Sustainable biomass production and use

A compilation of lessons learned from the Netherlands Sustainable Biomass Programmes 2009-2013

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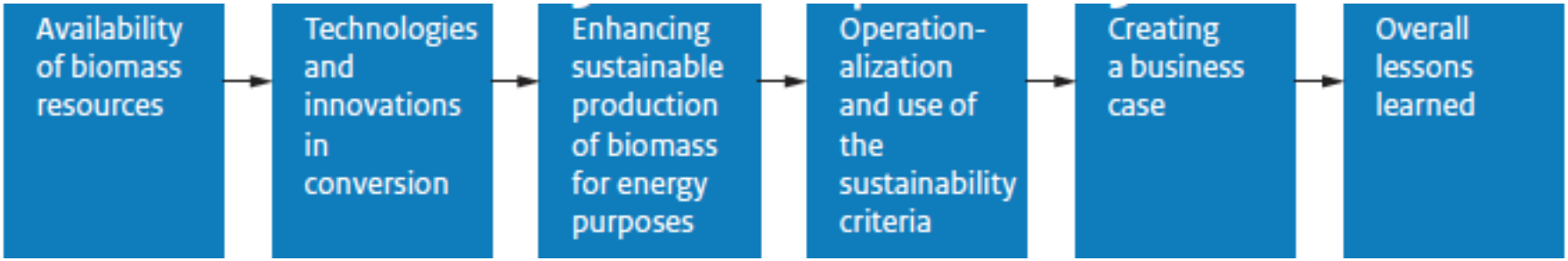
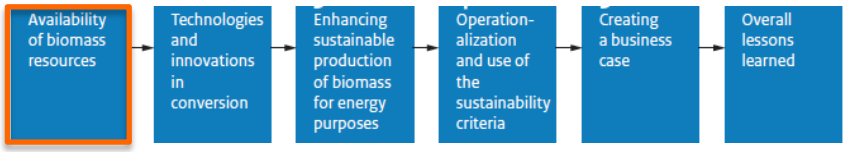
Introduction

- Based on a compilation of the overall lessons learned from the NPSB programme.
- Based on 37 projects and 30 assignments for additional research.
- Large diversity in projects (scope, biomass resource, country of operation).
- This presentation provides a selection of the highlights and recommendations



Creating availability of biomass for local use and for export



- Worldwide, there is **increasing demand**
  - Bioenergy (power, heat, biofuel), Cooking
  - Biobased Economy
  - Global Trading

- -> worldwide more biomass needs to be unlocked over time;

- Demand needs, technological developments and available resources change over time.
- With this in mind, it is recommended to policy makers to apply some flexibility in defining bioenergy targets for a country (volume, time) – especially for countries relying on import

Creating availability of biomass for local use and for export

Projects have successfully used **resource estimates** for:

- Select a promising area for a selected feedstock, or
- Selecting an area where large potential resources are available for exploration.

Project experiences:
There is a gap between what is potentially available and what amount of biomass meets at the end the criteria from the project developer or government
Example: land estimates biomass availability in Mozambique

- Project developers can use resource assessments as first screening tool for identifying suitable areas and to get insight into new, underexploited opportunities.
- In a next stage, it is key to determine the “wish list” and and its impact on availability on the ground.

Creating availability of biomass for local use and for export

Alternative, yet unexploited, resources for bioenergy production are available and show promising results.

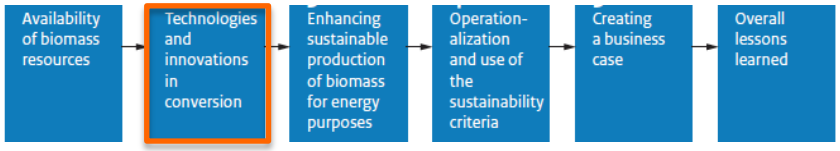
Project examples:

- Growing fast-growing grasses as reeds, bamboo and switchgrass (DBI01010, DBI02006).
  Promising potential, especially for use of marginal land
- Production of alternative agricultural crops – cassava (DBM02024)
- Making use of agroforestry systems (DMB02031)
  Part of these crops are harvested creating multiple benefits

Commodity-based biomass resources have been developed and are traded internationally in large volumes (soy in Argentina, sugarcane Brazil): Infrastructure is developed and chains are cost-efficient.

