***Distribution Planning Advisory Group***

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| Meeting Date: | March 29, 2023 |
| Time: | 9:00am – 11:30am |
| Location: | Teams Meeting |

**Agenda** **Presenter**

I. Welcome
   – Overview of Meeting: Rules and Intent
II. Avista's System Planning Team
III. Distribution Planning Advisory Group
IV. Power Delivery 101
V. Avista's Distribution System
VI. Distribution Planning Basics
VII. Next Steps

## Meeting Notes

### Welcome & Introductions

Welcome and thank you for attending our first DPAG Meeting, discussed Rules and Intent of today's agenda.

### Avista's System Planning Team

Introduced Avista's current system planning team and how they work together for transmission, distribution, and overall system planning needs.

### Distribution Planning Advisory Group (DPAG)

We are excited to get started with our first DPAG meeting, thank you for joining. The core of our vision for this group is to provide expertise and support towards informing a transparent, robust, and holistic planning process for electric system operations and investments. Contribute to and inform the long-term plan to ensure operational efficiency and customer value are maximized. Having transparency in this process is important and making sure that the decisions we are making are right for our community and the Company. The DPAG also fulfills some obligations we have pertaining to our Clean Energy Implementation Plan (CEIP) which is outlined in Condition 13.

This effort will be to inform stakeholders about the electric system, provide an opportunity for feedback, please speak up and share your thoughts/expertise, is open to all stakeholders, and we will be flexible and open to adjustments. We ask for patience as we receive your feedback as some of our processes take time.

Here is a potential outline for future meetings in 2023.

| | January - March | April - June | July - September | October - December |
|---|---|---|---|---|
| **Meetings** | 2-3 hours in February | 2-3 hours in April<br>2-3 hours in June | 2-3 hours in August | TBD |
| **Topics** | • DPAG Introduction<br>• Distribution System and Electrical Concepts<br>• Avista's Distribution System Overview<br>• Planning Processes<br>• Load Forecast and DER Potential Assessment | • Distribution Planning Process<br>• Performance Criteria<br>• System Needs Identification<br>• Identify Solutions<br>• Solution Examples | • Review Solution Selection<br>• DER Potential Assessment Update<br>• Hosting Capacity<br>• Review System Plan | • To be determined |

## Power Delivery 101

The electric grid connects sources of energy to the consumers energy.

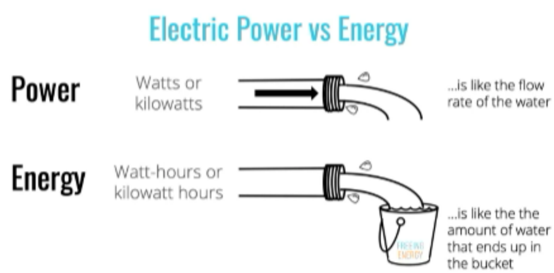
- Energy Sources: hydro, wind, solar, thermal, efficiency.
- Energy Consumers: lights, refrigerators, motors, AC, EVs, Storage, etc.

As energy is put onto the grid, energy needs to flow off the grid. Balance needs to be maintained. When we generate the “juice”, it needs to be used. The balance is important and complex to maintain.

Electricity, Energy and Power

- Electricity is energy in the form of charged particles that are static or moving.
- Energy delivered is the quantity of work done
- Power is how fast the work was done

