

# **Appendices**



## Appendix A: References

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## Appendix B: Energy Strategy Team Contact List

<b>Group</b>	<b>Representative Name</b>	<b>Representative Title</b>	<b>Phone Number</b>	<b>Email</b>
<i>DNR</i>	<i>Mason Murphy</i>	<i>EESP Manager</i>	<i>541-429-7766</i>	<i>MasonKMurphy@ctuir.org</i>
<i>OED</i>	<i>Donald Sampson</i>	<i>Executive Director</i>	<i>541-429-7391</i>	<i>DonaldSampson@ctuir.org</i>
<i>OLC</i>	<i>Naomi Stacy</i>	<i>Lead Attorney</i>	<i>541-429-7405</i>	<i>NaomiStacy@ctuir.org</i>
<i>TPO</i>	<i>JD Tovey</i>	<i>Planning Director</i>	<i>541-429-7520</i>	<i>JDTovey@ctuir.org</i>
<i>COM</i>	<i>Matthew Johnson</i>	<i>Communications Director</i>	<i>541-429-7342</i>	<i>MatthewJohnson@ctuir.org</i>
<i>ECD</i>	<i>Bruce Zimmerman</i>	<i>Tax Administrator</i>	<i>541-429-7484</i>	<i>BruceZimmerman@ctuir.org</i>
<i>WRC</i>	<i>Cal Tyer</i>	<i>Hotel Manager</i>	<i>541-966-1701</i>	<i>Cal.Tyer@wildhorseresort.com</i>
<i>DPW</i>	<i>Alaina Mildenberger</i>	<i>Acting Director</i>	<i>541-429-7500</i>	<i>AlainaMildenberger@ctuir.org</i>



## Appendix C: Financing Mechanisms

## Federal, State, and Local Grants

This table summarizes the current federal, state, and local grant opportunities applicable to tribal organizations.

The grants landscape is expected to change as more details from the Infrastructure Investment and Jobs Act (IIJA) are released. Presently, the following funding allocations are expected nationwide:

- \$7.5B to build a national network of electric vehicle (EV) chargers
- \$65B to upgrade power infrastructure to deliver clean, reliable energy across the country and deploy cutting-edge energy technology to achieve a zero-emissions future.

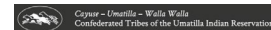
Moreover, approximately \$12.5B are earmarked for tribal governments, consisting of provisions in the following categories: transportation, water infrastructure, water rights, broadband, and mine site cleanup. While none of these categories are directly related to renewable energy capital investments or energy sector economic development, energy-related opportunities may be eligible for future tribal grants.



Type	Administering Organization	Program/Grant Name	Eligible Receiving Agencies	Recurring?	Description	Potential Eligible Opportunities (listed opportunities are not intended to be exhaustive)	Match Requirement?	Funding Use (Planning, Implementation, or Both)	Funding Range per Grantee	Application Deadline for Most Recent Round	Local Examples (if available)	Other Considerations	Source
Federal	AmeriCorps	State and National Tribal Grants	Tribal governments	Yes	AmeriCorps State and National Tribal Grants are intended to help tribal communities respond to and recover from the COVID-19 pandemic, provide educational opportunity and economic mobility, and advance environmental stewardship and climate change, including renewable energy and energy efficiency.	<ul style="list-style-type: none"> <li>Solar photovoltaics</li> <li>Hydropower</li> <li>Wind turbines</li> <li>Energy conservation</li> <li>Energy training program</li> </ul>	None for fixed-amount grants (see Other Considerations column)	Planning	Up to \$21,600	4-May-22		<ul style="list-style-type: none"> <li>Two types of grants are available under this program: (1) fixed-amount grants, in which a set price is determined in advance, and (2) cost reimbursement grants, in which a subaward agreement is used to pay for actual expenses incurred in the performance of the statement of work.</li> </ul>	<a href="https://americorps.gov/funding-opportunity/2022-ameri-corps-state-national-tribal-grants">https://americorps.gov/funding-opportunity/2022-ameri-corps-state-national-tribal-grants</a>
Federal	Bonneville Power Administration	Tribal Education Capacity Building Grant Program	Tribal governments	To be determined	The Tribal Education Capacity Building Grant program provides funding assistance to federally recognized tribes to advance awareness and understanding of the federal Columbia River Power and Transmission system and BPA programs. Selected projects are intended to advance participants' awareness and understanding of electrical generation and transmission, energy efficiency, hydropower, and environmental stewardship of the Columbia River Basin habitat and ecosystems, and cultural resource management.	<ul style="list-style-type: none"> <li>Hydropower</li> <li>Energy conservation</li> <li>Energy management program</li> </ul>	None	Planning	Up to \$20K	16-Dec-20			<a href="https://www.bpa.gov/news/Tribal/Grants/Request-for-Applications.pdf">https://www.bpa.gov/news/Tribal/Grants/Request-for-Applications.pdf</a>
Federal	US Department of Agriculture (USDA)	Community Wood Grant Program	State, local, and tribal governments, school districts, nonprofit organizations, or special purpose districts	To be determined	The Community Wood Energy and Wood Innovation Grant Program (referred to as Community Wood Grant Program) is intended to support forest health and stimulate local economies by expanding renewable wood energy use and innovative wood products manufacturing capacity. The USDA Forest Service solicits proposals for projects that will achieve the following: (1) expand thermally led community wood energy or innovative wood product opportunities, (2) improve forest health, and (3) stimulate local economies.	Residential wood stoves	None	Both	Up to \$1M	19-Jan-21		<ul style="list-style-type: none"> <li>Examples of eligible projects include the installation of thermally-led community wood energy systems for heating, cooling, and/or electricity that replaces fossil fuels such as coal, oil, propane, or natural gas.</li> <li>The Forest Service may award up to \$1.5M for a proposal that warrants special consideration, especially for projects located in areas of high unemployment.</li> </ul>	<a href="https://usfs-public.app.box.com/s/5d54g6jil9c5yp554hdsmjshahpaatc">https://usfs-public.app.box.com/s/5d54g6jil9c5yp554hdsmjshahpaatc</a>
Federal	US Department of Agriculture (USDA)	High Energy Cost Grants Program	State and local government entities, federally-recognized tribes and tribal entities, nonprofits, and for-profit businesses	Yes	The High Energy Cost Grants Program assists energy providers and other eligible entities in lowering energy costs for families and individuals in areas with extremely high per-household energy costs (75% percent of the national average or higher).	<ul style="list-style-type: none"> <li>Solar photovoltaics</li> <li>Biomass combined heat and power</li> <li>Building electrification</li> <li>Solar thermal water heating</li> <li>Geothermal</li> <li>Hydropower</li> <li>Energy conservation</li> <li>Tribal utility authority</li> </ul>	None	Both	\$100K - \$3M	6-Jul-21		<ul style="list-style-type: none"> <li>Eligible areas must demonstrate annual average household energy cost exceeding 275% of the national average under benchmarks published in the 2021 High Energy Cost Grant Funding Opportunity announcement (linked).</li> <li>Funds may be used to finance the acquisition, construction, or improvement of facilities serving eligible communities, including: (1) electric generation, transmission, and distribution facilities, (2) natural gas distribution and storage facilities, (3) petroleum product storage and handling facilities, (4) renewable energy facilities, (5) backup or emergency power generation or energy storage technology.</li> </ul>	<a href="https://www.grants.gov/web/grants/view-opportunity.html?oppld=333294">https://www.grants.gov/web/grants/view-opportunity.html?oppld=333294</a>
Federal	US Department of Agriculture (USDA)	Rural Business Development Grants	Rural public entities, including towns, communities, state agencies, nonprofit corporations, institutions of higher education, federally-recognized tribes, and rural cooperatives	Yes	The Rural Business Development Grants program is designed to provide technical assistance and training for small rural businesses (i.e., businesses with fewer than 50 new workers and less than \$1 million in gross revenue). Projects include training and technical assistance, acquisition and development of land, renovations of buildings, pollution control and abatement, rural business incubators, and long-term business strategic planning, among others.	Energy training program	None	Both	\$10K - \$500K	28-Feb-22	The Republic Food Enterprise Center in Pennsylvania was awarded \$91,576 to convert 5,000 square feet of warehouse space into an energy-efficient cool room to allow for storage and processing of fruits and vegetables (2015).	<ul style="list-style-type: none"> <li>Eligible areas include projects that benefit rural areas or towns outside the urbanized periphery of any city with a population of 50,000 or more.</li> </ul>	<a href="https://www.rd.usda.gov/programs-services/business-program/rural-business-development-grants">https://www.rd.usda.gov/programs-services/business-program/rural-business-development-grants</a>
Federal	US Department of Agriculture (USDA)	Rural Energy for America Program (REAP) Energy Audit and Renewable Energy Development Assistance Program	State, local, and tribal governments, institutions of higher education, rural electric cooperatives, or public power entities	Yes	The REAP Energy Audit and Renewable Energy Development Assistance Program provides grants for energy audits and renewable energy development assistance to eligible agricultural producers and rural small businesses. This program is intended to promote American energy independence by increasing the private sector supply of renewable energy and decreasing the demand for energy through energy efficiency improvements.	<ul style="list-style-type: none"> <li>Solar photovoltaics</li> <li>Biomass combined heat and power</li> <li>Hydropower</li> <li>Wind turbines</li> <li>Solar thermal water heating</li> <li>Geothermal</li> <li>Energy auditing program</li> </ul>	100% match recommended	Planning	Up to \$100K	31-Jan-22		<ul style="list-style-type: none"> <li>Grant funds may be used for (1) salaries directly related to the project, (2) travel expenses directly related to conducting energy audits, (3) office supplies, and (4) administrative expenses.</li> <li>Grant funds may NOT be used to (1) pay for construction-related activities, (2) purchase or lease equipment, and (3) pay any judgment or debt owed to the US government.</li> </ul>	<a href="https://www.rd.usda.gov/programs-services/rural-energy-america-program-energy-audit-renewable-energy-development-assistance/or">https://www.rd.usda.gov/programs-services/rural-energy-america-program-energy-audit-renewable-energy-development-assistance/or</a>
Federal	US Department of Agriculture (USDA)	Wood Innovations Grant Program	State, local, and tribal governments, school districts, nonprofit organizations, or special purpose districts	To be determined	The Wood Innovations Grant Program is intended to mitigate the nationwide challenge of disposing of hazardous fuels and other wood residues from the National Forest System and other US forest lands in a manner that supports wood products and wood energy markets. The USDA Forest Service will provide funding to state, local, tribal, and other entities that reduce hazardous fuels and improve forest health on forest lands, reduce the costs of forest management on all land types, and promote economic and environmental health of communities.	Residential wood stoves	100% match required	Both	Up to \$250K	19-Jan-21	No previous examples available since the Wood Innovations Grant Program is a pilot program.	<ul style="list-style-type: none"> <li>Examples of innovative projects include, but are not limited to: (1) establishing or increasing wood products manufacturing capacity, (2) showcasing quantifiable environmental and economic benefits of using wood as a sustainable building material in a constructed commercial building, (3) developing a cluster of wood energy projects in a geographic area or specific sector, and (4) developing commercial woody biomass and wood product utilization industrial parks.</li> </ul>	<a href="https://usfs-public.app.box.com/s/q9xogiribwg7y1n9p9e2efzvinzju">https://usfs-public.app.box.com/s/q9xogiribwg7y1n9p9e2efzvinzju</a>
Federal	US Department of Energy	Local Energy Action Program (LEAP)	Local, tribal, territorial, regional, or state government entities	To be determined	The DOE Communities LEAP Pilot aims to facilitate sustained community-wide economic and environmental benefits primarily through DOE's clean energy deployment work. This opportunity is specifically open to low-income, energy-burdened communities that are also experiencing either direct environmental justice impacts, or direct economic impacts from a shift away from historical reliance on fossil fuels.	<ul style="list-style-type: none"> <li>Vehicle fleet electrification analysis</li> <li>Building electrification</li> <li>Hydropower</li> <li>Wind turbines</li> <li>Battery energy storage systems</li> <li>Electric vehicle to grid applications</li> <li>Microgrid controls and smart meters</li> <li>Energy conservation</li> <li>Energy management program</li> </ul>	None	Planning	Approximately \$450K - \$700K	17-Dec-21	No previous examples available since LEAP is a pilot program.	<ul style="list-style-type: none"> <li>Agencies may choose to pursue one or more pathways toward clean energy-related economic development, including (1) clean energy planning and investment, energy efficient buildings and beneficial electrification planning and investment, (3) clean transportation planning and investment, (4) carbon capture and storage, (5) energy site reclamation and critical minerals processing, (6) community resilience microgrids, and (7) new and enhanced manufacturing.</li> <li>Community applicants may apply for this opportunity as a multi-stakeholder team.</li> </ul>	<a href="https://www.energy.gov/communities/LEAP/communities-leap">https://www.energy.gov/communities/LEAP/communities-leap</a>
Federal	US Department of the Interior	Energy and Mineral Development Program (EMDP)	Tribal governments	Yes	The Energy and Mineral Development Program (EMDP) is intended to provide financial assistance to evaluate the energy and mineral resource potential of tribal lands. These resources and their uses include, but are not limited to, biomass (woody and waste) for heat and electricity, transportation fuels, hydroelectric, solar, or wind generation, geothermal heating or electricity production, district heating, other forms of distributed energy generation, oil, natural gas, and geothermal heating or electricity production.	<ul style="list-style-type: none"> <li>Solar photovoltaics</li> <li>Biomass combined heat and power</li> <li>Hydropower</li> <li>Hydropower</li> <li>Wind turbines</li> <li>Solar thermal water heating</li> <li>Geothermal</li> </ul>	None	Planning	\$10K - \$2.5M	2-Dec-20	CTUIR was awarded \$294K to prepare geothermal drilling operations on select land parcels that are intended to host temperature gradient holes (2019).	<ul style="list-style-type: none"> <li>EMDP was available in 2020. Applications and awards for 2021 and 2022 have yet to be announced.</li> <li>EMDP projects include initial resource exploration, defining potential targets for development, performing a market analysis to establish demand for a commodity, performing economic evaluation and analysis, baseline studies related to energy and mineral projects, and other pre-development studies.</li> </ul>	<a href="https://www.bia.gov/service/grants/emdp">https://www.bia.gov/service/grants/emdp</a>
Federal	US Department of the Interior	Tribal Energy Development Capacity (TEDC) Grant	Tribal governments	Yes	The Tribal Energy Development Capacity (TEDC) Grant provides the opportunity for tribes to receive financial assistance to establish the legal framework for developing and regulating their energy resources. Development activities eligible for funding include (1) developing the legal infrastructure to create any type of tribal energy business, (2) establishing an energy-focused corporation under tribal or state incorporation codes, and (3) establishing an energy-related tribal business charter under federal law.	<ul style="list-style-type: none"> <li>Tribal utility authority</li> <li>Energy training programs</li> <li>Tribal energy development organization</li> </ul>	None	Planning	\$10K - \$1M	1-Sep-20	The Morongo Band of Mission Indians were awarded \$70K to explore the possibility of developing a tribal electric utility (2019).	<ul style="list-style-type: none"> <li>TEDC was available in 2020. Applications and awards for 2021 and 2022 have yet to be announced.</li> </ul>	<a href="https://www.bia.gov/service/grants/tedc">https://www.bia.gov/service/grants/tedc</a>
Federal	US Environmental Protection Agency (EPA)	Tribal and Insular Area Grants: Diesel Emissions Reduction Act (DERA)	Tribal governments	Yes	The Diesel Emissions Reduction Act intends to fund tribal areas that aim to achieve significant reductions in diesel emissions and exposure. Eligible diesel emissions reduction solutions include verified retrofit technologies, verified idle reduction technologies, verified aerodynamic technologies, verified low rolling resistance tires, certified engine replacements and conversions, and certified vehicle or equipment replacement.	<ul style="list-style-type: none"> <li>Vehicle fleet electrification analysis</li> <li>Alternative fuel sales at Arrowhead Travel Plaza</li> </ul>	None	Planning	Up to \$800K	25-Jun-21	The Tulalip Tribe of the Tulalip Reservation was awarded \$392K to repower eight marine vessels with new, low-emission diesel engines (2017).	<ul style="list-style-type: none"> <li>DERA was available in 2021. Applications and awards for 2022 have yet to be announced.</li> <li>The following vehicles, engines, and equipment are eligible for funding: school buses; medium-duty or heavy-duty trucks; and nonroad engines, equipment, or vehicles.</li> <li>Umatilla County has not been identified as a priority county according to the FY21 Tribal and Insular Area RFA Priority County List: <a href="https://www.epa.gov/sites/default/files/2021-04/documents/fy21-dera-tribal-insular-area-priority-county-list-2021-04_0.pdf">https://www.epa.gov/sites/default/files/2021-04/documents/fy21-dera-tribal-insular-area-priority-county-list-2021-04_0.pdf</a></li> </ul>	<a href="https://www.epa.gov/dera/tribal">https://www.epa.gov/dera/tribal</a>
Federal	Federal Transit Administration (FTA)	Low or No Emission Vehicle Program - 5339(c)	States, local governmental authorities, and tribal governments	Yes	The Low or No Emission competitive program provides funding to state and local government authorities for the purchase of lease of zero-emission and low-emission transit buses as well as acquisition, construction, and leasing of required supported facilities.	<ul style="list-style-type: none"> <li>Vehicle fleet electrification analysis</li> </ul>	Yes	Implementation	Approximately \$200K - \$7M	TBD	The City of Nashua was awarded \$356K to purchase new hybrid electric vans to replace aging vehicles and related charging infrastructure (2020).	<ul style="list-style-type: none"> <li>Eligible projects include purchasing or leasing low- or no-emission buses, acquiring low- or no-emission buses with a leased power source, or rehabilitating or improving existing public transportation facilities to accommodate low- or no-emission buses, among other initiatives.</li> <li>Funds are available the year appropriated plus three years.</li> </ul>	<a href="https://www.transit.dot.gov/lowno">https://www.transit.dot.gov/lowno</a>
Federal	US General Services Administration (GSA), US Department of Energy	Green Proving Ground Program	Any government agency	Yes	The Green Proving Ground Program provides funding toward projects that reduce climate pollution, increase resilience to the impacts of climate change, and spur economic growth through innovation. This includes, but is not limited to, technologies that produce or enable on-site energy savings, load flexibility, carbon-free, clean power generation, or carbon capture, and technologies that use lower global warming potential refrigerants, decarbonized heating and cooling systems or other solutions that provide improvements towards transitioning commercial buildings to net-zero carbon emissions.	<ul style="list-style-type: none"> <li>Solar photovoltaics</li> <li>Building electrification</li> <li>Hydropower</li> <li>Wind turbines</li> <li>Geothermal</li> </ul>	To be determined	Both	To be determined	7-Dec-21	No previous examples available.	<ul style="list-style-type: none"> <li>Examples of projects include electrification, heat pump, heat recovery, and building envelope, photovoltaic, solar thermal and geothermal, wind, and hydrogen fuel related initiatives.</li> <li>The Green Proving Ground Program is currently advertised as a Request for Information (RFI) and has yet to be established as a grant program.</li> </ul>	<a href="https://sam.gov/opp/0b0b36334fa141a6b4ba78040cbbce5f/view">https://sam.gov/opp/0b0b36334fa141a6b4ba78040cbbce5f/view</a>
State	Energy Trust of Oregon	Energy Trust of Oregon - Community Partner Funding	Cities, counties, nonprofits, and others	Yes	The Energy Trust provides Community Partner Funding that offers residential customers higher cash incentives for energy-saving upgrades delivered through partnership with community organizations. Though the program was intended for household-level rebates, a portion of funds is targeted toward communities' (e.g., nonprofit organizations, local governments, etc.)	<ul style="list-style-type: none"> <li>Energy conservation</li> </ul>	None	Both	Information not provided	Information not provided		<ul style="list-style-type: none"> <li>To be eligible for Community Partner Funding, organizations must offer or develop services that target low-to-moderate income customers, communities of color, rural customers, veterans, or people with disabilities.</li> </ul>	<a href="https://www.energytrust.org/communities/">https://www.energytrust.org/communities/</a>
State	Oregon Department of Energy (ODOE)	Community Renewable Energy Grant Program (CREP)	Oregon tribes, public bodies (e.g., counties, municipalities, and special government bodies), and consumer-owned utilities	Yes, through June 2025	The Community Renewable Energy Grant Program (CREP) is intended to provide grants for planning and developing community renewable energy and energy resilience projects, starting in 2022 and continuing through June 2025.	<ul style="list-style-type: none"> <li>Solar photovoltaics</li> <li>Biomass combined heat and power</li> <li>Building electrification</li> <li>Solar thermal water heating</li> <li>Geothermal</li> <li>Hydropower</li> <li>Microgrid controls and smart meters</li> </ul>	None	Both	<ul style="list-style-type: none"> <li>Planning a community energy resilience project: Up to \$100,000</li> <li>Planning a community renewable energy project: up to \$100,000</li> <li>Developing a community energy resilience project: Up to \$1,000,000</li> <li>Developing a community renewable energy project: Up to \$1,000,000</li> </ul>	Spring 2022	No previous examples available since the first grants will be awarded in mid-2022.	<ul style="list-style-type: none"> <li>Official documentation for this grant program is not yet available. House Bill 2021 created a \$50M fund at the Oregon Department of Energy, starting in early 2022 and continuing through June 2025. The Oregon Department of Energy has appointed an advisory committee to support the development and implementation of the grant program to provide guidance on program rules, establish program equity metrics, and adopt a methodology to identify qualifying communities, among other responsibilities.</li> <li>Half of the grants will be awarded for projects that serve environmental justice communities, including communities of color, lower-income communities, rural communities, and others.</li> </ul>	<a href="https://www.oregon.gov/energy/ncen/Pages/CREP.aspx">https://www.oregon.gov/energy/ncen/Pages/CREP.aspx</a>

## Financing Strategies

This table summarizes the financing and revenue-generating strategies that are applicable to tribal governments and/or energy related efforts.



