Making Bioenergy Sustainable

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Trade-Offs in the use of Biomass

Commercial use of biomass serves

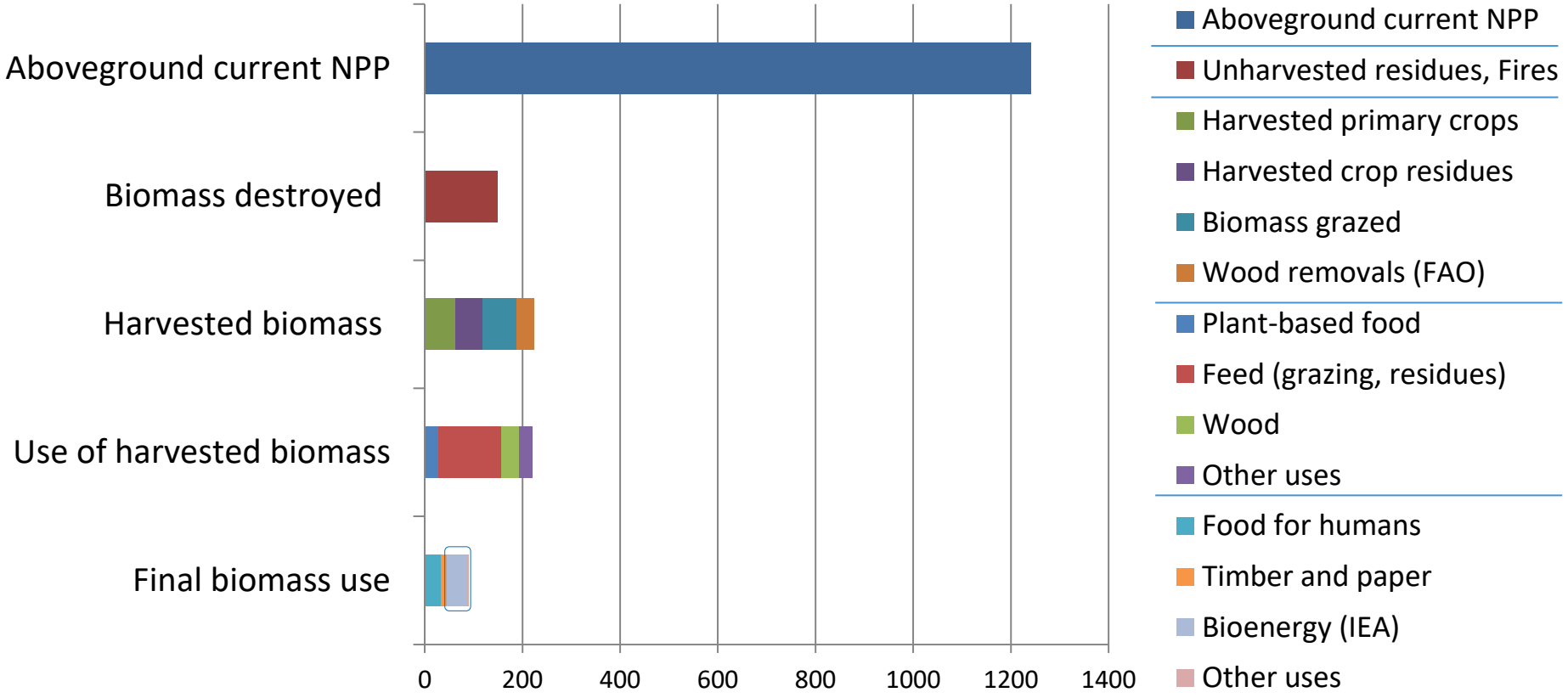
many needs

…. and it supports

global ecosystem functions

Global biomass potentials and Net Primary Production (NPP)