Energy and Power are closely related by time



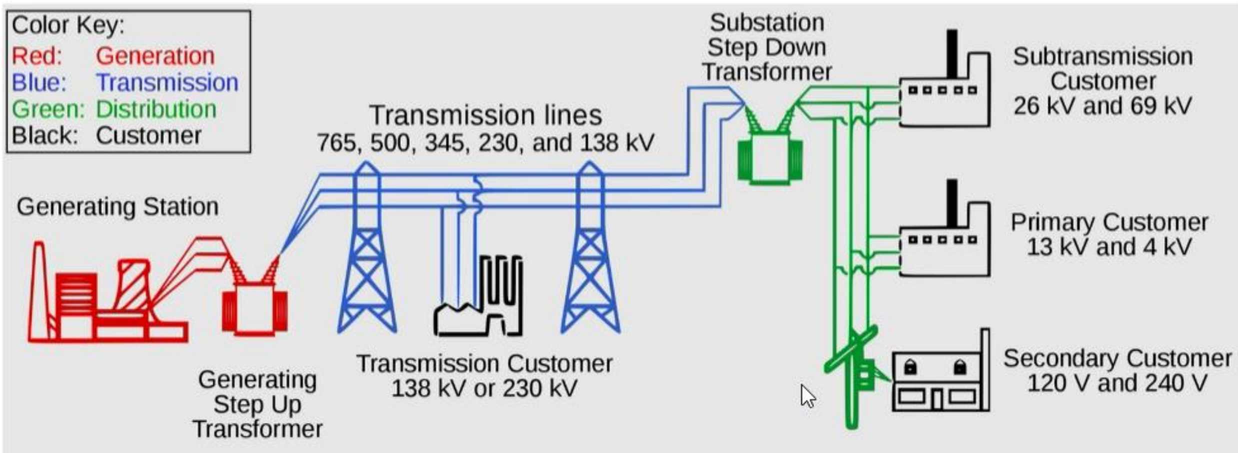

Capacity=$$

- The power that is possible
- Same units as power (watts)
- Generation capacity
    - Constant (ish)
    - variable

Delivery Capacity

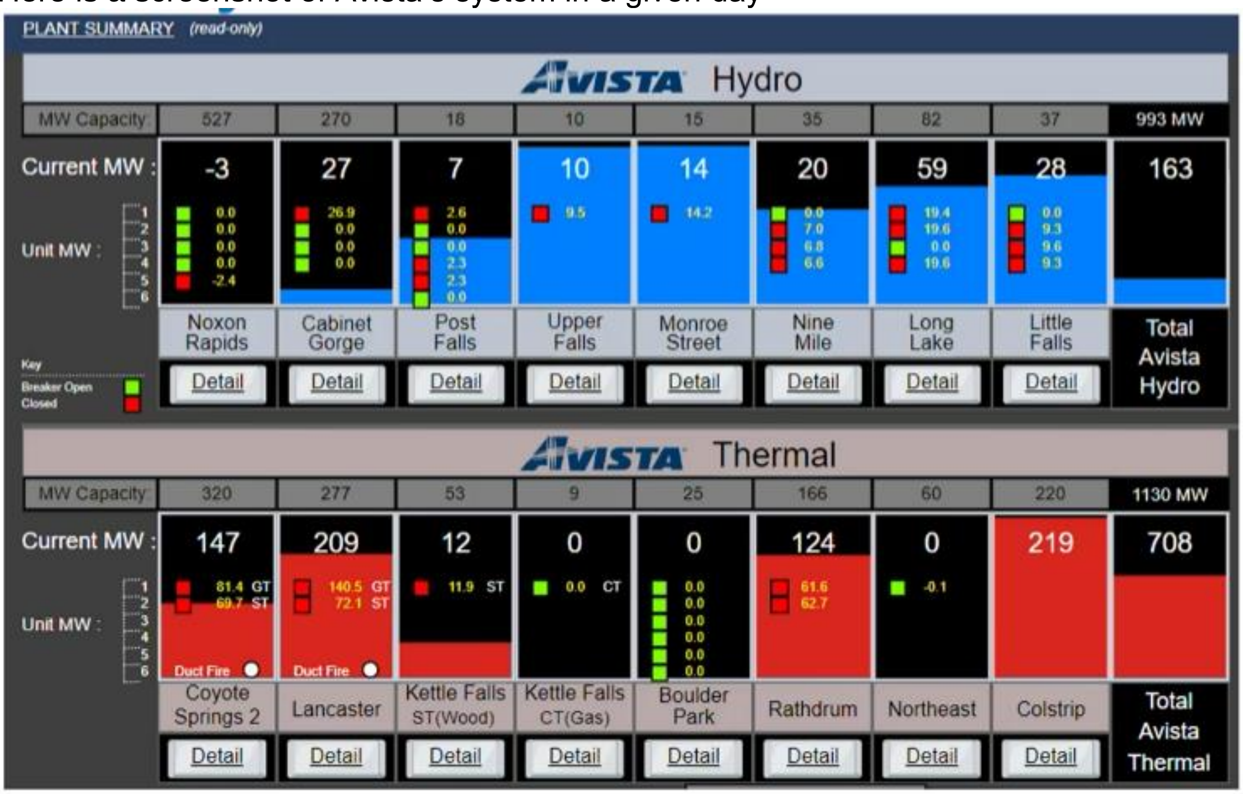
Temperature dependent

Fundamental components to the power system= generation, transmissions, distribution, and then the customer. Changing the voltage at each interchange to ensure proper delivery of voltage. Transmission system has higher voltage than generation and then we lower that back down when it goes to the customer as you don’t want higher voltages running through the alleys.




