

Enabling Project - H2020

Biomass residues from rural sector and Circular Bioeconomy

Vito Pignatelli, ITABIA - Italian Biomass Association

Webinar

Europe - Turkey Cooperation

30 March 2020

- ▶ **ITABIA** is an independent no-profit Association operating since 1985 in the sector of biomass, bioenergy and bioeconomy for the purpose of sharing experiences, promoting research and development, guiding and supporting the planning, participating in the creation of local initiatives
- ▶ **ITABIA** represents therefore a centre for data collection and the selection of news, experiences and proposals in favour of partners and operators of the sector, assuring the information quality and/or support to the planning

The circular economy is based on the principle that waste can be a resource

In Europe, circular economy was first mentioned in 1976 in the report "The Potential for Substituting Manpower for Energy"

The first concrete measures on the subject:

- ▶ 2012 - EU Commission's Communication "Innovation for sustainable growth: a bioeconomy for Europe"
- ▶ 2015 - European Commission "The missing link - Action plan for the circular economy". For sustainable economic growth and creating new jobs
- ▶ 2018 - EU Commission's Communication "A sustainable bioeconomy for Europe: strengthening the link between economy, society and environment"

Circular Economy Action Plan

- ▶ **54 actions** to “close the circle” of the products life cycle (production, consumption, waste management, secondary raw materials market)
- ▶ **Close cooperation** with Member States, regions and municipalities, businesses, research organizations, citizens
- ▶ **5 priority sectors** to work on:
 - 1) Plastics
 - 2) Food waste
 - 3) Critical raw materials
 - 4) construction and demolition
 - 5) biomass and biological materials

European funding for the circular economy

- ▶ The transition from linear to circular economy requires economic resources
- ▶ Financial support from the European Structural and Investment Funds, Horizon 2020, the European Fund for Strategic Investments (EFSI) and the LIFE program

European funding for the circular economy

The funds are oriented towards 5 main sectors:

- ▶ Research and innovation
- ▶ Digital technologies
- ▶ Low carbon economy
- ▶ Sustainable management of natural resources
- ▶ Aid to small businesses

Budget for 2014-2020:

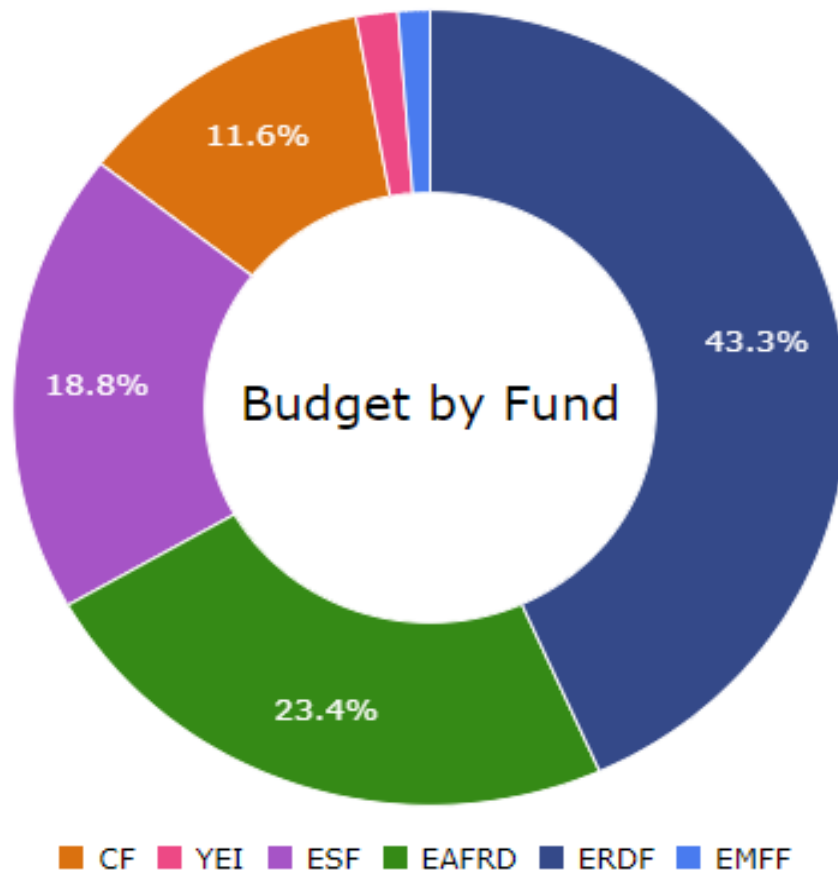
allocated funds for about € 643 billions (€ 461 UE + € 182 National)

