Développement de la cogénération basse tension en Europe

29 Janvier 2020

Paris

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COGEN EUROPE The European Association for the Promotion of Cogeneration

COGEN Europe

- Représente le secteur de la cogénération en Europe auprès des institutions européennes
- Promeut les bénéfices de la cogénération pour sa plus grande utilisation en Europe
- Gestion de projets européens

PACE

Pathway to a Competitive European Fuel Cell micro-CHP Market

FCH

FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

+50 membres toute la chaine de valeur

Corporate Members

National Members

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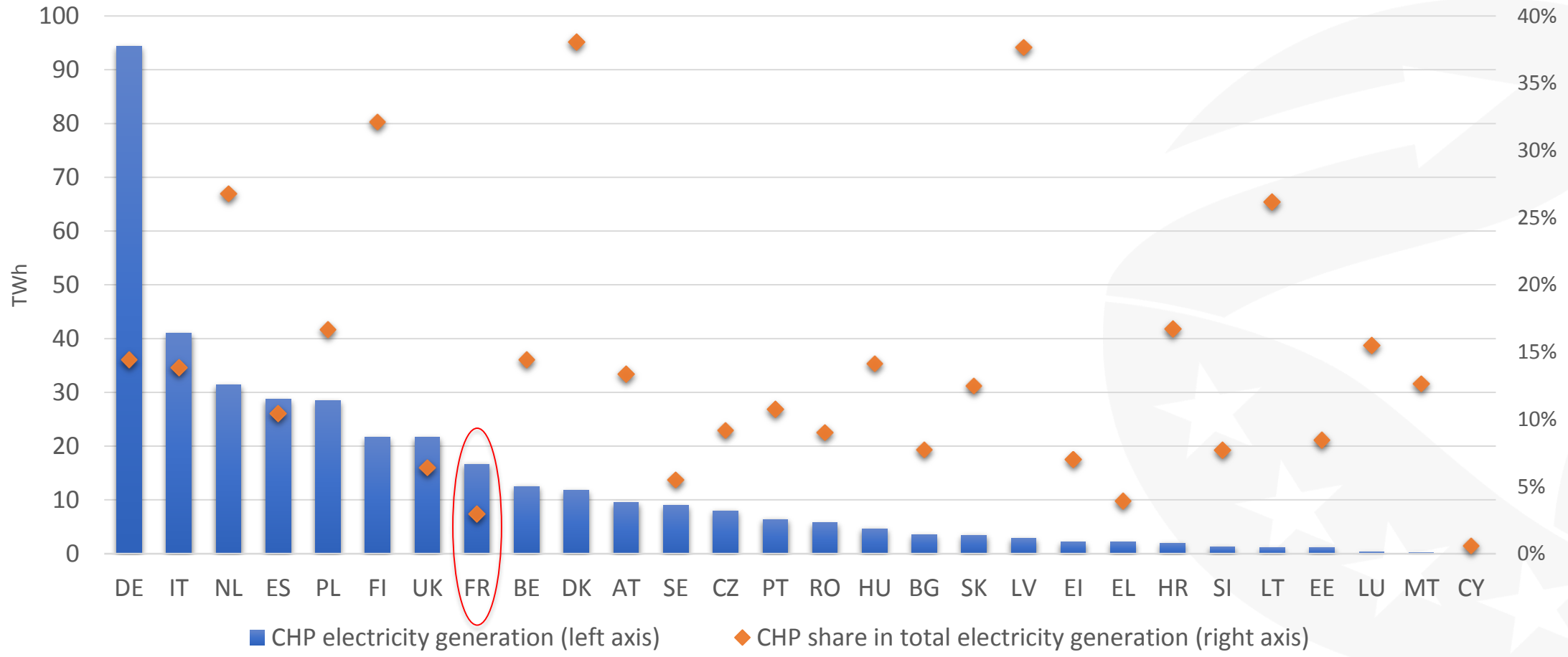
Marchés de la cogénération en Europe