**Participant**: Good overview

Here is a screenshot of Avista's system in a given day




Buying and selling of energy can be difficult to predict. We do buy around 200 MW of nameplate wind and 20 MW of nameplate solar. Our connected grid has quite a few more generators that we do not own but we do monitor them closely. The image above is a snapshot of what we did on a generation basis at one given time.

Fundamentally, for our purposes, this is how we serve our load outside of buying power with these facilities and others that we have long term contracts on. The whole integrated resource planning (IRP) process is how we deal with these resources and

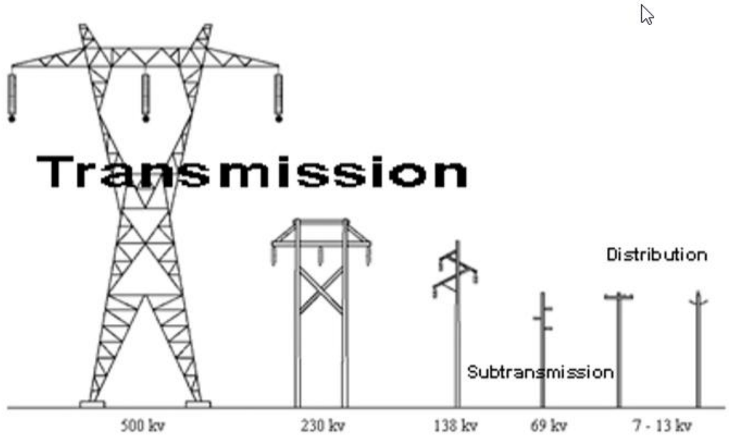
what we will need in the future. And the DPAG deals with how to get that power to the customer.
The transmission system has a breaker similar to the ones in your home, that help run things safely, it is complicated, but is important to have to maintain the system. The volts go through the breaker and then goes to the transmission line and hits a bus then goes through a transformer and reduces the volts through the distribution system and ultimately to the customer.

**Participant**: I agree, very informative.

The distribution planning group is more interested in capacity with the notion that there are all of these transmission lines that we can connect to, and it is the transmission folks responsibility to ensure the distribution system has enough to connect to.

Downtown we have what is called “the network” and it operates on its own grid, the distribution system is operated like a grid but is not connected to the next feeder electrically, we don’t operate the bulk to the distribution system in the downtown network.

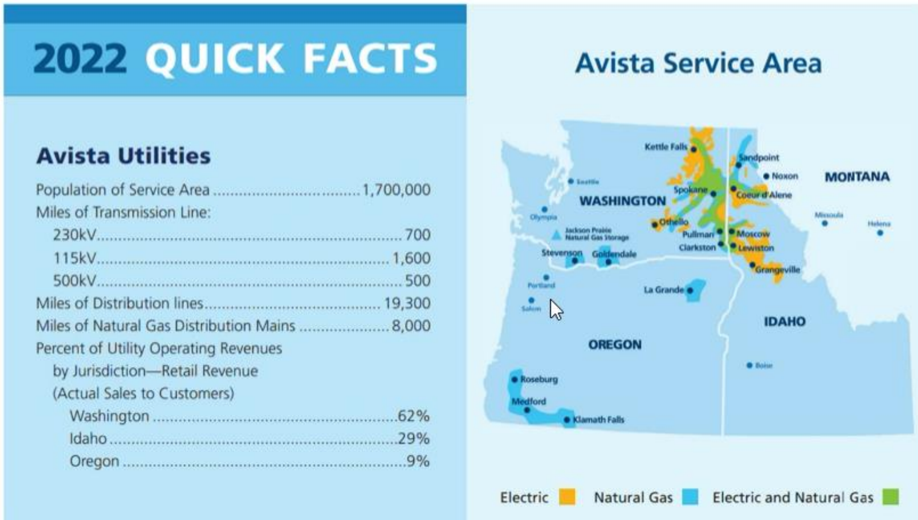
Here is what a typical system looks:




Avista does not have a lot of the 500kv.

BREAK

## Avista’s Distribution System




These quick facts are located on our website; the righthand side shows the extent of our electric service in orange, natural gas system is in blue, and the combined electric and gas service is highlighted in green.
Reviewed our supply mix including wind contracts, hydro, thermal.

