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Sandia National Laboratories Indian Energy Program Overview



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Albuquerque, NM 87185-1127**

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Outline

- Background
- Sandia IE Program Overview
- Student Research Topics Examples
- Future Plans
- Conclusions

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Indian Energy Background

The **DOE Office of Indian Energy** is tasked by **Congress** to provide, direct, foster, coordinate, and implement energy planning, education, management, conservation and deliver programs that

1. promote Indian tribal energy development, efficiency, and use;
2. reduce or stabilize energy costs;
3. enhance and strengthen Indian tribal energy and economic infrastructure relating to natural resource development and electrification; and
4. bring electrical power and service to Indian land and the homes of tribal members located on Indian lands or acquired, constructed, or improved (in whole or in part) with Federal funds.”

Program Mission

To maximize the development and deployment of strategic energy solutions that benefit tribal communities by providing American Indians and Alaska Natives with the knowledge, skills, and resources needed to implement successful strategic energy solutions.



Clockwise from top right: **Seneca Nation's**(NY) 1.5 MW wind turbine, **Fort Yukon's**(AK) combined heat and powerhouse, **Coeur d'Alene Tribe's**(ID) Benewah Market energy efficiency project, **Sokaogon Chippewa Community**(WI) Housing Project, and **Chippewa Cree Tribe's** (MT) Residential Solar

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Sandia Indian Energy Program

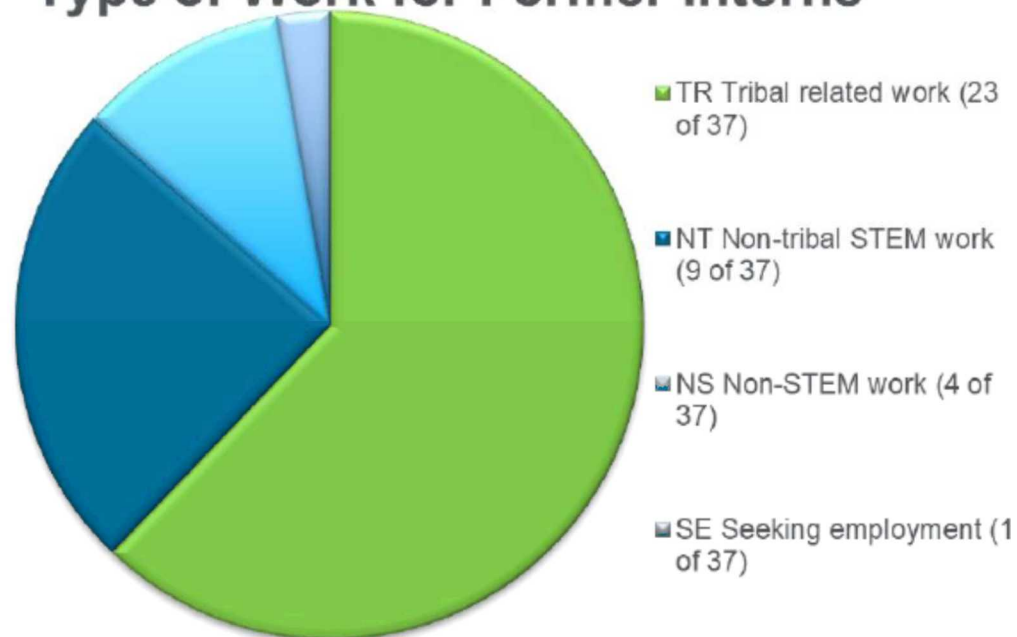
- Established in 2002 to
 - 1) provide **technical assistance** to tribes, and
 - 2) provide **student internships** at Sandia National Laboratories.
- Technical assistance is requested by tribes to DOE. DOE and Sandia work with the tribes to address their needs, where Sandia facilitates the assistance.
- Student internships at Sandia allow American Indian college students exposure to tribal energy needs for planning, development, and implementation.
 - Internship is set up to address unique challenges AI groups face in education by closing the achievement gap in STEM.