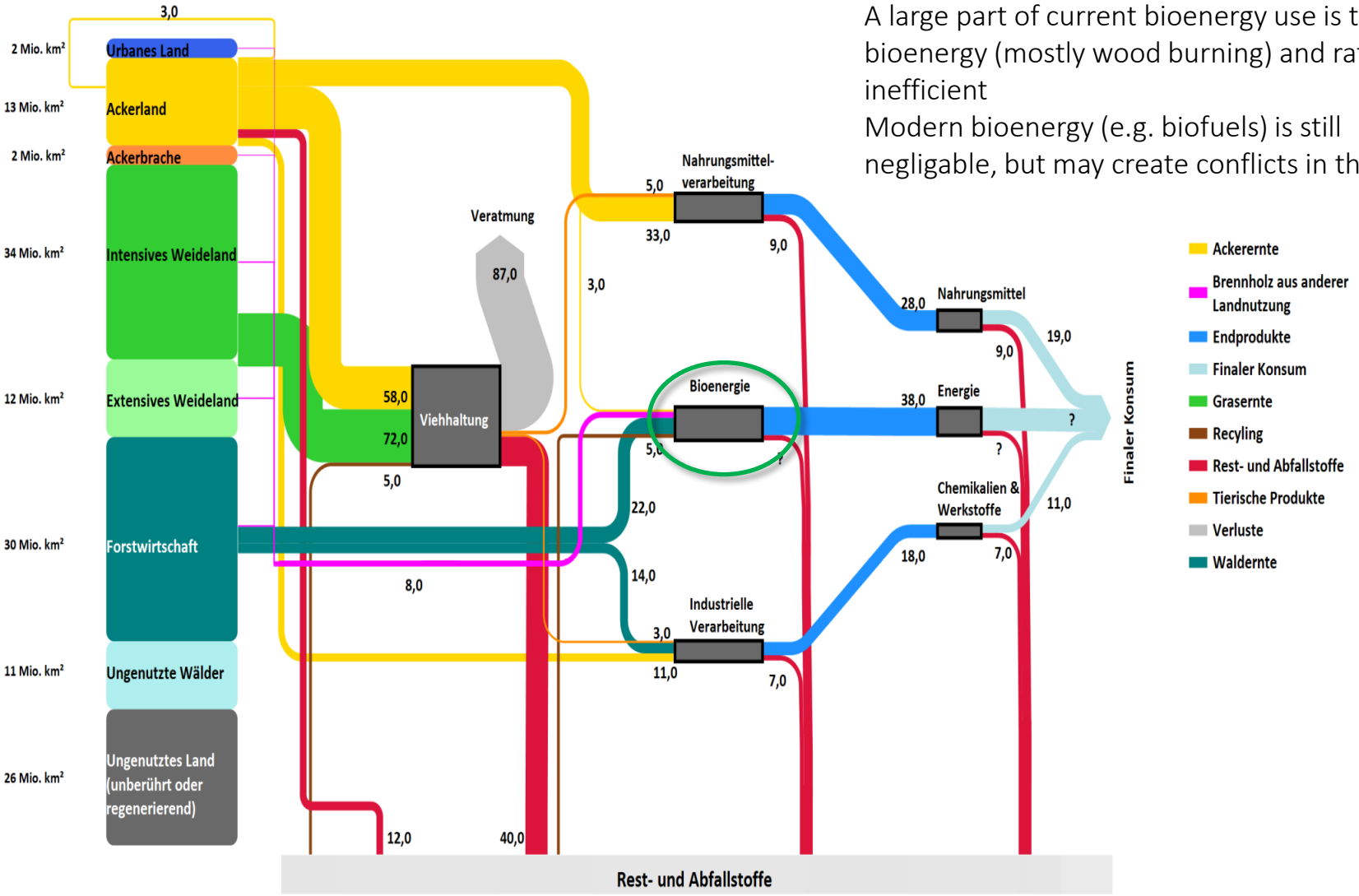
Global yearly biomass flows around 2000 in EJ/year



Source: IEA, 2012

Which ecosystems are used for bioenergy?

A large part of current bioenergy use is traditional bioenergy (mostly wood burning) and rather inefficient
Modern bioenergy (e.g. biofuels) is still negligable, but may create conflicts in the future



Quellen: Erb et al., 2007; Schneider et al., 2009; FAO, 2010; Wirsenius, 2003; Sims et al., 2006; Krausmann et al., 2008; FAOSTAT, 2012; Kummu et al., 2012

Bioenergy in the context of sustainability requires consideration of complex feedback effects

- Direct Trade-offs
  - Food
  - Ecosystem functions
  - Fibre uses
  - Alternative sources (waste/residues)
- Indirect Knock-on effects
  - Rural development
  - Overall land use
  - Distributional effects
- Welfare aspects
  - Income generation
  - Poverty reduction
- Ecologic sustainability
  - Biodiversity
  - Carbon sinks (forests, peat)

SDGs set the framework for sustainable economic activities
SDGs may be in conflict to each other:
Need for societal decisions about such trade-offs!

