FLExibilize combined cycle power plant through power-to-X solutions using non-CONventional FUels

Fact Sheet

Project Information

FLEXnCONFU
Grant agreement ID: 884157

DOI
10.3030/884157

Funded under
SOCIETAL CHALLENGES - Secure, clean and efficient energy

Total cost
€ 12 555 440

EU contribution
€ 9 887 141,39

Start date
1 April 2020
End date
31 March 2024

Coordinated by
RINA CONSULTING SPA
Italy

Project description

Innovative power-to-X-to-power solutions

The use of alternative carbon-free fuels in existing power plants and a high penetration of renewable energy sources into the grid are required in order to meet EU 2030 and 2050 climate and energy goals. As such, combined-cycle gas turbine plants represent a crucial technology with the required flexibility to compensate for the intermittency of renewable energy sources like wind and solar. The EU-funded FLEXnCONFU project will develop innovative, economical, viable and replicable power-to-X-to-power solutions to be integrated to existing and new power plant to level the load, and to un-tap their flexibility, converting electricity into hydrogen or
ammonia to be in turn locally re-used in the same power plant to respond to varying demand, thus reducing time their environmental impact. A 1MW scale power-to-hydrogen-to-power system will be integrated in a real operational environment in Portugal (EDP’s Ribatejo power plant) while a small-scale power-to-ammonia-to-power solutions will be coupled with a mGT properly modified to burn ammonia in Savona Smart Microgrid laboratory.

**Objective**

Natural gas (NG) fired Combined Cycle (CC) power plants are currently considered the most flexible power plants to operate in the EU grid to facilitate RES penetration. They changed their role in the EU electric market from the backbone of EU electrical grid to providing most of regulation services necessary to increase the share of non-programmable renewable sources into the electrical grid. In order to enhance their flexibility and also start to sell flexibility/ancillary services (also considering potential virtual aggregation), GT Original Equipment Manufacturers (OEMs) and Utilities are investigating new strategies and technologies for power flexibility, also considering that a “fuel switch” is close foreseen from coal to NG among most used fossil based dispatchable power plants and that the role of CC will be of “RES best friends” at least up to 2030. In this sense reducing their emission is also a strong need of GT R&D panorama promoting the exploitation of different fuels than Natural gas only. FLEXnCONFU aims to demonstrate at TRL7 in Ribatejo EDPP CC Power Plant a Power-to-gas-to-power (P2G2P) solution that will enhance CC flexibility (thus enabling them to provide grid flexibility services and getting higher revenues), reduce their NG consumption and therefore their related emission. The P2G2P system will be based on a Power-to-Hydrogen solution developed by HYGS+ICI, while a Power-to-ammonia-to-power solution developed by PROTON and ICI will be demonstrated in a properly modified microgas turbine operating in a UNIGE laboratory within the Savona Smart Microgrid (TRL6). The P2G2P solution will be directly controlled by a grid driven/responsive management system developed by MAS. GT combustion acceptability of different NG/H2/NH3 mixtures will be studied in CU labs. FLEXnCONFU will be a demonstration to market project and upscale and replication of the demonstrate P2H/P2A will be studied (in ENGIE and TP CC plants) and properly promoted by ETN.

**Fields of science**

- engineering and technology > electrical engineering, electronic engineering, information engineering > electrical engineering > power engineering > electric power distribution
- engineering and technology > environmental engineering > energy and fuels > fossil energy > coal
- engineering and technology > environmental engineering > energy and fuels > fossil energy > natural gas
Programme(s)

H2020-EU.3.3. - SOCIETAL CHALLENGES - Secure, clean and efficient energy

H2020-EU.3.3.2. - Low-cost, low-carbon energy supply

Topic(s)

LC-SC3-NZE-4-2019 - Integrated solutions for flexible operation of fossil fuel power plants through power-to-X-to-power and/or energy storage

Call for proposal


See other projects for this call

Sub call

H2020-LC-SC3-2019-NZE-RES-CC

Funding Scheme

IA - Innovation action

Coordinator

RINA CONSULTING SPA

Net EU contribution

€ 502 600,00

Address

Via Cecchi 6
16129 Genova

Region

Nord-Ovest > Liguria > Genova

Activity type

Private for-profit entities (excluding Higher or Secondary Education Establishments)
Participants (20)

EDP - GESTAO DA PRODUCAO DE ENERGIASA
Portugal
Net EU contribution
€ 1 477 319,38
Address
Avenida 24 De Julho N 12
1249 300 Lisbon
Region
Continente > Área Metropolitana de Lisboa > Área Metropolitana de Lisboa
Activity type
Private for-profit entities (excluding Higher or Secondary Education Establishments)
Links
Contact the organisation
Participation in EU R&I programmes
HORIZON collaboration network
Non-EU contribution
€ 633 136,87

