

# Development of a Sustainable Biogas sector – *the case of Cambodia*



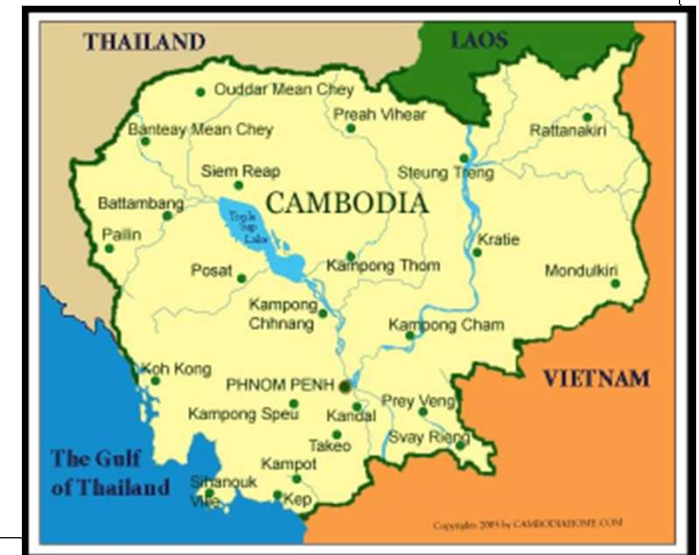
RenErGo Workshop 22-23 May 2010

# Content of Presentation

1. Background and Cambodia's Energy Conundrum
2. History of biogas in Cambodia
3. The National Biodigester Programme
4. Benefits of biogas and the energy challenge
5. Development of a Sustainable Biogas Sector
6. Financing of sector development
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# Cambodia – Background

- Tropical Agricultural Country
  - 13.40 Million inhabitants
  - 80.3% rely on agriculture
- Agricultural system
  - Integrated Livestock-rice system
  - Dominated by smallholders (household farms)
- Household energy
  - Fuelwood in rural areas, urban charcoal



# Cambodia – energy challenge

- Use of fuel wood comes at a great cost
  - Depletion of forest resources
  - Burden on household income, time required for gathering
  - Causes indoor air pollution and related diseases
- Problems are forecasted to exacerbate
  - Biomass will remain the dominant fuel up until 2030
  - Deforestation is rampant (2%/year) and accelerating
- UNDP calls for a massive intervention to safeguard access to energy



# A solution to the challenge

- Biogas production from animal waste at household level
  - Clean fuel for both cooking and lighting
  - Around 20-25% of the rural population has the technical potential (>25kg manure/day/household)
- Assessment of biogas initiatives in Cambodia (McIntosh 2004)
  - In 1986 the first digester was built, up until 2004 around 400 were built by 15 organizations, mostly plastic tube digesters
  - Status 2004, most in disuse or broken.
  - Main problem lack of support network and ownership, and the use of low quality digesters technologies



