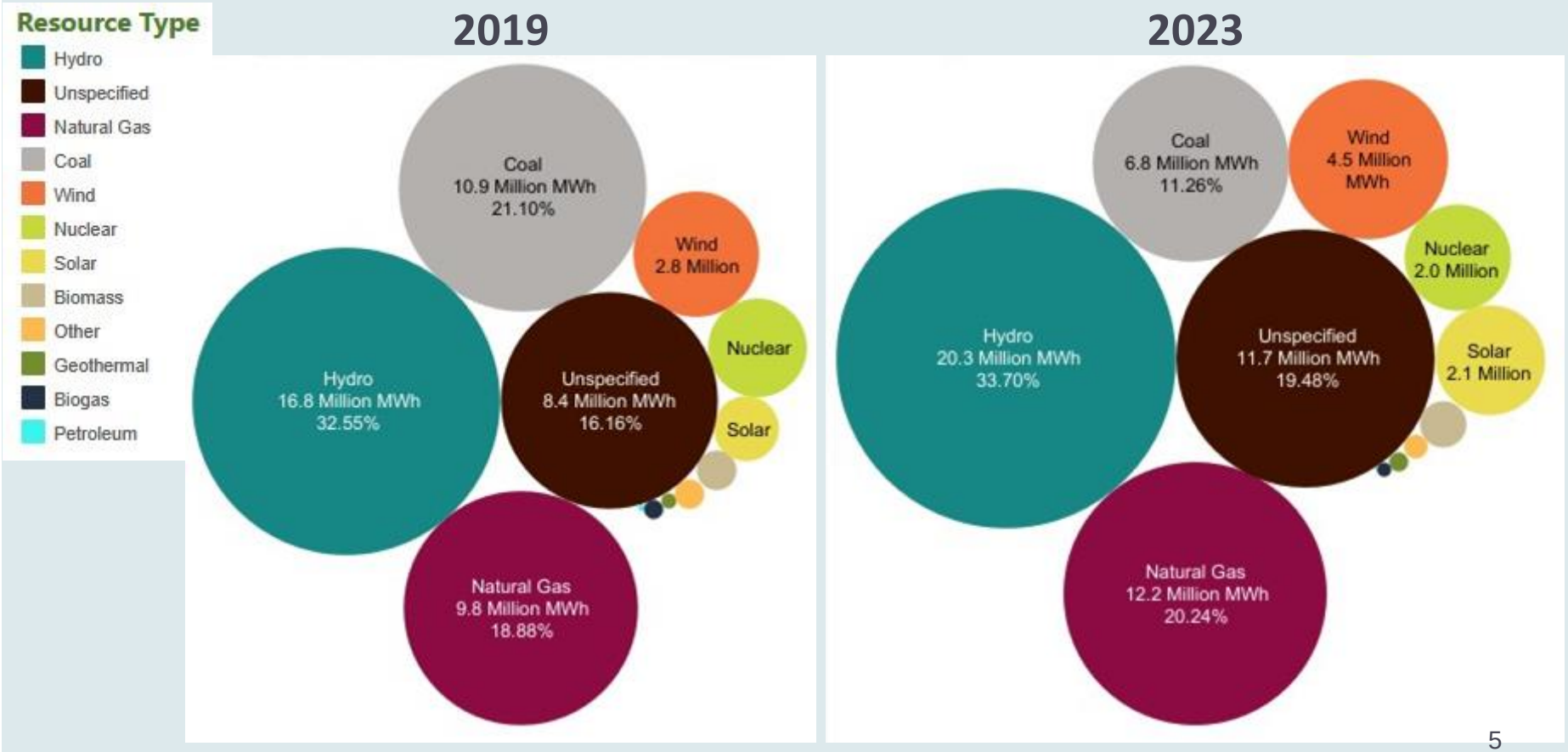

DSP and the Grid

Distribution System Planning

Needs change, and intensive planning has to be done to keep the grid up to date. Changes made to energy systems must be fair and informed by community.

Where Does Our Energy Come From?

Oregon's Electricity Mix



Fossil Fuels

Benefits:

- Systems currently in place
- Can run constantly
- Storage

Consequences:

- Finite
- Is slow to respond
- Public health impacts
- Employee health impacts
- Environmental harm
- **Each type has its own consequences**

Renewable Energy

Benefits:

- Inexhaustible supply
- Low carbon emissions
- Multiple-uses for project areas
- Residential opportunities
- Turns on/off quickly

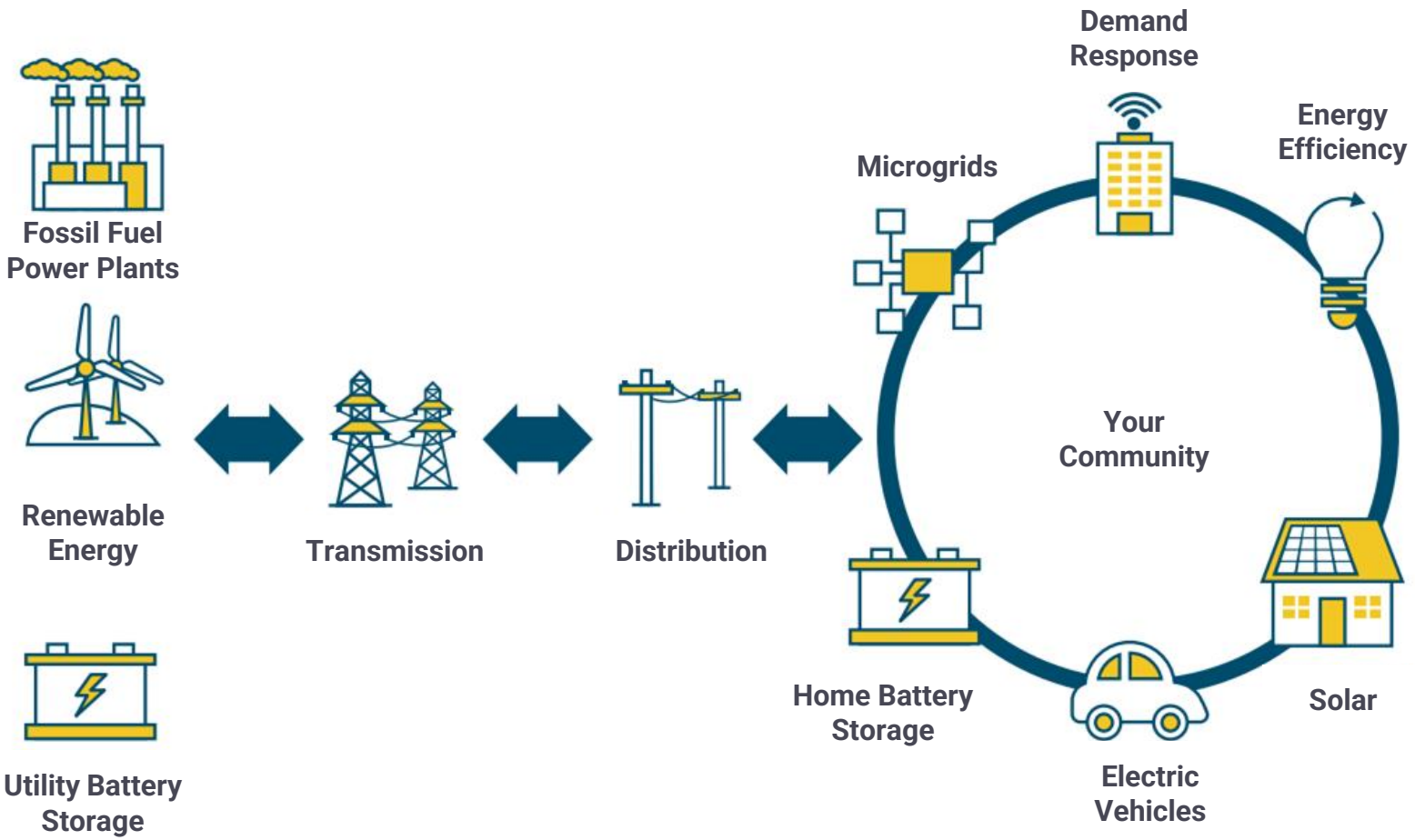
Consequences:

