Sustainability requirements for the Bio-Based Economy

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Two documents

**Commission Communication COM(2012) 60**

«Innovating for Sustainable Growth: A Bioeconomy for Europe»
Bioeconomy Strategy and Action Plan (available in all EU languages)

**Accompanying Staff Working Document SWD(2012) 11**

- Section A: Background to the Bioeconomy Strategy and Detailed Action Plan
- Section B: Estimating the impact of EU level research funding and better policy interaction in Bioeconomy
The Bioeconomy
Using research and innovation to produce renewable raw materials sustainably in **agriculture, forestry, fisheries and aquaculture**...

...and to process renewable raw materials into value added products in the **food, bio-based and energy industries**.
The Bioeconomy...

- Promotes sustainable production of renewable resources from land and sea and their conversion into food, bio-based products, biofuels and bioenergy.

- Encompasses the sectors of agriculture, forestry, fisheries, aquaculture, food and pulp and paper, as well as parts of the chemical, biotechnological and energy industries.

- Provides and protects public goods, such as clean air and water, fertile and functioning soils, landscapes, sustainable marine ecosystems and biodiversity, and addresses social needs.

- Applies a wide array of sciences (e.g. life sciences, agronomy, ecology, forestry-, fisheries- and social sciences) and enabling and industrial technologies (e.g. biotechnology, nanotechnology and ICT) with local and tacit knowledge.

- Contributes to addressing major societal challenges (e.g. food security, climate change, limited natural resources), economic growth and job creation.
Horizon 2020

Commission proposal for a 80 billion Euro research and innovation funding programme (2014-20)

A core part of Europe 2020, Innovation Union & European Research Area:

- Responding to the economic crisis to invest in future jobs and growth
- Addressing peoples’ concerns about their livelihoods, safety and environment.
- Strengthening the EU’s global position in research, innovation and technology
Horizon 2020
Common Strategic Framework for
Research and Innovation

Europe 2020 priorities

International cooperation

Shared objectives and principles

European Research Area

Tackling Societal Challenges
- Health, demographic change and wellbeing
- Food security, sust. agri. and bioeconomy
- Secure, clean and efficient energy
- Smart, green and integrated transport
- Supply of raw materials, resource efficiency and climate action
- Inclusive, innovative and secure societies

Creating Industrial Leadership and Competitive Frameworks
- Leadership in enabling and industrial technologies (Biotechnology,...)
- Access to risk finance
- Innovation in SMEs

Excellence in the Science Base
- Frontier research (ERC)
- Future and Emerging Technologies (FET)
- Skills and career development (Marie Curie)
- Research infrastructures

EIT will contribute to addressing these challenges

Simplified access

Common rules, toolkit of funding schemes

Coherence with other EU and MS actions
Sustainable and competitive bio-based industries

Aim
Promotion of low carbon, resource efficient, sustainable and competitive European bio-based industries.

Fostering the bioeconomy by:

- Transforming conventional industrial processes and products into bio-based resource and energy efficient ones;
- Developing integrated biorefineries;
- Opening new markets (standardisation, regulatory and demonstration/field trial activities).
Bio-based industries value chains

- Agriculture
- Forestry
- Pulp Paper
- Marine
- Biotech Industry/Enzymes
- Chemical Industry
- Biorefineries
- Food
- Bio-based products
- Biofuels/energy

RAW MATERIAL → Biorefineries → Bio-based products

END PRODUCT
Vision

Developing an EU bioeconomy founded on locally sourced and produced renewables with biorefineries at the heart of the initiative

Strategic objectives

- Ensuring competitive feedstock supplies
- Leadership in conversion processes for complex feedstocks
- Enabling smart use of biomass for bioproducts and bioenergy
- Cross-sectoral integration of industrial areas
- Accelerating development of emerging markets for biobased products
- Addressing the innovation gap
Dependence on fossil resources and climate change

- Current oil consumption forecasted to grow by 25% until 2030
  (Source: OPEC World Oil Outlook 2011)

### 3rd generation biofuels:
- will produce **15 to 300 times** more fuel by km²
- will be harvested **20 to 200 times faster** than conventional crops for 1st and 2nd generation biofuels.

### Bio-based plastics:
- will contribute up to a **50% decrease** in terms of energy consumption and
- up to **67% savings** of CO₂ emissions.

### Standard Greenhouse Gas Reduction by type of biomass

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<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Grain straw</td>
<td>85</td>
<td>Fisher-Tropsch Cellulose</td>
<td>95</td>
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<tr>
<td>Wood waste</td>
<td>74</td>
<td>Algae</td>
<td>90</td>
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<tr>
<td>Sugar cane</td>
<td>71</td>
<td>Sunflower seeds</td>
<td>51</td>
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<tr>
<td>Grown wood</td>
<td>70</td>
<td>Rape seed</td>
<td>38</td>
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<tr>
<td>Sugar beet</td>
<td>52</td>
<td>Soy</td>
<td>31</td>
</tr>
<tr>
<td>Corn (EU produced)</td>
<td>49</td>
<td>Palm oil</td>
<td>19-56</td>
</tr>
<tr>
<td>Grain</td>
<td>16-69</td>
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Source: www.energystrategy.it
Environmentally-compatible biomass potential
How much bioenergy can Europe produce without harming the environment, EEA 2006

- Short-term: largest potential for bioenergy comes from the biowaste with around 100 MtOE
- Long-term: Bioenergy crops from agriculture provide the largest potential
- Forestry is able to provide around 40 MtOE
Biotechnology: Key enabling and green technology

Uncoupling economic growth from negative environmental impacts

Application in sectors: chemicals, plastics, food processing, textiles, pulp and paper, mining, metal refining and energy.

Results in some cases in:

- Reduced capital and operating costs by 10-50%
- Decreased energy and water use by 10-80%
- Reduced petrochemical solvents by 90% or eliminated completely

Projected bio-based chemicals in 2025’s production

- More than 5% commodity
- Almost half of speciality and fine chemical
- More than 15% polymer

Source: OECD 2001

Source: IB 2025, BERR 2009
Key policy issues and technological implications

Sustainability
Food security
Higher technology hurdle to make efficient use of residues, waste, ligno-cellulosic crops "Advanced feedstocks" "2nd generation feedstocks"

Energy security
Building critical mass through massive use of food crops "1st generation feedstocks"
Objectives of the PPP

- Reduced imports of fertilizer components
- Reduced protein import dependency
- Increase the use of by-products and waste
- Covering some of the EU's transport energy demand with advanced biofuels in 2020
- Create new bio-based value chains, bio-based building blocks and bio-based products
- Reduced GHG emissions from industry

Feed-stock sustainability and LCA: Specific value chains might require the assessment of methodologies for addressing sustainability criteria facilitating all projects, including a sustainability and economic feasibility evaluation over the whole value chain, and the environmental footprint of the resulting product.
Status of the initiative

- Industry vision available, 41 founding members with a preliminary financial commitment of €2.8 billion
- Supported by ETPs, sector organisations, RTOs, and MS
- Industry provided budget for initial start-up activities
- Industry prepared draft strategic I&R agenda
- On-line public consultation finalised (673 replies) and stakeholder event took place on 09 January 2013 in Brussels
- Impact assessment in its final stages
- Possible adoption of initiative by September 2013

- Main uncertainty: Outstanding Council agreement on MFF and H2020