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Category	Type	Strategy	Eligible Agencies	Description	Other Considerations	Source
Financing Mechanism	Bond	<b>Carbon Revenue Bonds &amp; Renewable Energy Credits</b>	State and local governments	Carbon revenue bonds are bonds that raise capital for initial costs. The bond securitizes future revenue from renewable energy credits (RECs) or carbon credit sales to raise capital from investors who are later repaid with the future revenues from the credits generated by the project.	<ul style="list-style-type: none"> <li>Renewable energy credits and carbon credit sales are issued by the State of Oregon through the Energy Trust of Oregon or the Renewable Portfolio Standard.</li> </ul>	
Financing Mechanism	Bond	<b>Tribal Economic Development (TED) Bonds</b>	Tribal governments	Tribal Economic Development bonds are tax-exempt bonds that Indian tribal governments can issue to finance any project or activity for which state or local governments could issue tax-exempt bonds. For example, TED bonds may be used to finance water treatment facilities, sewage facilities, and qualified residential rental projects.	<ul style="list-style-type: none"> <li>TED bonds cannot be used to finance any portion of construction in which Class 2 or Class 3 gaming is conducted or housed.</li> </ul>	<a href="https://www.irs.gov/pub/irs-efile/Tribal%20Economic%20Development%20Bonds%20Fact%20sheet%202014.pdf">https://www.irs.gov/pub/irs-efile/Tribal%20Economic%20Development%20Bonds%20Fact%20sheet%202014.pdf</a>
Financing Mechanism	Bond	<b>Utility Revenue Bonds</b>	Utilities	A utility revenue bond is a type of municipal bond issued to finance a public utility project that repays investors directly from project revenues. Utility revenue bonds are used to fund capital projects in areas considered essential to public services including hospitals, fire services, water and waste treatment facilities, and improvements to the electrical grid.	<ul style="list-style-type: none"> <li>This strategy would be applicable to CTUIR if a tribal utility authority is created.</li> </ul>	<a href="https://www.investopedia.com/terms/u/utility-revenue-bond.asp">https://www.investopedia.com/terms/u/utility-revenue-bond.asp</a>
Financing Mechanism	Equity Investment	<b>Energy Savings Performance Contracting (ESPC)</b>	State and local governments	Energy Savings Performance Contracting is a budget-neutral approach to make building improvements that reduce energy and water use and increase operational efficiency. By partnering with an energy service company (ESC), a facility owner can use an ESPC to pay for today's facility upgrades with tomorrow's energy savings - without tapping into capital budgets. State and local governments can implement ESPC projects in their own facilities, as well as promote and support ESPC projects through ESPC programs.	<ul style="list-style-type: none"> <li>Eligible projects are required to identify a potential energy conservation measure (ECM).</li> <li>Ideal candidates for ESPC projects include any large building or group of buildings such as city, county, and state buildings, schools, hospitals, commercial office buildings, and multifamily buildings.</li> </ul>	<a href="https://www.energy.gov/eere/spsc/energy-savings-performance-contracting">https://www.energy.gov/eere/spsc/energy-savings-performance-contracting</a>
Financing Mechanism	Equity Investment	<b>Public Private Partnership (P3)</b>	State and local governments	A cooperative arrangement between one or more public and private sectors that can take different forms such as private equity financing, building, and/or managing a project in return for a promised stream of payments from a government agency over the projected life of the project. Government agencies elect to pursue P3s as a strategy to secure upfront funds for capital projects that they cannot fund alone.	<ul style="list-style-type: none"> <li>In the context of limited public funding, a P3 may provide capital that allows a project to be delivered faster.</li> <li>Private operators have the reputation for being able to more quickly and operate more efficiently than the public sector.</li> </ul>	
Financing Mechanism	Loan guarantee (applicable to CDFI)	<b>Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program (US Department of Agriculture)</b>	Federal or state-chartered banks, federally-recognized tribes, cooperatives, farm credit bank, credit unions, National Rural Utilities Cooperative Finance Corporation, who may request a guarantee for Indian tribes, state and local governments, and public and private entities	The Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program provides loan guarantees up to \$250M to assist in the development, construction and retrofitting of new and emerging technologies, including advanced biofuels, renewable chemicals, and biobased products.	<ul style="list-style-type: none"> <li>The total amount of a federal participation (loan guarantee, plus other federal funding) must not exceed 80% of the total eligible project costs.</li> <li>Funds may be used to fund the development, construction, and retrofitting of (1) commercial-scale biorefineries, (2) biobased product manufacturing facilities that use technological new commercial-scale processing, and (3) refinancing.</li> </ul>	<a href="https://www.rd.usda.gov/programs-services/energy-programs/biorefinery-renewable-chemical-and-biobased-product-manufacturing-assistance-program">https://www.rd.usda.gov/programs-services/energy-programs/biorefinery-renewable-chemical-and-biobased-product-manufacturing-assistance-program</a>
Financing Mechanism	Loan guarantee (applicable to CDFI)	<b>Business &amp; Industry Loan Guarantees (US Department of Agriculture)</b>	Federal or state-chartered banks, savings and loans, farm credit banks, credit unions, who may request a guarantee for Indian tribes, state and local governments, and public and private entities	Business & Industry Loan Guarantees intends to be used for business conversion, enlargement, repair, modernization, or development; the purchase and development of land; debt refinancing, and business and industrial acquisitions.	<ul style="list-style-type: none"> <li>Eligible areas include rural areas not in a city or town with a population of more than 50,000 inhabitants.</li> <li>The lender may be located anywhere in the United States.</li> </ul>	<a href="https://www.rd.usda.gov/programs-services/business-programs/business-industry-loan-guarantees">https://www.rd.usda.gov/programs-services/business-programs/business-industry-loan-guarantees</a>
Financing Mechanism	Multiple	<b>Community Development Financial Institution (CDFI) Fund's Native Initiatives Benefits - Financial Assistance</b>	Community development financial institutions (CDFI)	The CDFI Fund's Native Initiatives program creates jobs, builds businesses, and fosters economic self-determination in native communities nationwide by providing access to loans, grants, deposits, and equity investments via local CDFIs that will not only directly support initiatives but also make tribal governments more attractive to outside investors. Financial assistance awards can be used as lending capital, equity, and/or loan loss reserves.	<ul style="list-style-type: none"> <li>To qualify, at least 50% of activities must serve Native Americans, Alaska Natives, and/or Native Hawaiians.</li> <li>Niyawawi Community Financial Services (NCFS) may pursue this opportunity.</li> </ul>	<a href="https://www.cdfifund.gov/programs-training/programs/native-initiatives">https://www.cdfifund.gov/programs-training/programs/native-initiatives</a>
Financing Mechanism	Loan guarantee	<b>Indian Loan Guarantee and Insurance Program (ILGP) (US Department of the Interior)</b>	Community development financial institutions (CDFI)	The ILGP helps American Indian and Alaska Native tribes and individuals overcome barriers to conventional financing and secure reasonable interest rates, while also reducing the risk to lenders by providing financial backing to CDFIs from the federal government.	<ul style="list-style-type: none"> <li>Borrowers must have at least 20% equity in the project being financed and the project must benefit the economy of a reservation or tribal service area.</li> <li>Loans may be used for a variety of purposes including capital, equipment purchases, acquisition and refinancing, building construction, and lines of credit.</li> </ul>	<a href="https://www.bia.gov/service/loans/ilgp">https://www.bia.gov/service/loans/ilgp</a>
Financing Mechanism	Loan	<b>Energy Loan Program</b>	Tribal governments, businesses, local governments, state agencies, nonprofit organizations, schools, and farms	The Oregon Energy Loan Program offers fixed-rate, long-term loans for qualified projects that invest in energy conservation, renewable energy, alternative fuels, or create products from recycled materials.	<ul style="list-style-type: none"> <li>Projects financed by this program save electricity, natural gas, and oil to heat 150,000 households in Oregon.</li> </ul>	<a href="https://www.oregon.gov/energy/incentives/pages/energy-loan-program.aspx">https://www.oregon.gov/energy/incentives/pages/energy-loan-program.aspx</a>
Financing Mechanism	Loan	<b>Renewable and Energy Efficient Financing Grant Program (Opportunity Finance Network)</b>	Certified community development financial institutions (CDFI)	The Renewable and Energy Efficiency Financing Grant Program is a four-year partnership between Opportunity Finance Network and an anonymous donor. The grant program is intended to improve the energy efficiency of housing, businesses, and community facilities by lowering operating costs, creating "green collar" jobs, increasing resilience, and reducing carbon emissions. This award must be used for lending capital and loan loss reserves to OFN members for renewable and energy efficiency financing.	<ul style="list-style-type: none"> <li>CDFI applicant must be a member of the Opportunity Finance Network to apply.</li> <li>OFN is providing assistance between 2019 and 2022.</li> <li>The Rural Community Assistance Corporation was awarded \$100K to support the Biomass Utilization Fund, a pilot lending program designed to reduce wildfire risk by using low-value forest wood (biomass) to generate sustainable energy and employment for low-to-moderate-income rural Californians (2020).</li> </ul>	<a href="https://ofn.org/EnergyEfficiencyFinancingGrant#Overview">https://ofn.org/EnergyEfficiencyFinancingGrant#Overview</a>
Financing Mechanism	Loan	<b>Rural Economic Development Loan &amp; Grant Program (US Department of Agriculture)</b>	Former rural utilities service borrowers, nonprofit utilities, or current rural development electric or telecommunication programs borrowers	The Rural Economic Development Loan and Grant Program provides funding for rural projects through local utility organizations, which they, in turn, pass through to local businesses for projects that will create and retain employment in rural areas.	<ul style="list-style-type: none"> <li>Loans are zero-interest</li> <li>The utility is ultimately responsible for repayment to USDA.</li> </ul>	<a href="https://www.rd.usda.gov/programs-services/business-programs/rural-economic-development-loan-grant-program">https://www.rd.usda.gov/programs-services/business-programs/rural-economic-development-loan-grant-program</a>
Financing Mechanism	User fee	<b>Power Purchase Agreement (PPA)</b>	Utilities	A power purchase agreement (PPA) is a financial agreement where a developer arranges for the design, permitting, financing, and installation of an energy system on a customer's property at little to no cost. The developer sells the power generated to the host customer at a fixed rate that is typically lower than the local utility's retail rate. This lower electricity price serves to offset the customer's purchase of electricity from the grid while the developer receives the income from these sales of electricity as well as any tax credits and other incentives generated from the system. These may take the form of corporate power purchase agreements, which involve corporate or industrial buyers purchasing renewable energy directly or virtually from developers.	<ul style="list-style-type: none"> <li>PPAs typically range from 10 to 25 years, and the developer remains responsible for the operation and maintenance of the system for the duration of the agreement.</li> <li>This may follow the Morris Model, in which a public entity issues a government bond at a low interest rate and transfers low-cost capital to a developer in exchange for a lower power purchase agreement (PPA) price.</li> </ul>	<a href="https://www.seia.org/research-resources/solar-power-purchase-agreements">https://www.seia.org/research-resources/solar-power-purchase-agreements</a>
Revenue-generating mechanism	User fee	<b>On-Bill Tariff</b>	Utilities	On-bill tariffs can enable customers to finance as much as 100% of the cost of qualifying energy efficiency and distributed energy resource investments through their local utility, often with no money paid at the time of project initiation. In other words, utility or municipality provides the initial capital to install renewable energy. Repayment of this loan is then amortized and distributed as a charge on the customer's monthly utility bills or a surcharge on the property tax.		<a href="https://pubs.naruc.org/pub/06EB2716-947E-8048-2899-3DCA0FC6F16">https://pubs.naruc.org/pub/06EB2716-947E-8048-2899-3DCA0FC6F16</a>
Financing Mechanism	Bond	<b>Environmental Impact Bond (EIB)</b>	State, local, and tribal governments	An Environmental Impact Bond (EIB) is an innovative financing tool that uses a Pay for Success approach to provide up-front capital from private investors for environmental projects, either to pilot a new approach whose performance is viewed as uncertain or to scale up a solution that has been tested in a pilot program.	<ul style="list-style-type: none"> <li>The EIB is a newer financing mechanism and there are few examples of its application to energy projects.</li> <li>EIBs are insurance products—not municipal bonds—so sponsors are only responsible for paying premiums, not for repaying bond principal, which can help public-sector sponsors, such as municipal governments, avoid concerns about debt capacity limits or credit rating impacts.</li> </ul>	<a href="https://www.quantifiedventures.com/what-is-an-environmental-impact-bond">https://www.quantifiedventures.com/what-is-an-environmental-impact-bond</a>
Financing Mechanism	Bond	<b>Bonds (Revenue, General Obligation, Green, and Private Activity)</b>	State, local, and tribal governments	Revenue Bonds are used to pay for projects such as major improvements to an airport, water system, garage or other large facilities which generate revenue that is then used to repay the debt. General obligation (GO) bonds are issued to pay for projects that do not have a revenue stream, while Green Bonds are GO bonds that are specifically used for climate and environmental projects. Debt is repaid through local tax revenue.	<ul style="list-style-type: none"> <li>Tribal governments, however, may be limited in their ability to issue bonds and in how the debt may be used.</li> </ul>	
Revenue-generating mechanism	Tax	<b>New Sales Taxes</b>	State, local, and tribal governments	Tribal governments may levy a fixed increase in the sales tax rate for a defined term. Sales taxes are a primary source of funding for tribal governments, given that they cannot levy property taxes.	<ul style="list-style-type: none"> <li>Sales taxes are regressive.</li> <li>May be applied to capital or operating expenses.</li> </ul>	<a href="https://www.oregon.gov/dor/pages/sales-tax.aspx">https://www.oregon.gov/dor/pages/sales-tax.aspx</a>
Financing Mechanism	User fee	<b>Leasing Arrangements</b>	State, local, and tribal governments, or utilities	Leasing energy-related improvements, especially the use of tax exempt lease-purchase agreements for energy-efficient equipment, is a common and cost-effective way for state and local governments to pay for the financing cost. Leases are contracts that allow an entity to obtain the use of (or to purchase) equipment or real estate.	<ul style="list-style-type: none"> <li>Leases often have slightly higher rates than bond financing. However, leases are a faster and more flexible tool than many other options, including bond financing, and are an important tool for public entities for finance improvements in their own buildings.</li> </ul>	<a href="https://www.energy.gov/eere/spsc/leasing-arrangements">https://www.energy.gov/eere/spsc/leasing-arrangements</a>
Revenue-generating mechanism	Value capture	<b>Naming Rights Agreements</b>	Local, state, and tribal governments	Corporations or other entities may purchase the right to name a facility or event, typically for a defined period of time. Naming rights are frequently utilized for properties like multi-purpose arenas, performing arts arenas, and sports fields, but have also been approved for energy infrastructure projects.	<ul style="list-style-type: none"> <li>Companies are often willing to pay more for naming rights of lines or stations near important sites, such as universities and sports centers.</li> </ul>	<a href="https://www.investopedia.com/terms/l/licensing-agreement.asp">https://www.investopedia.com/terms/l/licensing-agreement.asp</a>
Financing Mechanism	Investment	<b>Other Private Sector Contributions</b>	Local, state, and tribal governments	Private sector contributions involve one or more parties supplying new financial resources in order to support needed capital investments, operating subsidies or ancillary improvements that help to build patronage to sustainable levels. For example, a developer may choose to make contributions to the hydropower or solar photovoltaic initiatives due to the social benefit incurred by these projects.	<ul style="list-style-type: none"> <li>In the absence of available grants and revenue sources, private sector contributions could be critical to making certain energy-related capital projects feasible.</li> </ul>	N/A

## Other Strategies

This table summarizes other funding and financing strategies, including prizes and rebate programs. Please note that CTUIR is not eligible to apply for many of these programs. Many of these programs are intended for direct consumers (e.g., households, car owners).



Type (i.e., Federal, State, local)	Administering Organization	Program/Grant Name	Eligible Receiving Entities	Description	Other Considerations	Source
Federal	US Economic Development Administration (EDA)	<b>American Rescue Plan Act Good Jobs Challenge</b>	Local and state governments, public and private institutions of higher education, tribal governments, nonprofit organizations	The ARPA Good Jobs Challenge is intended to develop and execute sectoral partnerships that will lead to well-paying jobs. The goal of regional workforce training systems is to create and implement effective employer-driven programs that will connect the existing and emerging skills needs of employers with workers and will help workers find and keep quality jobs and advance along their chosen career path.	• Workforce development may be directly applied to a specific sector like the energy sector.	<a href="https://www.grants.gov/web/grants/view-opportunity.html?oppld=334720">https://www.grants.gov/web/grants/view-opportunity.html?oppld=334720</a>
Federal	US Department of Agriculture (USDA)	<b>Higher Blends Infrastructure Incentive Program (HBIIIP)</b>	Transportation fueling facilities and fuel distribution facilities	The purpose of the Higher Blends Infrastructure Investment Program (HBIIIP) is to increase the sales and use of higher blends of ethanol and biodiesel by expanding the infrastructure for renewable fuels derived from US agricultural products.		<a href="https://www.rd.usda.gov/hbiip">https://www.rd.usda.gov/hbiip</a>
Federal	US Department of Energy	<b>Inclusive Energy Innovation Prize</b>	Private entities (for-profits and nonprofits), non-federal government entities (states, counties, tribes, and municipalities)	The Inclusive Energy Innovation prize aims to fund organizations for ongoing and/or proposed activities related to climate and clean energy that support, build trust, and strengthen relationships and partnerships with disadvantaged communities. Specifically, the prize seeks to enable and enhance business and technology incubation, acceleration, and other community-based and university-based entrepreneurship and innovation in climate and clean energy technologies.	• Up to 10 winning teams will receive \$200,000 each for Phase 1. Phase 2 is anticipated to open 12 months after the Phase 1 winner announcement, during which Phase 1 winners will be eligible for a total of \$500,000 in bonus prizes based on their activities during Phase 1. • Prize includes funding, in addition to in-kind mentorship services.	<a href="https://americanmadechallenges.org/inclusiveenergyinnovation/">https://americanmadechallenges.org/inclusiveenergyinnovation/</a>
Federal	US Department of the Treasury Community Development Financial Institutions Funds (CDFI)	<b>New Markets Tax Credit (NMTC) Program</b>	Community development entities	The New Markets Tax Credit Program helps economically distressed communities attract private capital in the areas of manufacturing, food, retail, housing, health, technology, energy, education, and childcare by providing investors with a federal tax credit.	• Community development entities may work on behalf of tribal governments to receive tax credit from NMTC to be implemented in energy-related projects. • The rate of New Markets Tax Credit deployment in Indian Country is low.	<a href="https://www.cdfifund.gov/programs-training/programs/new-markets-tax-credit">https://www.cdfifund.gov/programs-training/programs/new-markets-tax-credit</a>
Federal	US Department of Energy	<b>Property Assessed Clean Energy Programs</b>	Commercial and residential properties	The Property Assessed Clean Energy (PACE) model is an innovative mechanism for financing energy efficiency and renewable energy improvements on private properties. PACE programs allow a property owner to finance the up-front cost of energy or other eligible improvements on a property and then pay back over time through a voluntary assessment.		<a href="https://www.energy.gov/eere/sisc/property-assessed-clean-energy-programs">https://www.energy.gov/eere/sisc/property-assessed-clean-energy-programs</a>
Federal	US Department of Agriculture (USDA)	<b>Rural Microentrepreneur Assistance Program (RMAP)</b>	Nonprofit organizations, federally-recognized tribes, and institutions of higher education	The Rural Microentrepreneur Assistance Program (RMAP) provides loans and grants to microenterprise development organizations to (1) help microenterprise start up and growth through a Rural Microloan Revolving Fund, and (2) provide training and technical assistance to microloan borrowers and micro-entrepreneurs.		<a href="https://www.rd.usda.gov/programs-services/business-programs/rural-microentrepreneur-assistance-program">https://www.rd.usda.gov/programs-services/business-programs/rural-microentrepreneur-assistance-program</a>
Federal	US Department of Energy	<b>Weatherization Assistance Program (WAP)</b>	Low-income households	The Weatherization Assistance Program (WAP) reduces energy costs for low-income households by increasing the energy efficiency of their homes, while ensuring their health and safety.		<a href="https://www.energy.gov/eere/wap/how-apply-weatherization-assistance">https://www.energy.gov/eere/wap/how-apply-weatherization-assistance</a>
Federal	US Department of Energy	<b>Tax-Exempt Bond Financing for Nonprofit Organizations and Industries</b>	Nonprofit organizations, low-income multifamily housing, and industry and manufacturing facilities	Tax-exempt bonds generally offer lower interest rates and longer tenors than most taxable bonds, making them a well-suited and attractive means of financing energy efficiency or renewable energy projects for eligible borrowers.		<a href="https://www.energy.gov/eere/tax-exempt-bond-financing-nonprofit-organizations-and-industries">https://www.energy.gov/eere/tax-exempt-bond-financing-nonprofit-organizations-and-industries</a>
State	Oregon Department of Energy (ODOE)	<b>Energy Conservation Corporate Tax Credits</b>	Local, state, and tribal governments	The Energy Conservation Corporate Tax Credits is intended to help receiving private entities make improvements in the following areas: caulking and weather-stripping, duct and air sealing, building insulation, windows, doors, siding, roofs, processing and manufacturing equipment, agricultural equipment, comprehensive measures and whole building, unspecified technologies, evaporative coolers, water heaters, chillers, furnaces, boilers, heat pumps, central air conditioners, and compressed air.	• The program offers 35% of project costs.	<a href="http://www.energy-grants.net/or-energy-conservation-corporate-tax-credits/">http://www.energy-grants.net/or-energy-conservation-corporate-tax-credits/</a>
State	Oregon Department of Energy (ODOE)	<b>Energy Conservation Small Project Corporate Tax Credits</b>	Local, state, and tribal governments	The Energy Conservation Small Project Corporate Tax Credits is intended to help receiving agencies make improvements in the following area: solar water heat.	• The program offers 35% of project costs.	<a href="http://www.energy-grants.net/or-energy-conservation-small-project-corporate-tax-credits/">http://www.energy-grants.net/or-energy-conservation-small-project-corporate-tax-credits/</a>
State	Oregon Department of Energy (ODOE)	<b>Oregon Clean Vehicle Rebate Program</b>	Oregon residents	The Oregon Clean Vehicle Rebate Program offers a rebate for Oregon drivers who purchase or lease zero-emission vehicles. The program is designed to reduce vehicle emissions by encouraging more Oregonians to purchase or lease zero-emission vehicles.		<a href="https://www.oregon.gov/deq/FilterDocs/zev-faq.pdf">https://www.oregon.gov/deq/FilterDocs/zev-faq.pdf</a>
State	Oregon Department of Environmental Quality (DEQ)	<b>Plug-In Electric Vehicle (PEV) Rebate</b>	Oregon residents	The Oregon Plug-In Electric Vehicle (PEV) Rebate offers low- and medium-income Oregon residents a rebate of up to \$5,000 for the purchase or lease of a new or used PEV. Qualifying residents are considered households with income levels that do not exceed 400% of the federal poverty line.		<a href="https://www.oregon.gov/deq/qa/programs/Pages/Charge-Ahead-Rebate.aspx">https://www.oregon.gov/deq/qa/programs/Pages/Charge-Ahead-Rebate.aspx</a>
State	Oregon Department of Environmental Quality (DEQ)	<b>Plug-In Hybrid Electric Vehicle (PHEV) and Zero Emission Vehicle (ZEV) Rebates</b>	Oregon residents, businesses, nonprofit organizations, and government agencies	The Oregon Plug-In Hybrid Electric Vehicle and Zero Emission Vehicle (ZEV) Rebates provide receiving entities with rebates for the purchase or lease of PHEVs and ZEVs, including fuel cell electric vehicles and plug-in electric vehicles.		<a href="https://www.oregon.gov/deq/qa/programs/Pages/ZEV-Rebate.aspx">https://www.oregon.gov/deq/qa/programs/Pages/ZEV-Rebate.aspx</a>
State	Oregon Department of Energy (ODOE)	<b>Solar &amp; Storage Rebate Program</b>	Contractor	The Oregon Solar & Storage Rebate Program issues rebates for solar electric systems and paired solar and storage systems for residential customers and low-income service providers in Oregon. Rebates are issued to approved contractors, who pass the savings on to their customers.		<a href="https://www.oregon.gov/energy/Incentives/Pages/Solar-Storage-Rebate-Program.aspx">https://www.oregon.gov/energy/Incentives/Pages/Solar-Storage-Rebate-Program.aspx</a>





## Appendix D: Community Engagement

This appendix summarizes the results of the Confederated Tribes of Umatilla Indian Reservation (CTUIR) Strategic Energy Plan (SEP) survey conducted in support of the early work on plan. The survey collected feedback on energy priorities that would inform the plan. The target audiences for the questionnaire included CTUIR Tribal Members, CTUIR employees, CTUIR General Counsel members, CTUIR Board of Trustees, CTUIR Commissions and Committees, residents of the Umatilla Indian Reservation, utility employees, city and county employees, and students.

