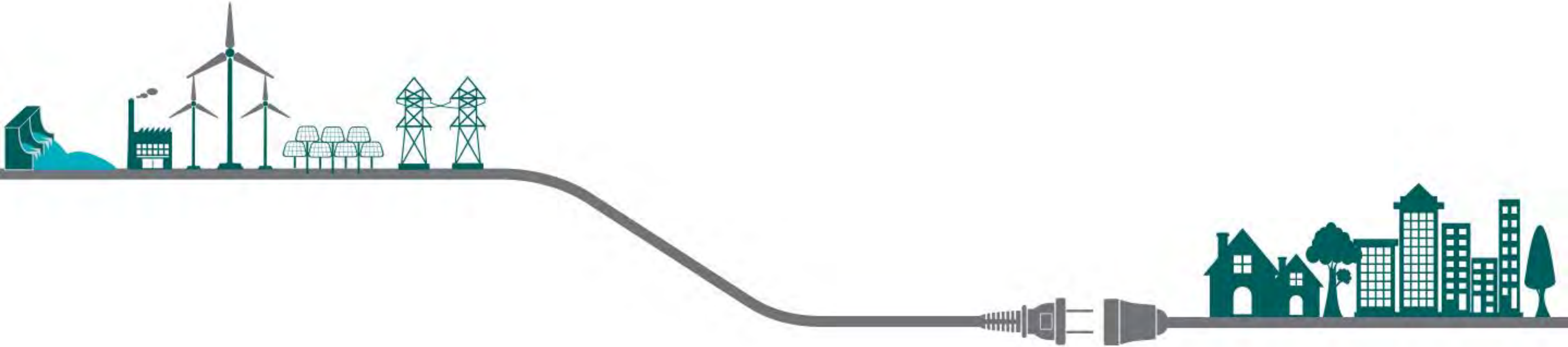
Idaho Power
Oregon Distribution System Planning



DSP – Public Meeting #3

May 18th, 2022

Welcome!

Thank you

for attending Idaho Power Company’s Distribution System Planning (DSP) Process

Workshop #3

DSP Workshop Goals

- Provide information to enable participation
- Start the conversation
- Gather community input on advancing a more holistic distribution system
- For the June 6th meeting, we are looking for input on projects that we will review at the end of this presentation

Agenda

- About Idaho Power
- Power Grid 101
- Distribution Planning Process
  - Forecasting Development
  - Grid Needs Identification
  - Solution Development
- Non-Wires Solution Examples
- Review Distribution Grid Needs

Guidelines

- Post comments and question in the chat
- Please feel free to speak up and engage throughout
- Please keep the discussion civil and respectful
- Take comments with positive intent

Introductions

In the chat, please send us:

- Name
- Organization
- What are you most interested in learning about in these workshops?

You can also send us more information at DSP@idahopower.com

Idaho Power Team

Name	Position	Name	Position
Jared Ellsworth	Transmission, Distribution & Resource Planning Director	Angelique Rood	Regional Manager
Jim Burdick	Distribution Planning Engineering Leader	Dena McFarlin	Regional Customer Relations Manager
Marc Patterson	Transmission & Distribution Strategy Engineer	Mike Ybarguen	Economic & Community Development Advisor
Tyson Kent	Distribution Planning Engineer	Danielle Ready	Education & Outreach Energy Advisor
Dan Johnston	Transmission & Distribution Strategy Engineer	Rodolfo Beltran	Key Account Energy Advisor
Alison Williams	Regulatory Policy & Strategy Advisor Regulatory Affairs	Duane Pearson	Agriculture Representative

Clean today. **Cleaner tomorrow.**®

Our Clean-Energy Goal

As Idaho Power continues serving customers and communities with **reliable**, **affordable** energy, we do so with an exciting goal:

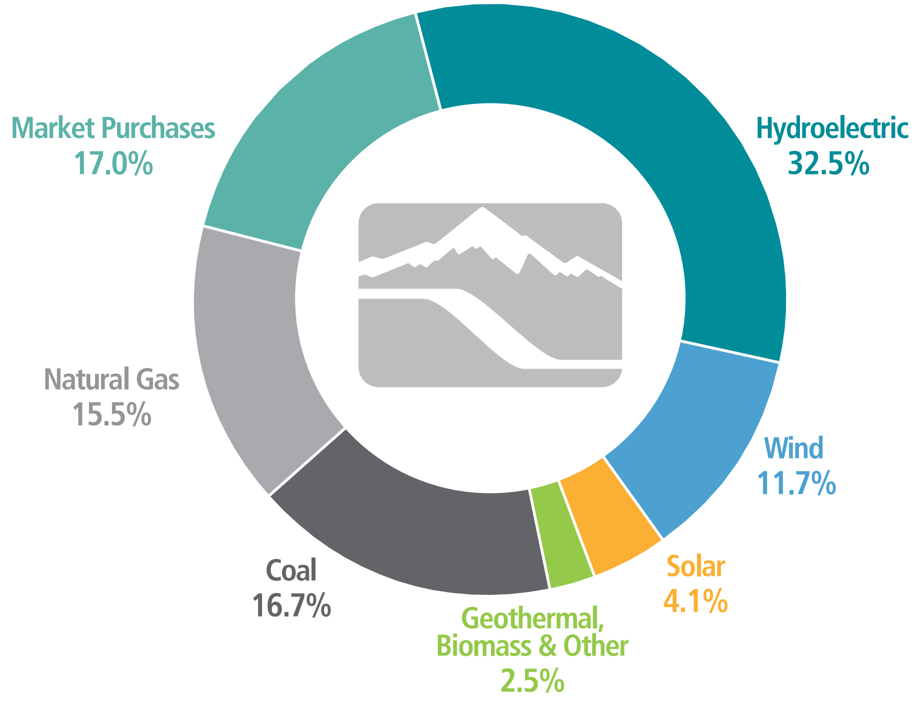
Providing

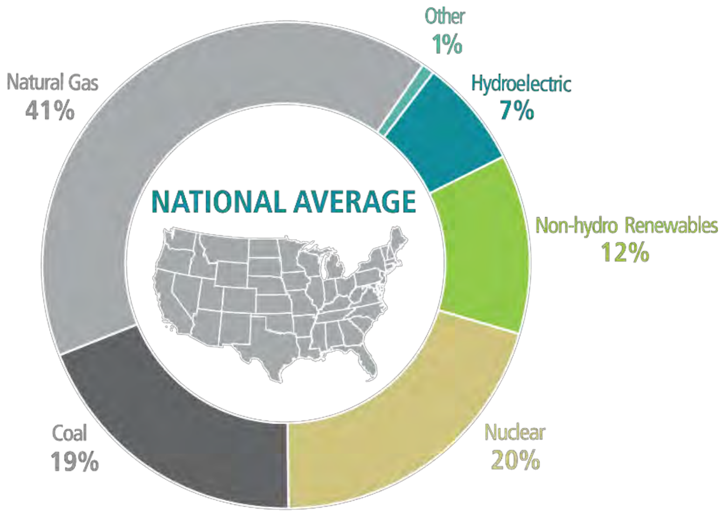
100% clean energy by 2045.

