

S2BIOM – **** THEME 2

Tuesday 16th June 2015



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Theme 1: Data & Tools (WPs 1-4)

- Current and future sustainable lignocellulosic biomass costs and supply (domestic and from imports) in EU28; Western Balkans, Moldova, Ukraine and Turkey.
- Common operating data, models, and tools representing the entire biomass supply chain
- Incorporation of models and tools for technical, environmental, economic and social impact analysis

Theme 2: Strategies & Roadmaps (WPs 5-8)

- Policy and regulations for supplying the future bioeconomy
- Support for future industrial investments
- Clarity on cross sector sustainability
- Strategies & Roadmap
- Ex ante impact assessment

Theme 3: Validation & project outreach (WPs 9-10)

- Support for policymaking at local, national, regional and EU28 levels by visualizing the outcomes of proposed policies
- Case Studies
- Stakeholder engagement
- Information Campaign
- Improvement of public awareness, education, and outreach

Setting the scene: Challenges shaping the biomass supply debate



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Biomass supply is a missing pillar in achieving progress in the energy and non- energy sectors of the bioeconomy

FAO: world's population will reach 9.1 billion, 34% higher by 2050 **SO** increased needs for food and feed while biomass feedstocks will also increasingly be used for materials and energy, to mitigate climate change. Two sources shape demand in Europe at the moment:

Directive 2009/28/EC of the European Parliament and of the Council of 5 June 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC. (to 2020- 2030 and beyond...)

Foster the sustainable development of the European biobased economy and meeting the objectives of the Bio-Based Industries (BBI) Joint Undertaking to contribute to a more resource efficient and sustainable low-carbon economy and to increasing economic growth and employment, in particular in rural areas of Europe.



Directive 2009/28/EC

- ...moving towards feedstocks for advanced biofuels,
 - Material classified as a waste, processing residue, agricultural or forestry residue, co-product, etc.
 - Not from high carbon stock land, peat land or land with high biodiversity
 - Considering what are the key competing uses: what would otherwise happen to the material if not used for biofuels production?
 - Lifecycle GHG emissions savings of producing biofuel from the material at least 60%
 - Would use of the material for biofuels production be economically viable without support, and hence likely to be deployed? Or would deployment only occur with additional support, due to the lack of commercial readiness of the conversion technology – and hence support is required to bring the technology up a few TRL levels?

Directive 2009/28/EC

- Continue...
 - Is investment required in logistics/infrastructure to increase collection volumes and supply chain efficiencies?
 - Does the conversion pathway provide cost effective GHG savings – e.g. a particular route from a material may be more expensive, but offers very high GHG savings, hence is worth supporting.



Bio-Based Industries (BBI)

Lead the transition towards a post-petroleum society

- Develop an economy that:
 - sources domestic renewable raw materials
 - produces food, feed, chemicals, materials and fuels locally
 - creates jobs in a broad range of sectors in Europe, triggering rural growth across regions
 - places sustainability, smart & efficient use of resources at the heart of industrial, business & social activities
- Fostering a sustainable biomass supply and building new value chains



A resource efficient Europe- Flagship initiative under Europe 2020 strategy

All resources are sustainably used. Energy, water, air, land and sea resources are used efficiently, while biodiversity is protected.



Brussels, 20.9.2011
COM(2011) 571 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

Roadmap to a Resource Efficient Europe

{SEC(2011) 1067 final}
{SEC(2011) 1068 final}

Mobilising biomass feedstocks in a sustainable and resource efficient manner

- Boosting efficient production..
- Green Public Procurement
- Environmental footprint
- Focus Union research funding (EU Horizon 2020) on key resource efficiency objectives, supporting innovative solutions for:
 - sustainable energy, transport and construction;
 - management of natural resources; preservation of ecosystem services and biodiversity;
 - resource efficient agriculture and the wider bio-economy;



How can S2Biom inform the biomass supply debate?

- Provide evidence through:
 - Consistent, update information on biomass cost supply across Europe (EU28, Western Balkans, Moldova, Turkey, Ukraine)
- Suggest sustainability criteria and indicators for all bioeconomy sectors
- Identify gaps & benchmark through large database on policies and measures in the under study countries
- Perform modelling for a set of scenarios reflecting both policy and biobased market futures
- Develop regional strategies tailored to country and local level