- Natural fluctuations in availability
- Each type has its own consequences

The Old Grid

Traditional “one-way” power flows from the source to homes and businesses.

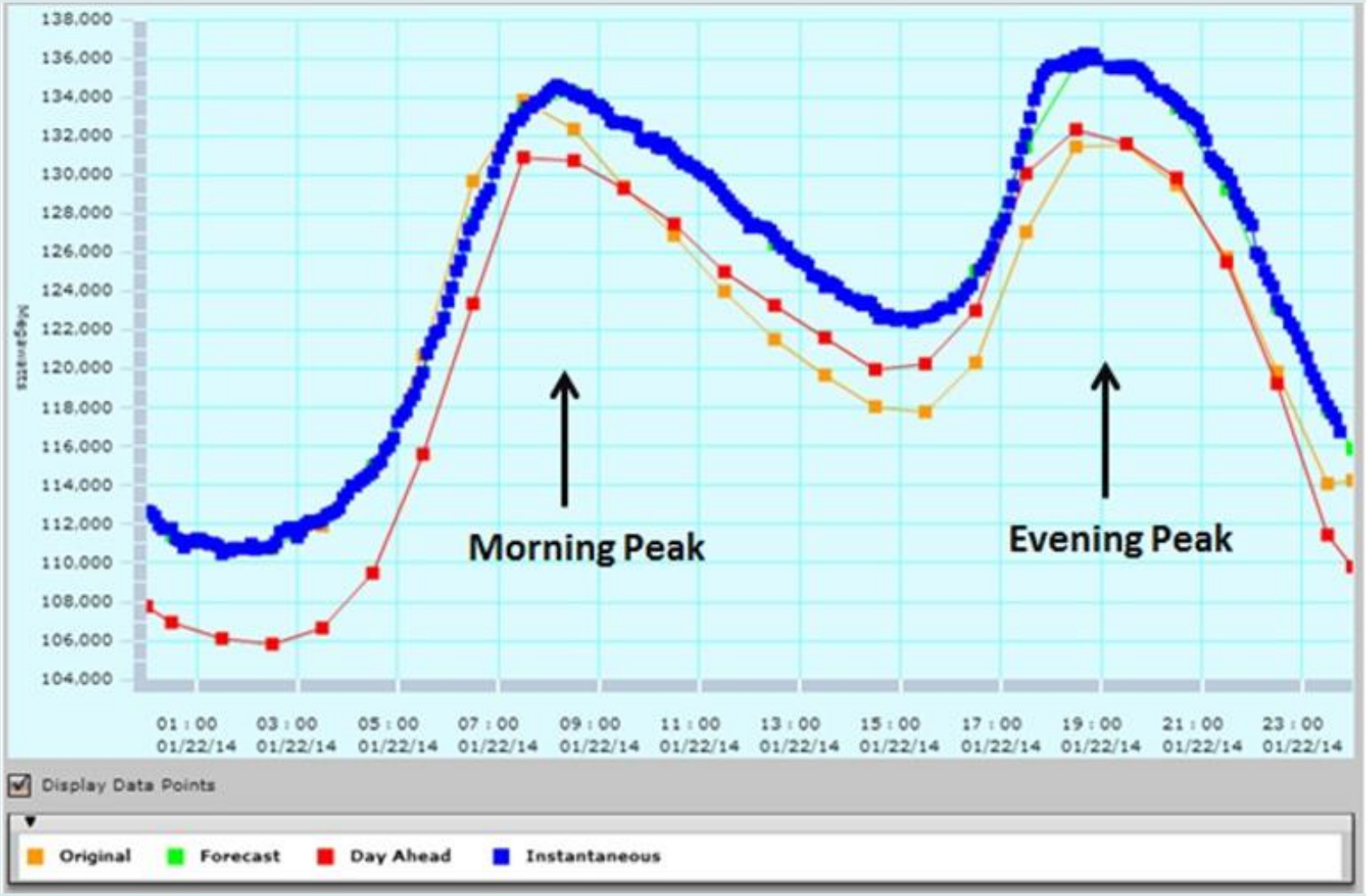
The Modern Grid



Renewables and the Grid

The grid must be perfectly balanced. Solar and wind can change suddenly, complicating this balance.

Peak Demand


138,000
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Megawatts
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Evening Peak
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05:00 01/22/14
07:00 01/22/14
09:00 01/22/14
11:00 01/22/14
13:00 01/22/14
15:00 01/22/14
17:00 01/22/14
19:00 01/22/14
21:00 01/22/14
23:00 01/22/14
Display Data Points
Original
Forecast
Day Ahead
Instantaneous

Why does it matter?