Clean today. **Cleaner tomorrow.**®

Clean Energy

2021 Energy Mix





Data Source: U.S. Energy Information Administration

Idaho Power in Oregon

Oregon Customers **20,477**

4,000 SQUARE MILES

Peak Demand and Generation

145MW Peak Demand

1.7MW Oregon Customer Generation (Net Metering)

142MW Oregon Small Generation

136MW Oregon Large Wind & Geothermal

We Are Reliable

WE KEEP THE LIGHTS ON

99.9%

OF THE TIME

We Are Affordable

OUR PRICES ARE MORE THAN

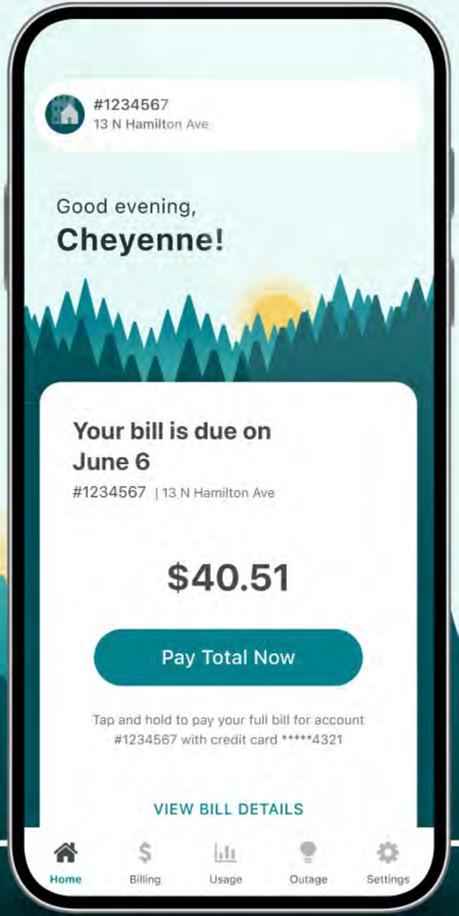
20% BELOW

THE NATIONAL AVERAGE

INTRODUCING OUR NEW MOBILE APP!

Idaho Power customers can now download the app to:

- Make quick and easy bill payments
- View billing and payment history
- Track power outages and view an in-app outage map
- Sign up for billing and payment programs
- Receive outage and billing push notifications
- Track energy use



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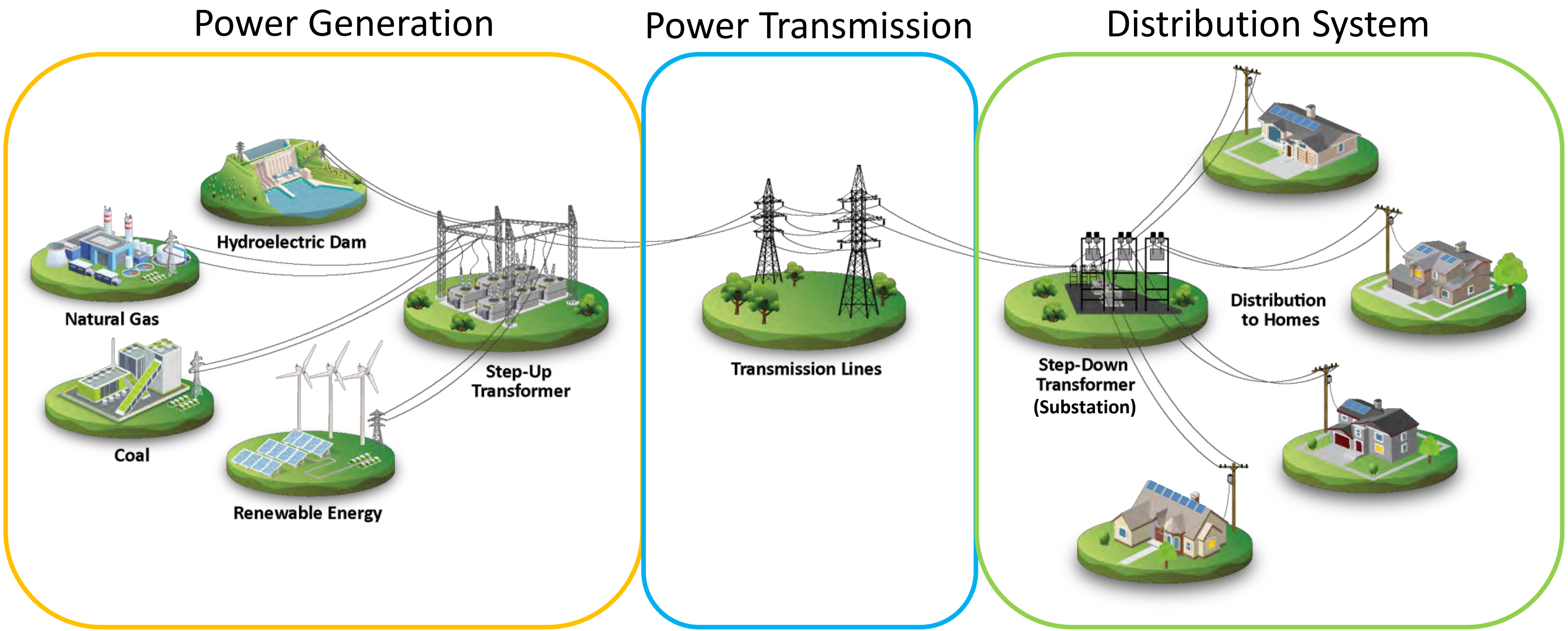
Power Grid 101

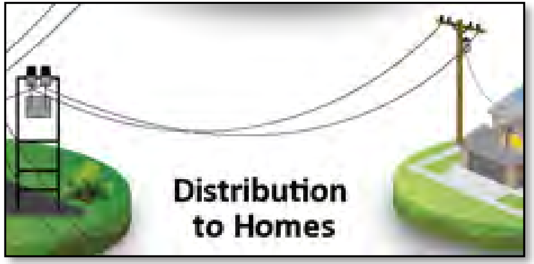


Distribution Components

- Substation
- Substation Transformer
  - Steps the voltage down from transmission voltages to distribution voltages
  - Has a voltage-regulating system to maintain distribution voltage

Distribution Components

- Distribution Circuit (Feeder)
  - Wires that transfer the electricity from the substation to the home or business.
  - These wires can be overhead or underground.



