Navajo Nation Utility Infrastructure Needs

The purpose of this document is to identify the number of homes on the Navajo Nation that lack utility services and the cost to get utilities to these unserved homes. In 1959, the then named Navajo Nation Tribal Council created the Navajo Tribal Utility Authority (NTUA) as a small water utility. Today NTUA is the largest multi-service utility company owned and operated by a Native American Nation and provides electricity, water, wastewater, natural gas, telecommunications services (broadband and mobile phones services), and electric generation services. Current generation includes utility scale solar and off grid photovoltaic services.

The Navajo Nation encompasses over 27,000 square miles extending into thirteen (13) counties located in the states of Utah, Arizona, and New Mexico. It is the largest land area occupied by a Native Nation in the United States, larger than the state of West Virginia. Housing density is low as compared to much of the United States and is comprised of mobile homes, modular buildings, traditional homes called "hooghans," and standard homes. On the Navajo Nation, it is estimated that 31% of all homes lack complete plumbing, 28% lack kitchen facilities, 30% lack water services, 32% lack electricity, 86% lack natural gas services, and 60% lack landline telephone services. The Navajo Nation also lacks a modern 911 emergency system.

Electricity

Approximately 14,063 homes on the Navajo Nation are not connected to the electric grid. The United States Census Bureau utilizing the American Community Survey (ACS) from 2015 to 2019 documents 68,101 housing units on the Navajo Nation which has a margin of error rate of ±646. To determine the number of homes on the Navajo Nation that are not connected to the electric grid, in late February 2021 NTUA surveyed the following electric service providers that provide service on the Navajo Nation: the Arizona Public Service Company, Continental Divide Electric Cooperative, and Jemez Mountains Cooperative. Approximately 53,049 residential homes on the Navajo Nation are served through these three electric utilities and NTUA. In addition, NTUA considered homes located in Alamo Chapter (573 homes) and in To'haajiilee' Chapter (416 homes) as connected to the electric grid because these communities have a high rate of electric grid connections.

Based on NTUA's historic costs, the average cost to connect one family to the electric grid is $40,000. It is estimated to cost $562.52 million to connect 14,063 homes to the electric grid. Many homes need their house wired for electricity. The estimated cost for house wiring is $98.44 million at the rate of $7,000 per home. Extending power lines to homes also requires extending and upgrading the electric distribution and transmission lines and electric substations, which is

estimated to cost an additional $400 million. The total estimated cost to electrify 14,063 Navajo homes is about$1,060,961,000.

Majority of NTUA's Electric Generation is Non-Carbon Emitting

The majority of NTUA's electric generation is non-carbon emitting. The sources of the non-carbon emitting generation are derived from hydropower generation-from the Colorado River Storage Act Projects and Hoover Dam and NTUA's Kayenta I & II Solar Projects which are located on the Navajo Nation. NTUA's total and non-carbon energy sales are found in the following table.

NTUA Energy Mix - Non-Carbon Resource

Year	Peak Load (MW)	Total Energy Sales (MWh)	Non-Carbon Resource (MWh)	Non-Carbon Resource %
2016	125	702,304	192,680	27.44%
2017*	185	862,422	256,526	29.74%
2018	201	1,027,068	383,986	37.39%
2019*	217	1,017,298	414,749	40.77%
2020	170	829,678	474,446	57.18%
2021	170	829,678	485,036	58.46%
2022	170	829,678	494,121	59.56%

*Resolute became an NTUA Customer on June 29, 2017.

*Peabody Coal Mine and Navajo Generating Station Railroad closed in August 2019.

Communications

The majority of the United States households have access to High-Speed Internet Services through Cable TV Providers or legacy Telephone companies. Most large communities have access to Fiber-To-The-Home (FTTH) service providers that have rate plans with speeds of 100 Mbps or higher. Navajo Nation households only have access to Local Exchange Carrier DSL Service (via copper telephone facilities) or Wireless Facilities, which provide a maximum speed of 25 Mbps. Broadband service to the Navajo Nation Eastern Agency is also limited because AT&T, Verizon, and T-Mobile/Sprint own the majority of spectrum, but they do not adequately deploy equipment to use the spectrum in this area. By not deploying spectrum, these carriers are dramatically limiting the coverage in this part of the Navajo Nation.