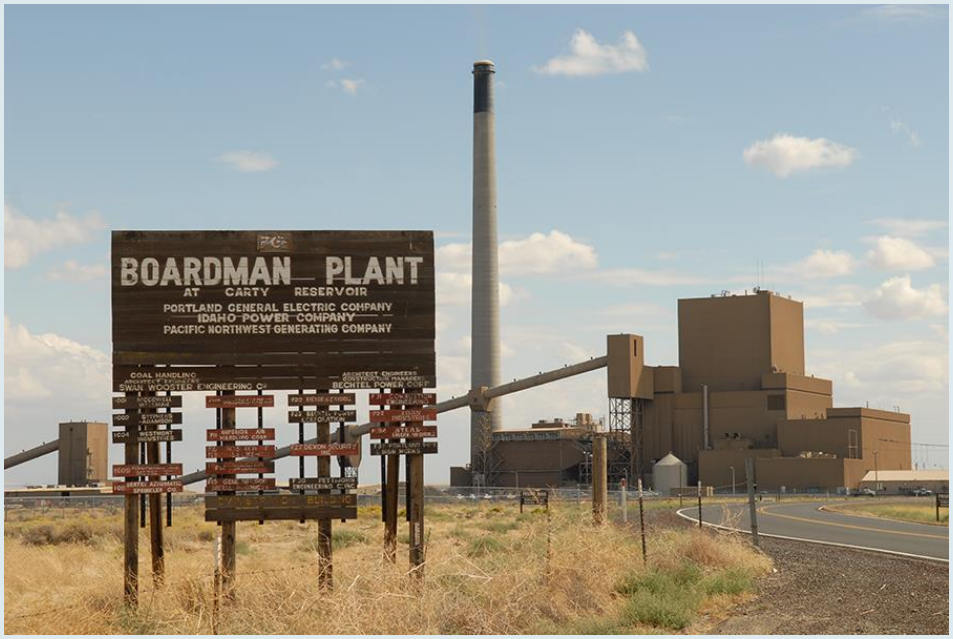
Building a new plant to produce energy for a small amount of time raises electricity rates. And as fossil fuel sources we can fully control tends to be dirtier.

Hydroelectricity (Dams)

Displacement of Indigenous People

- lack of compensation
- impacts to subsistence lifestyles

Coal Plants



Boardman Plant (closed 2020)

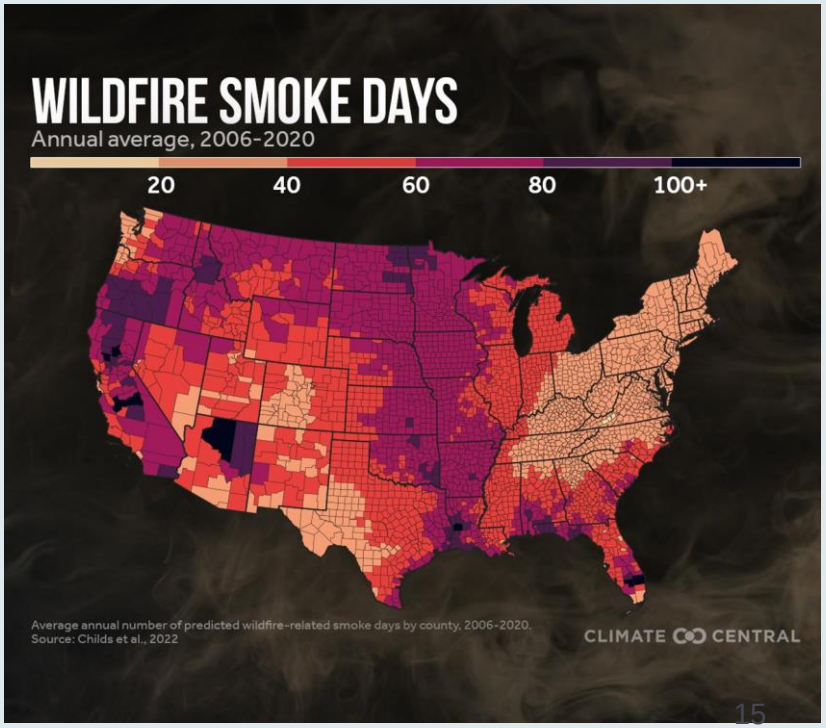
- 5.5 tons of coal/minute to power 500,000 homes
- 1.5-2 million tons of carbon/year
- Shipped from Wyoming and Montana

CLIMATE CRISIS AND THE GRID

Wildfires

- Anything can catch fire, from homes, businesses, wilderness, and even the power grid itself.
- Wildfire insurance increases mean rate increases.
- Public Power Safety Shutoffs may become more frequent

Photo: Willamette week



Winter Storms

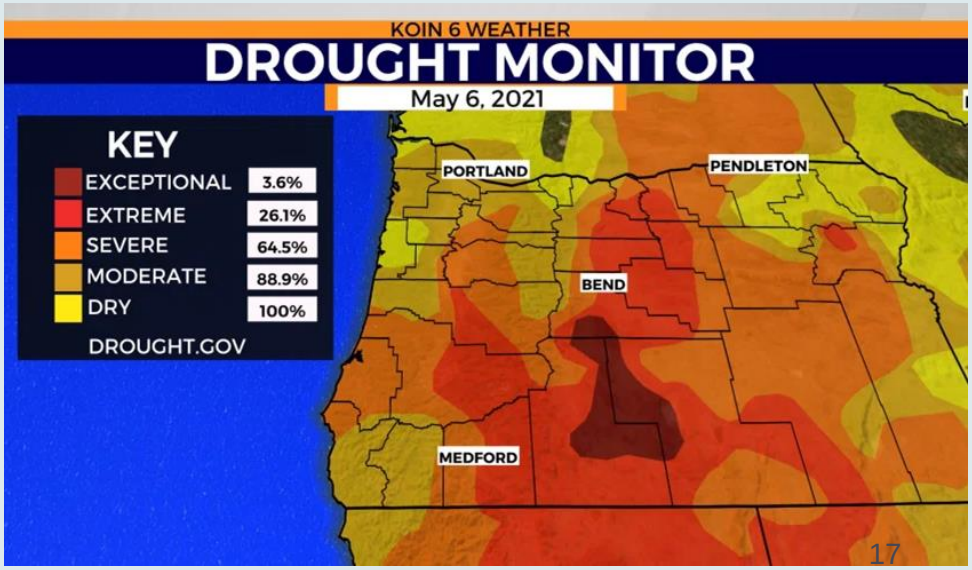
- Ice storms put weight on power lines. Snow and wind can push down trees or break branches.
- Then the power can go out in freezing temperatures.

