Pipelines and Infrastructure

Introduction

Electrical Transmission

Electrical transmission infrastructure is used to convey high-voltage electricity from a generation source to load-center substations, where it's transformed into lower-voltage electricity for distribution to end-users. Major components of electrical transmission infrastructure include transformers, towers, foundation materials, and conductors (transmission lines). High-voltage transmission can be either alternating current (AC) or direct current (DC). Alternating current, the most commonly used form of transmission, has the ability to convert to different voltages using a transformer, whereas DC is not easily converted. Typical voltage for transmission ranges from 69 Kilovolt (kV) up to 500 kV. Table 1 shows the right-of-way width needed for electrical transmission, which varies by line voltage and maintenance requirements.

Table 1: Recommended right-of-way (ROW) width for electrical transmission lines by voltage class.

Line Voltages (in Kv)	Typical ROW Total Widths (in feet)
69	75-100
115	100-125
138	100-150
161	100-150
230	125-200
345	150-225
500	150-250

Source: BLM West-Wide Energy Corridor Guidebook (HDR et al. ND).

Electrical transmission systems from individual utility companies (including those in Utah) are interconnected to the entire electrical network of generation facilities and transmission grids across the western United States. Utah is part of the Western Electricity Coordinating Council in the geographic region called the Western Interconnection, one of three major electric interconnections that operate independently of each other within the United States. The Western Interconnection allows load-balancing throughout the network. That is, power generated by utilities with excess generation capacity can be provided to utilities that cannot meet their peak load demand (EIA 2021). The Western Energy Imbalance Market (EIM) is a wholesale energy trading market where bulk power can be purchased and sold (EIM 2021). Because the EIM connects multiple generators in a marketplace, individual utilities can buy electricity to meet peak demand at reasonable rates. Renewable energy generators can also sell excess power capacity through the EIM instead of resorting to curtailment (Larsen 2018).

For information on the process of identifying and permitting the construction of electricity transmission infrastructure on federal land, refer to the Utility Corridor section.

Legal context

The Federal Powers Act of 1921 (16 U.S.C. § 12), as amended, provides for federal oversight of the bulk electrical transmission system by the Federal Energy Regulatory Commission (FERC). The Energy Policy Act of 2005 (among other items) enables FERC to facilitate transmission planning to meet the needs of utilities serving retail customers. In 1996, FERC issued Order No. 888, which opened all interstate transmission lines for use by any power generator to transmit power across the bulk transmission grid, provided the power generator pays tariffs to the transmission line utility owners. This is known as the Open Access Transmission Tariff (OATT). The FERC's Order No. 889, sets standards of conduct for power generators utilizing OATT transmissions (Utah Code § 54-17-901).

Natural Gas Pipelines

Natural gas pipelines are constructed by private utility companies to move natural gas from production areas to end users (54 Utah Code § 13). Gathering pipelines move extracted raw materials from wellheads to processing plants, where natural gas is separated from other gases, hydrocarbon gas liquids, and water. The refined natural gas is then pressurized and added to the mainline transmission system, which consists of large-diameter, high-pressure pipelines. Compressor stations along the network maintain pressure and move product down the line to storage areas, major industrial consumers, power plants, shipping ports, and distribution companies. From there, distribution transmission systems operate with smaller-diameter lines and lower pressure. Finally, service lines transport natural gas to the end users.

This planning document focuses on pipeline infrastructure located within designated utility corridors (typically major transmission lines), but may also include some gathering and distribution lines. More information on natural-gas production and distribution from the US Energy Information Administration (EIA) can be found here.

For information on the process of identifying and permitting the construction of natural gas pipeline infrastructure on federal land, refer to the Utility Corridor section.

Legal context

The State of Utah grants local governments the authority to supplement the state and federal laws with its own regulations for oil and gas development. Utah authorizes counties to enact any ordinances necessary to carry out its duties, so long as they are not repugnant to state or federal law (BMP 2021). The Pipeline and Hazardous Materials Safety Administration (PHMSA) exercises authority under the Pipeline Safety Act (49 U.S.C. § 60101) to prescribe minimum safety standards governing the location, design, construction, operation, and maintenance of liquefied natural gas facilities in or affecting interstate and foreign commerce. Whereas FERC serves as the lead federal agency for satisfying compliance with the National Environmental Policy Act (NEPA) (42 U.S.C. § 4321) for liquefied natural gas facilities subject to its jurisdiction (McIntyre 2018).

The Natural Gas Act (15 U.S.C 15B § 717) enabled the federal regulation of companies transporting and distributing natural gas both intrastate and interstate. The Public Law 109–468 (2006), an amendment to the 49 U.S.C § 60101, provides enhanced environmental and safety protection in the transportation and handling of national energy products. This includes the construction and demolition of pipelines for the purpose of transporting oil and gas products.

Oil Pipelines

Oil pipelines are very similar to natural gas pipelines in that the products are transported through networks of pipes and pump stations from production areas to consumers. First, the raw material (in this case, crude oil) is gathered from wellheads and moved downstream through trunkline pipelines to refineries, which separate the oil into numerous petroleum products. From the refinery, pipelines are used to transport petroleum products to various destinations for local use or export to other markets. A third product, called hydrocarbon gas liquid (HGL) is a secondary product created during the processing of natural gas. Because HGL is a liquid petroleum product, pumped through pipelines in a manner similar to oil, it is included in this section. More information on oil production and distribution can be found here.

For information on the process of identifying and permitting the construction of oil and gas pipeline infrastructure on federal land, refer to the Utility Corridor section.

