



# Demand Response and Flexibility Solutions



# Flexibility

In an ever-changing and complex energy market, companies must constantly face new challenges:

- Regulatory changes
- Market trend alterations
- Technical engineering challenges
- Disruptive new technology
- Volatility in the energy price
- Multiple supply contracts in the market
- Compliance with environmental policies
- Unforeseeable climatic events

Enel X simplifies this complex ecosystem and makes the energy assets of businesses across industrial and commercial sectors remunerative, making use of its experience and expertise. Our fully-fledged suite of flexibility solutions extends from Demand Response to GEO (Generation and Energy Optimisation) and beyond.



# Where we are and what we offer

Within the Flexibility suite of offers, in particular, Enel X offers 3 turn-key solutions.

1

Demand Response

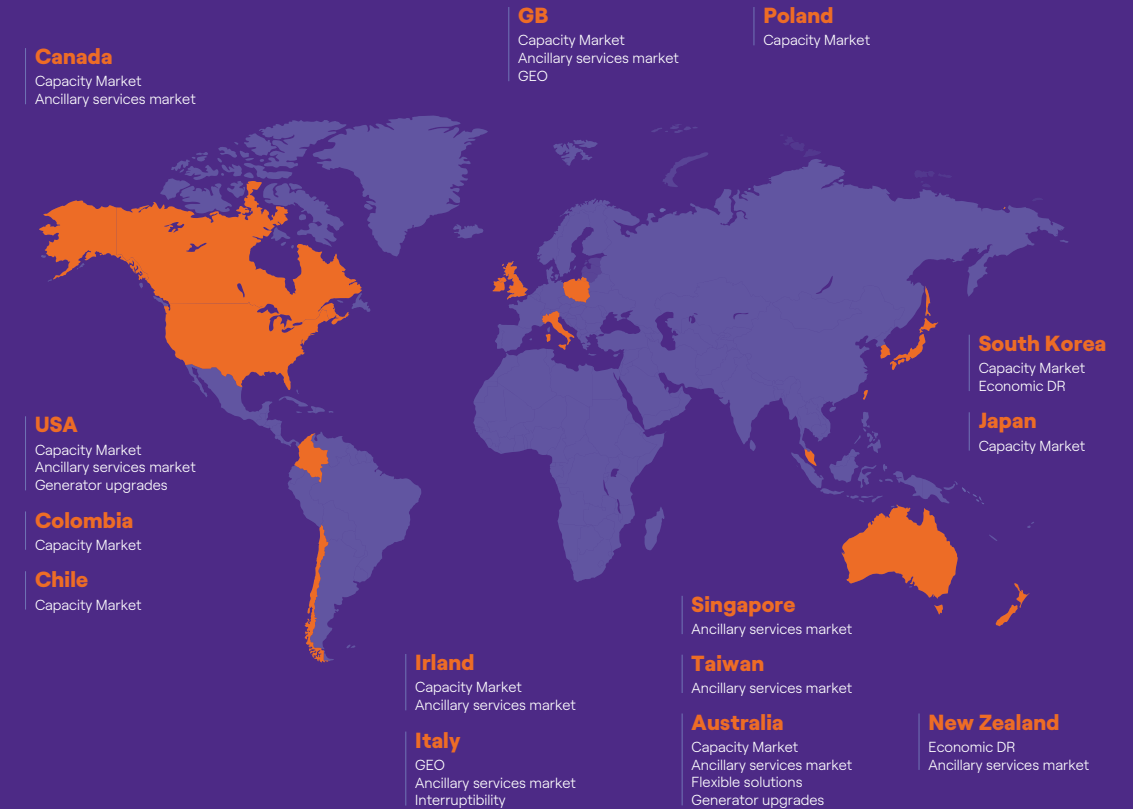
2

Generator upgrades

3

Generation and Optimisation of customer self-generation systems, known as "GEO"

## Geographical area where the Flexibility solutions are available



Discover how to make your energy assets remunerative, contributing to the decarbonization of the planet.

# Demand Response

## What is Demand Response?

The Demand Response (DR) programmes are used by utilities and grid operators to improve **grid stability**, increase the efficiency of the electric infrastructure, while permitting the integration of renewable energies in the grid. These programmes **pay commercial and industrial customers** to modulate their energy consumption when the electric grid is under stress.