Distribution Components

- Service transformer
  - Steps distribution voltage down to service voltage for use by the customer
  - Can be overhead or underground

Distribution Components

- Other distribution components include:
  - Voltage regulators
  - Reclosers
  - Capacitors

Distribution Components

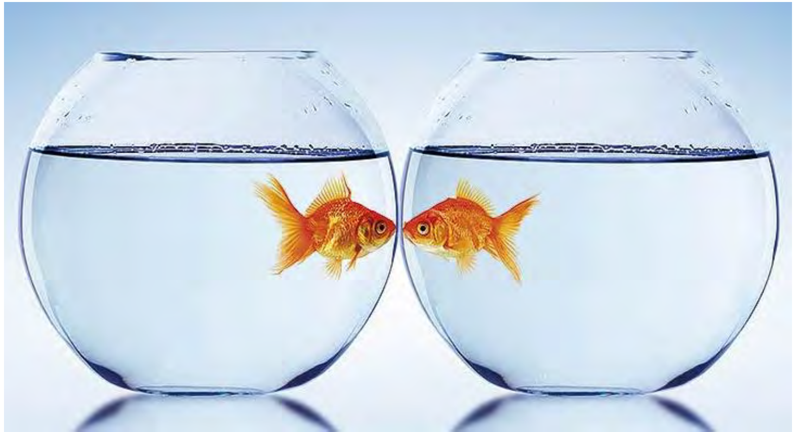
- Non-Wire Solution (NWS) Examples include:
  - Batteries
  - Solar
  - Wind
- These are commercially available options
- Anticipate more options in the future

Capacity

The amount of power a piece of the grid can handle

The unit is the same as it is for power, megawatts (MW)

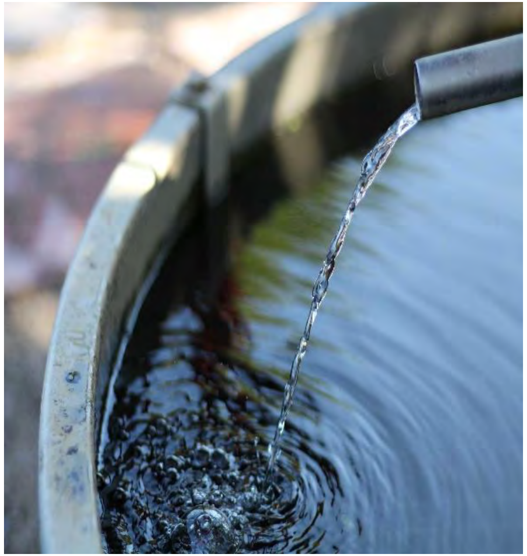
Planning for Capacity



Capacity Limits

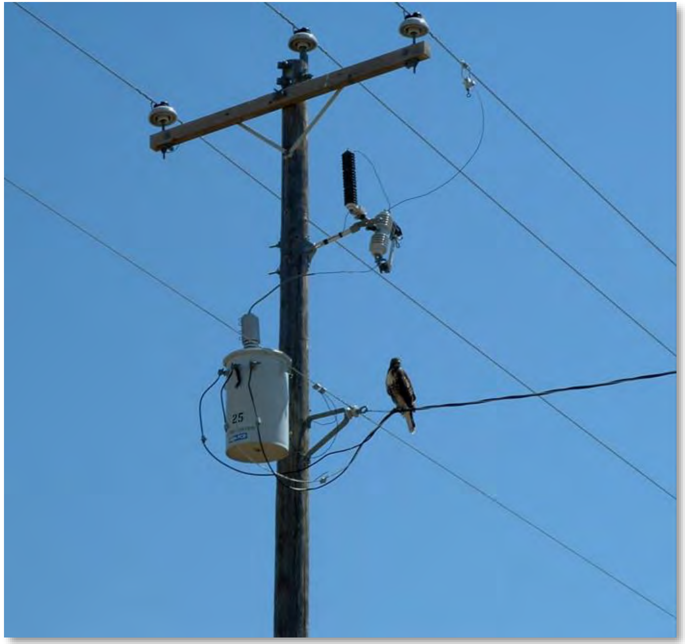
Distribution System Growth

- Residential
- Small Commercial
- Large Commercial



- Thermal Limit
- Planning Limit

Capacity



Energy

The amount of power used in a given period of time:

- kilowatt-hour (kWh) = unit of measure for electrical energy

100-Watt light bulb × 10 hours = 1 kWh

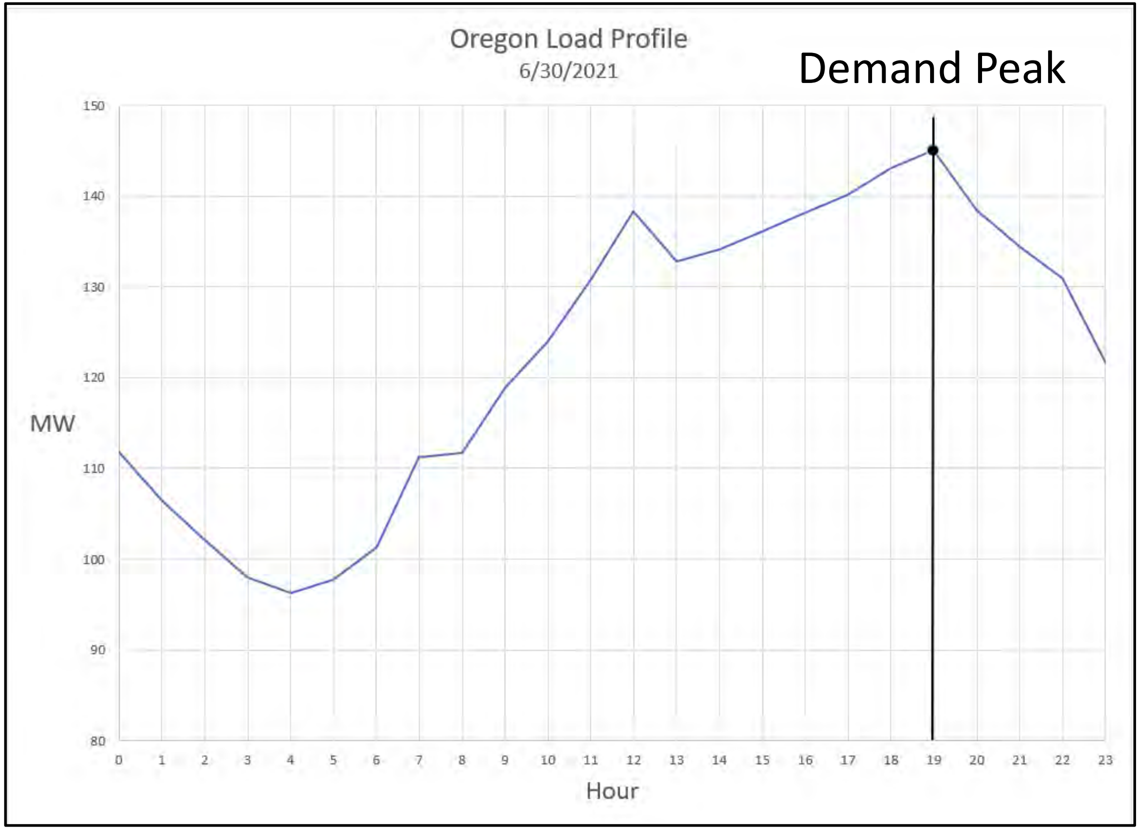
Energy vs Capacity Analogy

Capacity: 2 vehicles at a time

Energy: 1,000 vehicles pass the line in an hour

Demand (Load)

145MW, 7:00 pm Peak Demand in Oregon



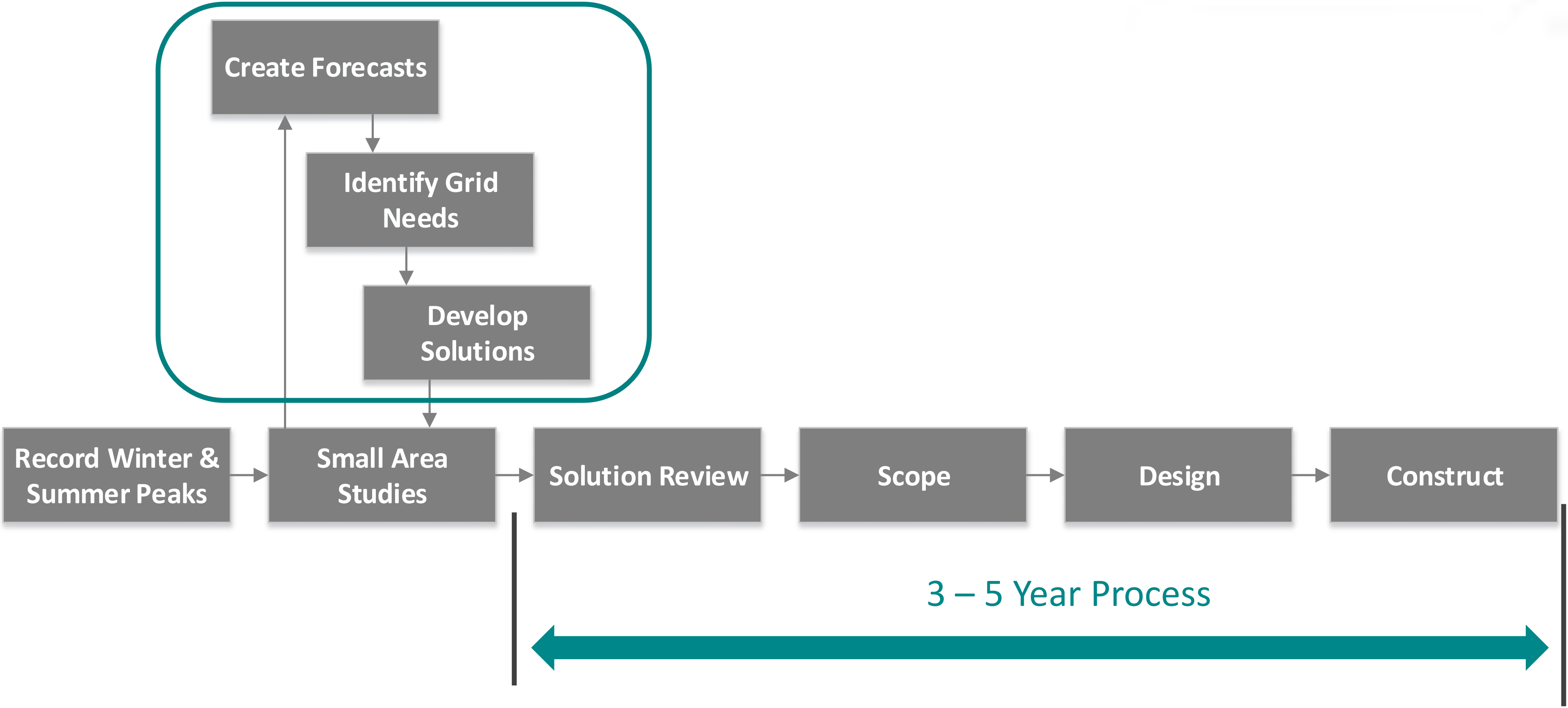
Typical Units for Power Delivery

	Base Unit	Typical Unit
Voltage	Volt (V)	kilovolt (kV)*
Power	Watt (W)	megawatt (MW)**
Capacity	Watt (W)	megawatt (MW)**
Energy	Watt-hours (Wh)	kilowatt-hours (kWh)

kilo = 1,000

mega = 1,000,000

Distribution Planning Process



Distribution Forecasting Development

- Historical Peak Demand
- Temperature Impact
- Growth from Customers (residential/commercial/industrial)

