



## **Gasification - a key technology in the energy transition and for the circular economy**

Topics: CHP, SNG, H<sub>2</sub>, liquid biofuels, BECC(U)S, green and circular chemicals, storage and grid stabilization

2<sup>nd</sup> December 2021 - workshop in presence & online

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The impact of fossil fuel use on climate change are now universally recognized, as evidenced by the many recent global initiatives of peaceful demonstrations or political initiatives for more support on climate action, as by the G20, the international forum that brings together the world's major economies, and COP26 (26<sup>th</sup> UN Climate Change Conference of the Parties).

The acceptance of climate change has a severe impact on how our energy and materials system needs to change in order to sufficiently reduce global greenhouse gas emission. Fossil fuels play an important role in our daily lives and to reduce our dependence on this we need to deploy a multitude of technologies which each play a role in achieving our targets. Gasification in that respect is a versatile technology that can be used for energy, fuels, chemicals, hydrogen and reach negative CO<sub>2</sub> emissions if applied correctly. Energy intensive sectors such as power production, transport, steel making and industry rely heavily on fossil fuels and have a large CO<sub>2</sub> foot print. To replace fossil fuels in these sectors, renewable energy sources (RES, i.e. the energy from naturally replenishing and virtually inexhaustible sources) can be a solution. RES are different and of these, biomass is probably the best known and oldest, since widely used before the advent of fossil fuels.

Biomass, meant as matter of plant origin, is by its inherent nature carbon-neutral and therefore its use rightly arises as a useful resource to achieve independence from fossil fuels and the targets of net zero CO<sub>2</sub> emissions. Although from a chemical point of view the characteristics of CO<sub>2</sub> do not depend on the original source, in environmental terms CO<sub>2</sub> from fossil sources and from biomass have very different impacts. CO<sub>2</sub> originated from residual biomass, and biogenic fractions, through the photosynthetic cycle of carbon dioxide, results infact in almost net zero emissions into the atmosphere. Coupled with CO<sub>2</sub> capture systems, its use can even lead to a reduction of CO<sub>2</sub> in the atmosphere, i.e. negative emissions.

Through the conversion of biomass into gaseous stream rich in CO and H<sub>2</sub>, it becomes possible to use it both as RES for direct application in conventional CHP systems, such as MCI and gas turbines, and for more advanced applications, as the use in solid oxide fuel cells (SOFC), for the production of H<sub>2</sub>, as synthesis gas for the production of gaseous and liquid energy carriers (i.e. biofuels, e.g. SNG, diesel and gasoline, methanol, DME) as well as for the production of (green) chemicals. Properly integrated with discontinuous electricity production from solar and wind, gasification of RES combined with electrochemistry can be used to store surplus electricity in molecules. Via this approach it acts as a buffer in the stabilization of networks. Finally, considering solid waste, gasification can also be a useful tool for a circular use of materials that would otherwise be disposed in landfills or by combustion, with a higher environmental impact.

IEA Bioenergy Task 33 together with the Horizon 2020 GICO (Gasification Integrated with CO<sub>2</sub> capture and conversion) project organizes a workshop that will deal with all the above aspects. It will show the versatility of gasification technology and trough speakers from industry will guide the listener to what is relevant in this field.

Programme

Time	Topic	Title of presentation	Presenter
<b>8:30-8:45</b>	<b>Virtual Room Opening/Registration</b>		
8:45-9:00	Welcome/Introduction	ENEA & Task 33	
9:00-9:20	Cross-cutting issues	Status and perspectives of bioenergy exploitation in Italy, including hydrogen production	Luigi Mazzocchi (RSE), Luca Benedetti (GSE)
9:20-9:40	Cross-cutting issues	Italian Hydrogen Research Strategy - the role of gasification for the production of green and circular H2	Franco Cotana - UniPG/CRB
9:40-10:00	Cross-cutting issues	BioEnergy outlook at EU and International level (tbc)	Luc Pelkmans IEA Bioenergy
10:00-10:20	CHP & Biochar	Climate positive energy system via biomass gasification combined with biochar production	Marcel Huber - Syncraft
10:20-10:40	CHP & Biochar	Meva Energy upcoming break-through projects and learnings	Niclas Davidsson - Meva Energy
10:40-11:00	CHP and Hydrogen	Power generation and hydrogen production from biomass and plastic waste via bubbling fluidized-bed gasification	Alberto Pettinau - Sotacarbo
11:00-11:20	CHP via SOFC	Highly efficient and fuel-flexible technology for combined heat and power from biomass via gasification coupled with SOFC	Bora Aydin - Walter Tosto
<b>11:20-11:40</b>	<b>Coffee break</b>		
11:40-12:00	CHP and Storage/Grid	Promising industrial pathways of biomass and waste gasification and solid-oxide cell integrated power-balancing plants.	Wang Ligang - EPFL/NCEPU
12:00-12:20	SNG/H2	ECO20x: from lignocellulosic feedstocks to green hydrogen	Domenico Cirillo - CMD S.p.A.
12:20-12:40	SNG/H2	Gasification of biomass to hydrogen	S Dasappa - Indian Institute of Science
12:40-13:00	CHP/SNG/H2/...	Projects and initiatives in the bioenergy sector	Stefano Capaccioli - ETA Florence
<b>13:00-14:00</b>	<b>Lunch break</b>		
14:00-14:20	H2& liquid biofuels/Circular Economy	From non-recyclable waste to hydrocarbon source through gasification route	Giacomo Rispoli – MyRechemical (NextChem)
14:20-14:40	Chemicals/Circular Economy	A short route to produce virgin plastic from plastic waste.	Bram van der Drift - Synova
14:40-15:00	Liquid biofuels /Chemicals/Circular Economy	Waste gasification: a proven solution toward Advanced Biofuels	Dennis Chafiã - GI Dynamics

15:00-15:20	Chemicals/Circular Economy	The role of gasification for production of polymers in a circular economy	Henrik Thunman - Chalmers
15:20-15:40	Liquid biofuels	Biofuels generated from any kind of waste via DFG-FT and HTL-APR	Richard Zweiler - Güssing Energy Technologies
<b>15:40-16:00</b>	<b>Coffee break</b>		
16:00-16:20	Liquid biofuels	Development of advanced lignocellulosic biofuels from sustainable agricultural value chains	Andrea Maria Rizzo - RECORD
16:20-16:40	BECCS/Biofuels	Chemical looping gasification for sustainable production of biofuels	Paul Dieringer - Technische Universität Darmstadt
16:40-17:00	BECCS/Biofuels	The value of flexible power and biomass-to-X systems based on gasification of second generation biomass	Matteo Romano – Politecnico di Milano
17:00-17:20	BECCS/Biofuels	Gasification Integrated with CO2 capture and conversion	Enrico Bocci – Università degli Studi “G. Marconi”
<b>17:20-17:50</b>	<b>Workshop Closure</b>	<b>Task 33 &amp; GICO</b>	

Task 33 website: <http://task33.ieabioenergy.com/>

GICO project website: <https://www.gicoproject.eu/>