Legal context

Similar to the natural gas pipelines, the State of Utah grants local governments the authority to supplement the state and federal laws with its own regulations for oil and gas development. The State of Utah authorizes counties to enact any ordinances necessary to carry out their duties, so long as they are not repugnant to state or federal law (BMP 2021). The PHMSA exercises authority under the Pipeline Safety Act (49 U.S.C. § 60101) to prescribe minimum safety standards governing the location, design, construction, operation, and maintenance of liquefied natural gas facilities in or affecting interstate or foreign commerce. Whereas FERC serves as the lead federal agency for satisfying compliance with NEPA (42 U.S.C. § 4321) for liquefied natural gas facilities subject to its jurisdiction (McIntyre 2018).

Hydrogen Pipelines

In contrast to oil and natural gas, which are extracted from the earth, hydrogen is a manufactured product. Hydrogen gas can be manufactured from fossil fuels such as natural gas ("grey hydrogen") or coal ("brown hydrogen"), or it can be created from water using electrolysis. When the electricity used in the electrolysis process is derived from a renewable energy source, the resulting hydrogen is known as "green hydrogen." Hydrogen can also be produced from biomass.

Pipelines and other infrastructure used to transport hydrogen are similar to those used to transport natural gas. Large-diameter pipes are first used in the transmission of high-pressure hydrogen gas. When blended with natural gas (at up to 15 percent hydrogen), existing natural gas pipelines can be used instead of installing separate hydrogen pipelines.

For information on the process of identifying and permitting the construction of hydrogen gas pipeline infrastructure on federal land, refer to the Utility Corridor section.

Legal context

The State of Utah grants local governments the authority to supplement the state and federal laws with its own regulations for oil and gas development. Utah authorizes counties to enact any

ordinances necessary to carry out its duties, so long as they are not repugnant to state or federal law (BMP 2021). The PHMSA exercises authority under the Pipeline Safety Act (49 U.S.C. § 60101) to prescribe minimum safety standards governing the location, design, construction, operation, and maintenance of liquefied natural gas facilities in or affecting interstate or foreign commerce. Whereas FERC serves as the lead federal agency for satisfying compliance with NEPA (42 U.S.C. § 4321) for liquefied natural gas facilities subject to its jurisdiction (McIntyre 2018). The US Department of Transportation (DOT), through PHMSA, has regulated hydrogen pipelines since 1970 via 49 CFR § 192. This code of regulation stipulates that a minimal level of safety standard needs to be met when transporting natural and other gasses. Regulations apply to pipeline construction, material standards, operations, and maintenance of pipeline structures.

Water Pipelines

For the purposes of this planning document, water pipelines consist of substantial infrastructure projects used to transport large quantities of water over long distances through varying terrain and elevations from reservoirs and rivers to major population centers and agricultural users.

Legal context

The Colorado River Compact created the Upper and Lower Colorado River Basin. In the Upper Colorado River Basin Compact of 1948, Utah is allocated 23 percent of the upper basin water allotment, which totals 1.73 million acre-feet. The Colorado River Storage Project Act (Public Law 485, 70 Stat. 105) was enacted to authorize the Central Utah Project (CUP) among many other such development projects within the Colorado River Basin. Congress enacted the Central Utah Project Completion Act (CUPCA) (P.L. 102-575) on October 30, 1992, providing policy guidance and direction for completing the CUP, including transferring all construction responsibilities from the BOR to the Central Utah Water Conservancy District, while retaining federal oversight. The Ute Indian Unit was de-authorized by the 1992 CUPCA (DOI 2021a).

All water use within the State of Utah is governed by Utah Code, Title 73. With respect to the Bear River, the Bear River Compact of 1958 divides the river into three main divisions: the Upper Division, Central Division, and Lower Division. The compact grants the State of Idaho the first right to develop and deplete 125,000 acre-feet in the Lower Division, the State of Utah the second right to develop and deplete 275,000 acre-feet in the Lower Division, and divides the next 150,000 acre-feet of water depletion equally between Utah and Idaho in the Lower Division. The compact then divides Bear River water in excess of the above allocations between Utah and Idaho, with Idaho receiving 30 percent and Utah 70 percent in the Lower Division. The compact further designates 36,500 acre-feet of "Original Compact Storage" above Bear Lake and allocates Utah 17,750 acre-feet of storage.

The Bear River Development Act (Utah Code § 73-26) directs the Utah Division of Water Resources to "develop the surface waters of the Bear River and its tributaries through the planning and construction of reservoirs and associated facilities as authorized and funded by the Legislature." The "associated facilities" include pipelines, pump stations, and reservoirs. The Bear River Development Project will provide 220,000 acre-feet of water to four Water Conservancy Districts (WCD). These are the Bear River WCD (which is allocated 60,000 acre-feet), Cache WCD (60,000 acre-feet), Jordan Valley WCD (50,000 acre-feet), and Weber Basin WCD (50,000 acre-feet) (UDWR 2021).

The Lake Powell Pipeline Development Act of 2006 (Utah Code § 73-28) authorized the construction of the pipeline to utilize a portion of Utah's water allocation from the Colorado River with the intention of delivering water from Lake Powell to Washington County.

For information on the process of identifying and permitting the construction of water pipelines on federal land, refer to the Utility Corridor section.

Telecommunications

Telecommunications refer to the infrastructure used to transmit and distribute electronic information. For this study, the discussion of telecommunications will focus on broadband infrastructure, typically transmitted through fiber optic cable, used by service providers to connect consumers to the Internet, which allows large quantities of digital information to be transmitted at high speeds.

Legal context

Coordination of highway and broadband information is regulated by Utah Code § 63N-3-501 (2020), which dictates the collection and maintenance of broadband data from providers and private or public entities.

For the purposes of telecommunication installation, utility access to the US interstate highway system, including the right-of-way areas, is regulated by Utah Code § 72-7-108 (2018) and Utah Administrative Rule § 907-64. These regulations facilitate longitudinal access to or use of any part of the right-of-way of a highway on the interstate system.

