Strategic Energy Plan

October 12, 2022

Version 1.0

Cayuse – Umatilla – Walla Walla
Confederated Tribes of the Umatilla Indian Reservation

To create an energy future where **independence** and **reliability** maximize **tribal sovereignty**, **affordability**, and **access** for the Umatilla Indian Reservation community in a manner that respects **Tamánwit**, protects and enhances **treaty-reserved resources**, and is consistent with the **Comprehensive Plan**

Confederated Tribes of the Umatilla Indian Reservation

Strategic Energy Plan

Final

Prepared by AECOM

May 5, 2022

Amended and Finalized by CTUIR EST for BOT Adoption
October 12, 2022

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Executive Summary

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) has a role in leading its community through a complex time in the energy landscape. It is a time of urgency but also a time full of opportunity. The need to mitigate and adapt to a changing climate, preserve and restore Treaty Reserved Rights, and advance the aims of economic development and self-determination is strong and urgent, but the opportunities presented by emerging technologies, innovative business models, and forward-thinking policies and funding streams mean that more solutions are available now than ever before. The 2020-2021 Board of Trustees of the CTUIR identified the urgency and opportunity and prioritized action by authorizing the formation of an Energy Strategy Team to be responsible for developing a CTUIR Strategic Energy Plan.

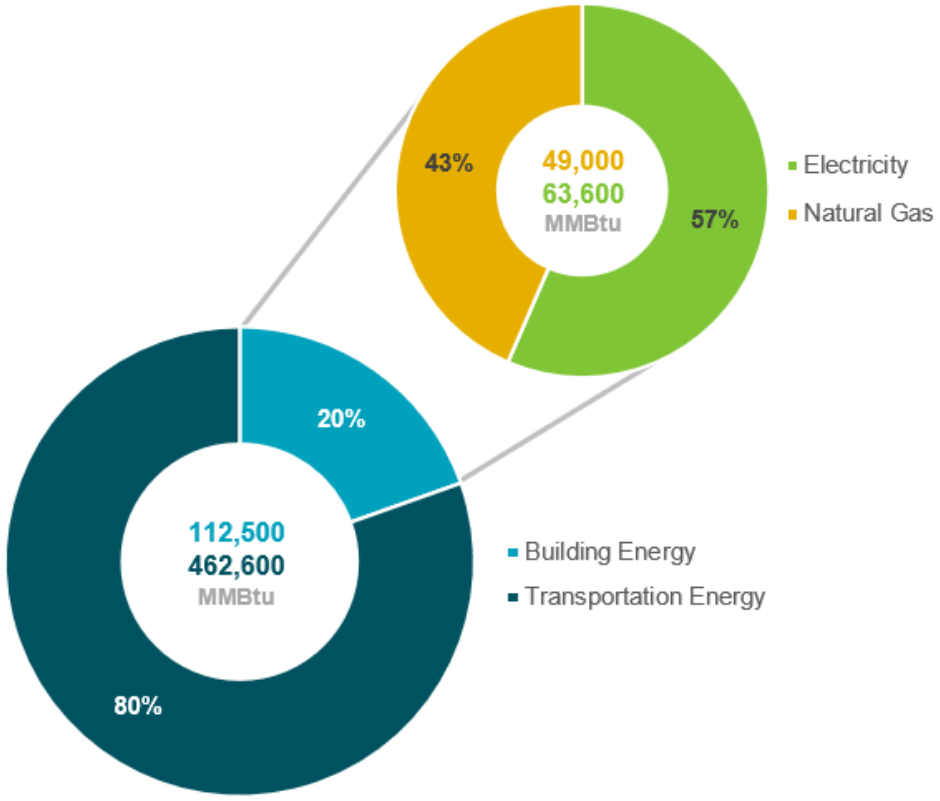
Major revisions to the CTUIR Strategic Energy Plan may occur at five-year intervals, and such major revisions will be provided to the Board of Trustees for their review and approval.

Through broad community engagement, extensive technical analysis, persistent tribal leadership, and iterative problem solving, the CTUIR Strategic Energy Plan achieves the following four objectives:

- Defines the existing energy landscape
- Develops a common energy vision for the community
- Identifies and assesses Energy Opportunities
- Charts an actionable roadmap to execute the Energy Vision

The CTUIR is a union of the Cayuse, Umatilla, and Walla Walla Tribes and has approximately 3,100 Tribal Members. About half of the Tribal Members live on or near the Umatilla Indian Reservation (UIR), which is also home to 300 Tribal Members from other tribes and 1,500 non-Tribal Members. The Umatilla Indian Reservation (UIR) covers approximately 273 square miles on the north side of the Blue Mountains in northeastern Oregon.

As illustrated in **Figure ES-1**, in 2019, the CTUIR consumed approximately 18,600 MWh (63,600 MMBtu) per year in electricity, 49,000 MMBtu per year in natural gas (Pacific Power, UEC, CNG, 2021), and 4,054,000 GGE (462,600 MMBtu) per year in transportation energy (CTUIR, 2020). Transportation energy consumption accounts for nearly four times more energy than the total building energy consumption (electricity and natural gas), which may be due to the high volume of vehicle miles driven for fleet vehicles relative to the size of the building portfolio. Six facilities are responsible for consuming approximately 73% of the total building energy consumption of 112,500 MMBtu per year across CTUIR accounts. Approximately 43% of total building energy consumption comes from natural gas used for heating, which has implications for reservation greenhouse gas emissions and energy sovereignty. Approximately 30% of residential homes use natural gas for heating, and 70% use heating fuel such as propane and wood.



Sources: CTUIR Fuel Purchases, Pacific Power Metered Utility Data, UEC Metered Utility Data, CNG Metered Utility Data

Figure ES-1: Total building and transportation energy consumption

The CTUIR purchases 94% of its electricity from Pacific Power and 6% from Umatilla Electric Cooperative (UEC). According to Oregon DOE (2020), over half of Pacific Power's electricity resource mix comes from coal, whereas over half of UEC's energy is supplied by hydropower. While Pacific Power and UEC are striving to transition to more sustainable energy generation alternatives, energy consumption for the UIR from the current energy resource mix currently yields a blended average rate of greenhouse gas (GHG) emissions of 0.661 MtCO2e/MWh, surpassing Oregon's emission rate of 0.363 MtCO2e/MWh and the national average of 0.401 MtCO2e/MWh (Oregon DEQ, 2019).

The consumption of electricity derived from coal, which produces GHG emissions, and hydropower, which impacts salmon fishery health and Treaty Reserved Rights to first foods access, drives the need for CTUIR to take ownership of energy supplies serving the UIR by pursuing alternative energy generation sources.

The Energy Vision for the CTUIR community reflects the existing energy landscape, the results of a community-wide survey that was conducted to capture Tribal Member values and priorities, and previous efforts to establish goals and priorities for energy systems for the CTUIR, including the *Comprehensive Plan: The Confederated Tribes of the Umatilla Indian Reservation* (CTUIR, 2018) and the *2009 Energy Policy* (CTUIR, 2009).

CTUIR Energy Vision

To create an energy future where **independence** and **reliability** maximize **tribal sovereignty**, **affordability**, and **access** for the Umatilla Indian Reservation community in a manner that respects **Tamánwit**, protects and enhances **treaty-reserved resources**, and is consistent with the **Comprehensive Plan**.

The Energy Vision is divided into 10 Energy Objectives, summarized in **Table ES-1**, each with an Energy Goal. Summarized in **Table ES-1**, each Energy Goal has an associated Energy Target and Key Performance Indicator (KPI). The Energy Goals and Energy Targets are intended to be considered when planning to implement an Energy Opportunity.

Table ES-1: Energy Objectives and Energy Goals

Energy Objective	Energy Goal
1. Improves affordability of Energy	Mitigate against the rising cost of energy
2. Maintains reliability or Electricity Supply	Minimize power outages
3. Reduces carbon emissions	Reduce GHG emissions
4. Supports self-determination	Contribute to community members' ability to steer their lives
5. Enhances tribal sovereignty	Increase capacity for self-governance through reduced tribal interference from outside authorities
6. Protects natural resources	Mitigate negative impacts to (or contribute positively to) tribal land, water, and air resources
7. Preserves cultural resources	Mitigate negative impacts to (or contribute positively to) treaty rights access, viewsheds, historical landmarks, and other cultural resources
8. Encourages economic sustainability	Achieve lifecycle financial viability (positive return on investment)
9. Promotes equitable access	Help all community members have an equally effective chance of receiving energy-related services
10. Aligns with *Comprehensive Plan*	Align with the goals and vision in the *Comprehensive Plan*

Table ES-2: Energy Targets and Key Performance Indicators

Energy Target	Key Performance Indicator (KPI)
1. Prevent energy rates from increasing faster than benchmark inflation.	Track community-wide energy rates in units of **$ per kWh**.
2. Maintain power reliability at current System Average Interruption Duration Index / System Average Interruption Frequency Index (SAIDI / SAIFI) performance or better.	Track **SAIDI / SAIFI values** as projects are implemented and ensure that values are equal to or better than baseline.
3. Reduce all electricity-related GHG emissions within the UIR to zero by 2050.	Track reduction of emissions in units of **mtCO_2e**.[1]
4. Increase energy independence through local production of energy resources.	Track the **percentage** of energy produced locally compared to energy consumed within the UIR.[1]
5. Pursue programs that generate greater legal autonomy over UIR energy resources.	Track whether a program generates greater legal autonomy with a **YES** or **NO**.
6. Align all projects and programs with the First Foods Policy (CTUIR, in progress).	Track whether a project or program aligns with the *First Foods Policy* with a **YES** or **NO**.
7. Align all projects and programs with the *Historic Preservation Code* (CTUIR, 2016)	Track whether a project or program aligns with the *Historic Preservation Code* with a **YES** or **NO**.
8. Pursue energy investments that have a positive Return on Investment (ROI).	Track whether an energy investment has a positive ROI with a **YES** or **NO**.
9. Design energy programs so that all community members have equal access to participation.	Track whether an energy program offers equal access to enrollment with a **YES** or **NO**.
10. Align all projects and programs with the *Comprehensive Plan*.	Track whether an energy project or program aligns with the *Comprehensive Plan* with a **YES** or **NO**.

Using the Energy Objectives, over 40 potential Energy Opportunities were evaluated, listed in **Table ES-3** for Technological Energy Opportunities and **Table ES-4** for Programmatic Energy Opportunities. The opportunities span a range of clean energy technology solutions and governmental policies and programs. The Energy Opportunities selected for further action in the Implementation Roadmap enable rapid and meaningful progress toward the Energy Goals.

Table ES-3: List of Technical Energy Opportunities

1.	**Alternative Fuel Sales: A** Alternative Liquid Fuels Sales at ATP	11.	**Building Electrification: B** Residential Building Electrification	20.	**Smart Meters**
2.	**Alternative Fuel Sales: B** EV Charging	12.	**Geothermal: A** Geothermal Electricity Generation	21.	**Solar PV: A** Community-scale Ground-mounted Solar PV
3.	**Alternative Fuel Sales: C** Hydrogen gas	13.	**Geothermal: B** Geothermal District Heating System	22.	**Solar PV: B** Solar PV on Commercial Rooftops and Parking Area
4.	**Battery Energy Storage System (BESS): A** Community-scale Lithium Ion (Li-ion)	14.	**Hydropower: A** Small-scale Hydroelectric Power at McKay Reservoir	23.	**Solar PV: C** Solar PV on Residential Rooftops
5.	**BESS: B** Other Community-scale Battery Technologies	15.	**Hydropower: B** Microscale Hydroelectric Power at Umatilla River Fisheries	24.	**Solar Thermal Water Heating (STWH): A** Residential STWH
6.	**BESS: C** EV to Grid	16.	**Hydropower: C** In-line Hydroelectric Power at Pressure-Reducing Valves with the Water Distribution System	25.	**STWH: B** STWH at WRC
7.	**Biomass: A** Biomass Combined Heat and Power (CHP) for WRC	17.	**Infrastructure Hardening: A** Underground Power Distribution Lines	26.	**Vehicle Electrification: A** Fleet Vehicle Electrification
8.	**Biomass: B** Residential Wood Stoves	18.	**Infrastructure Hardening: B** Protected Energy Assets	27.	**Vehicle Electrification: B** Specialty Vehicle Electrification
9.	**Biomass: C** Commercial Biomass Boilers	19.	**Microgrid Controls**	28.	**Wind Turbines** Community-scale Wind Turbine
10.	**Building Electrification: A** Electric Heat Pumps for Commercial Buildings				

Photo of Umatilla Indian Reservation

Table ES-4: List of Programmatic Energy Opportunities

1.	**Commercial Energy Auditing: A** ASHRAE Level 1 Audits	6.	**Energy Skills Training Program: A** Energy Auditing Skills Training	11.	**Net Zero Energy Building Design**
2.	**Commercial Energy Auditing: B** ASHRAE Level 2 Energy Audits	7.	**Energy Skills Training Program: B** Energy Plant Operations Skills Training	12.	**Nixyáawii Community Financial Services (NCFS) Loans for Energy-Related Investments**
3.	**Energy Efficiency and Renewable Energy (EERE) Seed Fund**	8.	**Energy Skills Training Program: C** Electrical Infrastructure Maintenance	13.	**Tribal Energy Development Organization (TEDO): A**
4.	**Energy Management Program: A** Energy Usage and GHG Emission Tracking	9.	**Home Energy Auditing: A** Home Energy Conservation Assessment	14.	**TEDO: B** Tribal Energy Resources Agreement (TERA)
5.	**Energy Management Program: B** Environmental Social Governance Tracking	10.	**Home Energy Auditing: B** Home Energy Generation Assessment	15.	**Tribal Utility Authority (TUA)**

The Energy Opportunities that are recommended for further consideration, based on their progress toward achieving the Energy Vision, are assembled into an Action Plan. To reduce the complexity, the Energy Opportunities identified for further consideration are divided into two core tracks, Centralized Actions and Distributed Actions. **Table ES-5** and **Table ES-6**, respectively, summarize the Energy Opportunities that are recommended for further consideration. The Action Plan serves as a kind of recipe book for the CTUIR to take decisive next steps to build early momentum in priority areas (such as community solar PV feasibility studies), while keeping in mind the longer term actions that will become higher priority after initial groundwork has been completed (such as considering hydrogen fuel sales).

Funding and financing mechanisms that could be used to support the implementation of the recommended Energy Opportunities include grant funding for energy projects that are supported by federal, state, and local initiatives; financing strategies such as loans and bonds specially constructed for energy projects and tribal communities, and incentive programs for consumers and private entities.

Table ES-5: List of Energy Opportunities with Centralized Actions

1	**Alternative Fuel Sales: B** EV Charging	8	**Energy Skills Training: B** Energy Plant Operations	15	**Microgrid**
2	**Alternative Fuel Sales: C** Hydrogen	9	**Energy Skills Training: C** Electrical Infrastructure	16	**Solar PV: A** Ground-mounted
3	**BESS: A** Lithium Ion	10	**Geothermal: A** Geothermal Electricity	17	**TEDO: A or B** TEDO or TERA
4	**Biomass: A** CHP	11	**Geothermal: B** Geothermal Heating	18	**TUA**
5	**EERE Seed Fund**	12	**Hydro: A** Small-hydro at McKay Reservoir	19	**Vehicle Electrification: A** Fleet Vehicle Electrification
6	**Energy Management: A** Energy Usage and Carbon Emission	13	**Hydro: B** Microhydro at Umatilla River Fisheries	20	**Wind Turbines**
7	**Energy Management: B** ESG Tracking	14	**Infrastructure Hardening: B** Protected Assets		

Table ES-6: List of Energy Opportunities with Distributed Actions

1	**Biomass: B** Residential Wood Stoves	11	**Home Energy Auditing: A and B** Weatherization, Lighting, and Appliances (A) and Home Energy Generation (B)	20	**Smart Meters**
2	**Building Electrification: A and B** Commercial Electric Heat Pumps (A) and Residential Building Electrification (B)	12	**Infrastructure Hardening: A** Underground Distribution Lines	21	**Solar PV: B** Commercial Rooftop / Parking
3	**Commercial Energy Auditing: A and B** ASHRAE Level 1 Audit (A) ASHRAE Level 2 Audit (B)	13	**NCFS Loans / Investments**	22	**Solar PV: C** Residential Rooftop
4	**Energy Skills Training: A** Energy Auditing	14	**Net Zero Energy Building Design**		

The combination of all Actions working together in the Action Plan results in multiple pathways to achieve substantial local and renewable energy generation, significant CO_2 emission reductions, and progress toward greater tribal sovereignty and self-determination, all while addressing energy affordability and resilience and preserving natural and cultural resources.

With the Strategic Energy Plan as a guide, the CTUIR is equipped to take on the urgent, complex, and multifaceted challenges related to energy systems that face the community now and into the future.