CNET CENTRE FOR NEW ENERGY TECHNOLOGIES SA
Portugal
Net EU contribution
€ 251 125,00
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Rua Cidade De Goa 4
2685 039 Sacavem E Prior Velho Lisboa
Activity type
HYDROGENICS EUROPE NV

Belgium

Net EU contribution
€ 1 776 285,00

Address
Nijverheidsstraat 48c
2260 Westerlo

SME
Yes

Region
Vlaams Gewest > Prov. Antwerpen > Arr. Turnhout

Activity type
Private for-profit entities (excluding Higher or Secondary Education Establishments)

Non-EU contribution
€ 761 265,00

ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS

Greece

Net EU contribution
€ 357 125,00

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57001 Thermi Thessaloniki
NUOVO PIGNONE TECNOLOGIE SRL

Italy

Net EU contribution
€ 244 825,00

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50127 Firenze

Region
Centro (IT) > Toscana > Firenze

Activity type
Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links
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Participation in EU R&I programmes
HORIZON collaboration network

Non-EU contribution
€ 104 925,00

EUROPEAN TURBINE NETWORK

Belgium

Net EU contribution
€ 235 562,50

Address
Chaussee De Charleroi 146-148
Proton Ventures BV

Netherlands

Net EU contribution
€ 203,546,88

Address
Karel Doormanweg 5
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SME
Yes

Region
West-Nederland > Zuid-Holland > Groot-Rijnmond

Activity type
Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links
Contact the organisation
Participation in EU R&I programmes
HORIZON collaboration network

Non-EU contribution
€ 87,234,37

Masae Proigmenes Technologies Energeias Kai Ischyos
**Greece**

Net EU contribution

€ 449,953,88

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Khfisou 92 Avenue
104 43 Athens

SME
Yes

Region
Κεντρικός Τομέας Αθηνών > Αττική > Αττική

Activity type
Private for-profit entities (excluding Higher or Secondary Education Establishments)

Links
Contact the organisation
Participation in EU R&I programmes
HORIZON collaboration network

Non-EU contribution

€ 192,837,37

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**FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS**

Spain

Net EU contribution

€ 348,000,00

Address
Parque Empresarial Dinamiza, Avda. De Ranillas, 3d
50018 Zaragoza

Region
Noreste > Aragón > Zaragoza

Activity type
Research Organisations

Links
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Website
Participation in EU R&I programmes
HORIZON collaboration network

Non-EU contribution

€ 0,00
UNIVERSITA DEGLI STUDI DI GENOVA

Italy

Net EU contribution

€ 510 000,00

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Via Balbi 5
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Nord-Ovest > Liguria > Genova

Activity type

Higher or Secondary Education Establishments

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Non-EU contribution

€ 0,00

CARDIFF UNIVERSITY

United Kingdom

Net EU contribution

€ 381 796,25

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Newport Road 30 36
CF24 0DE Cardiff

Region

Wales > East Wales > Cardiff and Vale of Glamorgan

Activity type

Higher or Secondary Education Establishments

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Non-EU contribution
TECHNISCHE UNIVERSITAT DARMSTADT

Germany

Net EU contribution

€ 291 696,25

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Darmstadt > Darmstadt, Kreisfreie Stadt

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Higher or Secondary Education Establishments

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Non-EU contribution

€ 0,00

UNIVERSITE CATHOLIQUE DE LOUVAIN

Belgium

Net EU contribution

€ 323 750,00

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Région wallonne > Prov. Brabant Wallon > Arr. Nivelles

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€ 275 843,75
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Higher or Secondary Education Establishments
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HORIZON collaboration network

Non-EU contribution
€ 0,00

COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES
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€ 219 131,25
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Ile-de-France > Ile-de-France > Paris
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TIRRENO POWER SPA
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€ 119 437,50
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Centro (IT) > Lazio > Roma
Activity type
Private for-profit entities (excluding Higher or Secondary Education Establishments)
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BELGISCH LABORATORIUM VAN ELEKTRICITEITSINDUSTRIE

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€ 207 743,75
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Activity type
Private for-profit entities (excluding Higher or Secondary Education Establishments)
Links
Contact the organisation
Website
Participation in EU R&I programmes
HORIZON collaboration network
Non-EU contribution
€ 0,00

UNIVERSITE D'ORLEANS

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€ 234 062,50
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Centre — Val de Loire > Centre — Val de Loire > Loiret
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Higher or Secondary Education Establishments
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SME
Yes

Region
Nord-Est > Veneto > Verona

Activity type
Private for-profit entities (excluding Higher or Secondary Education Establishments)

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