# Development of a support programme

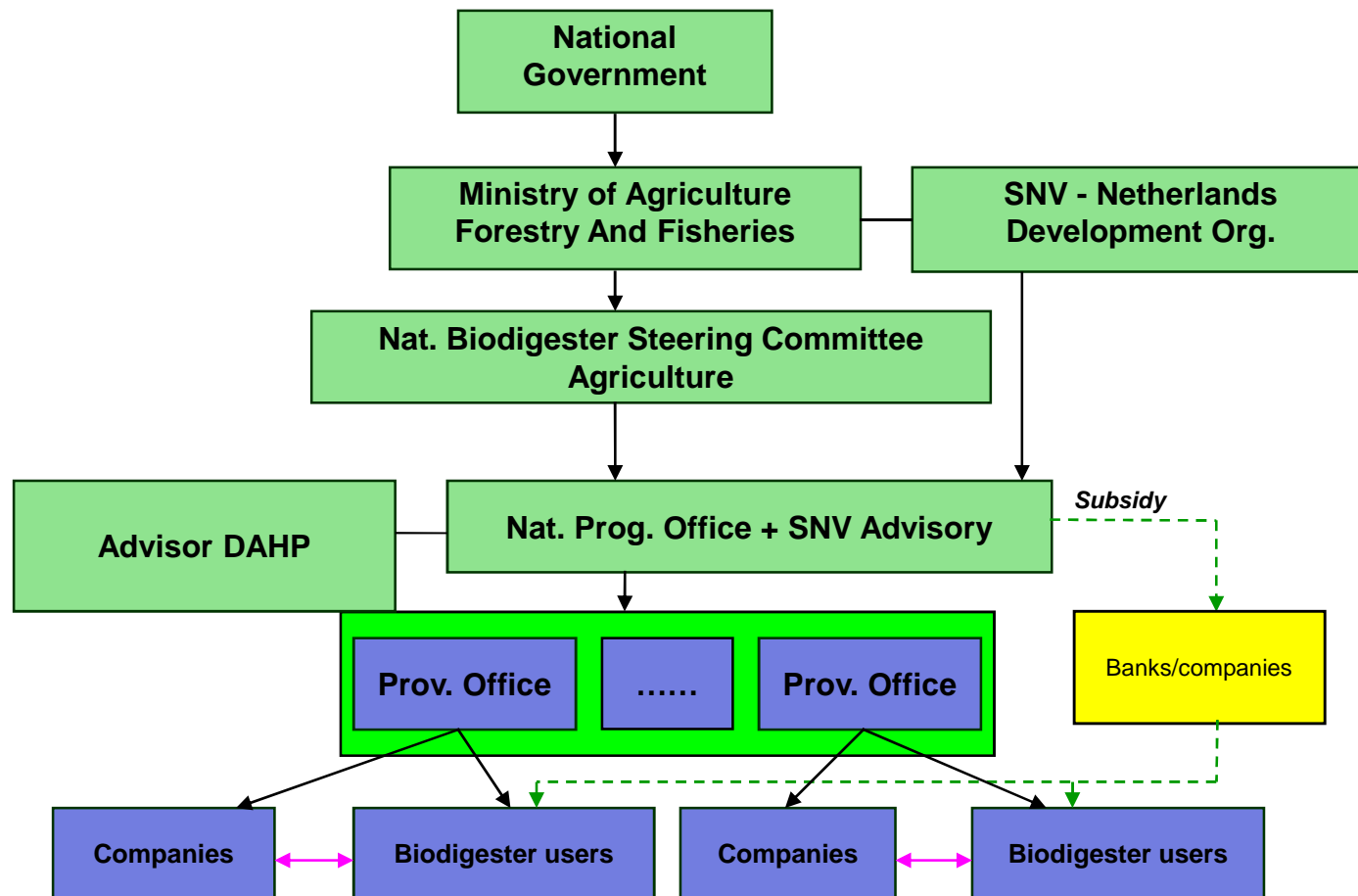
- SNV was contacted by the RGC to study the feasibility of a support programme
  - SNV has a track record of building biogas sectors in notably Nepal and Vietnam (over 300,000 biodigesters built)
- SNV executed a feasibility study to identify a ‘niche’ in which the program can operate according to the country specific conditions
- In 2005 after securing finance, a national programme was formulated which formally started in 13 March 2006.

# The National Biogas Programme

- Joint venture between MAFF and SNV
- **Objective:** The mass dissemination of domestic biogas as an indigenous, sustainable energy source through the development of a commercial, market oriented biogas sector.