NTUA is majority owner of NTUAW Choice Wireless. Choice Wireless is a mobile phone and broadband service Provider. NTUA and NTUAW estimate that for the entire Navajo Nation to receive broadband services, fifty-five (55) new telecommunications towers need to be constructed at a total cost of $49.5 million. The supporting new fiber builds are estimated to cost $150 million and the radio equipment for the towers is estimated to cost $25 million. The total cost is $224.5 million. This wireless broadband solution would provide speeds of 25 Mbps. NTUA and NTUAW did not calculate the cost of FTTH, which would allow service at100 Mbps or higher.

Additionally, the majority of the United States households have access to somewhat reliable Cellular Services. The Navajo Nation has very limited coverage areas for Cellular Telephones due to mountainous terrain and high cost of deployment.

Water and Wastewater

The Indian Health Service (IHS) is charged with reporting unmet need for water and wastewater to homes on the Navajo Nation through Public Law 86-121 and annually reports to the Navajo Nation. NTUA is reporting IHS's findings herein, because IHS is statutorily responsible to serve Navajo homes with water and waste \water services for sanitation purposes.

IHS does not conduct a census of homes; they report "eligible homes." An "eligible home" is defined as a 24-hour year-round family dwelling within the Contract Health Services Delivery Area (CHSDA). A CHSDA is defined in the Federal Register and normally consists of a county which includes all or part of a reservation, and any county or counties which have a common boundary with the reservation. In addition, due in part to the large number of homes, IHS has established feasibility criteria for connecting homes on the Navajo Nation to water and wastewater facilities. That being recognized, Ronson Chee, Ph.D., P.E., of Riley Engineering conducted a study of IHS data in three target areas on the Navajo Nation, and noted for every home reported in IHS's system, he could visibly see two additional occupied homes within eyesight of the reportable home. Based on that observation, the HIS tabulation does not include all of the Navajo homes that need service.

The December 23, 2020 IHS report to the Navajo Nation documents 16,100 "eligible homes" without adequate water and/or wastewater. Among those homes, about 3,500 homes lack any water or wastewater facilities. IHS's total estimated cost is $535,580,490 to serve all deficiencies of these 16,100 homes. This cost escalates every year and increased $15.9 million from 2019. Feasible projects make up $166 million of the total estimated cost of $535,580,490. The IHS reports that at the current level of funding, it will take approximately 6 years to fund the feasible projects – which is a subset of all projects. In NTUA's experience, IHS's estimate of 6 years to fund feasible projects means it can take a minimum of ten years for an identified feasible project to be built. Another item to note about IHS's reporting is that engineering costs are not included and historically engineering costs add about another 25%. Through the implementation of NTUA's 2020 federally funded water projects to combat COVID-19, NTUA collected information that shows that IHS's data is outdated. Specifically, NTUA constructed waterlines to homes that IHS had not identified as being deficient. Unlike electricity, there are no other large water utility providers to serve Navajo homes. Other than NTUA, only a few small public water systems serve a total of a couple hundred homes. It is fair to compare the number of Navajo electric residential customers of 53,046 to the number of NTUA residential water customers of 38,780 to further demonstrate the potential outdated nature of IHS's reporting. The difference between those two values, 14,266 reflects homes without water. That value is 4 times greater than the number provided by IHS.

In addition to water and wastewater needs on the Navajo Nation, NTUA estimates a cost of approximately $30,000,000 to upgrade existing water delivery facilities to serve existing and near-future demands. Critical other needs include the larger water projects that have been funded through existing water rights settlements in the States of New Mexico and Utah. These projects will be withdrawing, treating, and transmitting bulk water that will meet the needs of many of the homes that lack water and meet other current and projected municipal water demands ("bulk water projects"). These regional bulk water projects are designed for a long-term planning period and are intended to support the livelihoods and economic development of the Navajo

Nation. One such bulk water project – the Navajo Gallup Water Supply Project (NGWSP) -- is facing an anticipated funding shortfall of $250 million, as estimated by the United States Bureau of Reclamation.