The placement and relocation of utility facilities that conflict with the construction or maintenance of highways (which applies to any and every facility, utility, or other structure not owned by the State of Utah) falls under the Utility Accommodation Rule (Utah Administrative Rule § 930-7).

For information on the process of identifying and permitting the construction of telecommunication infrastructure on federal land, refer to the Utility Corridor section.

Other Infrastructure

Other infrastructure includes mechanical wastewater treatment facilities, sewer collection systems, sewage lagoons, and stormwater systems. The vast majority of these systems in Utah are owned and operated by local municipalities and service districts. For information on the process of identifying and permitting the construction of infrastructure on federal land, refer to the Utility Corridor section.

Legal context

The Federal Water Pollution Control Act of 1972, commonly referred to as The Clean Water Act 40 CFR § 1, Subchapters D, N, and O (Parts 100-140, 401-471, and 501-503), gives the Environmental Protection Agency (EPA) the federal authority to set standards for allowable pollutants for point and nonpoint source discharge into waterways. The Utah Water Quality Act as amended establishes framework for State oversight of water quality.

Transportation Infrastructure

Transportation infrastructure is the backbone network of major roads, highways, railroads, and other infrastructure used to transport goods and services within and across Utah. For the purposes of this planning document, the roads and highways managed by the Utah Department of Transportation (UDOT) and major railroads are considered.

Legal context

The UDOT was established to have the authority and responsibility for planning, research, design, construction, maintenance, security, and safety of state transportation systems (Utah Code § 72). This includes the preparation and adoption of standard plans and specifications for the construction and maintenance of state highways.

Findings

Electrical Transmission

The majority of electricity generation and bulk energy transmission capacity in Utah is owned by PacifiCorp (note: Rocky Mountain Power is owned by PacifiCorp). According to company statistics, PacifiCorp serves 948,000 customers in Utah across 26 counties (Cox 2021).

Other power generators and distributors in Utah include the Utah Rural Electric Cooperative Association (URECA), Utah Municipal Power Agency (UMPA), and Intermountain Power Agency (IPA).

The URECA is a collective of nine local power generators and transmission companies from six states. Utah members of the cooperative include Deseret Power Electric Cooperative, Dixie Power, Garkane Energy, and Moon Lake Electric Association. Combined, they service about 70,000 utility meters and 250,000 consumers in Utah (J. Peterson, URECA, personal communication, 10/28/2021).

The UMPA comprises the communities of Levan, Manti, Provo, Salem, and Spanish Fork. In 2013, UMPA generated approximately 26 percent of its electricity and purchased the other 74 percent from the Colorado River Storage Project, Deer Creek, PacifiCorp, Deseret Power, and spot markets (UMPA 2013).

The IPA sells power to 23 municipal customers across the state as well as URECA members in Utah, Nevada, and Wyoming. They also sell power to municipal customers in California.

These power co-ops and associations make use of the OATT, provided by FERC Order numbers 888 and 889, to purchase transmission capacity on PacifiCorp's transmission infrastructure to provide power to their customers without having to install their own transmission lines.

Within and across Utah, PacifiCorp's infrastructure provides the majority of electrical transmission capacity. Other transmission infrastructure owners include the IPP, which owns a 500kC DC transmission line that services its California customers. Figure 1 shows the major existing transmission lines in Utah while Table 2 shows the approximate length of transmission line by voltage class.

The majority of future planned utility transmission infrastructure in Utah will be owned by PacifiCorp. Their 2021 Integrated Resource Plan describes new transmission projects intended to (1) strengthen the backbone of Utah's energy grid for future energy loads, (2) improve interstate energy market connections through the Western EIM, and (3) change generation sources to include greater renewable contingents. Pacificorp's future projects are listed below.

- Gateway South, 416 miles of 500 kV transmission line from Aeolus, Wyoming to Delta, Utah. Estimated completion date: October 2024.
- Emery to Clover, 75 miles of 345 kV transmission line
- Clover to Sigurd, 70 miles of 345 kV transmission line
- Spanish Fork to Mercer, 50 miles of 345 kV transmission line

- Cross-Tie Transmission Project, 214 miles of 500 kV transmission line from Clover, Utah to Thirty Mile substation in eastern Nevada. 2026.

Transmission projects from other companies include the TransWest Express Transmission Project, a 732-mile 500 kV DC transmission system connecting Sinclair, Wyoming, to Las Vegas, Nevada, with a terminal connection in Delta, Utah. This transmission line will eventually provide 3,000 megawatts of transmission capacity, which will be generated by wind power in Wyoming (TransWest Express 2021). The URECA has indicated they have no new transmission projects planned in the near future (Peterson 2021).

When planning for new utility-scale solar developments, considerations should be made for the inversion of DC power generated from solar array prior to connection to the AC bulk power grid.

Another consideration for the planning of electrical transmission in Utah includes future chokepoints or bottlenecks in transmission-line capacity. This issue has been studied with respect to electrical transmission in the 2021 Utah Transmission Study, which determined that (under scenarios of high renewable energy buildout in southern Utah) electrical transmission needs might exceed capacity (Energy Strategies 2021).

Resilience and redundancy of electrical transmission are issues that have been identified by stakeholders. Many rural locations in Utah are served by single transmission lines, referred to as "radial transmission lines." Radial transmission lines are the least costly option for providing some remote locations with electrical power, but they also leave those areas vulnerable to utility disruptions because of their lack of redundancy. Additional transmission connections are costly not only because of their construction costs, but also due to the expense and time required to place utility corridors on federal lands. Refer to the Utility Corridor section for more information.