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Acronyms and Abbreviations

ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ATP	Arrowhead Travel Plaza
BESS	battery energy storage systems
BEV	battery electric vehicle
BOT	CTUIR Board of Trustees
BPA	Bonneville Power Administration
CDFI	community development financial institution
CHP	combined heat and power
CNG	Cascade Natural Gas
CO_2	carbon dioxide
COM	Communications Department
COVID	Coronavirus Disease 2019
CREP	Community Renewable Energy Grant Program
CRITFC	Columbia River Inter-Tribal Fish Commission
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
DEQ	Department of Environmental Quality
DERA	Diesel Emissions Reduction Act
DHW	domestic hot water
DNR	Department of Natural Resources
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DX	direct expansion
ECD	Department of Economic and Community Development
ECM	energy conservation measure
EERE	Office of Energy Efficiency & Renewable Energy
EIA	Energy Information Administration
EMDP	Energy and Mineral Development Program
EPA	U.S. Environmental Protection Agency
ESC	energy service company
ESG	environmental, social and governance
ESPC	Energy Savings Performance Contracting
EST	Energy Strategy Team
EUI	energy use intensity
EV	electric vehicle
EVSE	electrical vehicle supply equipment
EXD	Office of the Executive Director
GGE	gas gallon equivalent
GHG	greenhouse gas
GO	general obligation
GSA	General Services Administration
HUD	United States Department of Housing and Urban Development
hydro	hydroelectric power
ICE	internal combustion engine
kBtu	kilo-British thermal unit
kWh	kilowatt-hour
LED	light-emitting diode
LGL	Office of Legal Counsel
li-ion	lithium-ion
LPG	liquified petroleum gas
MM	Mission Market
MMBtu	million British thermal units
MtCO2e	metric tons of carbon dioxide equivalent
MW	megawatt
MWh	megawatt hour
n.d.	no date
NCFS	Nixyáawii Community Financial Services
NGC	Nixyáawii Governance Center
NPV	Net Present Value
ODOE	Oregon Department of Energy
P3	public-private partnership
PACE	Property Assessed Clean Energy
PEV	plug-in electric vehicle
PPA	power purchase agreement
PV	photovoltaic
REC	renewable energy credit
RECS	Residential Energy Consumption Survey
ROI	return on investment
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SEP	Strategic Energy Plan
SMART	Specific, Measurable, Actionable, Realistic, and Time-bound
sq ft	square foot
STWH	Solar Thermal Water Heating
SWOT	Strengths, Weaknesses, Opportunities, and Threats

TBD	to be decided
TED	Tribal Economic Development
TEDC	Tribal Energy Development Capacity
TEDO	Tribal energy development organization
TERA	Tribal Energy Resources Agreement
TPO	Tribal Planning Office
TUA	Tribal Utility Authority
TWT	Tamánwit
UEC	Umatilla Electric Cooperative
UIR	Umatilla Indian Reservation
USDA	U.S. Department of Agriculture
VRF	variable refrigerant flow
WAP	Weatherization Assistance Program
WRC	Wildhorse Resort & Casino

1. Introduction

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) is a union of the Cayuse, Umatilla, and Walla Walla Tribes and has approximately 3,100 Tribal Members. About half of the Tribal Members live on or near the Umatilla Indian Reservation (UIR), which is also home to 300 Tribal Members from other tribes and 1,500 non-Tribal Members.

The UIR covers approximately 273 square miles on the north side of the Blue Mountains in northeastern Oregon and is close to the small communities of Pendleton, Adams, Athena, Weston, and Pilot Rock, which have a combined population of 19,448.

The CTUIR oversees the following economic and government service enterprises in the UIR: Wildhorse Resort & Casino (WRC), Wildhorse Golf Club, Cayuse Technologies, Arrowhead Travel Plaza (ATP), Coyote Business Park, Nixyáawii Community School, Yellowhawk Tribal Health Center, Nixyáawii Community Financial Services, Nixyáawii Governance Center (NGC), and Mission Market (MM). The CTUIR also represents Tribal Members and entities located outside the UIR boundary.

Background

The vision in CTUIR's 2018 *Comprehensive Plan* is in part to "… strive to, once again, be a sustainable, empowered, and prosperous nation" (CTUIR, 2018). The energy element in the *Comprehensive Plan* establishes a need to pursue sustainable energy that creates independence.

> "Pursue **sustainable energy** that creates **independence** for the Tribal community to meet all energy needs and uses while reducing impacts to the **Treaty Reserved Rights**."
>
> Source: 2018 CTUIR Comprehensive Plan, p. 123

More broadly, the CTUIR energy context sits within the regional energy context overseen by the Columbia River Inter-Tribal Fish Commission (CRITFC). In the *Energy Vision for the Columbia River Basin* (CRITFC, 2021), which is being updated at the time of writing, a call to action is made for "federal, state, and tribal governments [to] work together on a regional plan for where renewable resources should be developed, and where they should not, and to provide expeditious siting with clear and uniform standards across all political subdivisions" (p. 10). This regional context aligns with the CTUIR's 2018 *Comprehensive Plan* and further emphasizes the imperative for the CTUIR to develop a Strategic Energy Plan (SEP) that addresses this regional priority within the local setting.

The current UIR energy landscape is as follows:

- The energy that the UIR consumes comes from **non-renewable sources**, which impact air quality and fishery health, and from renewable sources.
- The UIR is dependent on **third-party utilities** for energy supply and delivery.
- The rate of **greenhouse gas** (GHG) emissions from the energy the UIR consumes is higher than the national average.

To help fulfill the vision and pursue sustainable energy, CTUIR has developed a Strategic Energy Plan (SEP), which is presented in this document. The SEP follows the guidance in the *Strategic Energy Plan and Planning Handbook* from the U.S. Department of Energy's (DOE's) Office of Indian Energy (DOE, 2014). The steps the CTUIR Board of Trustees (BOT) took that led to the creation of the SEP are summarized in **Figure 1**.

The SEP provides a framework for the CTUIR to achieve the following four objectives:

- Define the existing energy landscape
- Develop a common energy vision for the community
- Identify and assess Energy Opportunities
- Chart an actionable roadmap to execute the Energy Vision

Implementing the SEP will benefit the CTUIR by, for example, creating long-lasting momentum for energy initiatives, reaching community consensus on established goals, following a prioritized action plan for near- and long-term energy programs and initiatives, and providing access to resources to help guide decisions and project implementation.

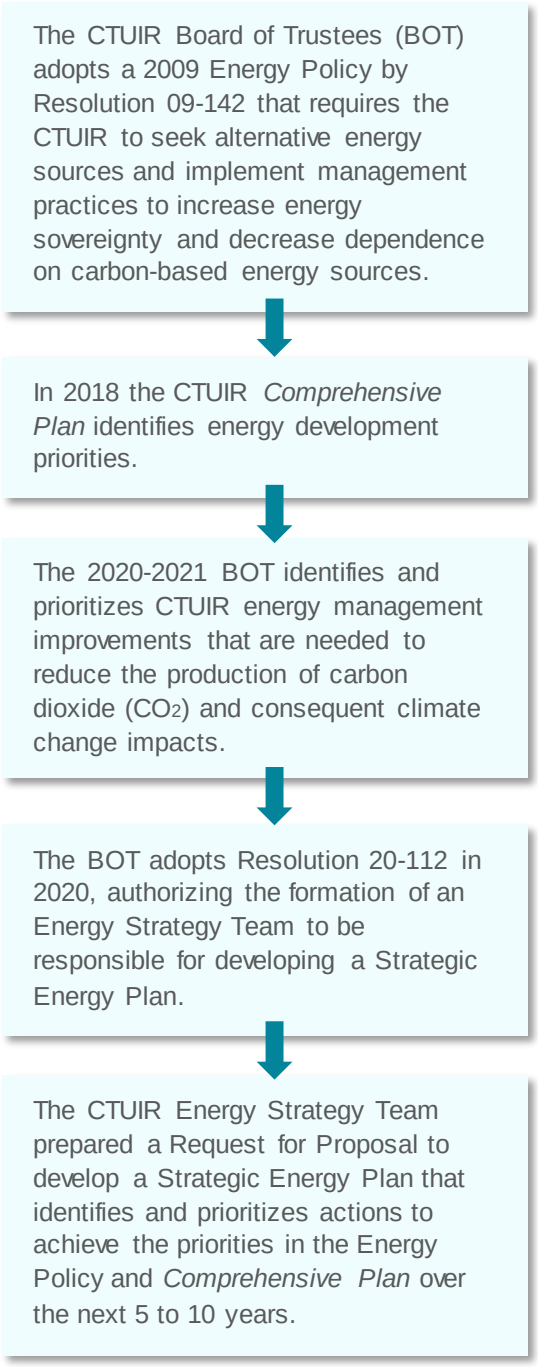


Figure 1: Timeline of the creation of the Strategic Energy Plan

SEP Structure

The structure of the SEP is as follows:

- **Chapter 1**: Background on CTUIR, UIR, and the SEP; the Energy Strategy Team (EST); and SEP maintenance
- **Chapter 2**: Existing energy landscape, which is the baseline for development of the SEP
- **Chapter 3**: Energy Vision, which is based on extensive stakeholder input and the Energy Goals and Targets
- **Chapter 4**: Technological and programmatic Energy Opportunities that are available to the CTUIR
- **Chapter 5**: Implementation roadmap that illustrates how the Energy Opportunities may be brought together to achieve the Energy Goals and the prioritized next steps that serve as a starting point to put the SEP into action

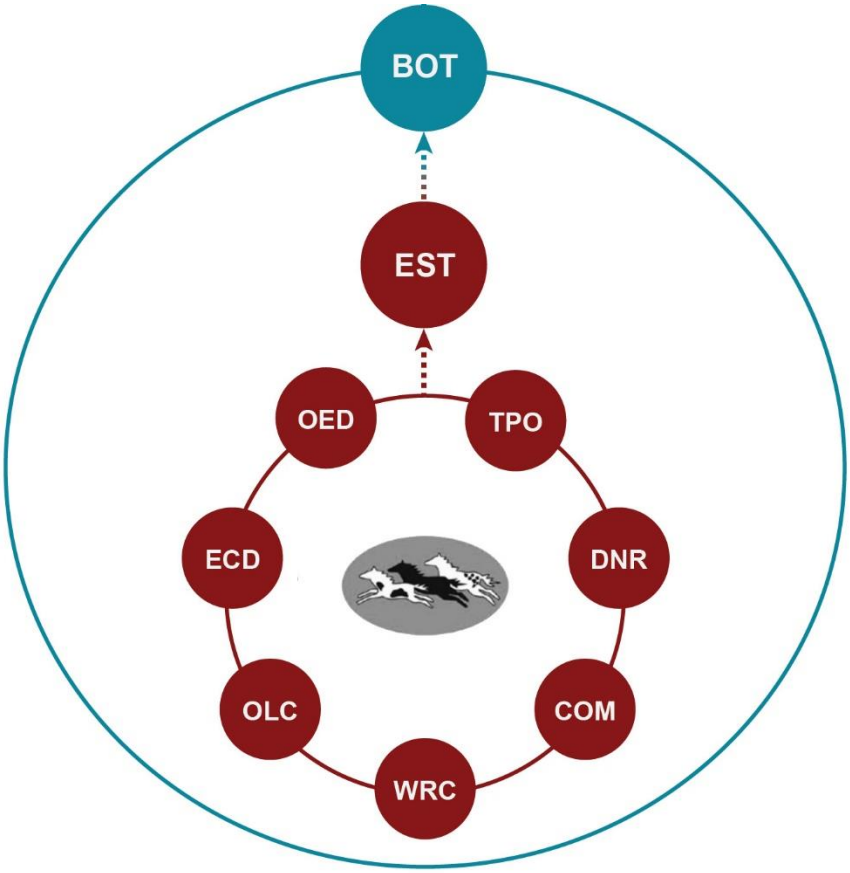
The SEP is a living document that will mature as the opportunities are evaluated, new technologies emerge, and community priorities evolve.

Energy Strategy Team

The successful implementation of the Energy Opportunities describe in Chapter 4 relies on the support and internal cooperation of an **Energy Strategy Team** (EST). The EST is authorized by the CTUIR Board of Trustees (BOT) in Resolution 20-112 as being responsible for implementing the SEP. The EST includes representatives from seven CTUIR departments (see **Figure 2**:**)**.

The members of the EST are expected to own certain initiatives from the SEP. Each Potential Action that is developed from the Energy Opportunities that are described in Chapter 4 requires various members of the EST to be responsible for implementing the action. The graphic below in figure 2 describes the primary energy strategy team members that are likely to be involved in all aspects of energy resource management and development. There are several secondary departments and enterprises that were included in the development of this plan including public works, Tamástslikt cultural institute, housing, and others. The energy portfolio manager will be the lead of the energy strategy team and will reside within the office of executive director. This position will be responsible for assigning the appropriate responsibilities and authority to each department, program, or enterprise required to develop and manage energy resources consistent with annual work plans and departmental functions.

The EST may coordinate with important **stakeholders** to obtain input on project development, feedback, and support. Stakeholders include the Yellowhawk Tribal Health Center, Tamástslikt Cultural Institute, CTUIR Housing Department, CTUIR Department of Education, other CTUIR agencies, other tribal entities such as the Columbia River Inter-Tribal Fish Commission (CRITFC), and other non-tribal agencies as they relate to project initiatives.



Board of Trustees (BOT)
Gives final project approval as the EST develops formal project proposals informed by the SEP. Major revisions to the SEP should be approved by the BOT.

Office of the Executive Director (OED)
Guides the overall direction of the EST, leads or selects the lead for the EST from the available representatives, and adds members as required.

Tribal Planning Office (TPO)
Maintains the Comprehensive Plan and develops energy codes.

Dept. of Economic & Community Development (ECD)
Deploys energy projects that have been demonstrated as feasible.

Dept. of Natural Resources (DNR)
Protects cultural and natural resources in addition to completing feasibility studies to identify energy sources that protect treaty reserved resources.

Office of Legal Counsel (OLC)
Ensures legal compliance with the energy portfolio including review of contracts, grants, and agreements.

Communications Department (COM)
Communicates SEP impacts to the community and ensures messaging is consistent with policies.

Wildhorse Resort & Casino (WRC)
Identifies and supports project deployment and financing related to WRC, ATP, MM, and others.

Figure 2: Energy Strategy Team representatives

SEP Maintenance

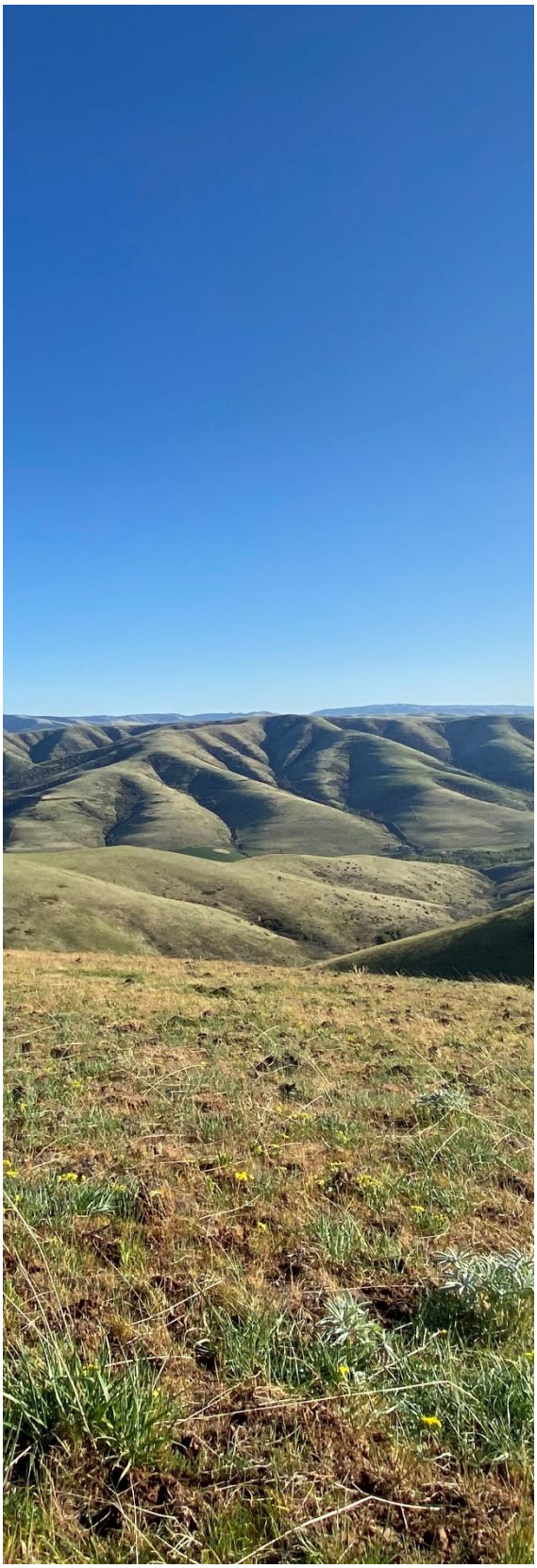
Staying open to the dynamic nature of energy technologies and energy priorities, the SEP is not intended to be a static document that is completed one time but rather a living document that is updated and course-corrected at regular intervals to ensure that it remains relevant to the community in future years.

The SEP will be reviewed and updated as follows:

- **Minor revisions** will occur annually. A minor revision includes updates of key metrics and the status of identified Potential Actions (e.g., pending, completed).
- **Major revisions** will occur every 5 years or when any of the criteria listed below are met. A major revision includes reassessing the Energy Opportunities, reprioritizing the Potential Actions, and revising the Energy Goals as needed. BOT approval of the revised plan will occur for major revisions.