ISCC as an example for a practical introduction of sustainability certification of global supply chains:

ISCC principles – a balanced set of ecological and social criteria

Principle 1: Protection of Biodiverse and Carbon Rich Areas

Principle 2: Good Agricultural Practice

Principle 3: Safe Working Conditions

Principle 4: Compliance with Human, Labour and Land Rights

Principle 5: Compliance with Laws and International Treaties

Principle 6: Good Management Practices and Continuous Improvement

SUSTAINABLE DEVELOPMENT GOALS

ISCC PRINCIPLE 1 & 2: Protection of land with high biodiversity value or high carbon stock. Production in an environmentally responsible way including the protection of soil, water and air:

- SDG7 Affordable and clean energy
- SDG13 Climate Action
- SDG14 Life below water
- SDG15 Life on land

ISCC PRINCIPLE 3: Safe working conditions:

- SDG3 Good health and well-being
- SDG6 Clean water and sanitation

ISCC PRINCIPLE 4: Human rights, labour rights and land rights:

- SDG1 No poverty
- SDG2 Zero hunger
- SDG4 Quality Education
- SDG5 Gender equality

United nations conference on climate change
COP21/CMP11

GOVERNMENTS AGREED:

- A long-term goal of keeping the increase in global average temperature to **well below 2°C** above pre-industrial levels
- To aim to limit the increase to **1.5°C**, since this would significantly reduce risks and the impacts of climate change
- On the need for **global emissions to peak as soon as possible**, recognising that this will take longer for developing countries
- To undertake **rapid reductions thereafter** in accordance with the best available science

➢ GHG requirements are already implemented in ISCC. Detailed methodology for international supply chains in place

Tracebility as a crucial element of global supply chains

Potential agricultural and forestry feedstocks for bioenergy

Examples

Soy

Rapeseed/
Canola

Palm

Sunflower

Cereals

Corn

Sugarcane

Sugarbeet

Wood

Cotton

Shea Nuts

Camelina

Waste and residue-based supply chains can avoid land use conflicts, but also feedstocks of non-biological origin

Examples

Waste and processing residues

UCO

Landfill gas

Tall oil

End-of-life tires

Municipal solid waste / mixed plastic waste

Crude glycerine

Renewable non-bio feedstocks

Power-to-Gas

Power-to-Liquid

CO2

Forestry / agricultural crop residues

Forestry residue

Husks

Straw

Support, encouragement, and regulation are crucial elements for farmers and companies to ask for sustainability certification

Examples

Energy

- Renewable Energy Directive (RED) and Fuel Quality Directive (FQD) of the European Union
- Japanese Government
- Liquid Fuel Supply Regulation of Queensland
- Participation in CORSIA for sustainable alternative jet fuels
- AIREG – Aviation for renewable energy in Germany

Industrial Applications

- Der Blaue Engel
- Textile Exchange's "2025 Sustainable Cotton Challenge"
- Sustainable supply of raw materials for the industrial use of biomass (INRO)
- Green Deal, sustainability criteria for biobased polymer products

Food

- Sustainable Agriculture Initiative (SAI) Platform
- Coca Cola's Sustainable Agriculture Guiding Principles
- Retailers' Soy Group (RSG) requirements for responsible soy of the Consumer Goods Forum
- Unilever Sustainable Agricultural code
- Diageo's Sustainable Agricultural Sourcing Requirements

