



FIRST2RUN

Flagship demonstration of an integrated biorefinery for dry crops sustainable exploitation towards biobased materials production

WP3 : SCALE UP

Giovanni Sanna
Research & Development Matrica Porto Torres

Kick-Off Meeting, Bruxelles
July 23rd, 2015



Bio-based Industries
Consortium



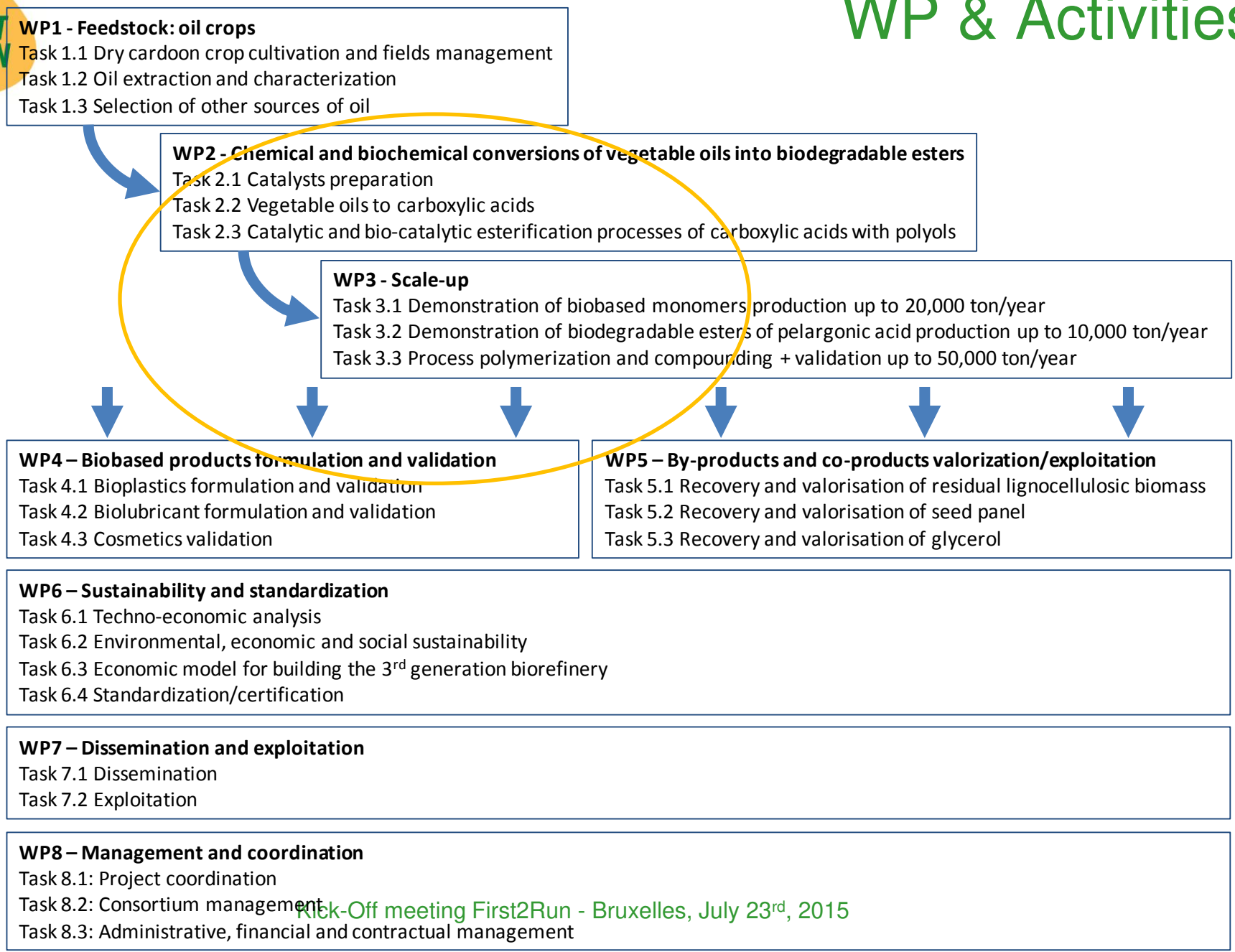
WP3 : SCALE UP

CONTENTS

- WP's general description
 - ❑ Objectives
 - ❑ Tasks
 - ❑ Main expected results
 - ❑ Description of deliverables
 - ❑ Time-scheduling (including milestones and deliverables)
 - ❑ Partners involved in the WP
- First 6 months' planning in the WP



WP & Activities



WP3 - Objectives

- **Main Objective:** to **validate** and **demonstrate** the **feasibility** of the **processes** developed in **WP2** for the production of Building Blocks and Biodegradable oils from vegetable oils obtained in WP1.
- **Specific objectives:**
 - ❑ **Adaptation and improvement** of the **existing production facility**, to be exploited in order to reach the targeted productivity of BBs and biodegradable oils;
 - ❑ **Validation** and **demonstration** of **biobased BBs** production from vegetable oils up to **20,000 ton/year**;
 - ❑ **Validation** and **demonstration** of **biodegradable oils** (complex esters of pelargonic acid) **production** up to **10,000 ton/year**;
 - ❑ **Polymerization** of di-carboxylic acids and further compounding for the biobased materials production **up to 50,000 ton/year**.