THEME 2



WP5. Value chain sustainability
across the biobased sectors



WP6. Financial and regulatory
frameworks



WP7. Integrated Assessment



WP8. Strategies and Roadmap



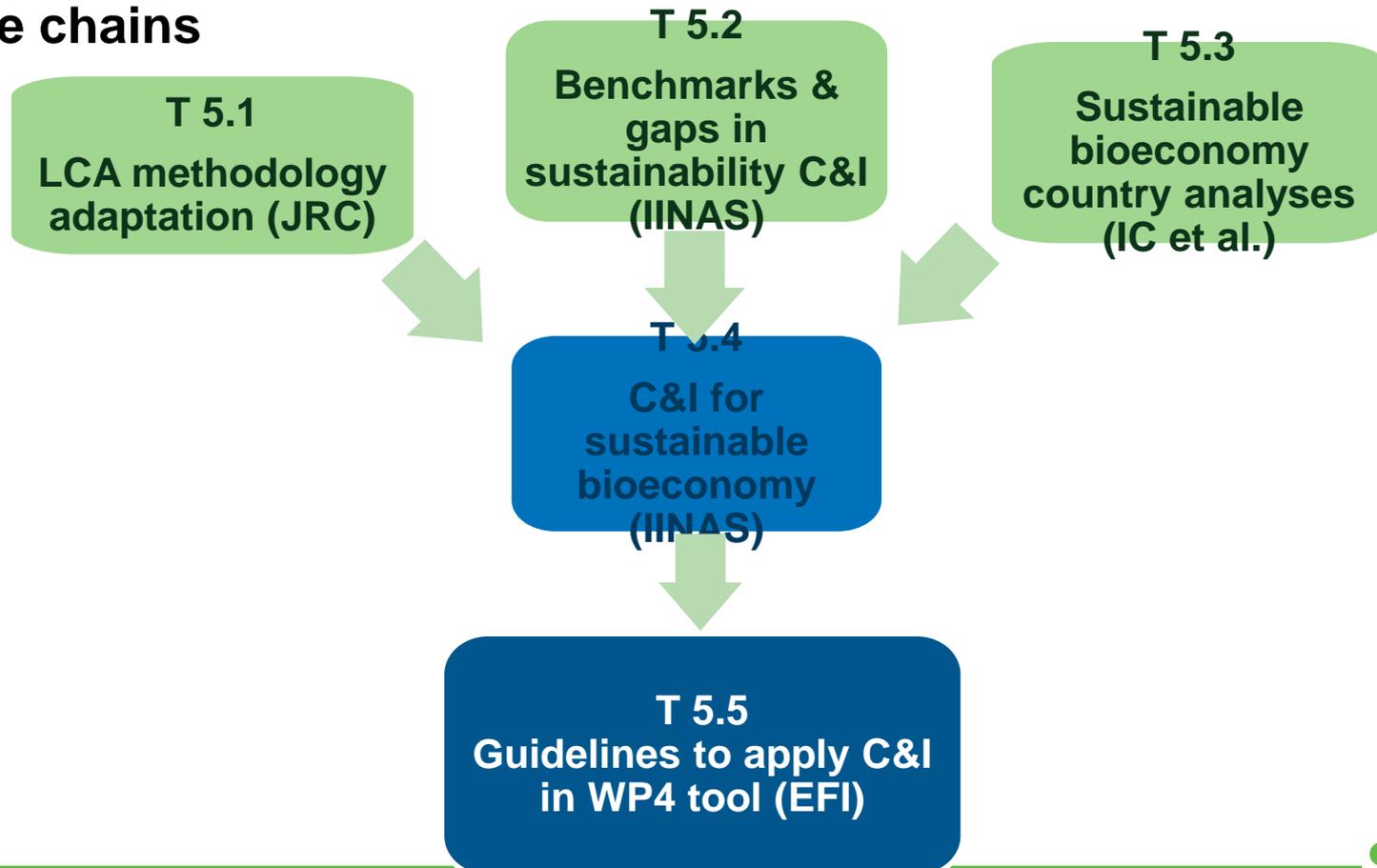
WP5. Value chain sustainability across the biobased sectors



Overview: Task Relation

General WP Objective :

Provide improved understanding among decision-makers in policy and industry regarding sustainability requirements in biomass value chains



Work Package structure

Task 5.1 Adaptation of the **life cycle-based European Commission Environmental Footprint** methods in order to develop a complementary methodology specific to non-food biomass value chains.

Task 5.2 **Benchmark and gap analysis of C&I** for legislation, regulations and voluntary schemes at international, selected EU Member States

Task 5.3 **Selected Country Analyses** of Sustainable Bioeconomy in Europe

Task 5.4 **Consistent Cross-Sectoral Sustainability C&I**

Task 5.5 **Guidelines for evaluating bioeconomy value chain sustainability performance**

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T5.1: Adaptation of the **life cycle-based European Commission Environmental Footprint** methods in order to develop a complementary methodology specific to non-food biomass value chains.

- Lead: JRC
- Brief description:
 - To be adapted from Product and Organisation Environmental Footprinting methods



T5.2: Benchmark and gap analysis of C&I for legislation, regulations and voluntary schemes at international, selected EU Member States

- Lead: IINAS
- Input: all
- Brief description:
 - Identification of current state of the art (legislation and regulations at European Level and selected MS; Voluntary approaches and management practices in selected MS and Voluntary certification schemes)



T5.3: Selected Country Analyses of Sustainable Bioeconomy in Europe

- Lead: Imperial
- Brief description:
 - Sub-task 5.3.1: Belgium and The Netherlands → DLO & VITO
 - Sub-task 5.3.2: Germany → IINAS & FNR
 - Sub-task 5.3.3: Scandinavia and Baltic States → VTT
 - Sub-task 5.3.4: Spain → CENER
 - Sub-task 5.3.5: Bulgaria, Greece & Turkey → JRC



T5.4: Consistent Cross-Sectoral Sustainability C&I

- Lead: IINAS
- Brief description:
 - Based on Task 5.1 and 5.2 outcomes, scientific literature and expert consultation (Task 9.1), the **methodology** for calculating the different **sustainability indicators** for bioeconomy value chains and their **overall sustainability** performance will be developed, including guidelines for calculating the different quantifiable sustainability indicators for bioeconomy value chains



T5.5: Guidelines for evaluating bioeconomy value chain sustainability performance in the toolset development in WP4

