IEA Bioenergy

Supporting How2Guide

Facilitating commercialisation and market deployment of environmentally sound, socially acceptable and cost-competitive bioenergy systems and technologies……

Kees Kwant, 27 November 2014

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- Netherlands Programmes Sustainable Biomass
- Case study sugar cane Brasil

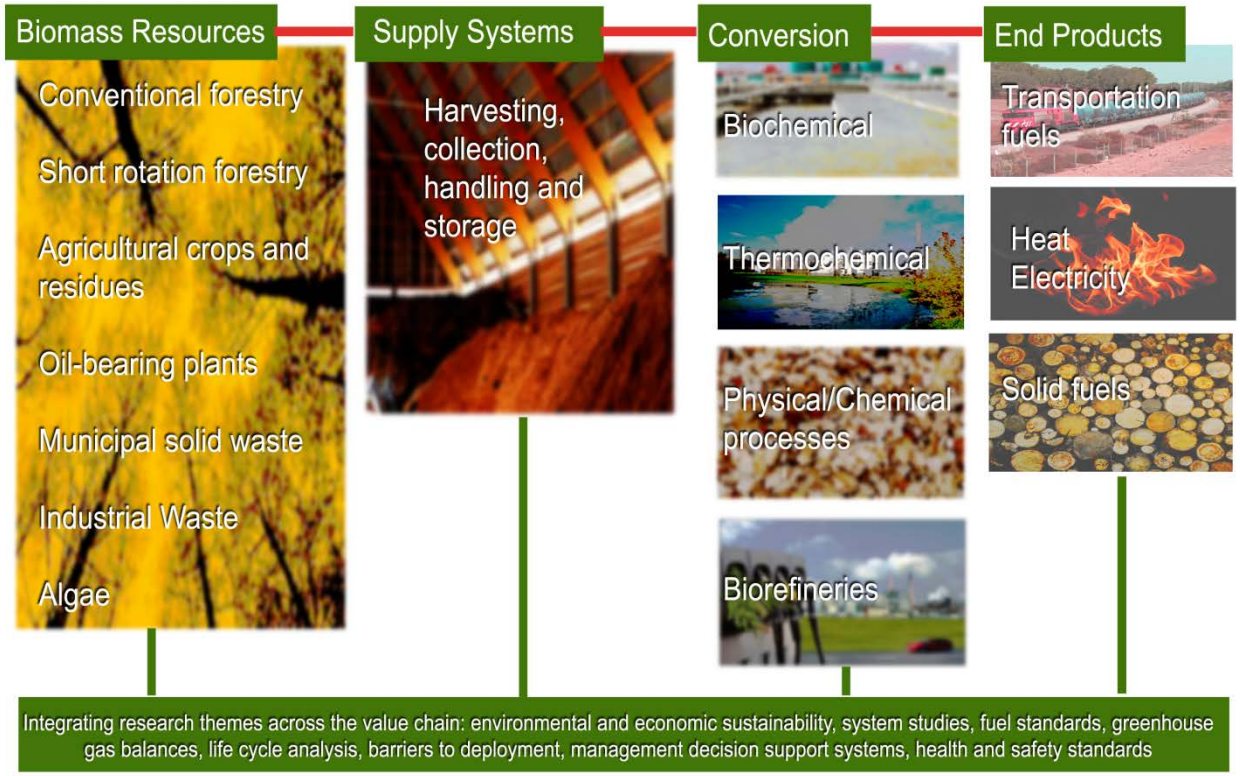
IEA Bioenergy……..

- Provides an international forum for sharing information and developing best practice on
  - Technology development
  - Non-technical barriers and issues
  - Regulatory and legislative issues

- Produces authoritative information on key strategic issues affecting deployment

Bioenergy

- ***involves a range of feedstocks and technology options that can produce heat, power and liquid fuels***

