

A post-Kyoto CDM bioenergy business model built on systems expansion

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Starting points

- Double objectives:
 - Climate
 - Development
- Green Growth and Technology Transfer
 - Swedish perspective: Bioenergy
- Sustainable use of biomass

Calls for

- Integrated measures and models*
 - Reduced cost
 - Increased impact

*Shukla PR, Dhar S (2011). Climate agreements and India: aligning options and opportunities on a new track. *Int Environ Agreements* **11**: 229–243.

Background

- Improved cook stove dissemination*
 - Slow deployment (despite apparent advantages)
- Bio combined heat and power (CHP)
 - sustainable biomass supply
 - increased project sustainability (climate and development)

* Vahlne N; Ahlgren EO (2014). Energy efficiency at the base of the pyramid – a systems based market model for improved cook stove adoption. *Sustainability* **6**: 8679-8699.

Aim

To present a post-Kyoto CDM framework model based on small-scale bioelectricity generation, which

- Provides not only CO₂ mitigation
- But also sustainability in a wider perspective
 - bioelectricity
 - sustainable biomass supply
 - deployment of improved cookstoves

Method

- Systems expansion
- Landscape approach

Model I

Starting point:

A small-scale bio-to-electricity project

Carbon impact:

Generated electricity is substituting ...

- Grid-connected case: coal-based generation
- Stand-alone/minigrid: diesel-based generation

➔ CO2 mitigation but other sustainability impacts?

Model II

Sustainability concerns:

- Job creation: biomass harvest and transport
- Biomass supply
 - Primary
 - Secondary (residues)
- Anything else?

System expansion

Other biomass-for-energy use:

- Cooking

Characteristics:

- Low energy conversion efficiency
- Severe health impacts
- Black carbon emissions

Options:

- Fuel switching
- **Improved cook stoves**

Improved cook stoves (ICS)

Today (cooking in most rural communities):

- 1 unit collected biomass used for cooking

After ICS adoption:

- only 0,5 unit used for cooking
 - Reduced collection effort (time savings)
 - With same collection effort: 0,5 unit biomass available for sale

ICS deployment

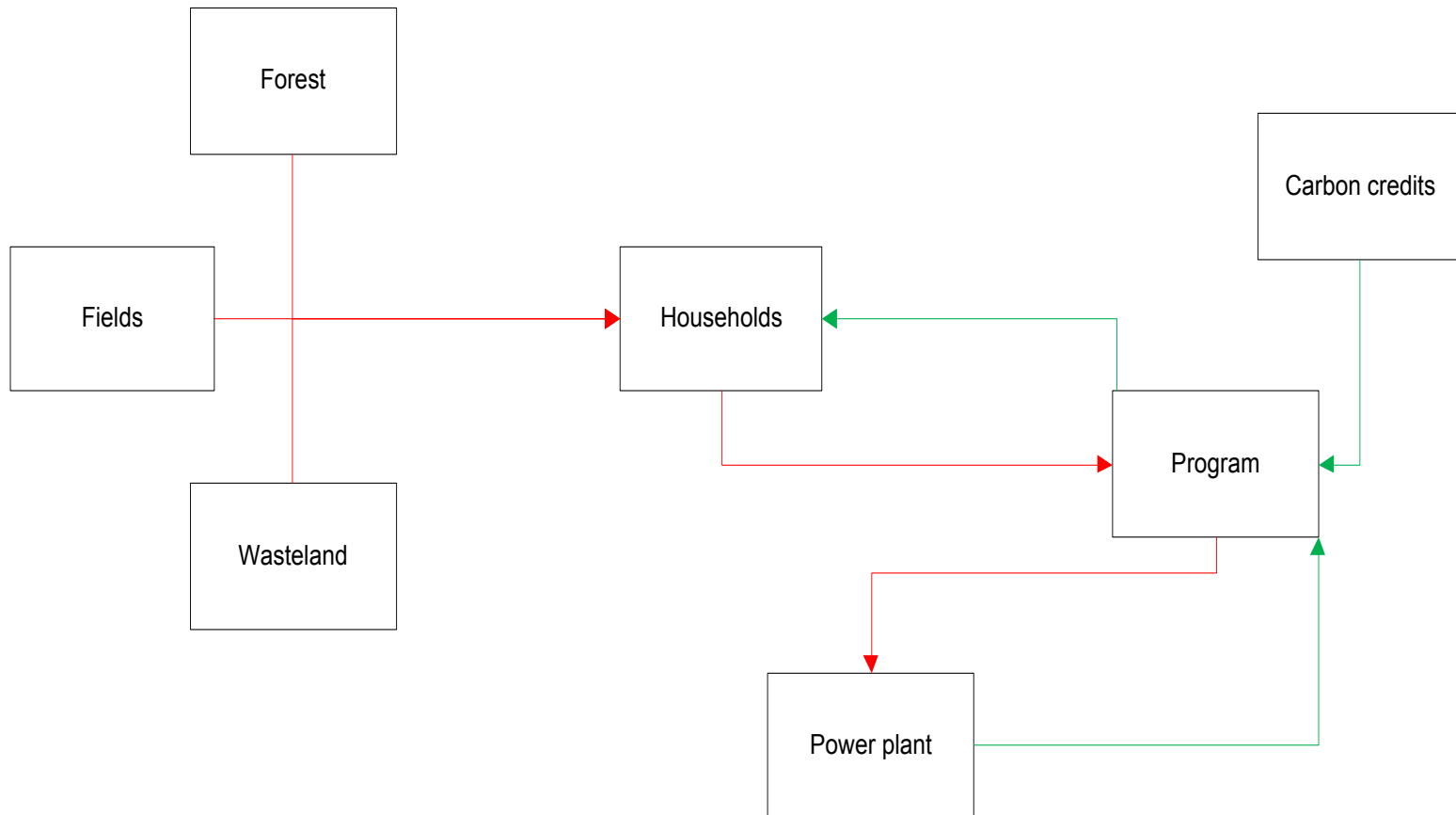
- Much better deployment success in urban/semi-urban areas
- When biomass is purchased (rather than collected)

→ **Market for biomass**

Model III

Creation of biomass market model through systems expansion?

Concept model



Results

- Bioelectricity
 - CO2 reduction
- Combined with ICS deployment
 - Black carbon reduction
 - Positive health impacts
 - Job for the poorest
- Only works if integrated

Conclusions

- Today, CDM biomass project and ICS deployment projects are NOT integrated
 - Bioenergy: climate driven
 - ICS: development driven
- **INTEGRATION** might imply considerable benefits
- Very simple model
 - Based on the literature

Critical issues

- Many barriers and hurdles to ICS deployment
 - Payments
 - Leakage
 - Limited to no-deforestation areas
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- Limited CDM sustainability

Thank you!