

USAID Afghanistan Clean Energy Program (ACEP)



ACEP Components

1. Renewable Energy
2. Energy Efficiency
3. Policy and capacity building

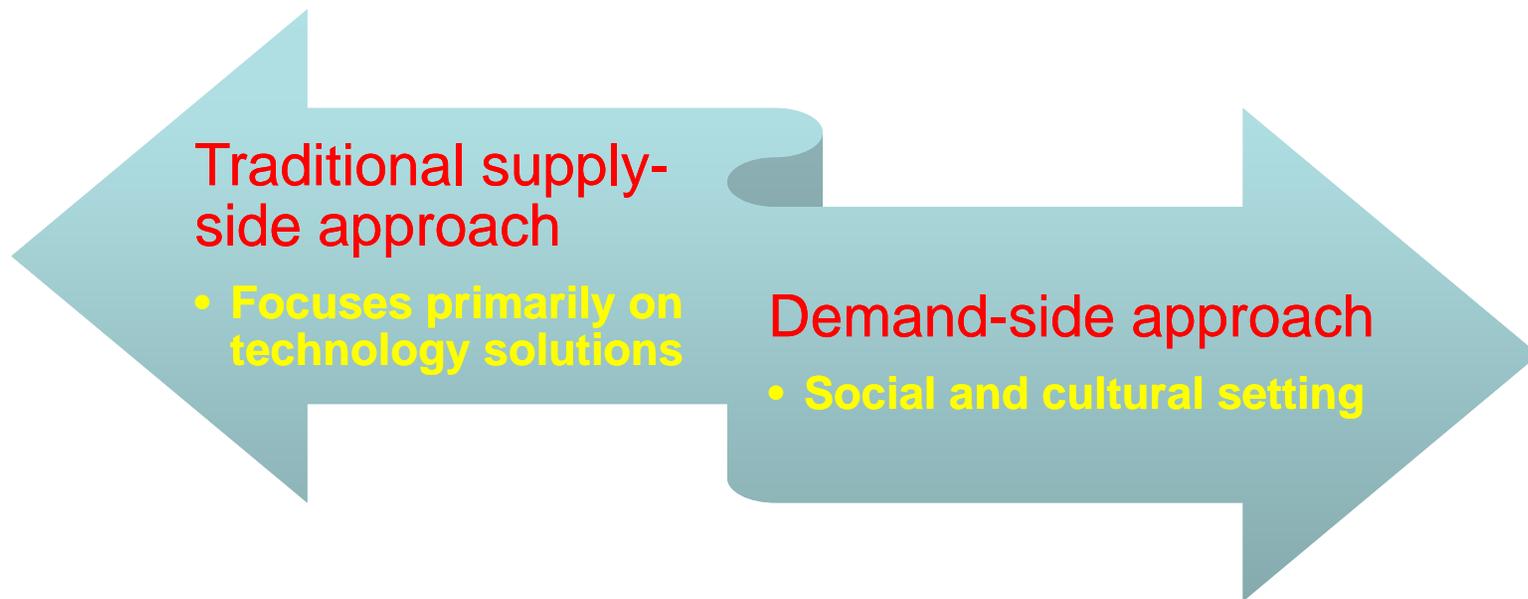


Afghanistan Energy Realities

- ~18% population of ~30 million has grid power, mostly in the major urban areas (Kabul, Mazar-i Shariff, Herat, Jalalabad, Kandahar).
- Renewables is the only realistic solution for much of the rural population widely scattered across difficult mountainous and desert terrain
- Afghanistan Renewable Energy Potential
 - Solar Energy Potential: ~3,450 MWh/yr (>500 MW possible)
 - >100,000 PV systems installed (most < 50 Wp)
 - Hydro Energy Potential: ~23,000 MW (>5,000 MW possible)
 - ~3,000 HP systems installed (most <25 kW)
 - Wind Energy Potential: ~158,000 MW (> 2,000 MW possible)
 - <100 small wind systems installed (most < 5 kW)

Energy Projects for Sustainable Development

- Poverty eradication
- Employment creation
- Sustainable livelihoods
- Empowerment of women
- Protection and regeneration of the environment



