



Biomass target 2030/2050 for small and medium cogeneration



Prof. Franco Cotana

(co-chair WG8 – EU - SET Plan)



WG 8- Bioenergy and Renewable Fuels for Sustainable Transport

CRB - CENTRO DI RICERCA SULLE BIOMASSE

UNIVERSITY OF PERUGIA

RESEARCH CENTRE ENEA TRISAIA, 10/10/2019

ACTIVITIES AND LABS



S. Apollinare

- Operative facility
- Pilot Plants



S. Venanzo

- Impianto pilota



Terni

- H2 Fuel cells Labs



Perugia

- Head quarter
- Labs

S. Andrea delle Fratte

- Impianti pilota



Torgiano

- Impianto pilota



S. Angelo di Celle

- Impianti pilota



Casalina

- Campi sperimentali



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Commission



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**CRB – Centro di Ricerca
sulle Biomasse**

Energy



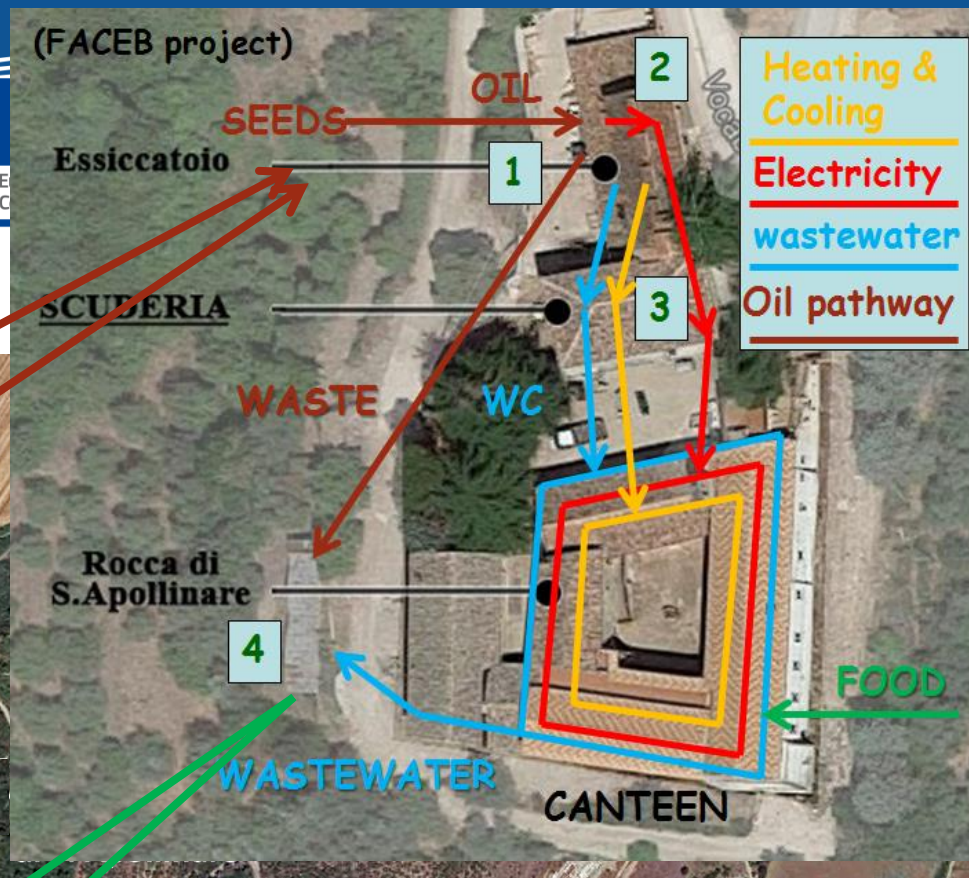
DI

**Dipartimento di
Ingegneria**

CIRCULAR ECONOMY VILLAGE OF S. APOLLINARE

Rocca Monaster

Available agricultural
land
50 ha



1. Seeds milling plant
2. Trigeneration plant
3. LEED-Historical Building
4. Mini biogas plant



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sull'Ambiente - mauro Felli



CIRCULAR ECONOMY – VILLAGE OF S. APOLLINARE



Account Carrello



Circular Economy Village of Sant'Apollinare



HOME

CHI SIAMO
VIRTUAL TOUR

LABORATORIO VIRTUALE ON DEMAND

ATTIVITÀ / EVENTI

CONTATTI



Ex-scuderie: first building in the world certified GBC-HB Italy

The Web SITE:

<http://stage.h24net.eu/santapollinare/>





University of Perugia

Italy

GBC HB LEED PROTOCOL:
«SCUDERIE OF S. APOLLINARE»
THE FIRST CERTIFICATION IN THE WORLD!

prof. dr. eng. Franco Cotana
president of PhD on Energy and Sustainable Development



PhD PROGRAMME

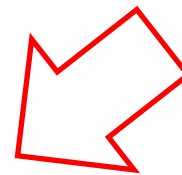
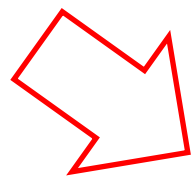


European
Commission



**PhD Programme
in Energy
Engineering**

**PhD Programme
in Rural Sustainable
Development**



**PhD Programme
in Energy and
Sustainable
Development**



Energy





European
Commission

SET-Plan n. 14 implementation plans



**Initiative for Global Leadership
in Concentrated Solar Power**

**Continue efforts to make EU
industry less energy intensive
and more competitive**

**Renewing efforts to
demonstrate carbon capture
and storage (CCS) in the EU
and developing sustainable
solutions for carbon capture
and use (CCU)**