Other locations experiencing issues with expanding electrical transmission capacity and redundancy are Dixie Power and Rocky Mountain Power in Washington County. Dixie Power's current transmission line (which supplies electricity to Washington County) runs through BLM land on which critical desert tortoise habitat has been designated. This land-use change prohibits

upgrades to the existing transmission line, which has resulted in the need to locate alternative transmission corridor locations (J. Peterson, URECA, personal communication).

Figure 1: Major electrical transmission lines in Utah (HIFLD 2021).

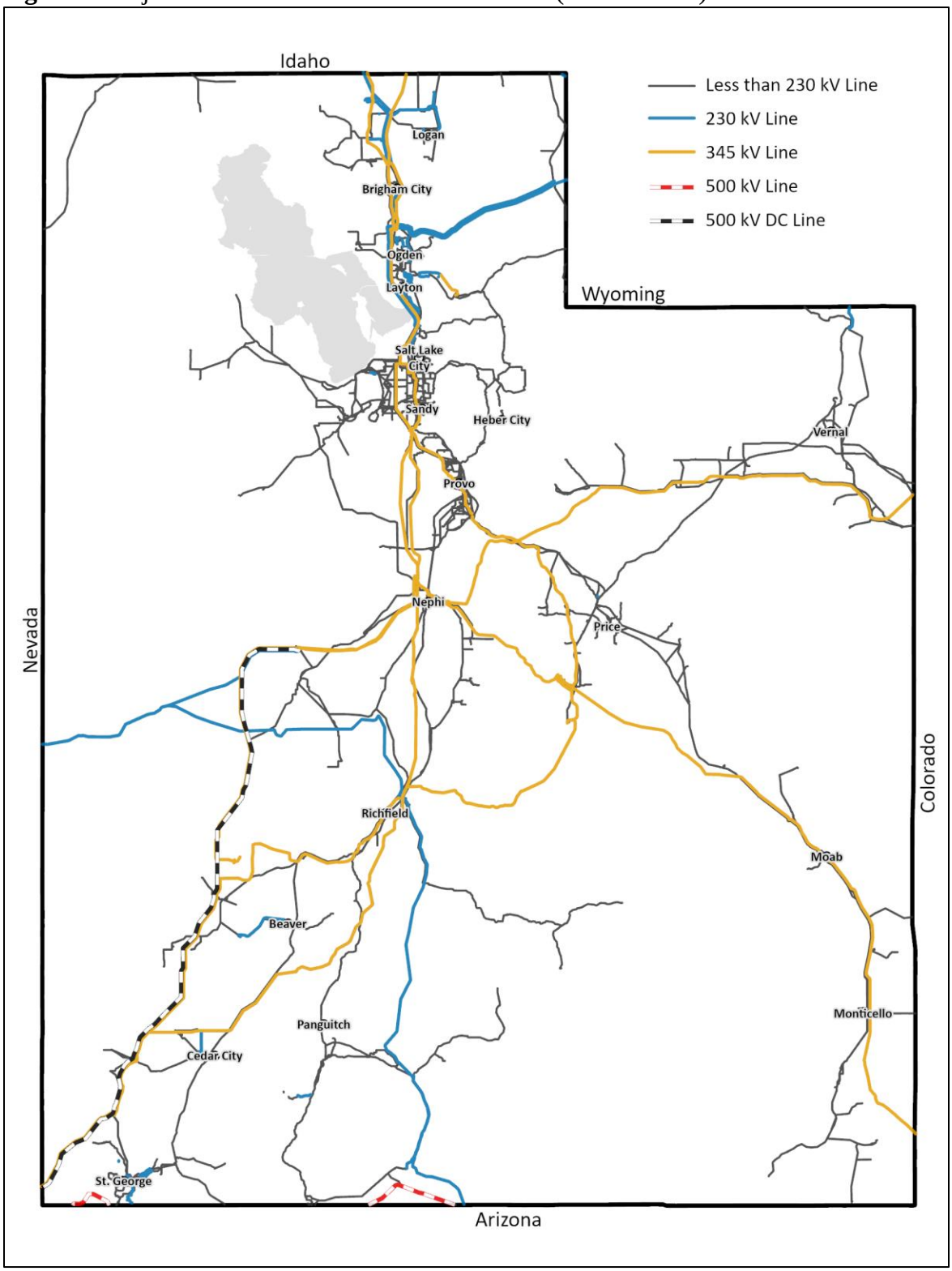

Table 2: Electrical transmission line length by type and voltage class.

Existing Alternating Current (AC) Transmission Lines	
Kilovolt Category	**Miles**
Under 100	2,292
100-161	3,642
220-287	1,005
345	2,218
500	45
Existing Direct Current (DC) Transmission Lines	
Kilovolt Category	**Miles**
Unspecified	207

Source: Homeland Infrastructure Foundation-Level Data, Electric Power Transmission Lines (HIFLD 2021).

Natural Gas Pipelines

Natural gas production in Utah is located primarily in Uintah and Grand counties (Vanden Berg 2020). Multiple interstate pipelines cross through Utah to transport natural gas from principal producing basins in Colorado, Utah, and Wyoming, to consumer markets in other states, and for export to foreign markets around the world. Figure 2 shows existing natural gas pipelines in Utah.

The majority of local natural gas transmission infrastructure in Utah is provided by Dominion Energy. The company owns 20,189 miles of transmission and distribution lines and has 1,090,000 customers (Dominion Energy 2020). Dominion Energy produces a large portion of the gas it sells to customers, but it also purchases natural gas from other interstate pipeline companies for delivery to residential, commercial, and industrial customers.

Major natural gas pipelines in Utah include those found in table 3.

Natural gas can also be produced from renewable sources to create a product known as "renewable natural gas" (RNG). A recent pilot project developed by Dominion Energy and Smithfield Foods (near Milford, Utah) converts methane from pig farms into RNG for distribution to Dominion Energy customers (Bioenergy Insight 2020).

