

EIT Raw Materials HUB Regional Center ADRIA

Learning and Education
ADRIA Internship Programme



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This activity has received funding from the European Institute of Innovation and Technology (EIT), a body of the European Union, under the Horizon 2020, the EU Framework Programme for Research and Innovation



Final student presentation

Implementation of 2020 ADRIA Internship

Student name: Lucia Garzia

Student home university: Università del Salento

Student e-mail address: luciagarzia92@gmail.com,
lucia.garzia@studenti.unisalento.it

Name of the organisation:

Address of the organisation: Via Bartolomeo Ravenna, 65
Parabita (LE) 73052

Date / location: Parabita, 05/01/2022



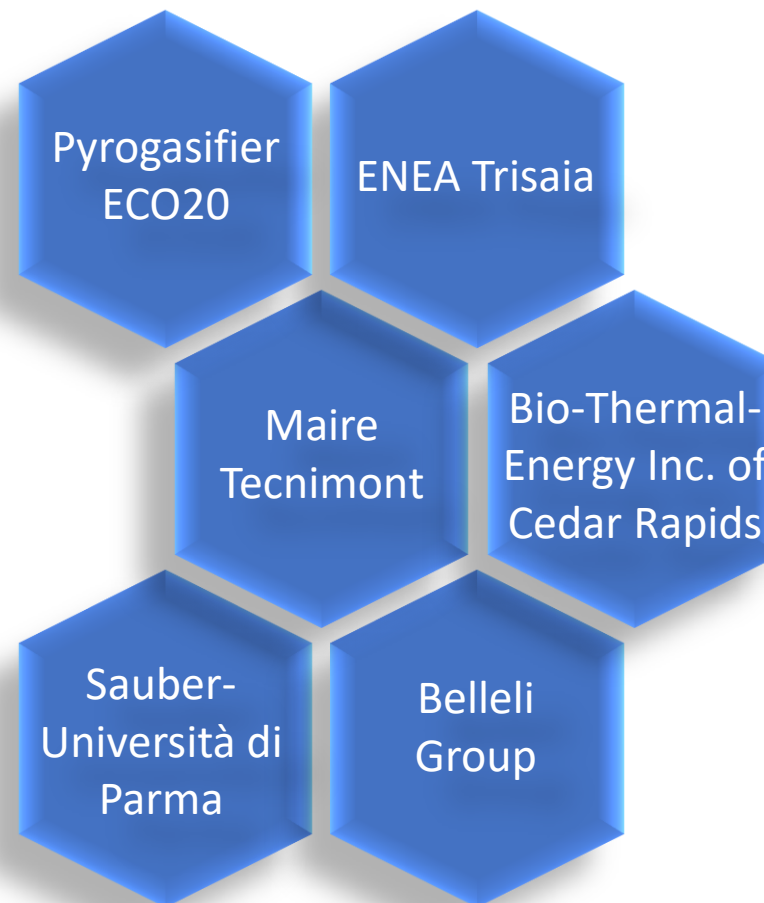
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Structure of the presentation

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Basic information on the Internship

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Basic information on the Internship

Name of the Intern:	Lucia Garzia
Educational background of the Intern:	Bachelor degree in Chemical engineering; student of Master's course (Materials Engineering and Nanotechnology)
Name of the organisation:	ABIS Srl
Name of the mentor:	Monica Bianco
Duration of the Internship (from - to):	01/12/2021-31/12/2021
Location of the Internship (city, country):	Parabita (Italy)



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Gantt chart

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Bio-Refining of waste biomass for waste-To-Chemical: State of the Art

project beginning : 1 December 2021

TASKS	GIVEN TO	PROGRESS	BEGINNING	END	2021-11-29		2021-12-06					2021-12-13					2021-12-20					2021-12-27																	
					29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2
					m	t	w	t	f	s	s	m	t	w	t	f	s	s	m	t	w	t	f	s	s	m	t	w	t	f	s	s	m	t	w	t	f	s	s
Task nr. 1	Lucia Garzia	100%	2021-12-01	2021-12-06			■	■	■	■	■																												
Task nr. 2	Lucia Garzia	100%	2021-12-01	2021-12-31			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■		

Task nr. 1: joining the creation of a presentation for a meeting with AVIO

Task nr. 2: research activity on the selected topic



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Company work process / processes

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CRF mission: *"Restanza"*

Encourage young people to stay in their native territory, creating opportunities for development and qualified work.