Source: European Cogeneration Snapshot Survey 2016, COGEN Europe

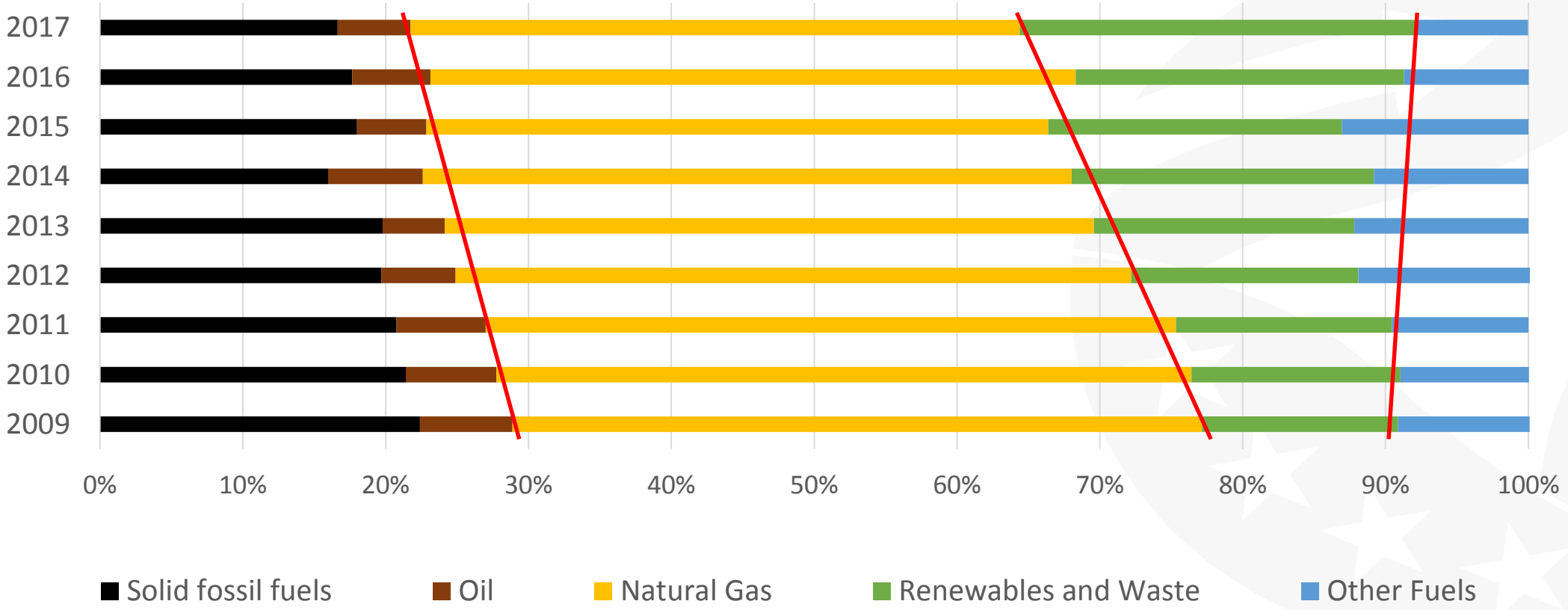
Diversité de situations



Data source: European Commission, Eurostat, 2019

Mix énergétique européen de la cogénération

2009-2017



Data source: European Commission, Eurostat, 2019

Soutien à la cogénération en Europe en 2018

	Feed-in Tariff	Feed-in Premium	Quota Obligation & Certificates	Capital grant	Tender scheme	Tax incentives	Other support	No support
Austria	✓			✓				
Belgium - Flanders			✓	✓		✓		
Bulgaria								✗
Czechia		✓		✓				
Germany	✓	✓		✓	✓	✓		
Finland		✓		✓	✓	✓		
France	✓	✓	✓				✓	
Greece		✓						
Hungary							✓	
Italy			✓					
Netherlands	✓					✓		
Poland			✓	✓				
Portugal	✓							
Romania		✓						
Slovenia	✓	✓			✓			
Spain	✓							
Sweden			✓			✓		
Turkey							✓	
United Kingdom	✓		✓	✓	✓	✓		