Figure 1:Major natural gas pipelines in Utah (Dominion Energy 2020).

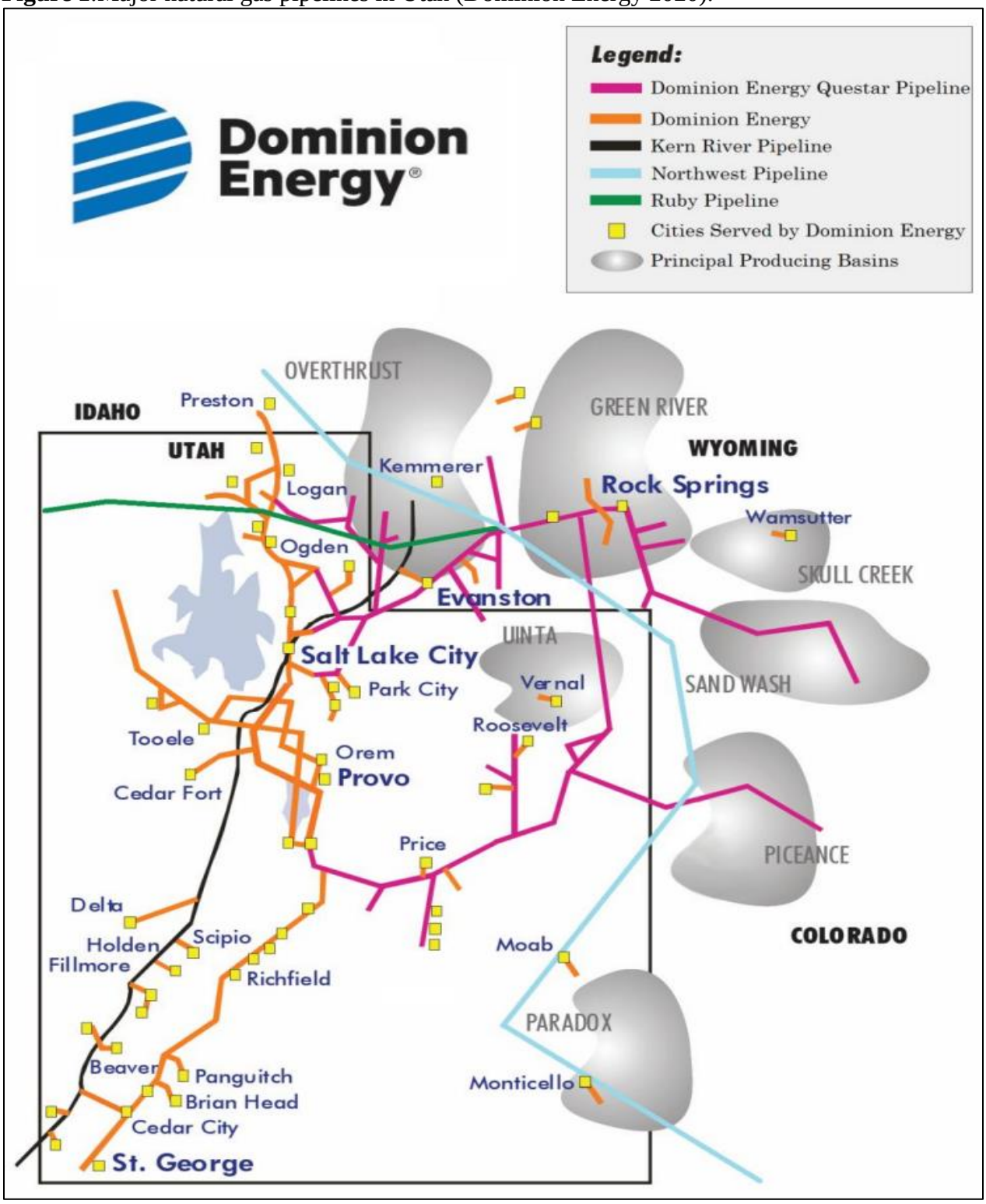

Table 3: Utah natural gas pipelines in Utah by operator.

Natural Gas Pipeline	
Operator	**Total (miles)**
Colorado Interstate Gas Co.	25
Kern River Gas Trans Co.	364
Northwest Pipeline	219
Questar Pipeline Co.	664
Rocky Mountain Natural Gas Co.	22
Ruby Pipeline LLC	178
Wyoming Interstate PL Co.	80
Grand Total	**1,552**

Source: U.S. Energy Information Administration), U.S. Natural Gas Interstate and Intrastate Pipelines (EIA 2020a.)

Oil Pipelines

According to the Utah Geologic Survey (UGS), Utah is consistently one of the top 15 oil-producing states in the United States (Chidsey 2021). In their recent circular, Utah's Energy Landscape, the UGS reported the majority of oil production in Utah is occurring in Duchesne, Uintah, and San Juan Counties. Oil produced from wells in the Uinta Basin and further east in Colorado is transported in oil pipelines and trucks to refineries in Salt Lake City. Crude oil produced in San Juan County is transported in pipelines south to refineries in New Mexico. Crude oil from Canada and Wyoming is delivered through pipelines to Salt Lake City for refining. Pipelines transport some petroleum products refined in Salt Lake City to other parts of Utah and out-of-state markets. The Tesoro pipeline transports products to the northwestern states, while the UNEV line supplies Cedar City and Las Vegas. Table 4 shows the lengths of oil pipeline by product type and operator.

Table 4: Utah oil pipeline length by product type and operator.