Funds:

1. European regional development fund (ERDF - it. FESR) - promotes balanced development in the different regions of the EU
2. European social fund (ESF - it. FSE) - supports employment-related projects throughout Europe
3. Cohesion fund (CF) - funds transport and environment projects in countries where the gross national income (GNI) per inhabitant is less than 90% of the EU average (14 Countries)
4. European agricultural fund for rural development (EAFRD - it. FEASR) - challenges facing EU's rural areas
5. European maritime and fisheries fund (EMFF - it. FEAMP) - helps fishermen to adopt sustainable fishing practices

Budget by Fund, EUR

Budget for 2014-2020: € 643 billions
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The final analysis on the effects of the Plan

In March 2019, the European Commission published the Report on the implementation of the Circular Economy Action Plan

According to the Report, the Plan favored:

- ▶ the transition to a circular economy in Europe
- ▶ the birth of new replicable industrial models (Best Practices)
- ▶ the increase in employment linked to new commercial opportunities and new business models

The main results

For example, in 2016:

- ▶ Over 4 million workers have found employment in sectors related to the circular economy, 6% more than in 2012
- ▶ activities such as repair, reuse or recycling generated almost 147 billion euros of added value, recording investments of around 17.5 billion euros

Today the bioeconomy generates annually:

- ▶ In Europe - an estimated turnover of 2,300 billion euros and 9 million employees
- ▶ In Italy (2017) - 328 billion euros and 2 million employees

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In Italy, the bioeconomy represents 10.1% in terms of production and 7.7% in terms of employees out of the country's total economy

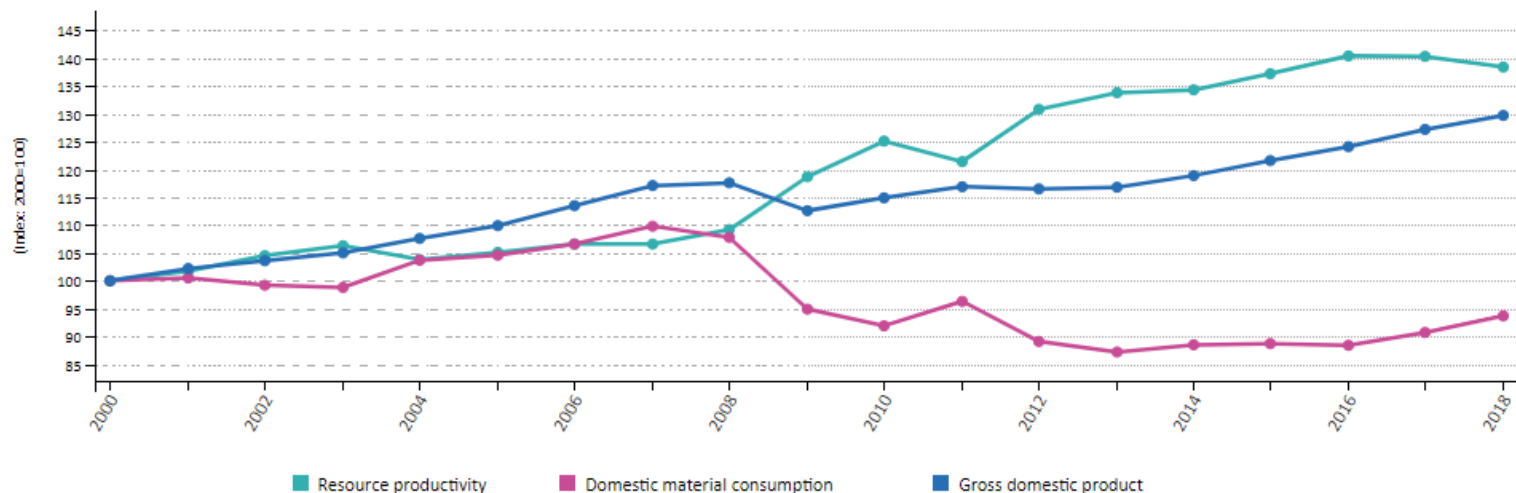
The increase of EU's resource productivity: comparison 2000 - 2018

