



Sandia
National
Laboratories

Shifting from Fossil Fuel Reliance to Green Energy Sovereignty: Ute Mountain Ute Tribe

Rudy Montoya

Graduate Student Intern

Photovoltaics and Materials Technology Department

August 9, 2022

Presentation to the Department of Energy – Indian Energy Office

Unclassified, unlimited release



Sandia National Laboratories is a multimission laboratory managed and operated by National Technology & Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA0003525.

SAND2022-16790 PE

INTRODUCTION AND MOTIVATION



- Background of the Ute Mountain Ute Tribe
- Urgent need to move from fossil fuels to renewables
- Costs of photovoltaic systems; decreased substantially in the last 10 years
- Office of Indian Energy Policy and Programs has empowered tribes to exercise their energy sovereignty

Background of the Ute Mountain Ute Tribe



- 2,000 members in 4 states (CO, UT, AZ, NM), mainly Southwestern Four Corners area
- Shoshonean language speaking
- Historically known for animal furs and skins
- Reservation near historic stomping grounds
- Oil & gas development on land since 1950's

Urgent need to move from fossil fuels to renewables

- Ute Mountain Ute Climate Action Plan of 2020
 - Preserving air quality
 - Preserving native lands
- Assisting tribe members
- Generating revenue



shutterstock.com · 1685508094

Figure 1. No Pollution, reprinted from Shutterstock.com

Costs of photovoltaic systems and have decreased substantially in the last 10 years



- Total Installation cost has decreased
- Levelized cost of energy (LOE) has decreased
- PV module cost has decreased