Oil Pipelines			
Type	**Operator**	**Pipeline**	**Total (miles)**
Crude Oil	Holly Energy	Frontier Aspen Pipeline	73
Crude Oil	Holly Energy	Salt Lake Crude Pipeline	162
Crude Oil	Plains All American Pipeline	Rocky Mountain	50
Hydrocarbon Gas Liquid	Enterprise Products	-	235
Petroleum Product	Chevron Pipeline Co.	Salt Lake Products	108
Petroleum Product	Phillips 66 Pipeline	Pioneer	76
Petroleum Product	UNEV Pipeline	UNEV Pipeline	342
Grand Total			**1045**

Source: U.S. Energy Information Administration, U.S. Crude Oil Pipelines, HGL Pipelines, and Petroleum Pipelines (2020b).

Hydrogen Pipelines

Presently, Utah has no pipelines designated for transporting compressed hydrogen because the demand for hydrogen as a fuel source is limited. One anticipated major hydrogen user in Utah is the IPP facility near Delta, which is scheduled for 2025 to begin energy generation from a fuel mixture of 70 percent natural gas and 30 percent hydrogen (Intermountain Power 2021). Eventually, their energy production will be converted to 100-percent green hydrogen. Related to this IPP development is a utility-scale hydrogen storage project that is intended to supply IPP with green hydrogen that will be generated on site.

Broader use of hydrogen, such as for motor vehicles and freight transport, is uncertain at this time. Wide-spread adoption of hydrogen as a transportation fuel would require a distribution network, either through pipelines or by tanker trucks, to fueling stations throughout the state to alleviate drivers' "range anxiety."

Water Pipelines

Two primary water pipelines and water development projects utilize (or plan to utilize) water allocated to Utah from the Colorado River Compact, CUP, and the Lake Powell Pipeline.

The CUP is a complex, transbasin water development and delivery infrastructure project that provides water storage and conveyance within the Uintah Basin and Wasatch Front of Utah. The CUP consists of four units--water projects that, when combined, comprise the entirety of the CUP. The Bonneville Unit is the primary unit. It enables transport of water from the Uinta Basin to the Wasatch Front. Within the Bonneville Unit is the Diamond Fork system. This system

comprises the Diamond Fork Pipeline, which delivers 101,900 acre-feet of water to the Wasatch Front (DOI 2021b).

The Lake Powell Pipeline Project is a proposed pipeline project that would convey up to 83,756 acre-feet of water from Lake Powell for use in Washington County (LPP 2021). A draft environmental impact statement for the project was developed by the BOR. The Southern Alternative route proposed for the pipeline and associated power transmission infrastructure from Lake Powell to St. George would utilize a portion of Section 368 energy corridors through northern Arizona.

The Bear River Development Act instructs the utilization of waters allocated to Utah in the Bear River Compact. To this end, the 2019 Bear River Development Report outlines planning and studying aspects of developing these water resources for the State of Utah. The report determined that the need for water may not occur until 2050, but corridors needed for pipelines for conveyance of the water as well as storage locations should be acquired in the near future.

Within Iron County, several projects have been proposed. The Pine Valley Water Supply Project (PVWS), as proposed, is a 66-mile pipeline that would bring water pumped from groundwater wells in the West Desert (known as “Pine Valley") to Cedar Valley (BLM 2021). The proposed pipeline operated by the Central Iron County Water Conservancy District would transfer about 15,000 acre-feet of water per year (CICWCD 2021). Approximately 42.6 miles of project length is located on BLM lands and would require a 50-foot-wide right-of-way. A second water project in Iron County is the Airport Recharge Project, which is intended to pump surface waters into a local aquifer in an attempt to recharge the overdrawn groundwater (UDWR 2021).

Telecommunications

The State of Utah is committed to deploying and expanding broadband and making it accessible across the entire state. To this end, the 2020 Utah Broadband Plan identifies a series of goals to meet that goal. As of June 2021, 94 percent of Utah has access to broadband Internet service with speeds of 100 mbps or faster. Approximately 68 percent of Utahns have access to fiber-optic services with a State Broadband Access Ranking of 29th in the United States (BroadbandNow 2021).

The widespread access to high-speed Internet service across rural Utah is due in large part to the UDOT Fiber Program. For the last 20 years, UDOT has been working to install a robust fiber optic network along state highways to connect traffic cameras, digital road signs, weather stations, and other sensors to provide real-time traffic updates (UDOT ND). This fiber-optic backbone also provides access for private companies to connect to broadband Internet networks and provide high-speed Internet to their customers. UDOT established a Public Private Partnership with private telecom companies to connect communities while expanding UDOT’s Intelligent Transportation System.

Utah’s current fiber-optic network consists of approximately 2,564 miles of single mode fiber (SMF or SMFO), 1.6 miles of multimode fiber (MMF or MMFO), and 24 miles of SMF and MMF (UDOT 2021a). A fiber-optic priority assessment revealed that 309 miles of fiber-optic network has been proposed with an additional 317 miles to meet existing needs (UDOT 2021b).

Approximately 105 miles of fiber-optic network is in progress, with another 146 miles scheduled for installation (as of November 2021).

Other Infrastructure

There are 41 mechanical water-treatment plants in Utah. These range in capacity from 0.25 million gallons per day (mgd) in Oakley City to 75 mgd at the Central Valley Water Reclamation Facility in Salt Lake City. Statewide, wastewater treatment plants are operating at 65 percent of capacity (WFWQC 2019).

A total of 24 sewer lagoons, which discharge treated effluent into waters of the State of Utah, serve a population of 73,500 people. Another 49 sewer lagoons are non-discharging treatment facilities that use evaporation and percolation to handle wastewater and serve a population of 132,500 people (Krouth 2019).