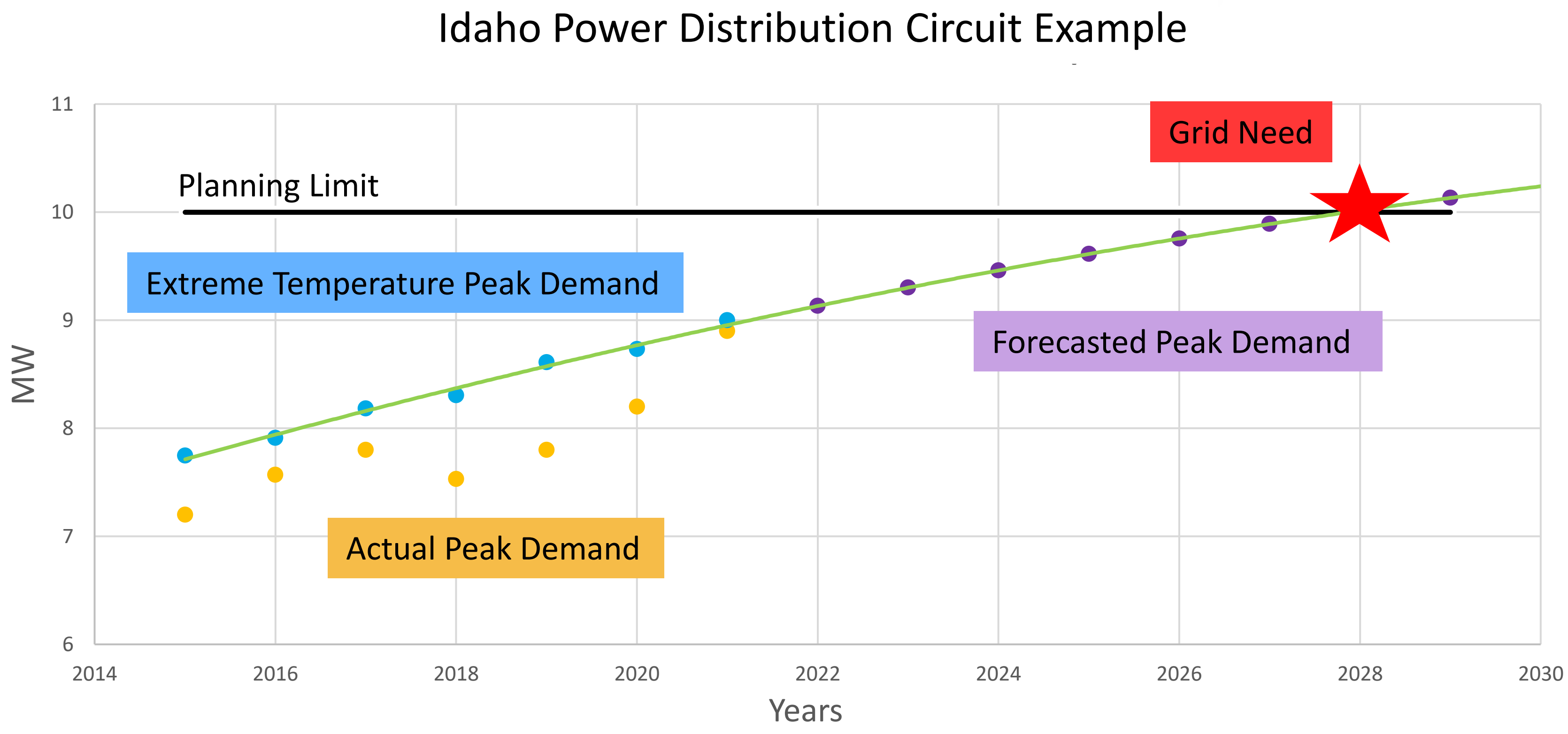
Forecast Adjustments

- EV adoption
  - Presently 20 EVs with high forecast of 148 in 2026

- Customer Generation (aka net metering) adoption
  - Presently 1.7MW of generation capacity with a high forecast of 2.7MW in 2026 (mix of residential, irrigation, and commercial)

Low impact in the near-term forecast (2 - 4 years)

Load Forecast Example

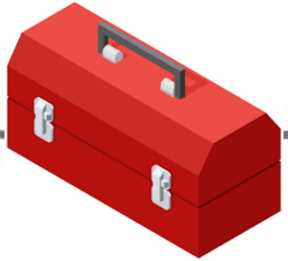


Distribution Grid Needs

Distribution grid needs drivers include:

- Growth and Reliability
  - Limited capacity
  - Low/high voltage
  - Frequent outages
- Asset Replacement
  - Signs of failure
  - Asset no longer supported by manufacturer
  - Line relocation due to road widening

Solution Development Toolbox



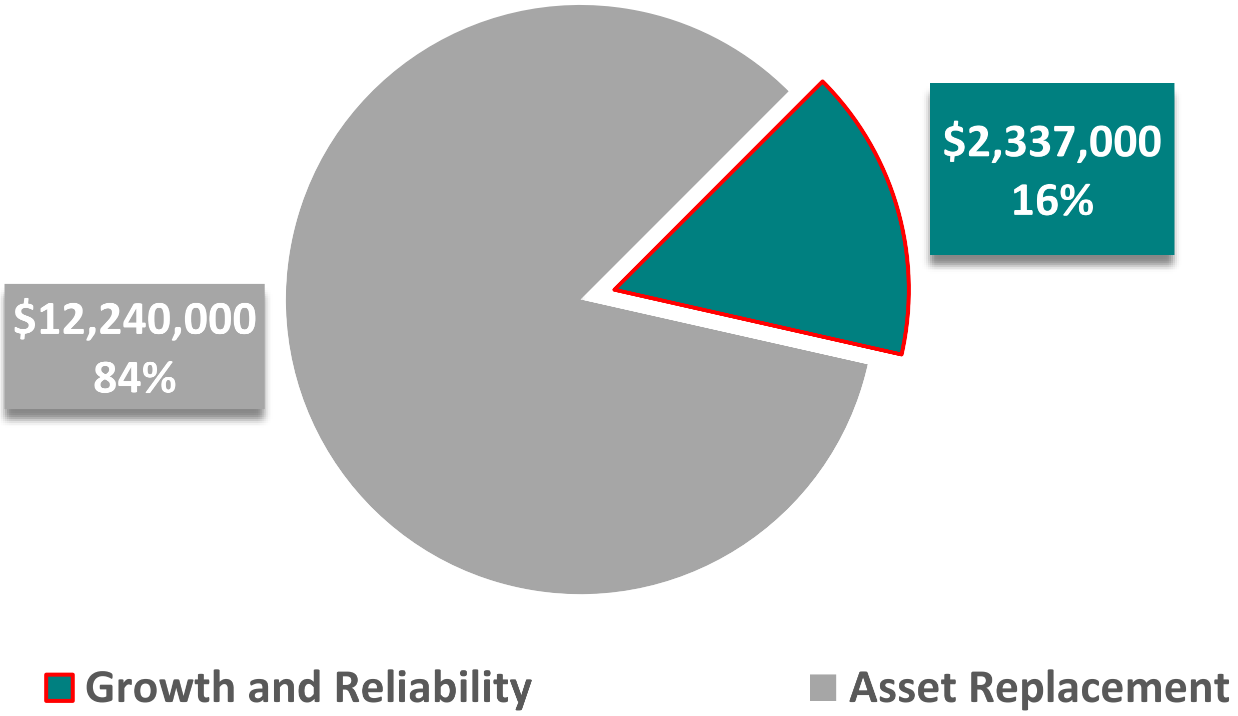
Tradition solutions

Non-Wire Solutions (NWS)