The criteria for a major revision are as follows:

- Completion of any major project (project that has a notable impact on the CTUIR's existing energy landscape) such as:
  - A new development project that increases total energy consumption notably
  - A new energy generation project that reduces net purchased electricity notably
- Completion of a feasibility study that impacts the future of certain initiatives
- A new energy technology that has emerged and that has not been considered
- The key performance indicators in Chapter 3 deemed off-track for the achievement of the Energy Goals



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2. Existing Energy Landscape

CTUIR's existing energy landscape (supply, usage, and generation) forms the baseline of the SEP. Developing an understanding of the landscape requires identifying the utility infrastructure and the authorities that supply energy, obtaining data on how much energy is consumed, and compiling the existing energy generation assets.

Utility Infrastructure

Oregon's electricity is generated predominantly outside the state and imported. According to the Oregon Department of Energy's (Oregon DOE's) *2020 Biennial Energy Report*, most of Oregon's energy use is sourced from hydropower, coal, and natural gas generation, with other generation from wind, solar, and other sources (Oregon DOE, 2020).

Photo of Umatilla Indian Reservation

The physical delivery of electricity from the regional grid to eastern Oregon is managed by the Bonneville Power Administration (BPA), a federal agency under the DOE. BPA owns a high-voltage transmission line that runs through the UIR. Pacific Power and Umatilla Electric Cooperative (UEC) own substations west of the UIR that step down the high-voltage power to medium-voltage distribution lines and distributes electricity to end users.

The CTUIR purchases 92% of its electricity from Pacific Power, an investor-owned utility, and 6% from UEC, a cooperative utility. CTUIR relies on Pacific Power to supply electricity to major accounts on the UIR with high electricity usage, such as WRC, Yellowhawk Tribal Health Center, and Cayuse Technologies. UEC provides electricity mostly to housing units on the UIR.

According to Oregon DOE (2020), over half of Pacific Power's electricity comes from coal, whereas approximately half of UEC's energy is supplied by BPA, the source of which is 83% from hydropower, 12% from nuclear, and 5% from market purchases. The remaining half of UEC's energy is sourced from 40% market purchases and 10% hydropower.

The physical delivery of natural gas to the UIR is managed by Cascade Natural Gas (CNG) through a high-pressure gas line that runs through the UIR. All natural gas accounts across the UIR are with CNG, which is responsible for the safe and reliable delivery of natural gas to end users.

Heating fuel is used on the UIR where natural gas supply lines do not exist. Heating fuels include propane and wood, which are purchased in the community.

CTUIR purchases transportation energy for its General Services Administration (GSA) and non-GSA vehicles. Fuel is typically purchased from the Arrowhead Travel Plaza (ATP). Both diesel fuel and unleaded gasoline are delivered to the ATP by tanker truck.

Figure 3 shows the energy resource mix supplying CTUIR. As can be seen in the figure, the source of 56% of the electricity that is supplied to CTUIR is coal; the sources of the remaining 44% are divided among natural gas (18%), market purchases (12%), wind (7%), hydropower (5%), BPA supplied, petroleum, geothermal, solar, and other sources (2% collectively). Due to lack of available data, only natural gas is shown as the source of heating energy, though many homes on the UIR use other energy sources for heating.

While Pacific Power and UEC are striving to transition to more sustainable energy generation alternatives, energy consumption for the UIR from the current energy resource mix currently yields a blended average rate of GHG emissions of 0.661 MtCO2e/MWh, surpassing Oregon's emission rate of 0.363 MtCO2e/MWh and the national average of 0.401 MtCO2e/MWh (Oregon DEQ, 2019).

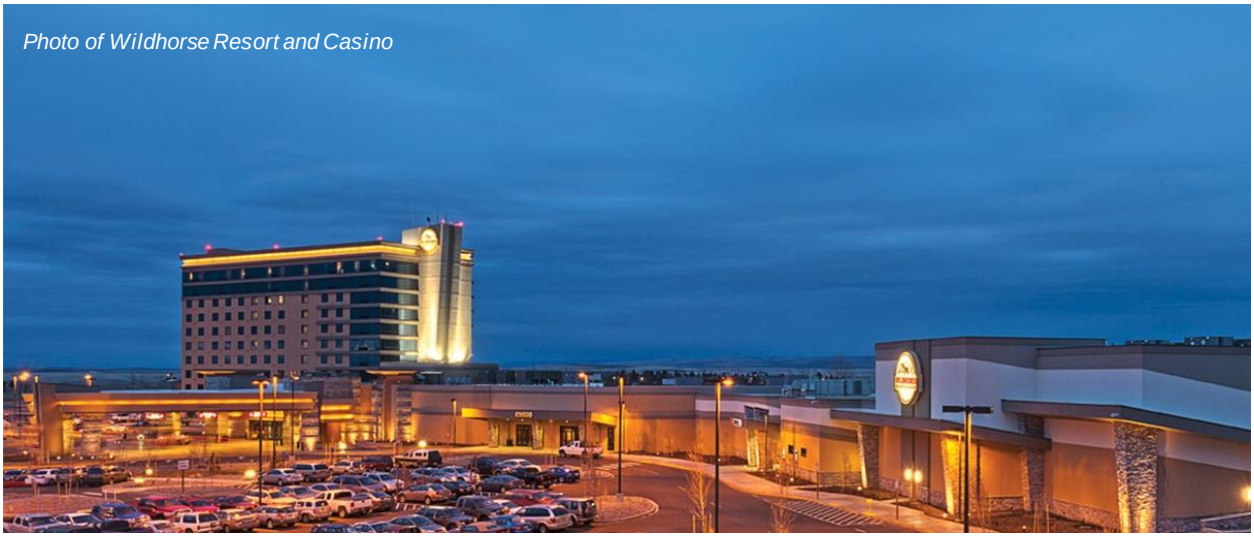


Photo of Wildhorse Resort and Casino

Sources: CTUIR Utility Data from CNG, Pacific Power and UEC; Oregon Department of Energy: Electricity Mix in Oregon (https://www.oregon.gov/energy/energy-oregon/pages/electricity-mix-in-oregon.aspx)

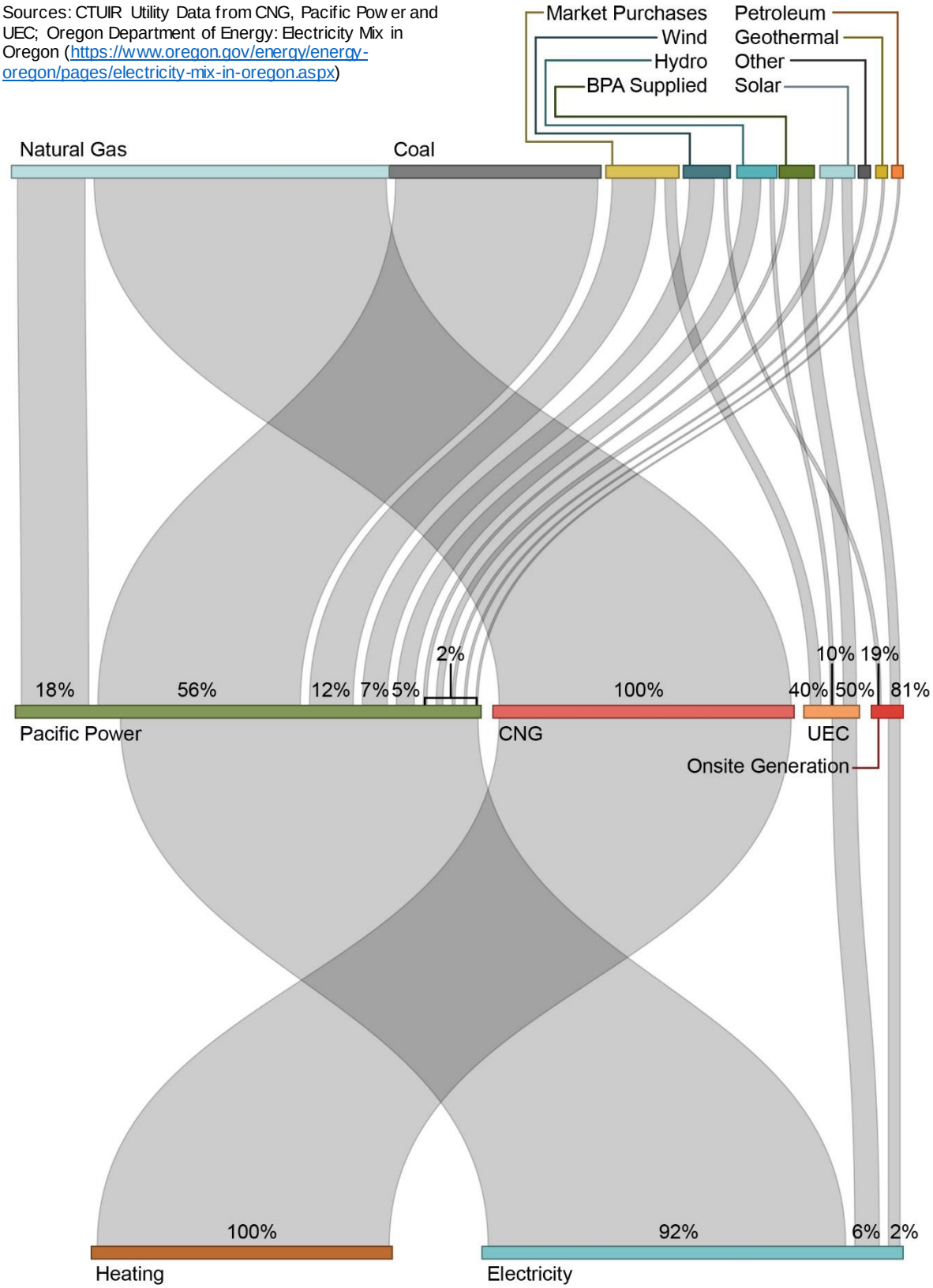


Figure 3: Sankey diagram of CTUIR energy sources

Energy resources physically enter the UIR from multiple sources. **Figure 4** illustrates the primary energy infrastructure on the UIR, including high-voltage regional transmission lines, Pacific Power and UEC transmission lines that deliver power to the UIR, the natural gas transmission line that serves the UIR as well as the broader region, and the liquid fuel pipeline passes through the reservation.

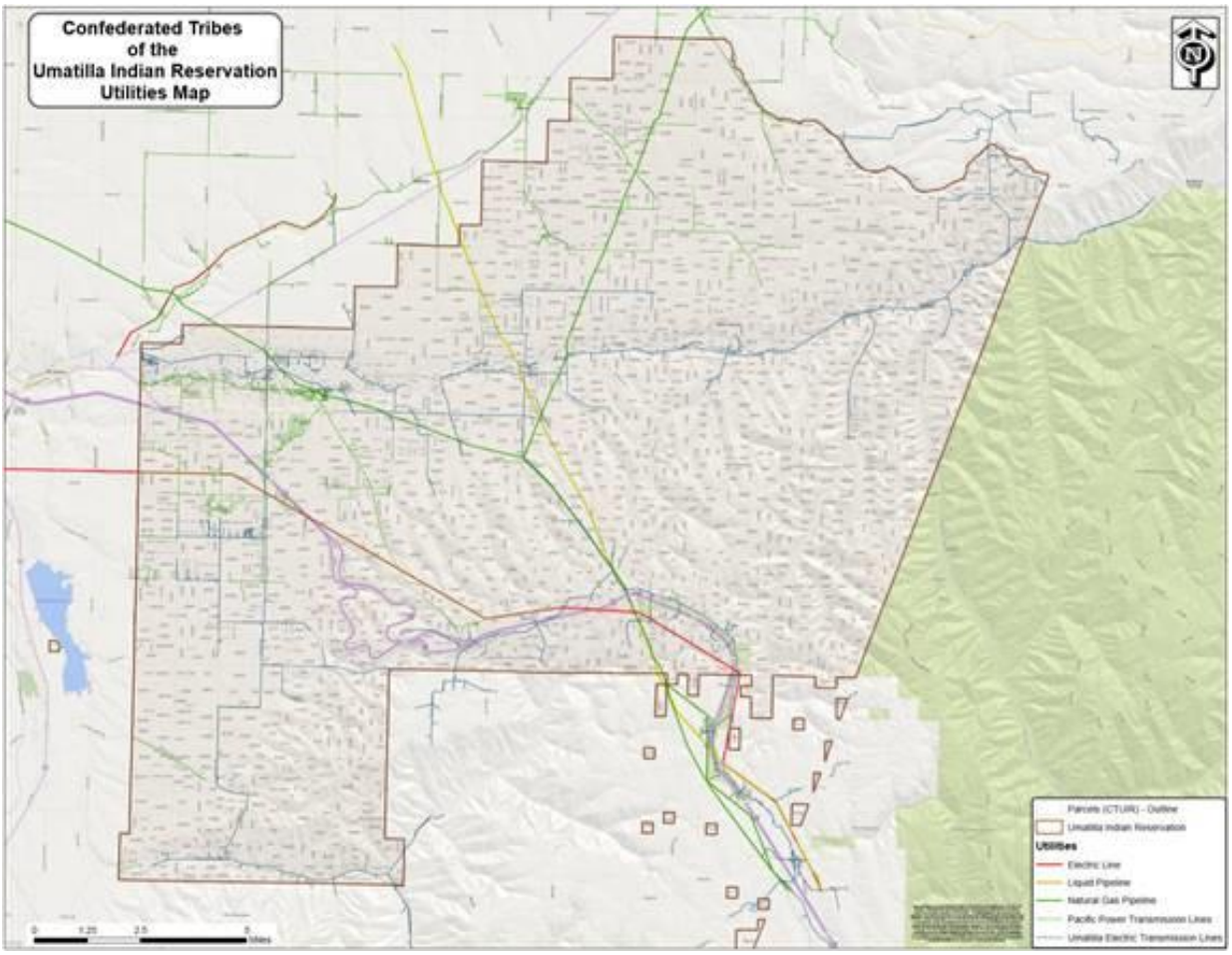


Figure 4: CTUIR primary energy infrastructure (CTUIR)

Baseline Energy Consumption

A full understanding of CTUIR's energy consumption will pave the way for the development of applicable Energy Opportunities. Knowing how much energy is consumed and how energy is used (e.g., for cooling and heating in buildings, transportation) informs the Energy Opportunities that are most impactful and that should be considered in order to achieve the Energy Vision and the goals in the CTUIR's 2018 *Comprehensive Plan*.

Commercial Building Consumption

Commercial buildings in the UIR span a range of ages. The characteristics of a building based on when it was designed and constructed significantly influence its energy performance and vary greatly between old and new construction, both of which exist on the UIR.

Energy use intensity (EUI) is a ratio of the total annual energy consumed by a building to the gross floor area of a building and is used to compare energy performance across building age and typologies (e.g., offices, restaurants, laboratories). The lower the EUI, the more energy efficient a facility is. For example, the EUI of a 10,000 sq ft building that used 500,000 kBtu in 1 year is 50 kBtu/sq ft (500,000/kBtu / 10,000 sq ft = 50 kBtu/sq ft). If the same building consumed 1 million kBtu in 1 year, the EUI would be 100 kBtu/sq ft (1,000,000/kBtu / 10,000 sq ft = 100 kBtu/sq ft).

> **29% reduction** in commercial EUI from pre-1980 to new construction in a climate similar to UIR's

Some of the oldest buildings on the UIR date to the 1960s, and some were built recently. More construction is anticipated in the future. The energy efficiency of buildings has increased drastically with improved construction practices, such as better insulation and modern systems, such as high-efficiency heating and cooling systems. According to the DOE, the average EUI of a typical medium office building in a climate similar to UIR's (American Society of Heating, Refrigerating and Air-Conditioning Engineers [ASHRAE] climate zone 5b) and built before 1980 is 66.1 kBtu/sq ft (DOE, n.d.a). The average EUI of the same building built to ASHRAE 2004 standards or later is 46.8 kBtu/sq ft (DOE, n.d.a). Over time, improved design, construction and operations practices have resulted in an average EUI reduction of 29% for a typical medium office building.

With a mixed portfolio of aged, recently renovated, and new commercial buildings on the UIR, the baseline annual energy consumption of major commercial bulidings can be developed from facility utility data from Pacific Power, UEC, and CNG. Data from calendar years 2019 and 2020 were available at the time of writing, but due to unforseen impacts from the 2020 pandemic, the 2019 dataset was used for analysis to represent a typical operational year.

Commercial buildings on the UIR use primarily electricity for lighting, cooling, ventilation, and plug loads. Natural gas, where available, is used primarily for space heating, domestic hot water, and specific loads such as laundry facilities at the WRC. **Table 1** and **Table 2** list the major utility accounts that represent the majority of building energy consumption. The tables illustrate the number of major accounts per utility and the consumption of energy by facility.

Table 1: UIR Electricity Consumption in 2019 by Facility

Provider	Account or Category	Consumption in 2019 (MWh)	Percent of Total Electricity
Pacific Power	Wildhorse Resort & Casino	12,000	64%
	Yellowhawk Tribal Health Center	915	5%
	Cayuse Technologies	780	4%
	Arrowhead Travel Plaza	720	4%
	Nixyáawii Community School	450	2%
	Umatilla Residential Housing Authority	110	1%
	Mission Market	80	0.4%
	Nixyáawii Governance Center	40	0.2%
	CTUIR Housing Department	3	0.02%
Umatilla Electric Corp.	CTUIR Housing Authority	3	0.02%
Total		**15,100**	**81%**

Source: CTUIR Utility Data from Pacific Power and UEC

Table 2: UIR Natural Gas Consumption in 2019 by Facility

Provider	Account or Category	Consumption in 2019 (MMBtu)	Percent of Total Natural Gas
Cascade Natural Gas	Wildhorse Resort & Casino	28,000	57%
	Aggregated data(1)	10,000	20%
	Tamástslikt Cultural Institute	1,000	2%
	Kayak Public Transit	160	0.3%
	Mission Market	135	0.3%
	Nixyáawii Community School	130	0.3%
	Nixyáawii Governance Center	130	0.3%
Total		**39,600**	**80%**

Source: CTUIR Utility Data from CNG

(1) Aggregated data (combination of multiple natural gas accounts) were used when account data release forms could not be obtained.