A 2019 study of existing sewer pipelines across Utah estimated there are 12,202 miles of sewer pipeline in the state with an average age of 35 years. The same study estimates that 7,320 miles of pipeline will need to be relined or replaced by 2060, and an additional 2,567 miles of new pipeline will need to be installed in the same timeframe (Forsgren 2019).

A 2019 study of stormwater pipes across Utah estimated there are 4,673 miles of existing stormwater pipes in the state with an average age of 29 years. The study estimates that 2,395 miles of this pipeline will need to be replaced by 2060, and another 956 miles will need to be installed in the same time period to accommodate new population growth (Forsgren 2019).

Water discharged into state waterways from mechanical wastewater treatment plants, sewage lagoons, and stormwater systems are subject to clean-water standards established by the EPA and the Utah Division of Water Quality. Those standards are defined here.

Transportation Infrastructure

The planning, construction, and maintenance of US interstate highways, state highways, and some local roads in Utah are completed through collaboration with UDOT. Roadway planning occurs during the compilation of the Unified Transportation Plan. The planning process is a unification of multiple transportation plans across the state including local governments, rural planning organizations metropolitan planning organizations, transit districts/authorities, and UDOT. Construction of new federal and state roadways and bridges as well as upgrades to existing infrastructure is prioritized during the planning process and ultimately approved by the Utah Transportation Commission appointed by the Governor. Maintenance of roadways within UDOT's jurisdiction is carried out through a system of maintenance facilities placed strategically across the state. Federal oversight of Utah's highway infrastructure is provided by the Federal Highway Administration.

The Utah Freight Plan addresses issues and needs specific to the statewide highway and multimodal freight networks. The UDOT, in conjunction with the Utah Transit Authority, also compiled the Utah State Rail Plan, a plan for freight and passenger rail transportation in Utah. Finally, Utah is in the planning process to site and construct a new rail connection between the Uinta Basin and the existing interstate railroad network. The preferred route would travel from

Kayune, Utah, to Myton, Utah, passing south of Duchesne along US Highway 191 through Indian Canyon. About 12 miles of the route would be through USFS land, which required preparation of an environmental impact statement. The USFS issued a draft Record of Decision on October 26, 2021, to allow the project to proceed on forest land. A decision by the federal Surface Transportation Board is also required.

Economic Considerations

Electrical Transmission

Rocky Mountain Power and its parent company PacifiCorp employs more than 1,800 people in Utah.

Lack of sufficient generation resources during peak demand puts utilities and customers at risk of high prices from the energy market during emergencies. This happened in Texas during February 2021, during which a winter storm and freezing temperatures disrupted one third of Texas's power generation capacity, resulting in astronomical power costs over just two days (Hersher 2021). A robust transmission system can reduce the potential for this kind of problem because transmission connects multiple generation sources across large regions.

Natural Gas Pipelines

Natural-gas distribution companies employ as many as 700 employees in Utah (DWS 2021) with Questar Gas (now Dominion Energy) being the largest natural gas company in the state.

Oil Pipelines

Sinclair Oil in Salt Lake City employs 1,200 people (Kolmar 2021).

Hydrogen Pipelines

Hydrogen has only limited use within Utah. This may change in the future if hydrogen is adopted as a transportation fuel or as a large-scale component of utility-scale electricity generation.

Water Pipelines

According to the 2020 Statewide Water Infrastructure Plan, over the next 50 years, the State of Utah and municipal water providers will need to spend $20.6 billion to repair and replace existing infrastructure and another $17.6 billion for new infrastructure and to develop new water supplies for future growth (BRWCD et al. 2020). The five river basins with the highest estimated costs are Bear River Basin, Kanab Creek/Virgin River Basin, Weber River Basin, Utah Lake Basin, and the Jordan River Basin.

The construction cost of the Pine Valley Pipeline Project is estimated at $254 million. The Bear River Development Project could cost between $1.5 billion and $2.8 billion, depending on the ultimate project design constructed (UDWR 2019). The Lake Powell Pipeline is estimated to cost between $1.5 billion and $3.2 billion (Utah Water Law 2016.).

Telecommunications

The Utah Broadband Advisory Council considers broadband essential to economic success (UBAC 2020). Broadband is essential for Utah businesses because it allows them to be nationally and internationally competitive. The technology also promotes entrepreneurship, attracts investments, and supports state and municipal governments. The partnerships developed

through the UDOT Fiber Program have saved the state an estimated $105.8 million while connecting many parts of Utah to high-speed Internet service.

Other Infrastructure

According to a recent study by the Utah Department of Environmental Quality, the present value of existing wastewater treatment facilities in Utah is estimated to be $4 billion (Reclaim 60 ND). However, wastewater conveyance and treatment facilities must be maintained to operate effectively. Utah faces an additional cost of $5.3 billion for infrastructure renewal and replacement, and another $1.3 billion for upgrades to meet future regulatory requirements. New infrastructure required to meet the needs of population growth across Utah is expected to cost $2.1 billion. Over the next 40 years, the total cost for wastewater treatment has been estimated to be $8.7 billion (Reclaim 60 ND).

In addition to wastewater treatment facility costs, other infrastructure must be replaced or upgraded over the next 40 years. Wastewater pipelines represent a cost of $4.3 billion, sewer lagoons are expected to cost $432 million, and stormwater-collection systems are estimated to cost $1.3 billion (Reclaim 60 ND).

Transportation Infrastructure

The Unified Plan determined a total of $108.5 billion would be needed between 2019 and 2050 to fund the maintenance of current infrastructure, to expand capacity of existing roads, and to build new roads. This estimate also includes funds for upgrading transit and railway infrastructure (UDOT et al. 2021). Funding for the construction and maintenance of major highway infrastructure is provided by federal and state funds, which are generated from fuel taxes, vehicle registrations, and general funds.