Photo: OPB

Drought

Drought and extreme temperatures

- Increases energy needs
- Dangerous conditions
- Reduced snowpack affects hydro

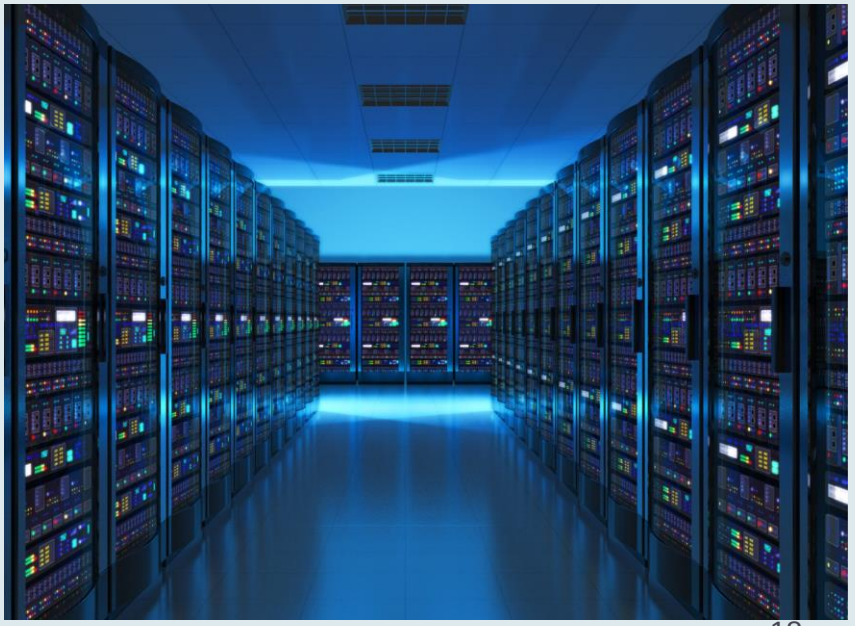


Increasing Need

- Population growth
- Retiring fossil fuel plants
- Electrification
  - In the home and at the utility level

Data /Artificial intelligence (AI) /Crypto Centers over 20 yrs:

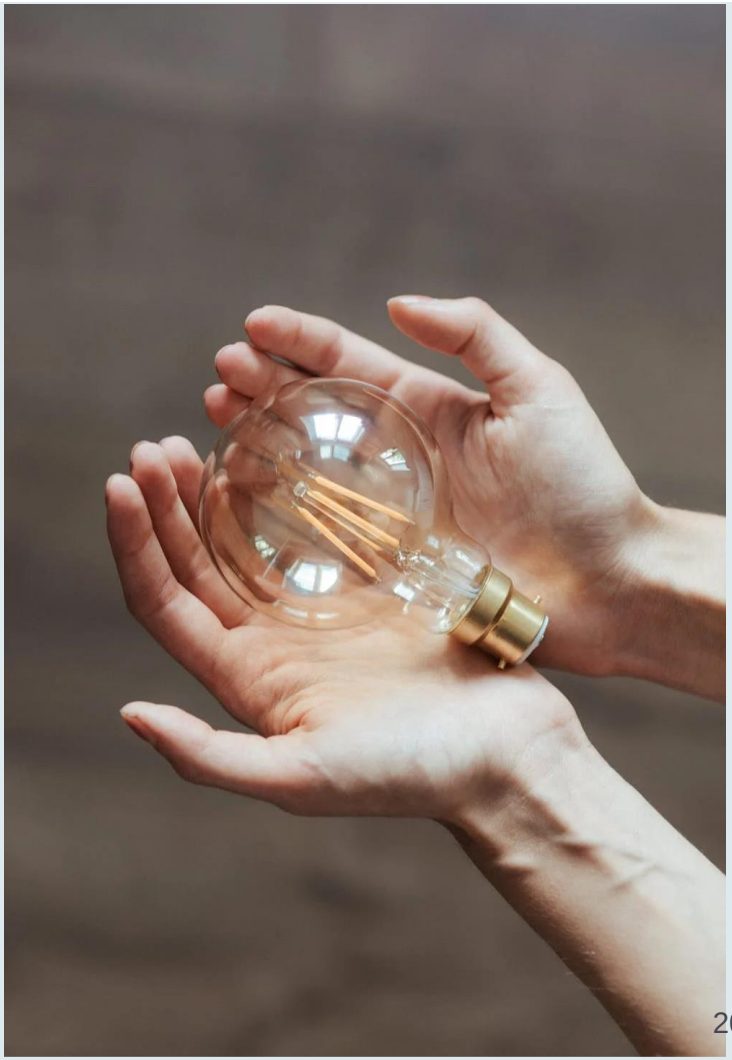
- Northwest Power & Conservation Council (NPCC) projects *doubling* of electricity demand in Pacific Northwest



DISTRIBUTED ENERGY RESOURCES And Virtual Power Plants (VPP)