Residential Building Consumption

Residential buildings in the UIR also span a range of ages. The characteristics of a building based on when it was designed and constructed significantly influence the energy performance (measured in EUI) and vary greatly between old and new construction.

Some of the oldest homes on the UIR date to the 1950s, and some were built recently. More construction is anticipated in the future. Energy efficiency of homes on the UIR have drastically increased with improved design in the newer homes, such as better insulation, tighter building envelope, more efficient heating and cooling systems, and more efficiency ENERGY STAR-rated appliances. Increased efficiency is particularly true for the transition from 1950s era mobile homes to modern prefabricated modular homes. 27 single-wide trailer homes from the 1960s were replaced, and more replacements are not anticipated. However, 70 new units are expected to be completed over the next 18 months; about half of the units will be apartments and the other half single-family units.

68% reduction in residential EUI from pre-1980 mobile home to modern single-family home

While data for home energy performance in the UIR are not available, anecdotal evidence confirms alignment with industry trends. According to the U.S. Energy Information Administration's (EIA) "Residential Energy Consumption Survey (RECS)," the average EUI of a typical mobile home built before 1980 is 100 kBtu/sq ft, and the total EUI of a single-family home built in 2015 or later is 33 kBtu/sq ft (EIA, 2015). Over time, improved design, construction, and operations practices have resulted in an average EUI reduction of 68% when a typical aged mobile home is converted to a modern single-family home.

Using these industry trends, an estimate for existing residential energy consumption can be developed. **Table 3** summarizes the total count of homes on the UIR by age and building type and includes an assumed EUI based on RECS data.

In total, the estimated annual residential energy consumption on the UIR is approximately 2,500 MWh (electricity) and 9,000 MMBtu (heating) based on the building stock provided in **Table 3** and the average home energy use trends reported in RECS. Note that heating energy comprises natural gas consumption and other heating fuel sources such as propane or wood. According to CTUIR's *Strategic Energy Plan Survey* (2021), approximately 30% of residential homes use natural gas while 70% of residential homes use other heating fuel sources.

Table 3: UIR Residential Energy Consumption by Home Typology

Home Type	Year Built	Number of Units	Assumed MMBtu/unit
Huckleberry site	1980-1999	8	58
Scattered site	1980-1999	14	58
HUD	Pre-1980	60	54
	1980-1999	130	58
	2000-2015	8	73
Manufactured homes	2016 or later	18	64
Manufactured homes[1]	2016 or later	35	64
Multifamily[1]	2016 or later	35	38
Total		**308**	**56[2]**

Source: Table CE1.5 RECS Survey Data (U.S. EIA) (2015)

(1) Under development

(2) Weighted average across all residential units

Transportation Energy Consumption

Transportation energy information is sourced from the CTUIR's log of fuel purchases for GSA vehicles and non-GSA vehicles. The transportation energy consumption analysis included only GSA and non-GSA fleet vehicles in the UIR Transient vehicles (i.e., vehicles that pass through the ATP) were not included. In 2019, the CTUIR consumed 4,054,000 GGE (462,600 MMBtu) across GSA and non-GSA fuel purchases. **Table 4** lists the total annual transportation energy consumption measured by the CTUIR.

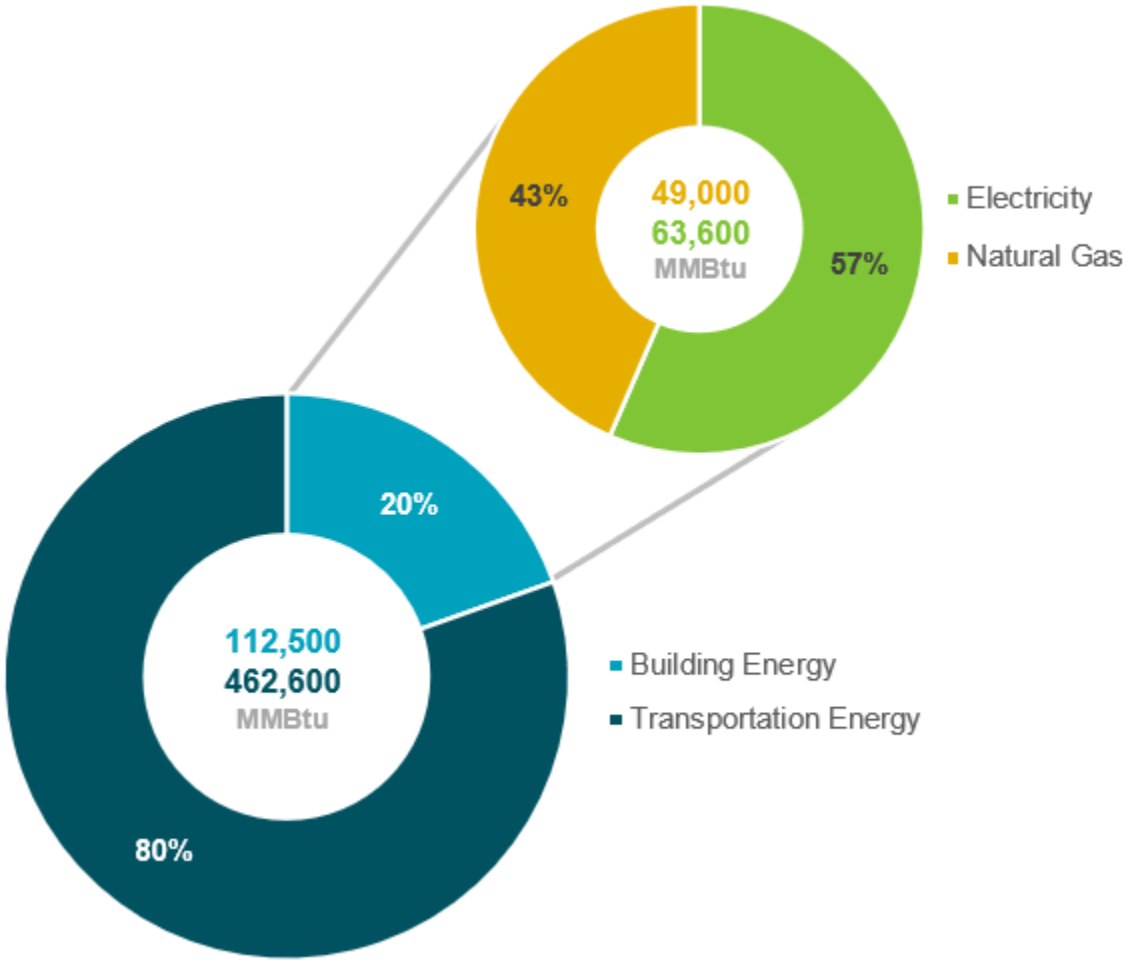
Table 4: UIR Transportation Energy Consumption in 2019

Provider	Account or Category	Fuel (GGE)	Percent of Total Fuel
CTUIR purchases	GSA vehicles	3,871,400	95%
	Non-GSA vehicles	182,600	5%
	Total	**4,054,000**	**100%**

Source: CTUIR Fuel Purchases for GSA and Non-GSA Vehicles

Total Energy Consumption

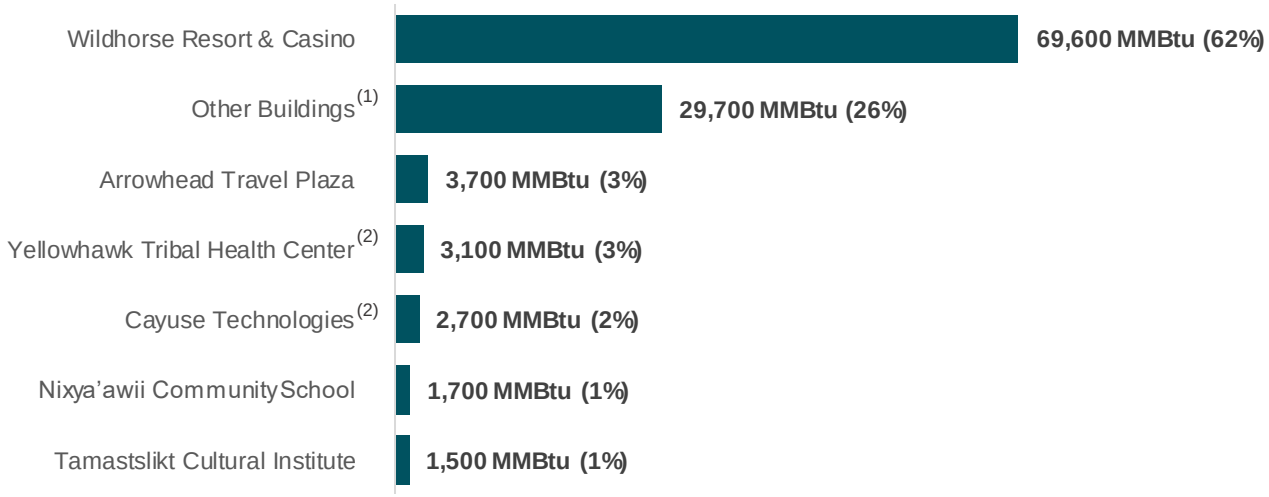
Based on 2019 data, the CTUIR and other facilities on the UIR consume approximately 18,600 MWh (63,600 MMBtu) per year in electricity, 49,000 MMBtu per year in natural gas, and 4,054,000GGE (462,600 MMBtu) per year in transportation energy. **Figure 5** compares the annual consumption of electricity, natural gas, and transportation energy. Building energy consumption is split into approximately 57% electricity and 43% natural gas across all facilities for which data are available. Transportation energy consumption accounts for nearly four times more energy than the total building energy consumption (electricity and natural gas), which may be due to the high volume of vehicle miles driven for fleet vehicles relative to the size of the building portfolio. One implication of the difference between transportation energy and building energy consumption is that the relative impacts of Energy Opportunities related to transportation are higher than for opportunities related to buildings because the total energy consumption and GHG emissions are higher.



Sources: CTUIR Fuel Purchases, Pacific Power Metered Utility Data, UEC Metered Utility Data, CNG Metered Utility Data

Figure 5: Total building and transportation energy consumption

For building energy consumption, Figure 6 illustrates the top energy users across the CTUIR, combining electricity and natural gas consumption. Six facilities are responsible for consuming approximately 73% of total building energy use across CTUIR accounts. The estimated total residential energy consumption and smaller building consumption are combined into a single value, shown as "Other Buildings."

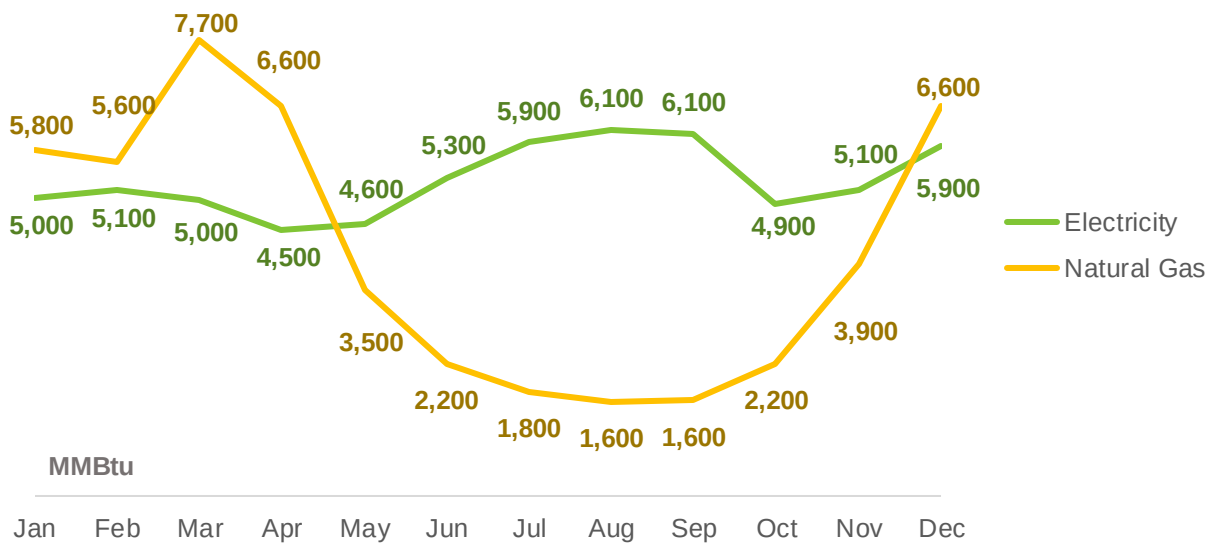


Source: CTUIR Utility Metered Data from Pacific Power, UEC, and CNG
(1) Residential buildings and commercial buildings that have smaller energy consumption
(2) Insufficient natural gas data

Figure 6: Annual energy consumption (electricity and natural gas) for top energy users

On a monthly basis, the CTUIR building energy consumption shows clear trends. Aligned with weather patterns, natural gas consumption increases significantly during the winter, while in the summer it reduces to a minimum, likely serving a baseload heating demand for domestic hot water, cooking, and other loads. Electricity demand meanwhile increases in the summer, aligned with the increase in electricity demand for cooling during the summer. **Figure 7** illustrates these trends.


Photo of Wildhorse Resort and Casino



Source: CTUIR Utility Metered Data from Pacific Power, UEC, and CNG

Figure 7: Monthly building energy consumption

Anticipated Load Growth

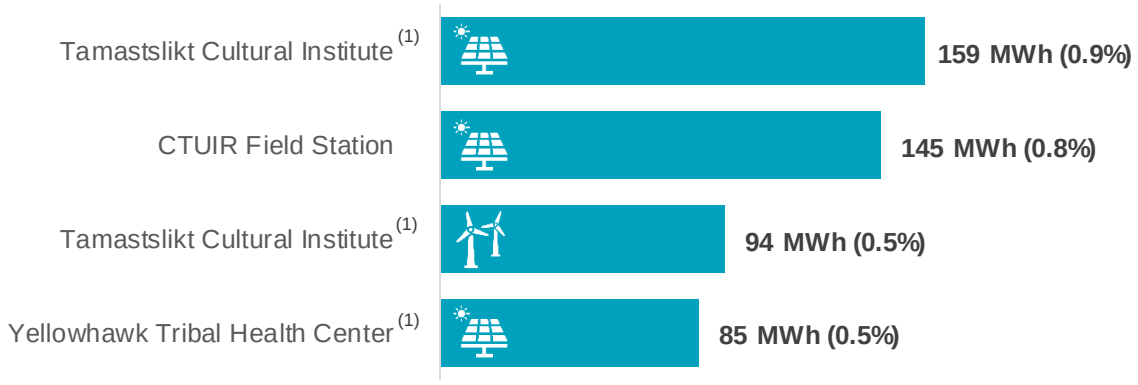
In addition to the existing energy consumption baseline summarized above, the following development projects are anticipated to increase increase energy demand on the UIR.

- Housing project: Approximately 70 new units, about half apartments and half single family, are anticipated to be completed by 2023, which will increase both residential electricity and heating energy consumption.
- Wildhorse Resort & Casino (WRC) tower: Anticipated future expansion of WRC is expected to increase load demand by appropriately 3% per year in annualized terms from existing load demand, in line with historical growth trends.
- Additional development projects that are not as clearly defined may also be realized.

These planned projects are anticipated to increase electricity demand by approximately 7,000 MWh (24,000 MMBtu) and increase heating demand by approximately 15,000 MMBtu, following baseline design, construction, and operation practices. The anticipated electrical and natural gas load growth can be mitigated if certain Energy Opportunities outlined in Chapter 3 are adopted.

Existing Generation

The CTUIR has established the following renewable energy generation systems: one wind turbine system at Tamástslikt Cultural Institute and three solar photovoltaic (PV) arrays: one at the CTUIR Field Station, one at the Tamástslikt Cultural Institute, and one at the Yellowhawk Tribal Health Center. Combined, the systems are estimated to produce an average of 480 MWh (1,600 MMBtu) annually, which offsets less than 3% of electricity purchases. **Figure 8** compares generation capabilities of each renewable system on the UIR; the outputs for most of the generating systems are pre-construction estimates because real-world data are not available.



Source: CTUIR Energy Generation Assets List

(1) Values are pre-construction estimates

Figure 8: Existing energy generation resources

Energy-Related GHG Emissions

Utility electricity consumed on the UIR is supplied by two utility providers: Pacific Power and UEC. The 2019 GHG emissions rate for each utility based on the 2019 energy resource mix is provided in **Table 5**. The emissions rate for UEC is significantly lower than that of Pacific Power's because Pacific Power generates 56% of its electricity from coal sources (refer to **Figure 3**) while UEC derives more than half of its electricity from hydropower and nuclear.