Since the year 2000, the EU's resource productivity has increased by around 40 %. Resource productivity quantifies the relation between economic activity - expressed by gross domestic product (GDP) - and the consumption of material resources - measured as domestic material consumption (DMC) which is an indicator derived from economy-wide material flow accounts (EW-MFA)

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EU-28 resource productivity in comparison to GDP and DMC, 2000-2018



Note: GDP in chain-linked volumes, reference year 2010

Source: Eurostat (online data code: nama_10_gdp, env_ac_mfa; env_ac_rp)

eurostat

https://ec.europa.eu/eurostat/statistics-explained/index.php/Resource_productivity_statistics

- ▶ In January 2020, the Commission (chaired by Ursula von der Leyen) obtained the positive opinion of the Community Parliament on the "Green Deal"
- ▶ the Strategy has an estimated cost of one thousand billion to combat climate change by making Europe "Carbon neutral" by 2050
- ▶ Europe intends to assume a role of world leader in the green conversion process of the global economy

*"The European Green Deal is our new growth strategy.
It will help us cut emissions while creating jobs."*

Ursula von der Leyen, President of the European Commission



*"We propose a green and inclusive transition to help
improve people's well-being and secure a healthy planet
for generations to come."*

Frans Timmermans, Executive Vice-President of the European Commission



93%

of Europeans see
climate change as
a **serious problem**



93%

of Europeans have **taken**
at least one **action**
to tackle climate change



79%

agree that taking action
on climate change will
lead to innovation

THE EUROPEAN GREEN DEAL INVESTMENT PLAN

Mobilising at least **€1 trillion** of investments over the course of 10 years, thanks to the combined:

- capital from EU and national budgets;
- public and private investments;
- additional measures to facilitate and boost green public and private investment;
- attractive investment conditions;
- technical assistance to help investors in selecting sustainable projects.



25% of all European Union funding for climate measures



30% of InvestEU to projects that fight climate change



Stimulating green investments with support from the EIB Group

The Green Deal: target and actions

The EU will be climate neutral in 2050. Reaching this target will require action by all sectors of our economy:

- ▶ **ENERGY** - decarbonise the energy sector. The production and use of energy account for more than 75% of the EU's greenhouse gas emissions
- ▶ **BUILDINGS** - renovate buildings, to help people cut their energy bills and energy use. 40% of our energy consumption is by buildings
- ▶ **INDUSTRY** - support industry to innovate and to become global leaders in the green economy. European industry only uses 12% of recycled materials
- ▶ **MOBILITY** - roll out cleaner, cheaper and healthier forms of private and public transport (25% of our emissions)

The Green Deal purposes for the rest of the world

The EU will:

- > **Work with Africa** to bring climate and environment issues to the centre of our relations.
- > **Engage with G20** countries who are responsible for 80% of global greenhouse gas emissions.
- > Following the Poznan Summit, set up a Green Agenda for the **Western Balkans**, mirroring the Green Deal.
- > Establish environment, energy and climate partnerships with the **Eastern Partnership** and **Southern Neighbourhood**.
- > Build Green Alliances with partner countries and regions in **Latin America, the Caribbean, Asia and the Pacific**.



The H2020 ENABLING Project

- ▶ Itabia is the Technical Coordinator of the H2020 Project **ENABLING** (2017 - 2020)
- ▶ The **ENABLING** Project “Enhance New Approaches in Biobased Local Innovation Networks for Growth” (CSA - Coordination Support Action), aims to stimulate the BBPs - Biobased products market by facilitating contacts between agricultural (biomass producer) and industrial sector (transformer) and final users

Green Deal and ENABLING Project: affinity and convergence

- ▶ The **Green Deal** underlines the need to "mobilize industry" for a transition of production systems from the linear approach of the past to a modern and "circular" one
- ▶ The **ENABLING Project** helps to make the Green Deal aspirations concrete