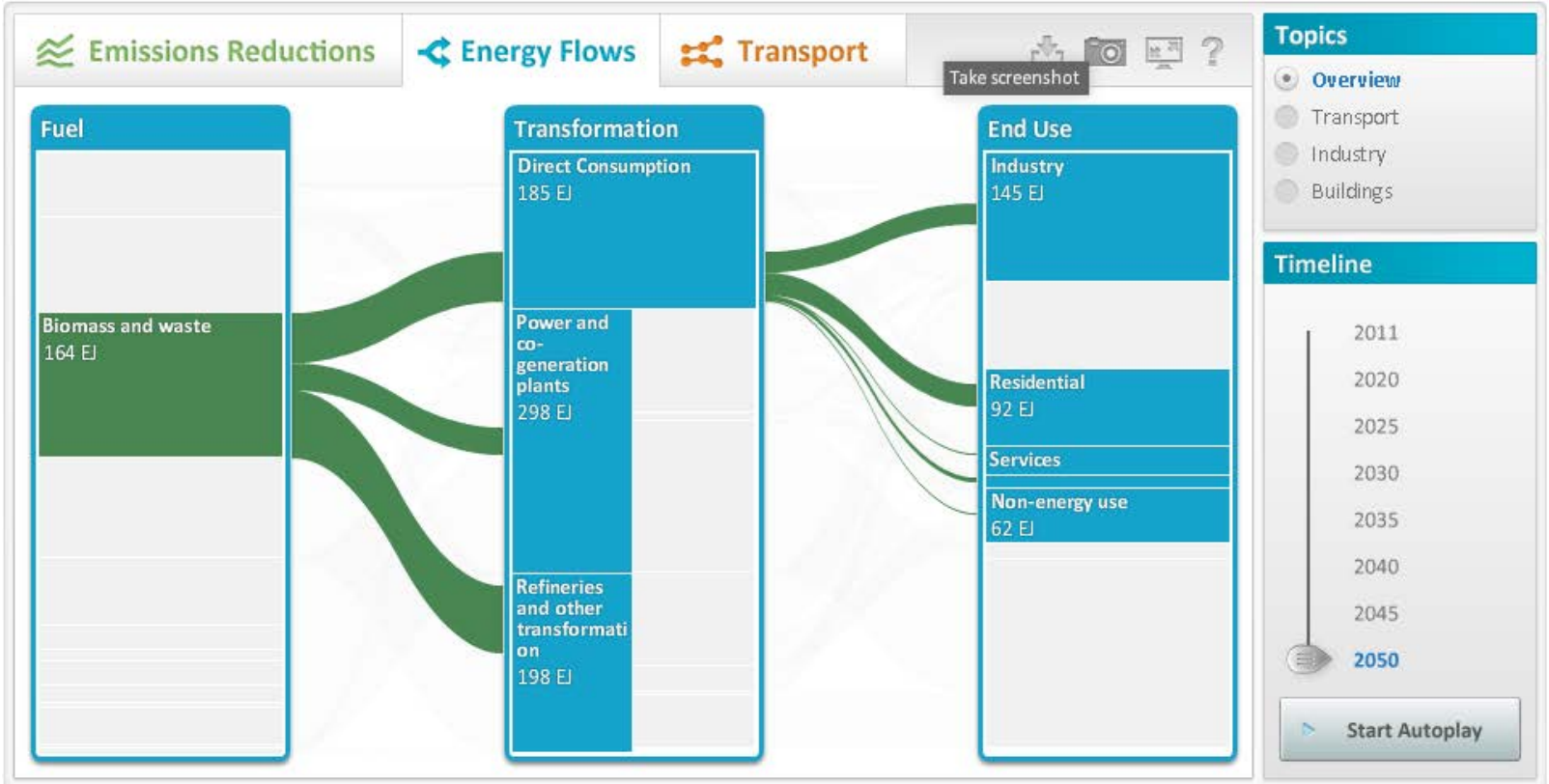


23 Contracting Parties

- Australia
- Austria
- Belgium
- Brazil
- Canada
- Croatia
- Denmark
- European Commission
- Finland
- France
- Germany
- Ireland
- Italy
- Japan
- Korea
- Netherlands
- New Zealand
- Norway
- South Africa
- Sweden
- Switzerland
- United Kingdom
- United States