**Initiative for Global Leadership
in Photovoltaics

Implementation Plan**

**Become competitive in the
global battery sector to drive
e-mobility and stationary
storage forward**

**Increase the resilience and
security of the energy system**

**Energy Efficiency Solutions for
Buildings**

**Initiative for Global Leadership
in Deep Geothermal**

**Initiative for Global Leadership
in Ocean Energy**

**Europe to become a global role
model in integrated,
innovative solutions for the
planning, deployment, and
replication of Positive Energy
Districts**

**Bioenergy & Renewable Fuels
for Sustainable Transport**

**Initiative for Global Leadership
in Offshore Wind**

**Smart Solutions for Energy
Consumers**

**Maintaining a high level of safety
of nuclear reactors and associated
fuel cycles during operation and
decommissioning, while improving
their efficiency**



	AT	BE	BG	CY	CZ	DE	DK	EE	ES	FI	FR	EL	HR	HU	IE	IT	LT	LU	LV	MT	NL	PL	PT	RO	SE	SI	SK	UK	CH	IS	NO	TR	EU																														
SET Plan IWGs	C: Chair, Y: Participate																																																														
1&2 Photovoltaics		Y		Y		C		Y	Y		Y					Y						Y									Y	Y																															
1&2 CSP		Y		Y		Y			C		Y					Y							Y										Y																														
1&2 Offshore Wind		Y				Y	Y	Y	Y		Y				Y	Y						C						Y				Y	Y																														
1&2 Geothermal		Y				Y			Y		Y					C						Y		Y					Y	C			Y																														
1&2 Ocean		Y		Y		Y			Y		Y				C	Y								Y		Y			Y																																		
3.1 Consumers	Y			Y		Y				Y						Y							Y		Y								Y																														
3.2 Smart Cities	C	Y		Y	Y	Y			Y	Y	Y					Y			Y			Y		Y		Y		Y	Y			Y	Y																														
4 Energy Systems	C	Y		Y		Y			Y	Y	Y				Y	C			Y			Y				Y			Y			Y	Y																														
5 EE Buildings	Y	Y				C					Y					Y										Y								Y																													
6 EE in Industry	Y	Y		Y	Y	Y			Y	C	Y				Y	Y			Y			Y	Y	Y		Y		Y	Y	Y	Y	Y	Y																														
7 Batteries (Transitioning to ETIP Batteries)	Y	Y				Y			Y		C					Y										Y			Y			Y	Y																														
8 Bioenergy	Y	Y		Y		Y			Y	C	Y					C						Y		Y		Y								Y																													
9 CCUS						Y		Y	Y		Y			Y		Y						C				Y			Y			C	Y																														
10 Nuclear Safety		C			Y				Y	Y	C			Y		Y	Y					Y	Y		Y		Y		C	Y			Y																														
ERA-NETS *	C: Coordinator, Y: Participation, In case of partial participation, it is indicated accordingly																																																														
1&2 Photovoltaics (ERA-NET Solar 1 & Solar 2)	Y	S 2		Y		Y			Y		Y	S 2				2							Y	Y			Y				C			Y																													
1&2 CSP (ERA-NET Solar 1 & Solar 2)	Y	S 2		Y		Y			Y		Y	S 2				2							Y	Y			Y				C			Y																													
1&2 Offshore Wind (DemoWind 1 / DemoWind 2)		DW 1					Y		Y														Y		Y					C			DW 2																														
1&2 Geothermal (GEOTHERMICA)		Y				Y	Y		Y		Y				Y	Y						Y		Y	Y		Y			Y	C			Y																													
1&2 Ocean (OCEANERA-NET)									Y						Y									Y		Y			C																																		
3.2 Smart Cities (ENSCC)	C	Y							Y	Y												Y		Y	Y	Y	Y			Y	Y	Y	Y																														
4 Energy Systems (SmartGridPlus (SG+) / RegSys(RS))	C	Y				Y	Y		Y	SG+	Y		Y	RS	RS	Y						Y	Y	SG+	Y	Y	SG+		Y	Y	Y	Y	Y																														
8 Bioenergy (BESTF 1 & BESTF 2 & BESTF3)	B 3					Y	Y		Y	B 1&3												B 2&3	3	1		Y			C	1																																	
9 CCUS (ACT)						Y			Y			Y										Y			Y				Y	Y		C	Y																														
* 1. GeoERA, 2. ERA-NET Smart Urban Futures & 3. ERA-NET Sustainable Urbanisation - Global Initiative are not included as they are not directly addressing SET Plan Actions.																																																															
ETIP	C: Chair, VC: Vice-Chair, SC: Steering Committee, AB:Advisory Board/Coordination Group, Y: Member																																																														
1&2 Photovoltaics **	Information on EU MS representaion not explicitly available																																																														
1&2 Offshore Wind **	Information on EU MS representaion not explicitly available																																																														
1&2 Geothermal **						Y					VC					C						VC									Y																																
1&2 Ocean **		Y							Y		Y				Y	Y										Y			Y																																		
4 Energy Systems (ETIP SNET)	C					VC																																																									
5 EE Buildings (ETIP RHC) **	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y																														
7. Batteries	Kick-off foreseen for June 2019																																																														
8 Bioenergy **	AB	SC				SC+AB	SC		AB	SC	SC	AB				SC						SC+AB	SC	SC		SC+AB		AB			SC+AB	AB																															
9 CCUS (ETIP ZEP) **	Y	Y				Y		Y	Y	Y	Y	Y		Y	Y	Y			Y			Y	Y		Y			Y	Y			Y																															
10 Nuclear Safety (ETIP SNETP)**	Information on EU MS representaion not explicitly available																																																														