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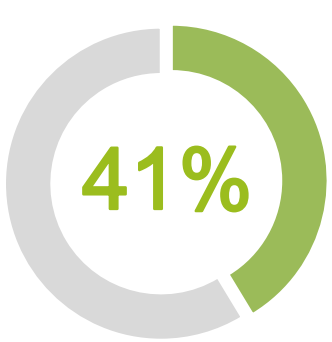
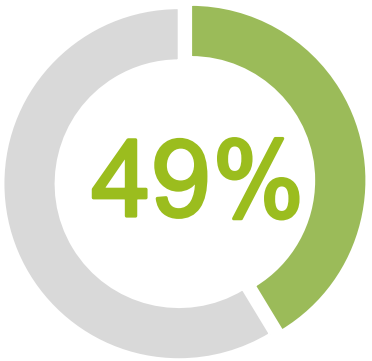
Data source: COGEN Europe, Snapshot Survey 2018-2019

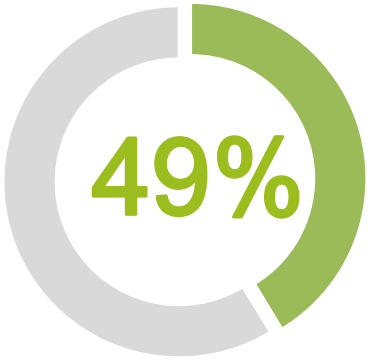
Micro/mini-cogénération en Europe

2015-2016



2017-2018





La cogénératon dans la fillière commerciale en croissance dans la plupart des marchés nationaux (BE, CZ, DE, SI, AU, UK).

Croissance de la micro-cogénération dans certains pays européens, representant 49% de la capacité installée en Europe (BE, DE, PL, SE, UK)

Source: COGEN Europe Snapshot Survey

Projet européen

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Pathway to a Competitive European Fuel Cell micro-CHP Market

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FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

PACE at a glance

PACE
Pathway to a Competitive European Fuel Cell micro-CHP Market

FCH – Fuel Cells and Hydrogen Joint Undertaking

>10,000
FC micro-CHP units/year post-2020

9
Partners
Representing manufacturers, utilities & research community

> 2,800
Fuel Cell micro-CHP
To be deployed

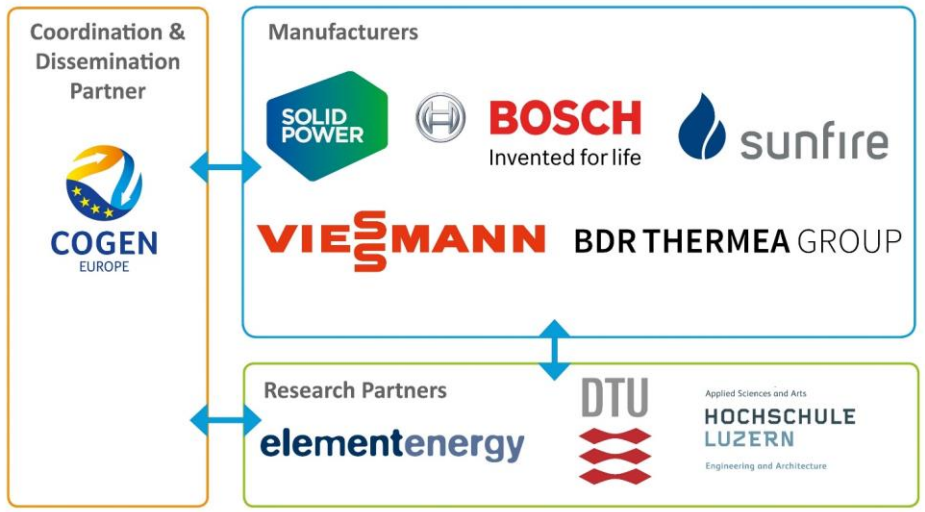
>500
Systems per manufacturer
Established production capacity per manufacturer