- Lead: EFI
- Brief description:
 - Building on task 5.3, two levels of assessment:
 - Traffic light system
 - Refined quantitative analysis using C&I



Task 5.1: LCA Methodology (I)

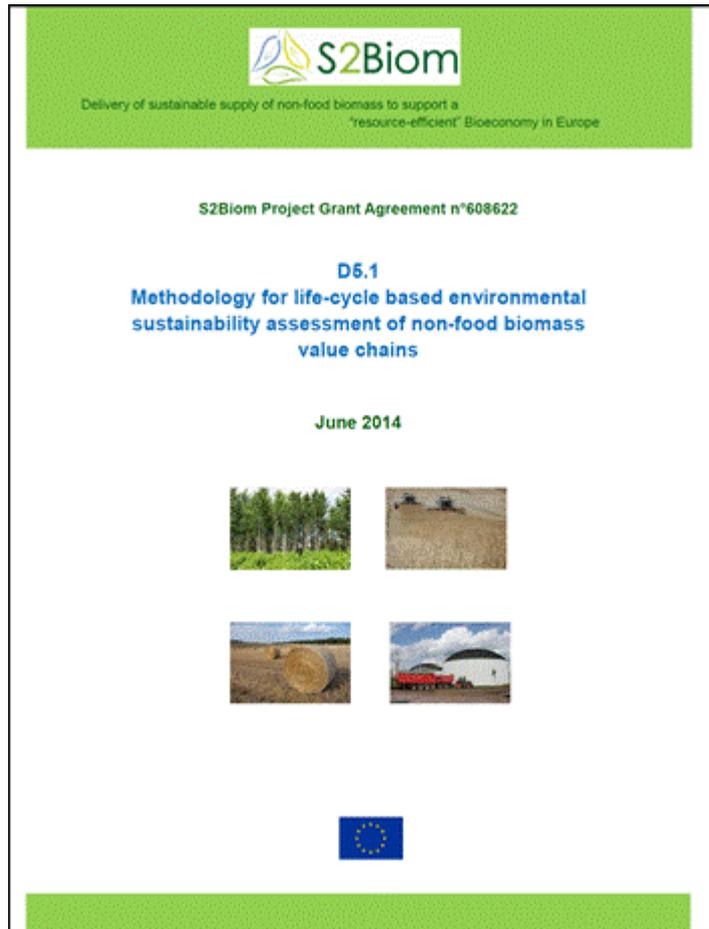
T5.1: Adaptation of the life cycle-based European Commission Environmental Footprint methods in order to develop a complementary methodology specific to non-food biomass value chains

D5.1: Methodology for life-cycle based environmental sustainability assessment of non-food biomass value chains

- User friendly tool to assess the environmental sustainability of non-food bio-based products and their supply chains, using a lifecycle perspective.
- A comprehensive, science-based method able to provide quantitative understanding of a wide range of environmental aspects.



Task 5.1: LCA Methodology (II)



Largely based on the Product Environmental Footprint (PEF) method developed by the JRC in close cooperation with the DG ENV. Useful for comparative assessments.

Structure:

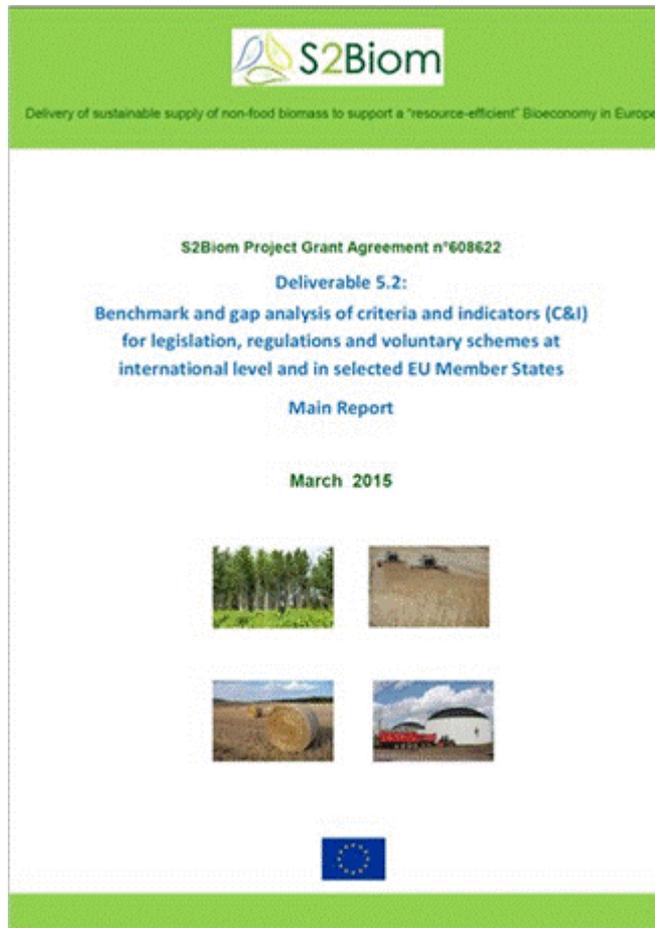
- (1) definition of the goals of the assessment,
- (2) definition of the scope of the assessment,
- (3) development of the assessment inventory,
- (4) development of the impact assessment,
- (5) interpretation and reporting of the results of the assessment,
- (6) critical review of the assessment.