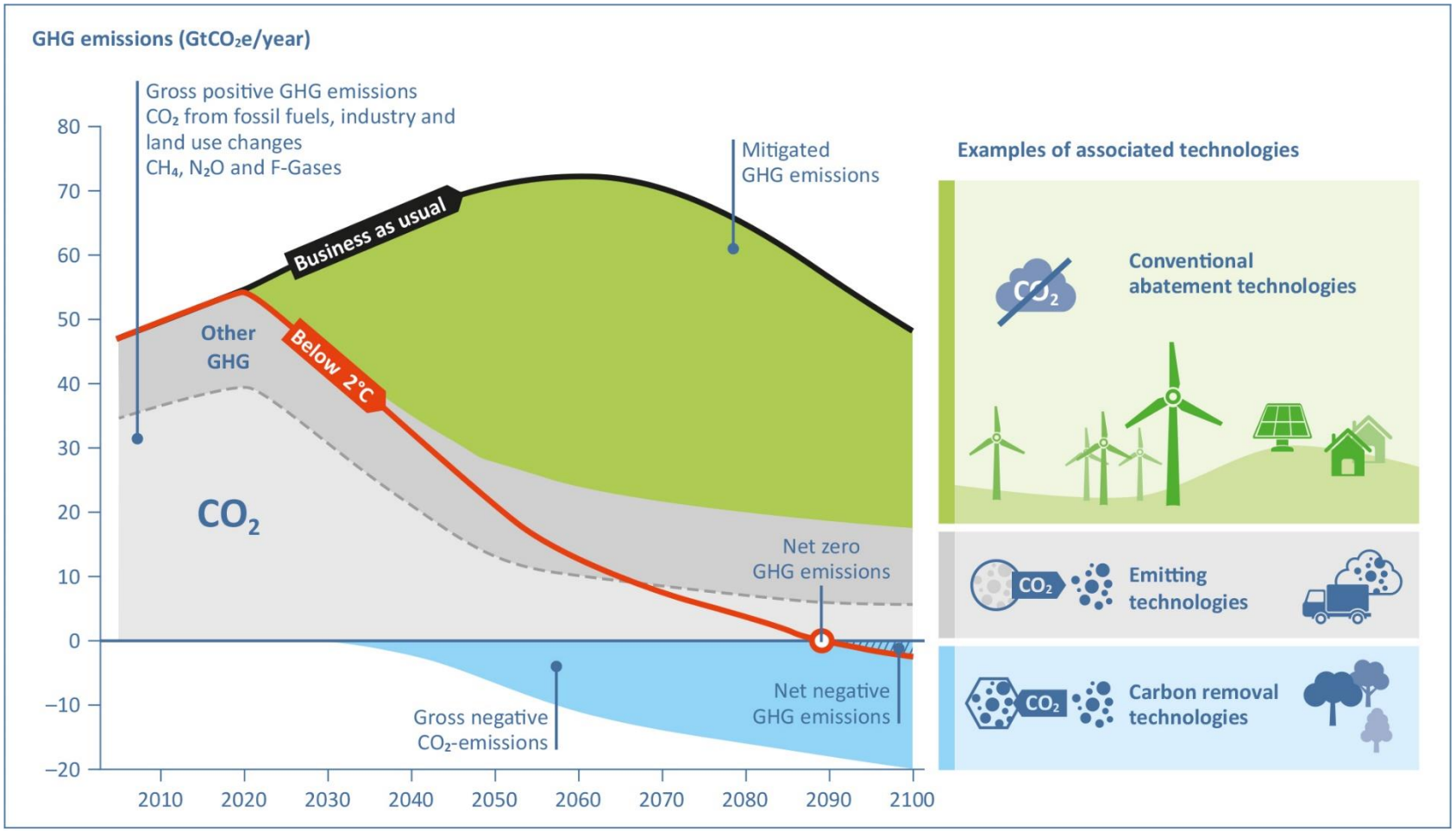
Feed

- ISCC in line with FEFAC Soy Sourcing Guidelines
- Soy Network Switzerland
- Soy sourcing supply chains of Mars petcare
- Soy sourcing supply chains of ADM

Others

- Responsible sourcing practices in areas that are exposed to high risk of deforestation

Future role of bioenergy for net-zero and net-negative GHG emissions



BECCS: Bioenergy and Carbon Capture and Storage

Ethanol plants with CC already in operation and storage technology ready with running demonstration projects

Can replace inefficient traditional bioenergy use!

Lessons for Sustainable Bioenergy

- Bioenergy will play an increasingly important role in future energy markets and in GHG-reduction (e.g. Sustainable Aviation Fuels (SAF), BECCS)
- But it needs to meet sustainability requirements in order to become effective in meeting societal goals
- Bioenergy along the entire supply chain is relevant for sustainability
- Latin America has large land resources and a climatic conditions for above average GHG-savings (e.g. ethanol, palmdiesel, etc.)
- Trade-offs between different sustainability objectives (ecologic, social, economic) need to be considered carefully
- Certification of the bioenergy supply chains is a transparent and cost effective way to establish a sustainable bioenergy sector
- Governments play a crucial role in making certification effective and wide-spread

Many thanks for your attention!

