

EUROPEAN MARKET MONITOR
FOR DEMAND SIDE FLEXIBILITY

2021

DELTA-EE

 **smartEn**
Smart Energy Europe

Synopsis

Delta-EE would like to thank all those who gave us their time to be interviewed for this report – your knowledge and insights were greatly appreciated. A special thank you to the research team at smartEn, and the members who took time to comment on the draft report.



Contact

Lucinda Murley

lucinda.murley@delta-ee.com

Cinzia Alberti Mazzaferro

cinzia.alberti@smarten.eu



Authors

Delta-EE Flexibility Research Service

Lucinda Murley

Flexibility Research Service Manager

lucinda.murley@delta-ee.com

smartEn

Cinzia Alberti Mazzaferro

EU Projects and Research Officer

cinzia.alberti@smarten.eu



Reviewed by

Jon Ferris

Head of Flexibility and Storage, Delta-EE

Andrés Pinto-Bello

Head of Research and Projects, smartEn



Date

February 2022

About Delta-EE and smartEn

Leading providers of intelligence and advocacy for the energy transition



DELTA-EE

Delta-EE is a specialist energy research and consulting service provider. We help organisations to develop the best strategies, business models and customer propositions for the energy transition.

This research is part of our **Flexibility Research Service** which provides insight into key markets, competitors, business models and issues shaping the sector, with a specific focus on demand side flexibility.



www.delta-ee.com



smartEn is the European business association integrating the consumer-driven solutions of the clean energy transition.

We aim to create opportunities for every company, building and car to support an increasingly renewable energy system.



www.smarten.eu



EUROPEAN MARKET MONITOR FOR DEMAND SIDE FLEXIBILITY 2021

CONTENTS

DELTA-EE



EXECUTIVE SUMMARY**6**

Purpose, Scope and Definitions	8
The 2021 European Market Monitor Map for DSF	9
Country Score Summary	10
Summary Score Guide	12

INTRODUCTION**13**

Methodology	14
Scoring System	15

2021 MARKET MONITOR MAPS**16**

Demand side flexibility regulatory progress	17
Local flexibility and energy communities	18
Potential market size of flexibility	19
Future of demand side flexibility	20

EUROPEAN LEGISLATION**21**

Energy Communities	22
Implementation of Energy Communities	23
Clean Energy Package overview	24

GLOSSARY**25**



EUROPEAN MARKET MONITOR FOR DEMAND SIDE FLEXIBILITY 2021

EXECUTIVE SUMMARY

- Purpose, scope and definitions
- 2021 European Market Monitor Map for Demand Side Flexibility
- Country ranking and score summary

2021 European Market Monitor for Demand Side Flexibility

“The increasing need and value of Demand Side Flexibility has been shown time and again during the pandemic. Progress has still been made towards opening up markets and levelling the playing field, but we are not yet where we need to be to fully exploit the benefits of demand side flexibility.

Developments in many countries are being driven by the Clean Energy Package, but implementation is behind target, frequently inconsistent, and sometimes reflects the dominant market position of existing participants.

If we are to achieve the 2030 targets set out in the EU’s Fit for 55 package and the climate neutrality goal cost-effectively, a much bigger role for flexibility, whether from electric vehicles, the electrification of heat, batteries or commercial and industrial buildings will be required.”

Michael Villa
Executive Director
smartEn



“There has been continued progress towards the standardisation of products and implementation of the Clean Energy Package, with some countries going further by introducing additional fast frequency response products and distribution system flexibility trials.

The existing value streams are only gradually being opened up, and new products launched to enable demand side flexibility, storage and aggregation. Opportunities for flexibility are emerging beyond the established markets, reflected in the expanded coverage of this report.

The value of flexibility has increased with wholesale price rises, but demand side flexibility could have played a much greater role in mitigating the cost to consumers.”

Jon Ferris
Head of Flexibility and Storage Research
Delta-EE



Demand Side Flexibility Market Monitor

Purpose, Scope and Definitions

What the Market Monitor is, and how to use it:

- This report provides a high-level summary of 30 European markets and their demand side flexibility market activity.
- Using this report you can benchmark markets against each other to track their progress on enabling DSF.
- The findings are based on our primary and secondary research across each market.
- Our approach and research findings have been challenged by internal and external experts to corroborate our view.

What is flexibility?

Flexibility is the ability of electrical generators and consumers to alter their output or consumption on demand. This includes both large front of meter assets and DSF assets.

Scope of Market Monitor:

- Regulatory progress to enable DSF
- Development of local flexibility and energy communities
- Potential market size of flexibility
- Future development of DSF

What is Demand Side Flexibility?