Key survey details are as follows:

<b>Number of questions:</b>	10
<b>Available dates:</b>	August 2, 2021 – August 23, 2021
<b>Number of responses:</b>	161 (159 online entries; 2 physical entries)
<b>Advertising methods:</b>	Email blast to stakeholders; notification on CTUIR website; newspaper advertisements in <i>Confederated Umatilla Journal</i> and <i>East Oregonian</i> ; radio advertisement on and KCUW radio

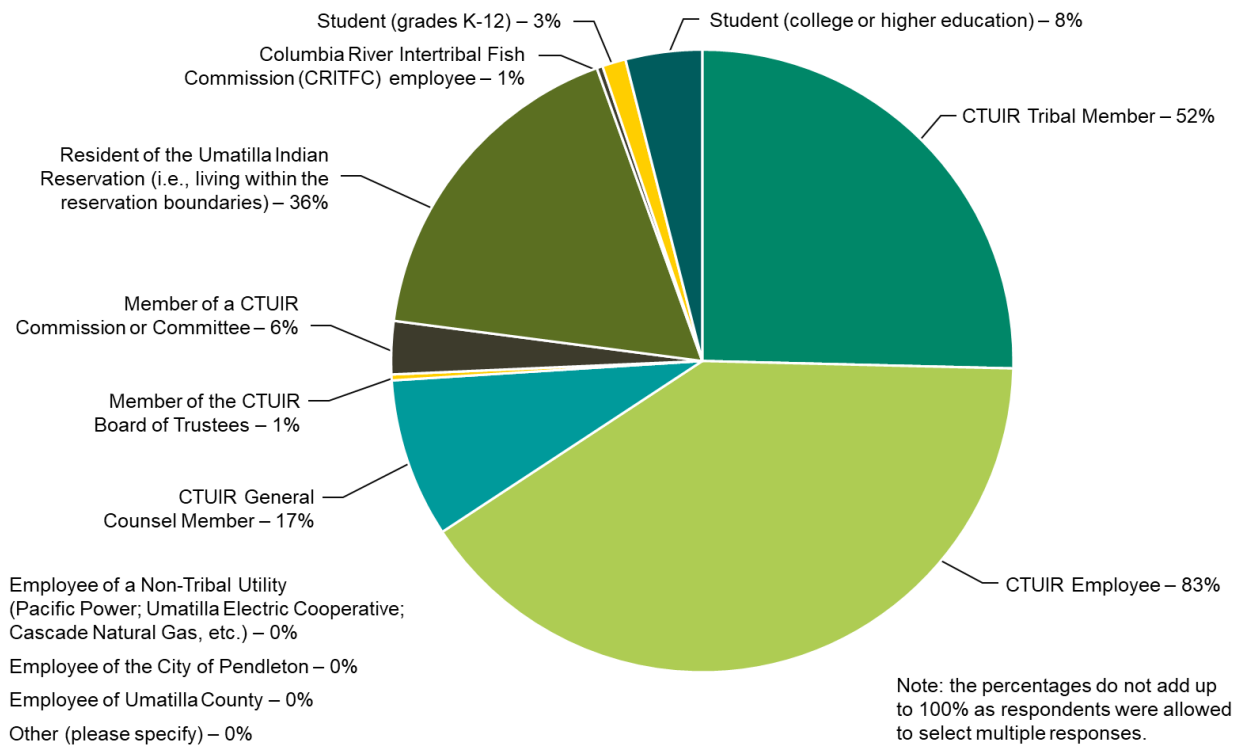
This appendix contains the results of the survey, key implications of the results for the CTUIR SEP, and open-ended responses to Questions 2, 4, 6, 8, 9, and 10.



## Results

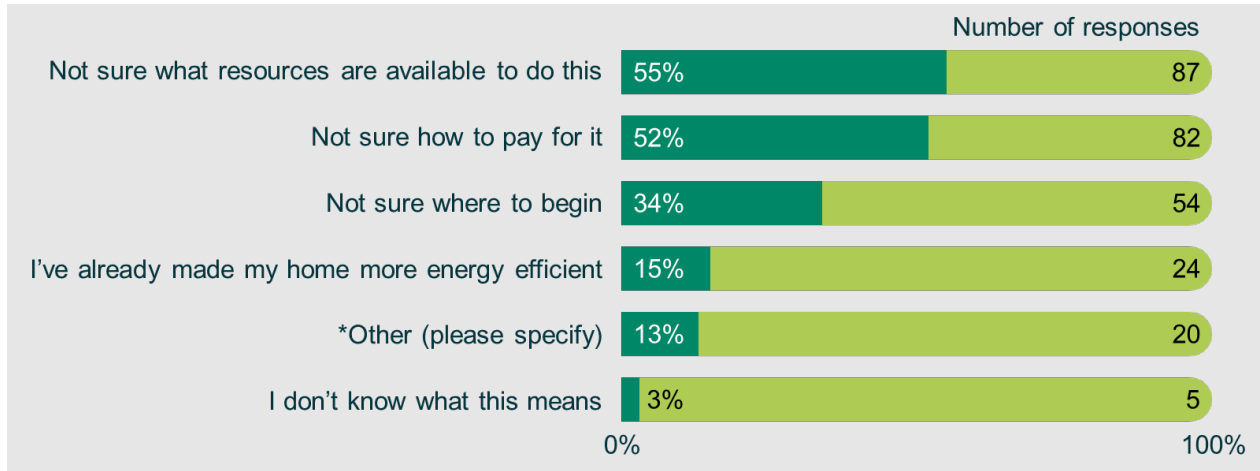
### Questions to Help Support CTUIR Families

#### Question 1. Please tell us about yourself (select all that apply).



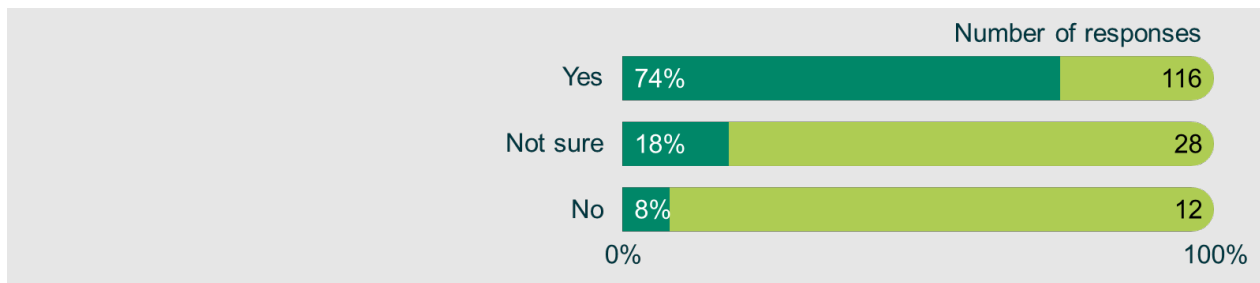


**Question 2. I am interested in making my home or business more energy efficient, which typically includes more efficient lighting, heating, and cooling systems, but I am: (select all that apply)**



\* For the responses in the “Other” category, see the section of this appendix with the open-ended responses.

**Question 3. Installing renewable energy generation systems such as solar panels allows property owners to produce their own energy, reduce carbon emissions, and potentially reduce the cost of electrical bills. Are you interested in installing renewable energy generation systems at your home or business?**



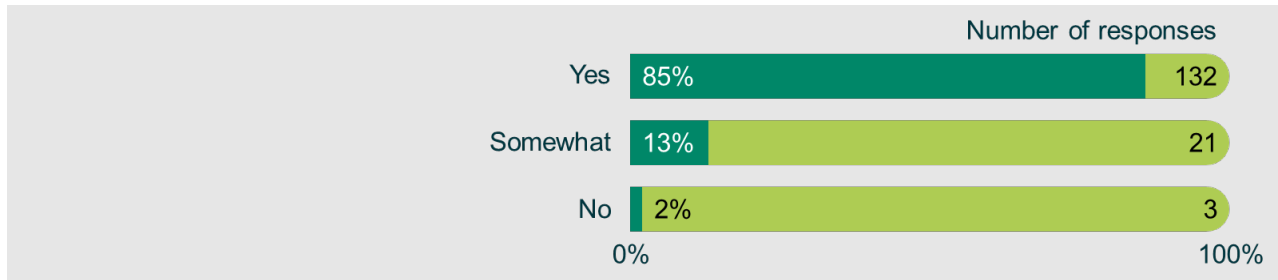


**Question 4. What are some of the barriers to installing renewable energy generation systems at your home or business? (select all that apply)**



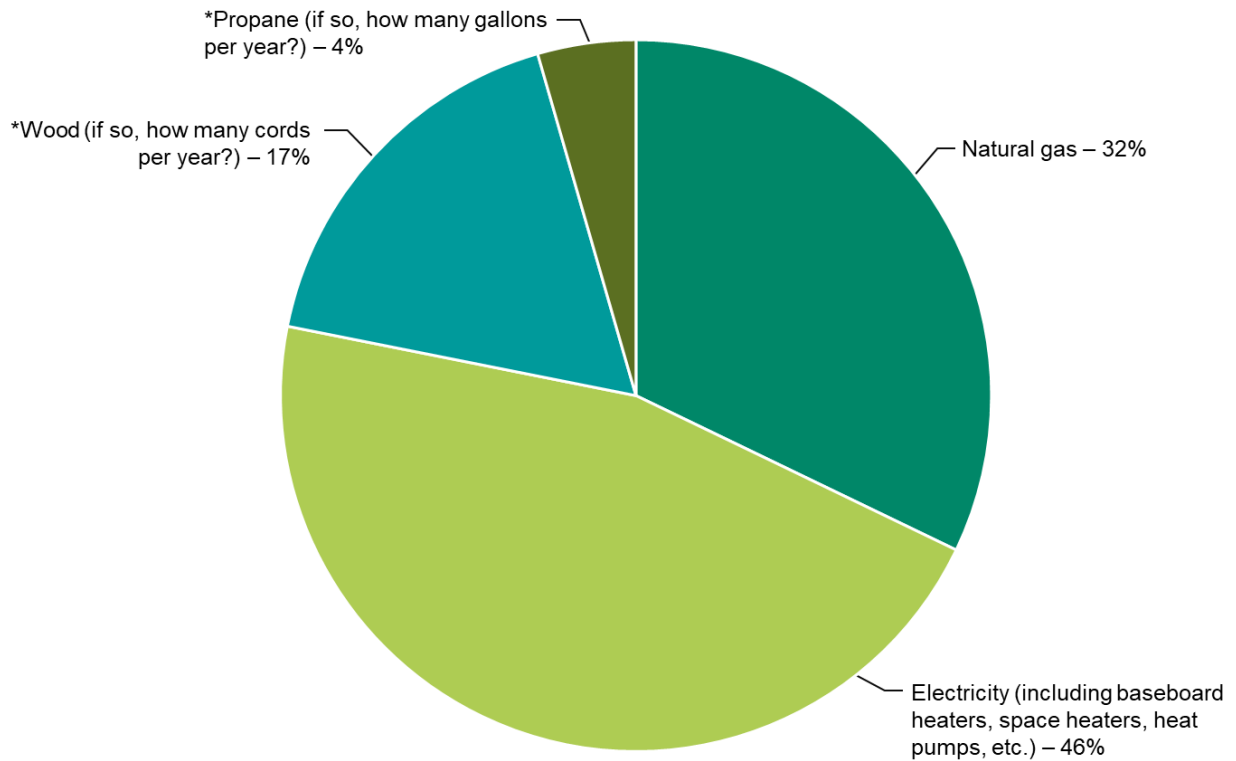
\* For the responses in the “Other” category, see the “Open-Ended Responses” section of this appendix.

**Question 5. I know which systems in my home or business would be impacted by a power outage. For example, consider your refrigerator/freezer, well pumps, heating furnace, etc.**





**Question 6. Do you use any of the following to heat your home? If so, please indicate "yes" and provide details as applicable below.**



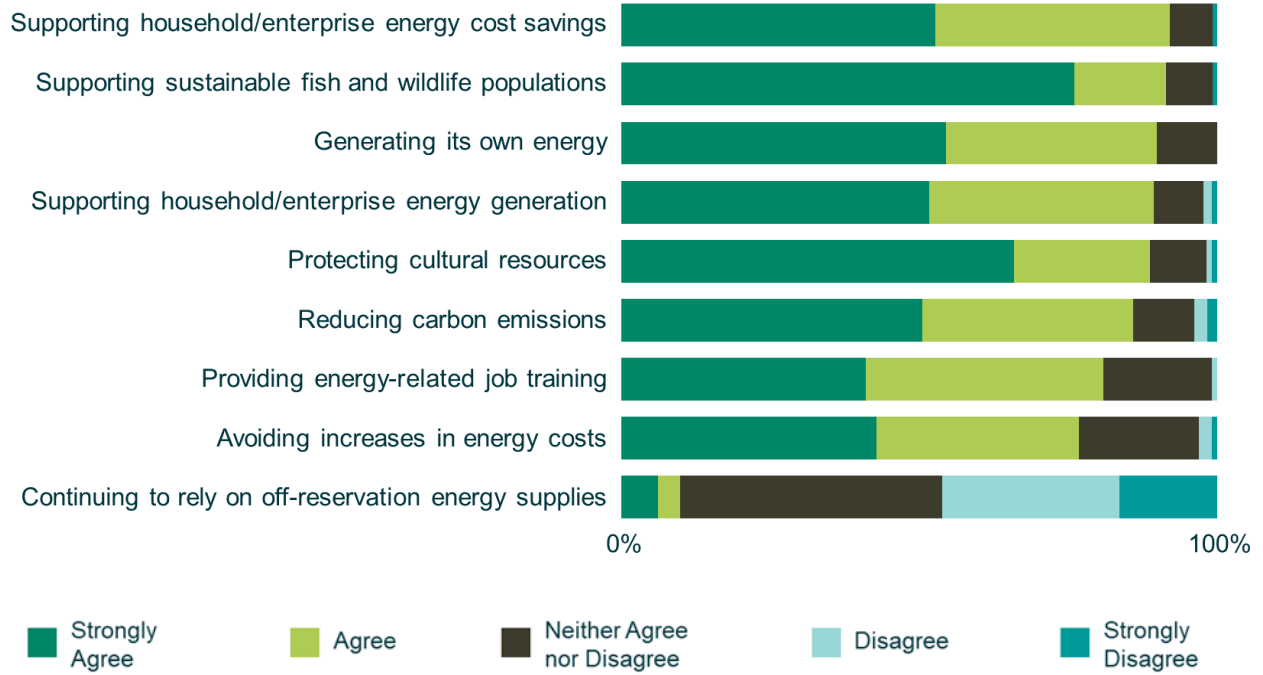
\*Heating oil (if so, how many gallons per year?) – 0%

\* The quantity of each resource used to heat homes will be used in estimating the baseline energy demand of the community and for informing the SEP. For a complete list of responses and the number of responses, see the “Open-Ended Responses” section.



## Questions about CTUIR's Energy Future

### Question 7. When you think about CTUIR's energy future, CTUIR should prioritize:





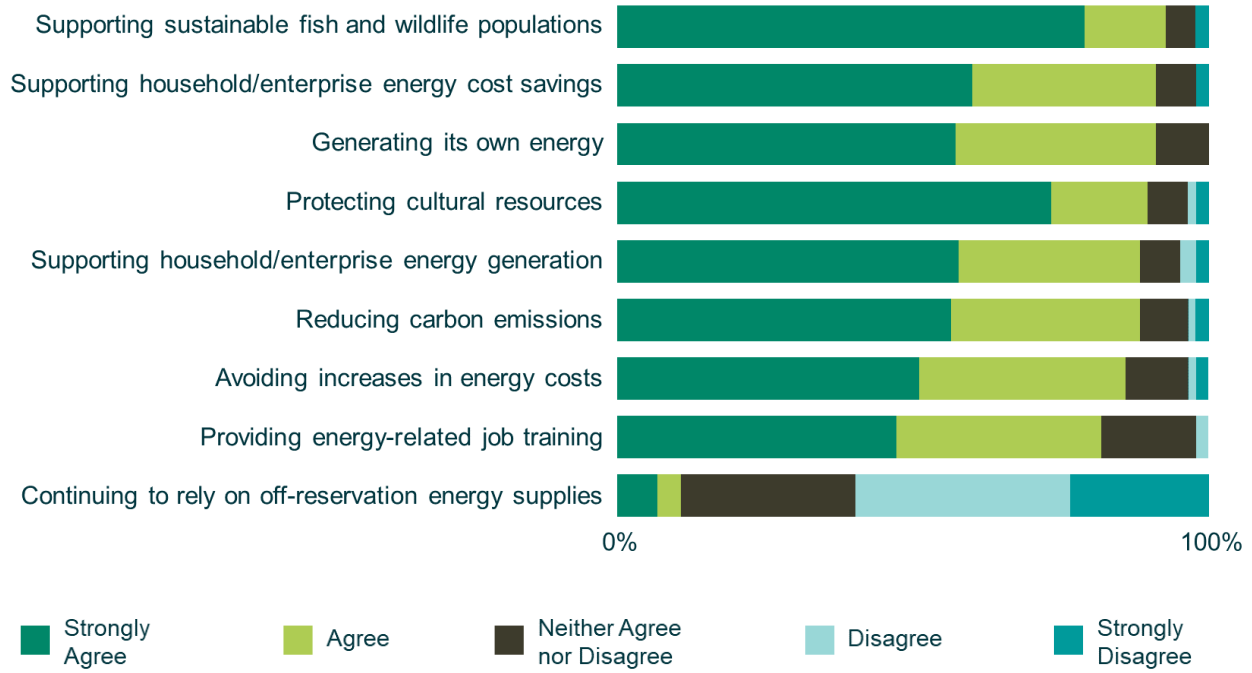
In addition to the graphic representation of Question 7 results above, the table below provides the number of responses and relative percentages for reference.

Priority	Strongly Agree		Agree		Neither Agree nor Disagree		Disagree		Strongly Disagree	
	%	No.	%	No.	%	No.	%	No.	%	No.
Supporting household/ enterprise energy cost savings	53%	76	40%	57	7%	10	0%	0	1%	1
Supporting sustainable fish and wildlife populations	76%	110	15%	22	8%	11	0%	0	1%	1
Generating its own energy	55%	78	36%	51	10%	14	0%	0	0%	0
Supporting household/ enterprise energy generation	52%	75	38%	55	8%	12	1%	2	1%	1
Protecting cultural resources	66%	95	23%	33	10%	14	1%	1	1%	1
Reducing carbon emissions	51%	73	35%	51	10%	15	2%	3	1%	2
Providing energy-related job training	41%	59	40%	57	18%	26	1%	1	0%	0
Avoiding increases in energy costs	43%	62	34%	49	20%	29	2%	3	1%	1
Continuing to rely on off-reservation energy supplies	6%	9	3%	5	44%	63	30%	43	16%	23

For reference purposes, the responses to this question by Tribal Members and Non-Tribal Members are provided below.



## Energy Priorities by Tribal Members

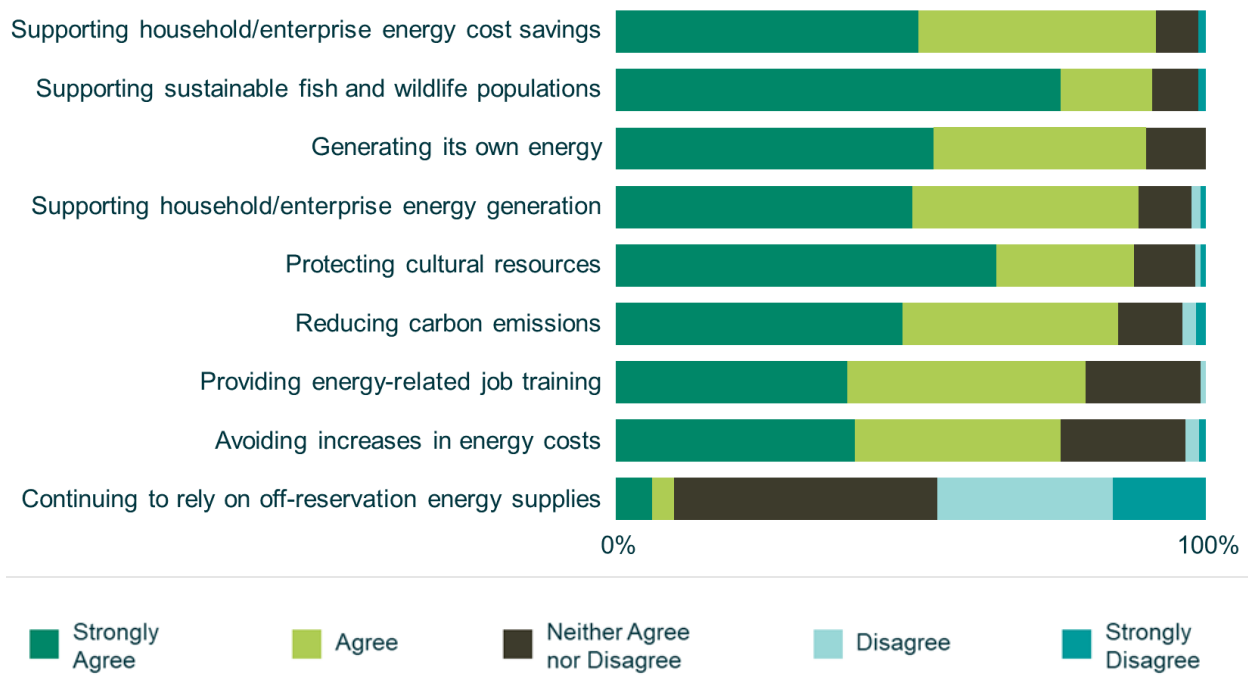


Priority	Strongly Agree		Agree		Neither Agree nor Disagree		Disagree		Strongly Disagree	
	%	No.	%	No.	%	No.	%	No.	%	No.
Supporting sustainable fish and wildlife populations	79%	58	14%	10	5%	4	0%	0	1%	1
Supporting household/enterprise energy cost savings	60%	44	32%	23	7%	5	0%	0	1%	1
Generating its own energy	58%	42	34%	25	8%	6	0%	0	0%	0
Protecting cultural resources	74%	54	16%	12	7%	5	1%	1	1%	1
Supporting household/enterprise energy generation	58%	43	31%	23	7%	5	3%	2	1%	1
Reducing carbon emissions	57%	42	32%	24	8%	6	1%	1	1%	1
Avoiding increases in energy costs	51%	38	35%	26	11%	8	1%	1	1%	1
Providing energy-related job training	47%	35	35%	26	16%	12	1%	1	0%	0
Continuing to rely on off-reservation energy supplies	7%	5	4%	3	30%	22	36%	27	23%	17