- Developing alternative biomass resources is promising **AND** challenging and requires additional effort and time compared to running business as usual.
- More insight is needed into the upscaling of production of biomass and how to realize this

Technologies, applicability of feedstock and innovations in conversion



Bioenergy technologies, both mature and innovative, have been introduced in new countries – this can generate a spin-off towards multiple sustainability impacts.

Project examples working that introduced conversion technologies in unexplored countries

Project	Operating country	Modification	End-use
Project (DBM02050)	Colombia	The trapiche underwent several technical, infrastructure and operational modifications. Efficiency improvements resulted also into higher yields of juice / unit sugarcane processed	Bagasse for own power production, surplus bagasse for alternative fuel uses.
Zebra project (DBM0104)	Innovative for Indonesia	Developed expertise and appropriate technology for capturing methane from palm oil production. The plant has become operational in March 2013.	Up to 70% of diesel consumption can be replaced by biogas
Project (DBM02021),	Indonesia	Research on how palm wastewater (POME) can be converted into aquatic biomass (algae). Research learns how much biogas can be produced from POME wastewater, combined with the use of algae for cleaning the waste. The algae can be used for feeding supplements	Biogas
Project (DBM02053)	Indonesia	First rice husk gasification plants at rice processing sites	Biogas
Project (DBM01012)	South Africa	Development biogas plant from manure: especially experiences in social innovation	Biogas
Project (DBM02045)	Mozambique	Specific biomass (bamboo) under African conditions, to prove applicability in the local context	Torrefaction

- The market can contribute to the introduction of unexplored technologies in countries by project development.
- New technologies should be embedded in and adapted to the local context. This requires a good understanding of local capacities and demand

Technologies, applicability of feedstock and innovations in conversion

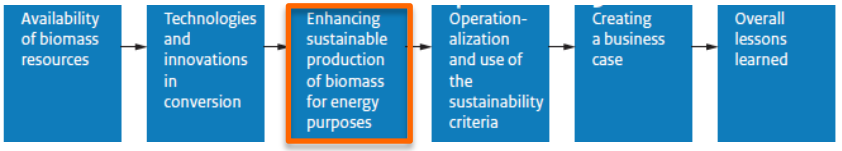
Alternative feedstocks have been tested successfully to use for conversion into bioenergy. Examples are the use of bamboo or reed pellets for bioenergy.

Project examples:

- Bamboo pellets, reed pellets, switchgrass (for heat and electricity)
- Also: Algae, sweet sorghum, cassava for biofuels use

➢ Adaption of conversion facilities and the development of quality standards for alternative feedstocks are needed to open new markets for yet unexplored, untapped feedstock resources.

Enhancing the sustainable production of biomass for energy purposes



Sustainable well-designed business models (such as agroforestry, integrated systems) are crucial to create a spin-off in the form of multiple direct and indirect benefits

Project example integrated systems

- Agroforestry project in Mozambique: reducing the famine risk for farmers by generating additional income.
- The sweet sorghum project in Indonesia: generating outputs for food-fuel and feed markets (income, contribution to food markets).
- The co-culture approach algae-shrimps in the project in Vietnam resulted into improvement in quality and yield of the shrimp crop, additional income and job generation

➢ It is worthwhile not merely to steer policies on the results (the impacts), but 'the road towards the result' by providing incentives for using sustainable, integrated business models

Enhancing the sustainable production of biomass for energy purposes

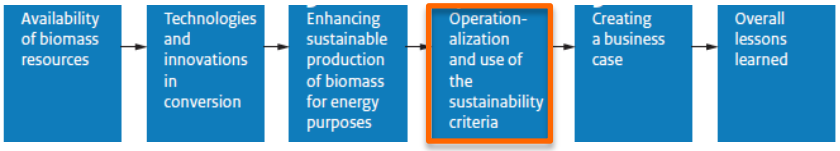
Biomass projects can enhance energy and food security.

