

# Electrification

## Executive Summary

Electrification is the transformation of processes and economic sectors from fossil fuel-based resources to electricity. This includes moving the transportation sector from gasoline and diesel to electricity, or transitioning industrial practices like large scale drying or curing processes from natural gas to electricity. The goal of the Electrification Topic Team (ETT) was to identify ideas that could help Chelan County take greater advantage of, and build upon, the low emission hydropower resources of Chelan PUD. Electrification is a way to contribute to greenhouse gas emission reduction when the source of power is clean and renewable.

A large majority of Chelan PUD customers already use electricity rather than fossil fuels for heating, cooling and industrial processes. For example, 93% of existing homes and 99% of new homes in Chelan County use electricity. This compares with 53% for the region. Even though this may limit electrification potential in this area, there are still opportunities for Chelan PUD to support electrification of the transportation sector, off-road vehicle applications, and small equipment.

As part of Chelan PUD’s Strategic Planning process for 2015 and beyond, the ETT evaluated over 60 ideas generated by the public and the ETT itself. Over the course of three months and six meetings, the ETT narrowed the list to four ideas that fit into two overarching themes that can best position Chelan PUD to support electrification. The ideas support the direction the ETT was given under the Strategic Planning process to select planning goals that to “do the best, for the most, for the longest.” The “Top 4 Ideas” ideas fit into two overarching themes, as illustrated below. In general, the ideas center on Chelan PUD being an example to the community and supporting electrification research and education opportunities. Table 1 provides an overview of the Top 4 ideas.

Table 1. Electrification Team “Top 4 Ideas” At a Glance

Overarching Theme	Top 4 Ideas
Lead by example, positioning Chelan PUD to be a County leader in the electrification of fossil fuel activities	<u>Appoint a Project Manager and Executive Sponsor to Oversee Electrification.</u> Chelan PUD should identify a project manager and Executive Sponsor to lead a team that would be responsible for investigating opportunities that would put Chelan PUD at the forefront of electrification in Chelan County. Estimated cost: \$250,000 - \$500,000 over 10 years.
	<u>Convert PUD Fossil Fuel Vehicles and Equipment to Electric.</u> Act as a community leader in electrification by converting the Chelan PUD fleet, parks vehicles and other tools from gas to electricity when they are replaced. Develop criteria that would be used to provide some allowance for this to happen (for example, some tolerance for non-cost effective equipment). Estimated cost: \$425,000.
	<u>Vehicle Chargers at Chelan PUD Facilities.</u> Install chargers at Chelan PUD facilities for use by staff and the public. Estimated cost: at least \$50,000.
Get involved in electrification research and education activities	<u>Be Involved in Electrification Research and Collaboration.</u> Get involved in regional activities including research and education regarding electrification and customer-focused renewable energy. Become a

	regional expert for these two topic areas and help customers as needed. Monitor and be active in regional activities. Consider participating in or developing education curriculum and promotional materials to support these areas. Estimated cost: \$1 million over 10 years.
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**The Electrification Topic Team – Charter and Special Considerations**

The ETT was chartered to identify how Chelan PUD could support electrification efforts in Chelan County while operating within Chelan PUD’s statutory authority. This was challenging because the electrification rate of residential homes is 93% to 99% in Chelan County, leaving little opportunity to increase electrification in that sector. Additionally, the majority of commercial and industrial processes are also already electric. The fact that Chelan County was already heavily electrified naturally narrowed down the options the ETT considered. There were also questions regarding Chelan PUD’s statutory ability (or lack thereof) to provide incentives and rebates to customers who purchased electric models of vehicles and equipment instead of fossil fuel versions. These considerations lead the ETT to focus on ways Chelan PUD could 1) lead by example; and 2) be a resource to the community by getting involved in electrification research and development.

**ETT Evaluation Process**

The ETT held six meetings over the course of three months and evaluated over 60 ideas from the public and the ETT itself. To manage the volume of input, the ETT created overarching categories to capture similar ideas. For example, ideas such as “Electrification of PUD Fleet” and “Install chargers at PUD facilities including dams and parks” were consolidated under a category entitled “EV support in PUD operations.” This process also helped identify general comments or ideas that better fit with one of the other five Topic Teams. These were either forwarded to the appropriate Topic Team or otherwise recorded in the tracking documents. An example of a general comment is “Local ownership-extremely important” (sic). See *Attachment A, ETT Categorization of Similar Ideas*.