Task 5.2: C&I Benchmark (I)

- T5.2: Benchmark and gap analysis of C&I for legislation, regulations and voluntary schemes at international and selected EU Member States
- D5.2: Benchmark and gap analysis of criteria and indicators (C&I) for legislation, regulations and voluntary schemes at international level and in selected EU Member States
 - Benchmark the selected schemes based on criteria and indicators (C&I) against the draft S2Biom sustainability indicators with the aim of characterizing sectoral patterns and of identifying gaps.
 - Identify concepts present in other schemes that could help enhance the final S2Biom approach to sustainability.



Task 5.2: C&I Benchmark (II)



- Identification of representative schemes: more than 50 (various sectors, feedstocks, end uses and geographical scopes)
- Benchmark and Gap Analysis: if schemes structured as a set of C&I, then benchmarked against the draft S2Biom structure. Sectoral aggregation
- Identification of additional issues: other elements: (framework indicators and complementary indicators).

Task 5.3: Selected Country Analysis of Sust. Bioeconomy

Sub-task 5.3.1: Belgium and The Netherlands → DLO & VITO

Sub-task 5.3.2: Germany → FNR & IINAS

Sub-task 5.3.3: Scandinavia and Baltic States → VTT

Sub-task 5.3.4: Spain → CENER

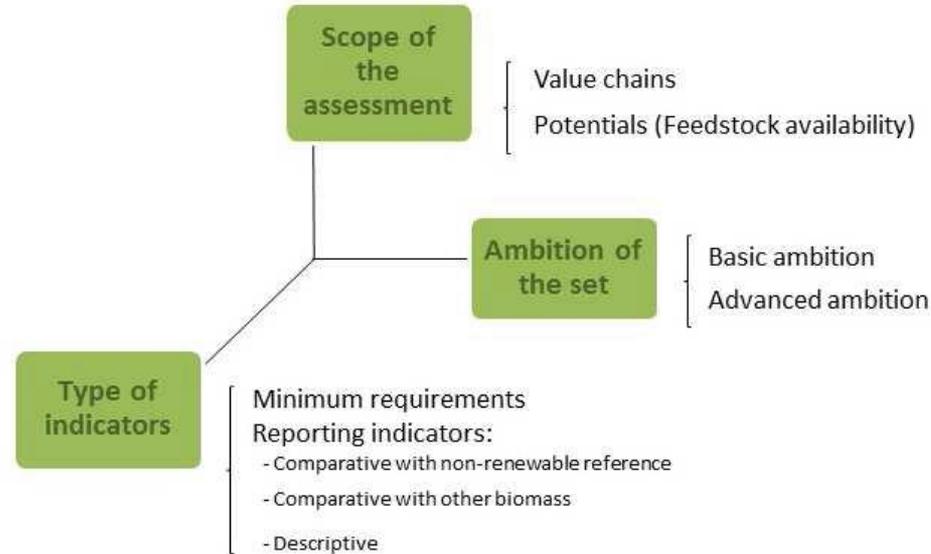
Sub-task 5.3.5: Bulgaria, Greece & Turkey → JRC, Imperial

- Template for country reports (jointly with JRC- IES) sent out in August 2014 to national partners
- Indicative size per country: 4 pages, +/-2 pages
- A standardized format of presenting the factual information for all countries: visual and uniform
- 20th November 2014, workshop “Sustainability issues for the deployment of bioeconomy”



Task 5.4: Sustainability C&I (I)

- T5.4 (& D5.4): Consistent Cross-Sectoral Sustainability C&I (Draft Report)
 - Umbrella to approach and assess non-food biomass sustainability
 - An overview of different points of view when defining the approach: scope, sustainability sets and type of indicators
 - A specific proposal of sustainability C&I for non-food biomass.



Task 5.4: Sustainability C&I (II)

(Draft) List of Sustainability C&I

Environmental	1. Resource Efficiency	Land Use Efficiency
		Secondary Resource Efficiency
		Energy Efficiency
		Functionality (Output service quality)
	2. Mitigate Climate Change	GHG(CO ₂ eq) LCA, including LUC
		Other GHG emissions
	3. Biodiversity	Protected areas and land with significant biodiversity values
		Biodiversity conservation and management
	4. Soil	Erosion
		Soil Organic C
		Soil Nutrient Balance
	5. Water	Water availability and regional water stress
		Water use efficiency
		Water quality
	6. Air	SO ₂ equivalents
		PM ₁₀

Social	7. Participation and transparency	Effective participatory processes
		Information transparency
	8. Secure tenure of land	Land tenure assurance
	9. Employment and labor conditions	Full direct jobs equivalents along the full value chain
Full direct jobs equivalent in the biomass consuming region (or country)		
Human and Labor Rights		
	Occupational safety and health for workers	
10. Health risks	Risks to public health	
Economic	11. Food, fuelwood and other products	Food, fuelwood and other products supply security
	12. Production costs	Current levelized life-cycle cost
		Future levelized life-cycle cost



WP6. Financial and regulatory frameworks



Objectives

- Provide a structured **overview** of economic and regulatory frameworks, at different governance levels across Europe (EU, national, regional)
- Develop coherent **policy guidelines** (including indicators) and **good practises** that could make a difference