## Energy Priorities Non-Tribal Members



Priority	Strongly Agree		Agree		Neither Agree nor Disagree		Disagree		Strongly Disagree	
	%	No.	%	No.	%	No.	%	No.	%	No.
Supporting household/enterprise energy cost savings	51%	70	40%	55	7%	10	0%	0	1%	1
Supporting sustainable fish and wildlife populations	76%	103	15%	21	8%	11	0%	0	1%	1
Generating its own energy	54%	73	36%	49	10%	13	0%	0	0%	0
Supporting household/enterprise energy generation	50%	69	39%	53	9%	12	1%	2	1%	1
Protecting cultural resources	65%	88	24%	32	10%	14	1%	1	1%	1
Reducing carbon emissions	49%	66	37%	50	11%	15	2%	3	1%	2
Providing energy-related job training	39%	53	41%	55	19%	26	1%	1	0%	0
Avoiding increases in energy costs	40%	55	35%	48	21%	29	2%	3	1%	1
Continuing to rely on off-reservation energy supplies	6%	8	4%	5	45%	61	30%	40	16%	21

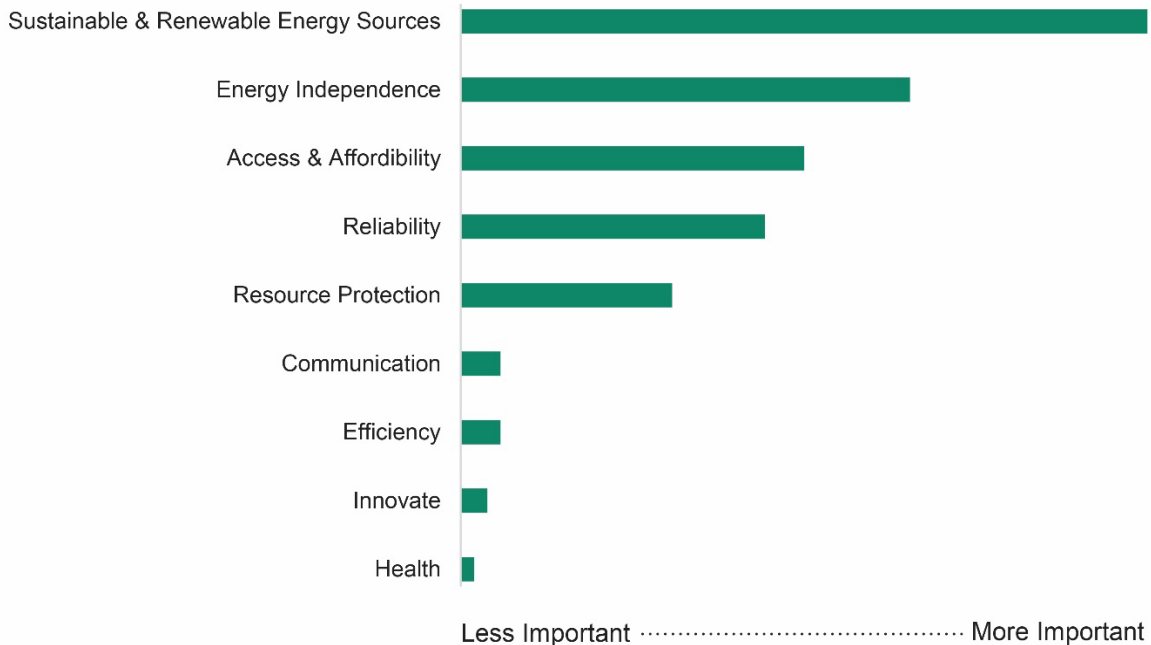
The remaining questions in the survey were open-ended questions with short answer responses. Word clouds have been generated for each question to visually display how frequently words appeared in the responses to each question by making the size of each word proportional to its frequency. Each question also contains a bar chart identifying the key themes and their level of importance.

For a complete list of all open-ended survey responses, please see the “Open-Ended Responses” section in this appendix.



**Question 8. In a word or phrase, what is important to you regarding the CTUIR's long-range energy future?**

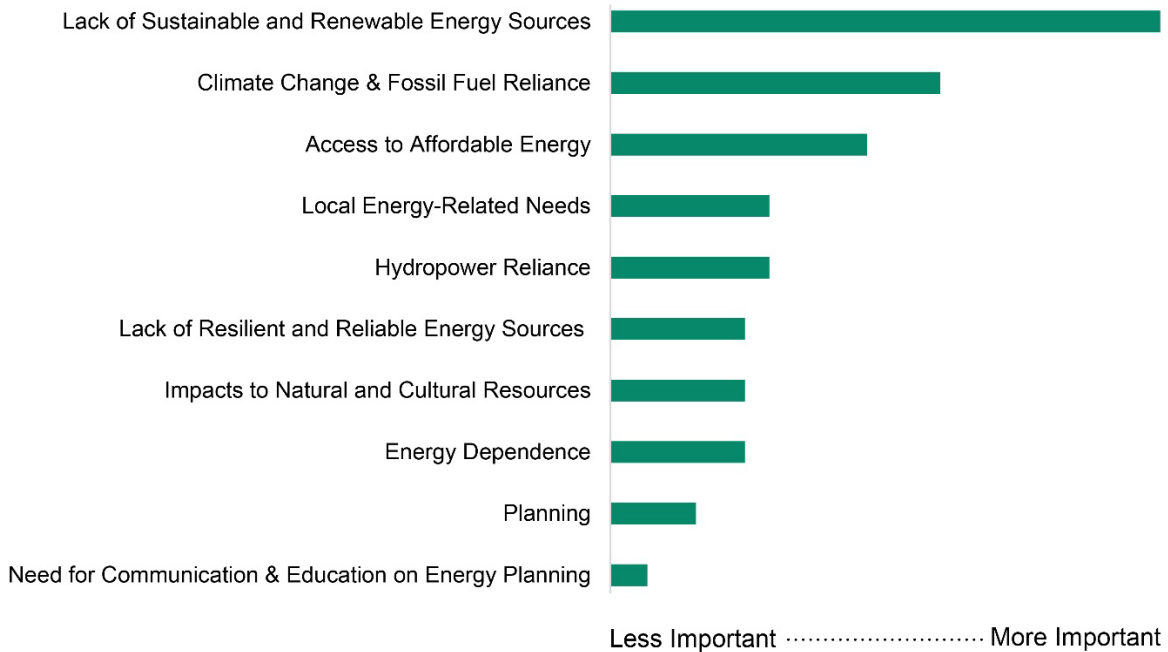
provide Protecting natural resources plan future generations affordable environment  
 savings Protecting power renewable energy cost self  
**Sustainability** self-sufficient **energy** renewable  
**CTUIR** green sustainable Energy independence needs Reduce  
 clean resources developing climate change Tribal energy production independence





**Question 9. What is the most urgent energy issue that needs to be addressed in the next 5 years?**

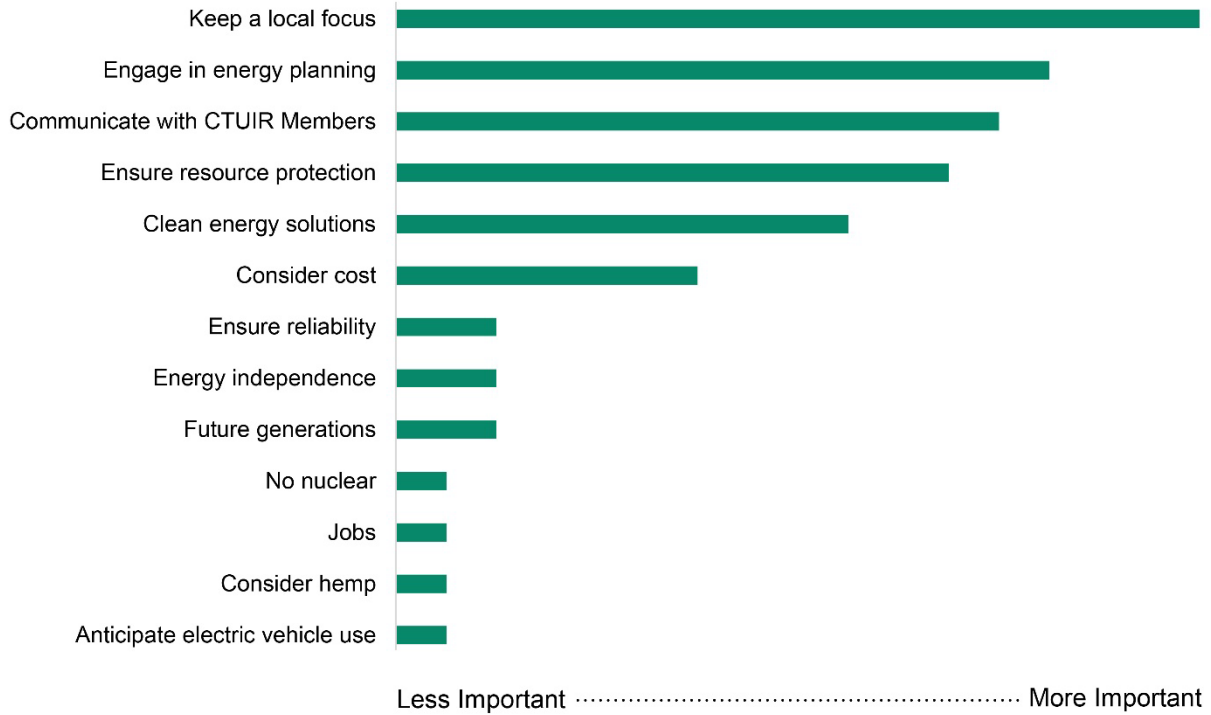
SOURCES climate change grid Affordable Carbon emissions green reservation  
 Housing electricity reduction power future home clean energy  
 reduce energy source cost hydropower energy  
 Energy generation solar plan water carbon use clean CTUIR will  
 renewable energy help dams Transitioning tribal energy efficient  
 renewable





**Question 10. Is there anything else you would like us to keep in mind as we work on the CTUIR Strategic Energy Plan?**

building options renewable energy THINK keep generation solar changes  
 make solar panels plan cost energy Tribal  
 tribal members N will sustainable CTUIR clean impact  
 generate resources





## Key Implications of the Survey Results for the CTUIR Strategic Energy Plan

The stakeholder engagement survey was an essential step in the development of the CTUIR Strategic Energy Plan (SEP) because it ensured that the values and opinions of the community would be accounted for in the SEP. The survey responses were considered when the CTUIR energy vision was developed.

Key implications of each question in how they informed the SEP are described below. Additional implications may be teased out, but the implications that are listed below served as a starting point for a broader discussion when the SEP Energy Objectives and Energy Goals were developed.

- ▶ Question 1: Please tell us about yourself (select all that apply).
  - The majority of respondents were CTUIR employees, CTUIR Tribal Members, Umatilla Indian Reservation (UIR) residents, and/or CTUIR General Counsel members.
  - The mix of respondents implies that the results of the survey are a good representation of the individuals who engage with the CTUIR regularly in some way and/or are impacted by the governance decisions made by the CTUIR as a local resident.
- ▶ Question 2: I am interested in making my home or business more energy efficient, which typically includes more efficient lighting, heating, and cooling systems, but I am (select all that apply):
  - The majority of respondents indicated they were not aware of the resources that are available to support energy efficiency measures, are not sure how to pay for them, or are not sure where to begin.
  - The responses imply that there may be opportunities for the CTUIR to increase the uptake of energy efficiency measures within the community through further education and publicization of existing energy efficiency resources. Additionally, if existing efficiency resources are limited, there may be interest in new energy efficiency programs owned and managed by the CTUIR (note that the viability of such a program must still be evaluated).
- ▶ Question 3: Installing renewable energy generation systems such as solar panels allows property owners to produce their own energy, reduce carbon emissions, and potentially reduce the cost of electrical bills. Are you interested in installing renewable energy generation systems at your home or business?
  - Seventy-five percent of the respondents indicated they are interested in renewable energy generation, but nearly 20% indicated they are not sure about renewable energy at their homes or businesses.



- The responses imply that some education or outreach may be beneficial for helping community members determine whether renewable energy is right for them. Depending on individual circumstances, renewable energy may not be right for every situation, but reducing uncertainty by narrowing where it is or is not financially or technically feasible may be a desirable focus of the CTUIR SEP.
- ▶ Question 4: What are some of the barriers to installing renewable energy generation systems at your home or business? (select all that apply)
  - The majority of respondents indicated they are not sure how to pay for renewable energy generation systems at their home or business or are not sure where to begin. Additionally, of the respondents who indicated “other” in response to the question, the majority indicated skepticism about the technical, regulatory, or financial feasibility of installing renewable energy. Only a minority of respondents indicated that they are not the owners of their residential units (therefore cannot make this decision for the property) or that they have already evaluated solar opportunities at their home or business and have installed systems or ruled them out as not possible.
  - The responses imply that there are opportunities for education and outreach to help community members understand the opportunities for renewable energy at their homes or businesses and the important factors to keep in mind. Some community members may have preconceived notions about the drawbacks of renewable energy that may not necessarily apply to the current state of the industry. Other community members may simply be unaware of the pros and cons of renewable energy, so support from the CTUIR may be beneficial to encouraging more community members to make the investment.
- ▶ Question 5: I know which systems in my home or business would be impacted by a power outage. For example, consider your refrigerator/freezer, well pumps, heating furnace, etc.
  - A majority of respondents expressed confidence in knowing which systems would be impacted by a power outage.
  - The responses imply that energy resilience (i.e., power reliability) is a point of awareness within the community. Whether the critical power loads within the homes and businesses are supported by backup power was not asked in this survey, but as indicated in later questions, reliable power is a high priority.
- ▶ Question 6: Do you use any of the following to heat your home? If so, please indicate “yes” and provide details as applicable below.
  - This question is relevant to opportunities to reduce carbon emissions within the community because energy consumed for heating is often a significant contributor to carbon emissions.
  - The majority of respondents indicated that they heat their spaces with electricity. When complemented with 100% zero carbon electricity sources, using electricity for



heating implies that a near-majority of community members are well configured for a pathway to zero carbon heating.

- Nearly 20% of respondents indicated that they heat their living spaces with wood. For the purposes of carbon emissions, wood or biomass-based heating systems are considered to be carbon neutral sources of energy. The combination of respondents who use electricity or wood for heating implies that nearly two-thirds of respondents are configured for a pathway to carbon neutral heating.
- Over 33% of respondents indicated that they use natural gas or propane to heat their homes. These respondents are the only group that directly releases carbon emissions from heating their spaces. The implication for the CTUIR SEP is that this group may comprise the focus of strategies for decarbonizing heating systems.
- ▶ Question 7: When you think about CTUIR’s energy future, CTUIR should prioritize ...
  - The majority of respondents indicated that natural and cultural resources should be a top priority for the CTUIR SEP, while energy cost savings, energy independence, carbon emissions, and economic opportunities are key considerations when developing a vision and energy goals/objectives. As a confirmation that the opposite is not true, the final statement in Question 7 implies a strong preference for prioritizing energy independence.
  - Additionally, given that respondents confirmed that energy efficiency and renewable energy are areas of high interest to the community, this question adds emphasis to questions 2, 3, and 4. Educational and outreach programs for energy efficiency and renewable energy could benefit the “energy literacy” of the community to help drive adoption of CTUIR energy strategies, and the strategies that such programs might support are likely to be high priority strategies in an SEP that reflects the energy priorities of the community.
- ▶ Question 8: In a word or phrase, what is important to you regarding the CTUIR’s long-range energy future? Question 9: What is the most urgent energy issue that needs to be addressed in the next 5 years?
  - The focus of Question 8 is on long-term priorities and was an open-ended response. The top long-term priorities in the responses to Question 8 include sustainable energy, energy independence, affordability, reliability, and resource protection.
  - The focus of Question 9 is on near-term priorities and was an open-ended response. The top near-term priorities in the responses to Question 9 include sustainable energy, fossil fuel and hydropower reliance, energy affordability, and considerations for natural and cultural resources.
  - Looking at the two questions in concert, a key implication from the responses is that a near-term focus for the next 5 years may be on carbon emissions and energy affordability, while a long-term focus for greater than 5 years may be on energy independence and protection or enhancement of cultural and natural resources.



- ▶ Question 10: Is there anything else you would like us to keep in mind as we work on the CTUIR Strategic Energy Plan?
  - This question was intended to capture any remaining thoughts and concerns to keep in mind when developing the CTUIR SEP. The top priority in the responses to the question was engaging well with the community and communicating transparently with CTUIR members. Both engagement and communication are important considerations when developing a plan that fosters “ownership” across a whole community which in turn is a key success factor in driving the execution of the plan.
  - Outside this major takeaway, many of the responses confirmed priority considerations that were captured in previous survey questions (e.g., considering cost and reliability or prioritizing cultural resource protection). The remaining open-ended responses included several ideas for the energy planning team to account for when developing strategies (e.g., biomass opportunities, preserving viewsheds).

## Open-Ended Responses

### Question 2 – Responses to “Other (please specify)”

I am interested in making my home or business more energy efficient, which typically includes more efficient lighting, heating, and cooling systems, but I am:
We are an organization who would have technical resources and financial incentives to support these efforts.
Living in tribal housing
I have been watching incentives and product development.
I work for Energy Trust of Oregon/ Energy Advisor
Live in town.
I do my best with making my home energy efficient starting with appliances
looking for subsidies, discounts or grants \$, to lower costs
I've started by doing simple things that I know I can change like using better light bulbs, different shower heads to help with water.
a renter
I live in Housing on the rez so most of this is beyond my ability to implement
Electricity included in the rent
I live in my son's home, who is a descendant. He has put in a new heating and cooling (with his own funds & it was costly- burdensome at the time- but he made it happen) system. Maybe lighting could be improved - not sure - not sure if he would get the assistance if there was some. Wish he could.
I don't live here
Have made small steps
I am a renter, but have done what I reasonably can to make my home energy efficient
Looking for more options





**I am interested in making my home or business more energy efficient, which typically includes more efficient lighting, heating, and cooling systems, but I am:**

- Rent. But interest in efficient energy for UIR
- ENERGY EFFICIENT, BUT THE COST IS SPENDY
- I am a renter and have limited decision making power
- I've done a few things but not sure what else to do to be more energy efficient

**Question 4 – Responses to “Other (please specify)”**

**What are some of the barriers to installing renewable energy generation systems at your home or business?**

- Always \$;already have renewables at work; more to do + my home.
- Haven't done enough active research to understand the viable options for installing solar panels on a manufactured home
- Don't see the return of investment
- Expensive
- not sure cost-benefit to justify; maintenance costs unknown
- zoning? Utility Rules? Would like more information. +Cost Benefit analysis
- don't think our old wiring would handle adding new systems
- Need help finding trusted vendors in our area
- This is something that Housing can do. Not me.
- Same as other on #2
- cost effectiveness
- Not sure who to hire to do it.
- Not sure if home site suitable for solar
- Home is too well shaded (85%) for solar panels; Energy Trust investigated my home for solar panels.
- Cost are high, return on investment is long. Looking for lower cost options
- The house I own is in Pendelton
- What would annual savings be if I go green? How much maintenance is involved in upkeep, replacement costs, does this energy depend upon how much solar or wind mother nature produces?
- This only benefits CTUIR entity buildings, and not homeowners.
- No barriers - we've already installed solar
- Cost
- mostly to expensive. we have resources but not enough to cover big changes and don't need more debt



## Question 6

Do you use any of the following to heat your home? If so, please indicate "yes" and provide details as applicable below.			
Electricity (including baseboard heaters, space heaters, heat pumps, etc.)	Wood (if so, how many cords per year?)	Heating Oil (if so, how many gallons per year?)	Propane (if so, how many gallons per year?)
yes			
			1200
			800-1000
yes; heat pump in one home; mini-split in 2nd; central heat in 3rd w/ no A/C	in one of the three homes I manage		
yes			
yes	no	no	no
Yes, heat pump, new unit installed within last three years			
	3		
yes			
I got a heat pump at my home AC/Heater			
	1 cord		
baseboard, space heaters			
Yes			
yes, heat pump/central air			
Yes, heat pump			
Yes	3	No	No
Yes	Yes 2 cords		
Heat pump			
Yes			
yes			
Pendleton	5 to 6 cords	N/A	N/A
only if needed.	6-8 cords		
Electric Base Board Heaters, wood heat	12		
yes			



Do you use any of the following to heat your home? If so, please indicate "yes" and provide details as applicable below.			
Electricity (including baseboard heaters, space heaters, heat pumps, etc.)	Wood (if so, how many cords per year?)	Heating Oil (if so, how many gallons per year?)	Propane (if so, how many gallons per year?)
YES	1 cord	N/A	N/A
yes			
No	No	No	No
No	No	No	NO
Yes	No	No	No
not sure			not sure
yes, baseboards			
HeatPump - Secondary heating is electric - Natural gas heat requires electricity to function	N/A	N/A	Only in extreme emergencies - we are prepared with 15 gallons of propane to last us a short while for heat/cooking. We acknowledge this is not enough. Redundant power is our best option.
yes			
HeatPump UEC	5 per winter		400
yes, on occasion use space heaters			
yes	yes; 1-2 cords/year		
yes	yes, 2-3 cords		
yes			
Space heaters			
Electric heat, space heaters			
Yes. Main source of heat is electric heat	Yes. Use wood as a heating source (was main heating source).		
Yes			
yes			
Yes			
Yes, heatpumps			
yes			
NO	NO	NO	NO



Do you use any of the following to heat your home? If so, please indicate "yes" and provide details as applicable below.			
Electricity (including baseboard heaters, space heaters, heat pumps, etc.)	Wood (if so, how many cords per year?)	Heating Oil (if so, how many gallons per year?)	Propane (if so, how many gallons per year?)
	Only use my fireplace maybe 5 times a winter		
Space Heaters			
Yes			
Yes, electricity is only source of heat			
Yes, baseboard heaters space heaters	yes- less than one cord. But utilize pellets for our stove ton and a half each winter		
Yes	No	No	No
yes			
electricity for pellet stove and plug in room heaters			
	8 cords		
Yes	Yes		Yes
Yes			
No	No	No	Yes unsure of gallons
Base board, plug in heaters			
Yes			
Yes	Yes		
split level 5-bedroom house 40 years old	about 7-cords		
Used for all appliances including washer/dryer - all of home			
nope	nope	nope	nope
yes			
Yes			
	Yes, only in extreme winter cold periods		
Water tank is electric			
yes; space heaters			
Heatpump	3		



**Do you use any of the following to heat your home? If so, please indicate "yes" and provide details as applicable below.**

<b>Electricity (including baseboard heaters, space heaters, heat pumps, etc.)</b>	<b>Wood (if so, how many cords per year?)</b>	<b>Heating Oil (if so, how many gallons per year?)</b>	<b>Propane (if so, how many gallons per year?)</b>
Electric	1/2. cord		
yes, floor vents via hvac			
yes			
electricity			
yes			
yes-heat pump			
	2 plus wood pellets (50 bags?)		400?
yes			
wall heater	3		300
yes			
	yes, one cord/year		
Yes			
Yes, Heat Pumps			
water heater, air conditioner			
yes, electric furnace is my only source of household heat.			
yes			
heat pump			
YES	NO	NO	NO
yes			
			600
No	Pellet Stove	No	No
	1		
	2-3 depends on the winter		
			200?
yes			
Yes	Yes. (1-2 cord)		
central air and hear, use heaters and swamp cooler and small			