Out of over 60 ideas, the ETT then subjected 20 options to a high-level qualitative assessment (See *Attachment B, ETT Evaluation of 20 Ideas, Composite Score*), with the objective of identifying the “top-five” ideas. The ETT used the same attributes as identified in the *Strategic Planning Valuation Criteria* table presented in the Introduction; however the scaling description was much more qualitative in nature. For example, in the *Strategic Planning Valuation Criteria*, a “1” for “Impact of District Finances” is described as a \$10-\$100 million cost. Under the ETT high-level qualitative assessment, a “1” was defined as “negative”. This was done to quickly bring the top ideas to the forefront. In addition, composite scores were created by summing the calculations of each individual member of the ETT. It was also during this process that the team really began to coalesce around how Chelan PUD could best support electrification in the County. Additional mixing and matching of ideas occurred until the final themes and associated ideas were identified. After the top ideas were identified, they were evaluated using the same attributes AND scaling definitions found in the *Strategic Planning Valuation Criteria* table. This is shown below in Figure 1, *Strategic Planning Evaluation Tool –Top Electrification Ideas*.

The biggest “lesson learned” from the ETT evaluation process is that what started out as a large “Chelan PUD to-do list” morphed into more of a call for Chelan PUD to be involved in electrification and to be a role model within this community. What is being recommended by the team is not a list of high cost

activities, but rather a change in how Chelan PUD supports and promotes electrification in the County. There are costs associated with the recommendations, but they are relatively low.

## ETT-Top Ideas

The ETT scored its top-four ideas using the attributes and scaling descriptions in the *Strategic Planning Valuation Criteria* table (see Introduction). Figure 1 illustrates how each top idea measured up to the various metrics. A full description of each option, including a discussion of relevant factors that contributed to the ETT decision-making process is included below. The top-four ETT ideas are shown below in Figure 1.

**Figure 1 Strategic Planning Evaluation Tool-Top Electrification Ideas**

	Direct Impacts					Indirect Impacts					
	Financial Impact	Customer Equity	PUD Authority	Workforce Capability	Jobs	Economic Impact	Recreation	Health	Education	Community	Environment
Appoint project manager and executive sponsor to oversee electrification	4	5	5	4	1	3	1	3	3	3	4
Convert PUD Fossil Fuel Vehicles and Equipment to Electric	4	4	5	4	1	4	3	4	4	4	4
Install Vehicle Chargers at Chelan PUD Facilities	5	3	5	4	1	2	2	3	3	4	3
Be Involved in Electrification Research and Collaboration	3	4	5	4	3	3	1	2	4	4	4

### Option Description – Appoint project manager and executive sponsor to oversee electrification

Chelan PUD should identify a project manager and Executive Sponsor to lead a team that would be responsible for investigating opportunities that would put Chelan PUD at the forefront of electrification. The estimated cost is between \$250,000 and \$500,000 over 10 years.

### Discussion of Relevant Factors

This option would identify a Chelan PUD Executive Sponsor and Project Manager responsible for electrification opportunities within the county. This would provide a clear line of responsibility and ensure electrification opportunities and efforts have a “home” and are investigated. This would also ensure that the customers have a single point of contact to ask questions or share ideas with Chelan PUD.

Electrification of fossil fuel activities and processes is an area of increasing interest both locally and at the state and national level. Interest is driven both from an environmental standpoint, reducing emissions, and from a financial standpoint, reducing the costs associated with acquiring and burning fossil fuels. Chelan PUD and its customers would benefit by having a single point-of-contact at Chelan PUD who is responsible and accountable for identifying and recommending electrification opportunities.

This would help ensure that both risks and opportunities would not be missed. The Chelan PUD project manager would also work with other entities interested in electrification and participate in outreach and education opportunities.

The estimated cost of this option is associated with the lost opportunity cost of staff time needed to support electrification opportunities. Over ten years, assuming a ¼ to ½ full time equivalent, the cost is estimated to be between \$250,000 and \$500,000.

Chelan PUD has the statutory authority to commit resources to this effort.

#### Option Description – Convert PUD fossil fuel vehicles and equipment to electric

Chelan PUD should act as a community leader in electrification by converting the PUD fleet, parks vehicles and other tools from gas to electricity as they are replaced. Develop criteria that would be used to provide some allowance for this to happen (for example, some tolerance for non-cost effective equipment). The estimated cost is \$425,000.