Enel X, via its **virtual platform**, manages the world's largest network of flexible energy load enabling companies to actively participate in the energy market. Many companies have begun tackling energy costs by participating in DR programmes, mainly because they make it possible to generate a new revenue stream **without the need to make any type of investment**. In exchange for modulating their energy consumption on request, the companies that participate in these programmes receive **remuneration related to their agreement to modulate**

in addition to being able to receive additional remuneration based on the quantity of flexible energy made available to the grid. For example companies can be compensated based on the **actual amount of energy reduced** during dispatches. Payment amounts vary depending on the programme rates offered by the utility or grid operator sponsor.

Enel X works with the customer to ensure that they receive the maximum financial benefits for their participation. The DR programmes offer however a range of advantages that is much wider than only the economic aspect. In fact, another advantage very appreciated by commercial and industrial companies is that they receive advanced notification in the case of imminent brown-outs or black-outs. Whether it is an **advanced notification** of 30 minutes or 2 hours or day-ahead notification (the amount of time depends on the programme), companies are able to use this time to prepare the measures necessary to **better protect their production**

**activities and their machinery.**

The DR service also contributes towards making the grid more stable and helps keep **electricity prices affordable** while offering

a **greener and more sustainable** alternative with respect to the construction of new power plants in the community and promoting the integration of renewable energy in the grid.



## How we manage the flexibility services

In order to manage flexibility services, Enel X state-of-the-art Network Operations Centre ("The NOC"), was established in 2011 in Dublin's "Silicon Docks" as our advanced grid monitoring hub. It is a true control centre for the Demand Response services. Here is where all energy dispatches are actioned, monitored and managed. Through the **NOC** we operate the largest portfolio of flexible energy assets across the world, to reduce global decarbonization and promote national grid stability in all the countries where we operate.

We currently manage **8.5 GW\*** demand Response in **12 countries**, and stream data from **more than 15,000 enterprise sites globally**. The power load managed by the NOC is distributed across **more than 60 Demand Response programmes** that vary substantially in dynamic and regulatory terms. At the NOC, we receive dispatching orders from more than **30 energy transmission operators**. Requests are sent from the NOC, ensuring an active response from each site that we manage, which guarantees the stability of the energy grid.

## The main types of DR

There are 3 major types of DR programmes that utility or grid operators typically offer:

### 1 - Capacity Markets

Capacity programmes pay energy users for their ability to reduce their consumptions on the grid when called upon to do so. Customers can participate by turning off equipment, switching to permitted on-site generation assets, discharging their energy storage system, or simply shifting their consumption at a different time.

Customers earn multiple forms of payments, depending on the programme: **payments related to Capacity or Availability** for their commitment to make available a pre-determined amount of available demand reduction; and **Energy or Event based payments** for the effective amount of demand reduction when requested to do so during system emergencies.

\* Update December 2022

## 2 - Programmes associated with the ancillary services

Ancillary service programmes typically require faster response times to leverage responses from customers in near real-time to help prevent sudden grid reliability issues. Ancillary services include the following types of programmes: **Reserve programmes** that call upon participants when additional supply is needed in near real-time to meet increasing demand to prevent imbalances

that could jeopardise grid stability. **Frequency response programmes** that compensate participants to help resolve system frequency issues, which occur when the grid encounters short-term imbalances between supply and demand. Participant sites are equipped with hardware that recognizes when frequency on the grid falls below certain thresholds and automatically curtails load from the grid until frequency is restored.



### 3 - Price-Responsive Markets

Price-Responsive Markets, also known as economic DR or Peak Management, can generate savings to businesses that reduce their electricity demand on the grid in response to high electricity prices. Participating facilities savings

on their electricity bills by using less electricity when prices are at their highest. Unlike other forms of DR where dispatches are initiated by the utility or grid operator, the customer can control when they choose to make themselves available for dispatch.