Wind is approximately 245MW: 105MW at Palouse and ~140 MW at Rattlesnake Flat

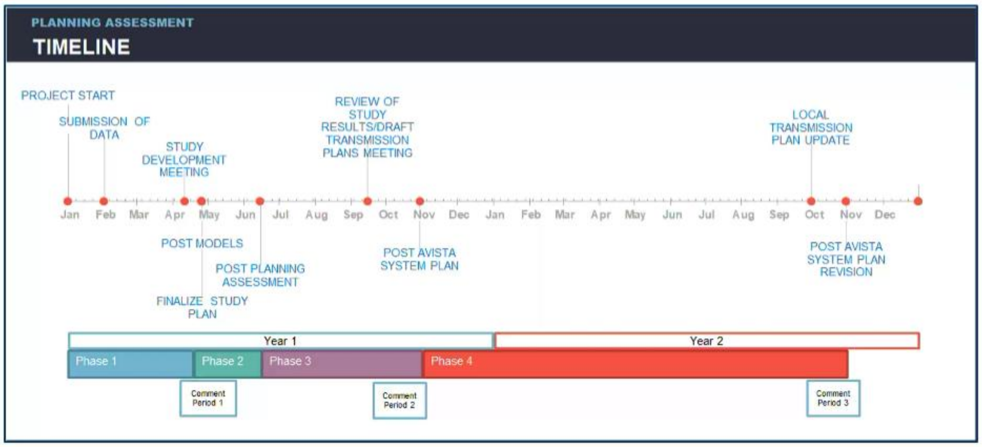
We have 130 distribution substations, 360 feeders, 410,000 electric customers and feeder capacity varies in rural areas. Feeder capacity in urban areas is around 10MW which serves 2-3 thousand customers. Voltage range is 12.5kV to 34.5kV.

Part of planning is around data, we do not measure all of our feeders at the granularity that anyone would want, this is an industry wide thing and it is slowly getting better, it can be expensive. We have about 60 feeders not SCADA, which means that feeder curve I showed earlier with Lind and Colstrip, those are from SCADA systems, meaning supervisory control and data acquisition. This data helps with distribution planning, someone could go out to the system each month and get the high read for the systems that send it automatically to see what we need to keep planning towards.

AMI meters has really helped with the distribution planning. As a customer, I can go online and view my usage data and trends down to a 5-minute granularity. This granularity is not helpful for planning reasons, but is nice for the customer. It is only in WA so far, but the information can be quite useful.

## System Planning

We have a two-year cycle which looks similar to the timeline below which incorporated transmission planning and distribution planning. We will learn about the state of the system which will inform the future plan. We are in year one of a two-year process. More information to come in future meetings.



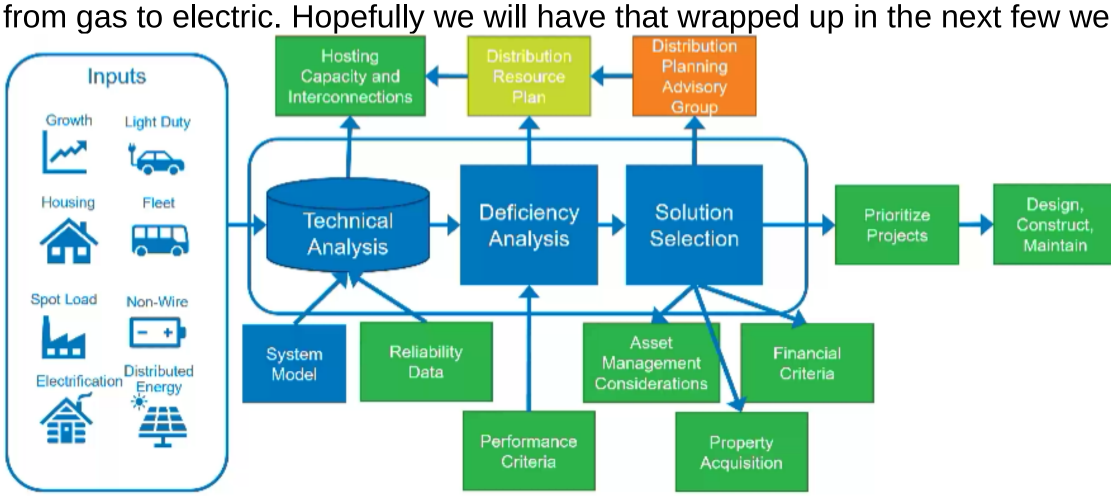

## Distribution Planning Basics

In short, ensuring the electric distribution infrastructure can serve customers now and in the future. We are maintaining the voltage and capacity needs, installing bigger conductors, more feeders, larger transformers, more substations, etc.,

There is a notion that this path is expensive so how can we look at other paths to ensure we have capacity and combined benefits of the renewable movement. This group will help determine some of these potential solutions.