WG 8- Bioenergy and Renewable Fuels for Sustainable Transport SET PLAN



ANNEX IV – Working Group Composition

SET Plan Temporary Working Group (TWG) Action 8: Renewable fuels and Bioenergy

National Representatives (Countries)

FI (TWG CHAIR)	Shared chairmanship with IT: Timo RITONUMMI
IT (TWG CHAIR)	Shared chairmanship with FI: Franco COTANA
FR	Xavier MONTAGNE Alternate: Jean Christophe VIGUIE
AT	Theodor Zillner Alternate: Kurt Pollak
BE	Laurence POLAIN Alternate: Lut BOLLEN
CY	Alex LUPION-ROMERO Alternate: Paris FOKAIDES
DE	Birger KERCKOW Alternate: Katja Tschetschorke TSCHETSCHORKE (ALTERNATE)
ES	Carlos Garcia Barquero Alternates: Pilar Gonzalez Gotor M. Luisa Revilla
NL	Kees Kwant
PT	Isabel CABRITA Paulo PARTIDARIO
SE	Greger LEDUNG (MEMBER) Alternate: Jonas LINDMARK
TR	Çağrı YILDIRIM (MEMBER) Alternate: İlnur YILMAZ

Stakeholders

ETIP Bioenergy (TWG Co-Chair)	René Venendaal (CHAIR) Ingvar Landälv (Lulea) Bjorn Fredriksson Moeller (EON – chair alternate)
ETIP RHC	Rainer Janssen
EERA Hydrogen	Peter Holtappels Stephen Mcphail
EERA Bioenergy	Juan Carrasco
FCH-JU	LYMPEROPOULOS Nikolaos
EUBIA	Drilona Shtjefni Giuliano Grassi
EPPSA	Ermenegilda Boccabella Maria Joao Duarte Patrick Clerens
EBA	Martina Conton Patrick Wellinger
Neste	Sari Kuusisto
DONG energy	Niels Henriksen
Technical Research Centre of Finland Ltd (VTT)	Eija Alakangas Niels-Olof Nylund Antti Arasto
IFP Energies Nouvelles (IFPEN)	Gilles FERSCHNEIDER Jean Christophe Viguié
Ente Nazionale Idrocarburi (ENI (Italy))	Alberto Del Bianco
Fraunhofer Institute for Environmental, Safety, and Energy Technology (UMISICHT)	Andreas Hornung
European University Association	Borana Taraj
EC Participants	
DG JRC D.1	Luisa MARELLI



SET Plan Implementation Plan

Action 8: Bioenergy and Renewable Fuels for Sustainable Transport

IP APPROVED: JUNE 2018

DG RTD G.3	Maria GEORGIAIOU
DG RTD G.3	Thomas SCHLEKER
DG ENER C.2	Kyriakos MANIATIS
Support and Consultation	
DG JRC C.4 –Senior active	Heinz OSSENBRINK
ETIP BIOENERGY - Chair of Work Group 2	Lars WALDHEIM

WG 8- Bioenergy and Renewable Fuels for Sustainable Transport

5 Strategic Targets

Renewable Fuels for Sustainable Transport

- 1. Improve production performance
- 2. Improve GHG savings
- 3. Reduce Costs

Bioenergy

- 1. Reduce conversion system costs
- 2. Improve performance and reduce GHG emissions by increasing efficiency

WG 8- Bioenergy and Renewable Fuels for Sustainable Transport

Bioenergy – STRATEGIC TARGETS 2030

1. Reduce conversion system costs for high efficiency (i.e. for district heating systems) * large scale biomass cogeneration of heat and power:

by **20%** in 2020 and **50%** in 2030

2. Improve performance and reduce GHG emissions by increasing efficiency:

Obtain net efficiency of biomass conversion to intermediate bioenergy carriers of at **least 75% by 2030** with GHG emissions **reduction of 60%** from use of all types of intermediate bioenergy carrier products resulting to a contribution to at least 4% reduction of the EU GHG emissions from the 1990 levels.

*(>70% based on net calorific value of which >30% electrical)

WG 8- Bioenergy and Renewable Fuels for Sustainable Transport

SET Plan PRIORITIES

Renewable Fuels for Sustainable Transport

- **Advanced biofuels**
- **Other renewable liquid and gaseous fuels**
- **Renewable Hydrogen**
- **Bioenergy**
- **Intermediate Bioenergy Carriers**

WG 8- Bioenergy and Renewable Fuels for Sustainable Transport

SET Plan PRIORITIES

Bioenergy

- # **Develop** high efficiency (large scale) biomass cogeneration of heat and power
- # **Demonstrate** high efficiency (large scale) biomass cogeneration of heat and power
- # **Scale-up** high efficiency (large scale) biomass cogeneration of heat and power

BIOENERGY AND RES - RENEWABLE ENERGY SOURCE

Contribution of Renewable Energy Technologies to final energy consumption (Mtoe)

