

# Roadmap to Scale-up Solar Irrigation in Bangladesh

*Final Report*

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## Background

- ❑ 1.24 million diesel pumps and 341,634 electric pumps are in operation.
- ❑ These pumps consume 1 million tonnes of diesel and 2,000 MW of power each summer.
- ❑ Solar irrigation should give priority to surface water and introduce sustainable water management (Minor Irrigation 2017, Groundwater Management Act 2018, Groundwater Management Rules 2019).
- ❑ The Roadmap covers the period 2021 – 2030.
- ❑ Proposed 3 Components under the Roadmap
- ❑ The Roadmap is fully aligned with the Paris Climate Agreement, Bangladesh Nationally Determined Contributions (NDC), climate, energy, and agricultural policies.



# Roadmap Ambition (1/2)

- **Component A: Standalone SIP systems replacing diesel pumps. 1,000 MWp solar pumps** (estimated 45,000 SIP systems) to phase out 25% of diesel pumps by 2030. Benefits from grid connection feasible through provisions of the [SIP Grid Integration Guidelines](#). **USD1.54 billion, of which USD700 million in loans/grants.**
- **Component B: Hybridization/solarization of electric grid-connected pumps. 25 MWp of hybrid solar-electric pumps in pilot phase** (estimated 1,250 hybrid pumps under [net-metering scheme](#) by 2023). After positive assessment, additional 475 MWp by 2030. **USD20 million, of which USD6 million in loans/grants in the pilot phase.**
- **Component C: Decentralized ground mounted SPV systems on agriculture lands. 25 MWp in pilot phase.** Projects ranging 50 kWp - 10 MWp and according to provisions of the [SIP Grid Integration Guidelines](#). After positive assessment, additional 475 MWp by 2030. **USD25 million, of which USD5 million in loans/grants in the pilot phase.**

- ❑ Grid connections depend on capacity of distribution network and sub-station.
- ❑ Continuation of Components B and C after assessing pilot phase is **optional**.
- ❑ The maximum new PV capacity aimed by the Roadmap is 2,000 MWp (provided continuation of Components B and C). Maximum export capacity is 1,300 GWh/year (~ 2.5% of current country's electricity production).



## Roadmap Ambition (2/2)

- Climate financers, such as the Green Climate Fund (GCF), give preference to actions aiming at profound paradigm shifts. In particular those solutions that combine climate mitigation with fighting poverty and inequality.
- Component C makes the Roadmap approach comprehensive and truly transformational. It fights poverty and empowers farmers.  
**Roadmap adoption is required to get financed.**



Left picture: 1 MWp on 1.5 hectare in the district of Anand (Gujarat, India), conducted by Anand Krishi University Gujarat Industrial Power Company Limited.  
Right picture: Project in Europe.



# Financing the Roadmap

❑ Financing scheme aims at:

- Not causing financial burden on Bangladesh's national accounts.
- Be farmer friendly.

❑ The cost of implementing the Roadmap is estimated in USD1.585 billion:

- USD1.540 billion for component A (replacement of diesel pumps).
- USD45 million for the pilot phase of components B and C.

❑ **Public Financing** searched from two sources:

- **National:** SIP public Fund, suggested USD250 million coming from NDC unconditional commitments and savings in diesel imports.
- **International:** USD461 million in low interests loans and small grants. GCF finances 0% interest loans for implementing truly transformational roadmaps (with paradigm shift to fight poverty and inequality) using viable technologies. ODA grants are possible for agencies service charges, technical assistance and for enabling grid connection for small farmers.

❑ **Private financing** from equity and debt taken by IPPs, project developers and farmers.



# Business Model Component A

- ❑ Only applicable **for replacing existing diesel pumps.** Individual farmers or farmers group can apply. Farmers grouping may reduce number of operative pumps and share project costs.
- ❑ **Grant to farmers initially to cover 50% of project cost.** Depending on cost reduction of equipment, this **grant will be gradually reduced to 40% in 2030.** Larger grants are possible for specific target groups. SREDA to facilitate centralized procurement of equipment.
- ❑ **2% of grant is allocated to implementing agencies** as service charges. **Agencies to include a proper O&M plan** in program design.
- ❑ **Farmers and sponsors can avail of bank finance** with preferential conditions to cover repayments. Contribution required estimated in USD800 – USD1,000 per kWp installed (depending size of system).
- ❑ **Farmers could recover up to 25% of their contributions by selling surplus electricity.** Grid connection depends on technical feasibility and follows SIP Grid Integration Guidelines. Utilities should facilitate it.
- ❑ **Micro-irrigation techniques should be encouraged** in all projects.