### Who can participate in the Demand Response programmes?

Any company that is able to modulate their electricity demand by at least 100 kW is a good candidate for the Demand Response programmes. Enel X develops tailored energy management plants for businesses operating in various sectors, including:

manufacturing (food and beverages, petrochemicals, construction, automotive, fabrics) commercial, agricultural, data centres, real estate, education, healthcare, IT, mining, public services, refrigeration and transport.

### How does a Demand Response programme work?

Most companies have inherent power flexibility, which can be harnessed by making temporary adjustments to electricity use, or by switching from grid power to a backup generator or battery storage unit, with little to no impact on operations. Harnessing the flexibility of energy assets through

grid services, like DR, can be a competitive advantage for companies to unlock a new source of income, and for the community around them benefiting from improved grid stability. There are 3 steps to participation: 1. Implementation, 2. Reaction, 3. Restoration of ordinary operation.



How does  
a Demand Response  
programme work?

# 01

## Implementation

### Definition of a tailor-made strategy for optimising energy management

Enel X will work with each customer to identify tailor-made plans for reducing the consumption of non-essential energy without affecting key activities for businesses, comfort, or product quality. It's our job to create a strategy that delivers maximum value with the minimum operational impact on the commercial activities of customers. Energy reduction measures are customised for each unique facility and can include turning off lighting, air conditioning, pumps, and other

non-essential equipment and/or performing maintenance during dispatch. Many facilities find that energy-intensive processes can simply be shifted by a few hours to facilitate dispatch participation. In some geographic areas, facilities may participate by switching to backup generation, thereby reducing demand on the grid. Enel X works with each customer to create a customised participation strategy that best suits them.

How does  
a Demand Response  
programme work?

# 02

## Reaction

### Installation of metering

Enel X installs first of all the necessary metering devices at the customer's facility. For example, we install a small gateway device at each of our customer facilities in order to establish communication with our Network Operations Centre (NOC).

This connection ensures that we can monitor energy consumption levels in real-time during DR dispatches and beyond, and also allows our customers to access their data and the valuable tools on our energy management software platform.

### Receive and acknowledge dispatch notification

When the utility or grid operator anticipates the need for support, it dispatches a signal to Enel X. Enel X will then send customers a notification via phone/email/SMS informing

them about the start and duration of the dispatch (typically between 15 minutes and 4 hours). Once they acknowledge the notification, they're ready to respond.

### Implement the energy management plan

At the start of the dispatch, the customer's facility will reduce its electricity usage according to their pre-determined energy reduction plan. Energy reductions can be managed manually on-site or conducted automatically by Enel X

with the click of a button. Enel X offers cloud-based applications that allows customers to log in and see their dispatch performance in real time, to ensure they are meeting their reduction target.

How does  
a Demand Response  
programme work?

# 03

## Restoration of ordinary operation

### Return to normal operations

Once the DR dispatch is over, customers receive a notification that they are now clear to return to normal operations. Enel X remains in contact with customers

before, during and after dispatch to ensure that they are hitting their reduction targets and ensuring the highest level of financial payments.

What are the **benefits** of participating in Demand Response programmes?



Access to a new revenue source

Cost reduction

Improved resilience

Improvement in sustainability

Management of risks

Improved transparency



## Access to a new revenue source

In exchange for availability to modulate the energy consumption, commercial and industrial energy users participating to DR programmes receive a payment. DR programmes enable companies active participation in the energy markets, transforming electricity costs into an opportunity to receive a new stream of revenue.



## Cost reduction

Thanks to an energy management plan developed together with Enel X team of experts, customers can reduce their energy demand on the grid and spot opportunities to better manage energy costs.



## Improved resilience

Participating in DR provides advance notice of unstable grid conditions (i.e. blackouts and brownouts), so clients can react and protect their equipment and machines in time, avoiding greater risks for their business operations.



## Improvement in sustainability

Participating in DR enables the integration of renewable energy sources in the energy mix and reduces the need for fossil fuels to supply electricity.



## Management of risks

Participating in DR programmes helps manage exposure to grid imbalances, protecting sensitive equipment and being prepared to activate alternative production/business schedules ensuring a seamless transition and protection of the site against unscheduled power interruptions.



## Improved transparency

Thanks to advanced technology, Enel X makes it possible for companies to have full visibility of their energy use and understand the impact that energy use has on its costs; which helps customers identify additional areas of saving and access new sources of revenue.