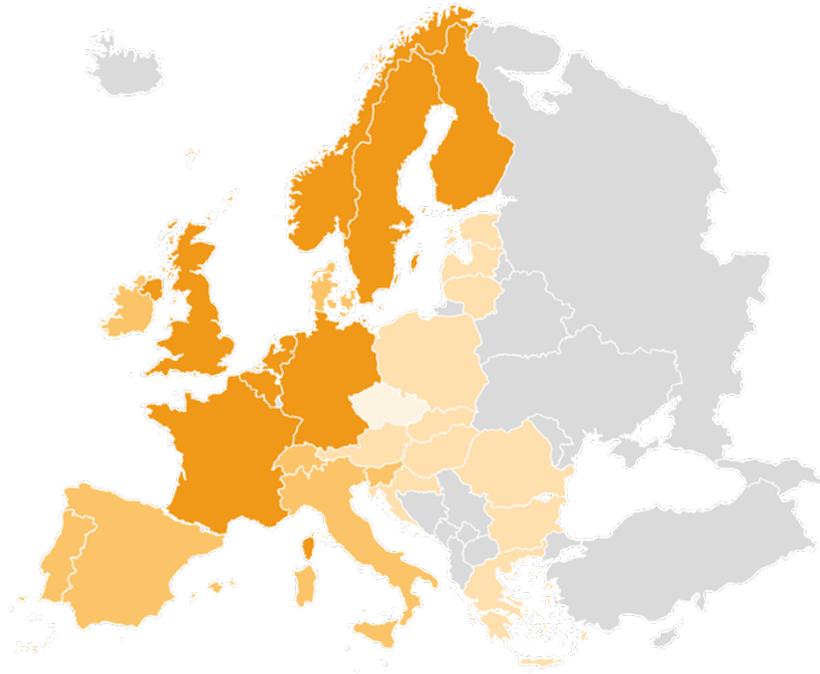
DSF refers to the deviation to the planned consumption, generation and use of storage, in response to price signals or instruction, on residential, commercial or industrial sites.

Flexibility helps ensure system stability



2021 European Market Monitor for Demand Side Flexibility

Larger countries spend most on flexibility, but should still be more open.



This report provides a high level summary of the current state of demand side flexibility and highlights the emerging opportunities based on our research across 30 European markets.

In practice, smaller countries that are more accessible to DSF provide better immediate opportunities.

From our research we find:

- The five largest markets (Spain, France, Great Britain, Germany and Italy) account for ~60% of the total value of flexibility.
- Where some countries have open and accessible markets, the majority still need significant improvement to meet the obligations set out in the Clean Energy Package (CEP).
- Greece and Poland are countries to watch for emerging potential as their flexibility markets open, whilst Italy and Spain have open markets yet limited participation.
- Despite having developed markets Great Britain, Germany and France are still likely to grow further due to their high renewable targets.

ASSESSMENT CRITERIA FOR MARKET MONITOR:

- Regulatory progress to enable DSF
- Development of local flexibility and energy communities
- Potential market size of flexibility
- Future development of flexibility



Participation of DSF is developing but significant progress is required. Participation is dominated by industrial and commercial loads with residential and local flexibility still nascent.

Country Summary

Ranked in order of regulatory progress (then alphabetically)

In practice, smaller countries that are more accessible to DSF provide better immediate opportunities.

CATEGORY	FEATURE
Potential market size of flexibility	<ul style="list-style-type: none"> Ancillary services (FCR, aFRR, mFRR, RR or local equivalent)
Demand side flexibility regulatory progress	<ul style="list-style-type: none"> Is the ancillary services markets operational? Can DSF participate? Is aggregation allowed? Is a BRP agreement required? Is the country part of co-ordinated markets?
Local flexibility	<ul style="list-style-type: none"> Is collective self-consumption allowed? Is there a national framework for citizen energy communities? Is there a national framework for renewable energy communities? Is DSO flexibility commercial? Are there DSO flexibility trials?
Future of flexibility	<ul style="list-style-type: none"> Current monetisation of flexibility Markets opening to DSF by 2025 2030 renewable targets Target dates to join European market coupling

	Regulatory progress	Potential market size of flexibility	Local flexibility and energy communities	Future of flexibility
Belgium	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Finland	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
France	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Great Britain	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Netherlands	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Norway	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Sweden	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Denmark	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Germany	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Ireland	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Slovenia	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Switzerland	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Austria	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Bulgaria	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Croatia	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■

Country Summary

Ranked in order of regulatory progress (then alphabetically)

High scores for potential market does not always mean DSF can access this value in practice.

It is an indication of the value that is theoretically possible for DSF to access.

The regulatory progress rating assesses how open and accessible to DSF the markets are.

	Regulatory progress	Potential market size of flexibility	Local flexibility and energy communities	Future of flexibility
Czech Republic	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Hungary	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Italy	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Latvia	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Spain	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Cyprus	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Estonia	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Greece	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Lithuania	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Luxembourg	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Poland	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Portugal	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Romania	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Slovakia	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Malta	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■

Summary Score Guide

Our research assesses the development of European flexibility markets

How to interpret the rankings:



Early Markets

'Low' scoring countries typically are markets which are not established or are yet to open fully to DSF and have limited activity.

- These markets have few, if any, value streams open commercially to DSF.
- These markets often have limited need for DSF due to low renewable targets, bilateral contracts with generators, or lack a transmission system (as is the case with Malta).
- With time these markets will develop the need for DSF, however commercial interest will remain limited over the next 3 years.



Emerging Markets

Countries scoring 'medium' are generally active markets undergoing development to open more fully to DSF.

- Some value streams are open to DSF but there are often significant barriers in high minimum bid sizes, challenging metering requirements or regulatory constraints.
- Despite the (current) lack of accessibility to DSF these countries have a high spend on flexibility, including Poland, Romania and Greece.
- These countries are aiming to join the coordinated EU markets for ancillary service (MARI, PICASSO, TERRE) over the next two years.



Maturing Markets

Countries scoring 'high' are more developed markets for DSF. This does not necessarily mean there are no barriers to participation.

