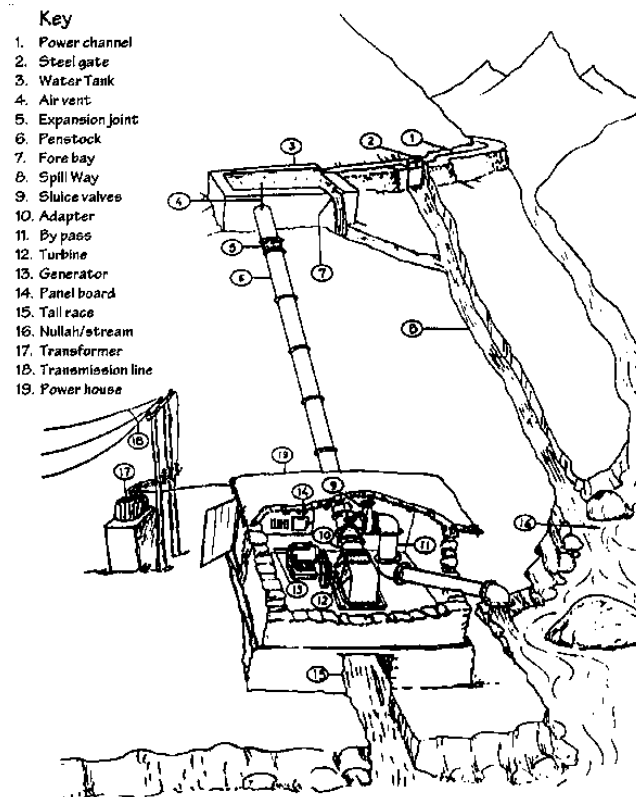


RE Practices in Pakistan – Micro Hydro

Community-managed micro-hydro projects in Northern Pakistan by Aga Khan Rural Support Programme (AKRSP)



Schematic drawing of a micro-hydro plant



Distribution, in this instance a transformer is needed



Generator at Pari micro-hydro plant, Gilgit

- **Design of the micro-hydro plants**

The design of all six plants is very simple; each plant comprises a set of diversions, channels, forebays (small reservoirs), small powerhouses, penstock pipes, turbines and very simple outlets (see Figure 1). The transmission line is just supported by wooden poles

- **Diversions**

The diversions have been constructed using boulders, stones, tree branches and gravel on the nullahs and main irrigation channels.

- **Channels**

The channels to take water from the main source have been constructed by digging out earth, stones and gravel. The side walls of the channels have been built using mud and dry stones. They measure between 150 m and 400 m in length.

- **Forebays**

The forebays vary in size from 4' x 5' x 6' to 6' x 7' x 8' and are constructed of mud and stones. In one instance, the forebay has been cemented.

- **Power houses**

Single room power houses made of mud, stones and local timber accommodate turbines, generators and power panel boards.

- **Types of turbine**

The turbines have been designed by AKRSP engineers to meet each site specification; availability of head, discharge and power demand. Four are cross-flow turbines, one is a pelton wheel and one is tubular. All were manufactured in workshops in Rawalpindi, Lahore and Peshawar.

- **Penstock pipes**

The penstock pipes vary in both length and diameter. The minimum length of pipe is 15 m and the maximum is 237 m. The diameters vary from 6" to 16".

- **Generators**

The generators are imported from China and have power ratings from 2Kw to 100Kw (see Figure 2). No automatic governing system has been installed; the power load is controlled by a gate valve which is operated manually.

- **Distribution wire**

Aluminium wire has been used for the distribution of power. The wire is supported on locally produced wooden poles.

- **Transformers**

Power is distribution up to 3Km. Very minor voltage losses are sustained by the beneficiaries, so in all but one case no transformers have been needed (see Figure 3).

Operation and maintenance

VOs have formed electricity committees or elected managers for handling all the post-completion affairs of the plants. These committees or managers appoint plant operators, decide plant operating hours and fix electricity prices, based either per unit consumed or per bulb fixed per house. The salaries of the operators and operation and maintenance costs are usually met from the income received from consumers. In addition, members contribute to the cost of major repairs

The Aga Khan Rural Support Programme (AKRSP) has installed over 180 micro-hydro power units in Chitral District, North-West Frontier Province, Pakistan. These supply electricity to about 175,000 people. The main use is for better quality lighting, but the ability to use radio, television and appliances like electric butter churners is also greatly valued.