				2020		2025		2030	
	2005	2010	2015	Baseline	Advanced	Baseline	Advanced	Baseline	Advanced
Wind	6	14,7	25,8	42,5	55,1	64,2	75	86	95
Hydro *	29	29,8	30,6	31,8	34	32,5	33,9	33	34,2
PV	0,2	1,7	4,5	7,2	11,5	21,9	27,5	36,6	44
Bioenergy	60	82,2	103,8	134,5	145	184,5	200,5	236	255
Geothermal	1,1	2,4	4,1	7,5	17,5	17,6	30,1	28,4	42
Solar Thermal	0,7	1,4	3	6,3	10,5	37	46	68	81
CSP	0	0,09	0,8	1,7	2,2	5	8,5	8,4	15
Ocean	0,09	0,09	0,8	0,5	0,7	1,3	3,4	2	6
Total RES	96	132,3	173,4	232	276,3	364	424,9	498,4	572,2
Total share of RES (%)	8,5%	11,3%	14,3%	19-20%	23-24%	30%	35%	41-42%	47-48%

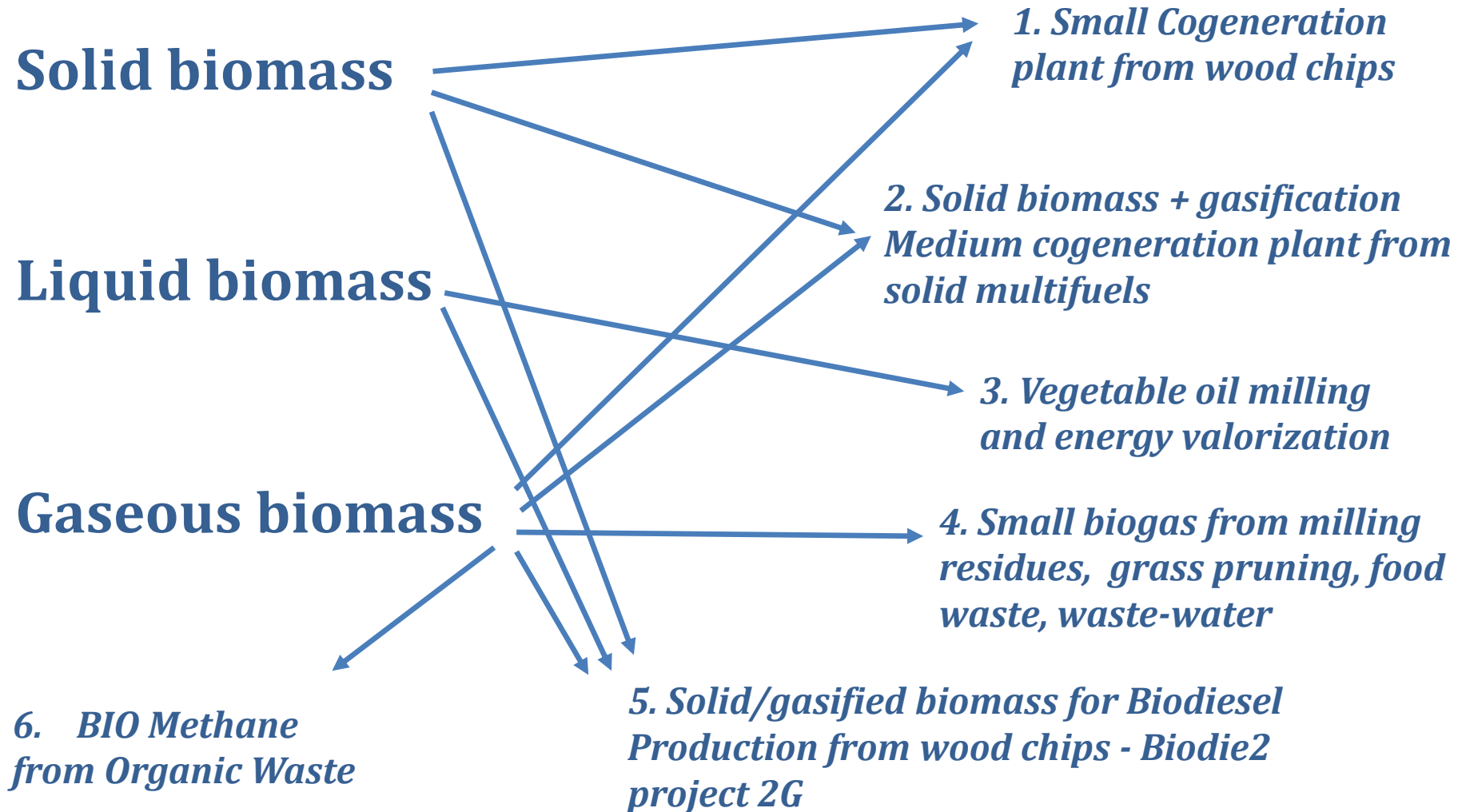
Source: EREC, "45% by 2030"

*excluding pumped storage



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Examples: Prototypes and commercial plants



1. Small Cogeneration Gassif. plant from wood chips

Commercial plant – Magione (PG)