Do you use any of the following to heat your home? If so, please indicate "yes" and provide details as applicable below.			
Electricity (including baseboard heaters, space heaters, heat pumps, etc.)	Wood (if so, how many cords per year?)	Heating Oil (if so, how many gallons per year?)	Propane (if so, how many gallons per year?)
window air conditioner in shop.			
HeatPump / AC			
yes central and ductless in 3 areas			
yes, heat pumps			
YES	YES, 4		
	yes, at least 2 cords		
	Once a year		
this is a backup system	2-3 cords		
Yes			
yes, heat pump.			
Yes	Yes. .5 cords or less.		
Yes	No	No	No
yes	yes		
yes			
yes	yes		
Yes			
yes.			
yes			
yes; central air			
PPL			not sure
Yes - HVAC			
Ductless heat pump			
	1		
yes, heat pump	2 cords used when the temp drops below 30 and heat pump is less effective or efficient		
Yes			
Space heaters.			
Yes	Yes, 1 cord annually	NA	NA
AC			



Do you use any of the following to heat your home? If so, please indicate "yes" and provide details as applicable below.			
Electricity (including baseboard heaters, space heaters, heat pumps, etc.)	Wood (if so, how many cords per year?)	Heating Oil (if so, how many gallons per year?)	Propane (if so, how many gallons per year?)
Backup	No	No	No

### Question 8

In a word or phrase, what is important to you regarding the CTUIR's long-range energy future?
It is critical to develop an actionable plan that engages all departments, stakeholders and projects related to energy and consider needs for the Energy Vision, Climate Adaptation Plan and the FEMA Natural Hazard Mitigation Plan efforts.
saving
No windmills
Sustainability
Reduce the use first, then install renewables. So energy efficient construction, repairs, remodels and practices must be everyone's priority.
Costs
The imperativeness of developing our, CTUIR's own Tribal Utilities department, developing and utilizing potential PPA Power purchase agreements to provide further economic security within CTUIR.
Energy independence
independence
health
Independency
ENERGY FOR THE FUTURE N FOR THE WHOLE REZ.
environmentally sustainable
instead of paying for energy from outside source we should work at providing locost energy for Tribal population so that expenditure's is coming back to tribe instead of outside sources how can we do that and still be lower coast than other energy providers?
Sustainability, consistency
renewable reliability
Climate change
Renewable Energy not only for Tribal Facilities but Tribal members homes also.
Sustainability & Effectiveness
Alert Info to All CTUIR Members. Always in the dark.
Sustainability
become self-sufficient
efficiency and "green"



In a word or phrase, what is important to you regarding the CTUIR's long-range energy future?
Energy sovereignty
Sovereign Sustainability.
control
Sustainability
Protecting tribal resources
Very
establish a plan which impacts CTUIR facilities and tribal members homes
Money
As the public opinion on hydro electric power shifts, I hope that green alternatives can be developed in the region that don't raise prices too much for the CTUIR.
Supply and Redundancy
Long term vision
Saving money on utilities
sustainability
currently lacking in renewable resources at NGC campus especially
diversify
n/a
Go green
Self-sufficiency
Self-sufficient
Protecting our natural resources and environment for future generations
N/a
I would love to see solar panels that provide the majority of the energy on the CTUIR land
Clean earth, clean future
durable
Energy independence for the UIR (no need for imported energy or fuels) and indefinite energy security.
Savings
power demands on Columbia River
Efficient, cost-effective, self-sufficient energy generation
Helping reservation residents keep costs down
Cultural Resource Protection
CTUIR's best interest.
More renewable energy.
Making energy efficiency affordable to all those that want/need it.





**In a word or phrase, what is important to you regarding the CTUIR's long-range energy future?**

Energy independence that is clean and sustainable with connection to the national power grid.
sustainability
All around sustainability (energy/jobs/foods/savings)
be a leader in innovation
cost
Transparency
Sustainable
Self sufficient
Becoming self sufficient
that it is affordable and sustainable.
Help CTUIR members pay for solar panels
having it.
CTUIR needs to get and STAY current with new energy technologies
non carbon
Be proactive now, not responsive later
More renewable energy. Less carbon emissions
affordable
Protecting our cultural resources & helping our tribal members
self contained as much as possible.
cost
renewable energy, while protecting natural resources
Sustainability
sustainability
tribal independence
what is most important is that we look towards a vision that doesn't include huge changes to our natural landscape. No large wind farms. PERIOD.
sustainability
Clean
self-reliance
Energy independence is important for CTUIR sovereignty and control over greenhouse gases.
sustaining natural capital (ecological systems that provide goods and services)
Culturally important
Self-sufficient
sustainability



**In a word or phrase, what is important to you regarding the CTUIR's long-range energy future?**

Solar or wind generated power and require energy efficient built homes with some Passive solar design.

Net Zero Energy

sustainability

Self-sufficiency

What is it?

Avoid using Wind Power they are disgusting.

Producing own clean energy

Reduce energy consumption and increase energy production

renewable

If it is attainable.

Reduce carbon print for all CTUIR

Backup Power

minimize consumption and optimize production

environment

Sustainable for our future generations

Protecting natural resources

Energy future was discussed years ago, but not action. Is this another all talk and not action.

Self sustaining

building redundancy into energy production systems

climate change

on-reservation grid

Stability

Independence

Utilize lands we've re-acquired or already own to produce energy

efforts to ensure our salmon and first foods will continue to be available for future generations

renewable, affordable, low environmental impact.

Energy Independent

security

Independence

That it be sustainable and accessible.

Self-reliant, sustainable green energy to supply tribal needs.

the less carbon footprint the better.

climate change

cost savings for all



In a word or phrase, what is important to you regarding the CTUIR's long-range energy future?
affordable resources including gasoline for auto
self sufficiency and cost savings
Sustainability
Net producer
sustainable
cost control. energy self sufficient should not come at an extra cost over purchasing needed energy from outside entities
Sustainability
Sustainability
Protecting our environment
Commercial scale energy production.
Energy stability

### Question 9

What is the most urgent energy issue that needs to be addressed in the next 5 years?
Resilience should be a key consideration to offset risk for severe energy disruptions, due to natural disasters and other events. The resulting plan should also consider local economic strain, equitable access to capital, resources and services, susceptibility to natural and human-made disasters and as well as agency over CTUIR's energy future.
water
Reduce reliance on outside grid
Creating more renewable options for home owners
Climate change impacts have to be dialed back dramatically. That means carbon reduction as well as decreased uses of all fossil sources.
how to produce clean renewable energy
Tribal Utilities Department, renewables, wifi, energy development project, broadband to house all of our utilities the CTUIR will have on reservation.
The current reliance on hydropower for CTUIR energy supply
hydro power is cheap but killing our salmon
climate change and salmon restoration
green
to have our own energy source that will help not only CTUIR but help out umatilla county
water supply due to drought
renewable energy to support our Tribal Economics
availability and cost control
Reduction of fossil fuels use on reservation



What is the most urgent energy issue that needs to be addressed in the next 5 years?
Solar energy.
Comprehension & thorough understandings of how this is beneficial
Housing need to be updated on weatherization to cut the cost of electricity and heating being used
Knowledge
Sustainable homes for tribal members esp within crisis such as COVID or during/after natural disasters.
Peoples lack of access to sufficient energy.
replace electricity when there are power outages
oil/gas usage
Carbon emissions reduction
Independent, reliable, green power grids & sources for UIR.
two equally important issues: the rising cost of electricity as hydropower becomes less available due to drought and our heating and cooling costs due to extreme weather
Forest Management. I am sick and tired of seeing our forests burn every year.
Water
Renewable energy
reduce price of propane and other oil products include gas
Self sufficiency.
Generally speaking, there needs to be a focus on actual green energy, not just generating energy domestically. Increased domestic production may reduce costs, but if it's not green it's not helping at this point.
Staffing and high levels of maintenance on the facilities, including the solar and wind power presently in place, through the Corona Virus. Staying the course in the short term still relies on maintaining what we have and not losing progress.
After that, more renewable energy.
carbon emissions
Electrical
outside reliance
renewable resources like wind and power at all campuses
small and mid-scale solar for individual buildings; advanced battery technologies
n/a
Cooling and heating
alternative energy that doesn't rely on hydropower
sustainability
Removable of snake river dams, finding ways to use solar energy vs wind mills
Carbon emissions
Developing solar panel energy plan for CTUIR & members



What is the most urgent energy issue that needs to be addressed in the next 5 years?
Carbon emissions, solar energy
capacity
Energy generation and efficiency projects that support climate change prevention initiatives and create employment and financial savings opportunities for the tribal community.
Electric car access
climate change
Upscaling and improving energy-efficiency of solar power generation. Improving energy storage.
Affordable energy
Unsure
Actually not sure on that point
More solar energy use.
Reduce carbon emission and/or reduce global warming.
Reducing heating and cooling costs and maintaining a reliable energy source.
access and funding to implement
I think that it would be good for CTUIR and its members to be energy self-sufficient whether it is on the reservation or not but first should be our reservation - this is home. I live in Pendleton but not on the reservation. :( I like to idea of solar energy. I have for a long time. It is smart - the sun is always going to shine. Hopefully that is not a statement to take for granted.
cost and access
Putting our hands back in the soil and becoming self sufficient with plant food and water and yes energy -we should go back to our ancestral roots of being grounded outdoors and using no energy indoors ... we're living a lie
Water
Unsure
Utilizing clean energy
the ctuir needs to be capable in managing a tribal energy program.
Go solar
Dams
Individual home energy generation, owned or rented
more non carbon sources
Costs to consumers getting out of control
The impact our energy use is having on the environment
homes are correct temperature for elderly
Fish and Wildlife
Protection and promotion of our sovereign citizenry/GC membership control (General Council, not general counsel)
cost



What is the most urgent energy issue that needs to be addressed in the next 5 years?
quickly moving away from fossil fuel use
Upgrading the nations electrical grid.
Creating self sufficient
making sure the tribe is sustainable without relying on outside companies.
global warming
Clean and efficient energy; reducing carbon footprint
dam removal
In priority, greenhouse gas emissions and dependence on oil/natural gas (limited resource)
Low carbon energy sources
Making sure homes/rentals are building to make them energy efficient to reduce energy consumption.
To remove dams and release the water flows on rivers.
energy efficient houses
cutting down high cost of energy and use cleaner source of enery to reduce energy foot printnt and negative effects on environment
Waste Water Treatment Facility
renewable energy
Systemic carbon emissions
Dams
renewable energy
Look at ways to have our own clean energy source
Solar power generation required for all new building construction
clean energy
Electric. Solar or Windmills.
Moving towards renewables
Power Outage back up
Breaching the dams
cost of using self-generated energy.
reduce emissions from trucks on freeways
CTUIR Planning needs to revise to the planning handbook to include energy future opportunities. Solar, Wind Turbines, etc. Also, when will the tribal member get their share of the profit from the existing wind turbine located at Arlington, OR?
Attempt to get rid of hydroelectric dams and increase education of other resources
Power loss when grid power is down, lack of solar and or wind power
building redundancy into existing energy systems
solar energy
how dam removal impacts price of energy



What is the most urgent energy issue that needs to be addressed in the next 5 years?
A strong and well protected electrical grid.
affordable energy solutions for our community
Using other energy options like solar panels and wind turbine so we are not relying just on electricity from the dam.
home energy efficiency.
Improve the infrastructure to handle the increase in demand for renewable electricity.
Affordable
self sustaining renewable cost effective energy generation
Transitioning to renewable energies and transitioning tribal housing and facilities to be the most energy efficient.
Building towards a future that has alternative for hydropower systems.
solar for every home ,big enough to cut electric bill in half.
transition to renewables
implementing a plan
sky rocket costs of electrical, propane and gas
water conservation
Cost
Local grid independence
The use of fossil fuels and plastics.
Electricity, if ctuir can generate solar, wind or ? for electricity to help reduce costs to residents and businesses on the reservation that would help greatly
Saving our planet with clean energy.
Research and investment to alternatives of energy power that does not involve harm to the land . i.e. hydropower, windmill, solar farms
Minimize our carbon footprint
Energy generation, development of energy strategy.
Power Outages-Microgrids

### Question 10

Is there anything else you would like us to keep in mind as we work on the CTUIR Strategic Energy Plan ?
Yes. Tamastlikt began down this road in 2002 and our journey continues. Recent meetings focused on energy did not include our expertise. We were not invited. ??
Continue to request input from the non-tribal community and CTUIR tribal members, as they are the primary stakeholders.
Complete transparency with the goal in mind & communicating how to achieve it.
Who is hired. Knowing what their doing.



**Is there anything else you would like us to keep in mind as we work on the CTUIR Strategic Energy Plan?**

keep people updated on progress.

ask for help/volunteers when needed.

Just to keep us as Tribal members in the loop and not install like TCI did and then we knew about it

Emphasize education strongly.

Keeping Tribal membership informed and educated for their knowledge and awareness of the future technology and ways to keep our resources protected

open dialogue and community outreach

concerned about the high wattage power lines being built on perimeters of rez to transport energy to Idaho; no info ever shared with tribal members on impact on food-gathering sites and allotments in the area

Education of homeowners

Keep everybody looped in on the planning and decision making, not the same programs, depts. and staff making all the final decisions for us. Turning into Good Old Boys Club.

Costs

Current costs of energy may not reflect the true cost of energy generation and use. Even if energy costs increase, it is important to find sustainable and efficient sources of renewable energy production.

the speed of which equipment and technology changes- this effects the cost for implementation

Think of the Tribal member and affordability

Supporting independence, low-cost, and sustainable options for homes and businesses.

Helping low income families meet sustainable goals.

Electric Car Charging Stations. Add to existing bank anticipating move to electric vehicles.

climate change and 7-generation planning

the unborns' children's children

Clean energy

Going electric, clean renewable energy

There are abundant opportunities to generate clean energy on the UIR. Hopefully this plan will make that known to folks.

Climate changes are evident now. The changes will only get more severe and effect all types of living conditions. Conservation of energy is most important to stress to individuals.

carbon offset sales to gain compensation for non carbon energy and mitigation such as growing more plants.

self sustaining

Conservation and recycling

improved Recycle infrastructure

Fossil fuels are the number one contributors to the increasing changes of climate. Taking major actions and switching to renewable energies to supply all of the Tribal entities needs, will be key in fighting climate change.

Look into the hemp industry for the reservation to dive into





**Is there anything else you would like us to keep in mind as we work on the CTUIR Strategic Energy Plan?**

Above stated relying on off reservation power supplies or generating own energy. Where is the option for CTUIR to generate own energy off reservation?

Energy independence aids Tribal sovereignty

Jobs

Encouraging and enabling Tribal member household and Reservation resident households to adopt renewable energy resources and better energy usage practices in general is important, but getting the major consumers, which I believe are the Tribal government and business entities (specifically Wildhorse) to change over to renewable, sustainable on-rez energy sources and energy efficiency practices is likely to be much more critical.

expanding public transportation with local communities

there are probably opportunities for CTUIR to make money from energy

solar should be built into every new development/building construction

Make it available for tribal members

CTUIR members

CTUIR Descendants - their are many that are 1/64 of being enrollable

On reservation first and off reservation second

tribal members

Hoping to co-locate things--like solar and roofs, etc.

I believe all streetlights and WRC parking lot lights could be solar powered . WRC could be using more solar panels to power lighting in the casino. They could also consider new building passive solar design or energy efficient design .

Advertising what is being done. Help homeowners with renewable anything. Make it the law!

Will this strategic energy plan be for only the CTUIR entity or will tribal members get the same opportunities with possible solar panel farm on their own agricultural land. If so, will tribal members get the same tax energy breaks as the CTUIR entity?

mixed land and home ownership make it difficult to install upgrades; dam removal impacts; on-rez resources

Providing resources to elders so they can save on electric bill. It would be great if there were like hands on stem workshops so youth learn about jobs in these fields...just don't do it virtually, kids are over it with zoom/google meets workshops.

Provide financial assistance that promotes renewable energy (electric/hybrid cars, residential solar, low impact wind.

incentive plans for solar panels and training for installation/cost/location of panels

Build a solar plant at Coyote Business Park, have TERO train our own people there, then CTUIR can sell at cost & install.

no nuclear clusters



## Is there anything else you would like us to keep in mind as we work on the CTUIR Strategic Energy Plan?

Energy Trust of Oregon is a non-profit organization that supports energy efficiency, generation and resilience for Pacific Power and Cascade Natural Gas within the UIR and other tribal-held land and properties. We have flexible resources that can support projects identified in the energy plan, including but not limited to:

- Technical assistance
- Project feasibility incentives
- Design assistance incentives
- Financial projects incentives
- Serving on committees in an advisory capacity
- Sharing data or conducting joint research
- Site evaluations
- Commercial and industrial strategic energy management
- Contracting for a program or service delivery
- Developing incentive offers that can be presented to customers

We have also been engaged with several communities throughout Oregon who have worked on community-wide plans. We can share what we have learned from their planning and implementation processes. For example, it is critical to identify non-energy benefits of the plan (ex. Energy resilience, affordable housing, economic development, leadership development).

start new--when we build make these building energy efficiency...lucky 7 new trailers are joke they are going to be energy efficient--poor insulation under MFH and HVAC

Vet any future partners for their continued involvement in the fossil fuel industry.

EESP seems to have some fantastic ideas about Solar and Geothermal. We really should be finding grants to expand existing solar, and diversify into something else.

modify NGC building if possible and all properties when feasible; working with and not alone or against other-County-Basin-local PARTNERS. We are in this together and not all alone by agency or entity. Have the Tribe lead the process for the County/Basins to become more energy efficient, not just the Tribe.

Plan for expansion and create a plan that can be managed through adaptive measures.

Don't have to do stuff like everyone else. We can try innovative or new ways

always hire professional energy staff to advise ctuir policymakers regarding energy issues.

Find grants and money from the casino to help CTUIR members pay for solar panels.

Make timeline goals for retrofitting all homes of tribal members with solar panels.

keep a holistic view and make sure you know what the impacts of seemingly green, renewable energy have. Not all renewable energy is equal.

consider costs that are not paid directly by the user when considering the cost of energy - externalities. The costs paid by our children will be extreme if we do not act with urgency. It would be good to implement a structure, for example, set a percentage higher price the tribe would be willing to pay for renewables versus conventional energy based on the harm caused by conventional energy - fish, air, and water quality impacts.



**Is there anything else you would like us to keep in mind as we work on the CTUIR Strategic Energy Plan?**

Don't throw money at high risk low return ideas.
We do not want to be like Texas during this last winter, they suffered trying to be independent from the national power grid to save money. We need reliable long term solutions.
In the next 10 - 15 years the Earths weakening magnetic field will not be able to protect us as well as in the past. It is imperative to have a strong electrical grid that can withstand or be repaired quickly if the earth is struck with a solar storm.
Natural and Cultural resources need protecting
Maintaining a balance with our natural resources.
NO WIND FARMS. And nothing that is going to impact our water.
Implications of Energy Development on First foods/natural resources
First foods, wildlife and safety for future generations.
No windmills keep our mountains scenic
THINK ABOUT THE LAND THAT YOU ARE LOOKING AT AN WHERE WOULD IT NOT STICK OUT AS AN EYE SORE TO THE TRIBE OR THE COMMUNITY
Impacts to historic landscapes and viewsheds.
solar panels
At the tribal owned facilities I hope we would use the options available for saving water with the toilets, etc...
Water
NA
N/A
N/A
No.
n/a
Cannot think of anything.
No
None
Don't be bought
No good start for right now
Plotting to take over BPA
Love the ambition and focus of the survey!
Do not limit tribal memberships' use of natural resources; tribal members are generally not exploitive.
Not at this time
n/a
none
No



**Is there anything else you would like us to keep in mind as we work on the CTUIR Strategic Energy Plan?**

no

no

no

No

The McKay reservoir is FERC licensed but isn't developed for electric generation yet.



## Appendix E: Opportunities Assessment

Each opportunity includes a description of either the technology or program, a review of possible applications of the opportunity specific to the CTUIR, and a summary of key considerations to account for when charting a path forward on the given opportunity.

Additionally, every opportunity includes analysis that summarizes the Strengths, Weaknesses, Opportunities, and Threats (SWOT) associated with each opportunity, reflecting both industry trends and the CTUIR-specific context.

Each opportunity also includes an Objectives Rubric that illustrates the potential impact the opportunity may have on the tribal community based on the Energy Objectives defined in Chapter 3. The Objectives Rubric qualitatively scores each opportunity based on a Likert Scale, from very positive to very negative (Table E-4).

**Table E-1: Objectives Rubric for Energy Opportunities**

Score	Description
Very positive	Very likely to have a positive impact
Positive	Likely to have a positive impact
Neutral	Unclear whether the impact is positive or negative
Negative	Likely to have a negative impact
Very negative	Very likely to have a negative impact

The SWOT Analysis and Objectives Rubric should be considered when evaluating the listed opportunities and additional ones not present.

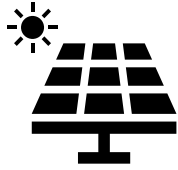
Note that the opportunities evaluated herein are not ordered or ranked by priority to the CTUIR. See Chapter 5 for priority ranking of Potential Actions.

### Technological Opportunities

Thirteen technological energy opportunities are presented in this section. The opportunities reflect advanced technologies and innovative concepts that are tailored to CTUIR.



## Solar Photovoltaics



Solar photovoltaics (PV) is passive energy generation technology that converts light (photons) from the sun to electricity using solar panels. Solar PV has become one of the lowest cost forms of energy generation globally. Three alternatives (locations) for solar PV arrays are considered in this SEP: ground-mounted, commercial rooftops and parking areas, and residential rooftops.

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### Alternative A: Ground-Mounted

Ground-mounted solar arrays could offset community-scale purchased electricity. The quantity of ground-mounted solar PV should be determined by project economics (i.e., how much is appropriate for current electrical loads, how much is appropriate for wholesale market participation, etc.) One such array is already under consideration at the time of writing: a community-scale solar project concept at Coyote Business Park. As a maximum value, a set of solar arrays could be added to this concept, sized to offset 100% electricity purchased on the UIR and allowing the community to become a Net Zero Electricity Community. The set of solar arrays would:

- ▶ Require 70 acres of land
- ▶ Require 13 MW of nameplate capacity
- ▶ Require 17,000 MWh of annual generation

---

### Alternative B: Commercial Rooftops and Parking Areas

Elevated solar PV systems could be installed on commercial rooftops and parking areas. If roughly 50% of available square footage on commercial rooftops and parking lots were covered by solar PV arrays:

- ▶ 12 acres of usable surface may be available
- ▶ 2.5 MW of nameplate capacity may be possible
- ▶ 3,200 MWh of annual generation may be possible

---

### Alternative C: Residential Rooftops

Installing solar PV systems on residential units could be facilitated. If rooftops of all single-family residential units in the UIR (approximately 273 rooftops) had solar PV:

- ▶ 1.9 MW of nameplate capacity may be possible (assuming 7 kW per roof on average)
- ▶ 2,500 MWh of annual generation may be possible



## Key Implementation Considerations

A solar PV system’s generation capacity is directly proportional to the amount of surface area that is dedicated to it. To produce an accurate generation potential, the square footage of array footprint must be estimated. The estimate will allow the project team to calculate system capacity, generation potential, and electricity offset amounts. This includes identifying locations within the UIR that are acceptable to consider solar PV relative to cultural and natural resource constraints. Similarly, the PV system’s specific efficiency nameplate capacity must be accounted for when more detailed assessments are made to increase the accuracy of the estimated generation potential.