This micro hydro project won the **Ashden Award** for Sustainable Energy in 2004.

Project Developer:

Aga Khan Rural Support Programme (AKRSP)

Chitral, Pakistan

Telephone: +92-933-412720, 412979

Fax: +92-933-412516

Sources:

www.headon.info

www.Ashdenawards.org

RE Practices in Pakistan – Micro Hydro

Pilot Project for Development & Installation of 2 x 40 kW Kaplan Turbines Mohra Muradu Taxila by AEDB, Pakistan



40 kW Local Turbine



40 kW Imported Turbine

Technical Specification of the Turbines-Generator

Description	Local Turbine	Imported Turbine
Capacity out put:	40 KW	40 KW
Discharge Requirement:	0.8 m3/sec -2 m3/sec	1.5 m3/sec – 2.4 m3/sec
Head:	6m	4m
RPM Turbine	385rpm	350rpm
Kaplan Type:	Horizontal	Vertical
Governor for load control	Hydraulic Automatic	Manual
Runner Dia.	560mm	805mm
Generator power:	50 KW	40KW
Voltage:	420 V	400V
Frequency:	50 Hz	50 Hz
Generator speed:	1500 rpm	750rpm
Current:	85.9 A	90 A



**1 & 2 kW Pico Type Kaplan
Turbines working on 1.5 m head
& Discharge 10 Cusecs**

Contact:

Alternative Energy Development Board (AEDB)

House # 3, Street # 8, F-8/3 Islamabad

Phone: (051)9262947 – 50

Email: support@aedb.org

www.aedb.org

Hydro Energy Businesses in Pakistan

Sarkar Energy (Private) Limited

Engineering, Construction, Procurement, Supply of Components of Fossil Fuel & Renewable Energy Power Plants.

- **Business type:** manufacture, supplier, exporter, importer
- **Product types:** fossil fuel, hydel energy system components, solar thermal energy, wind power plants, wind turbines, CDMs.
- **Service types:** consulting, design, installation, construction, engineering, project development services, site survey and assessment services, financial services, contractor services, testing services
- **Address:** Sarkar House, 342, Islamabad, Federal Capital Pakistan 444000
- **Telephone:** 0092 512104
- **FAX:** 0092 5121040
- **Web Site:** <http://www.sarkarenergy.com>
- **E-mail:** [Send Email to Sarkar Energy \(Private\) Limited](#)

Etimaad Engineering (Pvt) Ltd

- **Business type:** manufacturer
- **Product types:** gas turbine electric generators, steam turbine electric generators, cogeneration systems, packaged power systems, hydro energy systems (large), cogeneration systems, Boilers, Coded Pressure Vessels, Air Fin Coolers, Heat Exchangers, Columns and Towers .
- **Service types:** design, installation, construction, engineering, project development services, site survey and assessment services
- **Address:** Etimaad House, 12-D Model Town, Lahore, Punjab Pakistan 54700
- **Telephone:** +92 (42) 584 3549
- **FAX:** +92 42 584 3544

Iqbal Engineering Company

- **Business type:** manufacturers / Fabricators .
- **Product types:** Solar Electrical Generators, Solar Lighting System, Solar Water desalination plants, solar Billboards & solar commercial power generating systems. GSM Towers. Tubular Tower . Angle Tower . Guyed Mast . Monopoles Antenna Mounts . Network Implementation Services. 1000 Tons Per Month Fabrication Facility. Manufacturing of Telecommunication Towers and masts. Waste Water Treatment Equipments. Hot Dipped Galvanized Steel Structures. Tubular Towers, Lattice Towers, Ganetry Signs, Sign Boards, etc. water filtration and purification systems, water pumps, air filtering and purification system components, hydro energy system components (small), Liquid/Liquid Phase Separation units, Water removal systems from hydrocarbons. .
- **Service types:** Steel structure Fabrication Works.
- **Address:** E-362/26, opposite green complex, quanchi amer sidhu, ferozepur road lahore. , Lahore, Pakistan Pakistan 54000
- **Telephone:** 92-42-5275654
- **FAX:** 92-42-5275655

IST (Integrated Sustainable Technologies)

- **Business type:** manufacturer and supplier
- **Product types:** Photovoltaic module manufacturing equipment, Modules, Charge controllers, Inverters, UPS, wind energy systems (small), solar thermal water heating systems and Micro hydro power Equipment. .