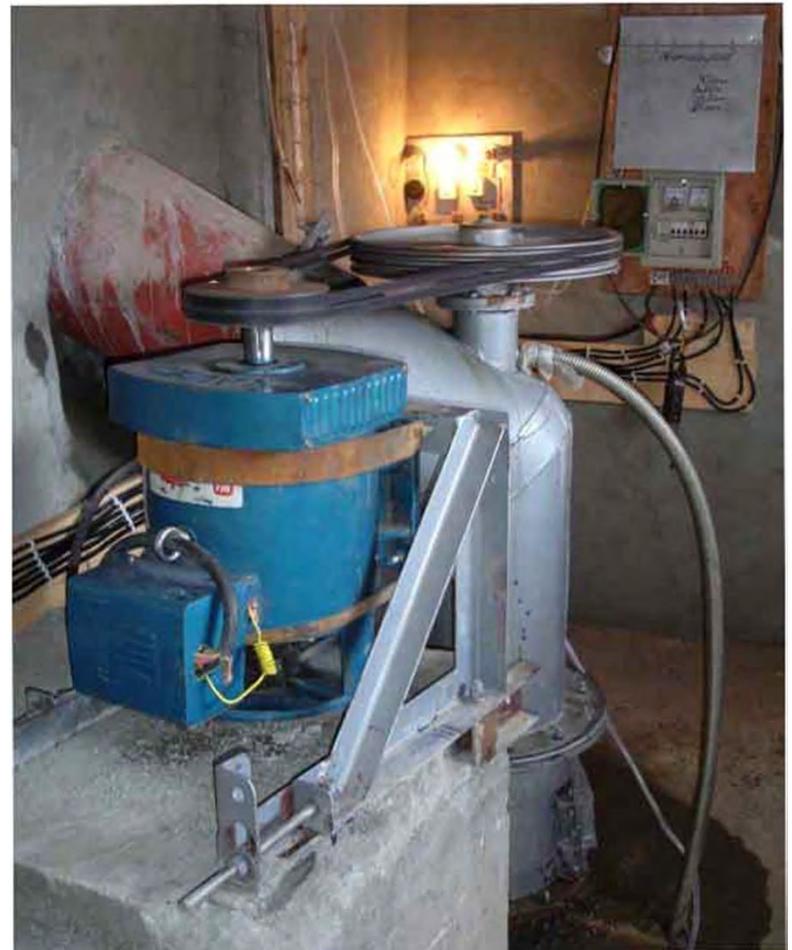
ACEP MHP Projects

- **Topchi, Bamiyan MHP Project:** ACEP will build a ~1,000 kW power system will be built for Bamiyan and surrounding communities by ~2012.
- **Thawak MHP Project:** Panjshir 45 kW MHP rehabilitation is underway and repairs should be completed by spring. A new 50 kW micro-hydro is proposed besides the existing micro-hydro for Unaba village as the existing one is not enough for both Thawak and Unaba.
- **Arghandab MHP Rehabilitation:** ACEP has met with elders and operators of the Arghandab valley in Kandahar to rehabilitate the 320 kW 80 year old MHP system.
- **Badakshan MHP Rehabilitation:** Technical surveys of 19 proposed MHP rehabilitation sites completed and 4 MHP sites under selection for initial rehabilitation.
- **Kunar MHP Projects:** Site selection of MHP projects made in Kunar Province at AsadAbad (920 kW). Replacement of electromechanical equipment. Preparing to bid.
- **Salang MHP Project:** Electrify district center on Salang river in Parwan (92 kW)