IEA Bioenergy

Biomass expected to grow: ETP2014

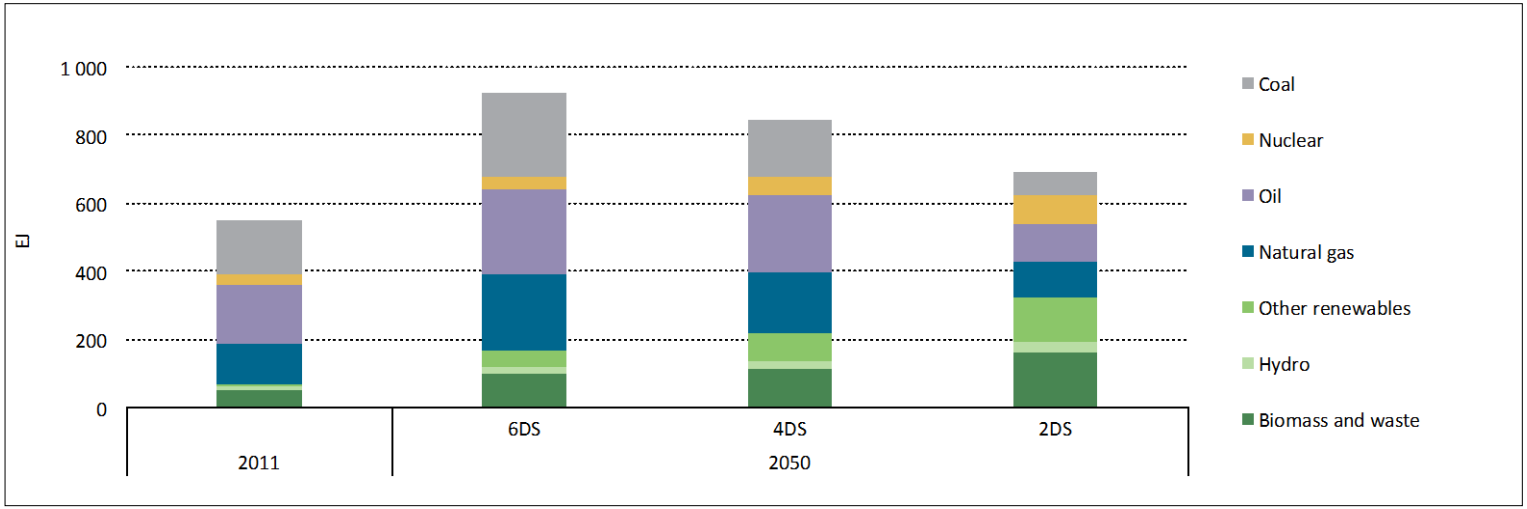


Biomass: 2010: 52 EJ -> 2050: 164 EJ

http://www.iea.org/etp/explore

Introduction…

Bioenergy has significant scope to make a greater contribution to secure and sustainable energy provision



Global modelling results - Total primary energy supply

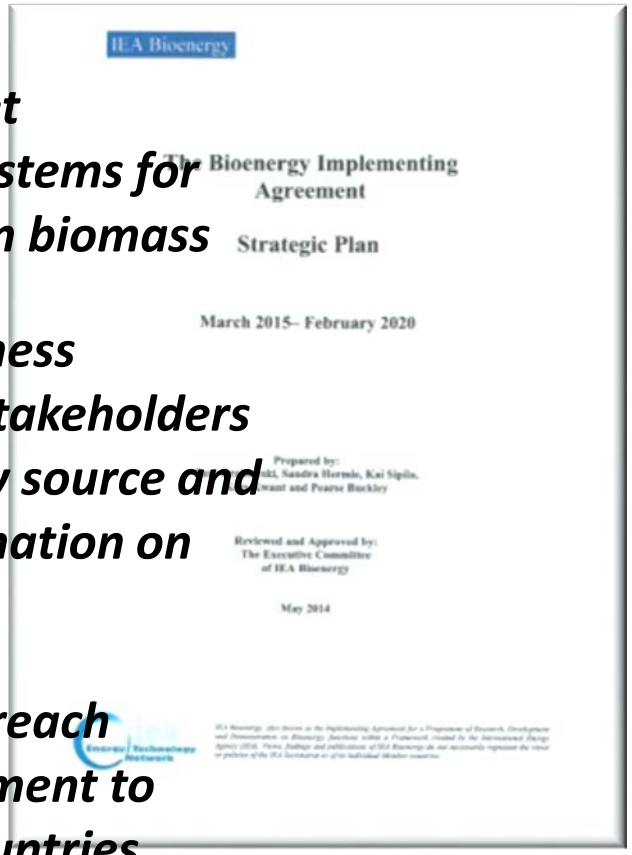
IEA Energy Technology Perspectives 2014

FRAMEWORK

- ***Bioenergy's significant potential to contribute to future global energy demand***
- ***Bioenergy's role in the transition to a low carbon economy***
- ***Bioenergy's role in the emerging bio-based economy***
- ***Bioenergy's intrinsic interlinkage with the growing demand for food, feed and fibre***