WP3 – Partners & Tasks

- **WP LEADER: MATRICA**
- **PARTNERS INVOLVED IN WP: NOVAMONT, MATRICA, SOLIQz, UNIBO**
- **MONTHS 12-48**

- **TASKS:**
 - ❑ **TASK 3.1** – Demonstration of biobased monomers production up to 20,000 ton/year
 - ❑ TASK LEADER: Matrìca INVOLVED: Novamont
 - ❑ **TASK3.2** – Demonstration of biodegradable esters of pelargonic acid production up to 10,000 ton/year
 - ❑ TASK LEADER: Matrìca INVOLVED: Novamont
 - ❑ **TASK3.3** – Process polymerization and compounding + validation up to 50,000 ton/year
 - ❑ TASK LEADER: Novamont

WP3 – TASK3.1

TASK 3.1 – Demonstration of biobased monomers production up to 20,000 ton/year

- **Purpose:** The **most promising processes** from task 2.2 will be further **upscaled** by using the extracted oil as raw material. Production of BBs will be optimized at large scale at Matrica facilities using already existing equipment and reactors. Stability and robustness of the process will be proven.
- The plant is **designed** and **operated** in **continuous** and the **targeted productivity** is approximately **20,000 t/year** of various biodegradable monomers, including both dicarboxylic fatty acids for polymerization and other monocarboxylic fatty acids for esterification or for the market, in addition to a portion of glycerine solution with concentration greater than 90%. The capacity reported corresponds to a maximum utilization of the main raw material, i.e. natural not modified vegetable oils, amounting to 30,000 ton/year.

WP3 – TASK3.2

TASK 3.2 – Demonstration of biodegradable esters of pelargonic acid production up to 10,000 ton/year

- **Purpose:** The biodegradable oils production optimized in task 2.3 will **demonstrated** in a **batch reactor**, already existing, operating 24 hours per day, 5 days a week, extendable to 7 in the case of production requirements. The production capacity of the plant is 10,000 tonnes/year of biodegradable lubricating oils, starting from 32,000 tonnes/year of raw materials, constituted by intermediate products produced in the plant realized in task 4.1 and from other sources coming from productive sites outside the biorefinery.
- The **production process designed**, realized and operated in task 3.2, will consist of the following **major sections**:
 - **Preparation** of the reaction mixture by means of raw materials dosing, melting, homogenizing;
 - **Batch reaction** of esterification with catalyst addition and production of different types of ester;
 - **Separation** of intermediate products of the process.

WP3 – TASK3.3

TASK 3.3 – Process polymerization and compounding + validation up to 50,000 ton/year

- **Purpose:** Di-carboxylic acids produced in task 3.1, will be used in **polycondensation reaction** to **synthesize polyesters** and **co-polyesters** through well assessed technologies.
- ❑ The targeted facility to prove/**demonstrate** the production **feasibility** of the **biopolyesters** is a plant with a production of **70,000 ton/year**; additionally the combination with starch and complexation reaction with starch will be demonstrate using a production plant with a productivity of compounded polymers of 50,000 ton/year
- ❑ Several type of **polyesters** will be **synthesized** and **characterized** in terms of chemical, physical, mechanical as well as rheological properties, performances in aging, permeability, biodegradability (EN13432) and environmental impact.
- ❑ **Products** will be fully **characterized** and **tested** in cooperation with **WP4**.

WP3 - DELIVERABLES

- **D3.1** Protocol and mass balances of feasible process up to 20,000 tonnes/year of biobased monomers production (Report M40)
- **D3.2** Protocol and mass balances of feasible process up to 10,000 tonnes/year of biodegradable oils production (Report M48)
- **D3.3** Protocol and mass balances of feasible process up to 50,000 tonnes/year of compounded polymers production (Report M48)



Contact

- Giovanni Sanna
Research & Development Matrica
CER PT
07046 Porto Torres (SS)
- Tel +39 079 509 570
- giovanni.sanna@matrica.it
- www.matrica.it