**Distribution planning process**:

We are looking to select a vendor, so we can have a better understanding of solar installs, EV usage, and battery installations, along with rate of heating conversations from gas to electric. Hopefully we will have that wrapped up in the next few weeks.



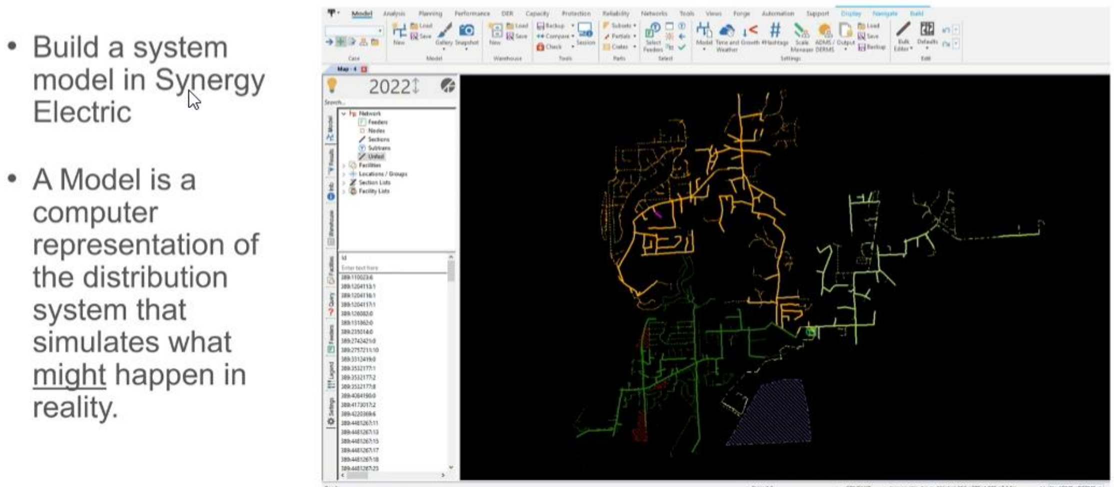

We have been working hard to create an effective model for distribution planning. Find out where problems are so we can select the correct solution.

One way to forecast is to look at the past, you don't know what the future holds, for instance with weather, but we can look back historically and see what the temps were over time to predict a potential range.

We also do regression forecasting which provide real measurement/values and predicted values based on a 40-year hourly average. We look for an average year and an extreme year to ensure our planning is adequate.
We also map out known new developments to ensure we are planning growth accordingly. We bring these new developments into the planning models. Airway Heights is seeing a lot of growth right now. This map can be found on slide 29

We look at all the SCADA data from feeder demand and feeder curves. We look for the peak, what the worst-case scenario could be and that would set our minimum capacity for that feeder. These curves can be found on slide 30.

Here is an image of an actual model:




We create this model weekly, and it runs for about a week and half just to build the model, not to run it. The output of that model is displayed on slide 32, which shows a 10-year load flow analysis.