Work Package structure

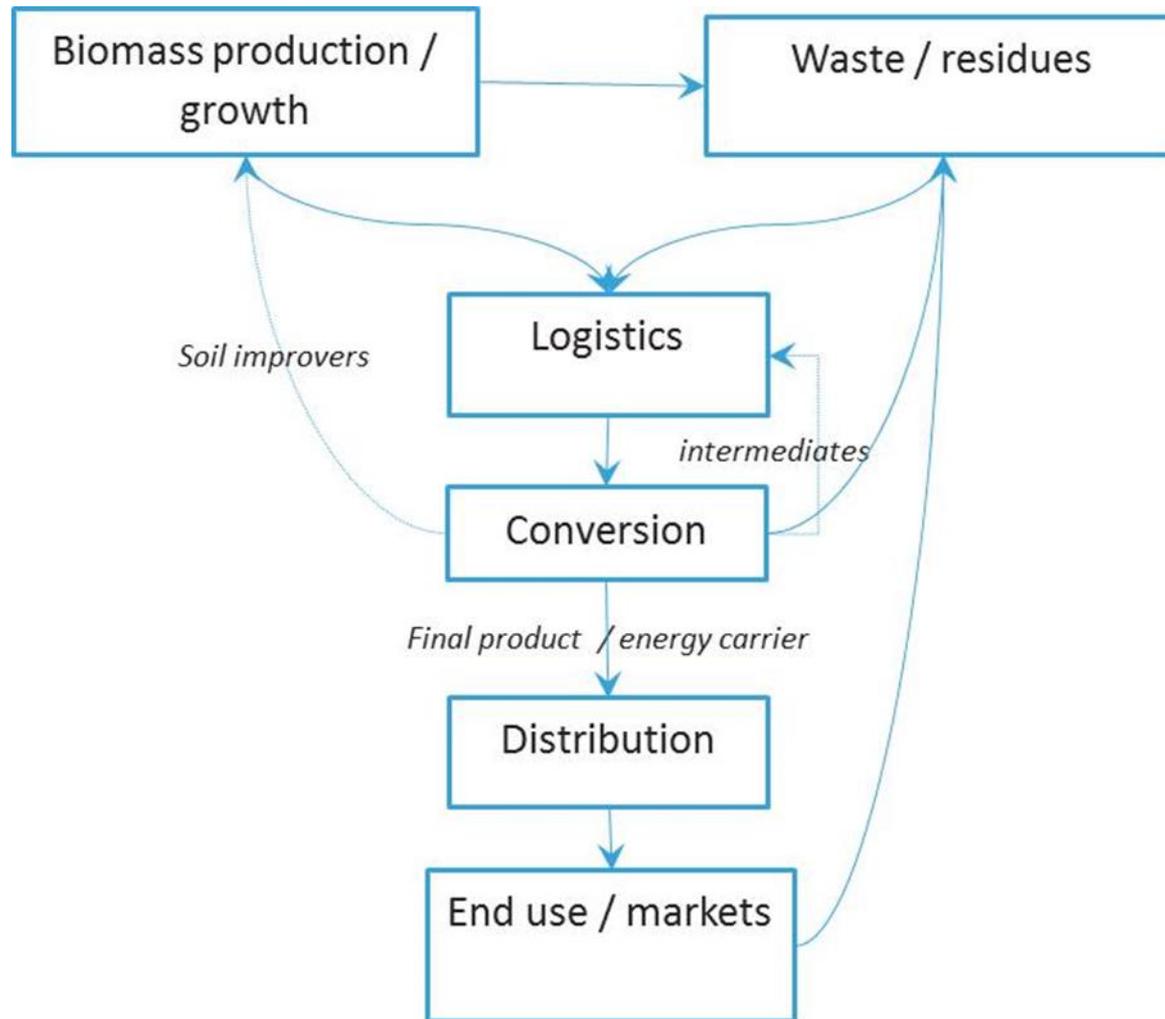
Task 6.1: Structured overview of regulatory and economic frameworks on EU and national level

Task 6.2: Benchmarking country approaches for mobilization of sustainable non-food biomass

Task 6.3: Policy guidelines and good practices

Task 6.4: Synergies and cooperation

Value chain



Task 6.1: Overview of regulatory and economic frameworks: EU & national level

- Policy fields *(may overlap)*:
 - Agriculture, Forestry, Waste, Environment, Climate, Energy, Transport, Taxation, Trade, Normation, Procurement, Enterprise/Economy, Innovation
- Types of instruments *(may overlap)*:
 - Financial: feed-in tariff, tax reduction, subsidies, loans, R&D funding, tradable certificates, ...
 - Regulatory: requirements, substitution obligation, permitting, zoning, procurement rules, binding standards
 - Soft measures: strategies, action plans, product labels, voluntary standards, publicity campaigns, guidelines, platforms, ...

Policy database

- Common database framework for “instruments & measures” for different EU projects:
 - BiomassPolicies,
 - S2Biom,
 - BERST,
 - BioTrade2020+
- Currently 563 instruments and measures are uploaded for S2Biom



On-line database (<https://s2biom.vito.be/>)

S2BIOM

Username or e-mail *
 Password *
[Create new account](#) [Request new password](#)

[About S2BIOM](#)
[Catalogue of Instruments & Measures](#)

Search Instruments & Measures by information fields

Search here in a targeted way for Instruments & Measures that foster the development of regional bioeconomies. You can filter your search based on a set of differentiating information fields. For each Instrument & Measure a detailed factsheet will be provided. Some examples of how the tool can be used.