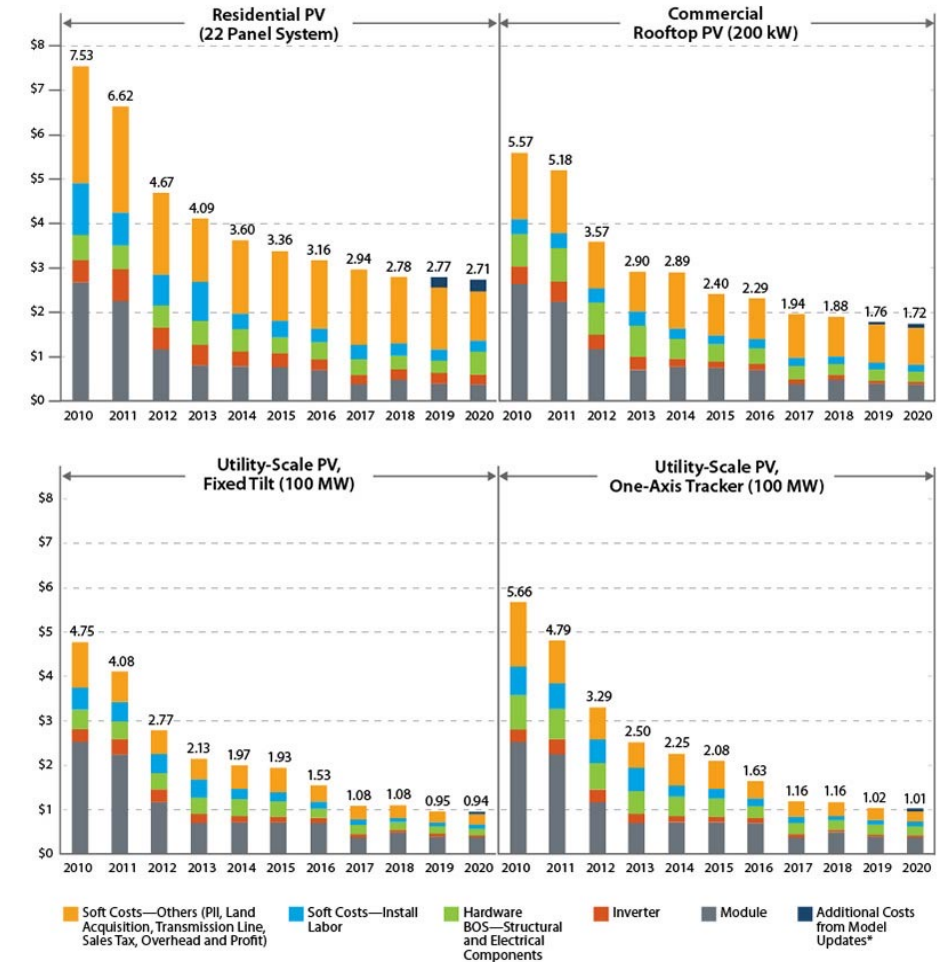


Figure 2. Solar Installed System Cost Analysis, reprinted from NREL

Levelized Cost of Energy Comparison

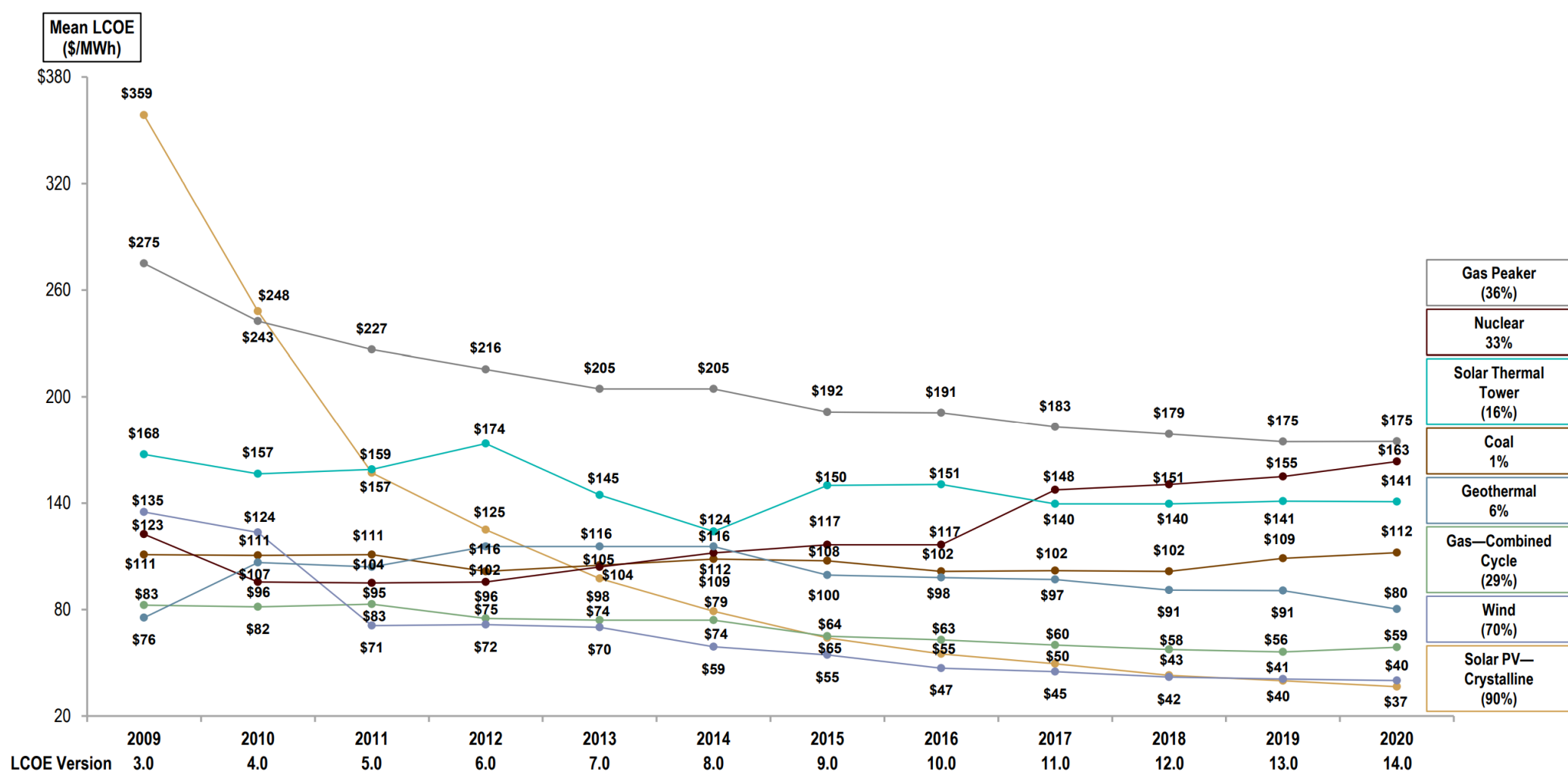


Figure 3. Levelized Cost of Energy Comparison—Historical Utility-Scale Generation Comparison, reprinted from Lazard’s Levelized Cost of Energy Analysis — Version 14.0

Office of Indian Energy Policy and Programs has empowered tribes to exercise their energy sovereignty

- Education
- Support
- Assistance
- Awareness



PAST SOLAR PV INSTALLATION

- 1 megawatt of power
- Direct connection to tribal casino
- Infrastructure owned by tribe
- Islanding possible as a microgrid