#### Discussion of Relevant Factors

This option would support Chelan PUD's conversion of fleet vehicles and other equipment from fossil fuel to electricity. In a manner that takes into account the over-all cost effectiveness of the varying technologies that are available, Chelan PUD would investigate replacing ageing vehicles and equipment with electrical versions during the replacement cycle. Items to consider when making the conversion case would be price premium of the all electric version, the intended work conditions. For example, vehicles that are mostly used in town or to commute between the dams and headquarters are better suited to electrification than are vehicles used to travel longer distances. A decrease in fuel usage and other maintenance costs would be expected help offset the price premium and installation of the charging stations needed to charge the vehicles and equipment. An evaluation criterion of when to replace a fossil fuel vehicle with an electric vehicle would be developed to help balance the different benefits and costs of the decision to add value to Chelan PUD's customer owners.

A high level cost estimate of \$425,000 was calculated. This estimate assumed 10 cars would be replaced with electric vehicles, 15 chargers at various Chelan PUD facility locations, and the replacement of some equipment and off-road vehicles. Since vehicles and equipment at the end of the useful life would be targeted for replacement, only the incremental costs above and beyond a similar fossil fuel version was accounted for. Finally, the cost associated with retraining fleet technicians was also estimated.

In the long-term, the benefits to Chelan PUD would be a decrease in fuel costs and maintenance costs. If the replacement equipment were targeted at Chelan PUD parks, then additional recreation benefits would accrue through a more pleasant experience to visitors since noise and air pollution would be reduced. A sense of community and pride in ownership of customer owners may also occur as Chelan PUD looks to become a utility of the future by backing it up with actions.

Chelan PUD has the statutory authority to implement this recommendation.

**Option Description – Install vehicle chargers at Chelan PUD facilities**

Chelan PUD should install chargers at Chelan PUD facilities for the use of staff and the public. The estimated cost is about \$50,000.

**Discussion of Relevant Factors**

This option recommends that Chelan PUD install car chargers at Chelan PUD facilities for both employee and public use. This action would show Chelan PUD is supportive of both customer and employee choices to electrify their transportation option.

Level two chargers are relatively inexpensive. The cost to provide one charger at each of the Chelan PUD satellite facilities and five at the Head Quarters building would cost an estimated \$50,000 for the purchase of the devices. Installation by Chelan PUD crews would add to the cost from a lost opportunity standpoint.

Benefits would mostly be indirect. Chelan PUD would be seen in a positive light from a state perspective and customers would have a physical representation of their Chelan PUD looking to the future. Employees who choose to drive electric vehicles would also have an enhanced view of the utility they work for.

Chelan PUD has the statutory authority to implement this option.

**Option Description – Be involved in electrification research and development and education**

Become involved in regional activities including research and education associated with electrification and customer-focused renewable energy. Become one of the regional experts for these two topic areas and help customers as needed. Monitor and be active in regional activities. Consider participating in or developing education curriculum and promotional materials to support these areas. The estimated cost is about \$1 million over 10 years.

**Discussion of Relevant Factors**

Chelan PUD should be a trusted energy and electricity expert to its customers. This option would have Chelan PUD become a more involved in electrification and customer focused renewable energy research and development that has direct application to its customers. The expertise that is gained from this greater involvement would help with education collaboration opportunities. Additionally, customers would have a trusted source to come to for technical questions regarding new technologies.

The cost of this option was assumed to be \$100,000 per year over the next ten-year period. The cost could cover a number of small studies and efforts or support a few large, targeted studies. Actual costs would be a mix of Chelan PUD staff time and the expenses associated with funding research.

Energy and electrification technologies are changing at a rapid rate. Understanding how and if these

technologies work within the Chelan PUD system is important in order to identify additional value opportunities that benefit customers. Customers would also benefit from having a local, trusted expert with the ability to answer questions on new electrification technologies. There is also an opportunity to help shape policies in a way that benefits and protects customers by being involved at the state and regional level and by being seen as an expert. Finally, Chelan PUD would also be able to participate in and promote local educational opportunities so customers and students would be able to hear about new technologies and understand the benefits and costs of each.

Chelan PUD has the statutory authority to implement this option as long as there are benefits to the customer-owner.