Country/Region

European Union
 NETHERLANDS (NEDERLAND)
 - None -

Type of Instrument or Measure

Economic / financial instruments
 - None -

Sector/Topic targeted

Energy

Feedstock type targeted

- None -

Product type targeted

- Any -

Value Chain

- Any -

Search Terms

Short name of Instrument or Measure	ISO	Country/Region	Type of Instrument & Measure	Sector/Topic targeted
Energy investment allowance	NL	NETHERLANDS (NEDERLAND)	Tax Reduction	Taxation and Trade, Energy
Environmental investment allowance	NL	NETHERLANDS (NEDERLAND)	Tax Reduction	Environment (soil, water, air, nature, biodiversity,...), Energy, Mobility, transport and logistics, Taxation and Trade
Environmental protection tax	NL	NETHERLANDS (NEDERLAND)	Tax Reduction	Taxation and Trade, Energy
Renewable energy in transport order	NL	NETHERLANDS (NEDERLAND)	Substitution Obligation, Tradable Certificates	Energy, Environment (soil, water, air, nature, biodiversity,...)
Renewable energy production incentive scheme (SDE+)	NL	NETHERLANDS (NEDERLAND)	Premium	Energy

Factsheet: Renewable energy production incentive scheme (SDE+)

Renewable energy production incentive scheme (SDE+)

Key Information

Country/Region:
 European Union > NETHERLANDS (NEDERLAND)

Full name of Instrument & Measure (English):
 SDE- Renewable Energy Production Incentive Scheme

Full name of Instrument & Measure (native language):
 Besluit stimulerend duurzame energieproductie (SDE-)

Description:
 The SDE- scheme grants a premium to the producers of renewable energy to compensate for the difference between the wholesale price of electricity, heat or gas and the corresponding price of electricity, heat or green gas from renewable sources. The sum of the premium, paid on top of the market price, is variable and depends on the annual market price development and is adjusted by a correction value accordingly. The premium is paid for a period of up to 15 years (for biomass projects 12 years, for biomass co-firing 8 years and for other options 15 years). The support is made available in various stages (6 stages in 2013-2014, 9 stages in 2015) and is allocated on a 'first come, first serve' basis. In general, the SDE- scheme gives an advantage to those applying for lower tariffs and at an early stage of the allocation process. The SDE- is not an open ended system, there is a yearly dependent budget ceiling (e.g. 3.5 billion Euro in 2015). When the budget is used, the further stages can't apply anymore. SDE was first opened in 2008. In 2011 it was replaced by the SDE+.

Smaller modification to the SDE- take place every year (see above): other technology categories are introduced; the number of phases changes; the budget changes per year.

Goal/Aim:
 stimulate investments in renewable energy

Type (and subtype) :
 Economic/financial instruments > Premium

Sector/Topic targeted:
 Energy

Responsible Authority:
 Rijksdienst voor Ondernemend Nederland

Status:
 In force

Trade Relevance:
 Since 2015 co-firing is in the SDE-. However, as agreed in the 'Energie Akkoord' overall co-firing can never be higher than 25 PJ Gross final consumption.

Year Instrument & Measure Started: 2008 **Year Last Instrument & Measure was last Amended:** 2015

Contact References

Advanced Information



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Task 6.2: benchmarking country approaches

- Building on regulatory and financial frameworks (T6.1)
- EU-broad clustering of countries according to Eurostat indicators
- Digging into representative cases and countries where supportive policies have been applied (*link to case studies WP9*)
- Benchmarking:
 - Comparison country approaches, key measures
 - Mobilizing effect => market & industry development
 - Balancing use of biomass in different sectors (*level playing field*)

Task 6.3: Policy guidelines & good practices

- Indicators & coherent policy guidelines => biobased economy (broader than bioenergy)
- Based on benchmarking results
- Draft report => end user workshop
- Potential policy options, discussion of pros, cons, points of attention and guidelines => feed into WP8



Task 6.4: Synergies and cooperation

- Synergies in international cooperations, e.g. sustainability framework, mutual technological developments, ...
- Relevant actions in different member states and at EU level
- Advisory document on fields of cooperation and potential synergies





WP7. Integrated Assessment

Key question to be addressed

- Will Europe have sufficient biomass to:
 - Meet its renewable energy objectives *and*
 - Provide a sufficient resource based for a biobased chemistry and materials sector?