The ENABLING Project

COUNTRY	PARTNER
Austria	EEE
Belgium	BB Projecten
Belgium	Euknow
Bulgaria	BGBIOM
Czech Republic	Wirelessinfo
France	ACTIA
Germany	EPC
Greece	Core Innovation
Ireland	Celignis
Israel	Migal
Italy	ITABIA
Italy	Federunacoma
Italy	Tinada
Norway	Vestlandsforsk
The Netherlands	ZLTO
UK	C&A

Coordinator

Federunacoma & ITABIA

Partnership

16 Partners from 13 Countries

Budget

€ 2.000.000

Project life

3 years



The aims of ENABLING Project

Strategic actions of Enabling Project aim to:

- ▶ facilitate the bioeconomy growth by reducing the gap from biomass producers to researchers, industrial transformers and final users
- ▶ valorize raw materials of biological origin with focus on rural residues destined to promising sectors as green chemistry, textiles, automotive, nutraceutical and green building

The purposes of ENABLING activities

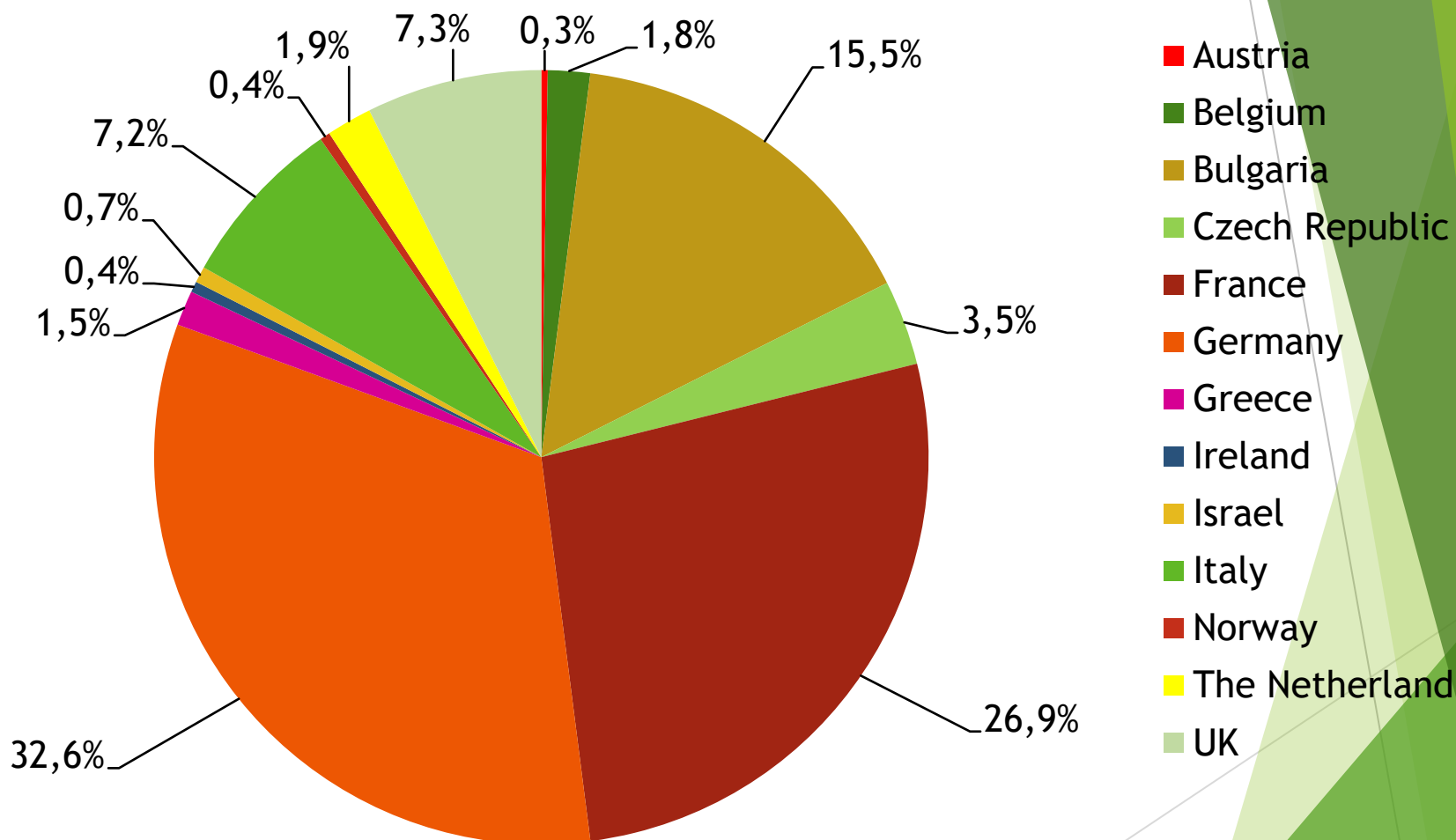
The ENABLING activities aim to:

- ▶ estimate the availability of residual biomass (WP2)
- ▶ identify the key stakeholders - from rural to industrial sectors - in order to facilitate the local Biomass exploitation (WP3)
- ▶ extend and strengthen the network among private and public partnerships with the support of research centers (WP3, WP4, WP6)
- ▶ select the Best Practices about the biomass exploitation for the BBPs sector (WP3)
- ▶ transfer the suitable know-how concerning the technological and regulation on BBPs and Biomass sectors (WP4, WP5)
- ▶ ensure the knowledge dissemination at the national and European level (WP5)

Potential of biomass residues in ENABLING's Countries (WP2)

Country	Biomass residues potential (t/year)		
	Agriculture	Agro-industry	Total
Austria	719,200	205,200	924.400
Belgium	1,084,058	5,014,664	6.098.722
Bulgaria	53,965,372	nd	53.965.372
Czech Republic	8,888,738	3,423,000	12.311.738
France	81,310,000	11,926,000	93.236.000
Germany	95,031,520	18,106,000	113.137.520
Greece	5,085,692	nd	5.085.692
Ireland	1,136,600	425,000	1.561.600
Israel	2,235,000	100,000	2.335.000
Italy	21,894,588	3,077,377	24.971.965
Norway	788,400	697,838	1.486.238
The Netherland	6,593,383	nd	6.593.383
UK	25,430,948	nd	25.430.948
Total	304,163,499	42,975,079	347,138,578

Potential of biomass residues in ENABLING's Countries (WP2)



Potential of biomass residues in Italy

	Biomass residues potential (t/year)			
	Agriculture	Agro-industry	Total	%
Northern Italy	13.132.966	1.228.249	14.361.215	57.5
Central Italy	3.316.313	317.929	3.634.242	14.6
Southern Italy	5,445,309	1,531,198	6,976,508	27.9
ITALY	21,894,588	3,077,377	24,971,965	

Estimates made with a territorial detail (region and provinces)

- ▶ Northern Italy: Val d'Aosta, Piemonte, Lombardia, Trentino A.A., Veneto, Friuli V.G., Liguria, Emilia Romagna
- ▶ Central Italy: Toscana, Marche, Umbria, Lazio, Abruzzo
- ▶ Southern Italy: Molise, Campania, Calabria, Puglia, Basilicata, Sicilia, Sardegna

- ▶ **Potential Biomass:** residues fraction calculated by applying specific coefficients (residues/hectare) to areas cultivated for different and specific crops
- ▶ **Available Biomass:** residues fraction derived from potential biomass which is economically and technically possible to collect

Which biomass residues?

Herbaceous and vegetable residues from 27 crops including:

- ▶ Soft and durum wheat (straw)
- ▶ Barley (straw)
- ▶ Oats (straw)
- ▶ Rice (straw)
- ▶ Corn (stalks and cobs)
- ▶ Sunflower (stalks)
- ▶ Potatoes (stems and leaves)
- ▶ Tomato (stems and leaves)



Which biomass residues?