10
Countries
Where units are installed

4
Countries
Policy & market development (BE, IT, NL, UK)

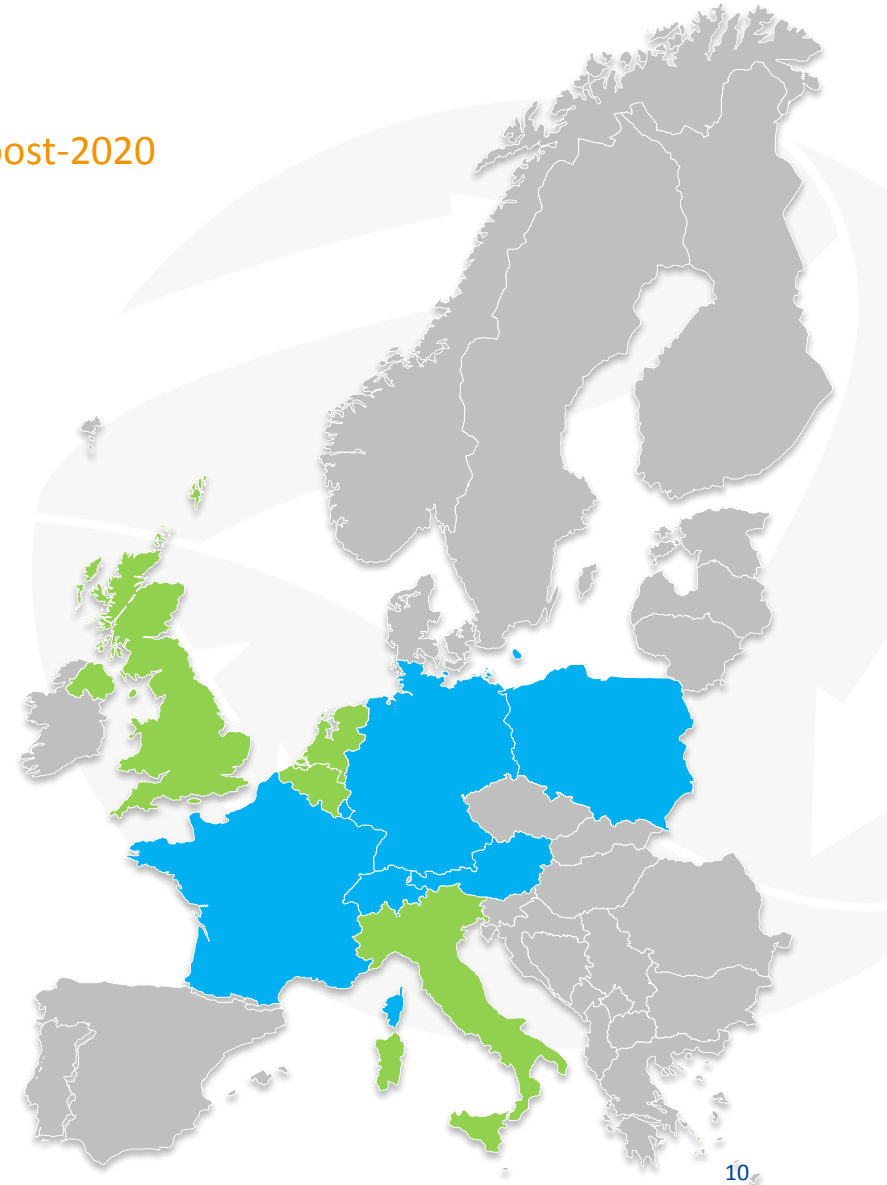
€90m
Budget
Including €33.9m Horizon 2020

5
Year Project
2016 –2021




Units deployment + installer training + targeted market & policy development activities