- Maturing markets have most (if not all) markets open to DSF, although barriers to entry are still present.
- Local flexibility is developing, with some example of commercial offerings (e.g. the Netherlands) at distribution level.
- Even at their current stage of development, some markets have the potential to grow further due to increasing renewable targets (e.g. France, Germany and Great Britain).



EUROPEAN MARKET MONITOR FOR DEMAND SIDE FLEXIBILITY 2021

INTRODUCTION

- Methodology
- Scoring System

DELTA-EE



Methodology

The Market Monitor is based on extensive primary and secondary research

This report is based on Delta-EE and smartEn's high-level qualitative primary research across 30 countries and more detailed research into twelve of those countries.

DEMAND SIDE FLEXIBILITY MARKET MONITOR

We extended the research process undertaken for previous Market Monitors to include substantial quantitative assessment to estimate market value. Our approach was as follows:

1. **Interviewed ~100 industry contacts** with knowledge on demand side flexibility across all markets, including TSOs, DSOs, Energy Suppliers, Aggregators, independent specialists, technology companies and industry associations.
2. **Gathered over 40GB of market data** (price and volumes of ancillary services) from TSOs, regulators and ENTSO-E.
3. **Calculated** the annual capacity or energy volume, average price and total market value for each value stream with available data.
4. **Assessed and scored** each country against four categories as described on the methodology slide.
5. **Aggregated scores** to produce an overall country ranking.
6. **Proofed and ensured consistency** across the scores, valuations and rankings with **internal and external challenge** on the results.

DETAILED COUNTRY REPORTING

Alongside the Market Monitor maps, Delta-EE and smartEn also carried out more detailed research in order to produce detailed country reports.

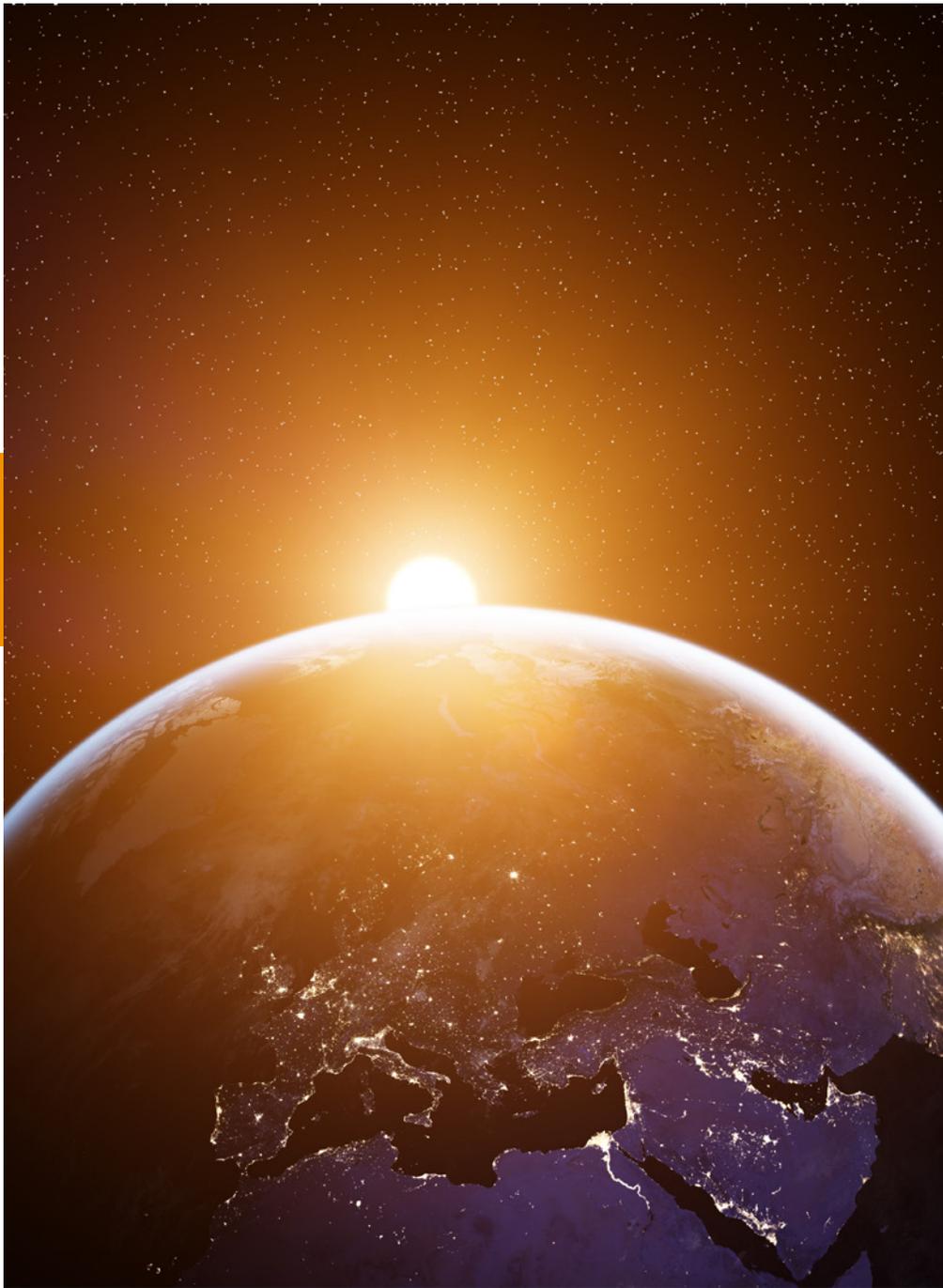
We focused on twelve countries to give a range of examples of markets actively developing demand side flexibility.