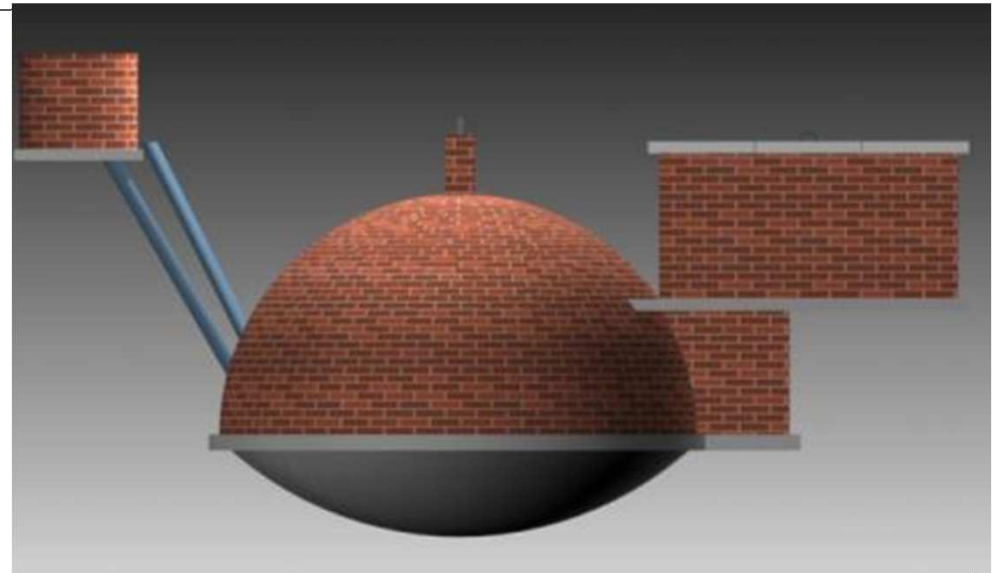
# Programme structure





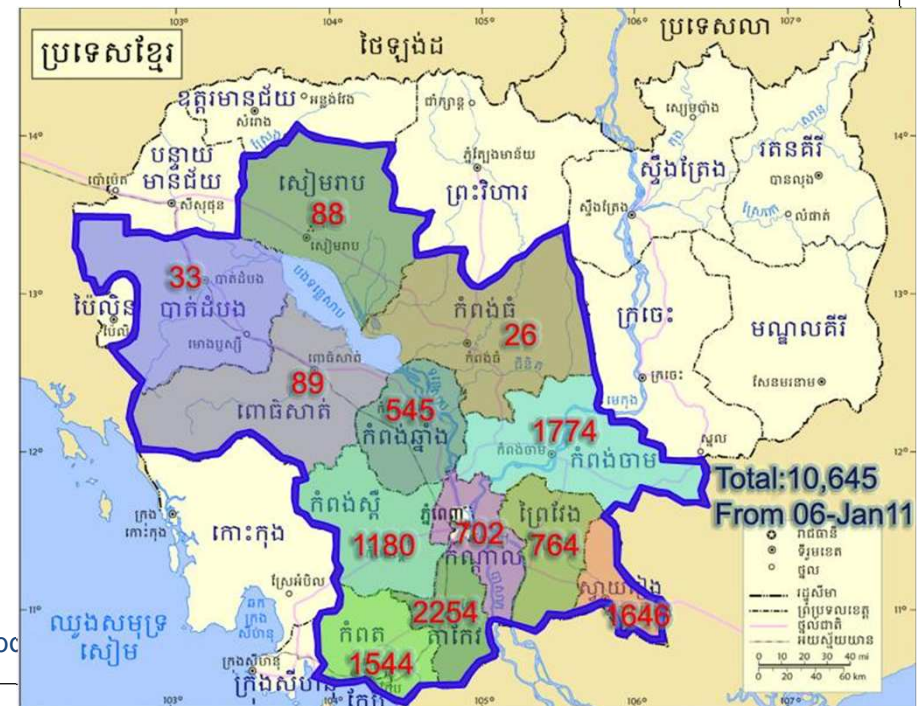
# Technology

- Modified Deenbandhu Biodigester: Farmer's Friend Digester
  - Modified for Khmer conditions
  - Lifespan >15 year
  - Chosen based on comparative assessment of common models in the region
  - Available in 4,6,8,10,15 m<sup>3</sup>, costing between \$400 to \$890
  - Subsidy is offered of \$150 on each model
  - Most common is the 6 m<sup>3</sup> digester