Units deployment + installer training



Systems overview in PACE

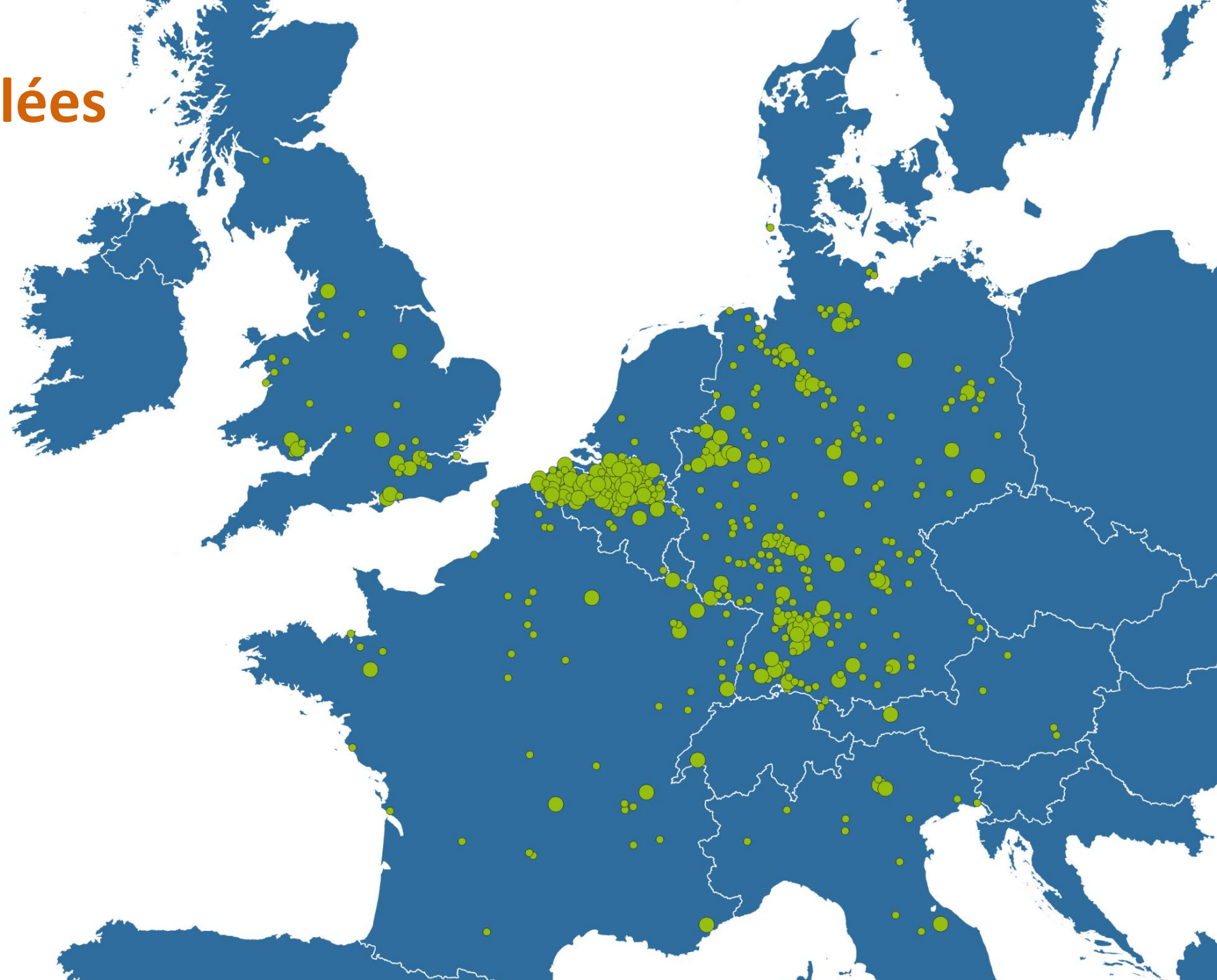
PACE
Pathway to a Competitive European Fuel Cell micro-CHP Market

FCH FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

Buderus: Logapower FC10.2	Buderus: System Logaplus	BlueGEN	BlueGEN BG15	Dachs 0.8	eLecta	Vitovalor 300-P, PA2 and SA2	Sunfire-Home 750
							
100	200	750		200	300	>750	500
SOFC	SOFC	SOFC	SOFC	PEM	PEM	PEM & SOFC	SOFC
0.7kW	1.5kW	1.5kW	1.5kW	0.75kW	0.75kW	0.75kW	0.75kW
Buderus JUNKERS	Buderus	SOLID POWER	SOLID POWER	BDR THERMEA GROUP SENERTEC	BDR THERMEA GROUP remeha	VIESMANN	sunfire
1-2 family homes (up to end 2018)	1-2 family homes, residential buildings and SMEs with high electricity demand	SMEs, apartment buildings and multifamily homes		1-2 family houses (for new and existing buildings)		Domestic and small commercial	Residential building (with LPG supply)