Delta-EE subscribers and smartEn members receive more detailed profiles for the following countries:

- | | |
|-----------------|---------------|
| — Belgium | — Italy |
| — Finland | — Netherlands |
| — France | — Norway |
| — Germany | — Spain |
| — Great Britain | — Sweden |
| — Ireland | — Switzerland |

Scoring System

CATEGORY	FEATURE	SCORING SYSTEM	DESCRIPTION
Potential market size of flexibility	<ul style="list-style-type: none"> Ancillary services (FCR, aFRR, mFRR, RR or local equivalent) 	<p>1– 5 based on the volume and prices of ancillary services procured by TSOs.</p> <p>1 = <€50M 2 = €50M - €99M 3 = €100M – €249M 4 = €250M – €500M 5 = >€500M</p>	<p>This score highlights the countries that have the highest spending on the ancillary services that to comply with the Clean Energy Package should be open to DSF (FCR, aFRR, mFRR, RR or local equivalent).</p>
Demand side flexibility regulatory progress	<ul style="list-style-type: none"> Is the ancillary services markets operational? Can DSF participate? Is aggregation allowed? Is a BRP agreement required? Is the country part of co-ordinated markets? 	<p>1 – 5 based on the availability and accessibility of DSF into ancillary services.</p>	<p>Markets scoring highly indicate that not only are markets open to DSF, but that aggregation is allowed and an agreement with a balancing responsible party (BRP) is not required. If the score is low then DSF is either not permitted or only with high barriers to entry.</p>
Local flexibility	<ul style="list-style-type: none"> Is collective self-consumption allowed? Is there a national framework for citizen energy communities? Is there a national framework for renewable energy communities? Is DSO flexibility commercial? Are there DSO flexibility trials? 	<p>1 – 5 based on the development of local flexibility.</p>	<p>Countries with commercial DSO offerings scored the highest. This is followed by countries that have implemented legal frameworks for collective self-consumption, citizen energy communities and/or renewable energy communities.</p>
Future of flexibility	<ul style="list-style-type: none"> Current monetisation of flexibility Markets opening to DSF by 2025 2030 renewable targets Target dates to join European market coupling 	<p>1 – 5 based on a planned development of DSF and future potential.</p>	<p>High scores highlight the countries that have the most potential to increase monetisation of DSF in the future, reflecting those with large flexibility markets with plans to open to DSF in the next 1-2 years. Where markets are already open, high renewable targets in relation to current renewable generation capacity will increase the need for flexibility.</p>



EUROPEAN MARKET MONITOR FOR DEMAND SIDE FLEXIBILITY 2021

MARKET MONITOR MAPS

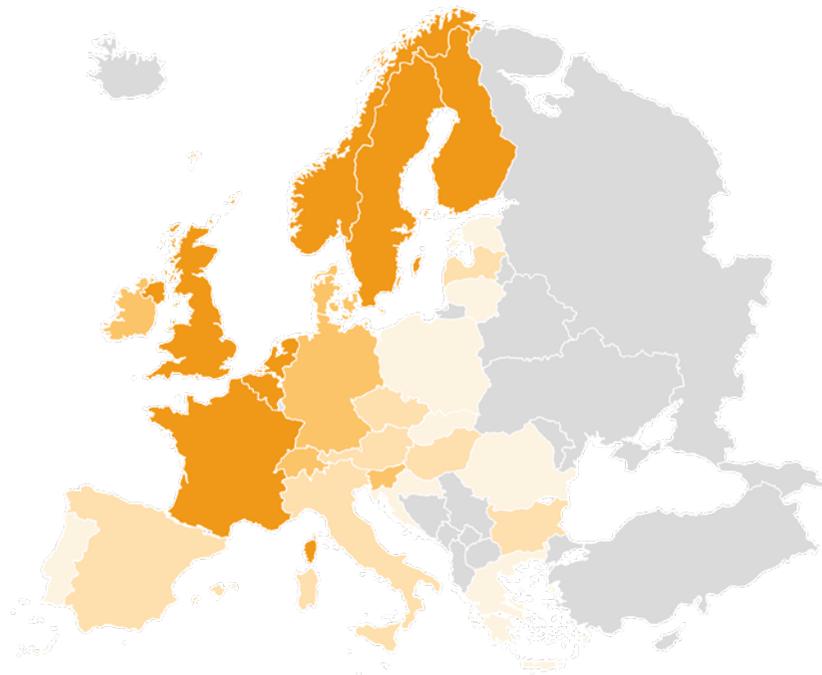
- Demand side flexibility regulatory progress
- Local flexibility and energy communities
- Potential market size of flexibility
- Future of demand side flexibility

DELTA-EE

 **smartEn**
Smart Energy Europe

Regulatory progress to enable Demand Side Flexibility

Which countries have open and accessible value streams for DSF?



Belgium, Finland, France, Great Britain, Netherlands, Norway and Sweden remain open and accessible. Ireland, Slovenia, and Switzerland are opening.

Interpreting the results

Most countries have commercial and remunerated ancillary services. However, **only ~50% allow DSF, fewer still allow participation from aggregated assets.**

In order to meet the requirements of the Clean Energy Package **most countries will need to make significant improvements.**

Even those countries where the markets are accessible (for example Germany) have **additional regulatory barriers** that hinder participation to DSF.