# Programme achievements (1/2)

- Established operations in 12 provinces
- 11,736 biodigester are installed (March 2011)
  - Performance: >99% working
  - Adoption rates are increasing from 218 per month in 2009 to over 500 in 2011
  - In 2016 around 45,000 units are forecasted
  - 2.9% of the technical potential is reached as of date



# Programme Achievements (2/2)

- Direct benefits
  - Saving of \$14.4/month and \$52/year on displacement of chemical fertilizer
  - Fuel wood reduced with 85%, 100% of the households cook on biogas, 71% use it also for lighting. Time saving: 1.5 hours/day
  - Access to basic sanitation increased from 29 to 73%
- Local benefits
  - Rural employment: 450 masons trained, 21 BCCs and 69 supervisors, reduction of deforestation (38,674 ton wood)
- National benefits
  - Better health, less fossil fuel imports, rural employment. Economic returns often higher than financial returns!



# Dev. of a sustainable biogas sector

- In a commercial viable biogas sector, companies act as suppliers to address an active demand from households who are willing to invest.
- Developing of a biogas sector takes around 10 years
  - NBP had to start from scratch in Cambodia
    - No biogas infrastructure, lack of skilled masons and technicians and a landscape of failed and abandoned projects

# Three pillar strategy of NBP (1/2)

## 1. **Demand side** : Capture the interest of farmers and turn them into sales

- Affordability: Subsidy of \$150 is offered to increase the FIRR<sub>3</sub> to 11% from -8%.
- Access to credit: 84% have insufficient fund to invest, but are willing to invest → Special biogas credit created (60% of all digesters are now built with biogas credit)
- After sale services, extension services, user training → USER satisfaction

## 2. **Supply side**:

- Training and certification of masons, supervisors.
- Private sector development → Piloting of BCCs, coaching and training
- Ensuring profitability → overhead includes a profit margin

# Three pillar strategy (2/2)

## 3. Facilitation and regulation

- Applied Research and Development
- Importation of appliances (if required)
- Quality control and enforcement
  - Quality of information
  - Quality of construction (before and after construction inspection)
  - Quality of after-sales service
- Monitoring and Evaluation
  - Progress monitoring
  - Biogas User Survey
  - CDM-VER verification
  - Activity recording in a central database