Operating in the last 3 years >7.500h/y

$P_e = 50 \text{ kW}_e$ POWER

$P_t = 110 \text{ kW}_t$ HEAT



2. Solid biomass gasification + turbine plant

Medium cogeneration plant from solid multifuels

prototype plant – Perugia

Output power: $P_e = 100 \text{ kW}_e$

Thermal input: $P_t = 800 \text{ kW}_t$



2. Solid biomass + gasification turbine plant

Medium cogeneration plant from solid multifuels
prototype plant - Perugia

Output power: $P_e = 100 \text{ kW}_e$

Thermal input: $P_t = 800 \text{ kW}_t$



Turbine



Heat
Exchanger

Gasifier
 $T = 900^\circ\text{C}$

Biomass tank
 $V = 8 \text{ m}^3$



3. Vegetable oil milling and Small cogeneration plant - commercial plant – S. Apollinare di Marsciano (PG)

Output power: $P_e = 110 \text{ kW}_e$

Thermal input: $P_t = 150 \text{ kW}_t$

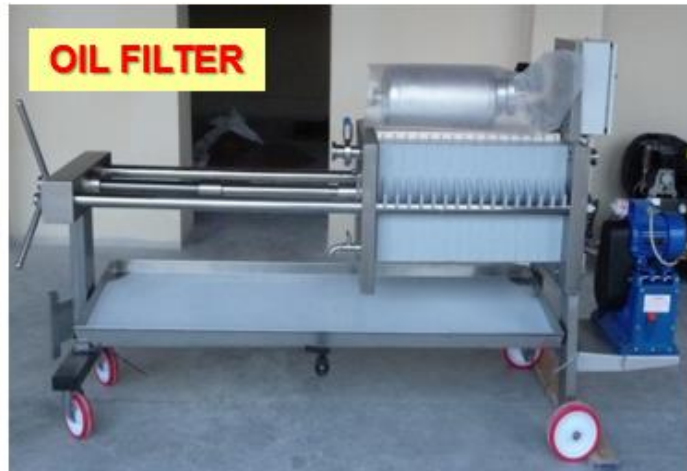


3. Vegetable oil milling

commercial plant – S. Apollinare di Marsciano (PG)

Output power: $P_e = 110 \text{ kW}_e$

Thermal input: $P_t = 150 \text{ kW}_t$



4. Small biogas from milling residues, grass pruning, food waste, waste-water commercial plant – S. Apollinare di Marsciano (PG)

Output power: $P_e = 30 \text{ kWe}$

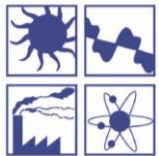
Thermal input: $P_t = 70 \text{ kWt}$



Underground
volume digesters:
21 mc



ALVEI FLUVIALI E CANALI DI BON



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da Agenti Fisici - "Mauro Felli"

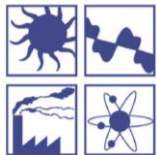


LAGO DI CORBARA



BIOMASSE SPIAGGIATE

Marinella di Sarzana

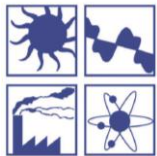


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BIOMASSE SPIAGGIATE



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TERRENI MARGINALI

Biomass, Energy, Landscape from Lignocellulosic and Agriculture Residues

ANNO I – Messa a dimora del CARDO (2 ha)

Mietitrebbiatrice



PAGLIA
14 t/ha



Rotoimballatrice



CARDO CEROSO
0,2 t/g

CRB - S. APOLLINARE

SEMI 1,7 t/ha



Mangime zootecnico

PANELLO
1 t/ha



OLIO
500 l/ha



Bioplastiche

Impianto di spremitura



Impianto di mini biogas



Biomasse
spiaggiate



Alvei fluviali



Manutenzione pertinenze
CRB - SEDE

ANNO II – Sperimentazione

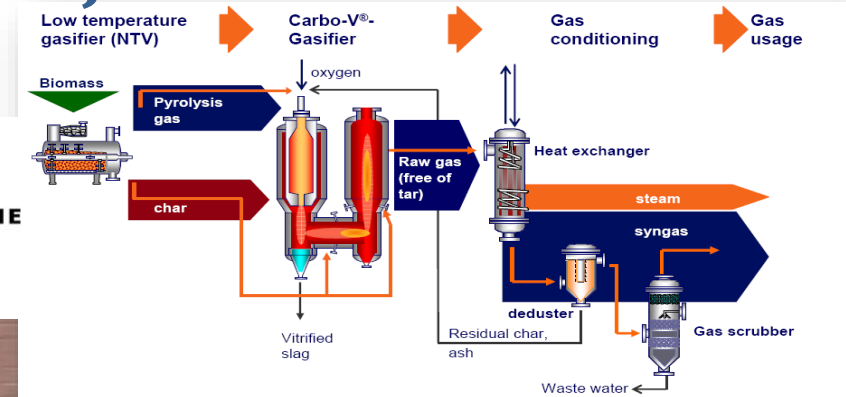


Reattore
Steam
Explosion

Gassificazione e turbina



5. Solid/gasified biomass for Biodiesel Production from wood chips - Biodie2 project - 2G prototype plant - Perugia



LEGENDA

- 1 – Reattore di gassificazione
- 2 – Ciclone depolveratore
- 3 – Tar cracker
- 4 – Venturi-scrubber