Snapshot: Italy

Through the UVAM (translated to 'virtually aggregated mixed assets') mechanism DSF assets can participate in some ancillary services. As of December 2021 this was extended to aFRR (energy payments only). **High metering and testing requirements still present a barrier** to DSF participation.

WE LOOKED AT:

- Can DSF participate?
- Is aggregation allowed?
- Is a BRP agreement required?
- Is the country part of co-ordinated markets?*

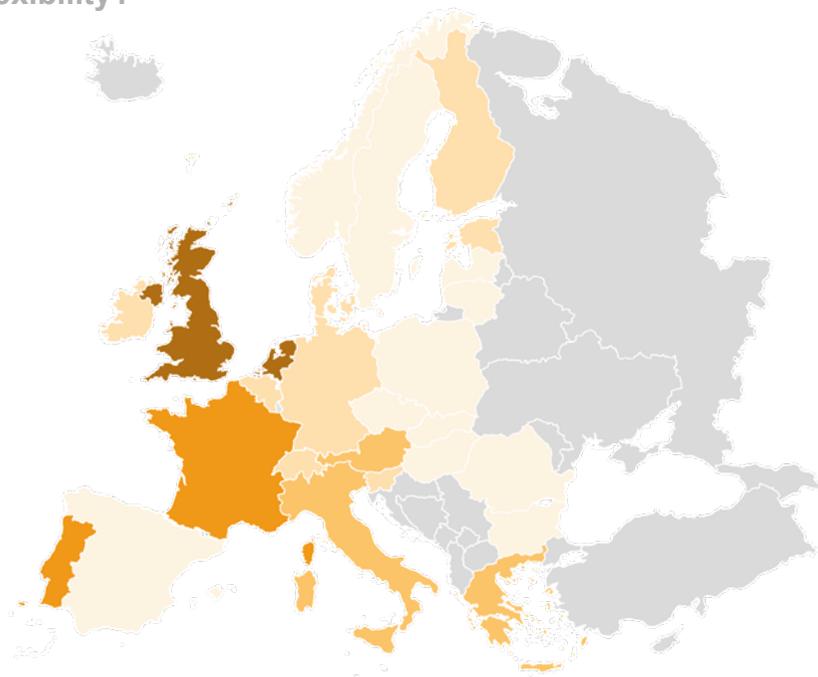
* PICASSO, MARI, TERRE, FCR co-operation



While progress is being made to implement the Clean Energy Package, there are still significant improvements required to increase accessibility to DSF.

Development of local flexibility and energy communities

To what extent can assets access local flexibility, be that through energy communities or distribution system flexibility?



Great Britain and the Netherlands are the only market with commercial distribution system flexibility. The Nordics, France, Germany and Sweden have large scale trials.

Interpreting the results

Local flexibility is still an emerging space, with **pilots and trials** ongoing even in the most advanced countries.

Great Britain and the Netherlands are the **only countries** with commercial distribution flexibility. A further 11 have trials.

Snapshot: Great Britain

The market in Great Britain has a very active local flexibility space with all six distribution network operators procuring flexibility. Additionally, several market place platforms (e.g. Piclo) are further enabling the participation of local flexibility by reducing complexity and streamlining procurement. However, **collective self-consumption is only allowed within regulatory sandbox conditions** and there is no implementation of citizen or renewable energy communities.

WE LOOKED AT:

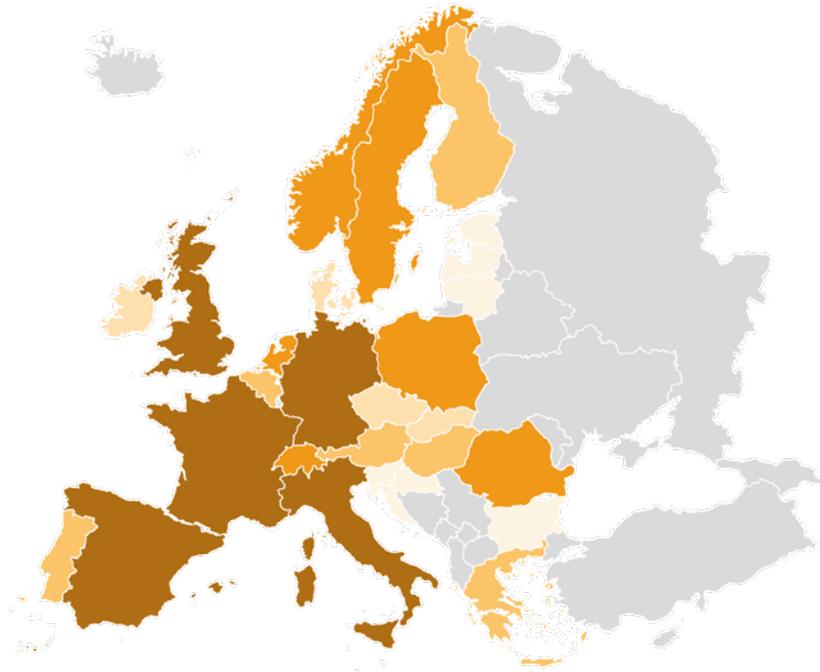
- Development of distribution system flexibility.
- Is collective self-consumption allowed?
- Is there a national framework for citizen energy communities?
- Is there a national framework for renewable energy communities?



~30% of EU countries have frameworks for implementing CSC, citizen and renewable energy communities, Great Britain and the Netherlands are leading in DSO flexibility.