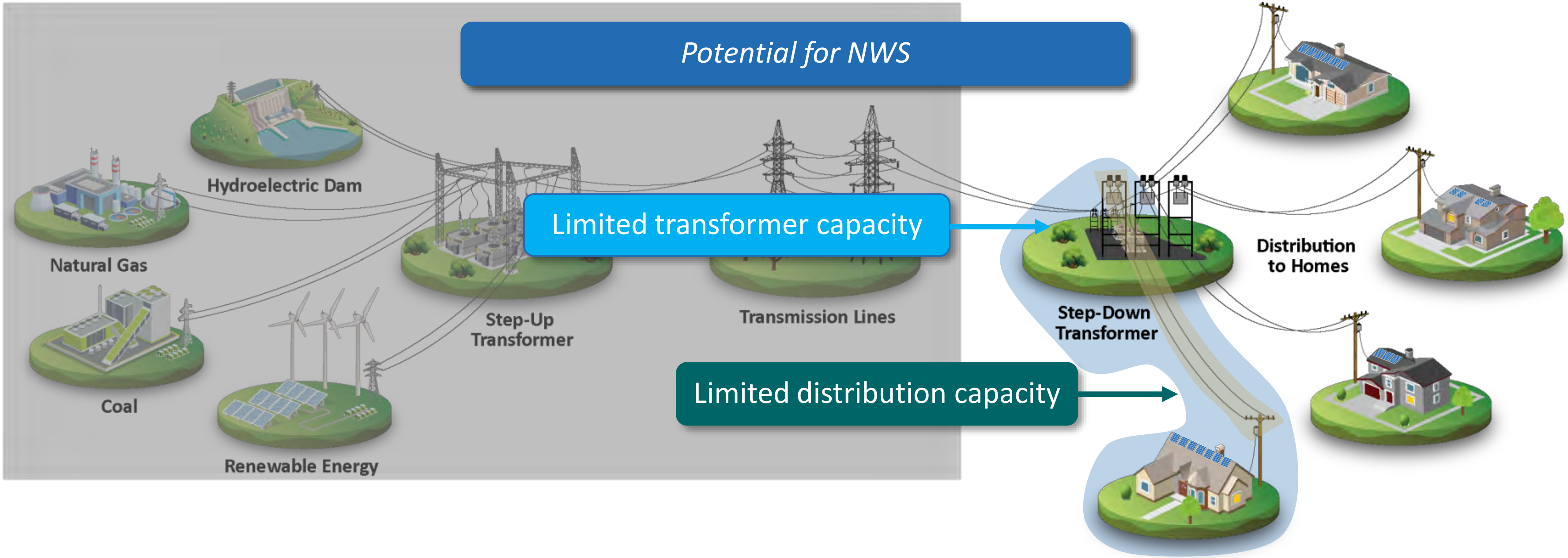
Distribution Grid Needs

Asset Replacement Grid Needs don’t typically work well with Non-Wire Solutions (NWS)

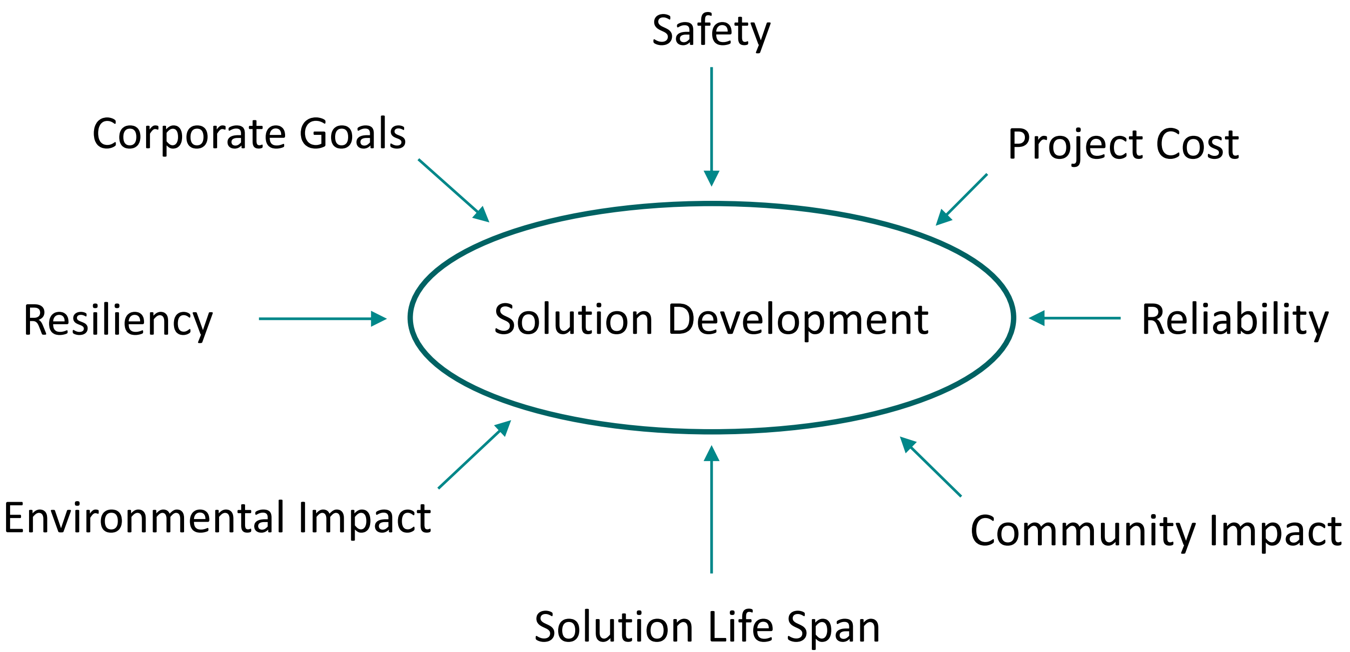
Oregon Distribution System Investment 2023 – 2026