All natural gas consumed on the UIR is supplied by CNG. GHG emissions for natural gas can vary slightly based on the natural gas makeup, delivery pressure, and other factors. It is assumed in this analysis that the CNG natural gas GHG emissions rate aligns with the national average. Similarly, GHG emissions from transportation energy can vary by fuel type, refiner, local conditions, and other factors. It is assumed in this analysis that the transportation energy GHG emissions rate, in terms of MtCO2e per GGE, aligns with the national average.

The estimated total GHG emissions by energy source is summarized in **Table 5**. As shown in the table, the greatest source of emissions is transportation fuel, followed by electricity purchase from Pacific Power, which receives approximately 74% of its electricity supply from coal and natural gas.

Table 5: GHG Emissions by Utility Provider

Energy Source	2019 GHG Emissions Rate	2019 Energy Consumed	2019 GHG Emissions (MtCO2e)
Pacific Power	0.689 MtCO2e/MWh 2.351 MtCO2e/MMBtu	17,100 MWh 58,500 MMBtu	12,000
UEC	0.183 MtCO2e/MWh 0.624 MtCO2e/MMBtu	1,100 MWh 3,800 MMBtu	200
CNG	0.059 MtCO2e/MMBtu	49,000 MMBtu	2,900
Transportation Fuel	0.009 MtCO2e/GGE 0.079 MtCO2e/MMBtu	4,054,000 GGE 35,561,400 MMBtu	36,000
On-site renewables	0 MtCO2e/MWh 0 MtCO2e/MWh	480 MWh 1,600 MMBtu	0
Total			**51,100**

Source: Oregon Department of Energy: Electricity Mix in Oregon (https://www.oregon.gov/energy/energy-oregon/pages/electricity-mix-in-oregon.aspx)

To put the total GHG emissions value in context, 51,100 MtCO2e emitted per year is roughly equivalent to the CO2 absorbed by approximately 62,700 acres of a typical U.S. forest per year.

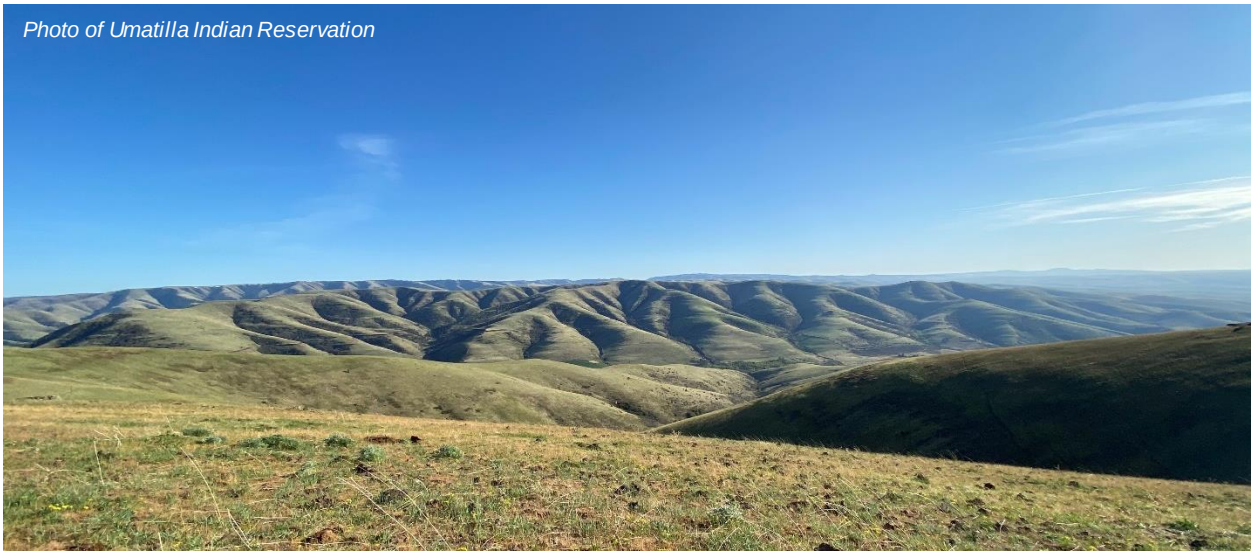


Photo of Umatilla Indian Reservation

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3. Energy Vision

Developing an Energy Vision that not only reflects the priorities, values, and interests of the CTUIR community, but is also realistic and implementable, is the critical foundation needed to develop a robust and effective SEP. The components of the Energy Vision are divided into Energy Objectives, from which Energy Goals are defined and tracked through Energy Targets and Key Performance Indicators (KPIs).

Energy Vision Statement

An Energy Vision statement for CTUIR was developed during a Visioning Workshop on August 31, 2021, with EST members. The workshop followed the completion of a community engagement survey that was used to assess the needs and priorities of the tribal community from an energy perspective. The results of the survey are summarized in **Appendix D**. Additional concepts that created the Energy Vision statement, such as Tribal Sovereignty, Tamánwit, and Treaty-Reserved Resources, are derived from and discussed further in CTUIR's 2018 *Comprehensive Plan*.

> "To create an energy future where **independence** and **reliability** maximize **tribal sovereignty**, **affordability**, and **access** for the Umatilla Indian Reservation community in a manner that respects **Tamánwit**, protects and enhances **treaty-reserved resources**, and is consistent with the **Comprehensive Plan**."

Goals

As the foundation of the SEP, the Energy Vision statement informs Specific, Measurable, Actionable, Realistic, and Time-bound (SMART) goals. With a baseline of energy needs and potential resources, evidence-based goals that reflect CTUIR's aspirations and opportunities were developed that contribute to the development of interim and short-, medium-, and long-term goals.

The Visioning Workshop produced not only the Energy Vision statement but also teased out 10 Energy Objectives that were further refined into Energy Goals. The Energy Objectives and Goals are listed in **Table 6.**

The 10 Energy Objectives and Goals are intended to be considered when planning to implement an Energy Opportunity. Energy Opportunities are presented in Chapter 4. Each Energy Opportunity should have an appropriate impact on some or all of the Energy Objectives and Goals. The Energy Goals are action statements that reflect key priorities and areas of concentration regarding energy desires and CTUIR issues.

Table 6: Energy Objectives and Goals

Energy Objective	Energy Goal
1. Improves affordability of energy	Mitigate against the rising cost of energy
2. Maintains reliability of electricity supply	Minimize power outages
3. Reduces carbon emissions	Reduce GHG emissions
4. Supports self-determination	Contribute to community members' ability to steer their lives
5. Enhances tribal sovereignty	Increase capacity for self-governance through reduced tribal interference from outside authorities
6. Protects natural resources	Mitigate negative impacts to (or contribute positively to) tribal land, water, and air resources
7. Preserves cultural resources	Mitigate negative impacts to (or contribute positively to) treaty rights access, viewsheds, historical landmarks, and other cultural resources
8. Encourages economic sustainability	Achieve lifecycle financial viability (positive return on investment)
9. Promotes equitable access	Help all community members have an equally effective chance of receiving energy-related services
10. Aligns with *Comprehensive Plan*	Align with the goals and vision in the *Comprehensive Plan*

Targets

The 10 Energy Objectives that together define the goals of the Energy Vision can be defined as specific targets for the CTUIR to pursue when implementing the SEP. The Energy Targets numbered to show association with each Energy Objective, defined in quantitative terms with their respective Key Performance Indicators (KPIs), are defined in **Table 7**. Note that due to the multifaceted nature of the Energy Opportunities under consideration for this SEP, not every opportunity will be able to achieve or directly contribute to the Energy Targets. Rather, the Energy Targets are intended to be a guide for decision making and to be weighed against each other when determining which opportunities to pursue.

Photo of Umatilla Indian Reservation

Table 7: Energy Targets and Key Performance Indicators

Energy Target	Key Performance Indicator (KPI)
1. Prevent energy rates from increasing faster than benchmark inflation.	Track community-wide energy rates in units of **$ per kWh**.
2. Maintain power reliability at current System Average Interruption Duration Index / System Average Interruption Frequency Index (SAIDI / SAIFI) performance or better.	Track **SAIDI / SAIFI values** as projects are implemented and ensure that values are equal to or better than baseline.
3. Reduce all electricity-related GHG emissions within the UIR to zero by 2050.	Track reduction of emissions in units of **mtCO_2e**.[1]
4. Increase energy independence through local production of energy resources.	Track the **percentage** of energy produced locally compared to energy consumed within the UIR.[1]
5. Pursue programs that generate greater legal autonomy over UIR energy resources.	Track whether a program generates greater legal autonomy with a **YES** or **NO**.
6. Align all projects and programs with the *First Foods Policy* (CTUIR, in progress).	Track whether a project or program aligns with the *First Foods Policy* with a **YES** or **NO**.
7. Align all projects and programs with the *Historic Preservation Code* (CTUIR, 2016)	Track whether a project or program aligns with the *Historic Preservation Code* with a **YES** or **NO**.
8. Pursue energy investments that have a positive Return on Investment (ROI).	Track whether an energy investment has a positive ROI with a **YES** or **NO**.
9. Design energy programs so that all community members have equal access to participation.	Track whether an energy program offers equal access to enrollment with a **YES** or **NO**.
10. Align all projects and programs with the *Comprehensive Plan*.	Track whether an energy project or program aligns with the *Comprehensive Plan* with a **YES** or **NO**.

[1] Indicates a key performance indicator

Numerical metrics are applied to the Energy Targets that can track progress toward Energy Goals. Two KPIs are used in Chapters 4 and 5 to illustrate progress toward the goals: reduction in carbon emissions from the 2019 baseline year and percent increase in local energy production from the 2019 baseline year. In 2019, the CTUIR purchased 18,600 MWh in electricity, 49,000 MMBtu in natural gas, and 4,054,000 GGE in transportation energy for a total of 575,000 MMBtu. The purchased energy translated into 51,200 MtCO2e in carbon emissions from electricity, natural gas, and transportation energy consumption. See **Table 5.**

Future editions of the SEP are anticipated to incorporate greater specificity into Target 4, in particular after certain high-priority energy generation feasibility assessments are completed. Similarly, Targets 6, 7, and 9 will likely be able to be refined with greater specificity in future editions of the SEP, in particular to align with the CTUIR First Foods Policy (anticipated in 2023) and as equal access is defined in greater specificity across CTUIR policies.

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4. Energy Opportunities

Informed by the Energy Vision and considering the existing energy landscape, Energy Opportunities are defined to aid CTUIR in achieving its Energy Goals. The opportunities that are presented are technical (related to or use energy technology) or programmatic (involve a program or policy established through the CTUIR).

Each Energy Opportunity includes a description of 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.

Evaluation of every opportunity consists of two core elements. The first is an analysis that reflects industry trends and the CTUIR context that summarizes the Strengths, Weaknesses, Opportunities, and Threats (SWOT) associated with each opportunity. The second is a review of the opportunity against an Objectives Rubric that illustrates the potential impact the opportunity may have based on the 10 Energy Objectives defined in Chapter 3. Evaluation of each opportunity is provided in **Appendix E**.

A summary of all opportunities under consideration is provided in **Table 8** (technical opportunities) and **Table 9** (programmatic opportunities). The tables include the opportunity name and highlights from the analysis. The opportunities are not in order of priority but rather are aligned with the order in which they are listed in **Appendix E**.

Table 8: Summary of Technical Energy Opportunities

Opportunity	Opportunity Highlights
Solar PV: A Community-scale Ground-mounted Solar PV	▶ Currently under consideration to support electricity demand for Coyote Business Park or community housing. ▶ Natural and cultural resources are the greatest constraints in identifying suitable locations.
Solar PV: B Solar PV on Commercial Rooftops and Parking Area	▶ Previously assessed and deemed infeasible, but industry context has changed and revisiting the analysis may yield different results. ▶ Up to 12 acres of hardscape may be available.
Solar PV: C Solar PV on Residential Rooftops	▶ May correlate with the energy skills training programmatic opportunity. ▶ Analysis of individual household energy usage and rooftop condition is required to refine the opportunity.
Biomass: A Biomass Combined Heat and Power (CHP) for WRC	▶ Would use approximately 25% of available renewable biomass material from local forestry management. ▶ Logistics for transporting and converting raw biomass to wood biopellets must be considered.
Biomass: B Residential Wood Stoves	▶ May produce carbon-neutral heat where electrification is technically or financially infeasible. ▶ May use excess biopellet production from Biomass A.

Table 8: Summary of Technical Energy Opportunities (cont.)

Opportunity	Opportunity Highlights
Biomass: C Commercial Biomass Boilers	▶ Conceivable alternative to electrifying heating for commercial facilities. ▶ Unlikely to be technically or financially preferred.
Vehicle Electrification: A Fleet Vehicle Electrification	▶ Replaces internal combustion engine (ICE) light duty passenger vehicles with electric vehicle (EV) counterparts, aligned with existing fleet vehicle replacement schedules. ▶ If combined with on-site generation strategies, could significantly reduce GHG emissions and increase energy independence. ▶ EV charging station locations must be considered. ▶ Energy resilience strategies must be considered to support reliable EV charging, such as Microgrid A and Infrastructure Hardening.
Vehicle Electrification: B Specialty Vehicle Electrification	▶ Only a portion of GSA and non-GSA fuel purchases are from light duty passenger vehicles; the remainder is for specialty vehicles that may not yet have readily available EV counterparts. ▶ As new EV technologies emerge, may be evaluated more closely.
Building Electrification: A Electric Heat Pumps for Commercial Buildings	▶ Replaces natural gas furnaces and boilers with electric heat pump counterparts. ▶ Can be combined with other heating strategies such as biomass or geothermal. ▶ If combined with on-site generation strategies, could significantly reduce GHG emissions and increase energy independence.
Building Electrification: B Residential Building Electrification	▶ Primary focus is heat pumps for heating and hot water. ▶ Secondary focus is electrification of cooking using induction stovetops and electric ovens. ▶ Indoor air quality is an additional benefit.
Wind Turbines Community-scale Wind Turbine	▶ Natural and cultural resources are the greatest constraints in identifying suitable locations. ▶ If a suitable location is identified, the technology is well established in the region.
Hydropower: A Small-scale Hydroelectric Power at McKay Reservoir	▶ Cultural resource or fishery protection is not a constraint for installing hydropower at this location. ▶ If deemed technically and financially feasible, may provide significant baseload power for the community, although less than geothermal. ▶ Power transmission from generation source to load may be a constraint.
Hydropower: B Microscale Hydroelectric Power at Umatilla River Fisheries	▶ Modern turbine designs that are compatible with fishery restoration may be available. ▶ The sites may produce less power than Hydropower A but would be sited closer to loads.
Hydropower: C In-line Hydroelectric Power at Pressure-Reducing Valves with the Water Distribution System	▶ Energy generation potential is low, but environmental constraints are likely be minimal.

Table 8: Summary of Technical Energy Opportunities (cont.)

Opportunity	Opportunity Highlights
Geothermal: A Geothermal Electricity Generation	▶ Technical and financial feasibility is under consideration. ▶ Generation potential may exceed 100% of electricity consumed on the UIR with zero GHG emissions. ▶ Potential opportunity to sell excess power to the grid or produce renewable hydrogen for use and sale. ▶ Potential opportunity to develop a geothermal attraction such as an educational center or recreational heated swimming pools using low-grade heat. ▶ May correlate with the energy skills training programmatic opportunity.
Geothermal: B Geothermal District Heating System	▶ If technical evaluation concludes that Geothermal A is not feasible, geothermal heating may still be an opportunity. ▶ If Geothermal A is deemed feasible, Geothermal B may be complementary by using lower-grade heat. ▶ Potential opportunity to supply heating to WRC. ▶ Potential opportunity to develop a district heating loop that supplies renewable heat to multiple facilities. ▶ Potential opportunity to develop a geothermal attraction. ▶ May correlate with the energy skills training programmatic opportunity.
Solar Thermal Water Heating (STWH): A Residential STWH	▶ May complement or replace the opportunities Building Electrification A, Biomass B, or Solar PV C. ▶ Due to cost and complexity of properly operating a residential STWH system, lifecycle financial viability and energy resilience may be lower than other opportunities.
STWH: B STWH at WRC	▶ STWH for commercial applications is most likely to be viable where domestic hot water demand is consistently high. STWH at WRC has the greatest potential to be technically and financially viable. ▶ Consider if neither Geothermal B nor Biomass A is deemed feasible, and compare to Building Electrification A.
Alternative Fuel Sales: A Alternative Liquid Fuels Sales at ATP	▶ May include ethanol, biodiesel, liquified petroleum gas (LPG), Fischer-Tropsch diesel, or other carbon-neutral technologies. ▶ May be sold to customers with transportation needs that are not readily transitioned to EV or hydrogen technologies. ▶ Within this class of technologies, some are not truly zero carbon, some are energy or resource intensive to produce, and some are not yet commercially available.
Alternative Fuel Sales: B EV Charging	▶ As transportation customers transition to EVs, demand may increase for EV charging stations both for the tribal community and transient customers. ▶ Considers installing EV charging station at ATP and Mission Market to meet the increase in demand.

Table 8: Summary of Technical Energy Opportunities (cont.)