Unités PACE installées

- 108 avant avril 2018
- 239 avant octobre 2018
- 528 avant april 2019
- 857 avant octobre 2019



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High-level Declaration
Stationary Fuel Cells for Green Buildings

SIGN THE DECLARATION NOW ON

www.pace-energy.eu

Législation européenne

Objectifs européens

2020

- - 20% GHG
- +20% d'énergies renouvelables
- +20% d'efficacité énergétique

2030

- -40% GHG
- +32% d'énergies renouvelables
- +32.5% d'efficacité énergétique

Clean Energy Package

2050

- Carbon neutrality

New Green Deal

Clean Energy Package

Législation européenne 2021-2030

- Energy Performance of Buildings Directive
- Energy Efficiency Directive
- Renewable Energy Directive
- Energy Union Governance Regulation
- Electricity Market Design

New Green Deal & Decarbonisation Framework

Sujets à surveiller au niveau européen dans le New Green Deal

- Suppression des soutiens pour les énergies fossiles (ex. fonds, subsides)
- Taxe carbon pour les secteurs en dehors d'EU ETS (au niveau national)? → secteur du chauffage
- Émergence de différentes limites d'émissions sur la génération de l'énergie
- Energy labelling and eco-design legislation review
- Comprehensive assessments (EED)

Prérequis pour la croissance (1/2)

Perspective européenne

- ✓ Cadre législatif ambitieux, favorable, cohérent, stable et implémenté
- ✓ Améliorer les conditions de marché
  - ✓ Assurer la stabilité des mécanismes de soutien
  - ✓ Développer les opportunités d'investissements/financements
  - ✓ Simplifier les procédures administratives
- ✓ Vision nationale claire pour décarboner le réseau de gaz

Prérequis pour la croissance (2/2)

Perspective européenne

- Reconnaître pleinement les bénéfices pour les utilisateurs et le système
  - Méthodes de calcul (ex. energy labelling, building codes)
  - Règles des marchés de l'électricité
- Meilleur sensibilisation de tous les acteurs de la filière énergie aux bénéfices de la cogénération: petits utilisateurs, installateurs, politiciens et financiers

Merci pour votre attention!

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We offer CO2 savings TODAY!

Fuel Cell CHP vs. alternative solutions*

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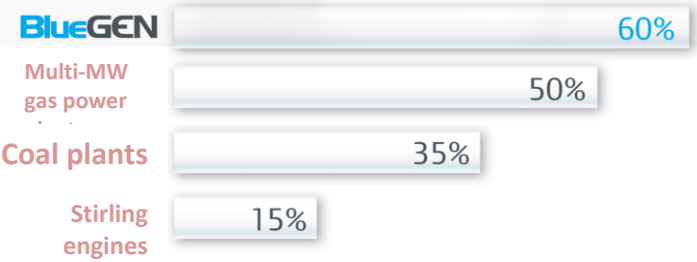
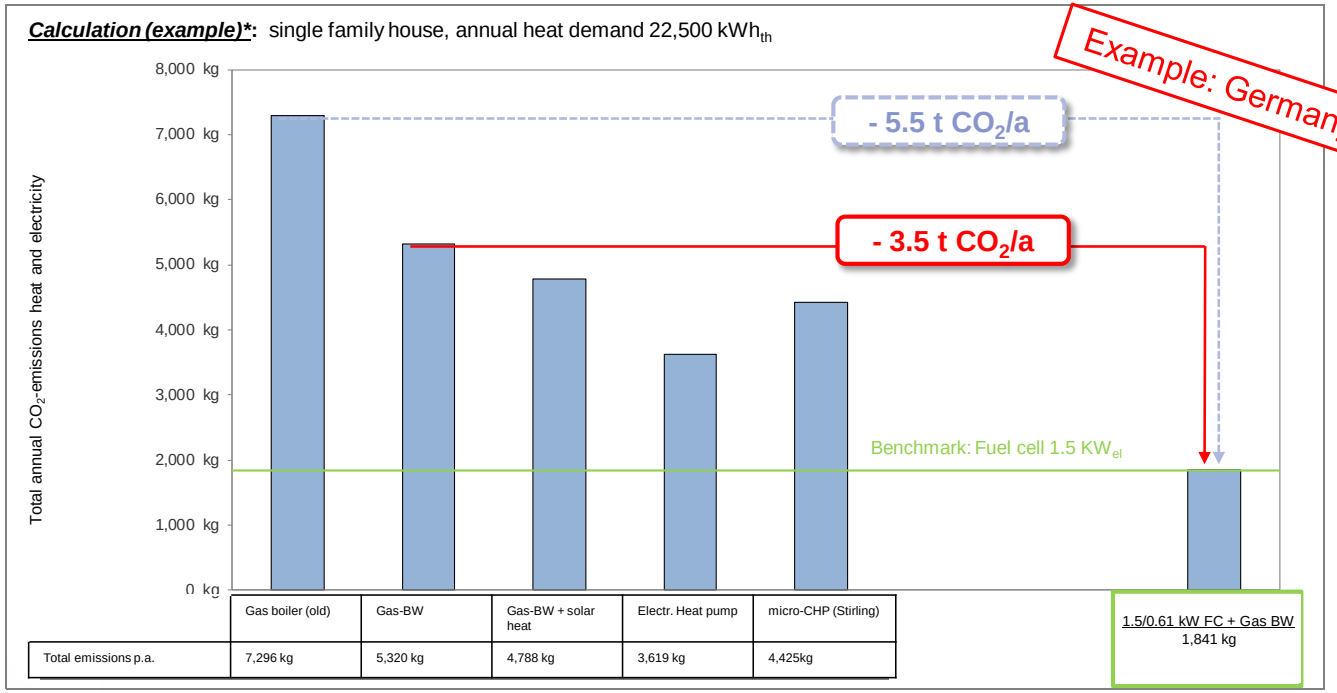


