

The BioEnergy Power Plant

A New Frontier



IED Invest Cambodia wanted to do something new with bioenergy. They had operated a biomass gasification plant before, but now they wanted to start a larger plant in the remote Sra-Em Village, Preah Vihear Province. The plant would provide power and income to an underserved community, but the avoided cost-based feed-in tariff was too low to make the project worthwhile. To counter this, IED Invest approached EEP Mekong for grant funding.



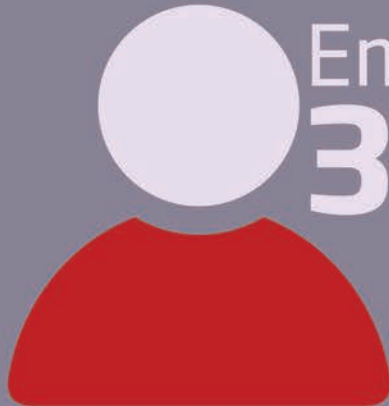
EEP funded

Investment Objective:

To design and demonstrate the sustainability of an innovative business model for operating a biomass power plant designed for grid injection.

23%

IN



Employs
30 people



1.5 kg
waste
wood
per kWh

OUT

3 GWh
per year



Connected
700
rural households

Biomass vs Diesel

Emissions

0.72 tonnes of CO₂ per MWh



Cost to Consumer

US\$0.16 per kWh

Carbon-Neutral



US\$0.122 per kWh

The Sra-Em BioEnergy Power Plant

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Providing Energy to the Unreached

By 2030, the Royal Government of Cambodia aims to provide electricity to 70% of the rural population by involving the private sector and using renewable energy to achieve energy independence.

However, only 35% of rural households in Preah Vihear Province have access to electricity, which mainly comes from diesel generation at high cost. To provide power to the unreached households of Sra-Em and Kantuot, IED Invest Cambodia built a 1 MW-capacity biomass gasification power plant in Sra-Em Village. This was an innovative approach because the village is in a remote part of Cambodia, far away from any other power generation infrastructure.



Employees selecting logs for the gasification process

Project Details

The plant cost €1.93 million and the generated electricity is fed into the existing grid.

The feed-in tariff is too low to make the project economically attractive. EEP Mekong provided a grant for 23% to make the project feasible.

Biomass gasification has a lot of potential, especially once the power feed-in tariff is calculated on marginal cost

Scope for Sustainability

Strong Policy Framework

Cambodian policy aims for energy independence by using local resources while finding sustainable land uses. This approach provides employment as well as affordable electricity to more households.

There is no indication that Electricité du Cambodge (EDC) will stop buying power, and improved purchase conditions are expected in the medium term.

Sustainable Biomass Supply

The plant created a sustainable supply chain that benefits local families and the environment. The supply chain has two phases:

1. Supply contracts with SLC holders, with required permits for waste wood transport
2. The development of plantations using the correct cultivation methods to maximise high-energy biomass production



Waste water from the plant is cleaned and cooled before being reused in a closed system, avoiding water pollution



The contract with EEP Mekong was signed on 8 February 2016 and the plant was completed on 31 January 2018. The plant currently generates and sells about 3 GWh of electricity per year.

For the first five years of plant operations, the plant uses waste wood sourced from land clearances of social land concession (SLC) and economic land concession (ELC) projects in the area. IED Invest is also establishing plantations in cooperation with local smallholders. The plantations are cultivating fast-growing, densely grown trees and will prevent deforestation while providing employment.

The power plant produces charcoal ("biochar") as a byproduct. Biochar briquettes are sold to the market as a cheap source of cooking energy.

Scale-Up Potential

- IED Invest Cambodia received authorisation from local authorities to build a second unit on the same site. Fund mobilisation is underway.
- Cambodia's utility organisation EDC has provided two more sites to replicate the power plant.
- Three agro-industries have offered their residue biomass to use as "fuel" at lower cost.
- The Sra-Em plant's success catalysed investors' interest in renewable power projects in Cambodia.
- The Ministry of Mines and Energy of Cambodia is reviewing the feed-in tariff calculations to make biomass-based clean energy projects more attractive.



Impacting Communities

There is a double rationale for locating this type of biomass power plant in a remote area.

It creates a local biomass market, providing employment and extra sources of income to the rural population. At the same time, it delivers electricity to the local communities without needing long transmission lines. Delivering 3 GWh per year, the Sra-Em plant allowed for 700 additional households and businesses in Sra-Em and Kantuot to be connected to the grid. The plant can deliver up to 5 GWh per year.

Environmental Impact

The Sra-Em plant's power generation is CO₂-neutral and avoids 2,160 tCO₂eq in greenhouse gas emissions by replacing diesel-generated electricity. The plant also reduces water pollution. It uses a closed-circuit cooling system with an effective water treatment system, allowing the complete recycling of process water with no discharge and no water pollution.