# Generator upgrading

Enel X supports businesses that own a backup generator to extend the life and value of their energy asset, in compliance with local regulatory policies. Our team develops customised energy management plans enabling businesses

to participate in DR programmes when financially and operationally convenient for them. Enel X can finance the backup generator upgrades, facilitating business participation in Demand Response programmes with no upfront cost.

## How does it work?

Enel X develops a customised plan for you to transition your load to your on-site generation assets for DR dispatches. In order to participate in DR, generators must meet strict regulatory requirements.

In case generators do not meet these requirements, Enel X can finance and implement upgrades to the generators at no upfront cost, so your business is allowed to participate in DR programmes.

**1** Selection and financing  
Enel X's qualified partners can help businesses select the right generator size and financing solution to meet their needs.

**2** Installation and maintenance  
Guarantee of generator installation and maintenance, ensuring optimal operation.

**3** Participation and earnings  
Enel X proposes the DR programmes most suitable and appropriate to companies to maximise their earnings. Then when circumstances occur where companies participating in the DR programme are requested to provide support, they turn on their generator, (or start it remotely with the support of Enel X) for an easy new source of revenue.



## What are the advantages related to upgrading your generator?



### Protect against costly power disruptions

With a power generator available on site, businesses do not risk unexpected power outages; and with Enel X DR, they get advance notice of potential grid emergencies so they can proactively protect their facilities and equipment.



### Access to new revenue sources

Businesses earn regular payments through their participation in DR.



### Gain visibility

Businesses monitor and manage their electricity consumption data through Enel X's energy intelligence software to help them make more aware energy decisions, monitor their performance during DR events, and track their earnings.



# GEO: generation and energy optimisation

The GEO solution was designed specifically to optimise the cogeneration (Combined, Heat and Power) and trigeneration (Combined Cooling, Heat and Power) systems for the supply of electric, thermal and cooling energy (Combined Cooling, Heat and Power, CCHP). Furthermore, the solution optimises the back-up assets, such as boilers, cold storage and other energy assets at the customer site, enabling it to participate in the energy market for additional earnings.

There are two GEO solutions offered: GEO and GEO Advanced.

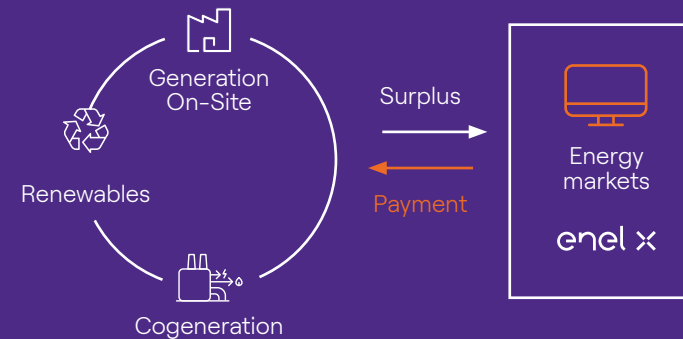
## GEO

GEO is a solution tailor-made for commercial and industrial customers owning an on-site distributed energy generation system (e.g. photovoltaic systems, back-up generator

market, CCHP systems and any other type of distributed energy resources, so-called DER). Furthermore, the solution does not require any type of investment or expense.

### HOW DOES IT WORK

Sale of surplus of energy generated by our clients that we feed into the market.



### Maximising the energy surplus

- Selection of the generation plan most suited to your needs.
- Sale by Enel X on the market of the surplus energy produced by the distributed generation plants at the customer sites.
- Remuneration by Enel X of the customer for the energy sold on the markets.

Enel X offers companies the possibility to make their auto generation assets remunerative by selling the surplus electricity generated by the customer on the market.

Leveraging on Enel Group's trading experience, Enel X secures the most advantageous energy price on behalf of the customer, creating a new revenue stream.

# GEO advanced

GEO Advanced is a solution based on advanced algorithms in order to create optimisation programmes for the generation of energy by cogeneration and trigeneration plants, in combination with other energy assets (inclusive of electrical and thermal backup systems, boilers, cold storage, absorbers, etc.). The optimisation programmes permits an integrated management of all energy assets, with a significant reduction in the customer's overall energy expenses.