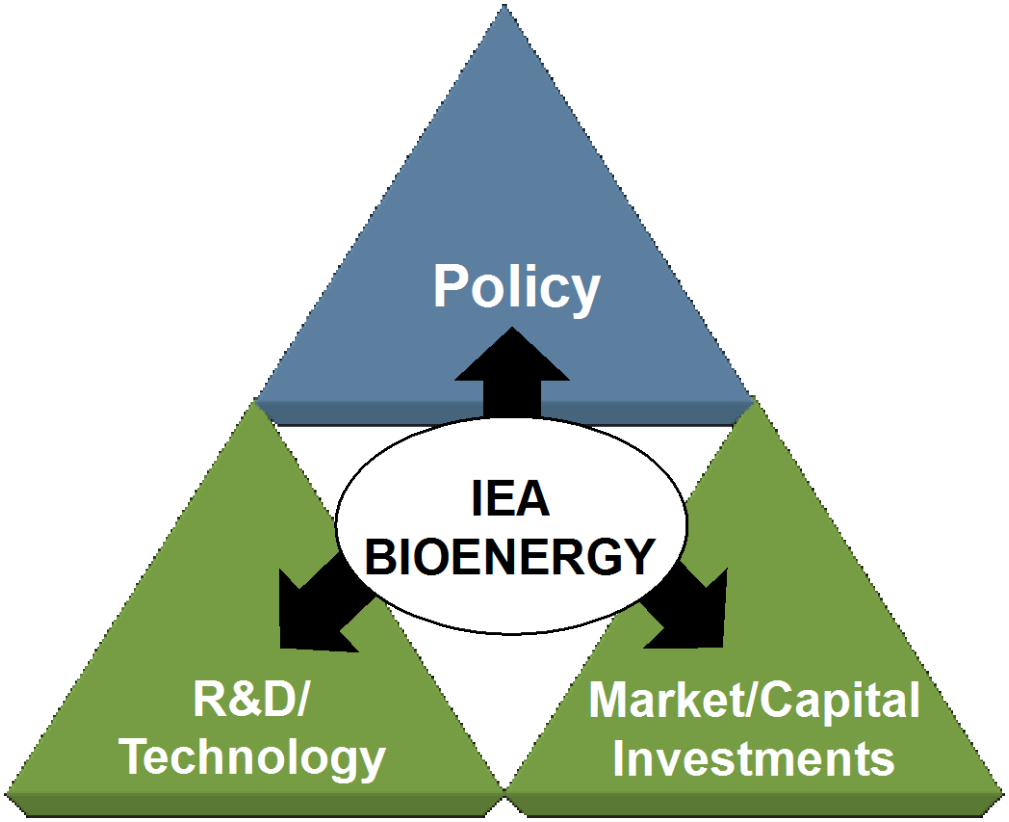
OBJECTIVES OF THE STRATEGIC PLAN

- ***Objective 1 - to promote the market deployment of technologies and systems for sustainable energy production from biomass***
- ***Objective 2 - to raise public awareness through communication with key stakeholders for the use of biomass as an energy source and to provide clear and verified information on bioenergy***
- ***Objective 3 - to strengthen the outreach efforts of the Implementing Agreement to involve interested new member countries, industry and multilateral organisations***
- ***Objective 4 - to increase the dissemination of information***



KEY ROLE OF IEA BIOENERGY

- ***Independent body to give clear and verified information on bioenergy***



FOCUS OF IMPLEMENTATION STRATEGY

- ***Technology development and deployment through Tasks' programmes and ExCo engagement***
- ***Strategic projects to address and resolve cross-Tasks' issues and broader topics***
- ***Expanded and more effective collaboration with other international bodies***
  - ***FAO***
  - ***GBEP***
  - ***IRENA***
  - ***SE4ALL***

Our Work: Tasks

Tasks

The work of IEA Bioenergy is structured in a number of Tasks, which have well defined objectives, budgets, and time frames.

Their activities include:

- Coordination of national RD&D programmes, information exchange and joint projects
- Task meetings, study tours and workshops
- Publications, reports, newsletters, websites
- Networking with industrial and other stakeholders

10 Tasks in three areas

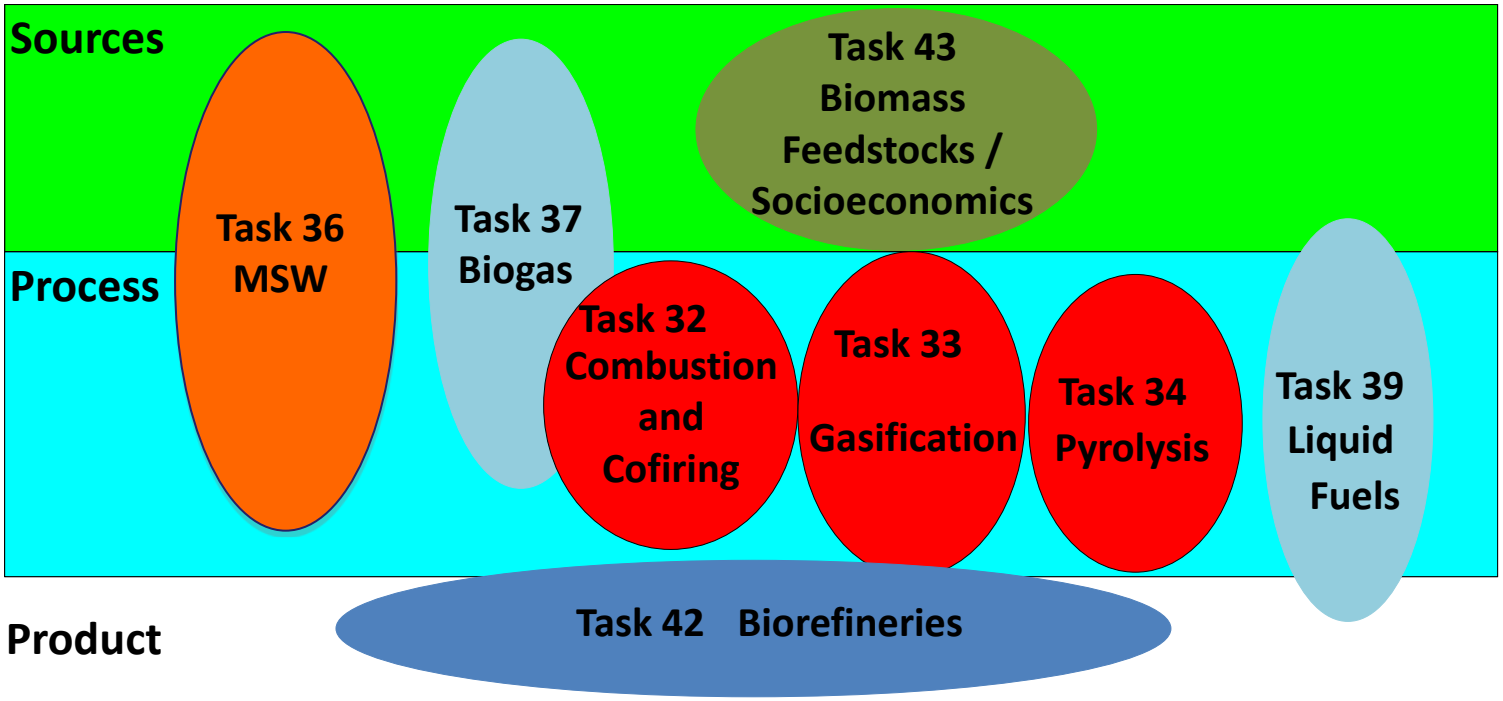
- **Feedstock**
  Forest and agricultural products, MSW and recovered fuels