- **Service types:** Manufacturing, Imports and exports
- **Address:** Industrial Plot No 33, Street No 10, Sector I-9/2, , Islamabad , Federal Capital Pakistan NIL
- **Telephone:** 92 51 4438110, Mobile: 9251 0333 5252747
- **FAX:** 92 51 4434313

Italtec Energy (Pvt) Ltd.

- **Business type:** engineering, supply, construction, commissioning, operation & maintenance
- **Product types:** hydro energy components (large), cogeneration components, gas turbine and generators, steam turbine and generators, hydroelectric turbines (large), geothermal energy systems, DCS, SCADA, Telemetry, Boilers, Transformers, Balance of Plants, Complete EPC Solutions, Relocations etc. .
- **Service types:** engineering, supply, construction, commissioning, operation & maintenance
- **Address:** No. 7, Main Double Road (Sumbal Road), Sector F-10/3, Islamabad, Federal Capital Pakistan 78640
- **Telephone:** +92-51-2110342-3, +92-51-2298795
- **FAX:** +92-51-2110352, +92-51-2298796

K. National Traders

- **Business type:** exporter, importer
- **Product types:** batteries rechargeable, photovoltaic modules, geothermal energy systems, biomass energy furnaces, hydro energy system components (small), photovoltaic cell materials.
- **Service types:** recycling services
- **Address:** 14-a, sultan Ahmmad Road, ichhra, , Lahore, Pb Pakistan 54000
- **Telephone:** 092-0300-4537047
- **FAX:** 092-042-5303059

K.National Traders

- **Business type:** manufacturer, importer
- **Product types:** photovoltaic cell materials, photovoltaic cell manufacturing equipment, hydro energy system components (small), photovoltaic module manufacturing equipment, solar water pumping system components, wood burning stoves and furnaces, as above.
- **Service types:** education and training services, maintenance and repair services
- **Address:** 14-A, Sultan Ahmmad Road, Ichhra, Lahore, Pb Pakistan 54000
- **Telephone:** 092-0300-4537047
- **FAX:** 092-042-5303059

Natural Power (Pvt) Ltd

- **Business type:** importer
- **Product types:** cathodic protection systems, photovoltaic systems, alternative homes and buildings, hybrid power systems, hydro energy systems (large), water filtering and purification systems.
- **Address:** 10/1 Civil Lines , Dr.Zia Uddin Ahmed Road , Karachi, Sindh Pakistan 75300
- **Telephone:** +92 21 5681750 / 60 / 70
- **FAX:** +92 21 5681155

NEWAGE GROUP

- **Business type:** Consultants For Power Generation Project and Investment advisors
- **Product types:** investment and financial services, hydro, wind, thermal energy system components (large), hydro energy system components (large).

- **Address:** House # 463/C, Street # 20-A, Sector-II, Airport Employees Cooperative Housing Society (AECHS), Rawalpindi, Federal Pakistan 44000
- **Telephone:** 92-300-8507474
- **FAX:** 92-333-8507474

Solar-Energy-Technologies

- **Business type:** manufacturer, retail sales
- **Product types:** solar water heating systems, hydro energy systems (small), solar pool heating system components, wind energy towers and structures (large), hybrid power systems.
- **Address:** 151 Margalla Road - F-6/3, Islamabad, Pakistan
- **Telephone:** ++92512270467
- **FAX:** ++92512270467

Source Group International

- **Business type:** wholesale supplier
- **Product types:** hydro energy system components (large), wind energy system components (large), hydro energy systems (large).
- **Address:** No:17, Street:41, F-6/1,, Islamabad,, Capital Pakistan ISB
- **Telephone:** 9251-2828182

Tecnasia International

- **Product types:** wind turbines (large), wind turbines (large), biomass energy systems, geothermal energy systems, hydro energy system components (large), hydro energy systems (large), Power Generation Project Development In Pakistan.
- **Address:** 64-A, Street 5, Chaklala, Rawalpindi, Pakistan 46000
- **Telephone:** +92 51 5593507-5505553

Source:

www.energysourceguide.com

Other Organisations Involved in Micro Hydro

Pakistan Council of Renewable Energy Technologies (PCRET)

No. 25, H-9, Islamabad - Pakistan

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