Hydro Power

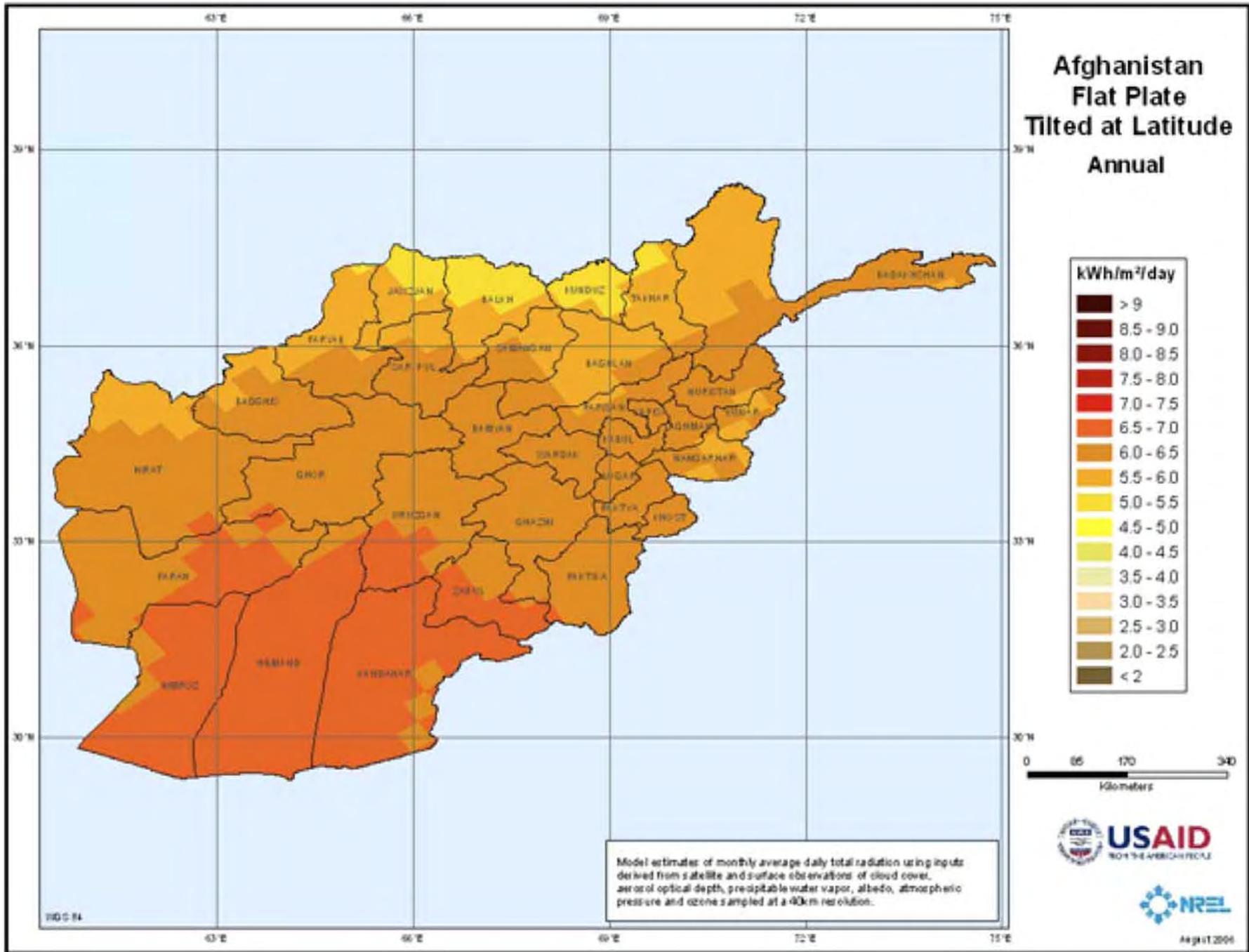
Micro-hydro systems (<100 kW).

Mini-Hydro (<1000 kW)



MHP Workshop for MRRD Engineers





Solar Power

Photovoltaic systems

- village power
- schools
- clinics

Solar Hot Water Systems

- dormitory (KU dorm)
- clinics

Productive Uses

- water pumping
- lighting
- cold storage
- food drying



Solar Food Drying Workshop. Kabul, Afghanistan

Solar Clinics

Tormai Comprehensive Health Clinic 5 kWp PV power system.



Solar Schools

2 kWp PV systems installed on schools in Yawkaland District near Band-e Amir National Park in Bamiyan. Systems capable of powering lights, computers, projectors, etc.



Solar Water Pumping

25 solar water pumping systems are under development to pump water for communities, clinics, schools, and for small farm irrigation in Kapisa, Nangarhar, Kandahar, etc.