Potential market size of flexibility

Shows the value of all ancillary services that are market based and remunerated, but not necessarily open to DSF.



The highest ranking five countries (France, Germany, Great Britain, Italy and Spain) account for ~60% of the total value of flexibility.

Interpreting the results

This is the total market value that is **theoretically open to DSF** – not the actual participation of DSF in those markets.

Total TSO spend on ancillary services has **increased significantly in Q4 of 2021** due to the European wide high wholesale costs.

Snapshot: Spain

Spain has a high market value despite having **relatively few value streams accessible to DSF**. Due to Spain's limited interconnection there is a large need for flexibility provided locally. Coupled with high utilisation prices due to European wide high wholesale prices the value of the Spanish market is high.

WE LOOKED AT:

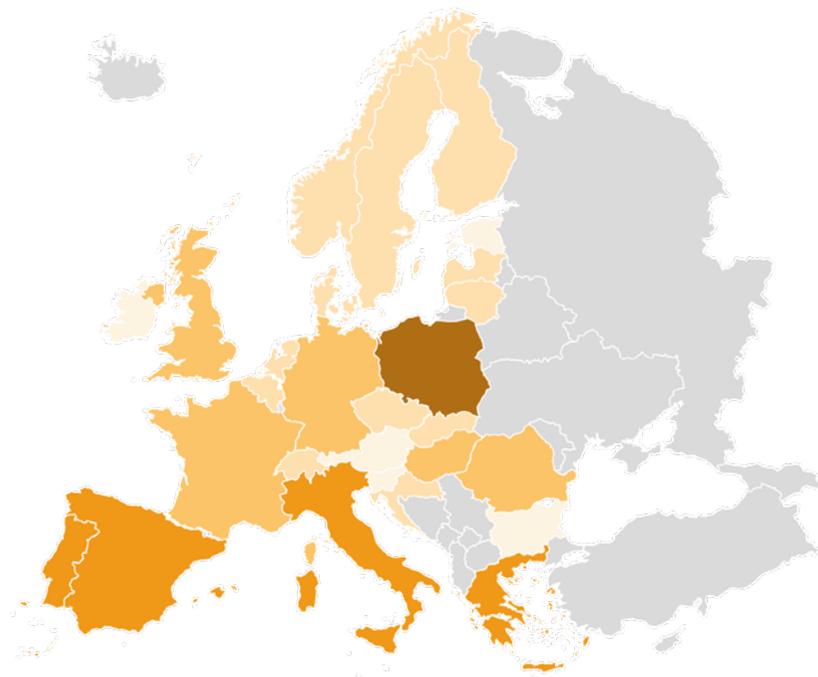
- Volume of ancillary services procured and activated.
- Price paid for reservation and activation of ancillary services.



This map illustrates the total spend by TSO on ancillary services (FCR, aFRR, mFRR and RR). High scores for monetisation does not always mean DSF can access this value in practice.

Future development of demand side flexibility

Where are the emerging markets for flexibility?



Poland and Greece followed by Spain, Italy and Romania are the most prominent emerging markets due to opening of value streams to DSF and a high need/value of flexibility.

Interpreting the results

Broadly there are three routes to future development of DSF markets:

- Countries that are currently closed but have formalised plans for opening to DSF. For example Poland and Greece.
- Countries that are open to DSF but due to technical and administrative barriers have limited participation (for example Spain and Portugal).
- Countries with existing open and accessible market but have high renewable targets so there is scope to grow.

Snapshot: Poland

Polski Sieci Elektroenergetyczna (TSO) has **ambitious plans to allow DSF in ancillary services over 2022/2023**. This, combined with Poland's high level of existing industrial assets and high renewable targets makes it an opportunity market for DSF.

WE LOOKED AT:

- Markets open to DSF by 2025.
- Market coupling.
- 2030 renewable targets.
- Potential market size of flexibility.



EUROPEAN MARKET MONITOR FOR DEMAND SIDE FLEXIBILITY 2021

EUROPEAN LEGISLATION

- Collective self-consumption
- Citizen Energy Communities
- Renewable Energy Communities
- Implementation of the Clean Energy Package

DELTA-EE

 **smartEn**
Smart Energy Europe

Energy communities

Citizen Energy Communities and Renewable Energy Communities both have legal definitions based on directive in the Clean Energy Package. The following definitions are broad and must be transposed into national law by individual member states.



Collective self-consumption, Citizen Energy Communities and Renewable Energy Communities are all measures enabling the participation of residential users.

RENEWABLE ENERGY COMMUNITIES

RED II: Renewable Energy Directive

- Open and voluntary participation, autonomous, controlled by shareholders or members that are located in the proximity of the renewable energy projects that are owned and developed by that legal entity;
- Shareholders or members are people, SMEs or local authorities including municipalities.
- Primary purpose to provide environmental, economic or social community benefits for its shareholders, members or the local areas, rather than financial profits.

CITIZEN ENERGY COMMUNITIES

Electricity Directive

- Voluntary and open participation, controlled by members or shareholders that are natural persons, local authorities, including municipalities, or small enterprises.

- Primary purpose to provide environmental, economic or social community benefits for its shareholders, members or the local areas, rather than financial profits.
- May engage in generation, including from renewable sources, distribution, supply, consumption, aggregation, energy storage, energy efficiency services, charging services for electric vehicles or provide other energy services to its members or shareholders.

