Mini-grid Webinar Series

Grid interconnection of micro/mini hydro mini-grids: What happens when the national grid arrives?

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HYDRO EMPOWERMENT NETWORK
Knowledge Exchange for Community Micro Hydro in South and Southeast Asia

skat_ Swiss Resource Centre and Consultancies for Development

Mini-grid Webinar Series

Why mini-grid technologies -- PV, biomass, diesel, micro/mini hydro, wind, and hybrid systems -- need to be differentiated (Watch the recordings)

Grid-interconnection of micro/mini hydro mini-grids: What happens when the national grid arrives? (June 1, 2017)

Productive End Use -- Three examples of how to make it happen (early July)

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Organizers

Energypedia UG is a non-profit organization that runs and maintains the wiki-based platform, **www.energypedia.info**. Energypedia.info is an online platform for collaborative knowledge exchange on renewable energy, energy efficiency and energy access in the context of development cooperation

The **Hydro Empowerment Network (HPNET)** is a knowledge exchange and advocacy platform for micro/mini hydro practitioners in south and southeast Asia, focusing on policy, technology, and socio-environment solutions for long-term sustainability. Core support for HPNET comes from the **WISIONS** initiative at the Wuppertal Institute for Climate, Environment and Energy.

Skat Foundation was established by Skat Consulting in 2002 to foster the exchange of knowledge and experience in development cooperation through generating, sharing and transferring knowledge about what works and how in selected thematic areas.
Skat Foundation has also funded this webinar series.

Webinar material

	How to get it
Presentation 1: Indonesia	Separate recording
Presentation 2: Sri Lanka	Separate recording
Q & A	pdf File
Content overview, introduction, country comparison, general conclusions, knowledge products	Current recording

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Webinar Content

What are the presentations about?

- ✓ Micro/mini hydro systems (MHP) supplying communities through mini grid → **later connected to grid**
- ✓ Exclude / postpone **interconnection** of several mini-grids and **licencing models** for distribution grids ("small power distributors", franchisees…)
- ✓ **Implications** of grid-interconnection (including required investment)
- ✓ Who **benefits** and how?
- ✓ "**Islanding**" as an option?

Introduction: Indonesia and Sri Lanka Progress*

Indonesia	Sri Lanka
• ~ 800 MHPs countrywide, 400 grid-connected from start, 400 built as community owned mini grids • In ~200 cases grid arrived: 150 abandoned, 40 continue operation, 9 succeeded in later grid connection • → need for advocacy to avoid waste of resources / earlier investments • Development of a strong MHP industry	• 2 big programs (ESD and RERED) led to 170 MHPs • "registered consultants" and "qualified engineers" → guarantee standards • Electricity Consumer Societies as MHP owner / operator → transform into limited liability companies (at least 5% ownership to remain with them) • Only 3 projects connected (2 under implementation, 10 applied; potential for 30 more)

** Tenenbaum, Bernard; Greacen, Chris; Vaghela, Dipti. 2017. Mini-Grids and Arrival of the Main Grid, Lessons from Cambodia, Sri Lanka, and Indonesia; Conference Draft. Washington, D.C: World Bank*

4-country comparison

Country	Number of MHP projects connected "ex post"	kW range	Year of inter-connection start	Guaranteed FIT / "negotiated PPA rate"
Indonesia	9	12-670	2003	**IPP**: 60-80% of **avoided cost** **Excess power**: 90% of avoided cost (**4-9** US Cent/kWh)
Sri Lanka	3 (+2 ongoing, +10 applied)	12-45	2012	**10-11.8** US Cent/kWh
India	12 (+4) in progress	100-200	2017	**3.9 – 5** US Cent/kWh (prelim. Info), negotiated?
Nepal	2 (completed in Aug '17)	23, 40	2017	same for 1 kW – 25 MW: **4.8** US Cent/kWh for 8 months wet season **8.4** US Cent/kWh for 4 month dry season

General Conclusions

- **Numerous MHP mini-grids** existing, more to come, extension of national grids → grid-interconnection relevant in many countries!
- Consider grid-interconnection **from beginning** (ownership, technical standard etc.)
- Interconnection **cost** depending on kW-range
- who **benefits**:
  a) reliable supply → consumers
  b) additional revenues → community
  c) additional generation potential → utility
- Advocacy required, **knowledge products**

Relevant Knowledge Products

Knowledge Product	Where to Access
From Hydro Empowerment Network (HPNET) **Frequently Asked Questions:** ***Grid Interconnection of Micro Hydro***	https://energypedia.info/wiki/Frequently_Asked_Questions:_Grid_Interconnection_of_Micro_and_Mini_Hydropower_Plants
From ESMAP Global Facility on Mini-Grids ***Mini-Grids and Arrival of the Main Grid: Lessons from Cambodia, Sri Lanka, and Indonesia*** **(February 2017 Workshop Draft)**	Contact Dipti Vaghela at hydroempowerment@gmail.com
From Alternative Energy Promotion Centre ***Development of Grid Interconnection Policy for Micro/Mini Hydro Plants in Nepal***	https://energypedia.info/wiki/Development_of_Grid_Connection_Policy_for_Micro/Mini_Hydro_Plants_in_Nepal
From Ashden Awards and IBEKA, Indonesia: ***Cinta Mekar*** **video**	https://energypedia.info/wiki/IBEKA:_Micro_Hydro_power_in_Indonesia,_Ashden_Award_Winner
From HPNET: ***Smart Grids for Rural Electrification*** **video**	https://energypedia.info/wiki/Smart_Grids_for_Rural_Electrification
The "Micro/Mini Hydropower Library provides *Other Knowledge Products on Interconnection*: in search fields**:** Theme → choose "Technology", Technology → choose "Grid Interconnectivity"	https://energypedia.info/wiki/Special:RunQuery/MicroMini_Hydropower_Library_(MHL)_Search

Thank you!

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