Statistics on Sandia IE Internship Program

Sandia IE Program 2002 -2019

- 44 undergraduate & graduate interns have participated
- 25 different tribal affiliations
- 43 different majors
- 20% of the interns were converted to year-round status (9 of 44)
- 14% of the interns were hired as FTEs or Sandia contractor (6 of 44)
- 64% female interns (28 of 44)

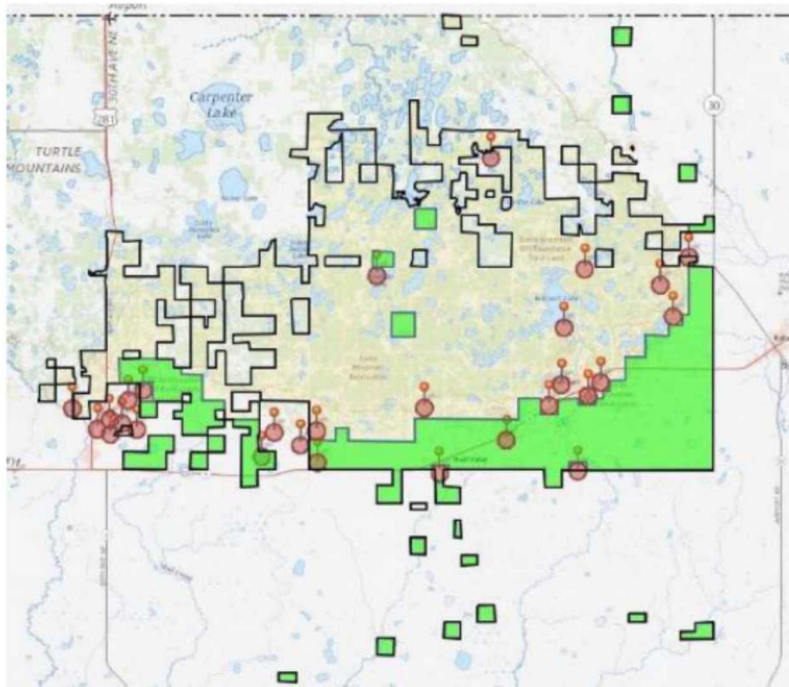
Type of Work for Former Interns



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Wind Technologies Potential on Turtle Mountain Band of Chippewa Reservation



- Culturally significant sites
- Potential areas for wind energy development

Site 1 (1.8 MW turbine capacity)



- Electricity consumption ~6,427,320 kWh per year
- ~1.8 MW of turbine capacity needed to completely offset energy consumption