Work Package structure

Task 7.1 Defining scenarios

Task 7.2 Analysing the markets for bio-based industries

Task 7.3 Expanding the RESolve-Biomass model to cover non-energy sectors

Task 7.4 Conducting the integrated assessment

Task 7.5 Synthesis report

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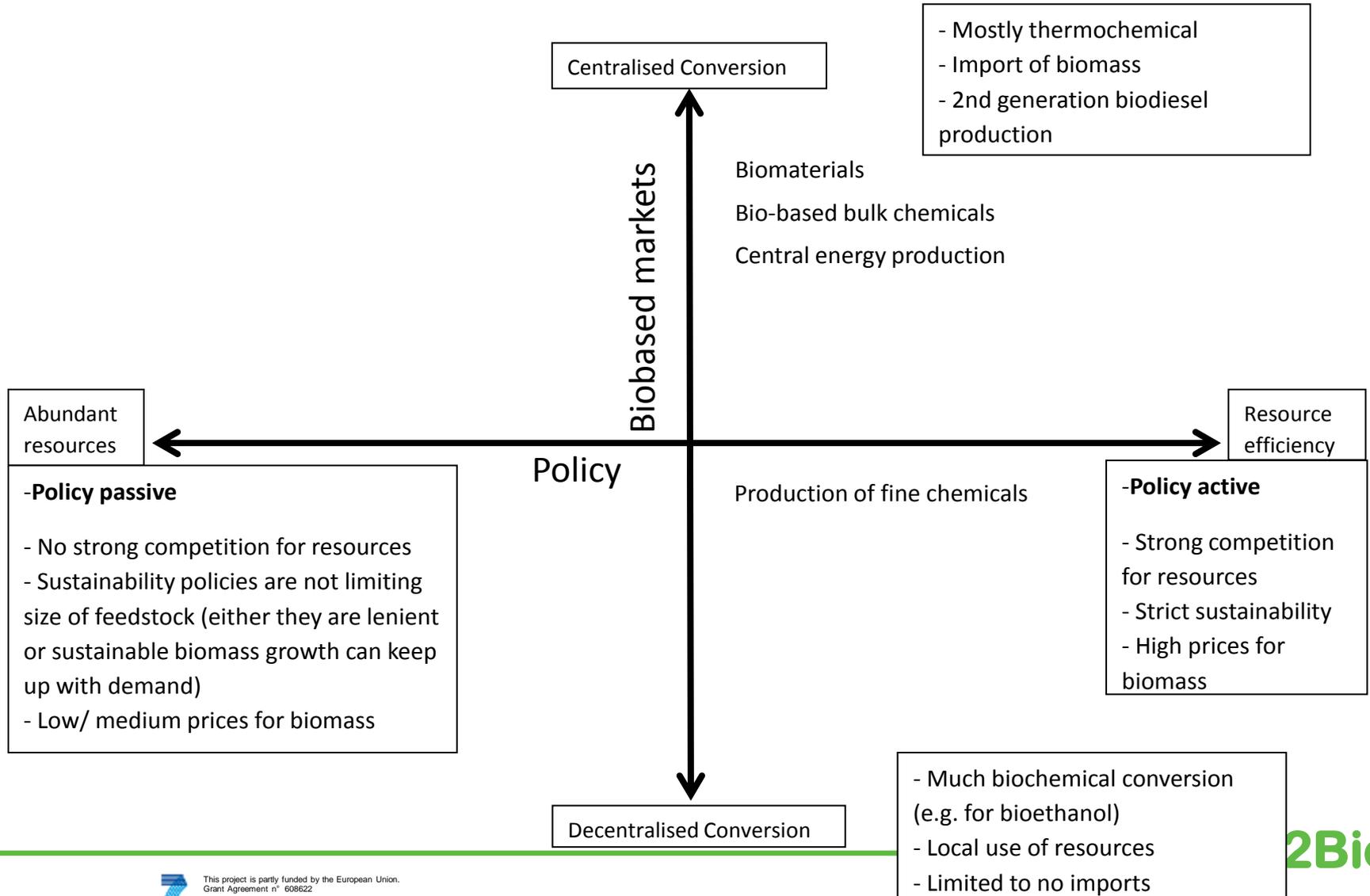
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Task 7.1: Defining scenarios (Imperial, ECN, JRC, DLO, IINAS)

- Major uncertainties:
 - Will specific policies (and/ or targets) beyond RD&D funding for the biobased (non energy/ fuels) materials develop in the coming years? And how strong will be corresponding break-through of new chains for biobased materials, also compared to energy applications?
 - What will these chains look like? (centralised with more thermochemical focus or decentralised with more biochemical focus)?
 - How substantial will the potential supply of biomass be in comparison to potential demand for materials and energy?



Proposed S2Biom scenario structure



7.2 Market analysis (Imperial, BTG, DLO, ECN)

- Focus on product-market combinations (PMCs)
 - Innovativeness versus data availability
 - Sufficient coverage but not too many PMCs
 - Data requirements:
 - Current and future market size
 - Prospects for bio-based options
 - Related biomass demand
- Status: Three final draft reports available:
 - On heat and electricity
 - On PMCs based on C5, C6 and lignin
 - On six other PMCs



Proposed product-market combinations (PMCs)

	Product	Market	Current	2020	2030
1	Heat	District heating	x	x	x
2	Electricity	Power market	x	x	x
3	BTX	Petrochemical industry		x	x
4	Adv. Biofuels ¹	Transport fuel		x	x
5	Bio-methane	Grid, transport	x	x	x
6	Methanol	Transport, chemical industry	x	x	x
7	Hydrogen	Transport, (petro)chem. ind.		x	x
8	Ethylene	(petro)chemical industry			x
9	Mixed alcohols	(petro)chemical industry			x
10	Ethanol	Transport	x	x	x
11	C6 sugars	C6 chemistry			x
12	C5 sugars	C5 chemistry			x
13	Lignin	Lignin chemistry			x

¹: Advanced biofuels from FT processes and pyrolysis oil upgrading



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7.3 RESolve model expansion (ECN)