It's a research body which operates to orient the results of public research towards mission projects

CRF activity

- ❖ Applied Research
- ❖ Improving of the culture of innovation and the creation of new businesses with a particular interest in circular economy
- ❖ Incubation and acceleration of new startups



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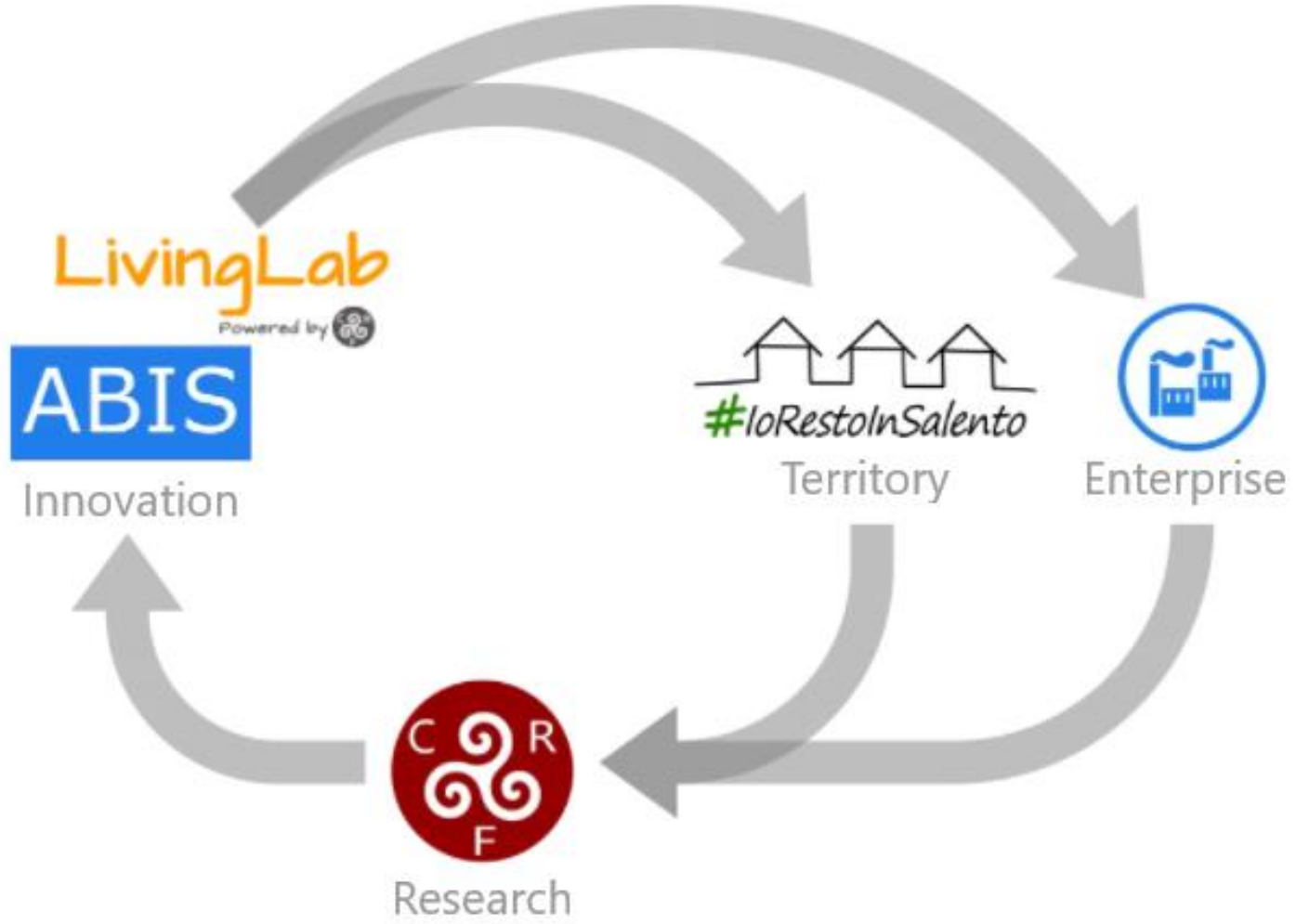
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ABIS (Adaptive Business Intelligence System) is a digital operation platform for supporting business processes.