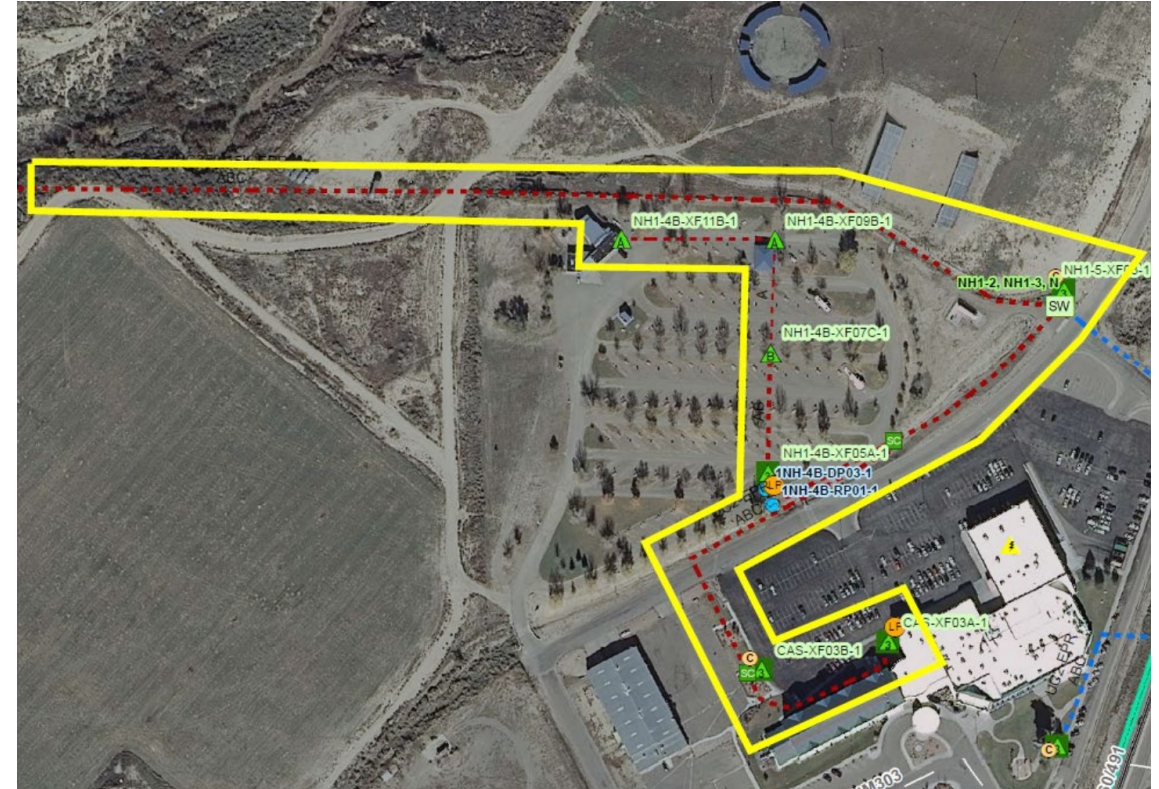


Figure 4. Nuchu 1 Circuit, reprinted from DOE Ute Mountain Ute Tribe Community Scale Solar Project – Final Report

FUTURE ENERGY PROJECTS



Additional PV

- White Mesa, Utah
- Towaoc, Colorado
- Utility scaling



Figure 5. Ute Mountain Ute Tribe's PV Array, reprinted from DOE

FUTURE ENERGY PROJECTS



- Energy Storage
 - Battery
 - Pumped Storage Hydropower

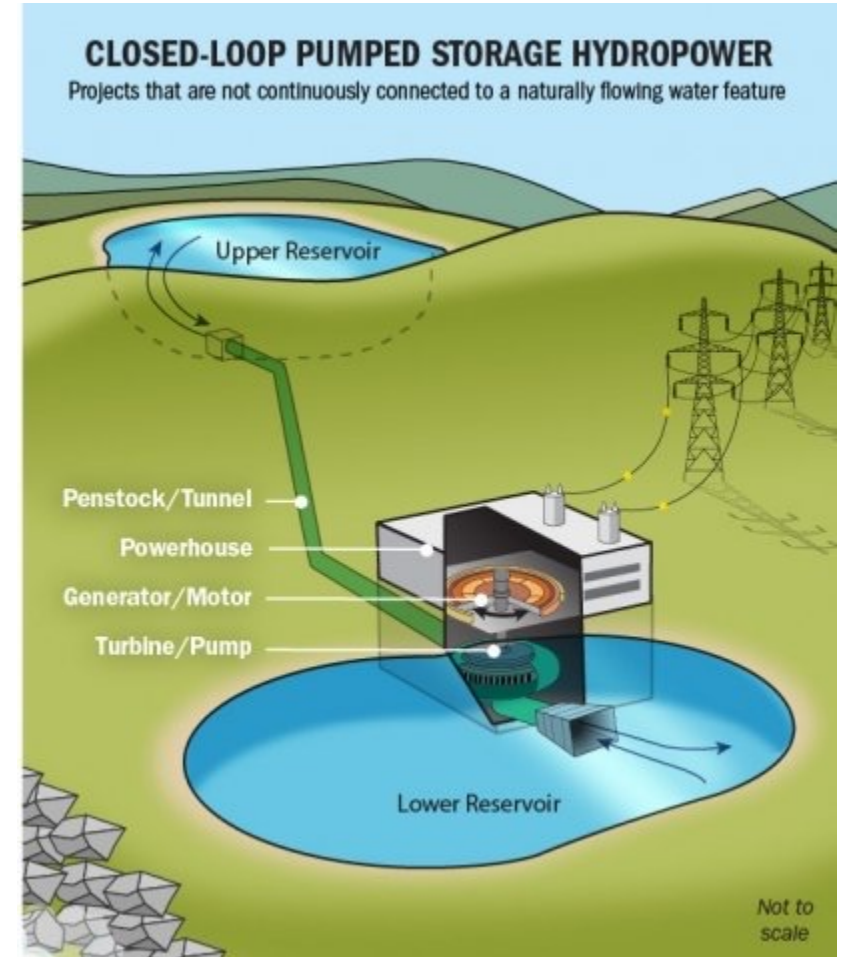


Figure 6. Closed-Loop Pumped Storage Hydropower, reprinted from DOE

RESULTS



- Economic benefits realized for the tribe
- CO2 emissions down
- Workforce development
- Sovereignty enriched