COLLECTIVE SELF-CONSUMPTION (CSC) is a framework that enables pooling of generation which can be shared amongst a group of consumer, often with the aim of optimising self-consumption within the community.

CSC is one method to satisfy the Clean Energy Package that gives communities the right to engage in the activities of energy generation, distribution, supply, aggregation and storage.

Implementation of Energy Communities

A framework for implementation is the first step to enabling energy communities, this does not mean there is active participation.

	Is collective self-consumption allowed?	Is there a framework for <u>citizen energy</u> communities?	Is there a framework for <u>renewable energy</u> communities?
Belgium	Yes	Yes	Yes
Finland	Allowed on private networks	Yes	Draft
France	Yes	Yes	Yes
Great Britain	Allowed in a regulatory sandbox	NA	NA
Germany	Yes	Draft	Draft
Ireland	No	Draft	Yes
Italy	Yes	Yes	Yes
Netherlands	Allowed in a regulatory sandbox	Allowed in a regulatory sandbox	No
Norway	Allowed on private networks	No	No
Spain	Yes	No	Yes
Sweden	Allowed on private networks	Draft	Draft
Switzerland	Yes	No	Yes

Clean Energy Package overview

Parameters taken from the Electricity Directive and Electricity Regulation.

	Are residential dynamic tariffs available?	Which markets can DSF participate in?							Which markets permit aggregation?						15 minute imbalance settlement period	Is storage allowed in ancillary services?	DSO flexibility – commercial or trials							
		FFR/DC	FCR	aFRR	mFRR	RR	DA/ID	RA	FFR/DC	FCR	aFRR	mFRR	RR	DA/ID				FFR/DC	FCR	aFRR	mFRR	RR		
Belgium	✓		✓	✓	✓		✓	✓		✓	✓	✓		✓		✗	✓	✓	✓		✓	✓	Neither	
France	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✗	✗	✗	✗	✗	✗	✗	✗	Trial
Finland	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✗	✗	✗	✓	✗				✗	✗	Trial	
Germany	✗		✓	✓	✓		✓	✗		✓	✓	✓		✓		✓	✓	✓			✓	✓	Trial	
Great Britain	✓	✓	✓	✓	✓		✓	✗		✓	✓	✓	✓		✓	✗	✗	✗	✗		✗	✗	Commercial	
Ireland	✗		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✗	✗	✗	✗	✗	✗	✗	Neither	
Italy	✓	✓	✗	✓	✓	✓	✗	✓		✓		✓	✓	✓		✗		✗	✗	✗	✗	✗	Trial	
Netherlands	✓	✓	✓	✓		✓				✓	✓	✓		✓		✓	✓	✓			✓	✓	Commercial	
Norway	✓	✓	✓	✓		✗				✓	✓	✗	✓			✓	✓	✓	✓		✗	✗	Trial	
Spain	✓		✗	✓	✓	✓	✗					✓	✓				✓	✓	✓		✗	✗	Trial	
Sweden	✓	✓	✓	✓		✓	✓			✓	✓	✓	✓		✓	✓	✓	✓			✗	✗	Trial	
Switzerland	✗		✓	✓	✓	✓	✗			✓	✓	✓	✓		✓	✗	✗	✗	✗	✗	✓	✓	Trial	

Positive Negative



EUROPEAN MARKET MONITOR FOR DEMAND SIDE FLEXIBILITY 2021

GLOSSARY

DELTA-EE



COUNTRY	ACRONYM	NAME	DESCRIPTION
EU	aFRR	Automatic Frequency Restoration Reserve	The reserves primary purposes are to continually: (1) balance the supply and demand, and (2) maintain system frequency. This reserve is activated automatically. The use of aFRR enables activated FCRs to deactivate and be ready to use in case of new disturbances.
EU	AS	Ancillary Services	Services procured by the transmission system operator to support the transmission of electric power from generators to consumers. They are used to maintain the proper flow and direction of electricity, address imbalances between supply and demand, and help the system recover after a power system event.
EU	AVL	Availability	Price and volume of balancing capacity reserved in EUR/MW/hrs and MW.
GB	BM	Balancing Mechanism	One of the tools used by National Grid ESO, the Transmission System Operator in Great Britain, to balance electricity supply and demand close to real time.
GB	BMU	Balancing Mechanism Unit	Units of trade within the Balancing Mechanism. Each BM Unit accounts for a collection of plant and/or apparatus, and is considered the smallest grouping that can be independently controlled.
EU	BRP	Balancing Responsible Party	Entities responsible for maintaining supply and demand on the energy markets. Each BRP must strive to be balanced in real time, and that BRP is financially responsible for the imbalances to be settled with the connecting TSO.
EU	BSP	Balancing Service Provider	A market participant providing balancing services to its Connecting TSO.
EU	BTM	Behind the meter	An asset located behind a demand meter on a customer site.
EU	C&I	Commercial and Industrial	Non-domestic customers.
EU	CEP	Clean Energy Package	A set of eight EU directives and regulations aims to provide an update to the European energy policy framework, aiming at facilitating the energy transition and providing a modern European energy market.
EU	CHP	Combined heat and power	A technology that generates electricity and captures the heat that would otherwise be wasted to provide useful thermal energy. CHP can be located at an individual facility or building, or be a district energy or utility resource.