Connections from these bulk water projects to existing NTUA water distribution systems need to be constructed. NTUA has over 100 existing water distribution systems across the Navajo Nation, not including the three independent water systems serving satellite Navajo communities in New Mexico. Existing NTUA water distribution systems need to be intertied to convey water from system to system and create regional distribution networks. NTUA estimates connections and interties will cost $1.7 billion.

It is important to note that there is no bulk water project authorized and funded to serve most of the Navajo Nation located in Arizona. If this area of the Navajo Nation does not benefit from a bulk water project and only the IHS Sanitation and Deficiency Program as currently funded and administered serves this area, most of Arizona will never receive clean drinking water or wastewater services. That being recognized, the Navajo Nation has been diligently working on a project called the Western Navajo Pipeline (WNP) to serve much of the Arizona portion of the Navajo Nation. WNP Phase 1 from LeChee Chapter to Bodaway Gap has a funding shortfall of $19 million. Future unfunded Phases include a transmission line to Tuba City and a transmission line to Cameron Chapter.

The total NTUA cost for NTUA water services to serve unserved Navajo homes is $1.73 billion, not including the NGWSP shortfall mentioned earlier.

Delivery of clean water must always include the management of wastewater. Stated simply, "water in is water out." The build out of NTUA's wastewater system is estimated to cost $194.1 million. This amount includes five essential projects to meet immediate needs on the horizon and six additional facilities to meet needs if the bulk water projects are realized.

Finally, Congress has authorized IHS to financially support Tribes for operations and maintenance of water systems. Congress has never funded that authorization. The COVID-19 pandemic has demonstrated why it is critical to not only construct clean drinking water systems but also the need to keep them up and running.

Natural Gas

NTUA serves 7,075 homes with natural gas. NTUA estimates it could serve another 30,000 homes on the Navajo Nation with natural gas. NTUA does not provide an estimate to serve all homes on the Nation with natural gas, because customers living in dense areas are more efficiently served by natural gas than in less dense areas. Based on the estimates to connect and convert propane customers to natural gas, it averages about $15,100 to connect one family on an existing natural gas distribution system and $60,000 to connect one family on a new natural gas distribution system.

For 30,000 homes it is estimated to cost $1.1 billion to connect them to natural gas. Extending natural gas pipelines to homes also requires upgrading existing natural gas regulator stations and installing new taps and regulator stations, which is estimated to cost an additional $6.6 million.

The total estimated cost to provide natural gas to the 30,000 Navajo homes is about $1,106,600,000.00.

Total Identified* Costs of Meeting the Utility Needs of all Homes on the Navajo Nation

Unmet Utility Infrastructure Needs on Navajo	**Estimated Cost**
Electricity	$ 1,060,961,000.00
Communication	$ 224,500,000.00
IHS Water and Wastewater	$ 535,580,490.00
NGWSP cost overruns	$ 250,000,000.00
Water	$ 1,730,000,000.00
Wastewater	$ 194,100,000.00
NGWSP Connections	$ 85,000,000.00
WNP (AZ) Phase 1	$ 19,000,000.00
Natural Gas	$ 1,106,600,000.00
Total	**$ 5,205,741,490.00**

* Identified Cost does not include a fully constructed WNP (Arizona) and unmet water needs in Utah.

This table shows the cost of meeting all of the Navajo Nation's utility infrastructure needs. Importantly this table puts into perspective the relatively small size of the existing programmatic authorities and funding. NTUA has shown that when significant funding was provided through the CARES Act, progress can be made and the challenge of serving all Navajo homes can be met.

For More Information, please contact Walter W. Haase, General Manager, NTUA at walterh@ntua.com or 928-729-6202