## **Conclusion**

The goal of the Electrification Topic Team (ETT) was to identify ideas that could help Chelan County take greater advantage of, and build upon, the low emission hydropower resources of Chelan PUD. Chelan County is already a very "electrified" county due to our existing low electric rates, opportunities for further electrification in terms of transportation, off-road vehicles and small equipment exists. In addition, Chelan PUD has the capacity to be a "local expert" on developing technologies and can serve as a resource for customer owners. Over three months, the team evaluated more than 60 ideas generated by the public and team members. We narrowed these down to four options. The four options fall into two categories: 1) Chelan PUD should "lead by example" by investigating in electrification opportunities, particularly with regard to converting fleet vehicles and installing electric charging stations at utility buildings; and 2) further its expertise in electrification research by supporting customer education activities and electrification research and development opportunities.

The ETT recommends these options to the Chelan County PUD Board of Commissioners for their consideration. The ETT members are hopeful that these ideas, if implemented, will help Chelan PUD be an example to the community, move towards being the utility of the future, while adding value to the customer owner.

## **Contact Information**

For more information or with questions, contact:

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## Attachment A – ETT Categorization of Similar Ideas

Category	Description	Individual Idea
EV support in PUD operations	Electrification of PUD Fleet	PUD electrify its own Fleet
		The PUD has the resources, funding and assets to boost electric cars and EV tourism in our area exponentially charging stations are only getting cheaper. Switch PUD fleet into EV's and save tens of thousands of dollars."
		Encourage electric vehicle usage in our county...charging stations...the PUD proudly driving electric vehicles. Cheap, green, the future. Thank you!
		Invest in all-electric cars for the PUD fleet.
	Install chargers at PUD facilities including dams and parks	EV charging station @ projects
		Create PUD charging network
Incorporate small application and off-road EV's (such as in parks)	Have the PUD use electric small application vehicles in it's fleet.	
Develop level III Chelan PUD charging network	Identify optimal charging locations outside of PUD property	Retail charging station
		More charging stations for electric cars, including public places and businesses
		Set up a few electric charging stations around town.
		Electric cars and electric charging station infrastructure
		Need rapid (DC fast charging) chargers in 25-30 mile increments (to get other options viable)
	Develop appropriate fee structure and means of payment	Who should pay for energy @ EV stations? Driver, Business (Marketing), Currently free, Utility (RFID chip for customers, pay online/phone as used)
Utility needs to look at a "fee model" to make EV stations feasible		
Level II EV Support	Provide incentives and technical support for Level II chargers in the home, smart charging	Purchase car chargers for the home
		Offer partial rebates for home owners installing charging stations/incentives for home builders to install.

		Sell chargers to homeowners (cooperative)
	Investigate solar and battery charging options of "off-grid" locations	Solar & battery for car charging
	Provide incentives to County residents for EV purchases. Depending on conditions and technology benefits to the District.	Fund electric plug-ins for cars throughout the county.
		Electric Vehicles
		"2 words: Electric Vehicles
		Provide incentives/rebates: Purchase of EV,
Research and collaborations	Participate in research and collaboration opportunities for EV deployment and other electrification technologies	Battery storage for car charging
		Providing residents/visitors opportunity to experience electric vehicles
		Partner with vehicle companies to recycle/EV car batteries- extend useful life
		Electric-train mass transit system through Wenatchee, north and south to lessen traffic. Then the Link could continue to Chelan, maximize ease of travel to our great outdoor resources, also a tram to mission.
		Explore benefits and costs of electric vehicle charging systems and customer demand response on grid stability and the distribution system.
	Partner with Plug-in NCW	Working with Plug-in NCW. Create a huge electrical vehicle event like Sturgis, a massive car show & rally
Streetlights	Deploy LED streetlight technology throughout the County	Take over street lighting in the name of electrification and energy efficiency. Street lighting is a great benefit to communities in terms of safety especially in low income neighborhoods where crime is concentrated. With LED technology, there is a great opportunity to lower long term energy consumption as well as ongoing maintenance costs of the lighting system. LED lights have an incredibly long service life. This would be another great benefit of hydro power county wide.
		Reduce Light pollution to enhance wildlife habitat, recreation opportunities,