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Specific Intern's work tasks

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Looking for scientific articles, academic studies, news about innovative plants to create a sort of review.



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Intern's level of responsibility

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As internship students, we were equal with all personnel in research operations, and therefore responsible for:

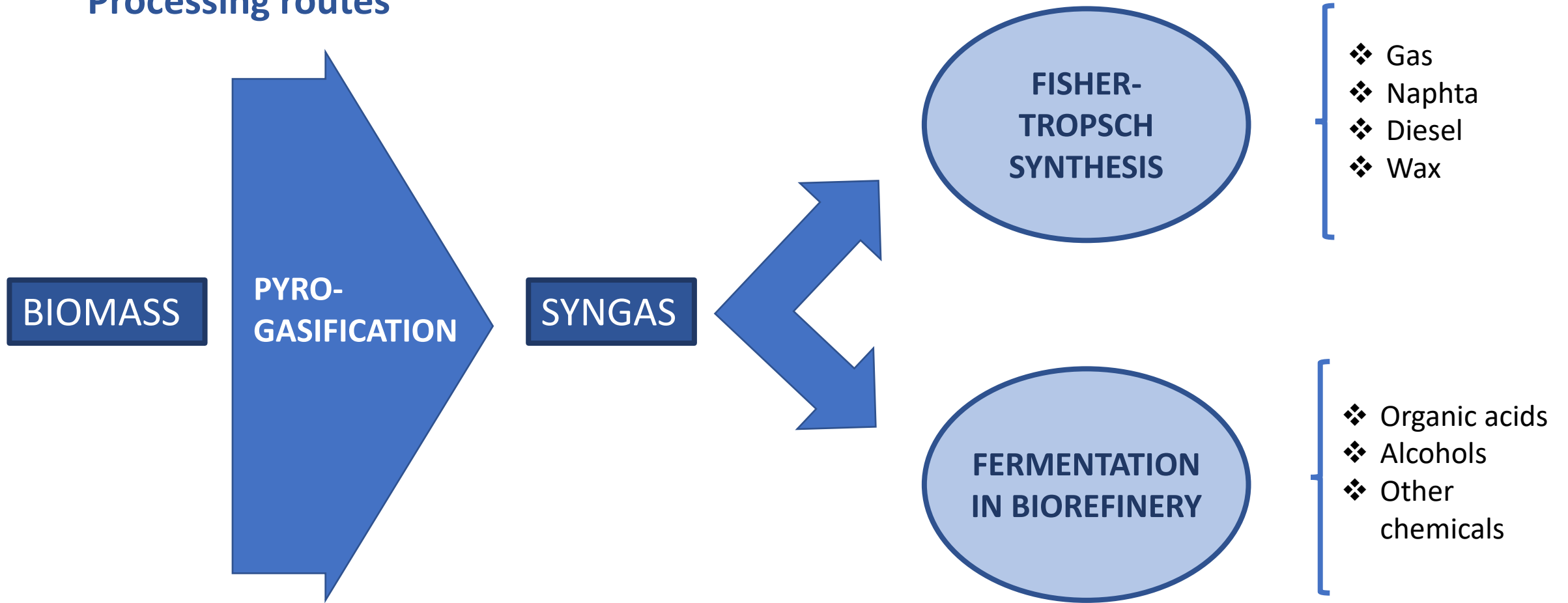
- following oral and written safety rules, regulations, and standard operating procedures required for the tasks
- assigned;
- take care of the work equipment;
- adopt the right practices to ensure cyber security;
- reveal to other people information about the work of the research organization;
- keeping work areas safe and uncluttered;
- obtaining prior approval from the supervisor for the use of particular equipment and supplies;
- informing the supervisor of any work modifications;
- providing results of the work with high accuracy;
- performing all the assignments in within the required time.