- **Conversion**
  Combustion, gasification, pyrolysis, anaerobic digestion, fermentation, biorefineries

- **Integrating Research Issues**
  GHG balances, socioeconomic drivers, international trade, systems analysis

TASKS SUPPORTING IMPLEMENTATION

Task Structure



Ongoing Tasks:

32 Biomass Combustion and Co-firing
33 Thermal Gasification of Biomass
34 Pyrolysis of Biomass
36 Integrating Energy Recovery into Solid Waste Management
37 Energy from Biogas
38 Climate Change Effects of Biomass and Bioenergy Systems
39 Commercialising Conventional and Advanced Liquid Biofuels from Biomass
40 Sustainable International Bioenergy Trade: Securing Supply and Demand
42 Biorefining – Sustainable Processing of Biomass into a Spectrum of Marketable Biobased Products and Bioenergy
43 Biomass Feedstocks for Energy Markets

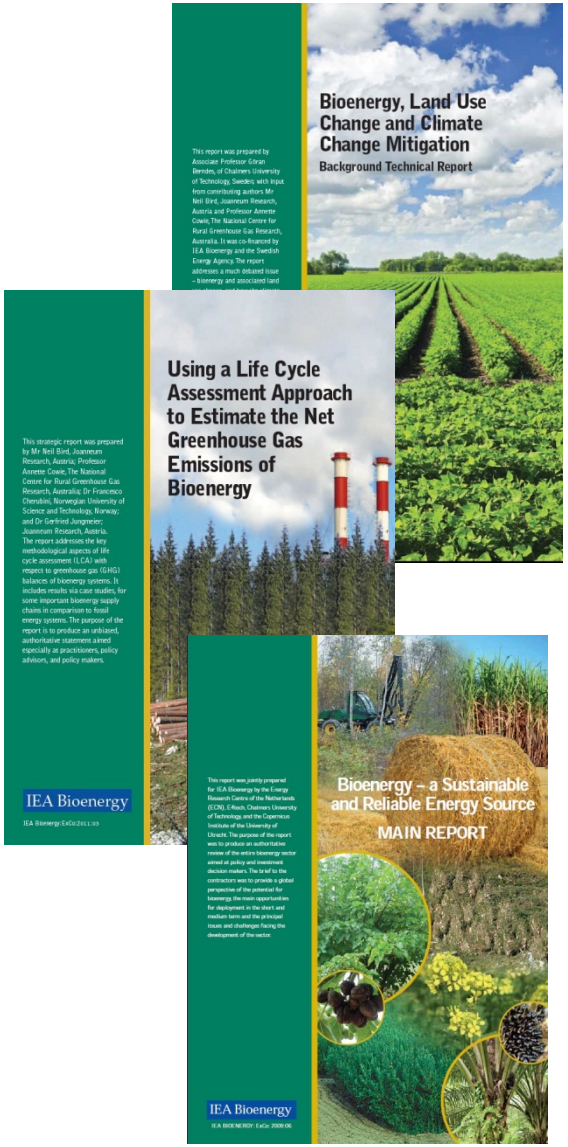
Added Value from Tasks in IEA Bioenergy:

- **promote the optimisation of the economic, environmental and social value of bioenergy through**
  - ***research and development collaboration***
  - ***identification of best practices in bioenergy policy***
  - ***pro-active communication with main stakeholders***