Table E-5 shows the SWOT Analysis for solar PV, and Table E-6 is the Objectives Rubric for this opportunity. Both consider all alternatives of solar PV, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, C or “All.”

**Table E-2: SWOT analysis for Solar PV Opportunity**

<b>S</b>	<p><b>All</b> – Distributed, local energy supply</p> <p><b>All</b> – Reduces demand for purchased electricity</p> <p><b>All</b> – May reduce peak demand</p>	<p><b>All</b> – Resistant to inflation</p> <p><b>All</b> – Zero carbon emissions</p> <p><b>B, C</b> – Environmental siting constraints</p>
<b>W</b>	<p><b>All</b> – Requires high upfront capital costs</p> <p><b>A</b> – Covers large amounts of surface</p> <p><b>B, C</b> – may require subsidies to be lifecycle cost effective</p>	<p><b>All</b> – Variable energy generation source</p> <p><b>All</b> – Requires Operations &amp; Maintenance (O&amp;M) staffing</p>
<b>O</b>	<p><b>All</b> – To acquire financial incentives</p> <p><b>All</b> – To utilize excess supply</p>	<p><b>All</b> – To develop job / skills training program</p>
<b>T</b>	<p><b>All</b> – Cloud / smoke coverage</p> <p><b>All</b> – Extreme heat reduces output</p>	<p><b>All</b> – Net metering limits</p>

S = Strength  
A = Application A

W = Weakness  
B = Application B

O = Opportunity  
C = Application C

T = Threat  
All = All Applications



**Table E-3: Objectives Rubric for Solar PV Opportunity**

Qualitative Measure	Score
1 Improves affordability	▲
2 Maintains reliability	▲
3 Reduces carbon emissions	▲▲
4 Supports self-determination	▲▲
5 Enhances tribal sovereignty	▲
6 Protects natural resources	▲
7 Preserves cultural resources	●
8 Encourages economic sustainability	▲▲
9 Promotes equitable access	▲
10 Aligns with comprehensive plan	▲

▲▲ = Very positive      ▲ = Positive      ● = Neutral  
▼▼ = Very negative      ▼ = Negative





## Biomass



Biomass in an energy context refers to any biologically based fuel for energy supply. Specific to the CTUIR context, biomass refers to the stock of wood product available from local Umatilla National Forest wildfire management programs. Currently, surplus wood stock (undergrowth) is cleared into controlled burn piles as a wildfire prevention measure. This stock of wood may be available for energy generation when combined with the right technology, such as converting the wood product to either wood chips or bio-pellets and supplying either a boiler/furnace or electric generator.

---

### Alternative A: Biomass Combined Heat and Power (CHP)

Consider designing a CHP using resources available from the Umatilla National Forest to serve a facility that has both a large power and large heating demand, such as the Wildhorse Resort & Casino. If it is assumed that the CHP can be sized to offset 90% of Wildhorse Resort & Casino's baseload natural gas demand, the CHP:

- ▶ Requires using 25% of the available biomass resource from the forest management program
- ▶ Generates 25,000 MMBtu of heating annually
- ▶ Generates 13,900 MMBtu of electricity annually

---

### Alternative B: Residential Wood Stoves

If the available biomass from wildfire management is greater than what would be used to supply CHP, the remaining resource could be considered for a high-efficiency residential wood stoves program. If it is assumed that this program is rolled out to every home in the UIR that is not already connected to a natural gas line:

- ▶ 6% of the available biomass resource from the forest management program is used
- ▶ 6,000 MMBtu of heating load is served<sup>1</sup>

---

### Alternative C: Commercial Boilers

The baseline usage opportunity for biomass is for boilers to serve traditional commercial-scale heating loads. This is a common use for biomass in an energy context but may not be as cost-effective as conventional natural gas boilers or electric heat pumps. For illustrative purposes, if 100% of heating demand in commercial facilities is replaced with biomass wood stoves (this is not likely to be cost effective):

- ▶ 50% of the available biomass resource from the forest management program is used
- ▶ 46,500 MMBtu of natural gas consumption for heating is offset

---

<sup>1</sup> Based on a typical annual heating demand for an average home in the region



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### Key Implementation Considerations

To accurately quantify the biomass potential, the exact volume and type of biomass available as fuel needs to be verified. Additionally, the cost and logistics required to convert the biomass into wood chips or bio-pellets must be accounted for, including the energy requirement and environmental permitting for manufacturing of biobased products. Note that the emissions from biomass combustion may provide a net offset compared to the baseline practice of open burning.

For a CHP project, industry best practice for sizing the CHP system is to size to the annual baseload heating or electricity demand (whichever is lower) in order to gain the most value from the project. Siting, sizing, efficiency, and environmental permitting must be considered for CHP project viability.

For a residential wood stoves program, stoves vary by capacity and output efficiency. To accurately quantify the impact of this opportunity, the number and type of wood stoves being installed in various residences would need to be determined.

Table E-7 shows the SWOT Analysis for biomass, and Table E-8 is the Objectives Rubric for this opportunity. Both consider all alternatives of biomass, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, C or “All.”



**Table E-4: SWOT analysis for Biomass Opportunity**

<b>S</b>	<p>A – Is carbon neutral</p> <p>A – Needs less land coverage</p> <p>A – Utilizes waste material</p>	<p>A – Supports forest management</p> <p>A – Improves air quality</p> <p>A – Is a distributed energy</p>
<b>W</b>	<p>A – Requires high upfront capital costs</p> <p>A – Requires steady heat load</p>	<p>A – Needs a variable fuel supply</p> <p>A – Requires O&amp;M staffing</p>
<b>O</b>	<p>A – To offset natural gas consumption</p> <p>A – To use bio-pellets for other applications</p>	<p>A – To load balance with other renewables</p>
<b>T</b>	<p>A – Wildfires</p> <p>A – Drought &amp; deforestation</p>	<p>A – Transportation logistics</p> <p>A – Localized bio-pellet production</p>

S = Strength      W = Weakness      O = Opportunity      T = Threat  
 A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-5: Objectives Rubric for Biomass Opportunity**

Qualitative Measure	Score
1 Improves affordability	▲
2 Maintains reliability	▲▲
3 Reduces carbon emissions	▲
4 Supports self-determination	▲▲
5 Enhances tribal sovereignty	▲
6 Protects natural resources	▲
7 Preserves cultural resources	▲
8 Encourages economic sustainability	●
9 Promotes equitable access	●
10 Aligns with comprehensive plan	▲

▲▲ = Very positive      ▲ = Positive      ● = Neutral  
 ▼▼ = Very negative      ▼ = Negative



## Vehicle Electrification



Battery electric vehicles (BEVs) use electrically driven motors to power a vehicle, with electrical energy stored in on-board battery energy storage systems—typically lithium-ion—that are charged at charging stations over a period of 30 minutes to several hours. BEVs offer a means to reduce net carbon emissions, operating cost, and local air pollution, and are experiencing a rapid price reduction and expansion of product availability. Fleet vehicles associated with the CTUIR (GSA and non-GSA) include light-duty passenger vehicles and specialty vehicles such as heavy machinery. Currently, a growing range of BEVs are being offered as alternatives to conventional internal combustion engine (ICE) vehicles, especially among light-duty passenger vehicles.

---

### Alternative A: Fleet Vehicle Electrification

Consider a phased program to convert existing passenger ICE vehicles to BEV. If it is assumed that 50% of the existing GSA and non-GSA fuel is purchased for ICE passenger vehicles, conversion of the entire passenger vehicle fleet:

- ▶ Reduces 2 million GGE consumed per year
- ▶ Increases electricity consumption by 15,500 MWh per year for BEV charging

---

### Alternative B: Specialty Vehicle Electrification

Consider a phased program to convert existing specialty vehicles such as heavy machinery and transit (buses) from ICE to BEV. This is likely a longer-term opportunity as EV technology continues to improve and more products become available and affordable. Depending on how technology advances, up to 100% of current GSA and non-GSA fuel purchases may be able to convert to electric, but at least some liquid fuels will likely be needed for the immediate future.

- ▶ Design considerations not applicable

---

### Key Implementation Considerations

Opportunities for further GHG emission reductions and increased tribal sovereignty may be available if electricity used for BEV charging can be generated within the UIR. The U.S. Department of Transportation resource, *Charging Forward: A Toolkit for Planning and Funding Rural Electric Mobility Infrastructure*, may be a useful guide for developing a more specific vehicle electrification strategy. Note that opportunities for transit should be accounted for in an electrification study, as effective transit opportunities can reduce the total personal vehicle occupancy trips.

Table E-9 shows the SWOT Analysis for vehicle fleet electrification, and Table E-10 is the Objectives Rubric for this opportunity. Both consider all alternatives of vehicle fleet electrification, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, or “All.”



**Table E-6: SWOT analysis for Vehicle Electrification Opportunity**

<b>S</b>	<p><b>All</b> – Reduces carbon emissions</p> <p><b>All</b> – Reduces fuel purchases</p>	<p><b>All</b> – Reduces lifecycle O&amp;M costs</p> <p><b>All</b> – Improves air quality</p>
<b>W</b>	<p><b>All</b> – Requires high upfront capital costs</p> <p><b>All</b> – Has limited options for specialty vehicles</p>	<p><b>All</b> – Has limited range for long-distance applications</p> <p><b>All</b> – Battery storage capacity diminishes in cold weather</p>
<b>O</b>	<p><b>All</b> – To phase implementation for EV conversion</p> <p><b>All</b> – To add charging stations at Arrowhead Travel Plaza</p>	<p><b>All</b> – To increase load for onsite energy generation</p> <p><b>All</b> – To apply grant resources</p> <p><b>All</b> – To balance enerav loads</p>
<b>T</b>	<p><b>All</b> – Insufficient capacity in electrical infrastructure</p>	<p><b>All</b> – Regional power outage</p>

S = Strength      W = Weakness      O = Opportunity      T = Threat  
A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-7: Objectives Rubric for Vehicle Electrification Opportunity**

<b>1</b>	Improves affordability	▲
<b>2</b>	Maintains reliability	●
<b>3</b>	Reduces carbon emissions	▲▲
<b>4</b>	Supports self-determination	▲
<b>5</b>	Enhances tribal sovereignty	▲
<b>6</b>	Protects natural resources	▲
<b>7</b>	Preserves cultural resources	▲
<b>8</b>	Encourages economic sustainability	▲
<b>9</b>	Promotes equitable access	▲
<b>10</b>	Aligns with comprehensive plan	▲



## Building Electrification



An emerging strategy to eliminate carbon emissions is to electrify everything and then produce clean electricity. In concert with developing clean electricity opportunities, building electrification consists of replacing components of buildings that produce carbon emissions with electric equivalents. For heating systems, that most commonly implies electric heat pumps. For kitchens, it implies electric stoves, including induction stoves, as a versatile substitute for gas stoves.

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### Alternative A: Electric Heat Pumps for Commercial Buildings

Consider decommissioning existing natural gas boilers and furnaces in buildings and installing electric heat pumps that provide both cooling and heating. If this is performed at all commercial buildings except Wildhorse Resort & Casino (which has additional gas demands that may be more difficult to electrify):

- ▶ Up to 38% of total UIR natural gas usage is offset
- ▶ 15% of electricity consumption is increased
- ▶ 2% of operational carbon emissions is reduced based on the current power mix

---

### Alternative B: Residential Building Electrification

Consider installing electric heat pumps at residential units to replace existing natural gas boilers or other heating sources (e.g., propane, wood). Pair this with replacing any natural gas appliances with electric equivalents to be able to fully disconnect natural gas service.

---

### Key Implementation Considerations

Each facility under consideration for electrification must be assessed individually, as retrofitting existing building systems varies on a case-by-case basis. The simplest electrification measure is often replacing a natural gas furnace and direct expansion (DX) cooling unit with a single heat pump unit for both heating and cooling. More complex mechanical systems may need engineering support to retrofit. This is true for commercial and residential buildings. Beyond space heating, other equipment conversions to consider may include domestic hot water (DHW) boilers, clothes dryers, and ovens/stovetops. In all cases, the capacity of facility electrical panels and main switchboard must be confirmed before converting to electrical systems.

Table E-11 shows the SWOT Analysis for building electrification, and Table E-12 is the Objectives Rubric for this opportunity. Both consider all alternatives of building electrification, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B or “All.”



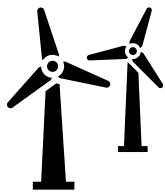
**Table E-8: SWOT analysis for Building Electrification Opportunity**

<b>S</b>	<p><b>All</b> – Reduces carbon emissions</p> <p><b>All</b> – Reduces energy consumption</p>	<p><b>All</b> – Improves air quality</p> <p><b>All</b> – Local climate favorable for heat pumps</p>
<b>W</b>	<p><b>All</b> – Requires high upfront capital costs</p> <p><b>All</b> – Requires O&amp;M staffing</p>	<p><b>All</b> – Has less willingness to adopt</p> <p><b>All</b> – Requires retrofitting existing buildings</p>
<b>O</b>	<p><b>All</b> – To train for maintenance professions</p>	<p><b>All</b> – To increase load for onsite energy generation</p>
<b>T</b>	<p><b>All</b> – Insufficient capacity in electrical infrastructure</p>	<p><b>All</b> – Regional power outage</p>

S = Strength      W = Weakness      O = Opportunity      T = Threat  
 A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-9: Objectives Rubric for Building Electrification Opportunity**

<b>1</b>	Improves affordability	●
<b>2</b>	Maintains reliability	●
<b>3</b>	Reduces carbon emissions	▲▲
<b>4</b>	Supports self-determination	▲
<b>5</b>	Enhances tribal sovereignty	▲
<b>6</b>	Protects natural resources	▲
<b>7</b>	Preserves cultural resources	▲
<b>8</b>	Encourages economic sustainability	●
<b>9</b>	Promotes equitable access	▲
<b>10</b>	Aligns with comprehensive plan	▲



## Wind Turbines

Wind turbines harness the energy of the wind through specially designed blades. Wind flows over the blades of a turbine around a rotor, which spins a generator and produces electricity.

---

### Alternative A: Wind Turbine Installed in Culturally Appropriate Locations

A major constraint to installing wind turbines within the UIR is that suitable locations that do not negatively impact cultural resources such as viewsheds have been identified. If a review of the site yields any suitable locations, the local wind resource is promising as a cost-effective source of local renewable energy. If a location for one typical utility-scale turbine can be identified:

- ▶ One 1.5 MW turbine could generate up to 4600 MWh of electricity per year, assuming a 35% capacity factor for the region

---

### Key Implementation Considerations

For the CTUIR context, the driving constraint for wind turbine applicability is identifying acceptable locations with respect to cultural resource preservation. To date, no suitable locations have been identified, and current land development regulations are not specifically supportive of wind turbines. However, a detailed review of the whole reservation has not been conducted and may identify one or two suitable locations. Outside of culturally acceptable locations, other environmental considerations include prevention of bird strike and noise pollution. Technically, a point of interconnection to the distribution grid should be accounted for in identifying locations. Ongoing maintenance of the system should be included in any development contract, and if battery storage can be paired with the generator, then a smoother and more reliable power output may provide complimentary benefits to the community.

Table E-13 shows the SWOT Analysis for wind turbines, and Table E-14 is the Objectives Rubric for this opportunity. Both consider all alternatives of wind turbines, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished.





**Table E-10: SWOT analysis for Wind Turbines Opportunity**

<b>S</b>	<p><b>A</b> – Reduces carbon emissions</p> <p><b>A</b> – Reduces energy consumption</p>	<p><b>A</b> – Improves air quality</p> <p><b>A</b> – Reduces utility demand</p>
<b>W</b>	<p><b>A</b> – Improves air quality</p> <p><b>A</b> – Reduces utility demand</p>	<p><b>A</b> – Needs an alternate fuel supply due to intermittency</p>
<b>O</b>	<p><b>A</b> – To train for maintenance professions</p> <p><b>A</b> – To offset natural gas consumption</p>	<p><b>A</b> – To load balance with other renewables</p>
<b>T</b>	<p><b>A</b> – Interconnection regulatory requirements</p>	<p><b>All</b> – High wind events</p>

S = Strength      W = Weakness      O = Opportunity      T = Threat  
 A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-11: Objectives Rubric for Wind Turbines Opportunity**

<b>1</b>	Improves affordability	▲
<b>2</b>	Maintains reliability	▲
<b>3</b>	Reduces carbon emissions	▲▲
<b>4</b>	Supports self-determination	▲▲
<b>5</b>	Enhances tribal sovereignty	▲
<b>6</b>	Protects natural resources	▲
<b>7</b>	Preserves cultural resources	▼
<b>8</b>	Encourages economic sustainability	▲
<b>9</b>	Promotes equitable access	●
<b>10</b>	Aligns with comprehensive plan	●



## Hydroelectric Power



Hydroelectric power (“hydro”) is a class of technologies that harness the potential energy of surface water through specially designed turbines and water conveyance. Water flows over the blades of a turbine around a rotor, which spins a generator and produces electricity. Water storage is typically paired with hydroelectric power to increase the energy potential of the generating system. Historically, dams have been constructed to increase the generating potential and have had major environmental repercussions. Newer technologies and engineering best practices offer alternatives to the dam building approach.

---

### Alternative A: Small hydro at McKay Reservoir

Consider applying small-hydro technology at McKay Reservoir to generate electricity. This reservoir is primarily used for potable water storage, so flow patterns vary seasonally, and salmon fisheries would not be disrupted. In December and January, negligible generation is expected due to low flow rates. The summer months (June to August) yield the highest flow and greatest electricity generation.

- ▶ Based on dam height, up to 1 MW of nameplate capacity can be installed
- ▶ Based on historical flow rates, up to 4,300 MWh of annual generation may be possible

---

### Alternative B: Micro-hydro at Umatilla River Fisheries

Consider applying micro-hydro technology along the Umatilla River, particularly where existing infrastructure such as hatcheries are in place. Highest flow and maximum generation occur during the spring season from March to April, whereas generation potential reaches a minimum in July through October.

- ▶ Based on flow patterns, up to 1 MW at peak output may be produced at one location
- ▶ Up to 3,500 MWh may be produced with a single application and average rainfall patterns

---

### Alternative C: In-line Hydro at Water System Pressure-Reducing Valves

In-line hydro refers to energy recovery turbines to be installed within water distribution lines to generate electricity where excess head (or pressure) is present. In its simplest application, pressure-reducing valves may be replaced with energy recovery turbines to produce a small yet steady power output that is proportional to the water flow rate and potential energy. Application of this technology depends on the characteristics of water distribution infrastructure within the UIR and has not been quantified in this analysis.

- ▶ Design considerations not applicable



---

### Key Implementation Considerations

Small-hydro refers to smaller-scale hydropower than is typically installed at the regional utility scale (1 to 10 MW compared to >100 MW). The benefit of the smaller scale is applicability to smaller sites, which translates to reduced environmental impact and the possibility of simpler grid interconnection. However, the installation cost per megawatt may be higher than a larger system. Micro-hydro refers to even smaller systems such as run-of-river applications that minimally impact natural hydrology. Fish-safe micro-hydro turbines can also be selected to mitigate the impact on salmon fisheries. Siting specifics in the Umatilla River must be identified before a feasibility analysis can be conducted.

Table E-15 shows the SWOT Analysis for hydro, and Table E-16 is the Objectives Rubric for this opportunity. Both consider all alternatives of hydro, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, C, or “All.”



**Table E-12: SWOT analysis for Hydroelectric Power Opportunity**

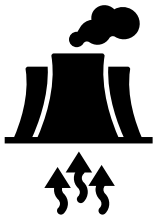
<b>S</b>	<p><b>All</b> – Reduces carbon emissions</p> <p><b>All</b> – Is a distributed energy</p>	<p><b>All</b> – Has a small footprint</p> <p><b>All</b> – Is compatible with fisheries</p>
<b>W</b>	<p><b>All</b> – Requires high upfront capital costs</p> <p><b>All</b> – Requires O&amp;M staffing</p>	<p><b>All</b> – Has limited connection points to existing electrical infrastructure</p>
<b>O</b>	<p><b>All</b> – To apply micro-hydro to Umatilla River Fisheries</p> <p><b>All</b> – To apply small hydro to McKay Reservoir</p>	<p><b>All</b> – To load balance with other renewables</p>
<b>T</b>	<p><b>All</b> – Drought and water level variations</p> <p><b>All</b> – Environmental permitting</p>	<p><b>All</b> – Interconnection regulatory requirements</p>
<p>S = Strength      W = Weakness      O = Opportunity      T = Threat            A = Application A      B = Application B      C = Application C      All = All Applications</p>		

**Table E-13: Objectives Rubric for Hydroelectric Power Opportunity**

<b>1</b>	Improves affordability	●
<b>2</b>	Maintains reliability	▲▲
<b>3</b>	Reduces carbon emissions	▲▲
<b>4</b>	Supports self-determination	▲▲
<b>5</b>	Enhances tribal sovereignty	▲
<b>6</b>	Protects natural resources	▲
<b>7</b>	Preserves cultural resources	▲
<b>8</b>	Encourages economic sustainability	▼
<b>9</b>	Promotes equitable access	●
<b>10</b>	Aligns with comprehensive plan	▲



## Geothermal



Geothermal energy technologies use heat from the Earth’s core and fall into two camps: geothermal heating and geothermal power generation. A minimum subsurface temperature is needed for power generation, but geothermal heating can be deployed either by directly extracting hot water or installing ground source heat pumps with subsurface heat exchange coils.

---

### Alternative A: Geothermal Electricity

Consider constructing a geothermal power plant to generate power for the community and sell excess power to the electric grid. As summarized in Chapter 5, if this opportunity is deemed technically and financially feasible, it has numerous implications for other opportunities available to CTUIR for meeting the energy goals. It is anticipated that a geothermal power plant would generate at least 20 MW of continuous power supply with zero carbon emissions.

- ▶ May exceed 100% of UIR electricity demand
- ▶ May offset 100% electricity GHG emissions
- ▶ May offset 24% of total current emissions

---

### Alternative B: Geothermal Heating

If geothermal power is not viable, geothermal heating for the community may still be an option. Where high temperature wells exist, consider installing a geothermal heating plant to supply reliable, low-carbon heat to serve facilities. This technology is most cost-effective when there is a high density of heating demand, so the Wildhorse Resort & Casino may be an option. Depending on project economics, it may be possible to link multiple nearby facilities together in a district heating system. This application assumes geothermal heating is used to supply all Wildhorse Resort & Casino heating loads.

- ▶ May offset 58% of total natural gas demand
- ▶ May mitigate 3% of current annual emissions

---

### Key Implementation Considerations

For geothermal electricity generation to be considered technically and financially viable, a feasibility analysis must show that subsurface temperatures meet a minimum threshold and that sufficient heat energy can be extracted at a sustainable rate. For geothermal heat generation, a similar (albeit lower) threshold for subsurface temperature and heat flow rate must be verified. In both cases, environmental constraints should be considered when siting a potential generation plant, and financing and regulatory details will need to be addressed.