Results and Discussion (1)

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Processing routes



Results and Discussion (2)

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Fisher-Tropsch synthesis

The Fischer Tropsch process allows the production of a wide range of hydrocarbon liquid products (olefins, paraffins, alcohol, aldehydes, ketones, etc.) from synthesis gas, by hydrogenation of CO. These products (raw products) are then subjected to a refining process (upgrading) that leads to the production of diesel, gasoline and more.



These are the main reactions which are involved:



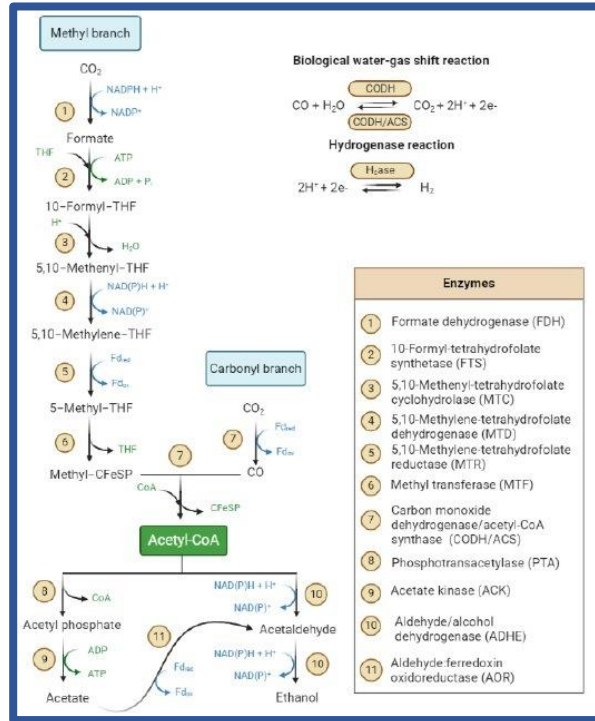
Crucial role of catalyst to improve the process and make it more sustainable

Results and Discussion (3)

The fermentation of syngas

Some bacteria are capable of using CO and/or CO₂ together with H₂ to produce organic acids, alcohols and other chemicals of industrial importance. Most used: **acetogens**.

Despite the wide metabolic diversity of these microorganisms, the Wood – Ljungdahl metabolic pathway is commonly used for the fermentation of syngas.



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cons

- Sensitivity of bacteria to environmental conditions
- Low ethanol productivity
- Limitations in the mass transfer

pros

- The kind of the feeded biomass is indifferent
- A complete conversion of biomass is achieved
- Much lower cost of the feedstock
- High selectivity for ethanol
- Tolerance of bacteria to some contaminants
- Fermentation is conducted at environmental conditions

Results and Discussion (4)

Technology of gasification

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Pyrogasifier ECO20

It allows gasification and the production of energy from wood waste. We have the possibility of producing H₂ green by coupling an ECO20x and an electrolyzer.

ENEA Trisaia

There are different technologies:

- downdraft or updraft fixed bed gasification
- boiling fluidized bed gasification
- multistage gasification
- gasification in supercritical water

Maire Tecnimont

It has also developed a technology from waste to produce methanol. This technology has its roots in the chemical conversion of non-recyclable municipal waste into syngas

Bio-Thermal-Energy Inc. of Cedar Rapids

The process combines landfill gas (essentially CO₂ and methane) with steam in a reformer. The syngas produced goes into a fermenter from which ethanol is obtained

