

BRINGING RUNNING WATER TO NAVAJO HOMES Solar Energy Solutions

- Concept and Implementation
- Phases



Cultures + Generations + Hearts + Connected



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Problem Statement

- Up to 40% of households in the remote parts of the Navajo Nation have no access to clean running water at home and use externally-installed 55 gal – 500 gal drums/barrels/tanks
 - People carry water via pale or another container from tank to the house
 - Some Navajo live on 10 gallons of water a day (equivalent to 2-3 toilet flushes). Most Americans use about 100 gallons a day
 - This poses a major issue for elders, single mothers and those with disabilities
 - The acuteness of the issue is equivalent of that in the Sub-Saharan African region
- !! Housing lacks properly-functioning utilities, plumbing, source of electrical power
- !! Lack of running water for personal hygiene is a threat to personal health and exacerbates water-washed infections like COVID-19
- !! Process of connecting to utilities is at this time unfeasible due to the lack of infrastructure and comprehensive government policy



Photo by Don Usner/Searchlight New Mexico

Defining the Needs

- Need a reliable and self-contained solution to bring running water to households
 - A solution that can be easily retrofitted to existing water source (tank/drum/barrel), or to a new one available on short notice/at low price
 - Does not require permits or approvals (12v battery powered)
 - Requires no continuous maintenance (except winterizing in climates with freezing temperatures)
 - Can be integrated into household plumbing or be used as complete stand-alone solution
 - Requires no training or education (except winterizing) for households of any age group

Introducing *To'h Ni'li'* – *Water Is Flowing*

- A weather-resistant container mounted atop of the water source that can pump water from the source to the household on-demand
 - 12 volt water pump with built-in pressure switch
 - 12 volt 7-15Ah AGM sealed battery
 - 10 watt solar panel
 - 5-10 Amp solar charge controller
 - Applicable wiring and plumbing hoses/pipes
- 12v water pump will automatically deliver water when faucet is opened
- Solar panel will continuously charge the battery
- Simple integration with house plumbing or as a stand-alone water tap

Implementation Plan – Phase 1 (September 2021 – January 2022) – COMPLETED

- Finalize To'h Ni'li design, get approvals from all stakeholders
- Assemble first prototype units (1-4)
- Perform integration testing, make updates as necessary
- Perform durability and other performance testing
- Document construction steps, develop training materials
- Line up on-the-ground assembly team
- Funding Required: \$4,000

Hogan Go Ne'h E'h To'h Nil Ya lili Do – Homes Will Have Running Water Inside

Implementation Plan - Phase 2 (January 2022 - December 2022) -IN PROGRESS

- Finalize assembly tooling and techniques
- Build 5-20 units using the approved design
- Train on-the-ground teams to install and service the units
- Install the units in the priority areas – remote households in the southern regions of the Navajo Nation (Arizona/New Mexico)
- Monitor performance and collect feedback
- Funding Required: \$10,000

To'h hogan go ne'h eh nil Ya iilii do– Water Will Be Flowing Into Your House

Implementation Plan - Phase 3 (January 2023 - December 2025)

- Installations Continue
- Update design based on field trials
- Establish production using 500 -1,000 unit batch runs (est. \$250/unit)
- Purchase components in large quantities at discount and assemble based on actual demand
- Estimated installation cost of \$60-\$90
- Ability to supply up to 1,000 households
- Funding Required: \$250,000

To'h Nil Ya lili' – Water Will Flow In For You

To'h Ni'li' System Visualization



Next Steps

- Phase 1 is completed.
- Phase 2 is in implementation. Performance of the first units is being monitored.
- On-the ground team training is in progress. Documentation development is in process.
- Secure partnerships and resources for Phase 3.