Project example: Agroforestry in Mozambique

- At the closing of the project, 1,300 farmers planted a total of 216 hectares of trees.
- It helped people to get more varied diets, by the introduction of beans, tomatoes and other produce, contributing to food security.
- Many farmers started producing a surplus, which they sell in the local market.

- Consider biomass projects as a policy for rural development in a broader sense than renewable energy alone,
- Especially in areas where energy and food security are at risk, and key priorities for local communities

Guaranteeing sustainability: operationalization and use of the sustainability criteria



- Different parts of the world prioritize and use different criteria to ensure sustainability in their policy frameworks. These differences also exist between certification systems.
- In Europe, social criteria are not included as requirement in the EU-RED

Developed sustainability principles for biofuels in national frameworks in Mozambique and Mali

Country	Environmental	Socio-economic
Mali	• Reduction of GHG emission • Protection of land with high value in terms of biodiversity • Protection of soil, water and air	• Ensuring food security (incl. that production should not affect food prices in local market); • Securing / protecting the land tenure; • Assurance of socio-economic sustainability
Mozambique	• Environmental protection; • Agricultural productivity	• Legality; • Social responsibility; • Energy security; • Economic and financial viability; • Public consultation; • Food security

- Integrating sustainability requirements in policy frameworks and law allows government to have a mechanism in hand to regulate and enhance sustainability in economically viable chains.
- These should be careful designed to avoided a tendency towards the use of recognized certification systems that guarantee a lower level of assurance

Guaranteeing sustainability: operationalization and use of the sustainability criteria

- Experience in certification has grown
- Competition between certification systems as well
- Certification for biomass and bioenergy is in a learning curve, especially in / for:
  - *Unexplored countries*
  - *Alternatives feedstocks and end-uses*
  - *Specific producer (smallholder groups)*
  - *Development of new impacts (ILUC, carbon debt)*
- The NPSB program served as a capacity building catalyst – tools and guidance has been developed

- It is important to select a certification scheme at the start of a project to understand what type of data management system is needed to meet requirements, and to align this with day-to-day business
- Self-assessment tools are beneficial during project development and implementation – certification systems should enhance their use

Creating a feasible business case

The essence of a robust business case

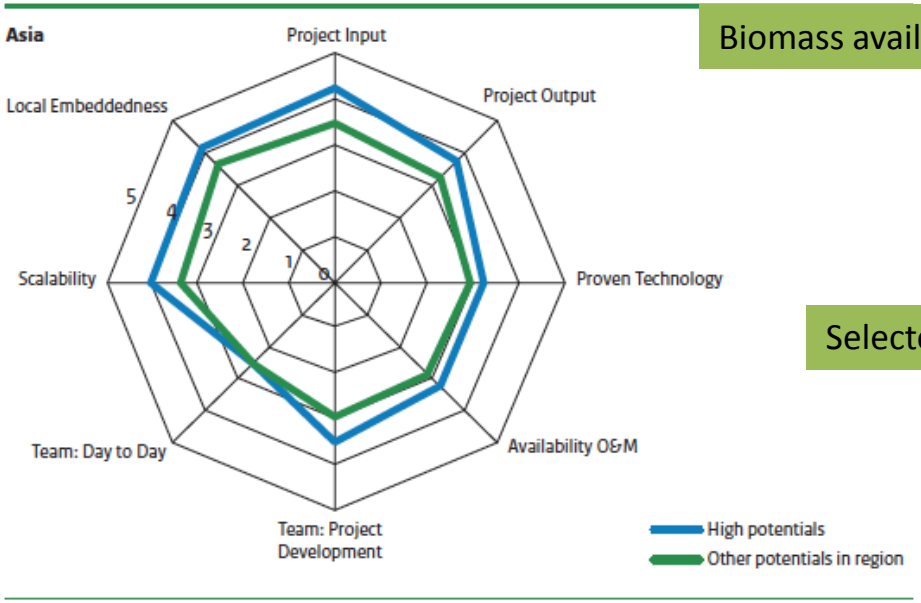
High potential projects can do a good job in all operating world regions on the condition that business is well designed and arranged during implementation.