# Client is central in the NBP strategy



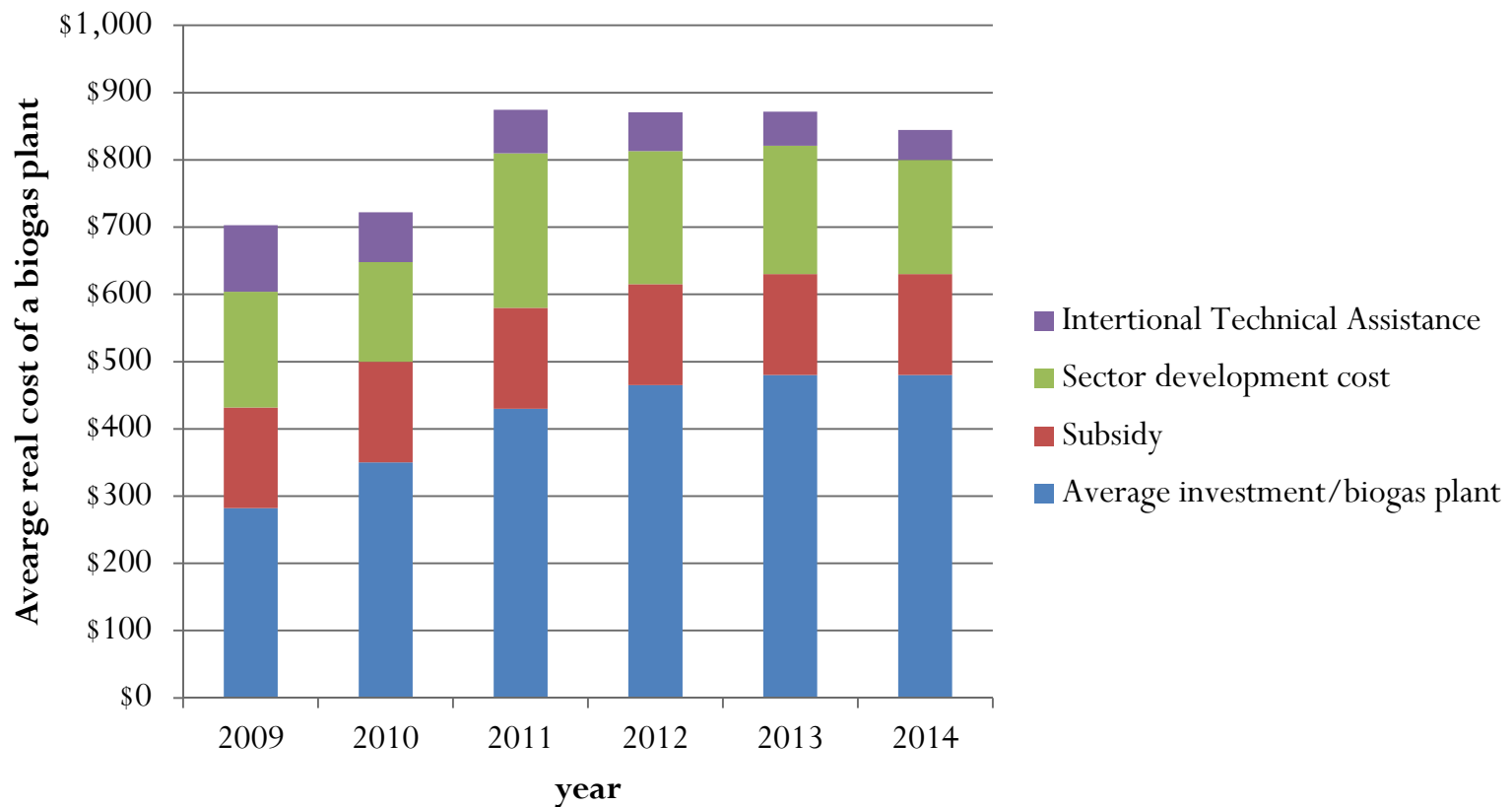
# Financing of the sector development

- A young market cannot bear the development cost and external funding is required
- NBP financing relies on:
  - Farmers' investment
  - ODA finance from the Dutch Government
  - SNV core funding for ITA
  - Carbon finance
  - In kind contribution for the Cambodian Government
- Long term objective: a self financed sector



# Average Biodigester unit cost

- Breakdown of average digester unit cost



# ODA and other funding sources

- ODA is essential for the start-up and transition to a sustainable sector
  - ODA from the Dutch government ceases in 2012
- Opportunities for output based ODA from countries with more climate and energy friendly policies
  - Germany, Czech and Denmark
- Feel good factor
  - NBP is exploring contracts with companies that can adopt biodigesters by paying the subsidy in exchange for promotion materials

# Carbon finance

- Often considered the Holy Grail
  - Volatile, performance based, complex
- Carbon Finance and NBP
  - NBP has received carbon since 2006 through a bilateral agreement with HIVOS
  - In 2008 markets changed and demanded credits with third party auditing, in 2010 NBP applied for the voluntary Gold Standard
  - Validation and verification is ongoing since September 2010
  - Contribution carbon finance 14% in 2011 to 39% in 2014 in 2017/2018 near 100%.

# Conclusion

- One of the solutions to Cambodia's energy conundrum is household biogas
- NBP tries to capture this potential by developing a viable biogas sector
  - More than 11,673 users switched from wood to biogas
  - Development of 21 BCCs
- Financing of NBP is a challenge
  - ODA or grant funding is essential for the start-up and transition to self-financing.
  - Carbon finance will (self) finance the programme, ODA is essential but drying up, other sources are being explored to secure funding



Thank  
you