## Business Model Components B

- **Only existing grid-connected electric pumps can benefit.** Programs should not allow to replace diesel pumps for hybrid electric pumps. SREDA to facilitate centralized procurement of equipment.
- **Grant financing of 30% of project cost during pilot phase.** Afterwards, lower financing or even zero financing (after assessing results of the pilot phase).
- **2% of grant is allocated to implementing agencies** as service charges. **Agencies to include a proper O&M plan** in program design.
- **Farmers sell excess electricity to the grid** through net-metering scheme. Savings in electricity bills could help to repay loan acquired.
- **Micro-irrigation techniques should be encouraged** in all projects.



## Business Model Component C

- ❑ **Farmers or private developers can become IPPs** and install 500 kWp to 10 MWp SPV systems. Grid connection depends on technical feasibility and follows provisions given by the SIP Grid Integration Guidelines. Electricity is sold to utilities through standard PPAs.
- ❑ **A minimum installation height and space between PV panels is enforced** to ensure that farming activities can take place along with solar plants.
- ❑ **SREDA and DAE to provide technical assistance** throughout the project.
- ❑ **No public financing to the private sector.** Possibility to offer eligible farmers grant financing for up to 20% of project cost to promote uptake.
- ❑ Project **developers are encouraged to provide irrigation water** to farmers' fields.



# Enabling the Transition - Institutional

- **Establish the Energy-Water-Agricultural Nexus.** The introduction of more efficient irrigation practices contribute to higher agriculture yields. Exporting the surplus electricity into the grid reduces the use of groundwater since farmers also want to maximize own income.
- **SREDA to play a coordinating role** to align efforts of implementing agencies. SREDA responsible of the monitoring, reporting and verification (MRV) mechanism and establish an independent Technical Standard Committee to safeguard quality of SIP systems.
- **Role for implementing agencies.** Agencies should ensure the right capabilities and proper organizational structure for achieving targets, and should include strong provisions for proper O&M practices.
- **Role for the financing sector.** Project sponsors, groups of farmers and individual applicants will require adequate financial products with low interest rates. Financing products should be standardized to the extent possible.