Opportunity	Opportunity Highlights
Alternative Fuel Sales: C Hydrogen gas	▶ For transportation needs that are not readily transitioned to EVs, hydrogen may be the next choice in zero carbon fuel. ▶ If hydrogen gas is able to be produced on the UIR using excess on-site energy generation, hydrogen gas could be considered for sale at ATP for hydrogen customers or sold to the broader region.
Battery Energy Storage System (BESS): A Community-scale Lithium Ion (Li-ion)	▶ May complement on-site energy generation opportunities to improve energy independence. ▶ May complement a microgrid opportunity to improve energy resilience.
BESS: B Other Community-scale Battery Technologies	▶ Beside lithium ion (li-ion), several BESS typologies are in various stages of market readiness. ▶ Few alternatives are as commercially available as li-ion, but as technologies mature, consider them as alternatives to BESS A.
BESS: C EV to Grid	▶ As EVs become more widespread, it is likely that vehicle-to-grid opportunities may become available to provide energy storage services. ▶ This opportunity is not yet commercially established; consider revisiting as the technology matures.
Microgrid Controls	▶ Establishes a microgrid to serve the UIR. ▶ May be considered as a complement to on-site energy generation and storage opportunities. ▶ May require establishing a Tribal Utility Authority (TUA) to become technically and regulatorily feasible. ▶ Supports energy resilience and energy independence, particularly if 100% of electricity consumed on the UIR can be generated on-site. ▶ May correlate with the energy skills training programmatic opportunity.
Smart Meters	▶ Installs smart meters across CTUIR facilities. ▶ Supports tracking of energy consumption and generation for monitoring success of the SEP. ▶ More and higher quality energy data may support better-informed decisions when implementing the SEP.
Infrastructure Hardening: A Underground Power Distribution Lines	▶ Ongoing as segments of power distribution lines can be moved underground in concert with other construction projects. ▶ Supports energy resilience by reducing the risk associated with natural hazards. ▶ May correlate with the energy skills training programmatic opportunity.
Infrastructure Hardening: B Protected Energy Assets	▶ To be considered in concert with the development of new energy assets. ▶ Supports energy resilience by reducing the risk of disruption to key energy assets from natural or human-caused hazards. ▶ May correlate with the energy skills training programmatic opportunity.

Table 9: Summary of Programmatic Energy Opportunities

Opportunity	Opportunity Highlights
Tribal Utility Authority (TUA)	▶ Considers establishing a TUA within the CTUIR. ▶ May significantly impact tribal energy sovereignty, energy affordability, and energy reliability. ▶ Technical, regulatory, and financial feasibility are major considerations. ▶ May correlate with the energy skills training programmatic opportunity.
Tribal Energy Development Organization (TEDO): A	▶ A TEDO is a regulatory framework to finance and operate major energy projects on the UIR. ▶ May be complementary to, or even necessary for, on-site energy generation opportunities.
TEDO: B Tribal Energy Resources Agreement (TERA)	▶ An alternative to TEDO for developing energy projects on the UIR. ▶ Other regulatory frameworks may be available to support energy development projects.
Net Zero Energy Building Design	▶ Applies to new construction or major renovation and to homes and commercial buildings. ▶ Net zero energy is achieved through maximizing on-site renewable energy generation (e.g., through solar ready rooftops) and designing the facility to be as efficient as possible. ▶ If incorporated into the design process early, the marginal capital cost for this level of performance can be substantially mitigated, and the lifecycle cost performance is much improved.
Home Energy Auditing: A Home Energy Conservation Assessment	▶ Includes systematic assessment of weatherization, lighting, and appliance improvements at housing units across the UIR. ▶ Consider revisiting periodically as new conservation opportunities emerge across the energy sector. ▶ May correlate with the energy skills training programmatic opportunity.
Home Energy Auditing: B Home Energy Generation Assessment	▶ Includes systematic assessment of energy generation opportunities, including rooftop solar PV, wood stoves, and STWH, at housing units across the UIR. ▶ Consider revisiting periodically as new generation opportunities emerge across the energy sector. ▶ May correlate with the energy skills training programmatic opportunity.
Commercial Energy Auditing: A ASHRAE Level 1 Audits	▶ Includes systematic assessment of weatherization, lighting, and appliance improvements at commercial facilities across the UIR. ▶ ASHRAE Level 1 emphasizes high-level walkthroughs to establish a preliminary list of energy conservation opportunities. ▶ Consider revisiting periodically as new conservation opportunities emerge across the energy sector. ▶ May correlate with the energy skills training programmatic opportunity.

Table 9: Summary of Programmatic Energy Opportunities (cont.)

Commercial Energy Auditing: B ASHRAE Level 2 Energy Audits	▶ ASHRAE Level 2 builds on the Level 1 audits by conducting deeper investigation of the preliminary list of energy conservation opportunities to validate technical and financial viability. ▶ Consider revisiting periodically as new conservation opportunities emerge across the energy sector. ▶ May correlate with the energy skills training programmatic opportunity.
Energy Management Program: A Energy Usage and GHG Emission Tracking	▶ Builds on the energy usage and GHG emission baseline established in the SEP. ▶ Numerous gaps in tracking capability were identified when establishing the baseline, which can be addressed as this opportunity is implemented.
Energy Management Program: B Environmental Social Governance Tracking	▶ Establishes tracking methodologies related to the environmental, social, and governance targets established in the SEP. ▶ In particular, Goals 6, 7, and 9 are identified as having opportunities for more quantifiable targets (see **Table 6**).
Energy Skills Training Program: A Energy Auditing Skills Training	▶ Considers the opportunity to train Tribal Members to conduct energy audits of residential and commercial facilities. ▶ Because energy auditing may be an action that is repeated periodically, training Tribal Members on the skills needed to perform energy audits may be feasible and valuable.
Energy Skills Training Program: B Energy Plant Operations Skills Training	▶ Considers the opportunity to train Tribal Members to operate and maintain energy-generating plants such as community-scale solar PV and a geothermal power plant. ▶ Because energy-generating stations require ongoing maintenance and operations to produce power, training Tribal Members on the skills needed to operate and maintain energy-generating plants may be feasible and valuable.
Energy Skills Training Program: C Electrical Infrastructure Maintenance	▶ Considers the opportunity to train Tribal Members to maintain medium-voltage distribution equipment such as power lines and transformers. ▶ If the TUA opportunity is selected and responsibility for power system maintenance transfers from the existing utility service providers, training Tribal Members on the skills needed to maintain and operate the electrical distribution system within the UIR may be a feasible and valuable opportunity.
Nixyáawii Community Financial Services (NCFS) Loans for Energy-Related Investments	▶ Opportunity to partner with NCFS to provide locally sourced low-interest loans to assist CTUIR Tribal Members with energy-related investments, such as energy audits, retrofits, or rooftop solar PV.
Energy Efficiency and Renewable Energy (EERE) Seed Fund	▶ Opportunity to develop a seed fund or revolving loan fund to increase the pool of available capital to Tribal Members and reduce the financial barriers of implementing energy projects.

5. Implementation Roadmap

Whereas Chapter 4 identifies technologies and programs that may be applicable to the CTUIR, the Implementation Roadmap that is described in this chapter identifies specific actions to take to move the most promising opportunities forward.

The Implementation Roadmap begins with a summary of funding and financing mechanisms available to the CTUIR to support the implementation of specific energy projects and programs. In an industry as broad and rapidly evolving as energy, many funding sources and financing mechanisms are available to maximize the resources that can be leveraged to implement the strategies in the Action Plan that is described later in this chapter.

The Action Plan serves as a breakdown of the numerous strategies identified as the most promising in the opportunities assessment and outlines the tangible next steps that are required of each strategy to move the opportunity forward. The Action Plan includes an analysis of interdependencies across the strategies to bring greater clarity to the impact that some strategies may have on others or the order in which a set of strategies may need to be implemented for the greatest chance of success. Finally, the Action Plan includes a prioritization of opportunities based on their potential impact on the Energy Goals and a recommended timeline for implementation. The prioritization and timeline help define which of the many actions to take first.

Funding and Financing Mechanisms

Chapter 4 presents a variety of technical and programmatic Emery Opportunities to improve CTUIR's energy resilience and independence. The opportunities range from a biomass combined heat and power (CHP) plant and hydropower investments to an energy auditing program and community-wide rooftop solar program. To implement these opportunities, the CTUIR will need to secure new funding sources, both for initial capital or startup costs and ongoing operational costs, particularly for the opportunities that are non-revenue generating.

Common funding and financing sources for energy investments and programs can be broadly categorized as (1) grants from state and federal agencies, (2) private market financing strategies (e.g., debt instruments), and (3) consumer and private activity incentives. This section summarizes key funding and financing sources that are currently available to support implementation of the opportunities outlined in this SEP, with special consideration for the strategies that are available to CTUIR as a tribal government.

Grant Funding

There is substantial competition for grant funding because local agencies across the country are largely underfunded. Competition has been exacerbated by the Coronavirus Disease 2019 (COVID-19) pandemic, which reduced revenues from sales taxes, user fees, and other public revenue streams. Likewise, the increasing frequency and intensity of extreme weather events have increased local agency demand for grant dollars to support recovery from these events and prepare for future events. In the context of energy planning, these climate stressors have heightened demand for funding that supports the transition to clean energy and improves community energy resilience.

The grants summarized in this section are those that are intended to fund clean energy or energy resilience investments, facilitate tribal economic development, or reduce community-wide GHG emissions. Successful implementation of these opportunities will require a strong strategy for securing grants, and the strategy should consider the competitive landscape (e.g., other entities from the region that may be pursuing the same grants), opportunities to bundle projects, annual funding priorities of each grant program, and CTUIR's ability to secure local match monies that many of the grants discussed below require at varying levels.

Federal grants tend to offer larger dollar amounts per grantee than state grants but tend to have more requirements and longer application processes, which can be resource intensive for the receiving entity. As such, federal grants can be better suited for higher price tag projects for which the grant can cover a sizable portion.

Two grants from the State of Oregon were identified as being applicable to CTUIR's strategic energy opportunities. A list of the federal grants that are most relevant to CTUIR's energy opportunities, plus the two State of Oregon grants, are summarized in **Table 10**. A full list of applicable federal and state grants, which includes more details about the grants listed in **Table 10**, is available in **Appendix C**.

Photo of Umatilla Indian Reservation

Table 10: Federal Grants Most Applicable to CTUIR's Strategic Energy Opportunities

Administering Organization	Program/Grant Name	Description	Match Requirement	Funding Uses	Funding Range per Grantee
U.S. Department of Agriculture (USDA)	Community Wood Grant Program	Supports forest health and stimulates local economies by expanding renewable wood energy use and innovative wood products manufacturing capacity.	None	Planning and implementation	Up to $1.0M
USDA	Wood Innovations Grant Program	Provides 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.	100% match required	Planning and implementation	Up to $250k
USDA	Rural Energy for America Program (REAP) Energy Audit and Renewable Energy Development Assistance Program	Provides grants for energy audits and renewable energy development assistance to eligible agricultural producers and small, rural 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.	100% match recommended	Planning	Up to $100K
U.S. Department of the Interior (DOI)	Energy and Mineral Development Program (EMDP)	Provides financial assistance to evaluate the energy and mineral resource potential of tribal lands. Resources include biomass (woody and waste); transportation fuels; hydroelectric, solar, or wind generation; geothermal heating or electricity production; district heating; and other forms of distributed energy generation.	None	Planning	$10k to $2.5M

Table 10: Federal Grants Most Applicable to CTUIR's Strategic Energy Opportunities (cont.)

Administering Organization	Program/Grant Name	Description	Match Requirement	Funding Uses	Funding Range per Grantee
DOI (cont.)	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 may 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.	None	Planning	$10k to $1M
U.S. Environmental Protection Agency (EPA)	Tribal and Insular Area Grants: Diesel Emissions Reduction Act (DERA)	Intends to fund tribal areas that aim to achieve significant reductions in diesel emissions and exposure. Eligible diesel emissions reduction solutions include certified vehicle and equipment replacement.	None	Planning	Up to $800k
Oregon Department of Energy (ODOE)	Community Renewable Energy Grant Program (CREP)	Intends to provide grants for planning and developing community renewable energy and energy resilience projects starting in 2022 and continuing through June 2025.	None	Planning and implementation	Up to $100k for planning and up to $1M for implementation
Energy Trust of Oregon	Community Partner Funding	Offers residential customers higher cash incentives for energy-saving upgrades delivered through partnership with community organizations.	None	Planning and implementation	Unknown

Financing Strategies

While grant funding eases the cost burden of developing and implementing programs and projects, it rarely covers 100% of costs. Access to local funds, through issuing debt and/or generating public revenue, is critical for both planning and implementing projects and for securing grants, which often require a local match. Equity considerations should be a central part of developing a financing strategy. A financing strategy that unequally distributes costs and benefits across populations and generations would diminish the success of this SEP and the opportunities it presents. This section focuses on the debt instruments that are available to CTUIR and may be applicable to the Energy Opportunities.

Table 11 summarizes current loan opportunities, which include loan guarantees that are offered to community development financial institutions (CDFIs) such as Nixyáawii Community Financial Services (NCFS) to facilitate low-cost loans to community residents and businesses by reducing the lending risk to the CDFI (e.g., the entity providing the guarantee will backfill any losses the CDFI encounters due to customers defaulting). **Table 12** lists the bonds that are most relevant to energy-related projects.

Table 11: Federal and State Loan Programs Most Relevant to CTUIR and/or Its Energy Opportunities

Loan	Issuing Entity	Description
Rural Economic Development Loan & Grant Program	USDA	Provides zero-interest loans for rural projects through local utility organizations, which, in turn, pass through to local businesses for projects that will create and retain employment in rural areas. The utility is ultimately responsible for debt repayment.
Business & Industry Loan Guarantees	USDA	Intended to be used for business conversion, enlargement, repair, modernization, or development; the purchase and development of land; debt refinancing; and business and industrial acquisitions. Eligible areas include rural areas not in a city or town with a population of more than 50,000.
Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program	USDA	Provides loan guarantees up to $250M to assist in the development, construction, and implementation of new and emerging technologies, including advanced biofuels, renewable chemicals, and biobased products. Funds may be used to fund the development, construction, and retrofitting of commercial-scale biorefineries and biobased product manufacturing facilities that use new commercial-scale processing. Funds may also be used, in some cases, for refinancing of loans.

Table 11: Federal and State Loan Programs Most Relevant to CTUIR and/or Its Energy Opportunities (cont.)

Loan	Issuing Entity	Description
Indian Loan Guarantee and Insurance Program	DOI	Helps American Indian and Alaska Native tribes and individuals overcome barriers to conventional financing and secure reasonable interest rates. Loans may be used for a variety of purposes including capital, equipment purchases, acquisition, refinancing, building construction, and lines of credit. 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.
Native Initiatives Benefits – Financial Assistance	CDFI Fund	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.
Energy Loan Program	ODOE	Offers fixed-rate, long-term loans for qualified projects that invest in energy conservation, renewable energy, or alternative fuels or create products from recycled materials.

Table 12: Most Relevant Bonds to Energy-related Projects

Type	Description
Carbon Revenue Bonds and Renewable Energy Credits	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 repaid with the future revenues from the credits generated by the project. RECs and carbon credit sales are issued by the State of Oregon through the Energy Trust of Oregon or the Renewable Portfolio Standard.
Tribal Economic Development (TED) Bonds	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.
Utility Revenue Bonds	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. This strategy would be applicable to CTUIR if a tribal utility authority is created.
Traditional Bonds (Revenue, General Obligation, Green, and Private Activity)	Used to pay for projects such as major improvements to an airport, water system, garage, or other large facility that generates 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 used specifically for climate and environmental projects. Debt is repaid through local tax revenue. Tribal governments, however, may be limited in their ability to issue bonds and in how the debt may be used.

CTUIR may pursue two primary revenue-generating mechanisms to pay for the debt instruments summarized in **Table 11** (loans) and **Table 12** (bonds): (1) new sales taxes in which tribal authorities may levy a fixed increase in the tax rate by a fixed amount for a defined term and (2) leasing arrangements, which allow tribal authorities to obtain the use (or purchase) of equipment or real estate to raise revenue.[1] On-bill tariffs, or fees added to energy bills, are another opportunity to raise revenue. However, implementing an on-bill tariff via a third-party utility may be administratively complex and would be better suited for CTUIR if it managed its own utility.

Meanwhile, projects that generate their own revenue, or cost savings, create private investment opportunities. Public-private partnership (P3) agreements are cooperative agreements between one or more public and private sectors that can take different forms, such as private entity financing or management of a project in return for a promised stream of payments from a government agency. In the context of limited public funding opportunities, P3 agreements may provide capital that allows a project to be delivered faster since private operators may have more immediate access to capital and debt financing and fewer competing resource demands. **Table 13** summarizes P3 opportunities to implement energy projects.

Power purchase agreements (PPAs) are a type of P3 agreement that is particularly applicable to the SEP. In a PPA, 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. The lower electricity price serves to offset the customer's purchase of electricity from the grid while the developer receives the income from these sales, which is priced higher than the cost to install and generate, as well as any tax credits and other incentives generated from the system.

The Morris Model may be attractive to CTUIR and any potential private partners. The Morris Model of a PPA is when 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 PPA price.


Photo of Wildhorse Resort and Casino

[1] Property taxes are not an available revenue source since CTUIR's tribal land is in a land trust.