Distribution Capacity



Solution Evaluation Process



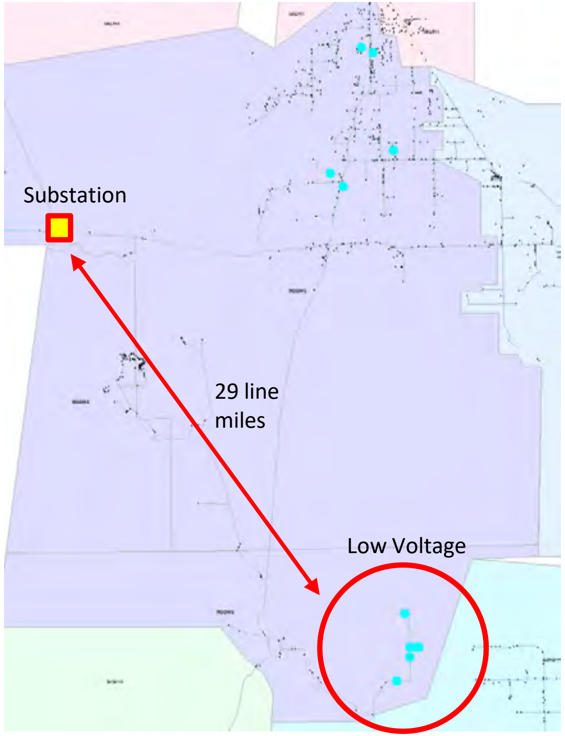
MOON42 End of Feeder PV Project

MOON42 End Of Feeder PV Project

NWS Example - Moon End of Feeder

A non-wires solution for mitigating low voltage at the end of a feeder

- Sustained seasonal low voltage at the end of a long radial feeder
- Traditional Solution: Reconductor
  - Estimated cost: $312k
  - 13 customers ~90 kW peak demand
  - Voltage regulators and capacitors not an option
- Non-wire Solution: Photovoltaic
  - 18 kW solar installed at low voltage area to increase voltage
  - PV installation cost: $43,250
    - Total Project cost: $132,500
  - In service October 2016



NWS Example - Jordan Valley Project

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- Traditional Project Costs $860,000
- NWS Project Costs $544,000
- Expected to defer project for 10 Years

Microgrid-Powered Services

1. Substation
2. Ambulance
3. Fuel
4. Medical Clinic
5. Water
6. Communications (Off Map)

NWS Example - Jordan Valley Project

What would this project accomplish

- Shave peak load to prevent transformer capacity overload
- Add microgrid to serve critical community load

What equipment would be installed?

- 70-kilowatt (kW) solar system with 250-kW battery system
- Distribution switches to isolate the microgrid area

Why did Idaho Power pick Jordan Valley for this project?

- Criteria that made Jordan Valley a good candidate for a microgrid:
  - Modest growth (1.75%)
  - Summer peak energy needs
  - Improve reliability

NWS Example - Jordan Valley Project

Why did Idaho Power **Not** Pursue the project?

- New load appeared (260kW)
  - Exceeded expected growth
  - Exceeded capability of Non-Wires solution
  - Cost prohibitive

NWS Example – WESR Battery Energy System

NWS Example - WESR Battery Energy System

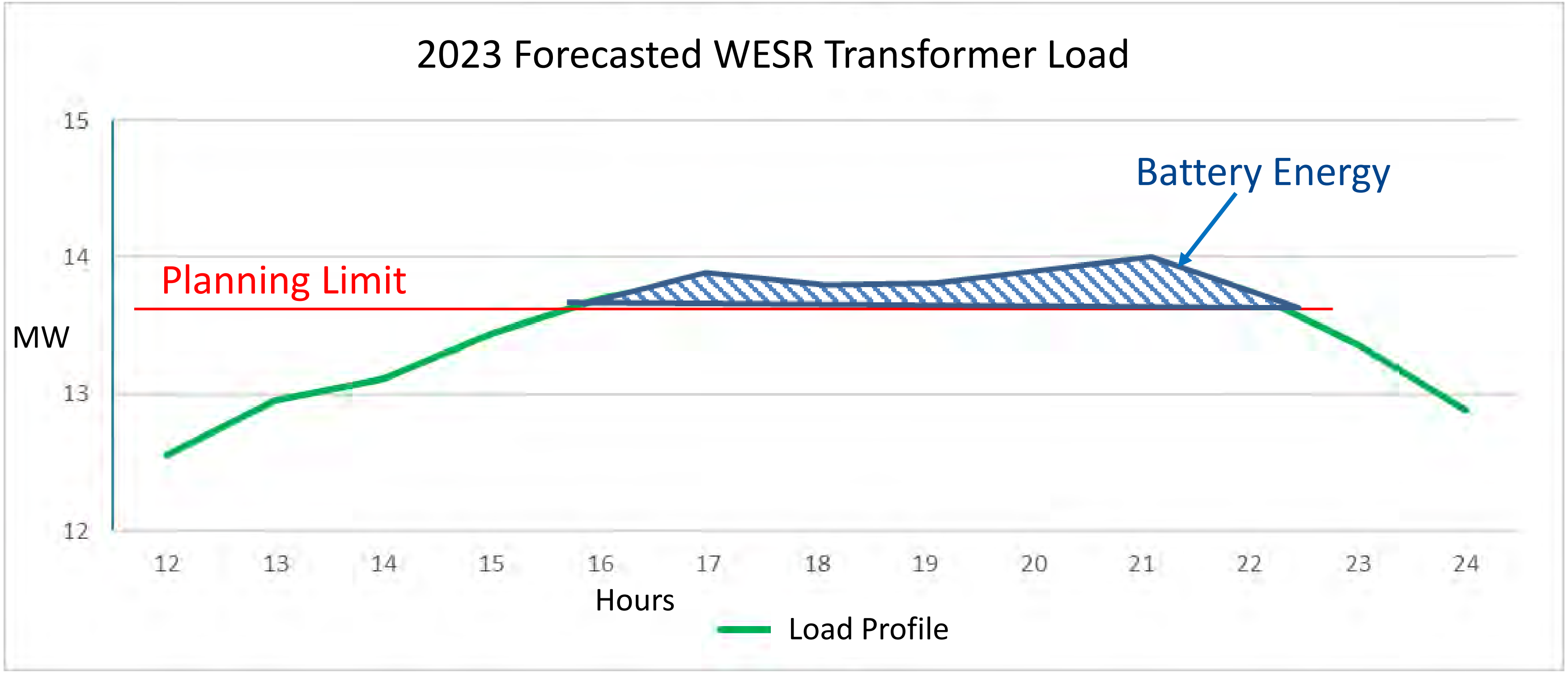
Peak occurs summer at 9 p.m.