Stakeholder consultation
Participation

Local partner

Strong project management,
Data structuring

Spider diagram showing performance of high potential projects in world regions (NL Agency, 2013c)



Biomass availability

Selected technology

- A structured approach of business development is recommended to adapt for changes, enhance funding opportunities, foresee possible risks and improve better practices.
- This requires an integrated approach towards sustainability (including economic performance) in day-to-day business.
- For alignment, certification systems should more recognize the importance of a feasible business case for being able to do so.

Creating a feasible business case

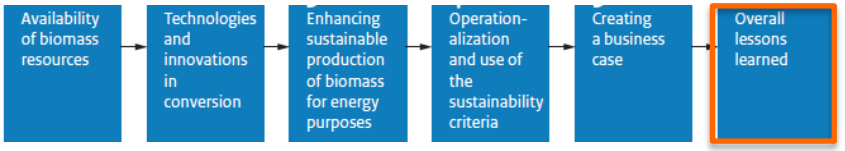
Innovative, best practice projects pave the road for transition towards more efficient and sustainable use of resources – this also requires additional effort – especially compared to "business as usual"

Some examples given:

- Scalability: likely to start small scale
- Local embeddedness:
  Project acceptance (new technology, new feedstock)
  Country of operation (presence of enabling environment, existence of procedures)
- Established technology: newer technologies have a higher risk profile (for financing)
- O&M:
  Level of investments, need for infrastructure development, research

- Best practice, innovative projects contribute to the transition towards more efficient and sustainable use of resources – and serve as example to trigger change.
- When this transition is desired, additional financial support is needed to bridge the gap in competition between innovative projects compared to "BAU" projects.
- This included support and investments in supply chain and infrastructure development.

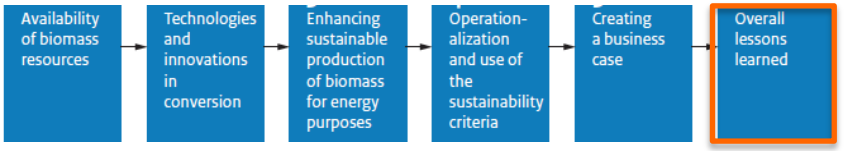
Key Conclusions



- Unlocking sustainable and affordable biomass requires a transition towards using resources more efficiently and creating alternative resources.
- The NPSB projects have shown that alternative biomass resources can be successfully unlocked, with multiple positive sustainability impacts.
- A transition towards more sustainable, innovative production models requires time, investment and effort.
- Although several of the pilot projects have not fully commercialized yet, they have created a spin-off in knowledge, business opportunities and replication and transfer of technologies. Time and patience is needed to see the full benefits, potential and spin-off from piloting best practice pilot projects.
- Lessons learned point to the need for integrated approaches with concerted action from multiple stakeholders.

One of the examples:
Creating an enabling environment and practical experiences on the ground should go hand in hand.

Key recommendations:



Concerted action is needed from all stakeholders.

Project developers
Fully integrate sustainability, certification, stakeholder consultation and capacity building as components in business development and implementation. These elements contribute to a project's feasibility and finance.

Governments
Design local, national and international policies and commitments to support a transition towards using and developing affordable, sustainable, innovative biomass resources (away from the "business as usual" commodities) in large volumes, and to facilitate for the investment and effort needed to do so

Knowledge institutions
More research (learning by doing) on optimized models for innovative sustainable biomass chains, in line with the concept of climate smart agriculture. More insight is especially needed on how to develop large-scale affordable and sustainable value chains

NGOs
Play a role in projects to articulate the voice of the local communities and to translate concerns on the grassroots level to government and policy level; This requires cooperation with governments and the market.

Thank you for your attention!

See also:
www.rvo/nl/biomass

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