Distributed Energy Resources

1. Renewable Energy & Battery Storage
2. Energy Efficiency
3. Demand Response
4. Electric Vehicles



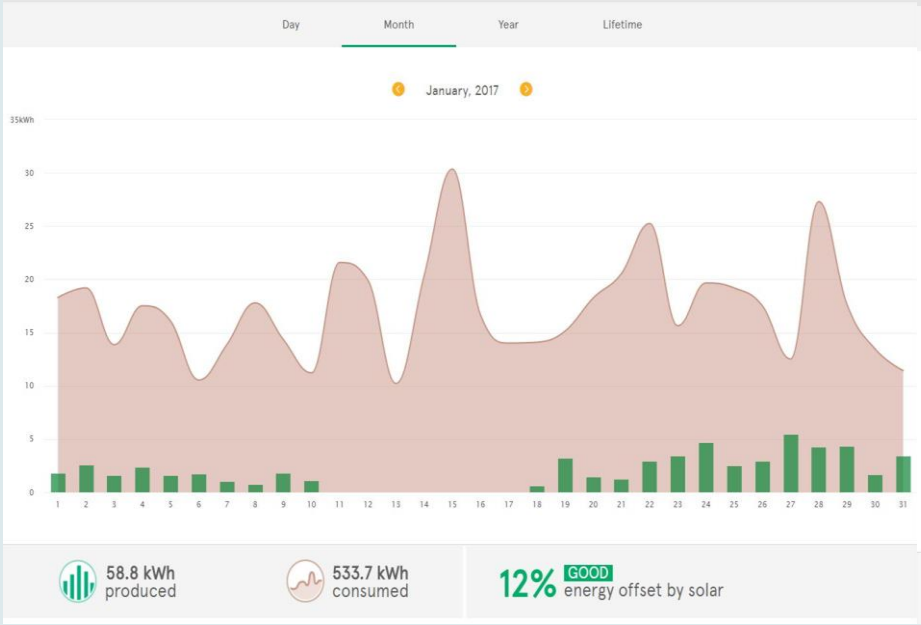
RENEWABLE ENERGY AND BATTERY STORAGE

Daily Fluctuations

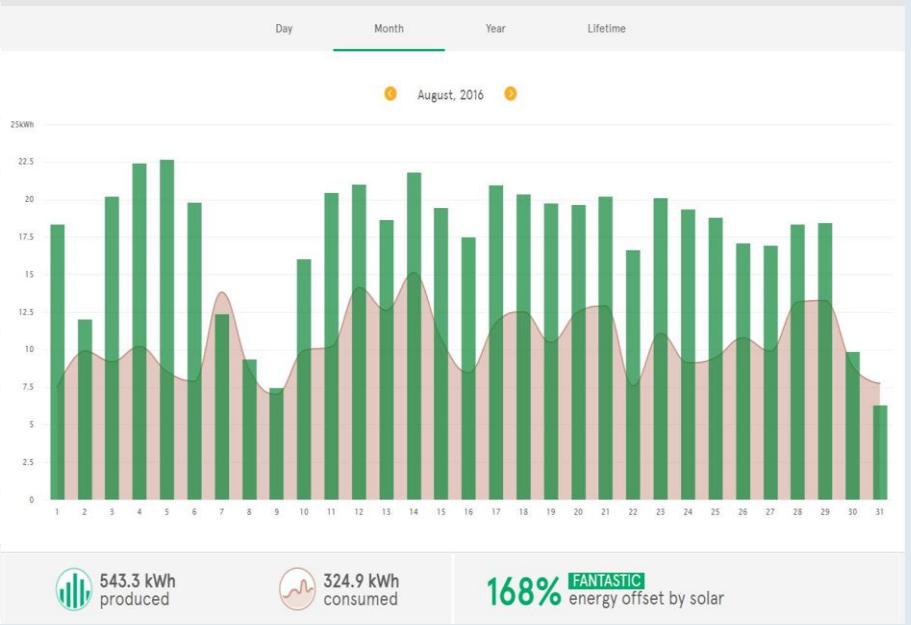
- All the power you use NOW is generated right NOW.
- The sun doesn't shine and the wind doesn't blow constantly

Seasonal Fluctuations

January



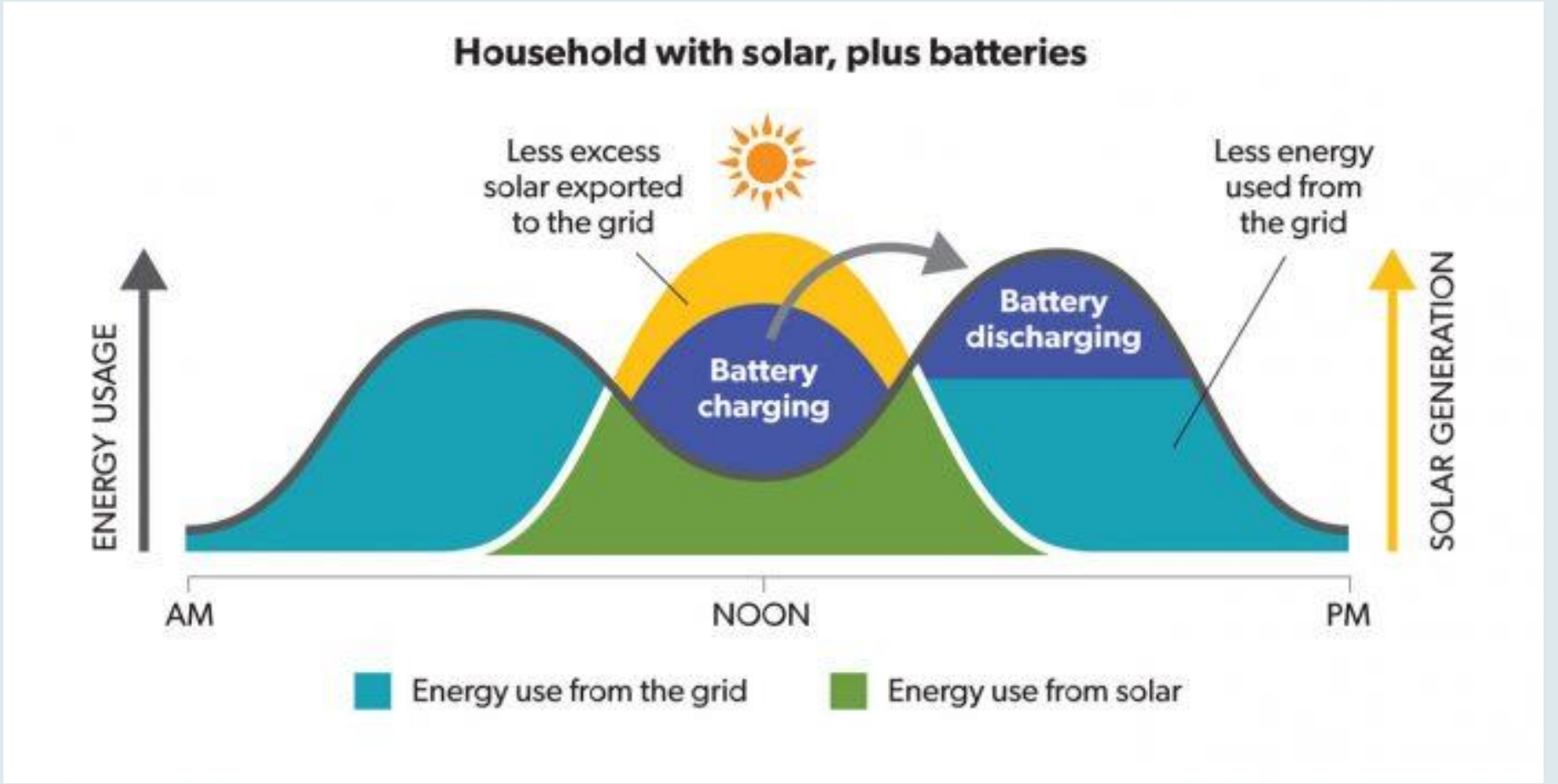
August



Pink = Energy Used / Energia Usada

Green = Solar Energy Produced / Energia Solar Producida

Solar + Battery Storage



Utility Level

PGE's new Wheatridge plant:

- 300 MW wind
- 50 MW solar
- 30 MW storage

350 MW = 57,000 homes

1 MW - 1,100 lbs of coal

Community Resilience

Blue Lake Rancheria Tribe Microgrid

Humbolt County, CA

- Can serve as a community gathering place with power during an outage
- A “Microgrid” that can operate when the grid goes down

Home Resilience

Charged batteries can run:

- Communication
- Medical equipment
- Heating/cooling
- Elevators

Interconnection

Solar Developers

- Delayed projects
- Problems with financing
- Extremely costly to have delays
- Project instability
- Interconnection costs $$

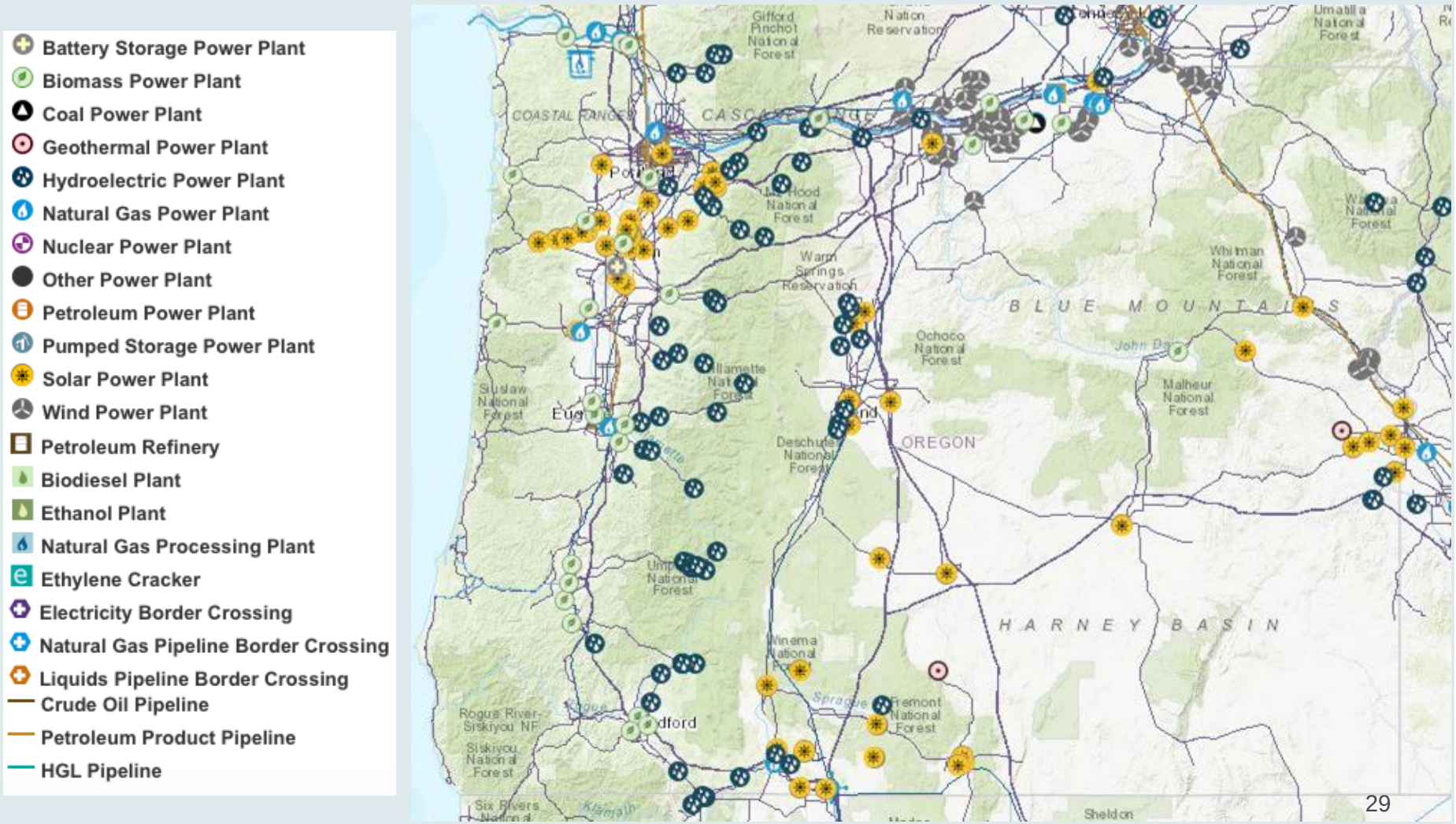
Utilities

- Power where it isn't needed at times its not needed
- Costs of infrastructure / antiquated equipment
- Not getting a return
- Pay more for electricity procurement