Backup

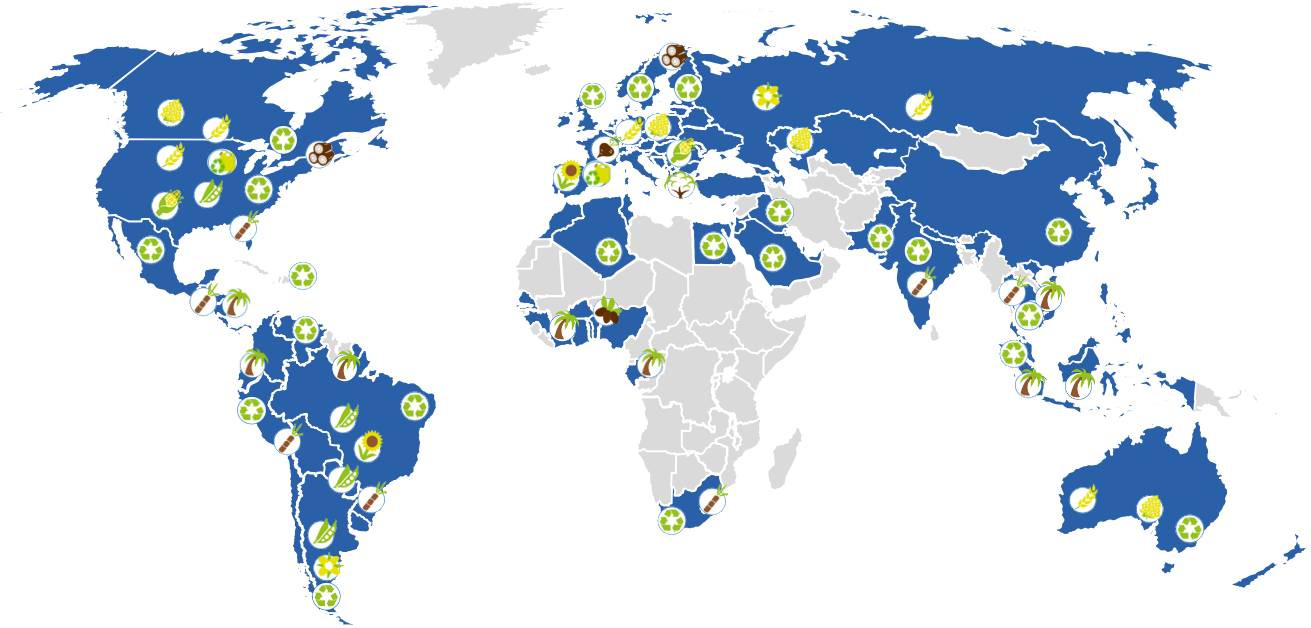
ISCC is a well established and credible certification standard

System users in 100+ countries	26,000+ certificates 5,000+ system users	32 certification bodies 500+ ISCC trained auditors	Training Programme (93 Trainings so far for audits and system users)
Innovative tools and procedures to facilitate audits	ISCC International Sustainability & Carbon Certification		Use remote sensing to verify land use change
6 Voluntary add-ons to address specific customer requirements	Stakeholder dialogue: 153 ISCC Association members	Discussion platform with 4 Regional and 3 Technical Committees	Integrity Programme 3 auditors

Over 4,000 ISCC certificates in more than 100 countries are currently valid

All Feedstocks, including:

- Camelina
- Canola / Rapeseed
- Cereal
- Corn
- Cotton
- Palm
- Shea
- Soy
- Sugarbeet
- Sugarcane
- Sunflower
- Waste & Residues
- Wood
- Mixed Plastic Waste



All Markets:

- Food
- Feed
- Energy
- Industrial applications

Regular impact assessment conducted by ISCC

- Critical review of **what has been achieved**, and **what is the impact** on the ground
- Definition of the ISCC **Theory of Change**
- Gathering of data about impact is challenging
- Assessment includes sample **data taken from audit reports** and a **survey with certification bodies**
- Improvements in the ISCC system will provide **more digitally accessible data** about impact
- Continuous **improvement** process with **involvement** of stakeholders
- ISCC will **report** about impact **on a regular basis** in the future