- **facilitate accelerated deployment of bioenergy globally**

Results:
Strategic Position Papers

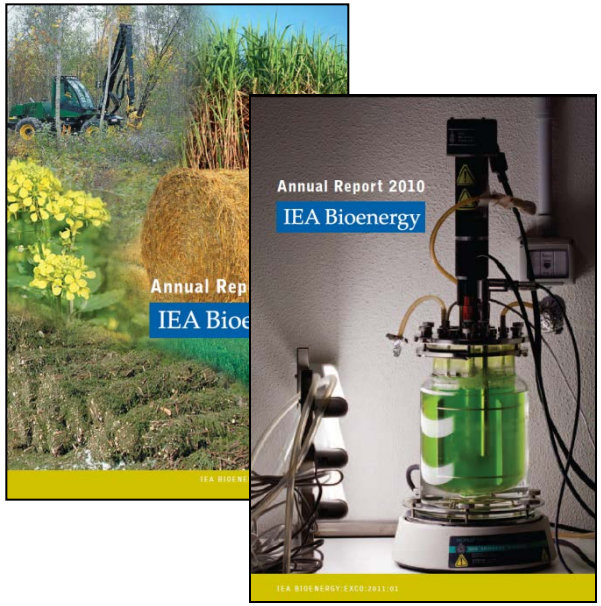
- Using a LCA Approach to Estimate the Net GHG Emissions of Bioenergy
- Bioenergy Land Use Change and Climate Change Mitigation
- Bioenergy - a sustainable and reliable energy source. A review of status and prospects
- Sustainable Production of Woody Biomass for Energy
- Municipal Solid Waste and Its Role in Sustainability
- Benefits of Bioenergy
- Potential Contribution of Bioenergy to Future World Energy Needs
- Synergies and Competition in Bioenergy Systems
- Gaps in the Research of 2nd Generation Transportation Biofuels



www.ieabioenergy.com

Annual Reports and Newsletters

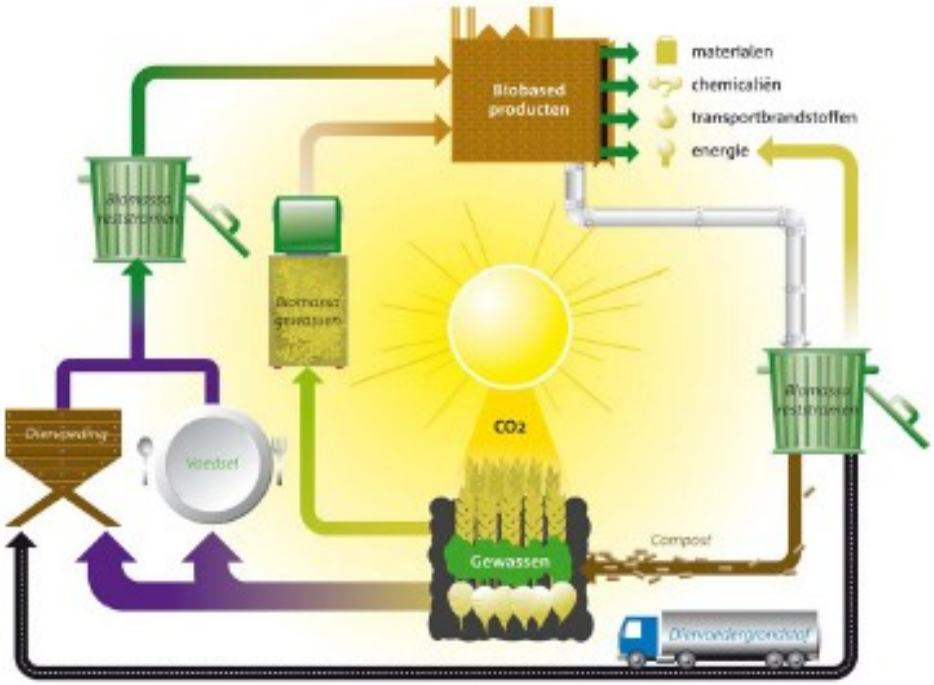
- The Annual Report (122 pp) contains a report from the Executive Committee and a detailed progress report on each of the Tasks. It also includes key information such as Task participation, Contracting Parties, budget tables, and the reports and papers produced by the Implementing Agreement. A feature article based on the work of a Task is also included.



- IEA Bioenergy News covers the most recent ExCo meeting and workshop. It also features an editorial from a Member Country, news from the Tasks recent publications and upcoming events.

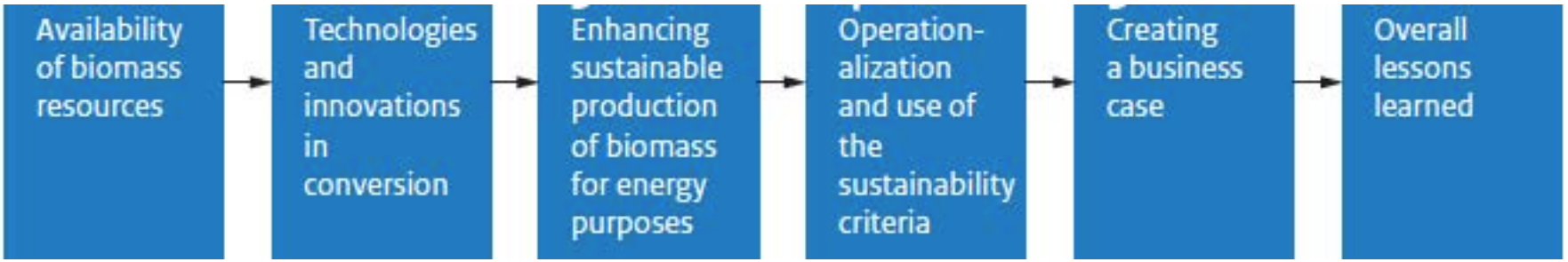
Netherlands Programmes Sustainable Biomass