5A – Sistema di aspirazione

5B - Torcia

6 – PLC

7 – Gusci ceramici

8A – Sensore di temperatura della zona di pirolisi

8B – Sensore di temperatura della zona di ossidazione

8C – Sensore di temperatura della zona di riduzione

8D – Sensori di temperatura dei reattori di cracking catalitico

8E – Sensore di temperatura del liquido assorbente

8F – Sensore di livello del liquido assorbente

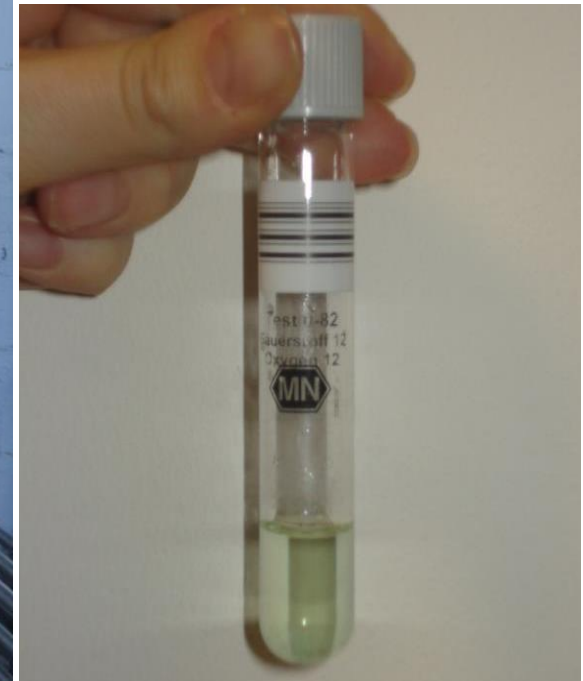
8G – Sensore di ossigeno

8H – Sensore di pressione differenziale (per la determinazione della portata di gas)

5. Solid/gasified biomass for Biodiesel Production from wood chips - Biodie2 project 2G prototype plant - Perugia



MINISTERO DELLE POLITICHE
AGRICOLE ALIMENTARI
E FORESTALI

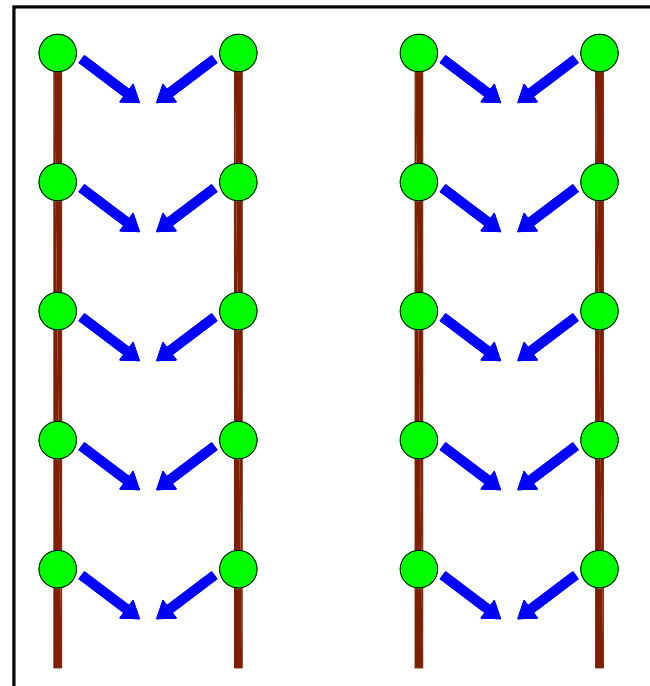
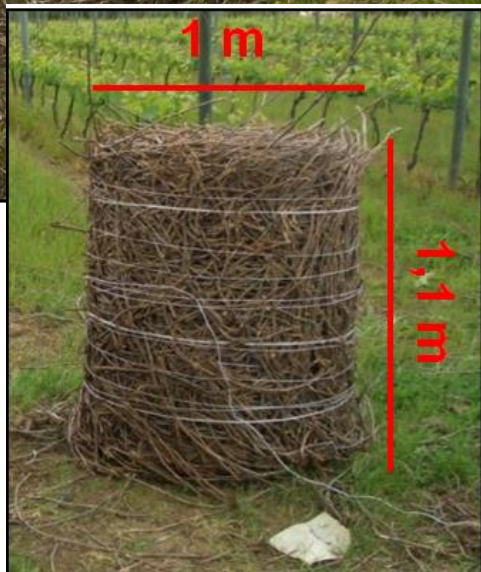


**Sezione di
Fischer Tropsch**

Progetto ERAASPV - Energia Rinnovabile per le Aziende Agricole da Scarti di Potature di Vigneti

FILIERA ENERGETICA DI RECUPERO DEGLI SCARTI DI POTATURE

1-Rotoimballatura



Progetto ERAASPV - Energia Rinnovabile per le Aziende Agricole da Scarti di Potature di Vigneti