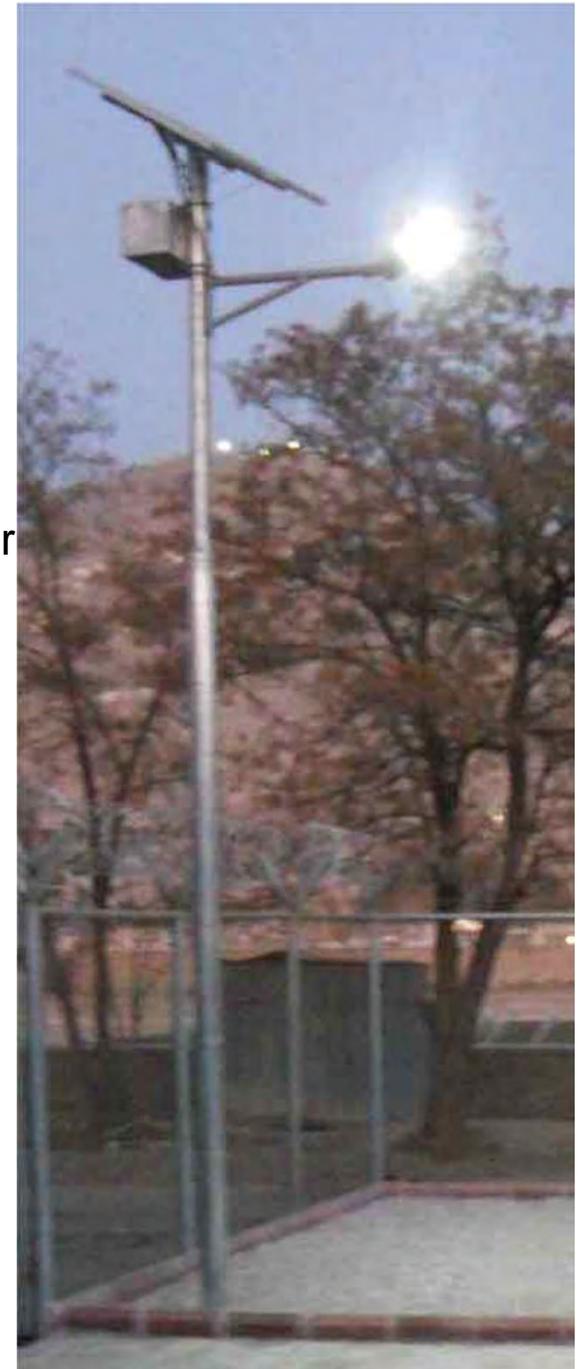
**Shipping/customs
> 6 months**

Cost: ~\$10-15k each

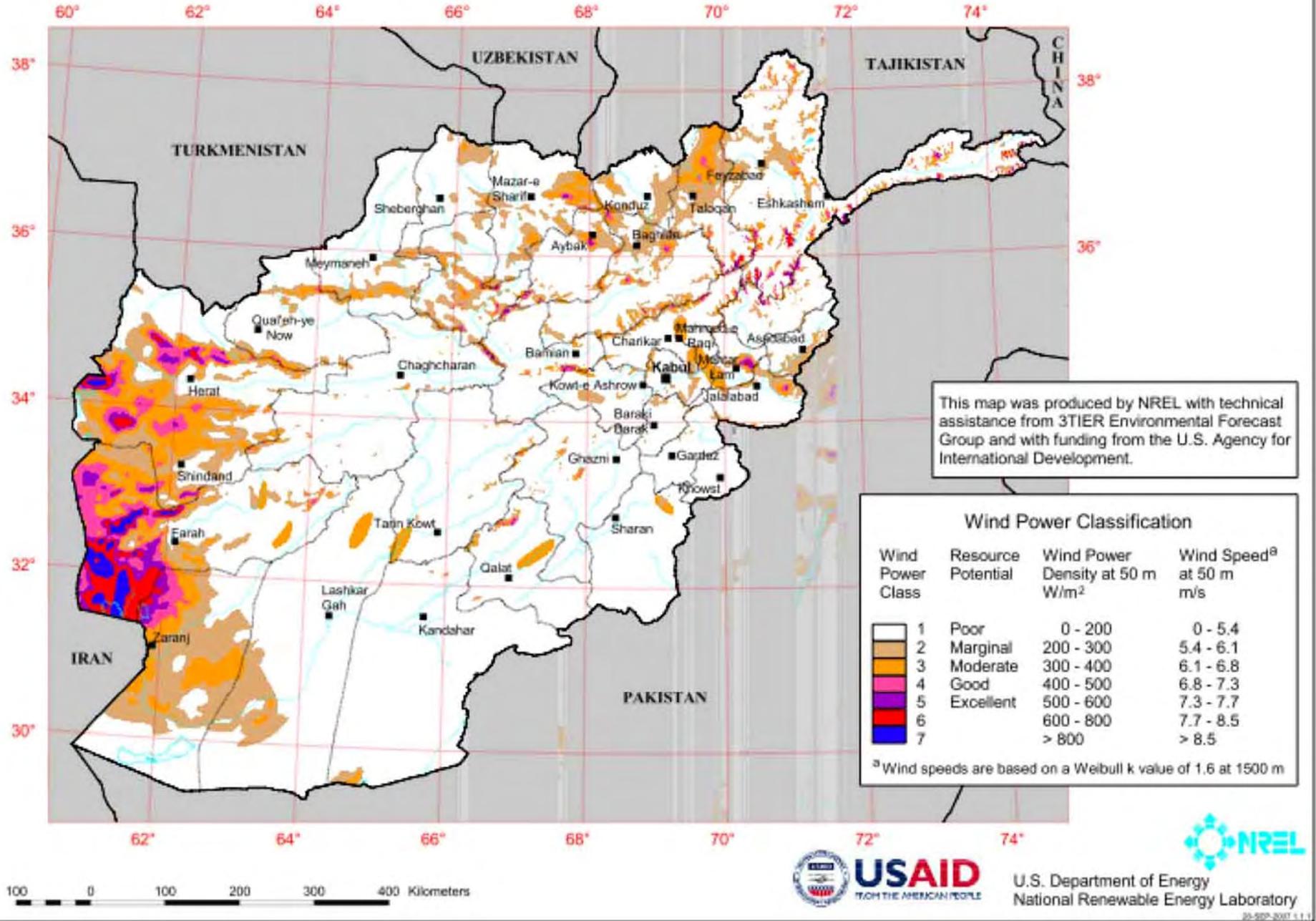


ACEP Solar Lighting Projects

- **Solar Lanterns:** The Kuchi nomadic people of eastern Afghanistan are receiving 10,000 solar lanterns to provide basic portable electric LED lighting.
- **Solar Home Systems:** 500 solar home systems are under development for Kapisa and Kandahar provinces.
- **Solar Streetlights:** Four hundred fifty-three stand alone solar PV street lighting systems.



Afghanistan - 50 m Wind Power



ACEP Wind Activities

- **Wind Resource Assessment:** Six meteorological towers have been procured to assess the wind resource in northern, western, and central Afghanistan. Using data from the Afghan Energy Information