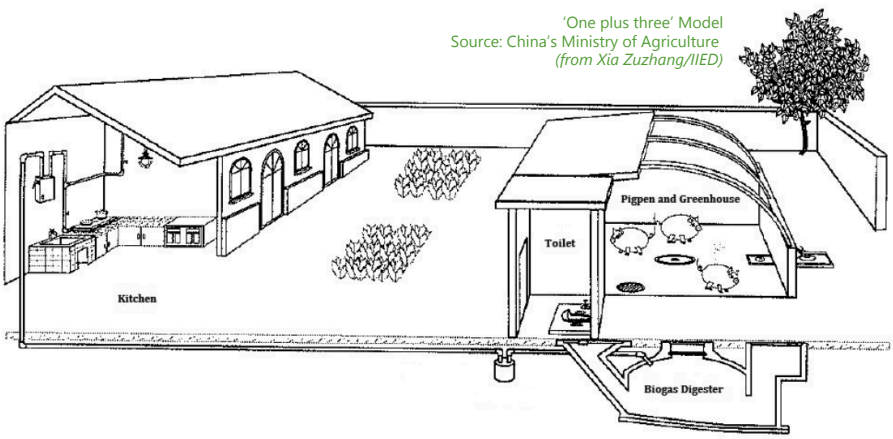
Biogas digester in China

- **Biomass:** Animal manure, sewage sludge
- **Conversion technology:** Anaerobic digestion
- **Output:** Biogas for cooking and heating water
- **Scale:** Household-level, constructed as 'one plus three' model: digester with pig pen, toilet, and biogas stove

- Cost of constructing 8 m^3 digesters are equivalent to MMK 635,000, for which the central and local government share 60% of investment costs and farmers pay the rest in cash and non-cash investments (e.g., labour, technician, installation)
- Operational costs vary per household depending on availability of manure, maintenance and repair costs
- Families that have fewer animals would need to buy manure from other households
- Households can earn up to equivalent of MMK 63,000 per year by selling sludge that can be used as fertilisers
- Villagers believe that the biodigesters has improved sanitation, lessened pollution (from burning firewood for cooking), and reduced the use of chemical fertilisers (because of shift to using sludge)

'One plus three' Model
Source: China's Ministry of Agriculture
(from Xia Zuzhang/IIED)



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Biomass gasification power plant in Uganda

- **Biomass:** Agricultural residues from maize cobs and coffee husks produced in the community
- **Conversion technology:** Gasification
- **Output:** Electricity for households
- **Scale:** Village-level, distributed to households via mini-grid
- International company installed the power plant, and partnered with a local business and a local research centre to manage its operations in the village


Source: Zambianeye.com

- Biomass was provided for free by farmers, but the company plans to purchase it from them in the future
- Charcoal residues from gasification can be sold to briquette manufacturers or used as fertiliser by farmers; but the wastewater produced from this process can contaminate groundwater if not disposed properly


Source: Bloomberg / Juan Carlos

- Villagers pay an equivalent of MMK 82,000 for initial connection and wiring; There was no clear pricing structure, but electricity was free on trial for the first month, and then payments were based on consumption
- Some lacked understanding about electrical devices and consumption – one household purchased 8 light bulbs, an iron, a television, and a sound system; Villagers tend to ask the Secretary of their Village Committee, but has limited technical knowledge on electricity
- Electricity was provided from 5pm to midnight, but this was not always fulfilled; thus, the villagers perceive the international company as unreliable
- Some residents wanted to have electricity all night for safety, others are happy that their children can now read books at night, some wanted to use electricity for their agricultural activities

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Biomass gasifier systems in India


Source: Husk Power System


Source: Flickr/Caitlin Childs

- **Biomass:** Rice husk
- **Conversion technology:** Gasification
- **Output:** Electricity for households, and heat for processing of agricultural products
- **Scale:** Village-level, directly supplied to households and local businesses through low voltage wires along bamboo poles
- Company installed a low-cost indigenous gasifier system with a 32 kW capacity, providing electricity to approximately 300 homes and shops for 6 hrs in the evening
- Exhaust heat from the plant is used for small-scale agricultural processes
- Members of the community are the primary suppliers of rice husk, employees of the power plant, and also customers of electricity – but some felt that they only have limited control over the project
- Electricity was sold at a cheaper rate than what locals would spend for their current source (e.g., kerosene lamps)
- However, customers were reluctant to pay because there were no penalties imposed; in order to address this, payments were taken monthly via a community-led bill collection system
- Maintenance of the units also became problematic because shortage of skilled technicians and unavailability of spare parts in rural areas
- When the company expanded to another village, locals were concerned about their credibility; as such, the company supported local schools and school children in various forms to gain the trust of the community

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