National Renewable Energy Laboratory's Village Power Program

Lawrence Flowers (NREL)

Pilot Projects

Village of Villa Las Araucarias and the installed power system

Russia: Assists the Russian Ministry of Fuel and Energy in the deployment of 21 wind-diesel systems in Russia's Northern Territories and feasibility studies for construction of a 1-MW demonstration biomass power plant in Arkhangelsk region
Mexico: Provides technical assistance to wind projects including village electrification, eco-tourism, and water pumping projects
Chile: Provides full range of assistance on small wind electrification projects including resource assessment, training, and pilot project development and installation
Brazil: Multi-faceted approach to renewable energy implementation and commercialization including solar home lighting pilot projects as well as two large hybrid wind/PV/diesel pilot projects
China: Works with in-country partners on renewable energy projects and training including resource assessment, pilot project and O & M plans, project identification, financial analysis, and pilot project implementation.

Isla de Chiloe Area of Region X; Preliminary map of favorable wind resource areas

Resource Assessment

NREL's regional wind resource map of the Chiloe Region of Chile was produced using Geographic Information System software. Meteorological data from NREL's global database combined with digital terrain data helped determine the distribution of the wind resource shown on the map.

. The purpose of the wind resource map is to highlight regions in Chiloe where the level of the wind resource is sufficient to make rural wind energy projects feasible.

. NREL is also providing technical assistance to Chilean organizations in siting potential wind monitoring stations and wind energy projects on these islands.

SunWize Wind-PV-Diesel system at the National Wind Technology Center

Applications Development/Testing

Approach:
- Important village power applications are identified and integrated renewable energy solutions are designed and developed to power those applications.
- Commercial systems are tested to ensure compatibility with specific village power applications (e.g. ice making and water desalination).

Example:
SunWize commercial hybrid system includes 1.8-kW PV, 5.8-kW diesel, two 4 kW inverters, and 535-ah battery bank at 48 volts with a connection for a wind turbine up to 6 kW . The system has been tested at the NWTC and will be deployed in a pilot project in the Dominican Republic. It is ideally suited for productive use applications such as ice making or water desalination (e.g. reverse osmosis).

Andrew McAllister of NRECA provides a training course on renewable energy to the villagers of Isla Nahuel Huapi as part of the village training program in Chile.

Training

Russia:
- Trained analysts in hybrid systems
- On-site training of system installation/commissioning/monitoring

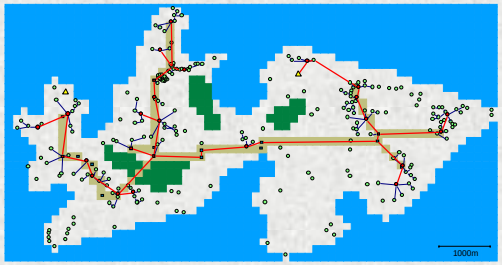
Mexico:
- Workshops on wind water pumping and village hybrids
- Installation training on water pumping, and ecotourism wind systems

Chile:
- On-site training of utility engineers and villagers on hybrid systems
- Training of rural electrification engineers in analysis of options

China:
- Training of analysts on hybrids and resource assessment

Brazil:
- Training of analysts and middle managers on wind hybrids analysis
- In-country workshops on wind and PV applications

Philippines:
- Trained SPUG and private sector analysts in hybrid systems.



A small island in the Chiloe Region of southern Chile.

Analysis and Model Development

NREL has developed a suite of Village Power analytical models:

- Hybrid2 is a detailed engineering model for technical and economic performance of hybrid systems.
- HOMER is an optimization model for quick and easy screening, economic comparisons, and conceptual design of hybrid systems.
- ViPOR is a grid optimization model that lays out village mini-grids and uses HOMER to compare mini-grids to individual household systems.
- NREL is developing a Regional Planning Model (RPM) that will use both HOMER and ViPOR to identify the conditions under which grid extensions, mini-grids, and individual systems have the lowest cost. RPM will interface with ARCInfo to exchange information on the existing grid and resource and demographic data and display its results geographically.

RSVP Home Page

Renewables for Sustainable Village Power (RSVP) Web Site (www.rsvp.nrel.gov)

- Dedicated to village power
- Provides information on applications, contacts, and development of renewable energy projects
- Provides a database of village power projects with information from more than 150 international village power projects from over 20 countries.
- Projects can be searched by technology (e.g. wind and photovoltaics) application (e.g., lights and water), sector (e.g. residential and commercial), and geographical region.