Center and interactions with MEW and other consultants, ACEP has completed a base case model for the northern Afghan electrical grid system, including NEPS and Herat that will be used in testing performance of various projected wind generation capacities.
- **Wind Water Pumping:** Demonstration wind water pumping systems planned for Shindand District of Herat province and Balkh District of Balkh Province

Challenges

- 2 ACEP subcontractor crews kidnapped en route to installations
- \$25k PV equipment stolen by Taliban
- Staff stranded overnight by snow avalanche in Salang: 160 people killed



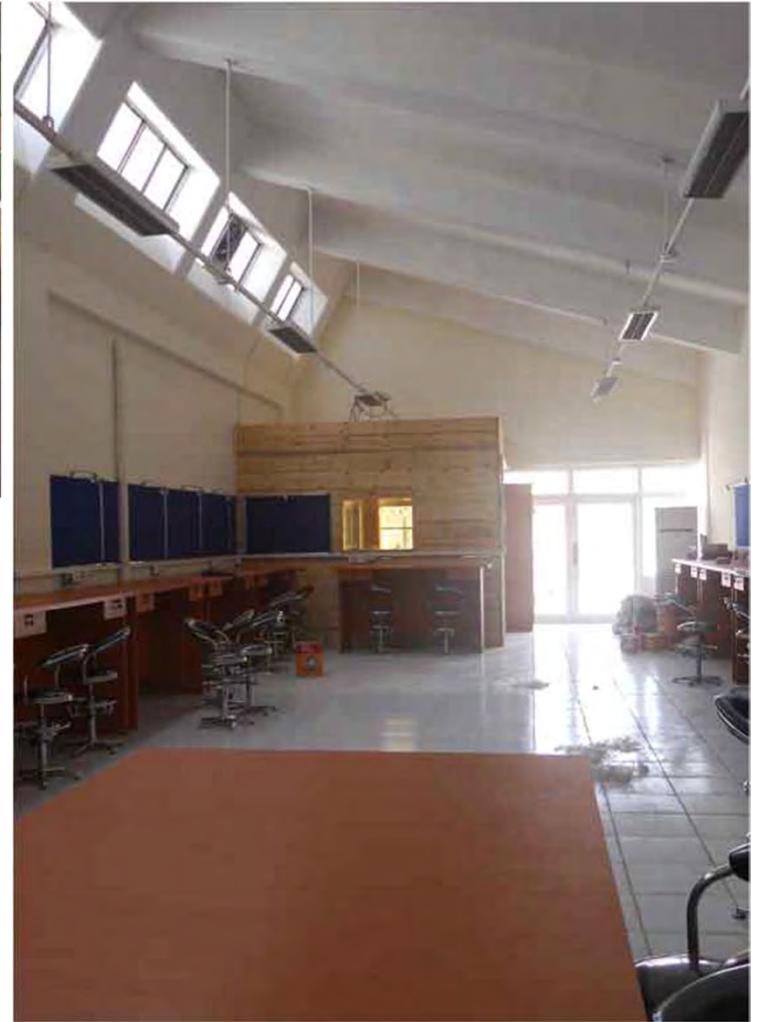
- Slow overseas shipping (4-6 months)
- Customs clearance issues and delays
- Difficult to inspect installed systems in the field due to security