FILIERA ENERGETICA DI RECUPERO DEGLI SCARTI DI POTATURE



1-Rotoimballatura



2-Trasporto e stoccaggio



3-Cippatura e stoccaggio

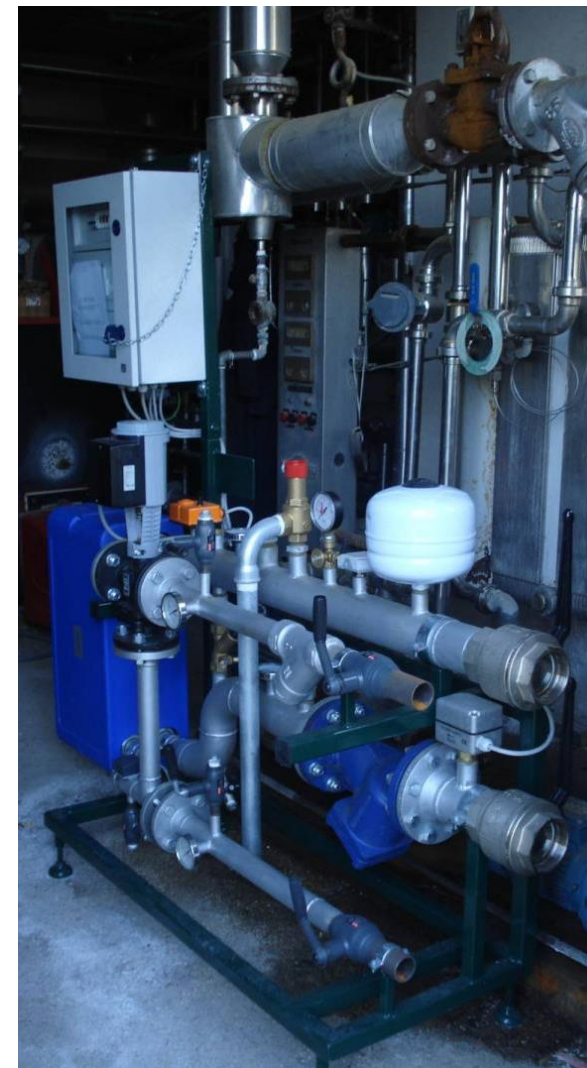


4-Conversione energetica

Progetto ERAASPV - Energia Rinnovabile per le Aziende Agricole da Scarti di Potature di Vigneti

FILIERA ENERGETICA DI RECUPERO DEGLI SCARTI DI POTATURE

4- conversione energetica



Biometane in Italy

FROM Organic Waste

Potential

Produzione di rifiuto: 500 kg/a
Produzione di organico: 250 kg/a
(Rapp. **ISPRA** DA BASE - rifiuti 2018)



60 M ab

ORGANIC WASTE - ITALY FORSU

15 M t/y

Raccolta differenz.

10 M t/y



Imp. a biometano
60.000 t/a FORSU
499 Sm³/h
4 Mm³/a

170 Plants
700 M m³/y

90% CH₄ 2018 attuale
request for transport

n	Località	Gestore	Produzione biometano	Biomassa	Upgrading	Anno
1	Montello, Bergamo	Montello S.p.a.	32 MSm³/Y	600.000 t/a FORSU e Fanghi depur.	Membrana	06/2017
2	Este, Padova	SESA S.p.a.	16 MSm³/Y	400.000 t/a FORSU	Chemical scrubbing	10/2018
3	Pinerolo, Torino	ACEA Pinerolese S.r.l.	0,5 MSm³/Y	7.000 t/a FORSU e fanghi	Water Scrubbing	10/2014
4	Sant'Agata Bolognese	HERA	7,5 MSm³/Y	100.000 t/a FORSU 35.000 t/a verde	Membrana	11/2018
5	Mantova	Elettrocero S.r.l.	5 MSm³/Y	60.000 t/a FORSU e Fanghi depur.	Membrana	In autorizz.
6	Ozegna, Torino	Egea	1 MSm³/Y	Biomasse agricole e zootecniche	Membrana	2015
7	Foligno	Asja ambiente	4 MSm³/Y	53.500 t/a FORSU	Chemical scrubbing	03/2019
8	Finale Emilia, Modena	Aimag	3 MSm³/Y	50.000 t/a FORSU	PSA scrubbing	10/2018
9	Rende, Cosenza	Calabra Maceri S.p.a	4,5 MSm³/Y	40.000 t/a FORSU	Membrana	09/2018

Tot. 73,5 MSm³/Y FROM ORGANIC WASTE 10% OF ITALIAN POTENTIAL

WG 8- Bioenergy and Renewable Fuels for Sustainable Transport 2020-2030

BUDGI

Total investment for R&I activities

Investment for research and development **2,29 Billion €**

+

Investment for demonstration and scale-up **104,31 Billion €**

		Billions €	Industry		MS Funding		EU	
Total Bioenergy and Renewable Fuels for Sustainable Transport		106,61	77,74	73%	22,23	21%	6,64	6%
Renewable Fuels for Sustainable Transport		84,81	62,34	74%	17,48	21%	4,99	6%
1	Advanced Biofuels	73,00	53,75	74%	15,00	21%	4,25	6%
	#1 Development	1,00	0,25	25%	0,50	50%	0,25	25%
	#2 Demonstration	2,00	1,00	50%	0,50	25%	0,50	25%
	#3 Scale-Up	70,00	52,50	75%	14,00	20%	3,50	5%
2	Other renewable liquid and gaseous fuels	11,40	8,35	73%	2,36	21%	0,69	6%
	#4 Development	0,20	0,05	25%	0,10	50%	0,05	25%
	#5 Demonstration	0,40	0,20	50%	0,10	25%	0,10	25%
	#6 Scale-Up	10,80	8,10	75%	2,16	20%	0,54	5%
3	#7 Renewable Hydrogen	0,41	0,24	59%	0,12	28%	0,05	13%
	TRL 2-6 (Development)	0,10	0,03	25%	0,05	50%	0,03	25%
	TRL 7-8 (Demonstration)	0,06	0,03	50%	0,02	25%	0,02	25%
	TRL 9 (Scale-Up)	0,25	0,19	75%	0,05	20%	0,01	5%
4	Bioenergy	11,30	8,03	71%	2,45	22%	0,83	7%
	#8 Development	0,50	0,13	25%	0,25	50%	0,13	25%
	#9 Demonstration	0,80	0,40	50%	0,20	25%	0,20	25%
	#10 Scale-Up	10,00	7,50	75%	2,00	20%	0,50	5%
5	Intermediate Bioenergy Carriers	10,50	7,38	70%	2,30	22%	0,83	8%
	#11 Development	0,50	0,13	25%	0,25	50%	0,13	25%
	#12 Demonstration	1,00	0,50	50%	0,25	25%	0,25	25%
	#13 Scale-Up	9,00	6,75	75%	1,80	20%	0,45	5%