- General model expansion activities well underway
 - E.g. expansion with new countries
- General update of feedstock, conversion and logistics data: link with WPs1-3 → month 30
- Specific adaptations to outcomes of T7.1&2:
 - Translation of scenarios into model parameters:
 - Feedstock uncertainty: two datasets from WP1
 - Centralised vs decentralised: variations in assumptions on technology costs and logistics
 - Introduction of new PMCs into the model

7.4 (assessment) and 7.5 (report) (ECN)

- Scheduled for Q3-4 in 2015 (draft)
- And Q1-2 in 2016 (final).
- Results will be fed into the communication WP, also to receive feedback on initial results





WP8. Strategies and Roadmap



Work Package structure

Task 8.1: Capacity mapping, gap analysis, trends and future scoping

Task 8.2 Vision statement for sustainable biomass supply

Task 8.3 Strategies & Implementation Plans

Task 8.4 R&D Roadmap

Task 8.5 Ex ante impact assessment

Aim

- Exploit the techno-economic background information from S2Biom and translate the large datasets of sustainable lignocellulosic biomass value chains across Europe to targeted strategic documents and market- industry oriented implementation plans for the sustainable delivery of non-food biomass feedstock at pan-European level.
- Give evidence and inform policy debates with S2Biom: make strategic choices in the countries/ regions covered to assist clarity of information and give evidence.

Through:

- a European Vision, regional strategies, industrial implementation plans and an R&D roadmap for the sustainable delivery of non-food lignocellulosic biomass feedstock.



Task 8.1: Capacity mapping, gap analysis, trends and future scoping (Imperial, with CEI, SDWES, EU-SEI, CENER, CIRCE, SFI, CERTH, REA, UB-FME)

- Review report (**first version available**) which aims to understand the current state of biomass use for energy, fuels and bio-based materials and appreciate the factors influencing the availability, security and future prospects of their supply.
- An update is being prepared to include Western Balkans, Ukraine, Moldova and Turkey and expected to be delivered in August 2015.
- Future scoping of these patterns will be performed by considering different time horizons and the range of explicit scenarios that are developed and used in WP7.



Task 8.2 Vision statement for sustainable biomass supply (Imperial)

- The Task aims to establish a vision statement for an expanded role of sustainable non-food biomass supply and delivery in the European bio based economy.
- Work started late 2014, to ensure that all the key working elements from Theme 2 and WPs 5 & 6 are appropriately reflected in the Vision.
- The first version will be presented in an **open call for evidence** consultation on the project website **on September 2015** and a **dedicated workshop** with the collaboration of JRC (**October 2015**).
- Following the consultation and discussions it will be finalized and form the basis for as a series of strategies, implementation plans (Task 8.3) and an R&D roadmap (Task 8.4).



Task 8.3 Strategies & Implementation Plans (Imperial; with FNR, ECN, DLO, VITO, CEI, IINAS, BTG, SDWES, EU-SEI, CENER, CIRCE, SFI, CERTH, REA, UB-FME)

- This task will synthesise the findings from Theme 1 (WPs 1, 2, 3), Theme 2 (WPs 5, 6 & 7) and information from the detailed work on the case studies performed in WP9. Two questions are considered:
 - what is the current state of sustainable supply and delivery of non-food lignocellulosic biomass?
 - what political, regulatory, economic, technical measures and developments are required to achieve optimal implementation?
- Six regional European strategies (Central; Eastern, Southern; Western; Northern, Energy Community) tailored at national and local level (NUTS3, matching tool and databases)
- 2-3 Industrial implementation plans (preparatory work for 2G bioethanol in Serbia is ongoing)
- Local action plans (matching case studies in WP9)
- Task 8.3 is scheduled end 2015-early 2016 but there have been initial consultations (late 2014 and early 2015) with the case study teams within WP9 (Serbia and Ukraine).



Task 8.4 R&D Roadmap (FNR; with Imperial, DLO, VITO, IINAS, CEI, BTG)

- The Task aims to outline a research and development roadmap for sustainable biomass supply and delivery at pan European level in order to promote and develop environmentally desirable bio-based materials, power and fuels.
- The roadmap will be organized in three categories: i.e. i) sustainable supply, ii) pretreatment and iii) logistics.
- The roadmap will aim to achieve the goals established by the European Commission and its neighbouring policies/ strategies and the aims set by the Vision in Task 8.2 and as such will be updated during the course of the project to account for all policy developments in the field.
- The work in Task 8.4 is scheduled for early 2016.



Task 8.5 Ex ante impact assessment (Clever Consult, with Census-Bio; Biomass Research)

- The Task aims to perform the ex-ante economic, social and environmental impact analysis of the key findings of the project at pan European and regional levels.
- Links with WP9/ case studies.
- The work in Task 8.5 is scheduled for early 2016.



Key Questions for discussion



WP5. How can sustainability safeguard biomass supply and foster the development of bioeconomy?

Please suggest three key issues you consider of outmost importance in a cross sector sustainability framework



WP6. Policy module of the tool: which are the most important features?

Policy guidelines: Please suggest three important principles



WP7. Based on your opinion which is the biggest uncertainty in bioeconomy?

Please suggest three biomass-to-chemical options that will generate substantial biomass demand in 2020 and 2030, estimate an order of magnitude and reason why?



WP8. How ambitious a European Vision for lignocellulosic biomass can be?

Please suggest three opportunities and three potential threats to implementation



Thank you for your attention !!