Sauber-Università di Parma

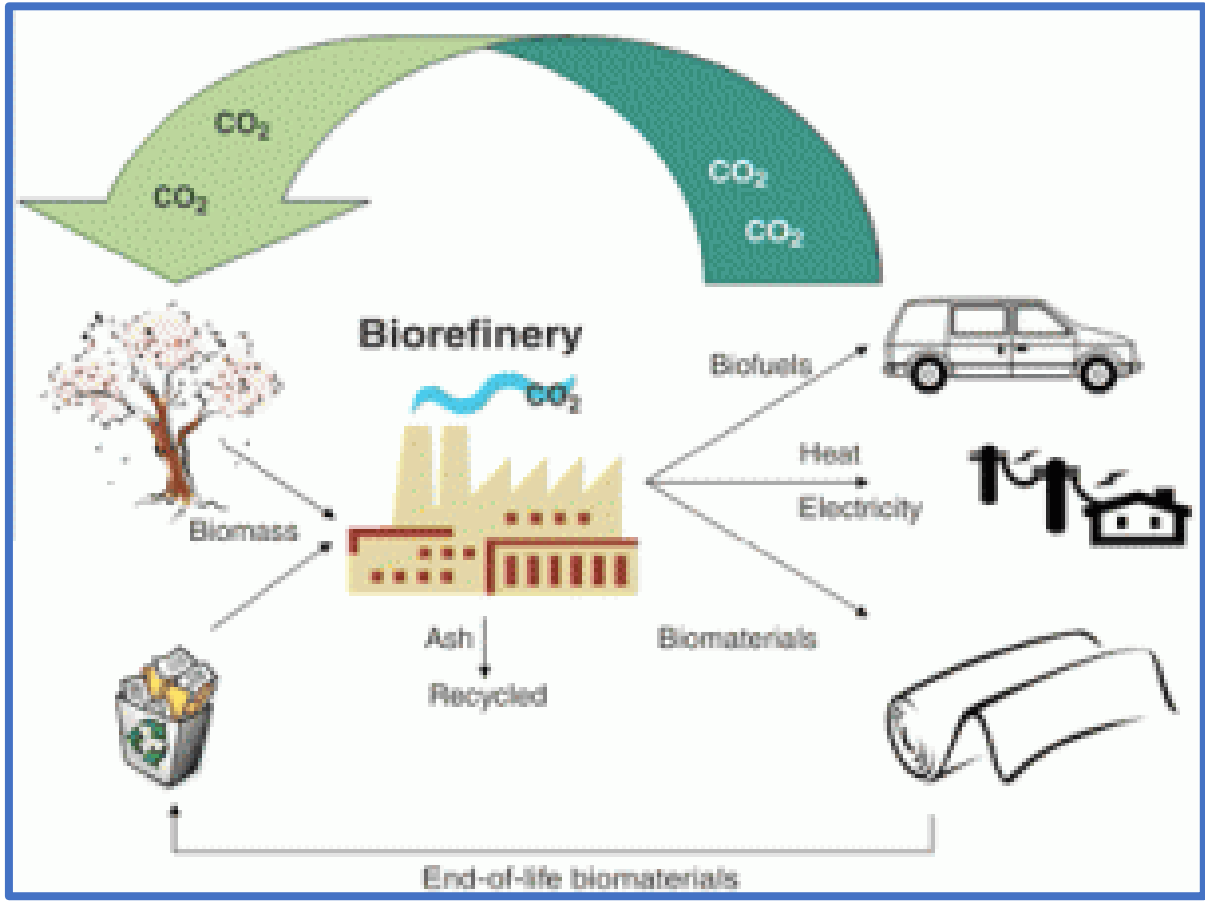
The ultimate goal of this plant is to produce clean energy from agricultural waste and generate quality biochar, to be introduced into the soil, as a soil improver for crops.

Belleli Group

Large PV plants on site convert electricity into the electrolyser producing green hydrogen and then green methane.

Conclusions

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This is a very promising process, but the real challenge is to make it economically competitive so as to allow it to spread on a large scale. It is essential:

- ❖ to be able to integrate the different technologies in the best way;
- ❖ to continue to study the various processes in order to optimize them.



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