- 2009 – 2014
- 40 pilots
- Sustainable Production
- Import
- Certification
- Closing the Cycles



Tools and Lessons from 40 pilot projects

- 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).
- highlights and recommendations



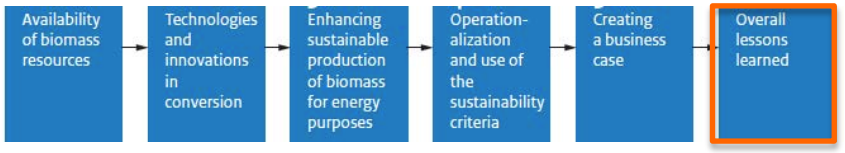
Guaranteeing sustainability: operationalization and use of the sustainability criteria

- 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

Key Conclusions



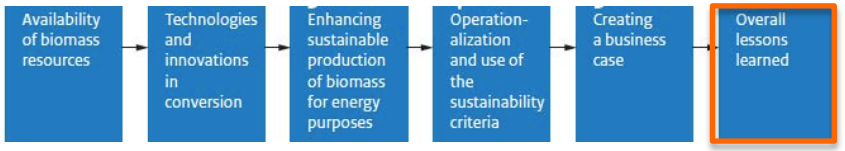
- Unlocking sustainable and affordable biomass is possible:
  - transition towards using resources more efficiently
  - creating alternative resources.
  - multiple positive sustainability impacts.
  - requires time, investment and effort.

- pilot projects created a spin-off in
  - Knowledge and tools
  - business opportunities
  - replication and transfer of technologies.

- Lesson:
  - 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.

Sustainable Biobased Approach

Integrated Food & Materials production

- Smart agriculture
- Increased production

Sustainable and Rural Development

- Local Resources and local use
- Tapping unused or abandoned land

Smart use of biomass

- Circular Economy, Cascading
- Biorefinery

Ref: http://www.sahyog-europa-india.eu/images/D2_3_Strategic_Advise_on_Biobased_Research_based_on_Sahyog_inventory_V3.pdf