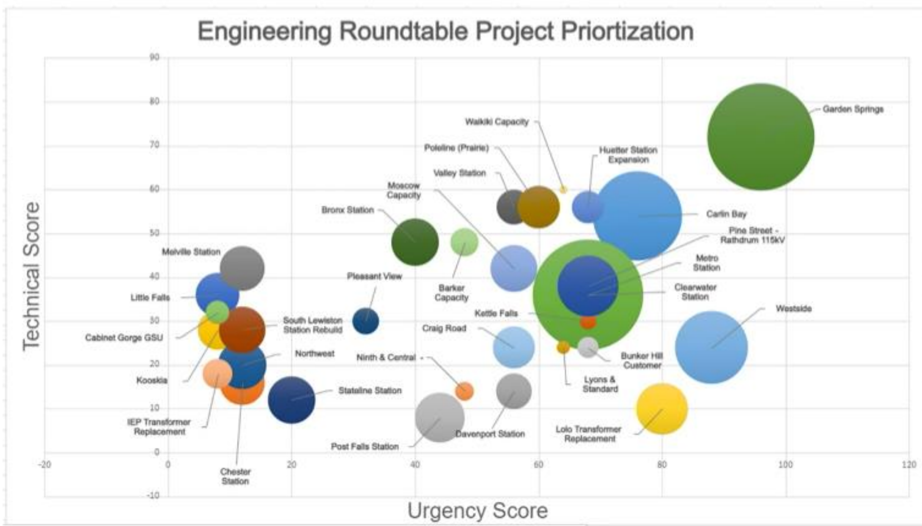
How do we want our system to perform? We developed criteria which is outline below and also on slide 33. This displays everything that is at or over 80% capacity so that we can switch load or determine corrective action. We do not ever want to let feeders get to 100% capacity. When building the model, the feeders should be equal, but as you add homes to feeders, sometimes they get unbalanced. 80% would be an ideal state.

- Performance Criteria

| Category[2] | Outage[3] | Thermal Performance | Voltage Performance[4] | Regulator Performance | Current Imbalance | Voltage Imbalance | Customers Experiencing Interruption[5] | Customers Experiencing Sustained Outage Longer than 2 Hours[6] | Notes |
|---|---|---|---|---|---|---|---|---|---|
| D0 - No Contingency | None | < 80% Continuous[7] | 118V < Volt < 127V | -12 < tap < +12 | Line loading > 90%: 5%<br>Line loading > 80%: 10%<br>Line loading >70%: 15%<br>Line loading < 70%: 20% | 3% | N/A | N/A | • Seasonal load transfers can be used |
| D1 - Feeder Contingency | Loss of one of the following: | < 95% Continuous | 114V[8] < Volt < 127V<br>< 4V Deviation[9] | -15 < tap < +15 | Line loading > 90%: 10%<br>Line loading < 90%: NA | 5% | | | • Field switching can be used to restore customers<br>• Generator curtailment may be required for restoration |
| | 1. Feeder Lockout | | | | | | 3000 or 10MVA | Suburban: 500<br>Rural: 3000 | |
| | 2. Generator Outage/Off | | | | | | 0 | 0 | |
| | 3. Automatic Transfer Switch Operation | | | | | | N/A | N/A | |
| D2 – Multiple Contingency (Common Structure[10]) | Loss of one of the following: | < 95% Continuous | 114V< Volt < 127V | | None | 5% | 4000 | 500 | |
| | 1. Loss of two feeders on common structure | | | | | | | | |
| | 2. Loss of three feeders on common structure | | | | | | | | |
| D3 - Substation Contingency | Loss of one of the following: | < 95% Continuous | 114V< Volt < 127V | -15 < tap < +15 | None | 5% | | | • Feeder breaker and/or regulator bypass is acceptable |
| | 1. Feeder Regulator | | | | | | 3000 | 0 | |
| | 2. Feeder Breaker | | | | | | 3000 | 0 | |
| | 3. Substation Transformer | | | | | | 6000 | Suburban: 0<br>Rural: 1500 | |

Once we go through the process of looking at our criteria and how we can fix any issues, we pick a path forward and look at the scope of work much more closely, how much is it going to cost, what are our actions, and when does it need to be done. We review to see if these projects are prudent and something the customers need, this is done through an engineering round table as shown below:

- Well scoped projects go to project delivery




“Urgency” is not around the importance, but more of when we need to move in order to have a successful project and the “Technical” is how important is the work to get done. They then turn that into a 5-year work plan. We have a lot of good projects and not as many resources tot get them all done, so prioritizing is important.

Are there any questions?
**Participant**: This was a great overview, thank you
**Participant**: Very interesting.

## Wrap Up and Next Steps

Thank you all for your wonderful ideas, please feel free to send us any additional thoughts. We will get the results of some of this work to you when it is available, hopefully in May. We will send a recap email out that will include todays recording and slides and if you have any suggestions on topics for future meetings, please send them through that email avenue. Thank you for you participation today.

We are currently working on the system assessment. Expect an update on the findings.

Next meeting will include a deeper dive into grid resources, non-wire alternatives and the expectations of planning in the future.

If you have a topic suggestion, please send it to-
DistributionPlanning@avistacorp.com