2,29 Billion €



EU – Energy roadmap 2050

BY Günther H. Oettinger European Commissioner for Energy

The **EU goal** to cut greenhouse gas emissions by **80–95 % by 2050** has serious implications for our energy system. We need to be far more energy efficient. About **two thirds** of our energy should come from **renewable sources**. Electricity production needs to be almost emission-free, despite higher demand.

Our energy system has not yet been designed to deal with such challenges. **By 2050, it must be transformed.** Only a new energy model will make our system secure, competitive and sustainable in the long-run.

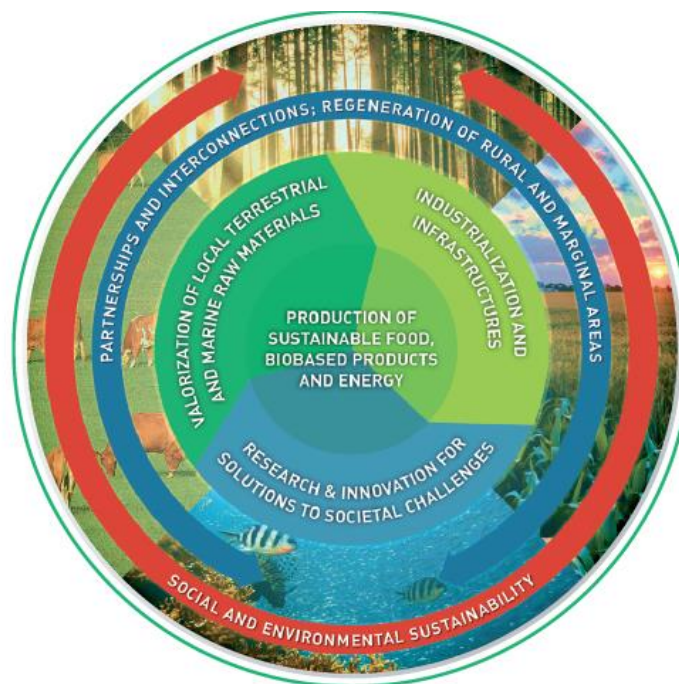
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Renewable heating and cooling are vital to decarbonisation.

- **A shift in energy** consumption towards low carbon and locally produced energy sources (including heat pumps and storage heaters) and renewable energy (e.g. solar heating, geothermal, biogas, **biomass**), including through **district heating systems**, is needed.
 - **Decarbonisation** will require a **large quantity of biomass** for heat, electricity and transport.
 - **In transport**, a mix of several alternative fuels will be needed to replace oil, with specific requirements of the different modes. **Biofuels** will probably be a **main option for aviation, long-distance road transport**, and rail where it cannot be electrified.
 - Work to ensure sustainability (e.g. on Indirect Land-Use Change **ILUC**) is ongoing.
- The market uptake of new **bio-energy** which reduces demand for land necessary for food production and which increases the net greenhouse gas savings (e.g. biofuels based on waste, algae, forest residues) **should continue to be promoted.**

BIT

bioeconomy in Italy

A new bioeconomy strategy for a sustainable Italy



THE NATIONAL BIOECONOMY TASK FORCE ESTABLISHED IN MARCH 2019, WHICH WAS ALSO INVOLVED IN THE REVISION OF THE ORIGINAL BIT, IS COMPOSED BY:

Giancarlo Giorgetti, Pamela Morassi, Giacomo Vigna - Presidency of Council of Ministers, Coordination

Andrea Lenzi, Fabio Fava - National Committee on Biosafety, Biotechnology and Life Sciences of Presidency of Council of Ministers Technical & Scientific coordination

Fabio Fava, Franco Cotana - Ministry of Education, University and Research

Elena Lorenzini, Debora Rogges, Cinzia Tonci, Daniela A. R. Carosi - Ministry of Economic Development

Emilio Gatto, Valerio de Paolis - Ministry of Agriculture, Food, Forestry and Tourism, Annalisa Zezza (CREA)

Piergiuseppe Morone, Orecchia Carlo, Pepe Paolina - Ministry of the Environment, Land and Sea

Manuela Bora, Raffaele Liberali - Committee of Italian Regions

Catia Bastioli, Giulia Gregori, Lucia Gardossi - Italian Technology Cluster for Green Chemistry (SPRING)

Luigi Scordamaglia, Patrizia Brigidi, Maria Cristina Di Domizio - Italian Technology Cluster for AgriFood (CLAN)

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