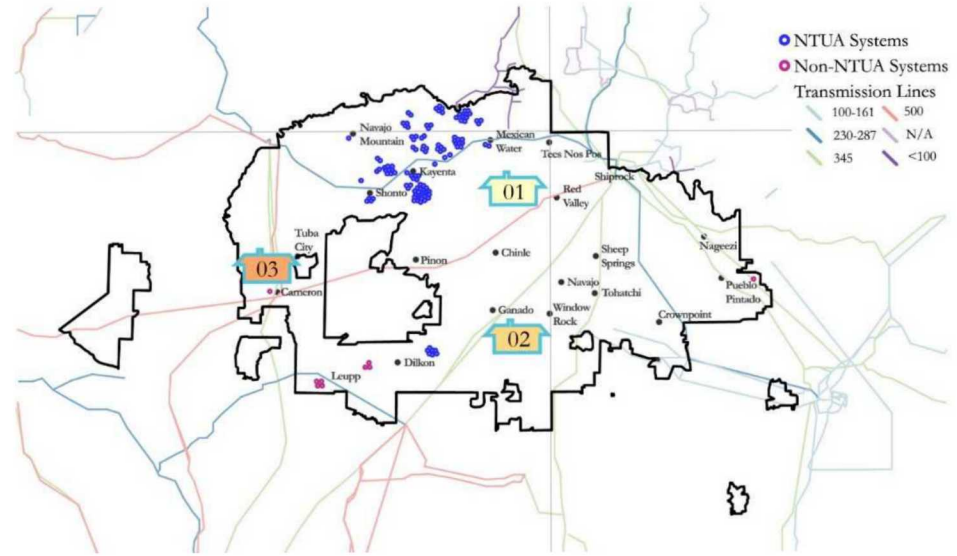
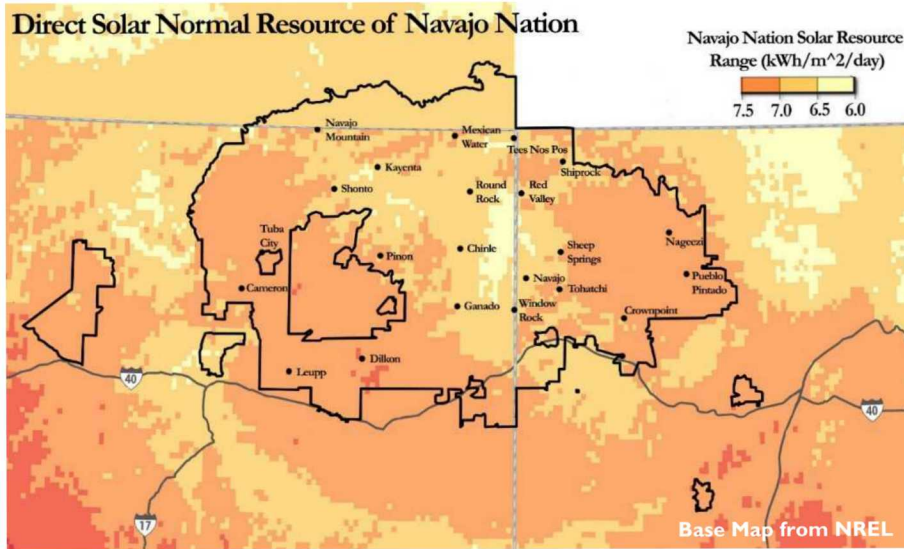
Site 2 (Utility-scale capacity)

- Outlined ~20.6 km² of land in this area
- Assuming a power density of 5 MW/km², the capacity for this site would be about 103 MW



11 Sizing Solar Renewable Technologies on Navajo Reservation and Rural Areas

Off-Grid PV System Deployment and Potential



01 Potential Home 01

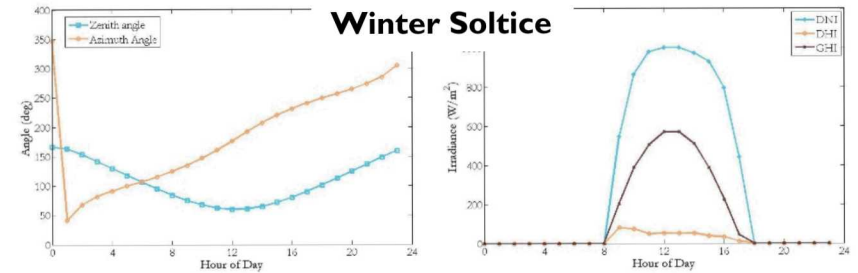
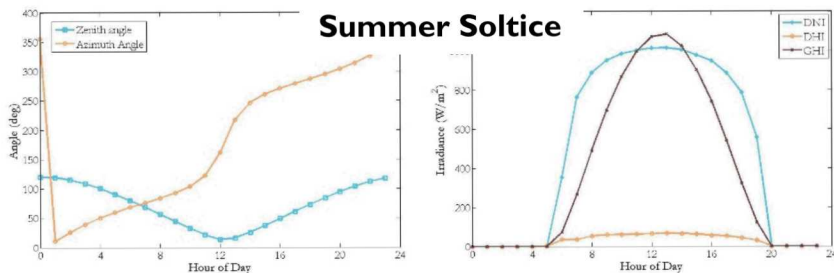
- Lukachukai/Tsaile Chapters
- 6.0-6.5 kWh/m²/Day
- 3 kW (NTUA considering)