Tree crops residues from 23 crops including:

- ▶ Olive (wood and prunings)
- ▶ Vine (prunings)
- ▶ Apple (wood and prunings)
- ▶ Pear (wood and prunings)
- ▶ Peach (wood and prunings)
- ▶ Citrus fruits (wood and prunings)
- ▶ Almond tree (wood and prunings)
- ▶ Hazel (wood and prunings)
- ▶ Apricot (wood and prunings)
- ▶ Actinidia (prunings)

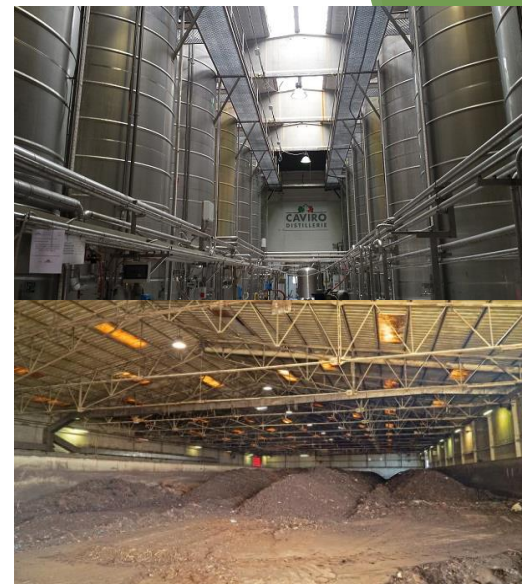


Which biomass residues?

Residues from agro-industry processes:

- ▶ Olive oil (exhausted pomace)
- ▶ Wine (skins, seeds, stalks and marc)
- ▶ Rice (husk and processing waste)
- ▶ Citrus fruits (pulp and skins)
- ▶ Tomatoes (peelings, process wastes)
- ▶ Potatoes (skins and process wastes)
- ▶ Drupaceae * (pulp, kernels)
- ▶ Legumes (vegetable wastes)
- ▶ Apples, pears, kiwis, etc. (skins and process wastes)

* (*Peaches, plums, apricots, cherries*)



Biobased industries in Italy

Region	n. of Biobased industries
Emilia-Romagna	8
Piemonte	6
Lombardia	6
Sicilia	5
Puglia	4
Toscana	3
Campania	3
Sardegna	3
Liguria	3
Veneto	2
Marche	2
Lazio	2
Trentino	1
Umbria	1
Calabria	1
ITALY	50

Work in progress:

The SMEs operating in the Bioeconomy sector (BBI) are continuously increasing in number and located in most of Italian regions

BBI production sectors in Italy

Production sector	n. of Biobased industries
Cosmetics	12
Energy	8
Bioplastics	7
Green building	7
Chemistry	6
Nutraceutical	4
Textile	3
Lubricants	3
Feed	3
Fertilizers	3
Natural paints	2
Packaging	2
Paper	1
Pharmaceuticals	1

Work in progress:

Most of the BBI Italian companies operate in various production sectors offering a diversified range of products on the market

Dissemination of best practices

More than 130 sustainable and replicable EU BBP (Biobased Products and Processes) best practices have been collected in a “Best Practices ATLAS TOOL” by all partners:

<https://www.enabling-project.com/platforms#best-practices-atlas>

- ▶ In Italy 20 Best Practices pathways were selected and described in datasheets included in the ATLAS
- ▶ 5 videos about Best Practices pathways were also shot and edited:

<https://www.youtube.com/channel/UCL5bI-7mrqaxV0EgtnVjZZg>

Citrus fruits and Bioeconomy

The global citrus production is around **146 million tons/year**

Italy is one of the major producers:

- ▶ **7th in the world**
- ▶ **3rd in the Mediterranean basin**



Country	Production (t/year)
Cina	38,000,000
Brasil	19,000,000
India	12,000,000
Mexico	8,000,000
USA	7,500,000
Mediterranean basin	
Spain	7,000,000
Egipt	4,800,000
Italy	2,900,000
Morocco	2,000,000

Data source: Faostat 2016

Citrus fruits and Bioeconomy

- ▶ Italian citrus production is around 3 million tons per year, more than half located in Sicily
- ▶ About **1 million tons** of citrus production is intended for the food industry, with byproducts/waste production over **600 thousand t/year**

Region	Crop (ha)	Production (t/year)	Industry (35%) (t/year)	Residues (60%) (t/year)
Sicily	78,159	1,600,000	560,000	336,000
Calabria	35,829	760,000	266,000	159,600
Puglia	9,186	200,000	70,000	42,000
Basilicata	5,775	112,000	39,200	23,520
Sardinia	5,100	73,000	25,550	15,330
ITALY	137,648	2,900,000	1,015,000	609,000