Table E-17 shows the SWOT Analysis for geothermal, and Table E-18 is the Objectives Rubric for this opportunity. Both consider all alternatives of geothermal, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, or “All.”

**Table E-14: SWOT analysis for Geothermal Opportunity**

<b>S</b>	<b>All</b> – Reduces carbon emissions <b>All</b> – Is a renewable energy source <b>All</b> – Steady and reliable energy source	<b>All</b> – Reduces Utility Demand <b>All</b> – Resilient to natural disasters (underground)
<b>W</b>	<b>All</b> – High upfront capital cost <b>All</b> – O&M Staffing Requirement	<b>All</b> – Land Coverage for boreholes <b>All</b> – Electrical interconnection requirements
<b>O</b>	<b>All</b> – Creates job opportunities <b>All</b> – Financial incentives may be available	<b>All</b> – Reduces utility cost price volatility
<b>T</b>	<b>All</b> – Earthquakes <b>All</b> – Feasibility depends on subsurface conditions	<b>All</b> – Disruption to underground infrastructure

S = Strength      W = Weakness      O = Opportunity      T = Threat  
 A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-15: Objectives Rubric for Geothermal Opportunity**

1	Improves affordability	▲
2	Maintains reliability	▲▲
3	Reduces carbon emissions	▲▲
4	Supports self-determination	▲▲
5	Enhances tribal sovereignty	▲
6	Protects natural resources	▲▲
7	Preserves cultural resources	▲
8	Encourages economic sustainability	●
9	Promotes equitable access	●
10	Aligns with comprehensive plan	▲▲



## Solar Thermal Water Heating

Solar Thermal Water Heating (STWH) units absorb solar radiation into a fluid via flat panels exposed to the sun. When the fluid reaches a desired temperature, it is incorporated into the hot water system, either directly or indirectly through a heat exchanger. This system can work in warm climates as well as cold. The most common STWH systems produce heat for DHW systems.

---

### Alternative A: Residential STWH

Consider a program to install STWH systems at residential units to supply DHW. Systems may be installed on roofs or in backyards and may reduce demand for natural gas, propane, wood, or electricity (in the case of heat pump water heaters).

---

### Alternative B: STWH at Wildhorse Resort and Casino

Consider installing STWH at Wildhorse Resort and Casino to offset DHW loads such as showers and laundry. In commercial applications, STWH is most beneficial when applied to large and consistent DHW loads such as in a hotel setting.

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### Key Implementation Considerations

STWH can potentially offset a large quantity of heating energy for DHW loads. STWH is generally more energy-dense than Solar PV and so may serve as a viable low-carbon alternative to solar-powered electric heat pump water heaters. However, STWH technologies in the US have a history of reliability issues related to leaking systems, failing pumps, and high maintenance costs. STWH technologies are deployed successfully internationally, so the problems may stem from poor contractor expertise and product support. To determine exactly how much STWH may be viable within the CTUIR, each facility under consideration must be assessed individually, as retrofitting existing building systems varies on a case-by-case basis. STWH for the Wildhorse Resort and Casino may be evaluated as a single feasibility study, while it may be possible to fold STWH assessment for home applications into a broader home energy auditing program. Key factors to consider when evaluating STWH include panel area required to serve the load, panel location, and interconnection to existing DHW systems.

Table E-19 shows the SWOT Analysis for STWH, and Table E-20 is the Objectives Rubric for this opportunity. Both consider all alternatives of STWH, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, or "All."



**Table E-16: SWOT analysis for STWH Opportunity**

<b>S</b>	<p><b>All</b> – Reduces carbon emissions</p> <p><b>All</b> – Reduces utility costs</p>	<p><b>All</b> – Is a renewable heating source</p>
<b>W</b>	<p><b>All</b> – Requires high upfront capital costs</p> <p><b>All</b> – Does not generate electricity</p>	<p><b>All</b> – Requires variable energy heating source</p> <p><b>All</b> – Can be difficult to maintain</p>
<b>O</b>	<p><b>All</b> – To receive government incentives</p>	
<b>T</b>	<p><b>All</b> – Leaks may damage roofs</p>	
<p>S = Strength      W = Weakness      O = Opportunity      T = Threat  A = Application A      B = Application B      C = Application C      All = All Applications</p>		

**Table E-17: Objectives Rubric for STWH Opportunity**

<b>1</b>	Improves affordability	▼
<b>2</b>	Maintains reliability	●
<b>3</b>	Reduces carbon emissions	▲▲
<b>4</b>	Supports self-determination	▲▲
<b>5</b>	Enhances tribal sovereignty	●
<b>6</b>	Protects natural resources	▲
<b>7</b>	Preserves cultural resources	●
<b>8</b>	Encourages economic sustainability	▼
<b>9</b>	Promotes equitable access	▲
<b>10</b>	Aligns with comprehensive plan	▲





## Alternative Fuel Sales at UIR Fueling Stations

This method adds technologies to the fueling station at Arrowhead Travel Plaza and Mission Market. These technologies include installation of liquid or gas alternative fuel (for example, Fischer-Tropsch diesel, CNG, etc.) fueling facilities or a battery switching station capable of refueling a number of vehicles per day. Furthermore, installation of electrical vehicle supply equipment (EVSE) (compliant with regional or local code for electrical connectors) would provide charging capacity for plug-in electric vehicles (PEVs).

---

### Alternative A: Liquid Fuels

Consider setting up new stations or new lines at existing fueling stations at Arrowhead Travel Plaza that allow fleet vehicles to top up with ethanol, biodiesel, liquefied petroleum gas (LPG), or other alternative liquid fuels. This applies to older vehicles as well because of miscibility with standard gasoline.

---

### Alternative B: EV Charging

While WRC has one EV charging station, consider EV charging stations at Arrowhead Travel Plaza with minimum capacity as per local code. These would also help charge hybrid vehicles to have enough power to make several commutes within the UIR vicinity.

---

### Alternative C: Hydrogen

Consider looking into hydrogen fuel cells in zero-emission vehicles and potential for domestic production. Despite production costs and storage challenges, there is potential for substantial growth in the transportation energy sector.

---

### Key Implementation Considerations

Consideration of a market for sales of alternative fuels is critical when developing a potential program. Potential markets include semi-trailer trucks, passenger vehicles, and local transit agencies. A list of exact fuel types being sold with an estimated amount sold (which could be based off of existing sales records) will be needed to accurately quantify the emissions offset resulting from this strategy. This will allow the project team to compare emissions per unit energy versus the baseline fuels being sold and arrive at a more precise emissions reduction number.

Table E-21 shows the SWOT Analysis for alternative fuels, and Table E-22 is the Objectives Rubric for this opportunity. Both consider all alternatives of alternative fuels, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, C, or "All."



**Table E-18: SWOT analysis for Alternative Fuel Sales Opportunity**

<b>S</b>	<b>All</b> – Carbon neutral <b>B</b> – No emissions <b>B</b> – Quiet running	<b>B</b> – Electric range can address short commutes for many drivers <b>A</b> – Widely available
<b>W</b>	<b>All</b> – Hybrids cost more than conventional cars	<b>B</b> – Recharging times
<b>O</b>	<b>All</b> – Potential for excellent fuel economy	<b>A</b> – To run on older vehicles
<b>T</b>	<b>All</b> – Federal fuel economy credits awarded to automakers	<b>A</b> – Supply issues

S = Strength      W = Weakness      O = Opportunity      T = Threat  
 A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-19: Objectives Rubric for Alternative Fuel Sales Opportunity**

<b>1</b>	Improves affordability	●
<b>2</b>	Maintains reliability	●
<b>3</b>	Reduces carbon emissions	▲
<b>4</b>	Supports self-determination	▲
<b>5</b>	Enhances tribal sovereignty	▲
<b>6</b>	Protects natural resources	▲
<b>7</b>	Preserves cultural resources	●
<b>8</b>	Encourages economic sustainability	▲
<b>9</b>	Promotes equitable access	▲▲
<b>10</b>	Aligns with comprehensive plan	▲



## Battery Energy Storage Systems

Battery energy storage systems (BESS) can play a pivotal role between green energy supplies and responding to electrical demands in the UIR. BESS, like lithium-ion batteries, are devices that can be charged by electricity generated from renewable energy, like wind and solar power, and then release the stored energy during high customer power demand. Peak demand times are deciphered by intelligent software and control systems, keeping costs down. During very high demand, PEVs can help compensate by returning electricity to the grid or limiting charging rate.

---

### Alternative A: Lithium Ion

Consider purchasing secondary/ rechargeable lithium batteries (from a reputable manufacturer) containing an intercalated lithium compound for the cathode and anode (lithium ion). Store purchased batteries away from combustible materials in the CTUIR community and use safe charging/ discharging methods as per specified parameters for both residential and transportation use.

---

### Alternative B: Other Battery Typologies

Lithium-ion battery technology is the most commercially established at the time of publication, but there are several other battery technology typologies under development that may be optimized for different applications compared to lithium-ion. Examples include flow batteries, zinc air batteries, kinetic storage, and others. Benefits over lithium-ion that have been touted by these developing technologies include cheaper unit cost, more environmentally friendly materials, and greater long-term storage capability. Drawbacks compared to lithium-ion commonly include lower energy storage density and lower round-trip efficiency. Continue monitoring the development of these alternative technologies, and as more options become commercially viable, consider feasibility reviews to determine their applicability to the CTUIR.

---

### Alternative C: Electric Vehicle to Grid

Consider implementing V2G technology that enables energy to be pushed back to the grid from the battery of an electric car. With this technology, a car battery can be charged or discharged based on different signals, like energy consumption and demand in the CTUIR region.

---

### Key Implementation Considerations

The total capacity of BESS being installed must be determined to accurately quantify this strategy. It is likely that this technology will be deployed in tandem with the community scale energy project such as Solar PV, so the capacity and performance of the energy generation project will also need to be quantified. Once the capacity and efficiency of both systems is determined, the project team will be able to calculate an estimated reduction in electrical energy used by the reservation.



Table E-23 shows the SWOT Analysis for BESS, and Table E-24 is the Objectives Rubric for this opportunity. Both consider all alternatives of BESS, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, C, or “All.”

**Table E-20: SWOT analysis for BESS Opportunity**

<b>S</b>	<b>All</b> – Is a relatively simple energy system <b>All</b> – Reduces carbon emissions	<b>All</b> – Reduces peak demands
<b>W</b>	<b>All</b> – Increased maintenance costs	<b>All</b> – Complicated installation process
<b>O</b>	<b>All</b> – To tie into the grid for load shedding <b>All</b> – To have backup power system during outage	<b>All</b> – To reduce utility costs
<b>T</b>	<b>All</b> – Failure due to operator error	<b>A</b> – Extreme cold or hot weather if not properly commissioned

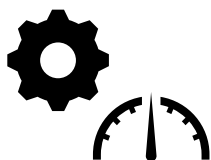
S = Strength      W = Weakness      O = Opportunity      T = Threat  
 A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-21: Objectives Rubric for BESS Opportunity**

1	Improves affordability	▲
2	Maintains reliability	▲▲
3	Reduces carbon emissions	▲▲
4	Supports self-determination	▲▲
5	Enhances tribal sovereignty	▲
6	Protects natural resources	▲
7	Preserves cultural resources	▲
8	Encourages economic sustainability	●
9	Promotes equitable access	●
10	Aligns with comprehensive plan	▲



## Microgrid Controls and Smart Meters



A microgrid is a single controllable entity that can connect and disconnect from the grid to distribute energy to CTUIR. In addition to identifying when and how to connect/disconnect, the controls ensure real-time and reactive power balance when the system is islanded and evenly dispatches energy resources in the long-term. A smart meter is a common integrated smart grid technology that records electric energy consumption and relays it back to the utility for monitoring and billing.

---

### Alternative A: Microgrid Controls

Consider installing an integrated microgrid control system that manages distributed energy assets to cost-effectively produce low-carbon electricity while maintaining grid stability and operational resiliency. The automatic process will satisfy power demand in CTUIR while maintain stable operating conditions.

---

### Alternative B: Smart Meters

Consider accurate measurement of electricity delivered from grid to customer. A smart grid solution will allow for better management of grid connectivity based on peak demand times and active collaboration within the CTUIR community to drive digital utility transformation.

---

### Key Implementation Considerations

When developing an islandable microgrid, a consolidated point of connection with the macro-grid much be determined. This may entail constructing or modifying a substation that can receive power from the grid during blue sky conditions and supply the whole community on downstream distribution lines. Additionally, it is important to find a utility that is microgrid metering friendly and has smart meter customers in the state of Oregon, considering most of Oregon's electricity is imported from outside the state. The cost of the meter interconnection charges must be communicated clearly before planning where and how many meters to install. There are also potential feedback opportunities to consider by integrating battery storage with the microgrid control, wherein metering will allow the producer to send excess energy back to the grid or to the battery when supply exceeds demand.

Table E-25 shows the SWOT Analysis for microgrids, and Table E-26 is the Objectives Rubric for this opportunity. Both consider all alternatives of microgrids, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, or "All."



**Table E-22: SWOT analysis for Microgrid Controls and Smart Meters Opportunity**

<b>S</b>	<b>A</b> – Increases control of energy distribution	<b>B</b> – Increase knowledge of energy usage trends
<b>W</b>	<b>All</b> – Has complicated operations if not installed correctly	<b>All</b> – Requires high upfront capital costs
<b>O</b>	<b>All</b> – To load shed and reduce utility costs <b>All</b> – To create high paying operations jobs	<b>All</b> – To island from the grid
<b>T</b>	<b>All</b> – Failure due to operator error	<b>All</b> – May be hard to find qualified operators

S = Strength      W = Weakness      O = Opportunity      T = Threat  
 A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-23: Objectives Rubric for Microgrid Controls and Smart Meters Opportunity**

<b>1</b>	Improves affordability	▲
<b>2</b>	Maintains reliability	▲▲
<b>3</b>	Reduces carbon emissions	▲
<b>4</b>	Supports self-determination	▲
<b>5</b>	Enhances tribal sovereignty	▲▲
<b>6</b>	Protects natural resources	▲
<b>7</b>	Preserves cultural resources	●
<b>8</b>	Encourages economic sustainability	●
<b>9</b>	Promotes equitable access	▲
<b>10</b>	Aligns with comprehensive plan	▲



## Infrastructure Hardening



Infrastructure or grid hardening involves undertaking a holistic approach of improving infrastructure, communications, and data documentation to better protect utility customers in the long-term and reduce the threat of outages during extreme weather. Integrating smart grid technologies as part of the hardening process will further help with damage prevention, service survivability, and rapid recovery efforts.

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### Alternative A: Underground Distribution Lines

Consider improving energy resilience and reliability of electricity distributed within the UIR by moving distribution lines underground. This can be done in segments by combining the effort with other projects.

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### Alternative B: Protected Energy Assets

Consider improving reliability of electricity generated within and supplied to the UIR by investing in physical protection of substation(s) and strengthening / securing power generation facilities. Protection against weather events and malicious intent.

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### Key Implementation Considerations

Infrastructure hardening requires a methodical approach to audit, identify, close, and control potential reliability and security issues in energy delivery. A good strategy will ensure extra infrastructure costs are not added on later in the process. Due to the ongoing crisis of climate change and increasing risk of extreme weather, the tribe can consider more research and testing of materials and methods that have better expected lifecycles.

Table E-27 shows the SWOT Analysis for infrastructure hardening, and Table E-28 is the Objectives Rubric for this opportunity. Both consider all alternatives of infrastructure hardening, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, or "All."



**Table E-24: SWOT analysis for Infrastructure Hardening Opportunity**

<b>S</b>	<b>All</b> – Increases energy reliability	<b>All</b> – Reduces utility blackouts
<b>W</b>	<b>All</b> – Requires high upfront capital costs	<b>All</b> – Does not reduce operating costs
<b>O</b>	<b>All</b> – To lower maintenance costs and have fewer repairs	
<b>T</b>	<b>All</b> – Opportunity cost of funding	

S = Strength      W = Weakness      O = Opportunity      T = Threat  
 A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-25: Objectives Rubric for Infrastructure Hardening Opportunity**

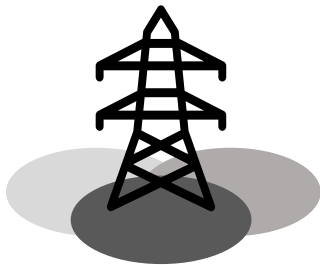
<b>1</b>	Improves affordability	●
<b>2</b>	Maintains reliability	▲▲
<b>3</b>	Reduces carbon emissions	●
<b>4</b>	Supports self-determination	●
<b>5</b>	Enhances tribal sovereignty	▲
<b>6</b>	Protects natural resources	▲
<b>7</b>	Preserves cultural resources	●
<b>8</b>	Encourages economic sustainability	●
<b>9</b>	Promotes equitable access	●
<b>10</b>	Aligns with comprehensive plan	●





## Programmatic Opportunities

Nine programmatic energy opportunities are presented in this section. These opportunities reflect policies or programs that the CTUIR may consider establishing to advance the Objectives of the Energy Vision.



## Tribal Utility Authority

A Tribal Utility Authority may provide electric utility service on tribal lands in place of the existing electric utility with the intention of receiving better price and service from the utility, or better meeting the tribe's goals or needs. The UIR may find price of electricity too high due to subsidization of other areas, paying profit to the investor, or lack of appropriate management. Formation of the authority will ensure appropriate steps are taken to reduce electricity costs as

appropriate, as well as address dissatisfaction with the utility service relating to grid reliability, general treatment of customers, or failure to comply with tribal sovereignty and community goals. If a locally controlled utility is established, it will be responsible for meeting all applicable regulatory requirements, enforcing utility policies and fees, and ensuring safety and reliability of power to customers.

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### Alternative A: Municipalization of Electric Utility

Consider municipalization of an electric utility to have electricity provided at a lower overall cost than the incumbent utility or meet other community goals and needs.

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### Key Implementation Considerations

Reliability is one of the most important considerations when choosing a new utility authority, so that outages in the community are avoided or responded to quickly. Residents and tribal officials should also have access to more convenient customer service as the need arises. Other community goals and tribe priorities that the utility provider should heed are decarbonization or the use of renewable fuels, economic use of tribal generation resources, local economic development, keeping residential rates affordable, and service expansion.

Table E-29 shows the SWOT Analysis for municipalization of an electric utility, and Table E-30 is the Objectives Rubric for this opportunity. Both consider all alternatives of municipalization, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished.



**Table E-26: SWOT Analysis for TUA Opportunity**

<b>S</b>	<p><b>All</b> – May lower electricity rates</p> <p><b>All</b> – Adds control over UIR energy infrastructure</p>	<p><b>All</b> – Provides utility customer service</p> <p><b>All</b> – Redirects revenue from investor-owned utility</p>
<b>W</b>	<p><b>All</b> – Adds costs for acquisition, staffing, and O&amp;M</p> <p><b>All</b> – Requires licensing and registration</p> <p><b>All</b> – Requires high upfront capital costs</p>	<p><b>All</b> – Questions reliability and safety of electrical infrastructure</p> <p><b>All</b> – Requires resources for initial planning and formation</p>
<b>O</b>	<p><b>All</b> – Control over preferred energy mix</p> <p><b>All</b> – Facilitate future energy generation projects</p> <p><b>All</b> – Skills training for tribal members</p>	<p><b>All</b> – Reduce dependence on dirty energy sources</p> <p><b>All</b> – Conduct power sales for nearby stakeholders</p>
<b>T</b>	<p><b>All</b> – Cost to buy-out existing power infrastructure</p> <p><b>All</b> – Terms of existing franchise agreement</p>	<p><b>All</b> – Regulatory compliance</p> <p><b>All</b> – Legal framework as a tribal entity</p>
<p>S = Strength      W = Weakness      O = Opportunity      T = Threat            A = Application A      B = Application B      C = Application C      All = All Applications</p>		

**Table E-27: Objectives Rubric for TUA Opportunity**

<b>1</b>	Improves affordability	●
<b>2</b>	Maintains reliability	▲
<b>3</b>	Reduces carbon emissions	▲
<b>4</b>	Supports self-determination	▲
<b>5</b>	Enhances tribal sovereignty	▲▲
<b>6</b>	Protects natural resources	●
<b>7</b>	Preserves cultural resources	●
<b>8</b>	Encourages economic sustainability	▼
<b>9</b>	Promotes equitable access	●
<b>10</b>	Aligns with comprehensive plan	●



## Tribal Energy Development Organization



Tribal Energy Development Organizations (TEDO) are business entities engaged in the development of energy resources. TEDOs can be wholly owned by a tribe or owned with others as long as the tribe maintains a controlling interest. Once certified by the Secretary of the Interior, TEDOs can enter into leases and business agreements with tribes and acquire easements without further approval. TEDOs allow tribes enter into these

agreements and to form partnerships with developers, financiers, or others as are needed to successfully develop energy resources on tribal lands. TEDOs were authorized by Congress to provide a less restrictive and cumbersome alternative to Tribal Energy Resource Agreements (TERAs) with the Bureau of Indian Affairs which also allows tribes to enter leases and business arrangements for the development of energy resources.

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### Alternative A: Tribal Energy Development Organization

Consider a study to determine the need, costs, and benefits of establishing and seeking certification of a TEDO to develop all, or a portion of, the tribe's energy resources.

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### Alternative B: Tribal Energy Resources Agreement

Consider a study to compare the processes for establishing a TERA versus a TEDO, as well as the ongoing regulatory compliance, and authorities granted under each.

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### Key Implementation Considerations

In addition to determining whether the tribe is eligible to form a TEDO under federal law, its formation will take thoughtful consideration of the legal and practical implications of the organization and its structure. Many of these considerations may require the assistance and advice of legal counsel as well as financial and other consultants. The tribe should identify the legal structure (e.g., corporation, partnership) that best meets its needs and energy development project goals and identify business partners. The tribe may want to enter into confidentiality agreements with potential partners as the TEDO is being developed and its terms negotiated. A feasibility study or business plan should be developed for the TEDO in cooperation with business partners to determine the opportunities, risks, capital and ongoing costs, and sources of capital and revenue. The tribe will also want to determine what tribal authorizations are necessary to authorize the formation of the TEDO and the necessary steps to apply to the Department of the Interior for its certification.

Table E-31 shows the SWOT Analysis for TEDO or TERA, and Table E-32 is the Objectives Rubric for this opportunity. Both consider all alternatives of TEDO or TERA, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, or "All."



