MINISTRY OF FINANCE
REPUBLIC OF INDONESIA

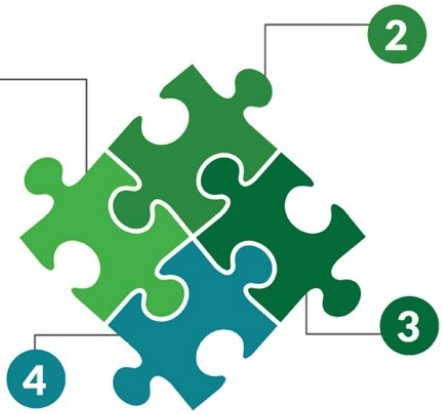
NDA GCF | National Designated Authority Green Climate Fund Indonesia

Technology and Investment Needs Assessment for Energy, FOLU, Food, and Water Sectors in Indonesia

Technology and Investment Needs Assessment was conducted by the Directorate General of Financial Sector Stability and Development, as the National Designated Authority (NDA) to the Green Climate Fund (GCF), through the Readiness III program with support from the Global Green Growth Institute (GGGI) as the Delivery Partner. This document aims to help stakeholders identify and prioritize green technologies with strong potential to support national climate targets, particularly in four strategic sectors: energy, forest and other land use (FOLU), food, and water.

1 Shortlisting of technology
Identify and shortlisting of technologies based upon the secondary research, and stakeholder consultations.

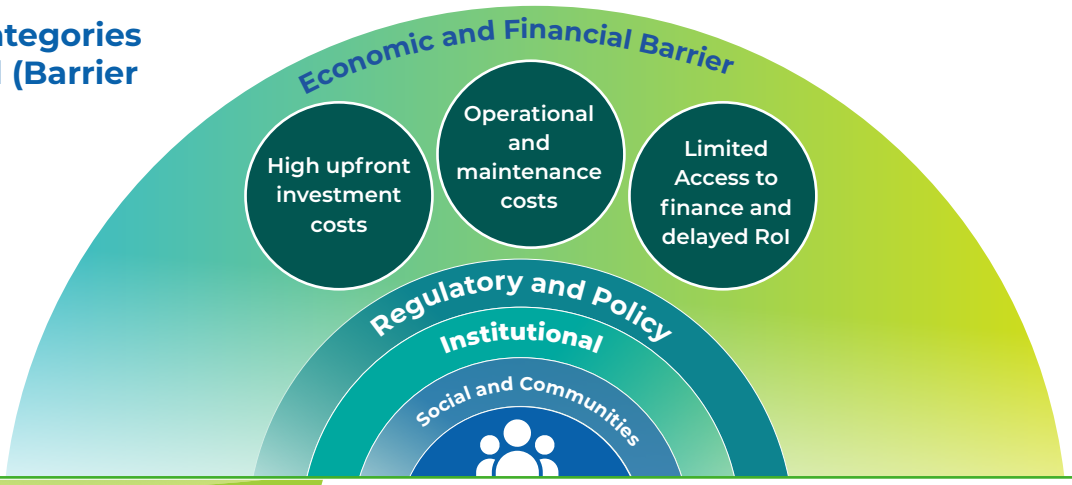
2 Identification of criteria for Multi-Criteria Analysis (MCA)
Stakeholder inputs and secondary research to identify and finalize criteria and sub-criteria for MCA.



3 Development of technology factsheets
Prepare factsheets for all shortlisted technologies covering details of each criteria and sub-criteria specific to Indonesia.

4 Evaluation of shortlisted technologies
Identify and shortlisting of technologies based upon the secondary research, and stakeholder consultations.

Barrier Categories Identified (Barrier Analysis)



Technology Action Plan

The overview map illustrates how TNA activities support NDC goals through a four-step process. The Technology Action Plan (TAP) highlights 16 priority technologies (4 per sector), along with strategies to overcome barriers. These are aligned with national climate goals and include specific actions, indicators, risk measures, timelines, and potential funding sources.

The Technology Action Plan process includes:

Summary of Investment Needs of the Selected Technologies

ENERGY

SOLAR PV

~0.4 USD/Wp (domestic +50%); needs blended finance to reduce capex + expand grid integration.

HYDROPOWER

Large hydro: **USD 2.56M/MW**; Small hydro: **USD 2.09M/MW**; Mini hydro: **USD 2.43M/MW; O&M 1–4%**; financing needed for major civil works + long payback periods.

ELECTRIC VEHICLES (EVS)

High upfront cost; **TCO 40–50%** lower than ICE; requires charging infra + risk-sharing mechanisms; OEM investments (**USD 2B–1B**).

BIOMASS POWER

Capital- and O&M-intensive; requires concessional finance + feedstock supply chain investment.

FOLU

GIS & REMOTE SENSING

High initial capex; needs funding for hardware, imagery; suitable for green bonds, PPPs, grants.

DRONES / UAVS

High equipment + training costs; mostly imported. Needs subsidies, local manufacturing support, and international partnerships.

DATA INTEGRATION SYSTEMS

Continuous financing for hardware/ software platforms & analysts; multi-sector interoperability investments.

AGROFORESTRY SYSTEMS

Capital- and O&M-intensive; requires concessional finance + feedstock supply chain investment.

FOOD

SOIL MANAGEMENT

Conservation Agriculture; High machinery/tool costs; financing for farmer adoption + extension.

ORGANIC & BIO-FERTILIZERS / BIOCHAR

Moderate cost for organic fertilizers; biochar requires higher capital investment. Long-term benefits offset operational costs.

CLIMATE INFO SYSTEMS & PRECISION FARMING

High upfront cost; **TCO 40–50%** lower than ICE; requires charging infra + risk-sharing mechanisms; OEM investments **(USD 2B–1B)**.

MICRO-IRRIGATION & RAINWATER HARVESTING

High installation capex; sprinkler **~$247/decare,** drip **~$278/decare;** storage adds **30–45%** more; moderate–high O&M; needs subsidies.

WATER

SMART WATER METERING

7× cost of conventional meters; requires major capital for sensors + backend systems.

SOLAR WATER PUMPING

High upfront cost for PV + pumps; requires blended finance for rural adoption.

WATER FILTRATION SYSTEMS

Financing for treatment plants, household filters, and distribution networks; needed for rural/peri-urban scaling.

CLIMATE-RESILIENT WATER INFRASTRUCTURE

Highly capital-intensive (flood control, storage, resilient supply); needs blended finance & multi-source financing + PPPs.

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