Case study Brasil

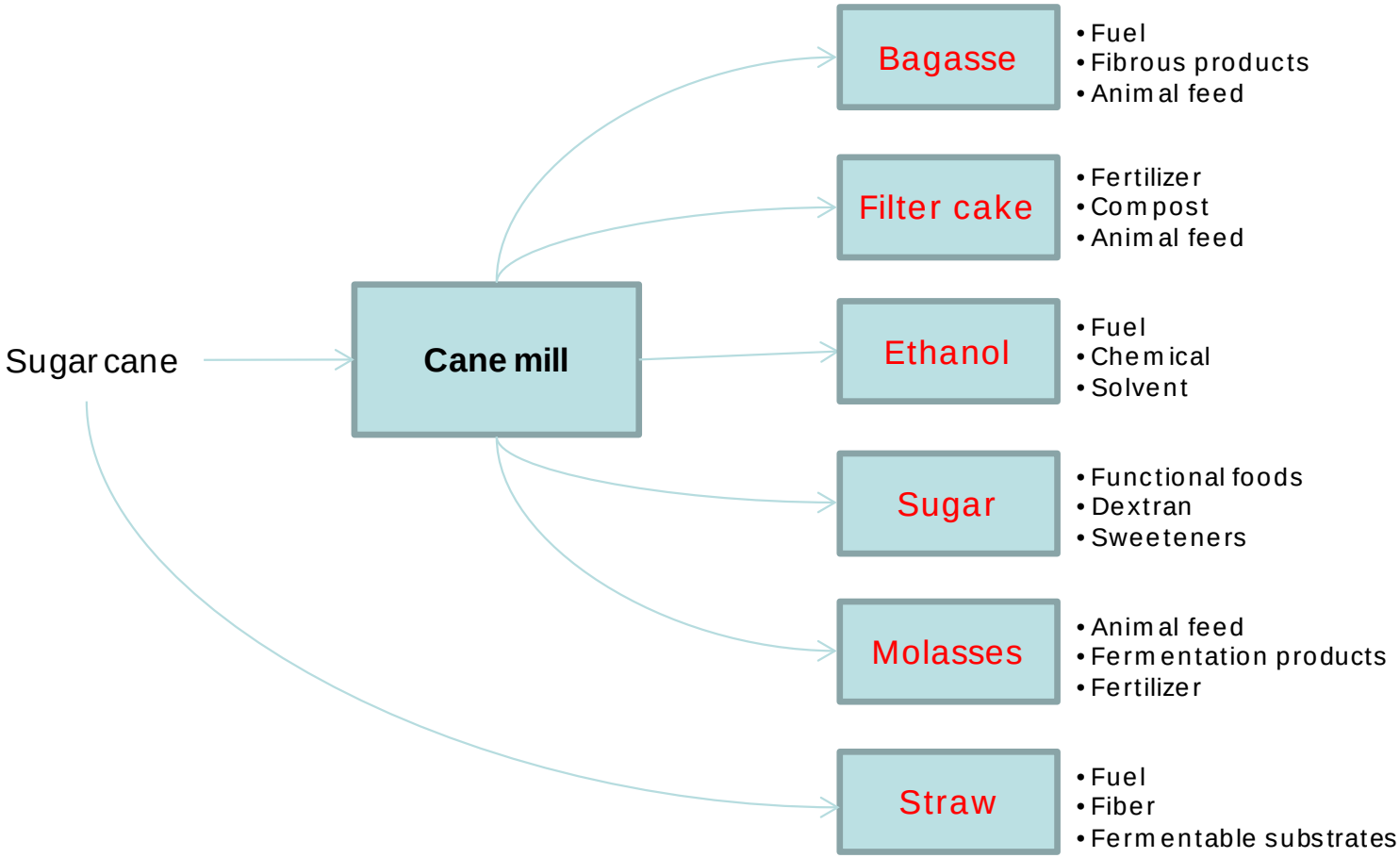
-Utilisation of Residues

-Closing Cycles

-Valorisation residues

-Economic Opportunities

Study: Opportunities to increase sustainability and output in cane sector in Brasil



Present situation of sugarcane bioethanol in Brasil

As far as we know…

-Still a large number of mills have a low efficiency of the power plant, due to limited access to grid

-Existing scheme to improve CHP in mills does not cover all plants

-Under utilisation of straw from the field

--> Potential to increase harvest and outputs from the mills and improve GHG balance

Potential Availability of excess biomass: Straw

With increased mechanical harvesting, the tops and leaves can be collected

- Straw = 30% by mass of the produced sugarcane
- Sustainable harvesting allows for 50% straw to be removed from field (need for nutrient recycling)
- Based on harvest season 2008/2009 (648 Mtonne cane)
- Assuming 100% green harvesting (no burning)
- **yield 97 Mtonne straw (mc 50%) or 870 PJ**

Possibilities of additional output from existing plants

By

1. improving efficiency of boiler/CHP
2. Process Optimisation (Pinch analysis)

Option	Biomass available	Mtonne Pellets	PJ
Efficiency improvements of boilers / CHP	107 Mtonnes bagasse	54	884
Efficiency improvements in process demand	75 Mtonnes bagasse	37	616

Or:

Second Generation bioethanol; 25 liter/ton cane ->

total additional 15 billion liter

Other applications of excess bagasse

- Bagasse can be used as a component in animal feed. Such synergies between food and energy production offer real measures for reducing the risk of indirect land-use change (ILUC)[1]

- Bagasse could be used as a heat source in other industrial sectors, such as the steel industry, which already uses charcoal for about a third of its energy needs (CGEE 2008).

- Sugargane biomass can also be used for high-value applications such as biochemistry, as is illustrated by the recent deal between European Solvay and the Brazilian National Bioethanol Science and Technology Laboratory (CTBE) to develop chemical routes for high-added value molecules => mills as bio-refineries

Other applications of excess bagasse

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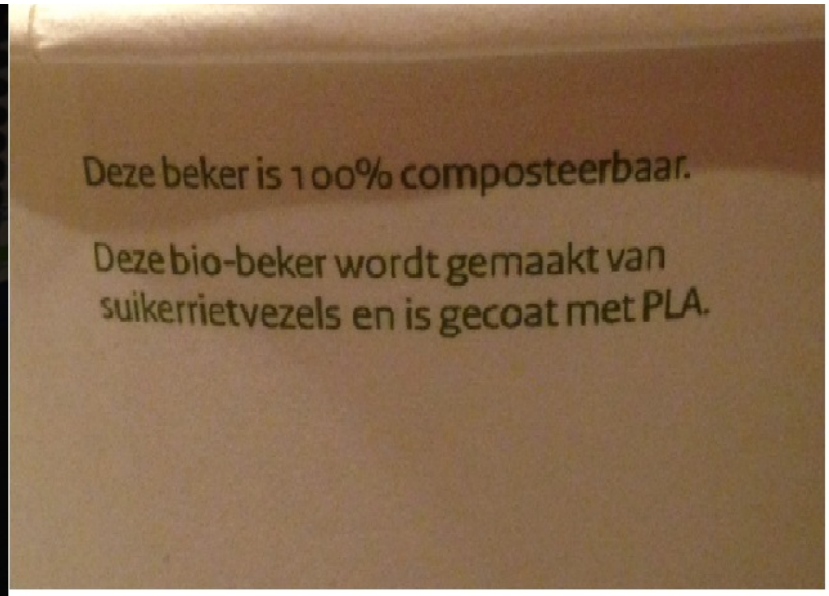
- 

- This cup is 100% biocompostable

  This coffee cup is made of
  Sugarcane fibres and coated with PLA

Conclusions

- Sustainable Bioenergy implementation needs clear guidance
- Results/evidence from different countries to be used
- IEA Bioenergy Implementing Agreement ready to contribute and use the How2Guide on Bioenergy

Thank you

Questions?

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