***Calculation (example)*:** single family house, annual heat demand 22,500 kWh_{th}

Example: Germany



	Gas boiler (old)	Gas-BW	Gas-BW + solar heat	Electr. Heat pump	micro-CHP (Stirling)
Total emissions p.a.	7,296 kg	5,320 kg	4,788 kg	3,619 kg	4,425kg

Emission factors: Oil: 337 gCO_2/kWh; Natural gas: 227 gCO_2/kWh; Electricity: 563 gCO_2/kWh_{el}; **Technical specifications:** **Gas fired boiler (old):** therm. efficiency: 70 %; **Gas-condensing boiler (Gas BW):** therm. efficiency: 96 % (if applicable: 10 % fuel savings by solar water heating); **Electric heat pump:** COP: 3,5; **micro-CHP (Stirling):** elect. output: 1 kW_{el}; elect efficiency.: 11 %; therm. output: 8 kW_{th}; therm efficency.: 85 %; annual operating hours: 2,813; **Fuel cell:** elect. output: 1,5 kW_{el}; electr. efficency: 60 %; therm. output: 0,61 kW_{th}; therm. efficiency.: 25 %; annual operating hours: 8,000; additional heat generator: Gas-Condensing boiler: efficiency of 96 %.

→ Compared to **conventional heating technologies**, a great amount of **CO_2 can be saved** through the **application of fuel cells**

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Revised Energy Efficiency Directive

Energy Saving Obligations - ESO (2021 - 2030)

- Les économies d'énergie finales des micro/mini/petite cogénération peuvent être prise en compte pour atteindre les obligations nationales d'économies d'énergies
    - Voir Note d'orientation de la Commission européenne pour l'application de l'article 7
- La cogénération peut être comptabilisé en plus des ESO

Assume that:

- the reference case is an oil boiler with a thermal efficiency (eta,thermal) of 0.77 (efficiency relative to net calorific value);
- as the CHP also generates electricity, in the base case an equal amount of electricity will have to be delivered to the building;

Calcul de la contribution de la cogénération aux obligations d'économies d'énergies
Example

Voir Note d'orientation de la Commission européenne pour l'application de l'article 7

- the CHP case is a CHP gas plant with an efficiency of eta,thermal = 0.70 and eta,electricity = 0.30;
- the delivered heat is 10,000 kWh,thermal

To calculate the total savings, we first have to calculate the amount of electricity generated by the CHP plant. In a first step, we calculate the amount of fossil fuel used by the plant by dividing the delivered heat by the thermal efficiency of the plant. From this, we can derive how much electricity is produced.