		and add to quality of life. Invest in infrastructure such as the distribution system and look for ways for the benefit of hydropower to lead the future such as LED street lighting which improves safety, reduces light pollution, and improve energy conservation. We have so many areas of the County that would benefit from good lighting and local agencies don't have the resources to meet the need.
EV Tourism	Actively support and provide resources to market PV travel and tourism	Chelan PUD should help to support activities and provide resources to events that help to promote tourism that is focused on EV travel
Energy Efficiency	Provide incentives for deep energy efficiency retrofits in existing buildings	Spend dollars on reducing electrical use - insulation, lighting. This is an investment in the future - more power to sell on the market that if we don't do it. Continue and expand energy efficiency incentive programs especially for appliances. Small home appliances (cost incentive)
	Provide incentives for building super efficient new homes.	Provide incentives to build super efficient homes (lost opportunity efficiency measures)
General electrification	Electrification of agriculture small vehicles, ATV's, etc.	Would it be possible to incentivize the ag industry to use more electric vehicles (ATV's, etc.)?" Ag.- electrification of ATVs (help Ag. Business to look into electrification)
	Provide incentives for purchase of electric lawn and yard care equipment	Lawn care (environmental)
	Electrification of commercial and industrial vehicles, fork-lifts, utility vehicles, pick-ups, etc., pto on vehicles	ATVs, Forklifts, Utility Vehicles, pick-ups (plug-in) brand vin (already exist)
Battery Technology	Electrification of Stehekin back-up diesel generator.	
	Investigate battery technologies as back-up to areas with higher likelihood of outages (Lake Wenatchee area). Flow batteries, used EV batteries, etc.	Discuss pro's/con's of increasing capacity, with solar/wind- look to power storage/battery pump storage?"

		Back-up power by battery vs. diesel generation (powered by solar)
Solar	Chelan PUD should support development of more solar in the County. Look into ways to make it more cost effective.	Implement programs that will make solar power cost effective without raising rates.
		Utility ownership of the inverter and/or batteries
		Find ways to cost-effectively provide solar power to off-grid customers in Chelan County."
		Invest in more solar power. Have the PUD own the inverters so that customer cost is lower. Put solar panels on the PUD buildings - be a role model.
Moved to Economic Development Team		Composites industry (carbon fiber)
		Public transportation. Cooperate in efforts to use forest thinning/orchard waste for biomass or other products.
		UG downtown distribution in Municipals
		Hydro cell factories
		Simplify interconnection procedures.
		Invest in protecting the distribution and transmission lines by undergrounding them.
		As lines get updated/replace consider option to put lines underground.
General Statements		Local ownership - Extremely important"
		When public money is used for R&D needs to be treated as such- not mainstream it
		Leverage existing resources
		Just maintain - you are already doing so well - carbon free and wild-fish friendly. Keep it up!
		My biggest fear is the state will try to move into the power side- making a state wide rate
		Monitoring capabilities
		The low rates are extremely important
		Keep the M&O going along with updating & improvements
		Keep the debt coming down and maintain the low rates

	<p>If every Chelan County member drove an electric car locally - we would be the national leaders in no-emissions, climate-change-driven electric cars movement!</p>
	<p>Continue to broker power (solar, wind)</p>
	<p>Pay for results &amp; information about it</p>
	<p>When public money is used for R&amp;D needs to be treated as such- not mainstream it</p>
<p>Others that were discussed and dropped off the list due to lack of authority</p>	<p>Solar Highways- deer crossing</p>
	<p>Uber-cars (Seattle) local, county-wide</p>
	<p>Available rental car options for EV</p>
	<p>The PUD could play a major role in electrifying transportation. One barrier for consumers is the price of electric cars. The PUD could do a business analysis of purchasing a fleet of electric vehicles that would be suitable for most commutes in the county. These could then be leased to customers. I would be willing to pay a higher rate for electricity for recharging an electric car, since it is still far cheaper than gasoline. This would increase revenue back to the PUD. And if smart grid were developed, the cars could act as peak load source. The impact on the local economy would be significant, as the dollars currently spent on gasoline would be retained within the community instead of being exported. This would also have our county make a contribution to reducing greenhouse gases. And it is possible that in the future carbon credits could be sold for this as well.</p>