Modest growth <0.85% per year

Land area available for storage

Integrated Resource Plan (IRP) identified need for storage

WESR Storage Peak Shaving



NWS Example – WESR Battery System

Battery Project Details

- 3MW capacity 4-hour battery (12MWh)
- Expandable to 4MW capacity 4-hour battery (16MWh)
- Expected to defer project for 8 years

Traditional Project Cost - $2,530,000

Deferring Project from 2023 to 2031 - $1,816,000

- May reduce the overall cost and satisfy IRP system resource need

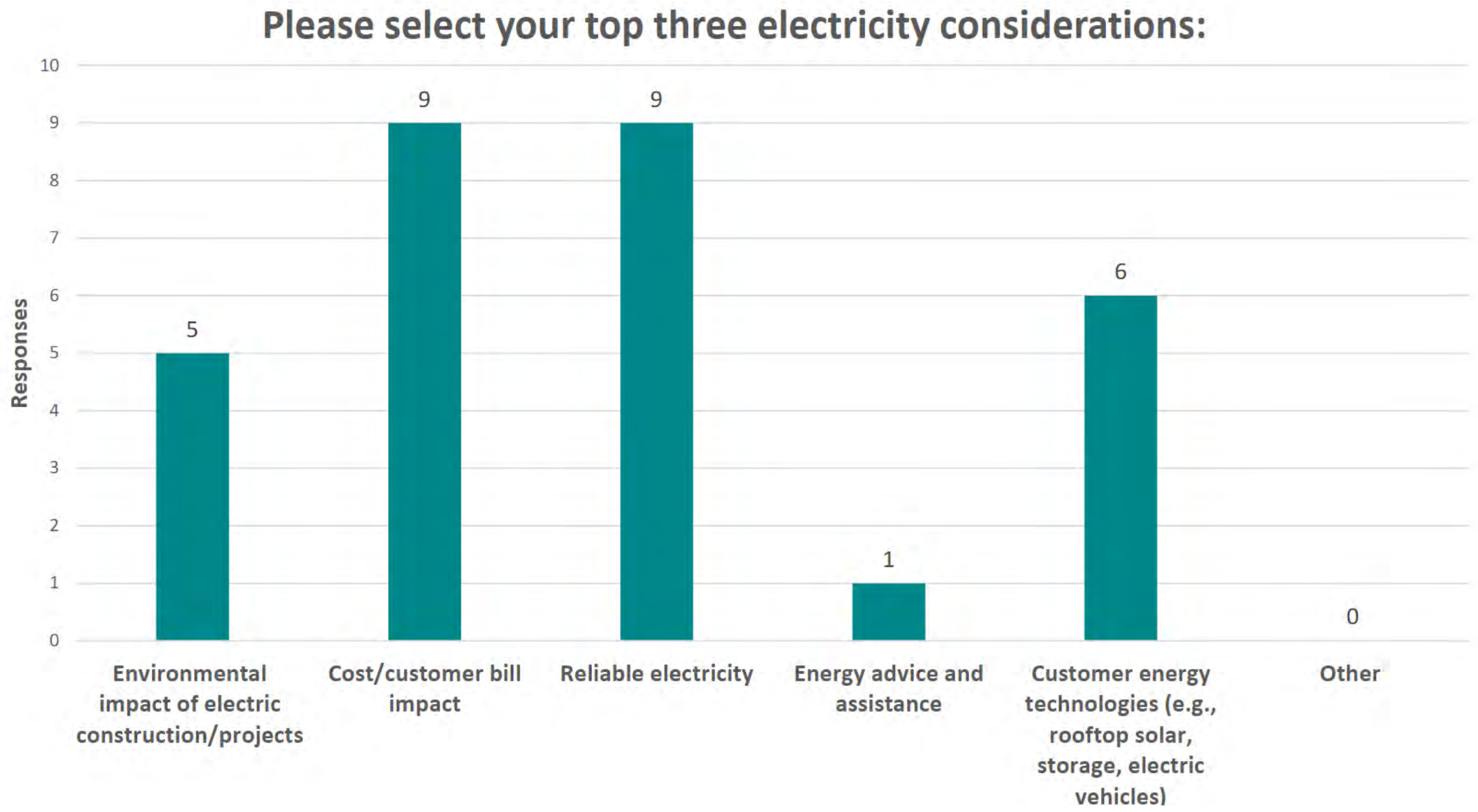
Review Distribution Grid Needs 2023 - 2026

Review Distribution Grid Needs 2027 - 2028

Detailed Distribution Grid Needs 2023 - 2028

Substation/Feeder Identifier	Project Type	Need Date	Grid Need - Traditional Solution	Traditional Project Cost
ADRN11	Reliability	4/1/2023	Line protection equipment does not record information - replace with modern smart recloser	$21,000
VALE13	Reliability	5/1/2023	Limit outage impact - Add fuses	$38,000
VALE15	Growth	5/1/2023	Low voltage on feeder - Add regulator	$48,000
HFWY12	Growth	10/1/2023	Regulator planning capacity at limit - Upgrade regulator capacity	$51,500
CWVY12	Growth	4/1/2024	Low voltage on feeder - Add regulator	$58,000
HMDL12	Growth	5/1/2027	Feeder capacity at limit. The project requires 4.25 mile of distribution rebuild with a river crossing and other distribution devices.	$1,074,000
HOLY13	Growth	10/1/2027	PAET12 planning feeder capacity at limit - Increase HOLY13 feeder capacity by rebuilding 3.9 miles of distribution with a river crossing and other distribution devices for a PAET12 load transfer.	$897,500
NYSA T-061	Growth	5/1/2028	Transformer planning capacity at limit - Upgrade transformer capacity	$1,716,000
JNTA T-061	Growth	5/1/2028	Transformer planning capacity at limit - Upgrade transformer capacity	$294,000
JMSN T-061	Growth	5/1/2028	Transformer planning capacity at limit - Upgrade transformer capacity	$837,600

Community Input



Next Steps

- What other data/information is needed to prepare for a meaningful discussion on potential NWS opportunities?
- There will be a document uploaded to the Idaho Power DSP Website identifying grid needs and the issue being addressed
- For the June 6th meeting, we will the share the non-wire analysis for the identified grid needs and ask for input on those potential solutions and the community impacts

Input