Source: data elaborated by ITABIA on database of Italfruit 2018 - ISMEA

Citrus pulp valorization

Small quantities of **Citrus by-products** deriving by food processes (non-marketable fruits and pulp) are used for:

- ▶ **organic fertilizers**
- ▶ **livestock feed**
- ▶ **source of pectin**

Most of the mentioned by-products are still considered **wastes**, with disposal costs ranging from **30 to 60 €/ton**



Citrus pulp valorization

The citrus fruit pulp is made up of **peels (60%)**, **seeds (30%)** and **pulp (5%)**

It contains:

- ▶ **Polysaccharides** (pectin, cellulose)
- ▶ **Sugars** (glucose, fructose)
- ▶ **Polycarboxylic organic acids** (citric, maleic)
- ▶ **Lipids and fatty acids** (oleic, linoleic, palmitic)
- ▶ **Essential oils** (flavonoids, carotenoids, limonoids)
- ▶ **Vitamin C and B complex**

It's wrong to consider it as waste!



Video n.1: BIONAP

- ▶ **Founded since 1997** - Headquarters placed in Belpasso (CT)
- ▶ **Production:** about 100 tons/year of active components extracted from raw materials (residues) from local agriculture
- ▶ **Target sectors:** nutraceutical, cosmetic industry, veterinary products
- ▶ **Residual biomass used yearly:**
 - 200,000 l/y of vegetation water
 - 400 t/y of olive leaves
 - 100 t/y of prickly pear cladodes
 - 100 t/y of citrus fruit pulp



Video n.1: BIONAP

- ▶ **Raw materials treatment:**
extraction, purification, filtration, freeze-drying
- ▶ **By-products production:**
disposal waste into the field as organic matter for improving the soil quality
- ▶ **Staff employed:**
50 employees (including pharmaceutical chemists, biologists and technologists), and a wider induced on the territory
- ▶ **Outlet markets:**
5% national, 15% EU, 80% USA and Asia
- ▶ **Revenues:**
8,5 Mln euro in 2017 and 10 Mln Euro in 2018



Video n.2: AB Group

- ▶ Biogas plant: Power 600 kW_e, and heating the closer greenhouses by using the heat waste during the winter
- ▶ Residual biomass yearly used: 23,000 tons of
 - citrus fruit paste
 - olive pomace
 - manure
 - whey
 - silage (max 5%)



Prickly pear in Sicily

- ▶ San Cono, 2,000 hectares cultivated with prickly pear
- ▶ pruning production up to 60 t/ha per year
- ▶ Residual biomass: 120,000 t/year
- ▶ Azienda Spitale owns 120 hectares cultivated to prickly pear with a cladodes production of 7,200 t/year



Video n.3: BIOINAGRO

- ▶ Founded since 2017 - Headquarters placed in Licata (AG)
- ▶ The company processes residues and other agricultural raw materials rich in active ingredients as antioxidants, vitamins, fibers and useful metabolites, interesting for green chemistry as well as health and wellness sector
- ▶ Used biomass:
 - Prickly pear cladodes pruning (60 t/year)
 - Hemp
 - etc. . .



Video n.3: BIOINAGRO

- ▶ **Business pathway:** Farms - Biorefinery - Green Industry
- ▶ **Sectors:** Nutraceuticals, cosmetics, green building, bioenergy
- ▶ **Operators involved:** Farmers' consortium
- ▶ **The cladodes market:** 10% national, 90% EU Countries (Germany, Austria, France)

New Mazzarino's biorefinery (currently under construction) will consolidate BIOINAGRO business to the national and local levels by valorizing the local supply chain



The purposes of today's webinar

- ▶ to stimulate discussions among stakeholders
- ▶ to provide indications about improving the exploitation of rural biomass toward the most promising bioeconomy sectors
- ▶ to increase the available **ENABLING** database
- ▶ to inform the stakeholders about **ENABLING** tools and stimulate the Biomass vs BBPs market growth
- ▶ to disseminate the Best Practices about integrated biorefineries in the local territories

Thanks for your attention

Vito Pignatelli - President of ITABIA

Website: <https://www.enabling-project.com/>