# Attachment B, ETT Evaluation of 20 Ideas, Composite Score

Electrification Composite Score

Category	Description	Direct Impacts on PUD						Impacts to the Community										Total	Comments
		Length of benefits (1 less than a year, 3 five years, 5 greater than 10 years.)	Financial Impact (1 negative or negligible benefit, 3 positive benefit, 5 very large positive benefit)	Customer Equity (1 small group or population benefits, 5 whole county benefits)	PUD Authority (1 can't do, 3 implicit authority, 5 explicit authority)	Workforce (1 no staff or capability, 3 internal capability but no staff assigned, 5 staff assigned and capable)	Capability	Jobs (1 decrease in jobs, 3 moderate increase in jobs, 5 large increase in jobs)	Economic Impact (1 negative economic impact, 3 moderate economic impact, 5 large economic impact)	Recreation (1 decreases recreation opportunities, 3 minor opportunity, 5 large increase in opportunity)	Health (1 decreases health, 3 negligible health benefits, 5 large increase in health benefits)	Education (1 decreases education opportunities, 3 maintains status quo or small increase, 5 large increase in education)	Community (1 negative impact to sense of community, 3 status quo or small increase, 5 large increase in sense of community)	Environment (1 degrades the environment, 3 status quo or small increase, 5 large benefit to the environment)					
EV support in PUD operations	Incorporate EV and PHEV's into the PUD fleet	30	13	24	17	16	17	19	17	23	21	22	24	243					
	Install chargers at PUD facilities including dams and parks	30	9	19	17	14	17	16	18	23	23	24	23	233					
	Incorporate small application and off-road EV's (such as in parks)	28	11	20	17	15	17	17	20	24	22	24	24	239					
Develop level III Chelan PUD charging network	Identify optimal charging locations outside of PUD property	27	11	18	18	12	17	17	17	21	22	24	23	227	Need to discuss this with the team.				
	Develop appropriate fee structure and means of payment	27	14	20	19	15	19	17	17	21	20	22	23	234					
Level II EV Support	<b>Provide incentives and technical support for Level II chargers in the home, smart charging</b>	28	12	23	18	15	17	19	17	25	25	27	26	252	Maybe some question on whether or not Chelan PUD can provide incentives.				
	Investigate solar and battery charging options of "off-grid" locations	27	11	9	17	13	18	17	20	21	23	23	23	222					
	Provide incentives to County residents for EV purchases.	23	10	19	17	17	17	20	17	24	25	26	26	241					
Research and collaborations	<b>Participate in research and collaboration opportunities for EV deployment and other electrification technologies</b>	28	16	23	17	15	20	21	18	22	26	24	22	252					
	Partner with Plug-in NCW	25	13	19	16	15	17	19	18	20	24	24	22	232					
Streetlights	<b>Deploy LED streetlight technology throughout the County</b>	27	22	25	21	18	17	18	17	20	21	23	25	254	Chelan PUD already has a plan to investigate this.				
EV Tourism	Actively support and provide resources to market PV travel and tourism	26	10	16	15	13	19	21	23	22	21	22	23	231					
Energy Efficiency	<b>Provide incentives for deep energy efficiency retrofits in existing buildings</b>	28	20	19	19	17	20	22	16	22	23	20	24	250	Chelan PUD conservation team will look at this next year.				
	Provide incentives for building super efficient new homes.	28	22	16	17	17	18	18	17	21	22	20	23	239	Chelan PUD conservation team will look at this next year.				
General electrification	<b>Electrification of agriculture small vehicles, ATV's, etc.</b>	30	16	17	14	14	19	21	21	24	24	25	24	249	Question on whether Chelan PUD can offer incentives				
	<b>Provide incentives for purchase of electric lawn and yard care equipment</b>	26	12	23	16	15	18	19	17	25	23	25	28	247	Question on whether Chelan PUD can offer incentives				
	Electrification of commercial and industrial vehicles, fork-lifts, utility vehicles, pick-ups, etc., pto on vehicles	28	14	14	14	15	20	21	17	22	21	20	24	230	Question on whether Chelan PUD can offer incentives				
Battery Technology	Electrification of Stehekin back-up diesel generator.	28	17	10	19	14	16	17	19	26	20	25	27	238	This is being moved into the participate in research and collaboration opportunities for other electrification technologies.				
	Investigate battery technologies as back-up to areas with higher likelihood of outages (Lake Wenatchee area). Flow batteries.	28	13	15	17	13	17	17	17	24	21	23	22	227					
Solar	Chelan PUD should support development of more solar in the County. Look into ways to make it more cost effective.	24	15	15	25	20	15	15	5	15	20	20	23	212	Note AG scored and then shared with team at a meeting for concurrence.				