**Table E-28: SWOT Analysis for TEDO or TERA Opportunity**

<b>S</b>	<p><b>All</b> – Facilitates energy project development</p> <p><b>All</b> – Maintains ownership and capital return for tribal entity</p>	<p><b>All</b> – Mitigates the financial risk to the tribal entity</p>
<b>W</b>	<p><b>All</b> – Partnership means other stakeholders with ownership in a project</p> <p><b>B</b> – TERA is an older policy with more cumbersome requirements than a TEDO</p>	<p><b>All</b> – Comparison to full third-party development must be considered before establishing</p>
<b>O</b>	<p><b>All</b> – More and greater projects may be possible with developer or financier partnership</p>	<p><b>All</b> – The tribal entity may be empowered to define the legal structure of the partnership to best meet economic and sovereignty goals</p>
<b>T</b>	<p><b>All</b> – Legal requirements to form TEDO or TERA must be clarified before establishing</p>	<p><b>All</b> – Financial implications of a TEDO or TERA to the tribal entity must be clarified before establishing</p>
<p>S = Strength      W = Weakness      O = Opportunity      T = Threat  A = Application A      B = Application B      C = Application C      All = All Applications</p>		

**Table E-29: Objectives Rubric for TEDO or TERA Opportunity**

1	Improves affordability	▲
2	Maintains reliability	▲
3	Reduces carbon emissions	▲
4	Supports self-determination	▲
5	Enhances tribal sovereignty	▲▲
6	Protects natural resources	●
7	Preserves cultural resources	●
8	Encourages economic sustainability	▲
9	Promotes equitable access	●
10	Aligns with comprehensive plan	▲



## Net Zero Energy Building Design



Design facilities to be capable of achieving “net zero energy” through a combination of high-performance building design and designing solar ready rooftops. Net zero energy is defined as generating as much energy as the facility consumes on an annual basis. This is achieved through maximizing the space available for on-site renewable energy generation and designing the facility to be as energy efficient as possible or necessary for demand to equal supply. This is recommended to apply to both all homes and commercial buildings that are newly constructed or undergo major renovation.

---

### Alternative A: Net Zero Energy Design for Commercial Buildings

A policy to require all new commercial building construction and major renovations to be designed to net zero energy standards may be an opportunity to ensure energy performance best practices are included in all future projects. Net zero energy is complimentary to other sustainable design programs such as Leadership in Energy and Environmental Design (LEED) because it defines a minimum level of energy performance without specifying how. A net zero energy policy for commercial buildings may be incorporated into project procurement requirements and become one of the design standards that a prospective architecture or engineering firm must comply with in order to be selected for the project.

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### Alternative B: Net Zero Energy Design for Homes

A policy to require all new residential building construction and major renovations to be designed to net zero energy standards may be a similar opportunity to implementing a net zero energy policy for commercial facilities. One major difference relates to who would absorb the cost burden that comes from designing a building to net zero energy standards (typically, net zero energy results in a higher capital cost but a lower lifecycle cost). If this cost is added to the purchase price of a home, then prospective homeowners may not be interested in considering this program. However, CTUIR may be able to develop a policy that mitigates the marginal cost of a net zero energy home so the higher upfront cost of the better performing home is not passed on to tribal members; only the lifecycle benefit of greater energy security is.

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### Key Implementation Considerations

A net zero energy policy for new construction and major renovations of either commercial buildings or residential units must be thought through from a capital cost and lifecycle cost perspective. The benefits of a net zero energy building or home are clear (lower operating cost, greater energy security, more comfortable interior environment, etc.), but the burden of a marginal upfront cost increase may discourage program participation. In a well-designed building, this marginal cost for net zero energy can be minimal. For a well-designed policy, this marginal cost can be mitigated in other ways such as incorporating alternative financing strategies.



Table E-35 shows the SWOT Analysis for ECMs, and Table E-36 is the Objectives Rubric for this opportunity. Both consider all alternatives of ECMs, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, or “All.”

**Table E-30: SWOT Analysis for Net Zero Energy Building Design Opportunity**

<b>S</b>	<p><b>All</b> – Marginal cost is minimized when net zero design is accounted for on day one</p> <p><b>All</b> – Lifecycle cost performance is typically much better than conventional design</p>	<p><b>All</b> – A well-written policy can pass the burden of the performance to developer(s), not the tribal entity</p>
<b>W</b>	<p><b>All</b> – Does not address existing buildings (retrofits)</p>	<p><b>All</b> – High energy intensity facilities (e.g., industrial) may not be able to achieve net zero</p>
<b>O</b>	<p><b>All</b> – Often creates more comfortable indoor environments</p> <p><b>B</b> – Mitigates energy insecurity and energy cost inflation</p>	<p><b>A</b> – Reduces operating costs, supporting business performance</p>
<b>T</b>	<p><b>All</b> – Savings might not be realized if design is not verified post-construction</p>	<p><b>All</b> – Higher capital costs might threaten projects on a tight budget</p>

S = Strength      W = Weakness      O = Opportunity      T = Threat  
 A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-31: Objectives Rubric for Net Zero Energy Building Design Opportunity**

1	Improves affordability	▲▲
2	Maintains reliability	▲
3	Reduces carbon emissions	▲▲
4	Supports self-determination	▲▲
5	Enhances tribal sovereignty	▲
6	Protects natural resources	●
7	Preserves cultural resources	●
8	Encourages economic sustainability	▲
9	Promotes equitable access	▲▲
10	Aligns with comprehensive plan	▲



## Home Energy Auditing Program



Consider implementing energy conservation measures (ECMs) resulting from the energy auditing process to reduce energy consumption in buildings. Residents and members of the UIR would be directly engaged and responsible for steering their energy use based on results from the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) audits or recommendations driven by advancements in technological opportunities that make energy-consuming devices cheaper and more efficient through their life cycle. This includes home energy auditing, home weatherization, appliance upgrades; include auditing for electrification opportunities in homes; include auditing for STWH opportunities in homes.

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### Alternative A: Weatherization, Lighting, and Appliances

Consider light-emitting diode (LED) lighting retrofitting for lower energy and maintenance costs and easier operation. Consider efficient appliances and fixtures (ENERGY STAR appliances for example) in the case of water heaters and heat pumps, as well as washer/dryers, refrigerators, and televisions in residential settings. Finally, review the construction materials used for housing units, and consider other efficient building practices like weatherization, high R-value insulation in curtain walls, multi-pane windows, and interior and exterior barriers.

---

### Alternative B: Home Energy Generation

Consider incorporating the home energy supply strategies discussed in other Opportunities into a consolidated program that assesses home energy supply at all housing units on the UIR. This relates to the Residential Solar PV, Residential Wood Stoves, and Residential Solar Thermal Water Heating opportunities.

---

### Key Implementation Considerations

To minimize risk and maximize savings in ECMs, engage a single point-of-contact specialist like an energy auditor or energy savings company to provide a holistic approach. Also consider differences in approaches for the same application in residential spaces versus commercial spaces.

Table E-35 shows the SWOT Analysis for ECMs, and Table E-36 is the Objectives Rubric for this opportunity. Both consider all alternatives of ECMs, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, or "All."





**Table E-32: SWOT Analysis for Home Energy Auditing Program Opportunity**

<b>S</b>	<b>All</b> – Is based on accurate quantifiable savings reports	<b>All</b> – Is based on up-to-date technology recommendations
<b>W</b>	<b>All</b> – Would need to balance costs and benefits of investment	<b>All</b> – Requires costs to implement new technology
<b>O</b>	<b>All</b> – To reduce utility bills and maintenance costs <b>All</b> – To reduce CO <sub>2</sub> emissions	<b>All</b> – To improve occupancy comfort
<b>T</b>	<b>All</b> – Limited useful life of technologies	<b>All</b> – Failing to abide by recommended ECMs to save energy

S = Strength      W = Weakness      O = Opportunity      T = Threat  
 A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-33: Objectives Rubric for Home Energy Auditing Program Opportunity**

<b>1</b>	Improves affordability	▲▲
<b>2</b>	Maintains reliability	▲
<b>3</b>	Reduces carbon emissions	▲▲
<b>4</b>	Supports self-determination	▲▲
<b>5</b>	Enhances tribal sovereignty	▲
<b>6</b>	Protects natural resources	●
<b>7</b>	Preserves cultural resources	●
<b>8</b>	Encourages economic sustainability	▲▲
<b>9</b>	Promotes equitable access	▲▲
<b>10</b>	Aligns with comprehensive plan	▲



## Commercial Energy Auditing Program



Energy auditing is an essential strategy to ensuring that the CTUIR portfolio of buildings, as well as other non-CTUIR owned commercial facilities on the UIR, are operating at their best possible level of performance. Even if a facility was built to industry best practices for energy performance when it was new, energy technologies continue to advance and new opportunities for improved efficiency become available. Examples include the progression from T-12 fluorescent tubes to LED lighting in office spaces, and continued improvements in the Seasonal Energy Efficiency Ratio (SEER) of commercial chillers and packaged units. Period energy audits offer a methodical pathway to identify where these advancements in energy efficiency may be applied to commercial facilities on the UIR.

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### Alternative A: ASHRAE Level 1 Audit

Consider auditing energy usage of buildings to build a comprehensive plan to improve energy efficiency. A Level 1 audit is a basic high-level audit of commercial buildings' operations and energy usage. Activities like interviewing key personnel and site walk-throughs will engage the UIR community. The goal of an ASHRAE Level 1 audit is to gather data and identify potential gaps and opportunities in the energy efficiency of buildings.

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### Alternative B: ASHRAE Level 2 Audit

Consider pursuing a Level 2 audit by going deeper into the data collection and reporting of energy consumption trends. Building personnel would work with utility providers Pacific Power and UEC to define strategies to improve energy efficiency at the best return on investment (ROI).

---

### Key Implementation Considerations

A comprehensive energy audit should cover all building systems and controls. Equipment and building project life are critical to life-cycle costing, which is a vital part of the report that is used to determine the best way to reduce energy use. It is also necessary to review feasibility and constructability of implementing any retrofits.

Table E-37 shows the SWOT Analysis for a commercial energy conservation program, and Table E-38 is the Objectives Rubric for this opportunity. Both consider all alternatives of commercial energy conservation programs, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, or "All."



**Table E-34: SWOT Analysis for a Commercial Energy Auditing Program Opportunity**

<b>S</b>	<p><b>All</b> – Estimates savings to acceptable degree of accuracy</p> <p><b>All</b> – Acquires quantifiable consequences</p>	<p><b>All</b> – Receive up-to-date advice on new technologies</p>
<b>W</b>	<p><b>All</b> – Iterative process due to technologies and tariffs</p>	<p><b>All</b> – Need investment in preliminary design and specifications</p>
<b>O</b>	<p><b>All</b> – To identify large number of savings potentials</p> <p><b>All</b> – To avoid investments in technologies with low savings potential</p>	<p><b>All</b> – To optimize energy expenditure and performance</p> <p><b>All</b> – To increase life span of equipment</p>
<b>T</b>	<p><b>All</b> – Limited useful life of technologies</p>	<p><b>All</b> – Failing to abide by report's recommendations to save energy</p>

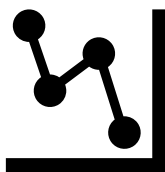
S = Strength      W = Weakness      O = Opportunity      T = Threat  
A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-35: Objectives Rubric for a Commercial Energy Auditing Program Opportunity**

1	Improves affordability	▲▲
2	Maintains reliability	▲
3	Reduces carbon emissions	▲▲
4	Supports self-determination	▲▲
5	Enhances tribal sovereignty	▲
6	Protects natural resources	●
7	Preserves cultural resources	●
8	Encourages economic sustainability	▲▲
9	Promotes equitable access	▲
10	Aligns with comprehensive plan	▲



## Energy Management Program



Consider tracking and optimizing energy consumption to conserve usage in buildings. Data tracked and collected by energy monitors should be analyzed by trained professionals (they can be members of the reservation who have completed the Energy Training Program) to optimize set points and flow rates of building systems. Other responsibilities of the trained professionals would be to record important findings at least annually and update the roadmap of energy programs in alignment with the energy-specific vision of the CTUIR community. Useful tools for this purpose would be a centralized workstation and dashboard within CTUIR to track progress against key metrics in order to measure the success of tribal programs as they are implemented.

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### Alternative A: Energy Usage and Carbon Emission Tracking

Energy metrics such as total purchased energy, total generated energy, scope 1 and scope 2 greenhouse gas emissions, and net energy intensity can be tracked to measure progress toward the Energy Vision and Goals defined in Chapter 3. During updates to the SEP, these metrics become important to inform whether the selected strategies are sufficient to stay on track toward the Goals or whether new / additional strategies need to be prioritized.

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### Alternative B: ESG Tracking

In addition to energy metrics, several of the Goals and Targets defined in Chapter 3 relate to topics that fall more broadly in the bucket of Environmental, Social, and Governance (ESG). Metrics for tracking these Targets are defined in Chapter 3, but there is room to elaborate on these tracking metrics to be able to measure progress more robustly in these Goals. Opportunities to elaborate include developing additional environmental metrics (natural resources), cultural metrics (historic preservation), energy equity metrics, and others.

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### Key Implementation Considerations

Calculating the return of investment based on metered energy units is an important step before executing energy optimization solutions. Collection and analysis of utility bill and meter data needs to be an iterative process to track progress of energy savings.

Table E-39 shows the SWOT Analysis for an energy management program, and Table E-40 is the Objectives Rubric for this opportunity. Both consider all alternatives of energy management programs, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, or “All.”



**Table E-36: SWOT Analysis for an Energy Management Program Opportunity**

<b>S</b>	<p><b>All</b> – Reduces operating costs  <b>All</b> – Reduces CO<sub>2</sub> emissions</p>	<p><b>All</b> – Reduces risk of energy price increase</p>
<b>W</b>	<p><b>All</b> – Certification feeds for management personnel</p>	<p><b>All</b> – Need regular maintenance of documents</p>
<b>O</b>	<p><b>All</b> – To support compliance with environmental regulations</p>	<p><b>All</b> – To promote further sustainability initiatives</p>
<b>T</b>	<p><b>All</b> – Cost of installing building automation systems</p>	<p><b>All</b> – Maintenance costs</p>

S = Strength      W = Weakness      O = Opportunity      T = Threat  
 A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-37: Objectives Rubric for an Energy Management Program Opportunity**

<b>1</b>	Improves affordability	▲▲
<b>2</b>	Maintains reliability	▲
<b>3</b>	Reduces carbon emissions	▲
<b>4</b>	Supports self-determination	▲
<b>5</b>	Enhances tribal sovereignty	▲
<b>6</b>	Protects natural resources	▲▲
<b>7</b>	Preserves cultural resources	▲▲
<b>8</b>	Encourages economic sustainability	▲
<b>9</b>	Promotes equitable access	▲▲
<b>10</b>	Aligns with comprehensive plan	▲▲



## Energy Skills Training Program



Consider providing training to the CTUIR members and residents on systems and technologies that help plants and buildings run more efficiently. The training would engage students in conducting energy audits and learning how to install energy-efficient retrofits. Generating an interest within the community in the *Comprehensive Plan* would both educate students on green building science and promote new jobs in the sustainable

environment industry. Train how to do energy audits.

---

### Alternative A: Energy Auditing

If the energy auditing opportunity is pursued, then there may be an opportunity to train tribal members to become qualified energy auditors capable of performing the work. Experienced energy auditing service providers may be brought in to guide the tribal personnel through on-the-job experience to fulfill the bulk of the labor burden required for energy auditing while ensuring high quality analysis for making sound energy investment decisions.

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### Alternative B: Energy Plant Operations

If any community-scale energy generation plants are selected (e.g., geothermal, solar PV, biomass CHP, micro-hydropower, etc.), then there may be an opportunity to train tribal members to become qualified energy plant operators. Experienced plant operators may be brought in to guide the tribal personnel to ensure quality excellence is maintained. Energy plant operation offers the potential for several permanent, high-wage jobs for tribal members, depending on the scale of the energy plant(s).

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### Alternative C: Electrical Infrastructure Maintenance

If the TUA opportunity is selected, then there may be an opportunity to train tribal members to become qualified energy distribution system maintainers and energy grid operators. Experienced electrical utility operators may be brought in to guide the tribal personnel and ensure safety and reliability standards are cost-effectively maintained.

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### Key Implementation Considerations

A variety of training methods and certifications should be made available to the CTUIR community to facilitate learning. For example, hands-on tasks at plants can equip up-and-coming graduates with the skills needed for energy and waste assessments. It is also important to emphasize to the trainees how new technologies and materials fit into the local energy codes.

Table E-41 shows the SWOT Analysis for an energy skills training program, and Table E-42 is the Objectives Rubric for this opportunity. Both consider all alternatives of energy skills training programs, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished to apply to either Alternatives A, B, C, or “All.”



**Table E-38: SWOT Analysis for an Energy Skills Training Program Opportunity**

<b>S</b>	<p><b>All</b> – Professional career development in green buildings</p> <p><b>All</b> – Hands-on experience in energy assessments</p>	<p><b>All</b> – Inform families in the reservation on ECMs</p> <p><b>All</b> – Acquire skill set to find jobs elsewhere</p>
<b>W</b>	<p><b>All</b> – Time and cost to become certified practitioners in the field</p>	<p><b>All</b> – Need to understand new energy code language</p>
<b>O</b>	<p><b>All</b> – To lean powerful decision support software loads to analyze and implement energy savings measures</p>	<p><b>All</b> – To help companies maximize benefits based on energy standards</p> <p><b>All</b> – To promote job growth in new industry</p>
<b>T</b>	<p><b>All</b> – Relationship between technology application and management principles</p>	<p><b>All</b> – Cost of developing curriculum</p>

S = Strength      W = Weakness      O = Opportunity      T = Threat  
 A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-39: Objectives Rubric for an Energy Skills Training Program Opportunity**

<b>1</b>	Improves affordability	▲
<b>2</b>	Maintains reliability	▲
<b>3</b>	Reduces carbon emissions	●
<b>4</b>	Supports self-determination	▲▲
<b>5</b>	Enhances tribal sovereignty	▲▲
<b>6</b>	Protects natural resources	●
<b>7</b>	Preserves cultural resources	▲
<b>8</b>	Encourages economic sustainability	●
<b>9</b>	Promotes equitable access	▲▲
<b>10</b>	Aligns with comprehensive plan	▲▲



## Nixya’awii Community Financial Services (NCFS) Loans for Energy-related Investments



By leveraging federal programs that provide loan guarantees to rural or tribal organizations, or to specifically support clean energy-related investments, NCFS may be able to maximize its loan offerings while minimizing its risk. NCFS may also elect to allow Tribal Member distributions to be used as income for loan repayment. These loans, in turn, will be instrumental in creating local demand for energy improvements, which will then support the need for an energy skills training program. The federal loan guarantee opportunities are discussed further in the Implementation Plan section of the SEP.

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### Alternative A: NCFS Loans for Energy-related Investments

Consider partnering with NCFS, which is a community development financial institution (CDFI), to provide locally sourced low-interest loans to assist CTUIR tribal members with energy-related investments, such as energy audits, retrofits, or solar panel investments.

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### Key Implementation Considerations

Capacity and timing are the primary considerations for this strategy. Understanding NCFS’ capacity to secure loan guarantees and manage a loan program, including associated financial risks, will be an important factor for developing a local loan program. The loan program should also be timed to coincide with the availability of related programs, such as residential solar or wood stoves, which will be important for facilitating program participation.

Table E-43 shows the SWOT Analysis for NCFS loans, and Table E-44 is the Objectives Rubric for this opportunity. Both consider all alternatives of NCFS loans, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished.





**Table E-40: SWOT Analysis for NCFS Loans Opportunity**

<b>S</b>	<b>All</b> – Eases access to capital for energy-related investments and reduces up-front costs for residents and businesses	<b>All</b> – Decreases capital cost of loans for tribal members <b>All</b> – Invests money directly into the community
<b>W</b>	<b>All</b> – May require NCFS to secure federal loan guarantee(s), which may be labor intensive	
<b>O</b>	<b>All</b> – Timing the loan program to coincide with the launch of the energy-related program(s) it will support	
<b>T</b>	<b>All</b> – Potential of other regional banks to offer similar loan products at a lower price, which would mitigate the purpose of the loan partnership	

S = Strength      W = Weakness      O = Opportunity      T = Threat  
 A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-41: Objectives Rubric for NCFS Loans Opportunity**

<b>1</b>	Improves affordability	▲
<b>2</b>	Maintains reliability	●
<b>3</b>	Reduces carbon emissions	▲
<b>4</b>	Supports self-determination	▲▲
<b>5</b>	Enhances tribal sovereignty	▲▲
<b>6</b>	Protects natural resources	▲
<b>7</b>	Preserves cultural resources	▲
<b>8</b>	Encourages economic sustainability	▲▲
<b>9</b>	Promotes equitable access	▲▲
<b>10</b>	Aligns with comprehensive plan	▲



## Energy Efficiency and Renewable Energy Seed Fund



Consider developing a seed fund to provide financial assistance to energy efficiency and renewable energy (EERE) projects that benefit the CTUIR and its tribal members. This seed fund would increase the pool of available capital to tribal members and reduce the financial barriers of implementation. As energy projects are financed, implemented, and become cash-positive over time, the return in investment can be reinvested in new energy projects, accelerating progress toward the energy goals by increasing available capital and reducing reliance on third-party financing.

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### Alternative A: Seed Fund established from energy generation and conservation projects

CTUIR could accrue funding for the seed fund from the savings it receives from its renewable energy and energy efficiency investments, such as the Solar PV Array under consideration for the Coyote Business Park, an LED Lighting Retrofit project, or a possible geothermal electricity generation plant.

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### Key Implementation Considerations

A financial analysis should be conducted to understand the amount of seed funding needed, both at the start and ongoing, in order to incite action. This analysis would include identifying the types of activities that would be funded with the seed funding and which upfront implementation barriers may be particularly challenging to securing funding. This would then inform the amount of funds that would need to be available per recipient and, in turn, the amount of money that should be in the fund itself. If earned savings alone do not generate enough funding, then CTUIR could consider a revolving loan fund concept instead. This analysis would be the basis for the seed fund's business plan. CTUIR may also consider the impact of the seed fund program on CTUIR finances, such as an opportunity cost analysis. Finally, CTUIR will need to consider the governance of the fund and any legal factors to ensure transparency and long-term feasibility.

Table E-45 shows the SWOT Analysis for a seed fund, and Table E-46 is the Objectives Rubric for this opportunity. Both consider all alternatives of seed funds, and in the SWOT Analysis, each strength (S), weakness (W), opportunity (O), and threat (T) are distinguished.



**Table E-42: SWOT Analysis for a Seed Fund Opportunity**

<b>S</b>	<b>All</b> – Eases access to capital for energy-related investments and reduces up-front costs for Tribal Members and businesses	<b>All</b> – Invests money directly into the community
<b>W</b>	<b>All</b> – Opportunity costs associated with distributing CTUIR funds outside of the immediate agency	
<b>O</b>	<b>All</b> – Timing the loan program to coincide with the launch of the energy-related program(s) it will support	<b>All</b> – Provides “proof of savings” to Tribal Members
<b>T</b>	<b>All</b> – Without a well-researched business plan the opportunity costs associated with the seed fund could risk financial well-being of CTUIR, particularly in a time of economic hardship	

S = Strength      W = Weakness      O = Opportunity      T = Threat  
 A = Application A      B = Application B      C = Application C      All = All Applications

**Table E-43: Objectives Rubric for EERE Seed Fund Opportunity**

1	Improves affordability	▲
2	Maintains reliability	●
3	Reduces carbon emissions	▲
4	Supports self-determination	▲▲
5	Enhances tribal sovereignty	▲▲
6	Protects natural resources	▲
7	Preserves cultural resources	▲
8	Encourages economic sustainability	▲▲
9	Promotes equitable access	▲▲
10	Aligns with comprehensive plan	▲