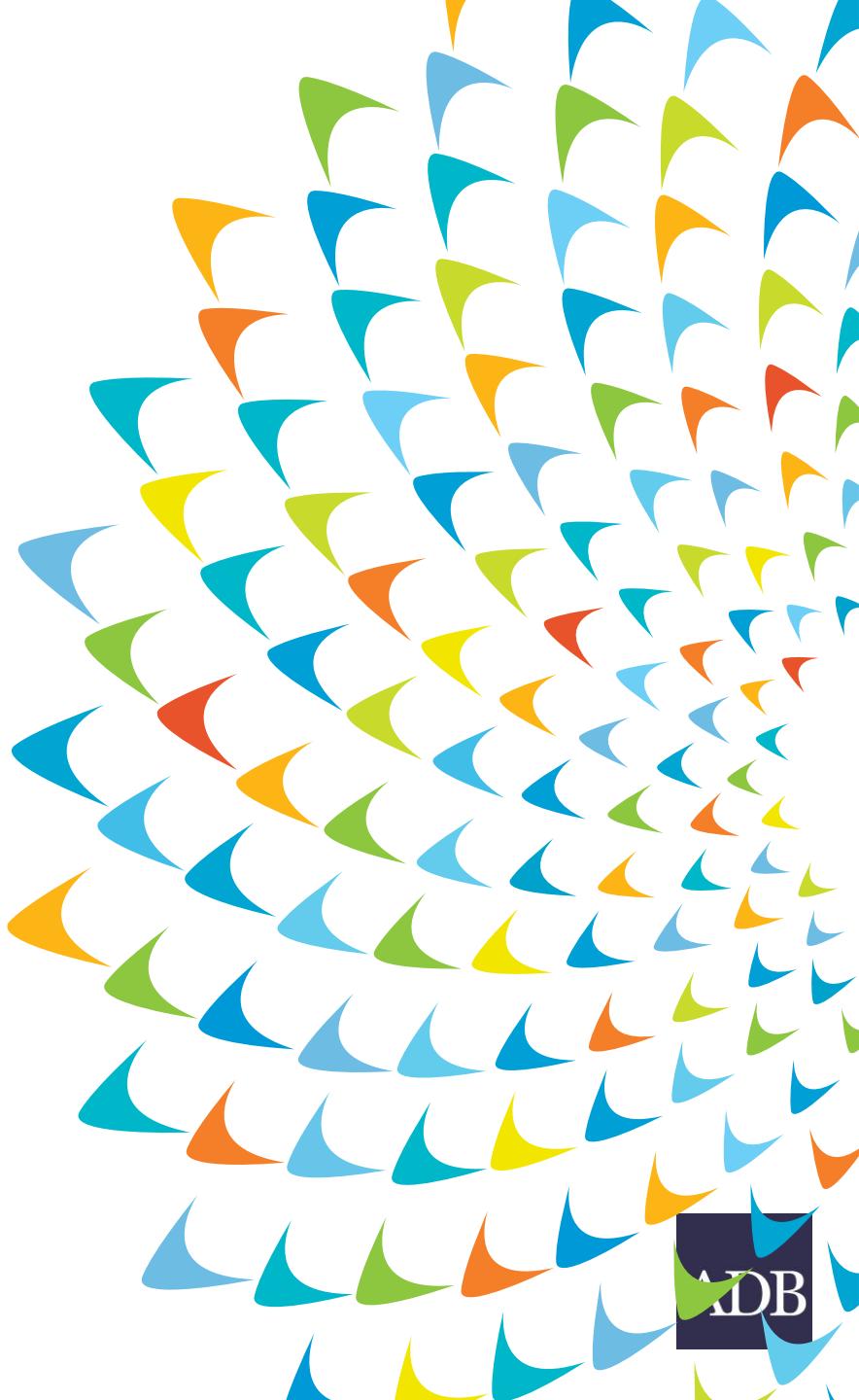
# Enabling the Transition – Financial

- **Preferential taxation to lower equipment costs:** Check benefits of extending incentives given to Bangladeshi PV panels manufacturers (exports **and include benefits for manufacturing for the local market**); keep tax waiver for imports of solar raw materials; reduce or exempt custom duty and Value Added Tax on pumps; reduce advanced income and trade taxes on pumps and solar panels. The Bangladesh National Board of Revenues (NBR), the Power Division and SREDA should be responsible in assessing the feasibility of these tax benefits.
- **Establish dedicated SIP Fund:** National fund established from NDC unconditional commitments and savings in diesel imports.
- **Search for international climate financing:** Low or zero % interest loans from GCF and other climate financers. Smaller grants from donors for agencies service charges, technical assistance and for supporting smaller farmers with larger project grants and financing their interconnection costs.



# Enabling the Transition – Sustainability

- ❑ Promote ownership by farmers through continuous awareness:** Boosting awareness of the benefits of SIP systems, in particular during the first years of roadmap implementation.
- ❑ Provide technical support for better O&M,** through capacity building and training.
- ❑ Compensation mechanisms:** Conditions established by the 2020 SIP Grid Integration Guideline apply to projects in Component A (replacing diesel pumps) and Component C (SPV on farm land). Net metering applies to Component B. It is recommended that the SIP Grid Connection Guidelines are revised to assess if the import cap of 1kWh /kW AC is not too restrictive.
- ❑ Safeguards to farmers:** To support farmers to repay loans during times of poor harvest or disaster such as cyclones and flooding. Example: Insurance on agricultural products or on loan repayment. This insurance could be supported by the SIP Fund during the rollout period.
- ❑ Regulation for energy storage and ancillary services:** Large SIP systems can provide important ancillary services to the grid if they are coupled with energy storage.



Thank you

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