Table 13: Public Private Partnership Opportunities to Implement Energy Projects

Type	Description
Energy Savings Performance Contracting (ESPC)	Budget-neutral approach to 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. 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 multi-family buildings.
Public Private Partnership (P3) Power Purchase Agreement (PPA)	Cooperative arrangement between one or more public and private sectors that can take different forms such as private entity 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. A PPA, a type of P3, is a financial agreement in which 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. The lower electricity price serves to offset the customer's purchase of electricity from the grid while the developer receives the income from the sales of electricity as well as any tax credits and other incentives generated from the system. These may take the form of corporate PPAs, which involve corporate or industrial buyers purchasing renewable energy directly or virtually from developers. PPAs typically last 10 to 25 years, and the developer is responsible for the operation and maintenance of the system for the duration of the agreement.

Consumer and Private Activity Incentives

Some of the Energy Opportunities are intended to facilitate household- or business-level adoption or participation. While CTUIR may develop its own programs to incentivize participation in energy-related programs, there is an array of state and federal programs that CTUIR may advertise to residents to facilitate a more immediate and widespread adoption of energy-related activities, such as rooftop solar array installation or energy audits. These incentive programs are classified generally as one of the following: (1) tax credits, which are sums of money that residents may subtract directly from taxes owed or (2) rebates, which are partial refunds to residents for the use of electric vehicles, solar electrification, or other clean energy-related activities. **Table 14** summarizes these programs; additional details are provided in **Appendix C**.

Table 14: Consumer Incentive Programs

Program	Issuing Entity	Description
Property Assessed Clean Energy (PACE) Programs	DOE	Innovative mechanism for financing energy efficiency and renewable energy improvements on private properties. PACE programs allow a property owner to finance the upfront cost of energy or other eligible improvements on a property and pay back over time through a voluntary assessment.
Weatherization Assistance Program (WAP)	DOE	Reduces energy costs for low-income households by increasing the energy efficiency of their homes while ensuring their health and safety.
Oregon Clean Vehicle Rebate Program	Oregon DEQ	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.

In addition to consumer-based incentives, several federal and state incentive programs, namely tax credits and rebates, are intended to incentivize private corporations or entities to expand energy conservation efforts and develop renewable energy projects. These incentive programs may augment P3 agreements to most effectively realize project finance objectives. Three of the incentives are summarized in **Table 15**; a full list is provided in **Appendix C**.

Table 15: Private-Sector Incentive Programs

Program	Issuing Entity	Description
Energy Conservation Corporate Tax Credits	ODOE	Intended to help private corporations or entities that are receiving the tax credits make improvements in caulking and weatherstripping, 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.
Solar and Storage Rebate Program	ODOE	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.

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Action Plan

Many factors and many approaches be considered when developing an Action Plan to implement the Energy Vision for the CTUIR. As described in Chapter 4, many Energy Opportunities—both technical and programmatic—are available that would all contribute in different ways to the 10 Energy Goals and 10 Targets to achieve the Energy Vision.

The opportunities are complex and interrelated and include many unknowns, so melding them into a holistic strategy that achieves the CTUIR Energy Vision is a monumental task. To reduce the complexity, the Energy Opportunities are divided into two core tracks:

- **Centralized Actions**: Actions that can be taken on at the CTUIR level and achieve results through relatively few projects such as a community-scale solar project or a consolidated energy management program. See **Table 16**.
- **Distributed Actions**: Actions that may be administered at the CTUIR level but are implemented across the UIR, such as evaluating energy conservation and generation potential across all residential units or electrifying heating systems for all commercial facilities. See **Table 17.**

Table 18 is a list of the Energy Opportunities that were considered but not included in the Action Plan.

Every action is given a time frame for a recommended initiation of the action, defined as short (0 to 2 years), medium (2 to 5 years), or long (5 to 10 years). Every action is additionally rated with a potential impact (high, medium, low) on any or all of the Energy Goals defined in Chapter 3, which serves as a priority ranking for which actions to implement first over others for initial investigation.

Time frame and potential impact are symbolized in the Action Plan in **Table 16** and **Table 17**. The party, defined as a member or members of the EST, is charged with taking ownership of the action to carry the given opportunity to the next stage of development whether developing a program or directing further study to verify project feasibility.

This section concludes with a consolidated interdependencies matrix (**Table 19)** that spells out in greater detail some of the complex interrelationships that many actions have with other actions. Examples include the recommended order in which to complete energy generation feasibility studies (e.g., complete the ongoing geothermal and community-scale solar PV assessments before evaluating microhydro at Umatilla River Fisheries in case the extra energy resources are not necessary) or the potential synergistic effect that may result from feeding certain programs into others (e.g., an energy skills training program may feed into home energy audits by enabling Tribal Members to conduct the energy audits for fellow community members on an ongoing basis).

Table 16: Centralized Actions

Category	Energy Opportunity	Action
Energy Management & Resilience	**Energy Management: A** Energy Usage and Carbon Emission  Short time (0-2 years)  Medium impact	The CTUIR SEP provides a consolidated baseline summary of existing energy usage and energy-related GHG emission metrics. As the SEP is implemented, continue tracking these metrics and regularly report on progress toward the targets related to energy usage and GHG emissions. Utilizing existing energy performance reporting platforms such as ENERGY STAR may facilitate this opportunity. In particular, some gaps in data collection for energy usage and GHG emissions were identified when establishing the baseline. Take action to address these data gaps by resolving the source of unknowns. Additionally, after completing the numerous feasibility assessments proposed in this Action Plan, refine the self-determination target (Goal 4) in the next major revision to the SEP. See **Table 6** for a list of the goals.
Energy Management & Resilience	**Energy Management: B** ESG Tracking  Short time (0-2 years)  Medium impact	Develop tracking methodologies for metrics related to environmental, cultural, and social targets. In particular, develop a set of trackable metrics for natural resources (Goal 6) and cultural resources (Goal 7) to be able to define the targets for these goals with greater specificity. These refined Targets may be aligned with the CTUIR First Foods Policy (anticipated 2023). Additionally, develop a set of trackable metrics for equitable access (Goal 9) to be able to define the Targets for this goal with greater specificity.

Table 16: Centralized Actions (cont.)

Category	Energy Opportunity	Action
Energy Supply	**Geothermal: A** Geothermal Electricity  Short time (0-2 years)  High impact	Complete the ongoing technical, financial, environmental, and social feasibility assessment of centralized geothermal electricity generation. In particular, the most pressing constraint to evaluate is whether subsurface conditions can allow enough heat extraction for power generation. If Geothermal A is deemed feasible, it is anticipated that no additional community-scale energy generation resources would be needed.
Energy Supply	**Solar PV: A** Ground-mounted  Short time (0-2 years)  High impact	Complete the ongoing feasibility assessment of a community-scale solar project to serve the Coyote Business Park or community housing. Otherwise, the most pressing consideration for conducting a technical, financial, environmental, and social feasibility assessment of a community-scale ground-mounted solar array is whether any sites can be identified that satisfy the natural and cultural resources constraints.
Energy Supply	**Geothermal: B** Geothermal Heating  Short time (0-2 years)  Medium impact	If geothermal electricity generation is deemed infeasible, evaluate the technical and financial feasibility of a geothermal district heating system to serve WRC with the option to expand the system to serve additional nearby loads. This opportunity may be considered in conjunction with Geothermal A as a way to make use of remaining low-grade heat. Additionally, low-grade geothermal heat may be available to consider developing an attraction or educational center at WRC. If both geothermal electricity generation and geothermal district heating are deemed financially or technically infeasible, evaluate the technical and financial feasibility of other energy generation options.

Table 16: Centralized Actions (cont.)

Category	Energy Opportunity	Action
Energy Supply	**Wind Turbines**  Short time (0-2 years)  Medium impact	Conduct a technical, financial, environmental, and social feasibility assessment of one or multiple wind turbines. In particular, the most pressing consideration is whether a site can be found for a wind turbine that satisfies the natural and cultural resources constraints.
Energy Supply	**Hydro: A** Small-hydro at McKay Reservoir  Medium time (2-5 years)  Medium impact	Conduct a technical, financial, environmental, and social feasibility assessment of a small-scale hydroelectric plant at McKay Reservoir. The most pressing considerations are to evaluate the constructability of the project and evaluate the lifecycle cost and energy generation potential of the project in order to determine whether the levelized cost of energy for the project would be financially beneficial.
Energy Supply	**Hydro: B** **Microhydro at Umatilla River Fisheries**  Medium time (2-5 years)  Medium impact	Conduct a technical, financial, environmental, and social feasibility assessment of one or multiple microscale hydroelectric turbines along the Umatilla River. The most pressing considerations are to evaluate the constructability at potential sites and evaluate the lifecycle cost and energy generation potential of the potential sites in order to determine whether the levelized cost of energy for the project would be financially beneficial.
Energy Supply	**Biomass: A** **CHP**  Medium time (2-5 years)  Medium impact	Conduct a technical, financial, environmental, and social feasibility assessment of a biomass CHP plant to serve WRC electricity and heating loads. The most pressing constraints are to confirm the annual volume of surplus wood stock available and evaluate the lifecycle cost and energy generation potential of the project in order to determine whether the levelized cost of energy for the project would be financially beneficial, accounting for the infrastructure required to convert the surplus wood to biopellets. The combined results of the feasibility assessments will provide an estimate for the total potential for on-site centralized renewable energy generation projects on the UIR. The estimate will point to the next phase in developing energy on the UIR, which is identifying the optimal energy project development pathway.

Table 16: Centralized Actions (cont.)

Category	Energy Opportunity	Action
Energy Finance	**TEDO: A or B** TEDO or TERA  Short time (0-2 years)  High impact	Conduct 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. Determine the need, costs, and benefits of establishing and seeking certification of a TEDO versus a TERA to develop all, or a portion of, the tribe's energy resources. Consider these options along with potential alternative pathways for energy project development.
		Implement all available energy projects that are deemed technically, financially, environmentally, and socially feasible, and that comply with the goals defined in Chapter 3. When complete, the maximum achievement of on-site energy generation and GHG emission reduction for electrical systems has been achieved.
Energy Management & Resilience	**TUA**  Medium time (2-5 years)  Low impact	Conduct a financial and regulatory feasibility study to determine whether establishing a TUA is beneficial for the community per the goals in Chapter 3. In the study, account for utility reliability requirements, the startup and ongoing costs to own and operate UIR electrical infrastructure, potential electrical tariff reductions, and sovereignty considerations such as operational autonomy.

Table 16: Centralized Actions (cont.)

Category	Energy Opportunity	Action
Energy Management & Resilience	**Microgrid**  Medium time (2-5 years)  Medium impact	If it is determined that all or most electricity consumed within the UIR may be generated on-site through the above energy development projects, conduct a technical and regulatory feasibility study for developing the UIR electrical distribution infrastructure into a microgrid. This may allow the community to consume maximum energy resources on-site, contributing to GHG emissions reduction, energy resilience, and energy independence. In the study, account for the existing distribution layout where a single interconnection point may go, blue sky versus grid outage operational modes, energy storage requirements to balance loads and supply, and regulatory requirements for distributing power (e.g., whether a TUA may be necessary).
Energy Management & Resilience	**Infrastructure Hardening: B** Protected Assets  Short time (0-2 years)  High impact	If a significant portion of energy consumed within the UIR is to be produced on-site or a community microgrid with a single interconnection with the regional grid is selected as a strategy, protection of these major energy assets will be a key consideration. In the design and construction phases of these projects, incorporate physical and cybersecurity into the design requirements and contractor specifications to protect the tribal community from reservation-wide outages caused by natural hazards or accidental and malicious human-caused events.
Energy Management & Resilience	**BESS: A** Lithium Ion  Short time (0-2 years)  Medium impact	Proportional to the capacity of energy generation installed on the UIR, calculate the optimal capacity of BESS to be considered for installation and evaluate the technical, financial, environmental, and social feasibility of developing a BESS project. In particular, if a community microgrid is selected as a strategy, an amount of BESS may be necessary to support the stable operation of the grid and maximize on-site energy self-consumption.

Table 16: Centralized Actions (cont.)

Category	Energy Opportunity	Action
Fuel Switching	**Vehicle Electrification: A** Fleet Vehicle Electrification  Short time (0-2 years)  High impact	Develop a vehicle electrification plan for fleet passenger vehicles serving the CTUIR. In particular, consider charging stations on the north side of the NGC parking lot, and integrate a plan for phasing out ICE fleet vehicles with the existing fleet vehicle leasing structure. Note that this action becomes more impactful if all or a majority of electricity is able to be produced on-site through renewable resources and especially if a microgrid and infrastructure hardening will result in exceptionally reliable power.
Fuel Switching	**Alternative Fuel Sales: B** EV Charging  Short time (0-2 years)  Medium impact	Evaluate the technical feasibility of installing EV charging stations at ATP and/or Mission Market (e.g., check existing electrical distribution capacity). Expand local distribution capacity as needed to install the optimal number of EV charging stations. Alternative funding is likely available to support EV charging stations and distribution capacity expansion. In particular, to support CTUIR fleet vehicle electrification, more charging stations will be needed than the single station that exists at WRC. EV charging can also support an anticipated growth in EV customers passing through ATP.
Fuel Switching	**Alternative Fuel Sales: C** Hydrogen  Long time (5-10 years)  Medium impact	Continue developing the concept for an off-reservation electrolyzer project to produce renewable hydrogen. If the project is successful and other renewable energy generation projects are able to produce more electricity than is consumed on the UIR (e.g., geothermal), consider a strategy to sell renewable hydrogen produced from excess energy generation. The strategy can be an alternative to or complement selling excess power generation to the grid.

Table 16: Centralized Actions (cont.)

Category	Energy Opportunity	Action
Community Programs	**Energy Skills Training: B** Energy Plant Operations  Medium time (2-5 years)  Medium impact	Consider implementing this strategy as centralized energy generation strategies are selected and implemented (e.g., a geothermal power station or a ground-mounted solar PV array). Training Tribal Members to operate energy generation plants may be an effective means of developing skilled jobs within the tribal community. Working with local organizations such as the Energy Trust may be an option to facilitate this workforce development.
Community Programs	**Energy Skills Training: C** Electrical Infrastructure  Medium time (2-5 years)  Medium impact	Consider implementing this strategy if the TUA strategy or microgrid strategy is selected and implemented. Training Tribal Members to operate and maintain the electrical infrastructure within the UIR may be an effective means of developing skilled jobs within the tribal community. Working with local organizations such as the Energy Trust may be an option to facilitate this workforce development.
Energy Finance	**EERE Seed Fund**  Short time (0-2 years)  Medium impact	Conduct a feasibility assessment for developing a seed fund to provide financial assistance to EERE projects that benefit the CTUIR and its Tribal Members. In particular, conduct a financial analysis to determine the amount of seed funding that is needed, at the start and ongoing, in order to support projects of various magnitudes. The results of the analysis will inform strategies to acquire the initial funding and the legal and financial specifics of such a program.

Table 17: Distributed Actions

Category	Energy Opportunity	Action
Community Programs	**Energy Skills Training: A** Energy Auditing  Short time (0-2 years)  High impact	Several strategies relate to assessing local conditions to determine feasibility of energy projects. With proper training, these assessments can be conducted by members of the tribal community both in the near term and on an ongoing basis. Conduct a technical and financial feasibility assessment to confirm the viability of establishing such a program through the CTUIR. Assessments include but are not limited to energy generation feasibility assessments and auditing for energy conservation. Working with local organizations such as the Energy Trust may be an option to facilitate this workforce development.
Community Programs	**Net Zero Energy Building Design**  Short time (0-2 years)  High impact	Consider establishing a policy for all new construction and major renovations, for both homes and commercial buildings, to be designed to achieve net zero energy status. Net zero energy includes optimizing the energy performance of new facilities by following best practices in high-performance building design, while maximizing the space available for on-site renewable energy generation (accounting for other design requirements).
Community Programs	**Home Energy Auditing: A and B** **Weatherization, Lighting, and Appliances (A) and Home Energy Generation (B)**  Short time (0-2 years)  High impact	Homes throughout the UIR may be good candidates for energy efficiency improvements such as weatherization and more efficiency lighting or appliances. Some homes may additionally be good candidates for energy supply projects such as rooftop solar PV. Develop a program to assess all homes on the UIR for energy efficiency and supply opportunities. This strategy could potentially use the energy skills training program.

Table 17: Distributed Actions (cont.)

Category	Energy Opportunity	Action
Community Programs	**Commercial Energy Auditing: A and B** ASHRAE Level 1 Audit (A) ASHRAE Level 2 Audit (B)  Short time (0-2 years)  Medium impact	Commercial facilities throughout the UIR may be good candidates for energy efficiency improvements such as weatherization and more efficient lighting or appliances. Develop a program to assess all commercial facilities on the UIR for energy efficiency and conservation opportunities. In particular, begin with an ASHRAE Level 1 audit to develop a high-level set of energy conservation projects. Then conduct a Level 2 audit of all potential opportunities to identify which projects are technically and financially feasible. This strategy could potentially use the energy skills training program.
Energy Finance	**NCFS Loans / Investments**  Short time (0-2 years)  High impact	Conduct a feasibility assessment of a loan program in partnership with NCFS that is focused on energy projects for CTUIR community members. In particular, this strategy could be used to aid in the implementation of other energy projects such as LED lighting replacements and rooftop solar PV.
Energy Supply	**Solar PV: B** Commercial Rooftop / Parking  Short time (0-2 years)  Medium impact	Revisit the technical and financial feasibility of installing solar PV arrays on commercial parking lots and rooftops. In particular, hardscapes are identified as suitable locations from a natural and culture resource protection point of view and, if deemed feasible, can support an early increase in on-site renewable energy generation. If deemed infeasible, consider revisiting the technical and financial feasibility during the next major revision to the SEP.

