



"STATUS OF PV WATER PUMPING SYSTEMS IN SOUTH AND SOUTHEAST ASIA:LESSONS LEARNT"

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Background



- Water is second basic human needs.
- 2/3 of the Earth is covered with water.
- Approximately a billion people who live in remote areas, do not have access to potable drinking water (water borne diseases)
- Many people living in the remote areas tap their daily water needs from:
 - Natural springs
 - Rivers
 - Water falls
 - Underground dug well or deep tube well
 - Rain water







Methods available for lifting water to place of needs:

- Diverting rain water and river water by gravitational force
- Walking to water sources and carrying on pots (Woman)
- Using hand pumps
- Using pulleys, rope and buckets to lift water from dug well
- Using diesel engine driven pumps
- Using animal powered to lift the water



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Background (cont..)



Possible Renewable Energy Options:

- Wind Pumps
- PV Water Pumping (PVP) system
 - * DC Pumping System
 - * AC Pumping System
- 3. Hammer Pumps to be used in rivers having high current





Background (cont..)



Comparison of Different Pumping Options

Pump type	Principal Advantages	Disadvantage		
Hand (manual)	Low cost, simple technology, easy maintenance, Clean, No fuel, Applicable to hand dug wells	Regular maintenance, low flow, absorbs time and energy, uneconomic use of expensive bore hole		
Solar (PV powered)	Low maintenance, clean, no fuel needed, easy installation, reliable long life, unattended operation, modular system and can be matched closely to need	Relatively high capital cost, low power output in cloudy weather		
Diesel (or gas) powered	Moderate capital cost, can be portable, extensive experience, Easy to install	Maintenance often inadequate, reducing life; fuel often expensive and supply intermittent; Noise, dirt and fume problems		

Source: Sandia National Laboratory



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PV Water Pumping Systems



- A matured System for Pumping water in remote areas
- Competitive with diesel or other pumping options
- 50,000 System installed world wide
- In India alone more than 4000 PVP systems installed
- In west Africa more than 1000 PVP systems installed
- In Maldives and the Philippines PVP systems are commercialized
- → Why similar pace couldn't take place in other developing countries?





Early History of Water Pumping Systems in Nepal



Solar Water Pumping Systems installed in Nep
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5. N.	District	VDC	Capacity (W)	Year of Invaliation	Support Organisation	Company	Implemented by
10	Chitavan	Bernstrage	1480	1986/87	France		ADB/N
2	Monage	Letang	1600	1986/27	France		ADBIN
3	Dang	Charsin	1480	1987/18	Shows State		RONAST
4	Navaparani	Argedi	1600	1990/91	France		ADB/N
5	Surkhet	Barnekhola	1600	1990/91	France		ADBAN
6	Katamandu	Sentenghet	4000	1992/93	NEDO	IEC.	RONASTANWSC
7	Bhaldapur	Bode	40000	1994/95	NEDO	1000	RONASTAWSC
8	Tanahun	Charapani	200	1994/95	DANIDA	SEC	CVDC
9	Siraba	Bhutes	1950	1996/97	000	1000	ECCA
10	Dhading	Maheshphont	150	1997/98	NSES		1525 Water
11	Dhadag	Salanghat	140	1998/99	WECS		NSESICMS
12	Sirata	Phubanya	100	1998/99	NSESMESC		MRSC
13	Katerandu	Khumalar	1050	1999/10	RUNAST		RUNAST
14	Mustang	Ghami	1600	1999/10	MDSA		MDSA
15	Siraha	Todae	700	1999/10	Asstralia		ECCA
16	Pyrthan	Swargatwari	1480	P2009/21	Temple	7790	ADBIN, RONAST
17	Syanga	Jaloke		1999/EE	KAAA	LTS	210000000000000000000000000000000000000
	Total	2000	59238	- Line Community	F-1807	77540	



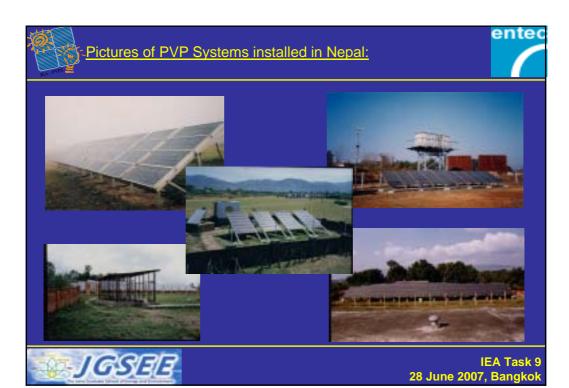
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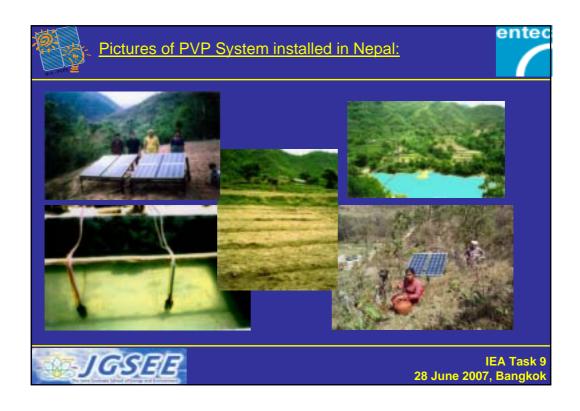