02 Potential Home 02

- Kinlichee Chapter
- 6.5-7.0 kWh/m²/Day
- Elder Load

03 Potential Home 03

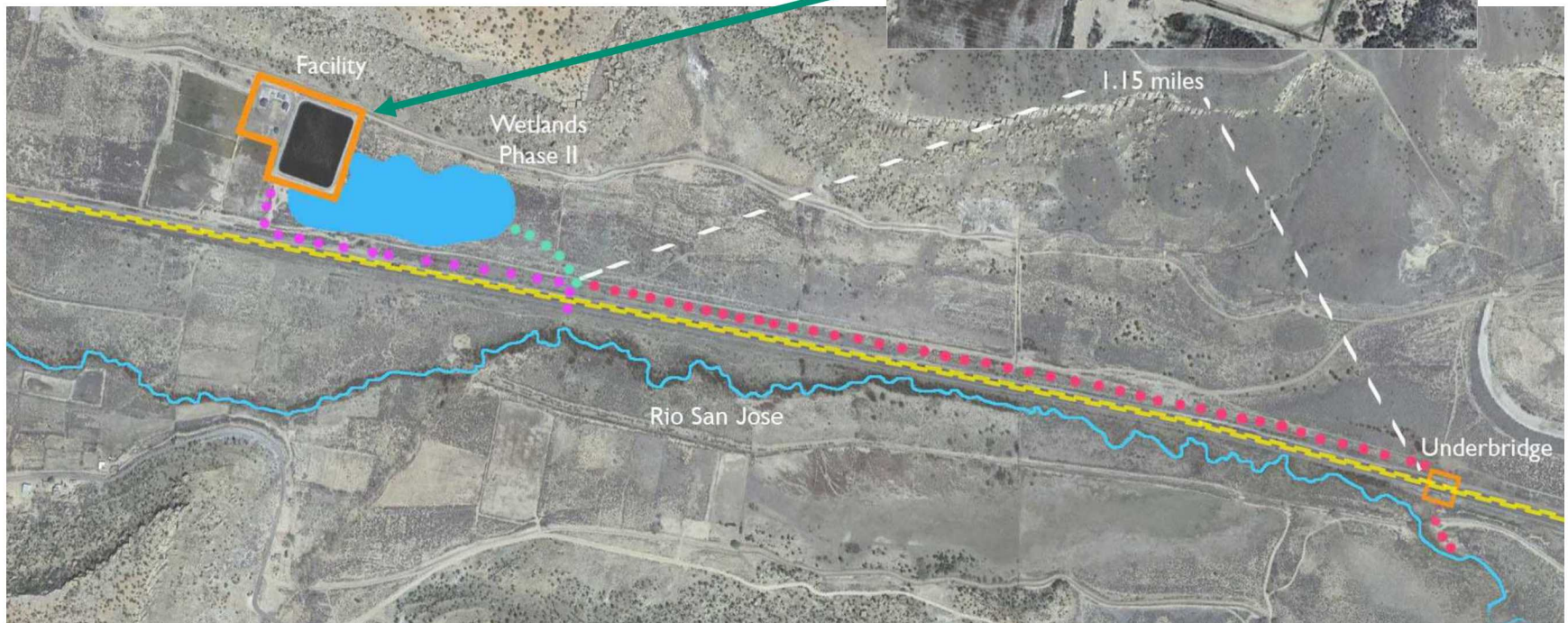
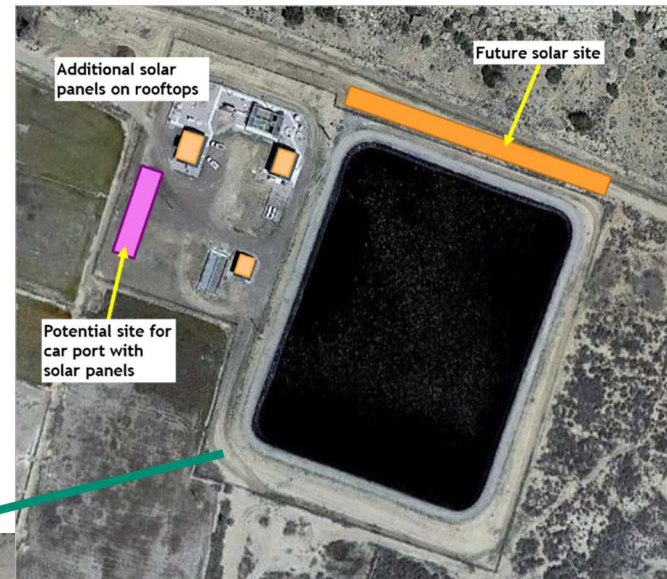
- Cameron/Coalmine Mesa Chapters
- 7.0-7.5 kWh/m²/Day
- Small Family Load