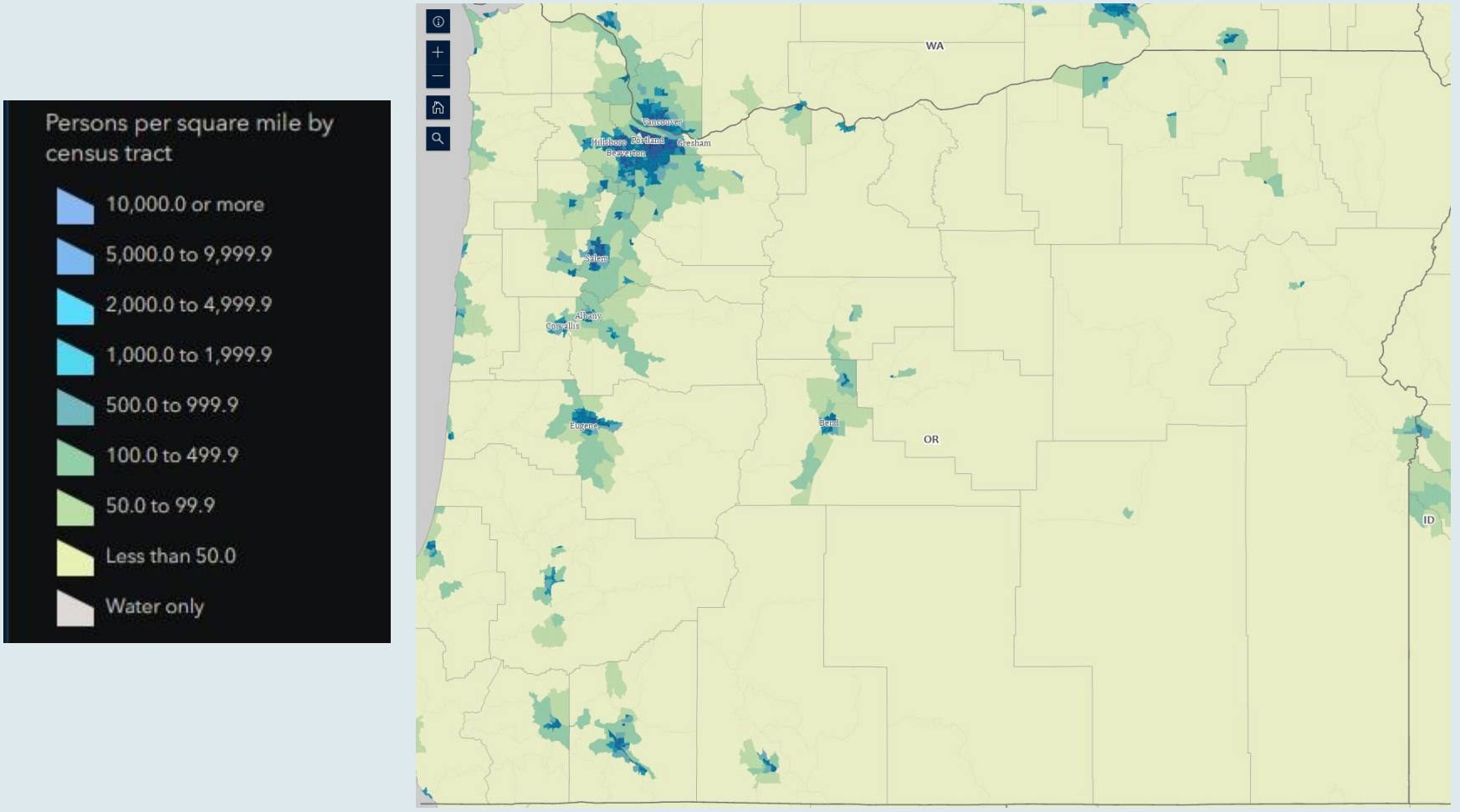
Community

- Delayed involvement
- The costs of fossil fuels remain
- Adoption of clean energy slows down
- Rate impacts vs health & environmental impacts

Oregon's Power Map



Oregon Population Distribution



ENERGY EFFICIENCY

Less Energy, Same Results

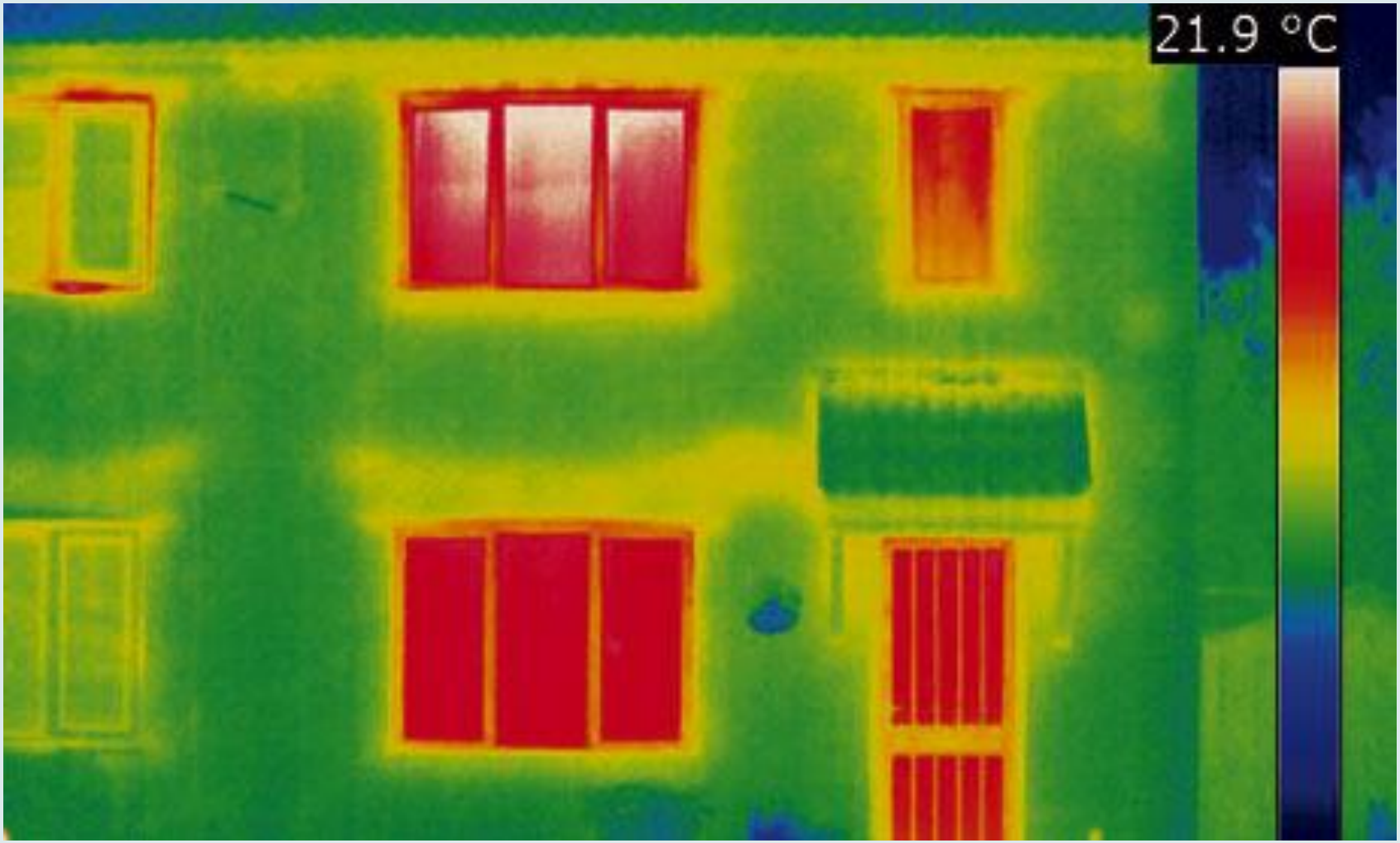
Weatherization

Efficiency and Peak Load

Efficient Homes

- Reduce demand
- Save Money
  - Individually
  - At utility scale (rates)
- Reduce carbon footprint

Resilience



Resilience

Efficient homes:

- Maintain temperatures and air quality
- Are safer
- Are more comfortable

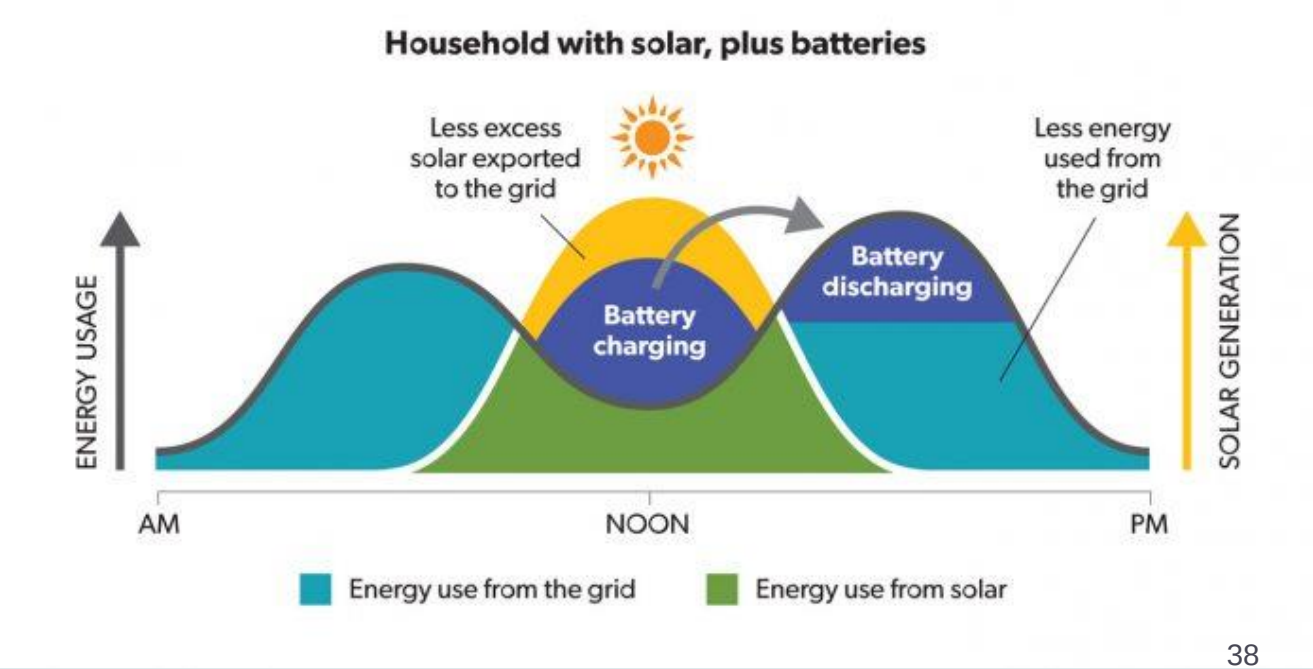
DEMAND RESPONSE & FLEX LOAD

Image: BC Hydro

Flexible Load

Blunting peak load is important. Another component is what to do with excess energy production.

- Batteries
- Water Heaters
- EVs



Demand Response

Smart technology

- Thermostats
- Water Heaters
- Electric Vehicles

Manual shifts

- Thermostats
- High-use appliances

The Virtual Power Plant

DERs, storage and flex load aggregated.
Reduce/shifting energy strategically by 3MW? It's a 3MW VPP.

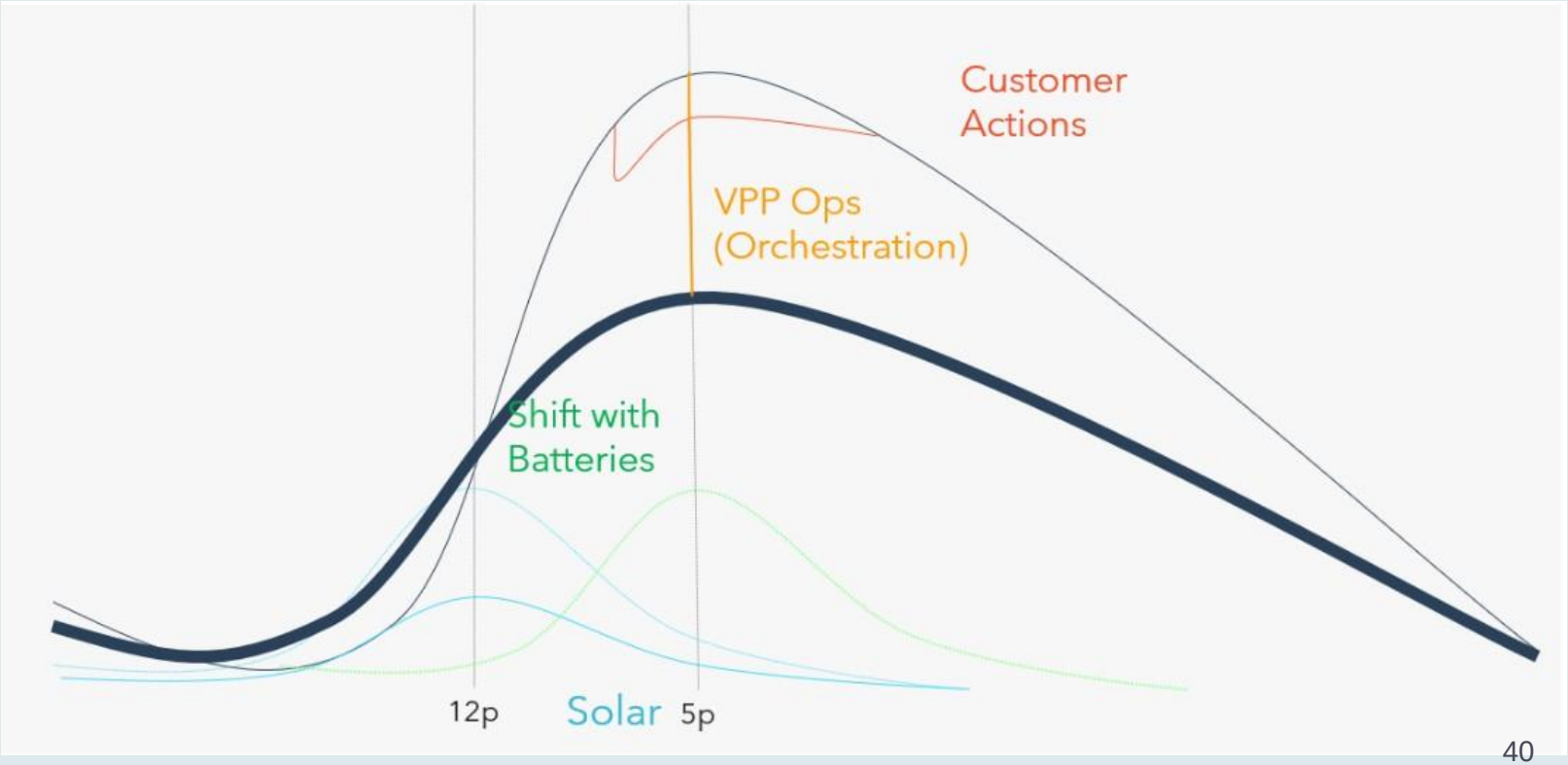


Image
from PGE
DSP 2024

Thank you!

Questions? Discussion?

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