Other PV pumps installed in Nepal:

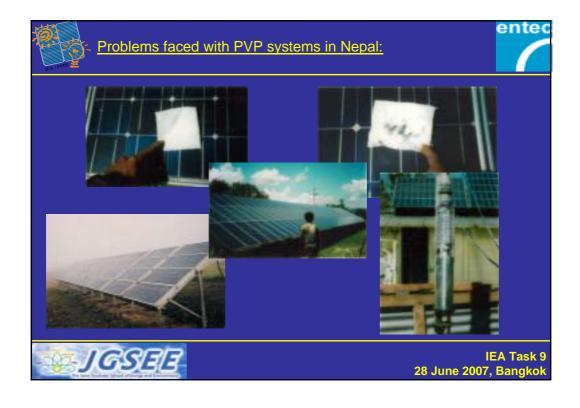


- > 32 other pumps in 32 different places
- ➤ Sizes ranging from 130 to 1800 Wp
- **➤ Government Subsidies 75% AEPC**











Institutions Involved in PVP Dissemination in Nepal



Government Institutions:

- Alternative Energy Promotion Center (AEPC)
- Nepal Academy of Science and Technology (NAST)
- Water and Energy Commission Secretariat (WECS)

Academic Institutions:

- CES, TU
- RECAST

NGOs, INGOs, International Donor Agencies

NSES, CRE, ECCA, KAAA,

Private Companies:

14 Government Certified Private Companies related to Solar Business.



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PVP Systems in Thailand



- Introduced in mid seventies with half the system installed were failed.
- > PVP were promoted in 6th National and Economic Development Plan as King's Project
- > By 1997, some 720 PVP system were installed in Thailand
- ➤ Updated (April 2007) data of DEDE revealed that 344.071 kWp of PV system were installed in Thailand (contradicted with data revealed in 2003 stating 1,126.35 kWp of PVP systems installed in Thailand
- ➤ Official Data of total number of system installed in Thailand is not available (at least in English Language)





Pictures of PVP systems installed in Thailand









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Pictures of PVP systems installed in Thailand









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Pictures of PVP systems installed in Thailand







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Problems in PVP systems installed in Thailand









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Problems in PVP systems installed in Thailand



- > Lack of proper site assessment
- ➤ Failure of controller
- > Dry running/ pump and controller damaged
- Stealing of Pipes
- > Poor installation of module/ module failure
- Lack of technical knowledge of community about the PVP systems
- > Lack of technical person to repair the system at community level



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Agencies Implementing PVP in Thailand



- > All the PVP systems installed in Thailand is Government Funded (EPPO's ECON Fund)
- > Government Agencies like DEDE, PWD, Ministry of Health are deploying the PVP in Thailand
- Academic Institutions like KMUTT, AIT and Naresuan University are doing researches on PVP
- > NEDO provided fund for few PWP systems in Naresuan University for Research Purpose
- > About 8 Private companies having Solar Business also installing the PVP in Thailand
- > An executive of Solartron Company disclosed that 300 system have been intalled by the company





Documentation of installed PVP in Thailand



- > As many Government agencies, Private Companies and Academic Institutions are working on installation, deployment and R&D of PVP system in Thailand
- > A single database of all the system installed in Thailand is not available
- > Status of all the PVP systems installed are also unknown



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Conclusions:



- > Many of the early PVP systems installed in both countries failed because of:
 - > Poor site assessment
 - > Lack of technical knowledge of community
 - > Lack of spare parts
 - Poor system installation and wiring
 - ➤ Most of the system failed as designer failed to design proper system
 - > Lack of proper training
 - > Stealing of system components (not enough security)
 - > Services are provided free of charge to end-users, hence the PVP systems are not making any revenue to keep themselves self-sustained





Recommendations:



- > To overcome the barriers in commercialization of PVP and make it self sustained following recommendations are made:
 - >Detailed site survey and assessment of water resources at site should be carried out
 - ➤ Discharge/Recharge rate of water resource
 - > Draw down of water level
 - > Water level at dry season
 - > Study well log properly (in case of the deep tube well)
 - Quality of water



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Recommendations:



- ➤ Based on site assessment and survey
 - > Proper system sizing/ pump selection should be carried out
 - > Proper (standard) installation should be carried out
 - > Proper insulation should be used incase of submersible pumps
 - > End users must be properly trained to operate and maintenance of the system
- > Even though the PVP systems are Government/ donor funded or subsidized
 - > Certain tariff should be levied to end-users for the services they get from PVP (replicate the system in Maldives or Philippines)
 - > Generate income from the services to make the system sustainable
 - ➤ With accumulated revenue, purchase spare parts and provide mainenance
 - > Commercialize the system with private involvement of private entrepreneur







Thank You For Your Kind Attention



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