RESULTS



Generation and Cost Savings Verification Towaoc Community Solar Initiative: DOE Grant Cost-Share DE-IE-0000095

Project Energized on 3/5/2020; approximate 50% of capacity due to need for Curtailment system verification test needed

Meter Reading Date	Total Generation (KWh)	Monthly Net Generation	Billed to Casino	Resident Bill Credits	Governemnt Meter Bill Credits	Empire Electric Administrative Fee	Unallocated Balance	Notes
4/1/2020	57,100.27	57,100.27		\$ -	\$ -			credits deferred and accumulated to future payment
5/1/2020	160,800	103,699.73		\$ -	\$ -			Curtailment system tested May 19, successfully; system ramped up to 100%; credits deferred and accumulated to future payment
6/1/2020	278,400	117,600.00		\$ -	\$ -			credits deferred and accumulated to future payment
7/1/2020	513,600	235,200.00	\$ 21,567.13	\$ -	\$ -			Casino Bill Gross up cumulative to August 1 ; credits deferred and accumulated to future payment
8/1/2020	676,800	163,200.00	none	\$ 10,698.64	\$ 10,747.96	\$ 220.53	\$ 100.00	First Bill Credit Implemented 8-10-20!
9/1/2020	751,200	74,400.00	\$ 9,981.71	\$ -	\$ -	\$ -	\$ -	Anomaly? Inverter 1 down; Troubleshoot
10/1/2020	969,600	218,400.00		\$ 2,625.00	\$ 7,065.07	\$ 198.64	\$ -	Second Round Bill Credit implemented 10-28-20
11/1/2020	MSSING DATA		\$ 9,181.54					
12/1/2020	1,384,800							
1/1/2021	1,598,400	213,600.00	\$ 8,273.47	\$ 6,489.00	\$ 2,514.73	\$ 177.81	\$ -	
2/1/2021	1,792,800	194,400.00	\$ 18,060.39	\$ 6,180.00	\$ 2,029.56	\$ 88.91	\$ -	Casino Bill cumulative for 2 months
3/1/2021	1,939,200	146,400.00	\$ 8,172.58	\$ 11,270.00	\$ 6,591.75	\$ 198.64	\$ -	Applied Credit 3-10-21
4/1/2021	2,119,200	180,000.00		\$ 6,400.00	\$ 1,655.78	\$ 116.80	\$ -	
5/1/2021		#VALUE!		\$ 7,872.00	\$ 5,733.05	\$ 116.80		added to correct
Totals				\$ 51,534.64	\$ 36,337.90	\$ 1,118.13		
				Total credits	\$ 87,872.54			

Figure 7. Generation and Cost Savings Verification Towaoc Community Solar Initiative, reprinted from Ute Mountain Ute Tribe Community-Scale Solar Project Final Technical Report

CONCLUSION



- Ute Mountain Ute has realized potential for green energy development
- Other tribes can learn from Ute Mountain Ute challenges and successes
- Inspiration for the future of green energy projects for other tribes

Figure References



Figure 1: <https://www.shutterstock.com/search/no-pollution>

Figure 2: <https://www.nrel.gov/solar/market-research-analysis/solar-installed-system-cost.html>

Figure 3: <https://www.lazard.com/media/451419/lazards-levelized-cost-of-energy-version-140.pdf>

Figure 4: <https://www.energy.gov/sites/default/files/2022-04/ute-mountain-ute-tribe-community-solar-project-2022.pdf>

Figure 5: <https://www.energy.gov/sites/default/files/2022-04/ute-mountain-ute-tribe-community-solar-project-2022.pdf>

Figure 6: <https://www.energy.gov/eere/water/pumped-storage-hydropower>

Figure 7: <https://www.energy.gov/sites/default/files/2022-04/ute-mountain-ute-tribe-community-solar-project-2022.pdf>