Table 17: Distributed Actions (cont.)

Category	Energy Opportunity	Action
Energy Supply	**Solar PV: C** Residential Rooftop  Short time (0-2 years)  High impact	Develop a program to assess the technical and financial feasibility of rooftop solar PV at all residential rooftops in the UIR. Account for roof stability, orientation, shade from trees, home electricity demand, and other factors. This strategy could potentially use the Home Energy Auditing program.
Fuel Switching	**Building Electrification: A and B** Commercial Electric Heat Pumps (A) and Residential Building Electrification (B)  Medium time (2-5 years)  Medium impact	As electricity supply is sourced from increasingly renewable resources, a greater proportion of GHG emissions will come from on-site natural combustion, in particular from space heating in homes and offices. To address the shift, develop a program to assess homes and offices for the financial and technical feasibility of transitioning natural gas and other heating fuels to electricity. This strategy could potentially use the Home Energy Auditing program.
Energy Supply	**Biomass: B** Residential Wood Stoves  Medium time (2-5 years)  Low impact	Not all homes may be suitable for heating electrification, depending on technical and financial factors. As an alternative, especially if the biomass CHP strategy is selected, assess the technical and financial feasibility of installing wood stoves at homes for heating supplied by local, renewable biomass fuel. Assessing feasibility will change on a case-by-case basis. Assessing each home could potentially use the Home Energy Auditing program.

Table 17: Distributed Actions (cont.)

Category	Energy Opportunity	Action
Energy Management & Resilience	**Smart Meters**  Short time (0-2 years)  Medium impact	Develop a program to install smart meters at homes and businesses within the UIR. This can be in partnership with the local utility provider or completed in-house if the TUA strategy is pursued. Smart meters may help with energy usage tracking and time-based energy demand management for energy cost savings and GHG emission reduction.
Energy Management & Resilience	**Infrastructure Hardening: A** Underground Distribution Lines  Short time (0-2 years)  Medium impact	Continue the existing policy of replacing segments of overhead power distribution lines on poles with underground lines in trenches and conduit. In particular, whenever a new facility is constructed or an existing facility undergoes major renovation, consider folding the cost of moving power supply underground into the cost of the project. This project may benefit from establishing a TUA. For any projects that are deemed infeasible, revisit the feasibility during the next major SEP revision (approximately every 5 years) to assess whether technology or regulatory conditions have changed such that projects may be feasible. This also applies to any new technologies that are not listed in the opportunities assessment.

Table 18: Energy Opportunities Not Included in the Action Plan

Opportunity	Reason Not Included
Biomass: C Commercial Boilers	While installing biomass boilers at commercial buildings is a technical possibility, the potential benefit is not as great as the potential benefit from electrifying commercial heating systems; and the difficulty of implementation is greater.
Vehicle Electrification: B Specialist Vehicle Electrification	Electrification of specialty vehicles is more of a long-term strategy to consider as new EV technologies become commercially available. In order to focus on strategies that can be considered using currently available technologies, this strategy is not included in the Action Plan at this time.
Hydro: C In-line Hydro at Water System Pressure-Reducing Valves	In-line hydro may have a few small applications that are viable within the UIR, but the net energy generation potential would be small and focused on local applications. These applications may be analyzed, but because the potential impact is small relative to other energy generation strategies, in-line hydro is not included in the Action Plan at this time.
Solar Thermal: A and B Residential STWH and STWH at WRC	Solar thermal water heating (STWH) has potential applications for providing hot water to homes and commercial facilities. However, the technology is not widely applied in the United States, and contractor knowledge of proper installation and operation therefore tends to be limited, leading to lower reliability and higher lifecycle costs. Because there are other renewable energy technologies that offer strong opportunities for decarbonization and energy independence, this strategy is not included in the Action Plan at this time.
Alternative Fuel Sales: A Liquid Fuels	Renewable liquid fuels such as ethanol, biodiesel, LPG, and Fischer-Tropsch diesel are expensive to produce and perform best when the producer has ready access to the resources needed to refine the product. Because the UIR does not already produce the materials used in alternative liquid fuels and because greater promise has been identified in pursuing EV charging and hydrogen strategies, liquid fuels are not included in the Action Plan at this time.
BESS: B Other Battery Typologies	Several BESS technologies are in development for commercial readiness. However, in order to focus on strategies that can be considered using currently available technologies, strategies for emerging technologies are not being included in the Action Plan at this time. Continuing to monitor BESS technology development and revisiting this strategy are encouraged as development milestones are met.
BESS: C Electric Vehicle to Grid	Consider implementing this strategy after the vehicle electrification strategy has been largely implemented and after vehicle-to-grid has become a more common approach to energy storage. Until then, it is not a priority for consideration.

Interdependencies Matrix

The development and implementation of an Energy Opportunity may impact or be enabled by other Energy Opportunities. As **Table 16** and **Table 17.** outline actions and other driving factors to implement Energy Opportunities, **Table 19** illustrates how Energy Opportunities may interrelate or have interdependencies with other Energy Opportunities.

The matrix organizes two axes: the y-axis reiterates the Energy Opportunities described in the Action Plan (**Table 16** and **Table 17)**, and the x-axis labels "Interdependencies with other Energy Opportunities." Both axes show the same list of opportunities, with the intent to show how the opportunities may benefit from or influence the others.

The relationship between any pair of Energy Opportunities is illustrated in the matrix with an up arrow or a left arrow:

- An up arrow (▲) indicates that the Energy Opportunity of that column would helped be achieved by implementing the Energy Opportunity listed in the given row.
- A left arrow (◀) indicates that the Energy Opportunity of that column is a prerequisite for implementing the Energy Opportunity listed in the given row.

For example, establishing an Energy Skills Training program may support the pursuit of Commercial or Home Energy Auditing by making it possible for Tribal Members to be the ones who conduct the energy audits (▲).

By comparison, it is recommended to complete the ongoing feasibility studies for a geothermal power plant and community-scale solar project at the Coyote Business Park before conducting feasibility studies for community-scale wind turbines or hydroelectric power because if the ongoing studies are successful, additional local power generation may not be necessary (◀).

Additional context and narrative about interrelations can be referenced in **Table 16** and **Table 17**.

Note the matrix contains only the Energy Opportunities that are included in the Action Plan. Energy Opportunities not included in the Action Plan can be referenced in **Table 18**.

Table 19: Interdependent Opportunities Matrix

Category	Energy Opportunity		Scale	Energy Opportunity																																
				Community Programs							Energy Finance			Energy Management & Resilience								Energy Supply										Fuel Switching				
					Energy Skills Training			Home Energy Auditing						BESS	Energy Management		Infrastructure Hardening					Biomass		Geothermal		Hydro		Solar Photovoltaics				Alternative Fuel Sales		Building Electrification		Vehicle Electri-fication
				Commercial Energy Auditing	A: Energy Auditing	B: Energy Plant Operations	C: Electrical Infrastructure Maintenance	A: Weatherization, Lighting & Appliances	B: Home Energy Generation	Net Zero Energy Building Design	EERE Seed Fund	NCFS Loans / Investments	TEDO or TERA	A: Lithium Ion	A: Energy Usage & Carbon Emission Tracking	B: ESG Tracking	A: Underground Distribution Lines	B: Protected Assets	Microgrid	Smart Meters	Tribal Utility Authority	A: Combined Heat & Power	B: Residential Wood Stoves	A: Geothermal Electricity	B: Geothermal Heating	A: Small-hydro at McKay Reservoir	B: Microhydro at Umatilla River Fisheries	A: Ground-mounted	B: Commercial Rooftop/Parking	C: Residential Rooftop	Wind Turbines	B: Electric Vehicle Charging	C: Hydrogen	A: Commercial Electric Heat Pumps	B: Residential Building Electrification	A: Fleet Vehicle Electrification
Community Programs	Commercial Energy Auditing		Distributed																																	
	Energy Skills Training	A: Energy Auditing	Distributed	◄				◄	◄																											
		B: Energy Plant Operations	Centralized										◄								◄															
		C: Electrical Infrastructure Maintenance	Centralized																		◄															
	Home Energy Auditing	A: Weatherization, Lighting & Appliances	Distributed																																	
		B: Home Energy Generation	Distributed																											◄						
	Net Zero Energy Building Design		Distributed	▲				▲	▲																											
Energy Finance	EERE Seed Fund		Centralized	▲										▲						▲		▲		▲	▲	▲	▲	▲	▲		▲		▲			▲
	NCFS Loans / Investments		Distributed					▲	▲	▲													▲							▲				▲	▲	
	TEDO or TERA		Centralized								▲			▲								▲		▲		▲	▲	▲	▲		▲		▲			
Energy Management & Resilience	BESS	A: Lithium Ion	Centralized			▲													▲			◄		◄		◄	◄	◄	◄		◄	◄		◄	◄	◄
	Energy Management	A: Energy Usage & Carbon Emission Tracking	Centralized	▲				▲	▲																											
		B: ESG Tracking	Centralized																																	
	Infrastructure Hardening	A: Underground Distribution Lines	Distributed																																	
		B: Protected Assets	Centralized											▲					▲		▲	▲		▲	▲	▲	▲	▲		▲	▲	▲	▲			
	Microgrid		Centralized			▲																										▲	▲	▲	▲	▲
	Smart Meters		Distributed	▲				▲	▲										▲											▲				▲	▲	▲
	Tribal Utility Authority		Centralized											▲			▲		▲	▲												▲	▲			▲
Energy Supply	Biomass	A: Combined Heat & Power	Centralized			▲													▲		▲		▲	◄	◄	◄	◄	◄	◄		◄	▲		◄		▲
		B: Residential Wood Stoves	Distributed			▲			◄													◄													◄	
	Geothermal	A: Geothermal Electricity	Centralized			▲					◄								▲		▲	▲			▲							▲		▲	▲	▲
		B: Geothermal Heating	Centralized			▲																		◄												
	Hydro	A: Small-hydro at McKay Reservoir	Centralized			▲													▲		▲			◄				◄				▲		▲	▲	▲
		B: Microhydro at Umatilla River Fisheries	Centralized			▲													▲		▲			◄		◄		◄	◄			▲		▲	▲	▲
	Solar Photovoltaics	A: Ground-mounted	Centralized			▲													▲		▲			◄								▲		▲	▲	▲
		B: Commercial Rooftop/Parking	Distributed			▲													▲					◄				◄				▲		▲		▲
		C: Residential Rooftop	Distributed			▲			◄										▲																▲	
	Wind Turbines		Centralized			▲													▲		▲			◄		◄	◄	◄	◄			▲				▲
Fuel Switching	Alternative Fuel Sales	B: Electric Vehicle Charging	Centralized																																	▲
		C: Hydrogen	Centralized			▲								◄					▲			◄		◄		◄	◄	◄	◄		◄	◄		◄	◄	◄
	Building Electrification	A: Commercial Electric Heat Pumps	Distributed	◄																					◄											
		B: Residential Building Electrification	Distributed					◄																												
	Vehicle Electrification	A: Fleet Vehicle Electrification	Centralized																																	

BESS = Battery energy storage systems
EERE = Office of Energy Efficiency & Renewable Energy
ESG = Environmental, social and governance
NCFS = Nixyáawii Community Financial Services
TEDO = Tribal Energy Development Organization
TERA = Tribal Energy Resources Agreement
Up arrow (▲) = Energy Opportunity supports the implementation of the related opportunity on the x-axis
Left arrow (◄) = Energy Opportunity builds on the implementation of the related opportunity on the x-axis

Next Steps

Of the many actions that are described in the previous section, a few top priority actions emerged as the next steps to take in the early stages of implementing the SEP. These actions are listed in **Table 20** for Centralized Actions and **Table 21** for Distributed Actions.

Table 20: Next Steps for Centralized Actions

Energy Opportunity	Action
Energy Management: B ESG Tracking	Develop tracking methodologies for metrics related to environmental, cultural, and social targets. In particular, develop a set of trackable metrics for natural resources (Goal 6) and cultural resources (Goal 7) to be able to define the targets for these goals with greater specificity. These refined Targets may be aligned with the CTUIR First Foods Policy (anticipated 2023). See **Table 6** for a list of the goals. Additionally, develop a set of trackable metrics for equitable access (Goal 9) to be able to define the targets for this goal with greater specificity.
Solar PV: A Ground-mounted	Complete the ongoing feasibility assessment of a community-scale solar project to serve the Coyote Business Park or community housing. Otherwise, the most pressing consideration for conducting a technical, financial, environmental, and social feasibility assessment of a community-scale ground-mounted solar array is whether any “green light” sites can be identified that satisfy the natural and cultural resources constraints.
Geothermal: A Geothermal Electricity	Complete the ongoing technical, financial, environmental, and social feasibility assessment of centralized geothermal electricity generation. In particular, the most pressing constraint to evaluate is whether subsurface conditions can allow enough heat extraction for power generation.

Table 20: Next Steps for Centralized Actions (cont.)

Energy Opportunity	Action
TEDO: A or B TEDO or TERA	Conduct 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. Determine the need, costs, and benefits of establishing and seeking certification of a TEDO versus a TERA to develop all, or a portion of, the tribe's energy resources. Consider these options along with potential alternative pathways for energy project development.
Energy Management: A Energy Usage and Carbon Emission	The CTUIR SEP provides a consolidated baseline summary of existing energy usage and energy-related GHG emission metrics. As the SEP is implemented, continue tracking these metrics and regularly report on progress toward the targets related to energy usage and GHG emissions. In particular, some gaps in data collection for energy usage and GHG emissions were identified when establishing the baseline. Take action to address these data gaps by resolving the source of unknowns. After completing the numerous energy generation feasibility assessments proposed in this Action Plan, refine the self-determination target (Goal 4) in the next major revision to the SEP.
Vehicle Electrification: A Fleet Vehicle Electrification	Develop a vehicle electrification plan for fleet passenger vehicles serving the CTUIR. In particular, consider charging stations on the north side of the NGC parking lot, and integrate a plan for phasing out ICE fleet vehicles with the existing fleet vehicle leasing structure. Note that this action becomes more impactful if all or a majority of electricity is able to be produced on-site through renewable resources and especially if a microgrid and infrastructure hardening will result in exceptionally reliable power.
EERE Seed Fund	Conduct a feasibility assessment for developing a seed fund to provide financial assistance to EERE projects that benefit the CTUIR and its Tribal Members. In particular, conduct a financial analysis to determine the amount of seed funding that is needed, at the start and ongoing, in order to support projects of various magnitudes. The results of the analysis will inform strategies to acquire the initial funding and the legal and financial specifics of such a program.

Table 21: Next Steps for Distributed Actions

Energy Opportunity	Action
Energy Skills Training: A Energy Auditing	Several strategies relate to assessing local conditions to determine feasibility of energy projects. With proper training, these assessments can be conducted by members of the tribal community—both in the near term and on an ongoing basis. Conduct a technical and financial feasibility assessment to confirm the viability of establishing such a program through the CTUIR. Assessments include but are not limited to energy generation feasibility assessments and auditing for energy conservation.
NCFS Loans / Investments	Conduct a feasibility assessment of a loan program in partnership with NCFS that is focused on energy projects for CTUIR community members. In particular, this strategy could be used to aid in the implementation of other energy projects such as LED lighting replacements and rooftop solar PV.
Home Energy Auditing: A and B Weatherization, Lighting, and Appliances (A) and Home Energy Generation (B)	Homes throughout the UIR may be good candidates for energy efficiency improvements such as weatherization and more efficiency lighting or appliances. Some homes may additionally be good candidates for energy supply projects such as rooftop solar PV. Develop a program to assess all homes on the UIR for energy efficiency and supply opportunities. This strategy could potentially use the energy skills training program.
Commercial Energy Auditing: A and B ASHRAE Level 1 Audit (A) ASHRAE Level 2 Audit (B)	Commercial facilities throughout the UIR may be good candidates for energy efficiency improvements such as weatherization and more efficient lighting or appliances. Develop a program to assess all commercial facilities on the UIR for energy efficiency and conservation opportunities. In particular, begin with an ASHRAE Level 1 audit to develop a high-level set of energy conservation projects. Then conduct a Level 2 audit of all potential opportunities to identify which specific projects are technically and financially feasible. This strategy could potentially use the energy skills training program.

Table 22: Next Steps for Distributed Actions (cont.)

Energy Opportunity	Action
Solar PV: C Residential Rooftop	Develop a program to assess the technical and financial feasibility of rooftop solar PV at all residential rooftops in the UIR. Account for roof stability, orientation, shade from trees, home electricity demand, and other factors. This strategy could potentially use the Home Energy Auditing program.
Smart Meters	Develop a program to install smart meters at homes and businesses within the UIR. This can be in partnership with the local utility provider or completed in-house if the TUA strategy is pursued. Smart meters may help with energy usage tracking and time-based energy demand management for energy cost savings and GHG emission reduction.
Infrastructure Hardening: A Underground Distribution Lines	Continue the existing policy of replacing segments of overhead power distribution lines on poles with underground lines in trenches and conduit. In particular, whenever a new facility is constructed or an existing facility undergoes major renovation, consider folding the cost of moving power supply underground into the cost of the project. This project may benefit from establishing a TUA.