COUNTRY	ACRONYM	NAME	DESCRIPTION
EU	DA	Day ahead	The day before delivery. Generally used in the context of electricity spot markets.
EU		De-rating	Rating factors applied to assets to represent the confidence of system operators in the reliability of the contribution they make to the system.
EU	DSO	Distribution System Operator	The operating managers (and sometimes owners) of energy distribution networks, operating at low, medium and, in some EU member states, high voltage levels (LV, MV and HV).
GB	DHL	Dynamic High Low	This is a dynamic service that delivers equal volumes of Primary, Secondary and High frequency response.
IE	DS3		Collective name for Ireland's ancillary and reserve services markets.
EU	EBGL	Electricity Balancing Guidelines	The EBGL was created as a result of an EU Regulation that aims to enable countries to share balancing resources.
EU	FCR	Frequency Containment Reserve	Active power reserves which are automatically controlled to maintain system frequency as supply and demand constantly changes.
EU	FCR-D	FCR - Disturbance	Frequency Containment Reserve for Disturbances contains the frequency during disturbances, and aims to limit the deviation when the frequency goes outside the standard range.
EU	FCR-N	FCR - Normal	Frequency Containment Reserve for Normal Operation contains the frequency during normal operation, and aims to keep the frequency within the standard frequency range.
EU	FFR	Fast Frequency Reserve	Fast Frequency Reserves are being introduced as grid inertia declines. It is currently the fastest acting ancillary service and higher volumes are required for period of low inertia. In the GB market this is referred to as Dynamic Containment (DC).
EU	FOM	Front of meter	An asset connected directly to the electricity network, instead of behind a customer meter.

COUNTRY	ACRONYM	NAME	DESCRIPTION
GB	GSP	Grid Supply Point	Connection point between the transmission network and the distribution network.
EU	ID	Intraday	The day of delivery. Generally used in the context of electricity spot markets.
EU	mFRR	Manual Frequency Restoration Reserve	This reserve is activated when a serious grid imbalance or congestion issues arise. The primary purposes of mFRR are to resolve: (1) major or systematic supply and demand imbalance, (2) a significant frequency variation, and (3) major congestion issues. This reserve is activated manually.
EU		Net-metering	Net-metering refers to charging electricity consumers based on the net volume of imports and exports. The exports are remunerated at the full retail import tariff, and unreflective of the prevailing wholesale price.
EU	RR	Replacement Reserve	Replacement reserves enable activated FRRs to deactivate and be ready to use in case of new disturbances. This is an ancillary service in approximately half of the EU countries.
EU	RA	Resource Adequacy	Inclusive term referring to the products countries use to ensure peak demand can be met. For example, capacity market/mechanism, strategic reserve or capacity remuneration scheme.
EU	STOR	Short-term operating reserve	STOR is a reserve product in the GB market that maps to the EBGL definitions of mFRR and RR.
EU	SME	Small, medium enterprise	Non-subsidiary, independent firms which employ fewer than a given number of employees. This number varies across countries. The most frequent upper limit designating an SME is 250 employees, as in the European Union.
EU	TCR	Targeted Charging Review	A significant code review being conducted by the GB regulator, Ofgem, which will bring in changes to the charging methodology of transmission network use of system charges.
EU	TERRE	Trans European Replacement Exchange	The European implementation project to create a common marketplace across Europe for exchanging replacement reserves.
EU	TNUoS	Transmission Network Use of System Charges	Network charge in GB used to cover the cost of transmission system operation, paid by all customers and generators.

COUNTRY	ACRONYM	NAME	DESCRIPTION
GB	ToU	Time-of-use	A type of electricity tariff that varies at different times of day
EU	TSO	Transmission System Operator	The operating manager of the transmission system and party responsible for system balance.
EU		Utilisation	Price and volume of balancing energy activated in EUR/MWh and MWh.
EU	UVAM	Virtually Aggregated Mixed Units	Italian ancillary service product dedicated to distributed resources.
EU	VLP	Virtual Lead Party	A non-BRP participating in the balancing mechanism, typically an independent aggregator.

Disclaimer

Copyright

Copyright © 2022 Delta Energy & Environment Ltd. All rights reserved.

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means electronic, mechanical, photocopying, recording or otherwise without the prior written permission of Delta Energy & Environment Ltd.

Unless otherwise credited all diagrams in this report belong to Delta Energy & Environment Ltd.

Important

This document contains confidential and commercially sensitive information. Should any requests for disclosure of information contained in this document be received, we request that we be notified in writing of the details of such request and that we be consulted and our comments taken into account before any action is taken.

Disclaimer

While Delta Energy & Environment Ltd ('Delta-EE') considers that the information and opinions given in this work are sound, all parties must rely upon their own skill and judgement when making use of it. Delta-EE does not make any representation or warranty, expressed or implied, as to the accuracy or completeness of the information contained in the report and assumes no responsibility for the accuracy or completeness of such information. Delta will not assume any liability to anyone for any loss or damage arising out of the provision of this report.

Where this report contains projections, these are based on assumptions that are subject to uncertainties and contingencies. Because of the subjective judgements and inherent uncertainties of projections, and because events frequently do not occur as expected, there can be no assurance that the projections contained herein will be realised and actual events may be difference from projected results. Hence the projections supplied are not to be regarded as firm predictions of the future, but rather as illustrations of what might happen. Parties are advised to base their actions of an awareness of the range of such projections, and to note that the range necessarily broadens in the latter years of the projections.

EUROPEAN MARKET MONITOR
FOR DEMAND SIDE FLEXIBILITY 2021