ACEP signed a Memorandum of Understanding with Kabul University





Renewable Energy Class for Engineers



KURE Lab

ACEP established the KU Renewable Energy Lab



KURE Lab

Fully renovation of the power lab



PV-Wind water pumping workshop



PV-Wind water pumping workshop



Solar Food Drying Workshop

Gender and Development Issues

- Men and women play unique roles in supporting development, economic growth.



Development cannot be achieved if 50% of the population is excluded from the opportunities



Gender-Sensitive Policies

- Policymakers must be aware of the needs of men and women in relation to their roles and responsibilities to offer technologies and services that match those needs.
- Energy institutions tend to be male-dominated; as a result, the issues identified and the solutions offered often have a male bias.

Gendered Sensitive Capacity Building

- Capacity building is needed to strengthen involvement of women at all levels of energy policymaking, planning, and project development.



Female Engineering Students at KU - Renewable Energy Class



Afghan Women in Energy Association



Management and Leadership in Energy Projects



Train women to be involved in the energy sector

15 new female engineers graduated from Kabul University and Kabul Polytechnique University



CB at Project Level

- Learning skills
- Gaining confidence in defining community problems and designing solutions.



CB at Implementation

- Technical skills (bookkeeping, marketing, managing a plant, learning about energy technologies and how to run them).



CB at Policy Changes

- CB may mean promoting or facilitating women involvement in decision making processes.

ACEP Capacity Building Summary

Program Name	Start Date	End Date	Total Male Participants	Total Female Participants	Total Participants
Micro Hydropower wksp for engineers	March 7, 2011	March 17, 2011	56	1	57
Gender and Energy Nexus	March 2, 2011		0	15	15
Management and Leadership for Energy Projects	22 Feb 2010	24 Feb 2010	1	20	21
Solar-Wind Water Pumping Workshop	Nov 7, 2010	Nov 9, 2010	42	4	46
Solar Food Drying Workshop	Oct 3, 2010	Oct 6, 2010	38	14	52
Renewable Energy Class	Aug 15, 2010	Dec 20, 2010	50	4	54
Turbine Manufacturers Needs Assessment Workshop	Aug 8, 2010	Aug 8, 2010	30	2	32
First National Energy Efficiency Conference	Jul 27, 2010	Jul 27, 2010	233	12	245
Micro Hydro Power Training Seminar	May 11, 2010	May 16, 2010	22	0	22
Wind Energy Training Symposium (ACEP)	Apr 5, 2010	Apr 6, 2010	46	1	47
Total			518	73	591

Azteca Solar

THE MEXICO RENEWABLE ENERGY PROGRAM

1992-2004



- Water Pumping
- Lighting
- Education
- Water Purification
- Protected Area Management
- Remote Communications
- Refrigeration



U.S. Department of Energy



U.S. Agency for International Development



Sandia National Laboratories



New Mexico State University

- When developing solar projects in Latin America, there is a tendency for some organizations to focus on the technology, while other focus largely on institutional issues. The happy medium takes into account both and promotes partnerships, local capacity building, quality technical design, and monitoring and evaluation.

Thanks

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