Goals, Objectives, and Policies

Goal

In light of Utah's arid environment and the world's changing climate conditions, the need for sufficient and reliable water, energy, and critical resources, the need for storage and related infrastructure is ever increasing. Therefore, to ensure Utah's ongoing drought resilience, energy security, and to provide for current and future needs, the State supports efforts to build and invest in necessary infrastructure, including additional pipelines, dams, reservoirs, above and below-ground storage facilities, and other feasible infrastructure.

Objectives

- Provide statewide economic opportunities and resilience for Utah communities.
- Develop and allow pipelines and sufficient infrastructure to meet Utah's current and future needs.
- Ensure that project continuity issues on public lands do not inhibit project implementation.
- Explore opportunities for above and below-ground water storage statewide at different scales, finalize projects that have been proposed and vetted, and complete projects that were never constructed. Support tribal pipeline and infrastructure projects that receive federal appropriations.
- Conduct feasibility studies to prioritize water storage and pipeline projects and become proactive in order to capitalize on high water flows during flood years.
- Improve techniques and the utilization of aquifer storage and recovery.
- Efficient and timely delivery of water and energy resources without damaging infrastructure.
- Support innovative and proven technologies to line earthen and concrete canals in order to reduce water loss and increase transportation efficiency.
- Increase pipeline capacity and availability to decrease evaporation and unnecessary loss.
- Form partnerships with stakeholders and obtain funding from the Bureau of Reclamation to form partnerships that benefit communities.
- Support counties and water conservancy districts in applying for grants to improve water delivery systems.
- There may be a future need to supply hydrogen along major highway arteries. There are several different methods of utilizing hydrogen opportunities that need to be further studied and strategically implemented. Avoid hydrogen production that requires excessive water consumption.
- Investigate and strategically support and implement hydroelectric production by using new technology such as in-pipe hydro systems within existing and future pipelines.
- When feasible, and in the best interest of the state or local communities, encourage the maintenance required to avoid decommissioning hydroelectric power facilities.
- Develop infrastructure projects aimed at recharging depleted aquifers.
- Encourage xeriscaping policies, incentive programs, and educational campaigns to reduce water usage and reliance.

- Increase watershed yields through active management of forests and other vegetated areas.
- Support programs like Shared Stewardship and the Watershed Restoration Initiative to enhance water yields.
- Support the implementation of the Utah State Water Plan.
- Strategically promote watershed restoration and flood abatements after wildfires to improve soil retention, improve water quality, and reduce downstream impacts caused by flooding, siltation and debris flows.
- Incorporate silt traps and other mechanisms to trap silt upstream and keep it from entering water treatment plants and downstream reservoirs that will ultimately need to be dredged when their storage capacity is reduced.
- Mitigate the "use-it-or-lose-it mentality" by providing alternative options to water consumers (e.g. water banking).
- Support innovation to make existing and future water storage and delivery systems more efficient, reliable, safe, climate friendly, and sustainable.
- Support a network for the distribution of natural gas, crude oil, and refined petroleum products to domestic and foreign markets.
- Develop agreements with federal agencies to make it possible to maintain and improve dams, impoundments, and other facilities on federal lands with limited access in a timely and economically feasible manner. It is not economically feasible to transport equipment and supplies by helicopter.
- Encourage the use of Advanced Metering Infrastructure (AMI) to quickly identify water leaks reducing wasted water. The technology also allows remote monitoring and manipulation (valves, flow rates, pressure, etc.) of water conveyance infrastructure.

Policies

- The State supports coordinated efforts across all agencies, governments, tribal nations, and other land ownerships on infrastructure projects to minimize delays.
- The State encourages and requests federal appropriations for water infrastructure, including pipelines, water storage, and aquifer recharge.
- The State supports active forest management to increase water yields and water quality.
- The State supports active forest management to decrease water quality issues from wildfire, flooding, etc., which impacts water storage, water treatment, and water delivery systems.
- The State supports the plans and strategies presented by the Shared Stewardship Program, Watershed Restoration Initiative, and the Utah Division of Water Resources.
- The State will support the Utah Watershed Council Act.
- The State encourages water conservation measures, education, and incentives.
- The State supports maintaining access to water in the Colorado River and its access to state and county owned shares that have not been fully exercised as a result of access and transportation limitations.
- The State supports the development of pipelines from the natural gas and crude oil producing areas to refineries, export terminals, or to other associated transportation systems.

- The State discourages natural gas vent pipes (e.g. pig lines) in close proximity to electrical transmission and distribution lines, or any other non-compatible operations.
- The State supports federal appropriations for methane capture while maintaining safety protocols.
- The State supports the effort to conserve water by creating hydrogen through natural gas, coal, and other sources.
- The State supports creating a strategy to provide consumers with hydrogen access along major transportation arteries, if or when, markets support this energy transference option in the future.
- The State supports and encourages the maintenance and development of pipelines and infrastructure that improve the state's market share and improve the quality of life for Utahns, provided such can be maintained and developed in a sustainable manner.
- The State opposes the creation of pipelines and infrastructure to remove water resources from the state of Utah in order to transport it to other states.
- The State expects pass-through pipelines and associated infrastructure to continually benefit the citizens of Utah and communities.
- The State desires unimpeded and timely access to water storage facilities on federal lands to feasibly improve and maintain infrastructure in an effort to address water storage needs.
- The State supports the completion of the Central Utah Project as originally proposed to fulfill all promises made to Uintah Basin counties to mitigate for the transfer of water to the Wasatch Front.
- The State supports projects that conserve water by the lining of ditches and canals.
- The State supports the preservation of existing hydroelectric facilities and construction of new facilities, including in-pipe hydro systems and other innovative technologies.
- The State supports the construction and operation of pipelines and other infrastructure to enable the production and transportation of mineral resources from federal lands.

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