CHP case:

10,000 kWh,thermal / eta,thermal = 14,285 kWh,gas

14,285 kWh,gas * eta,electricity = 4,285 kWh,electricity

A total of 14,285 kWh final energy (all natural gas) is delivered to the building.

For the base case, the calculation is different. We derive the amount of gas from the thermal efficiency and delivered heat of the boiler:

Base case:

10,000 kWh,thermal / eta,thermal = 12,987 kWh,gas

In addition, 4,285 kWh of electricity has to be delivered from the grid to the building.

A total of 17,273 kWh final energy (natural gas and electricity) is delivered to the building.

In this example, installing CHP would save 2,988 kWh of final energy.

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Key CHP Article not part of EED review (4)

EED Article 14

Members States to:

- **Carry out Comprehensive Assessments (CA)** on potential for high efficiency (HE) CHP and District Heating & Cooling by 31 December 2015

  → Updated every 5 years at the request of the Commission

  → **next CA in 31Dec 2020?**

- **Perform cost-benefit analysis** of efficient heating & cooling
- **Adopt policies** to realise the potential identified in CA

Support for electricity from HE CHP & waste heat used to achieve primary energy savings.

Priority dispatch (PoD)

- **New** installations
  - New small scale RES (below 400 kW) shall continue to get PoD by 2026, to go down to 200 kW after 2026 & under certain conditions
  - New small scale CHP (below 400 kW) may get PoD (no time limit & no conditions)

- **Existing** small & large scale CHP to continue to benefit from PoD
  - Commissioned before entry into force (i.e. summer of 2019)
  - Subject to significant modifications
    - A new connection agreement is required
    - Generation capacity is increased

Priority dispatch (PoD) – Recommendations

- Ensure that small scale CHP (using fully/partly renewable gas) falls under the “shall” rather than “may”

- Ask the Commission to clarify “significant modifications” in compliance with existing other legislation (e.g. Network Codes, EU ETS)

Access to the grid & Curtailment - Recommendations

- CHP to benefit from guaranteed capability of transmission & distribution for electricity from CHP with min. redispatching
- CHP to be second last to be curtailed, after RES
- Conditions to curtail: **disproportionate** costs or **severe risks** to network security
- Curtailment prevented for CHP self-consumption
- Curtailment should be market based or compensated
  - except in the case of generators accepting connection agreement in which **firm delivery of energy is not guaranteed**
  - Compensation based on: additional operational cost or back-up heat provision, net revenues from sale of electricity in day-ahead & financial support lost

Access to the grid & Curtailment – Recommendations

- Better define **disproportionate** costs or **severe risks** to network security

- Better define compensation in case of curtailment in non-market conditions

Distribution grid tariffs

- Charges should be cost-reflective, transparent, and account for for network security
- Shall take into account EED Article 15 & Annex IX
  - *Network charges shall **neutrally support overall system efficiency** in the long run through price signals to consumers*
- *Should **not discriminate** between production at **distribution level** or production at **transmission level***
- *Not discriminate against aggregation and energy storage*
- *Shall **not create disincentives** for self-generation, self-consumption & participation in demand response*

→ *ACER to draft a guidance on grid tariff best practices*

Energy Performance of Buildings Directive
Smart Readiness Indicator (SRI)

- **Système européen de classification de la "**smart readiness" des bâtiments

- Cogénération bien positionnée dans différents dimensions du SRI
  - Energy Generation,
  - Demand Side Management,
  - Heating

- SRI est 'technology neutral →' Pas de référence direct aux micro/mini-CHP en tant que 'smart and flexible' solutions

Energy Union Governance Regulation

Plans Nationaux Énergy & Climat (NECPs) en deux mots…

- **National Energy efficiency targets are set too low**
- **Heating & cooling are not sufficiently addressed**
- **Cogeneration potential not adequately considered**
- Few mentions of micro-CHP in terms of
  - potential (including quantification)
  - targeted support measures
- Residential sector considered uncompetitive in France & Italy
  - Unclear if it only covers micro-CHP