Design Considerations for Upgrading Water Treatment Facility on Acoma Reservation

Facility located in North Acomita on the Acoma Reservation treats ~75,000 gallons of waste water per day

- Water quality is currently at the NM Class 2B: irrigation use
- Facility technology is Sequencing Batch Reactors (SBR)
- Monthly electrical usage for facility is 9,000 kWh and electrical and utility cost \$37,500 annually



Potential for Utility-Scale Solar Energy Development on Navajo Reservation

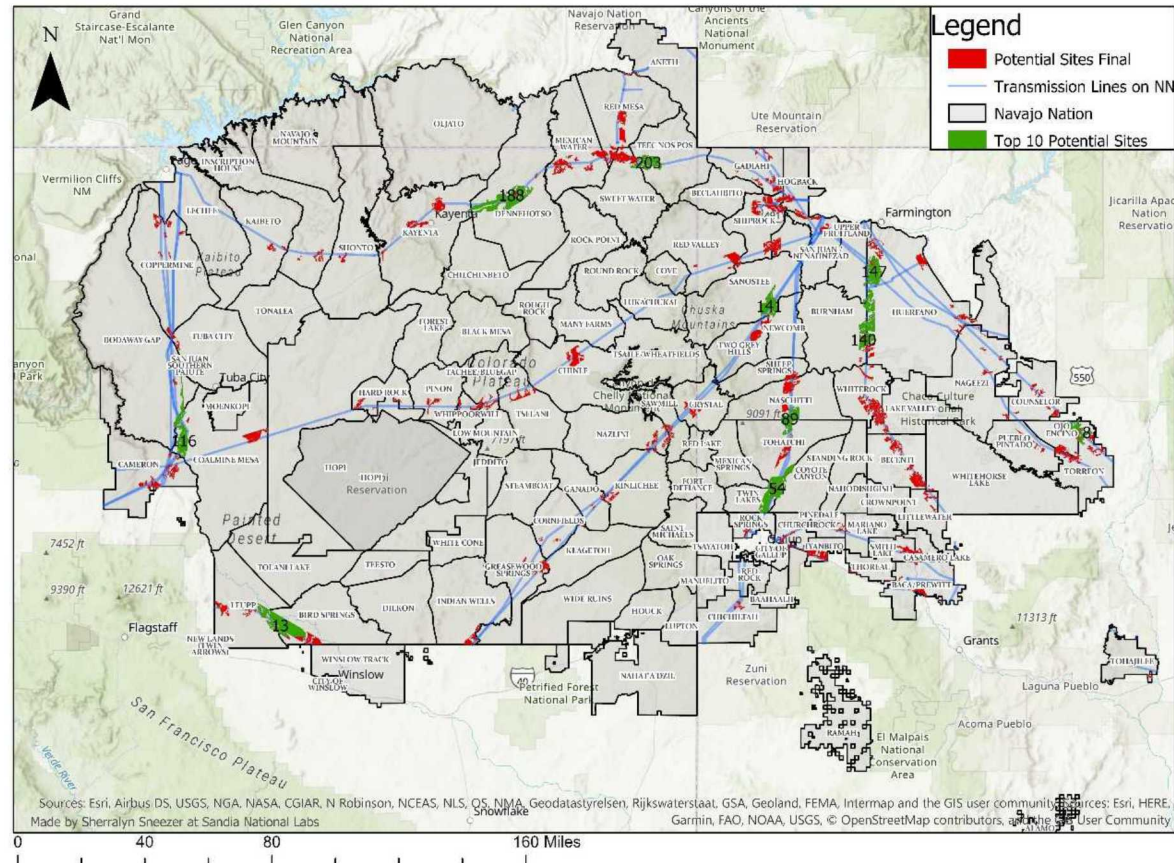
Current Results:

- Utility scale solar is feasible – dependent on land usage (365 acres for KSP 1 & 2)
- Unique issues Navajo Nation faces:
 - Grazing Permits/Homesite Leases
 - Access to Transmission Lines
 - Funding

Next Steps:

- Use criteria to obtain land with potential
- Additional research needed to determine electricity on Navajo Nation

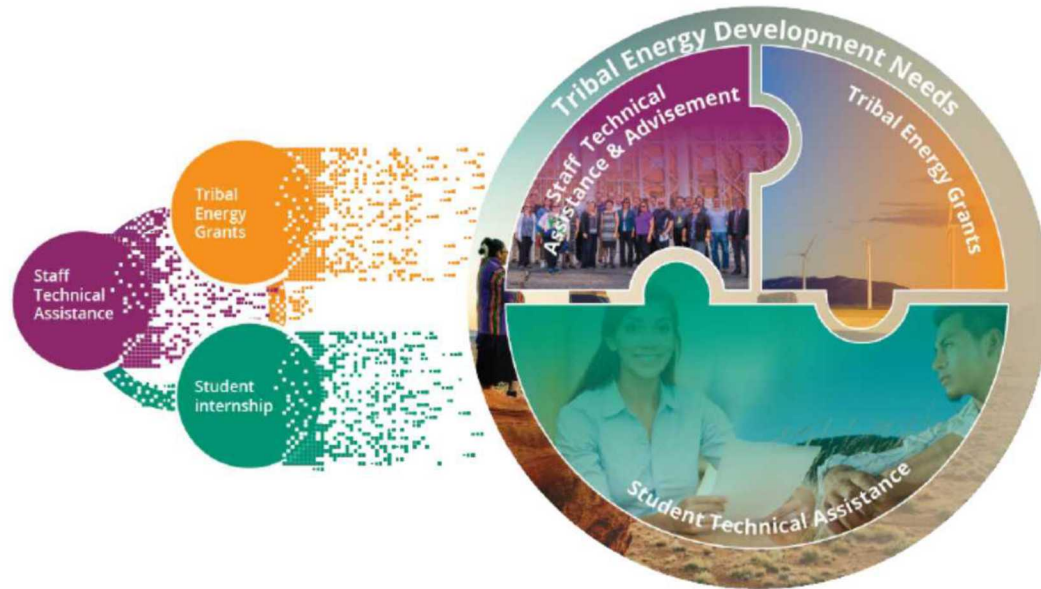
Potential Sites for Utility-Scale Solar PV Development on the Navajo Nation



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Future Proposed Plans for Sandia IE Program



Proposed updated model is more responsive to current DOE Office IE vision.

- Intern students provide direct technical assistance to tribes with Sandia National Laboratories providing guidance and mentorship.
 - Taps into Sandia National Laboratories SMEs for expertise in renewable energy technologies.
- Provide pathways for student interns to fill related to energy development roles at tribal offices, industries, non-profit companies, and DOE IE offices.

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Conclusions

- DOE IE established technical assistance to tribes and student internship programs at Sandia National Laboratories.
- Sandia IE internship program
 - Students provide direct technical assistance to tribes with Sandia SMEs providing guidance
 - Sandia recruits capable and interested students year-round
 - Goal is to create pathways for student intern to fill important renewable energy development roles
 - Planning
 - Designs
 - Technical analyses
 - Performance modeling
 - Economics modeling, etc.

Maximize development and deployment of strategic energy solutions that benefit tribal communities.

Questions?

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