## Who is it for?

Enel X's GEO Advanced solution is dedicated to all businesses that own a cogeneration (Combined Heat and Power – CHP) or trigeneration

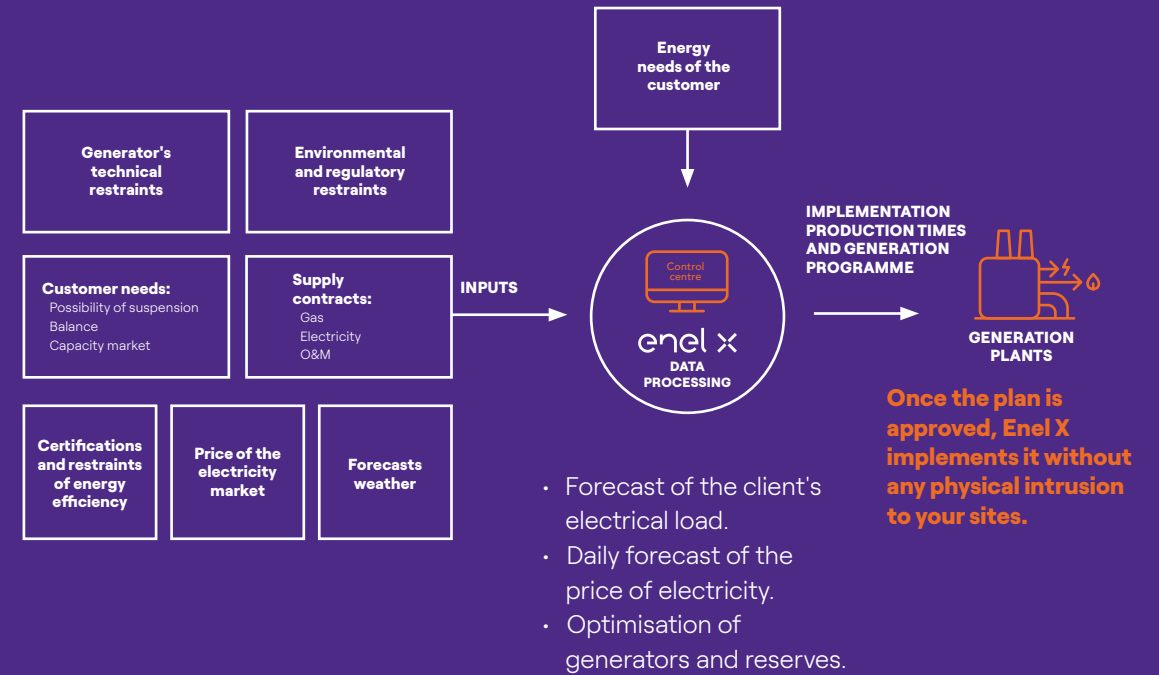
plant (Combined Cooling, Heat and Power – CCHP), such as hospitals, airports, ceramic, chemical and pharma, iron and steel, offices, retail, food sector.

## How does it work?

Our algorithm constantly analyses data from the client's facility and the external market, creating an optimised schedule for the client's generation assets.

A qualified team of Enel X technicians installs a Remote Transmission Unit (RTU)

at the client's site that remotely interfaces with the client's asset controller (SCADA or PLC), enabling the development of a schedule that optimises the generation timing on the basis of electricity prices and the curve of the forecasted demand.



GEO Advanced, in fact, processes real-time data and takes into account aspects such as, technical constraints of generators, local regulatory framework, environmental compliance, weather forecasts, load forecast, day-ahead electricity market price, energy efficiency, regulatory incentives, supply contracts (e.g. gas supply, electricity, operations and maintenance) and the overall client requirements, to design a real-time Optimal Generation Schedule (OGS).

## What are the Benefits?

As a result, the client will see a significant **reduction in their overall energy expense.** Moreover, thanks to our Optimal Generation Schedule, the client will be able to manage all

its energy assets in an **integrated manner.** The GEO Advanced can be coupled with other flexibility services too, such as other DR programmes, to unlock further inflows.



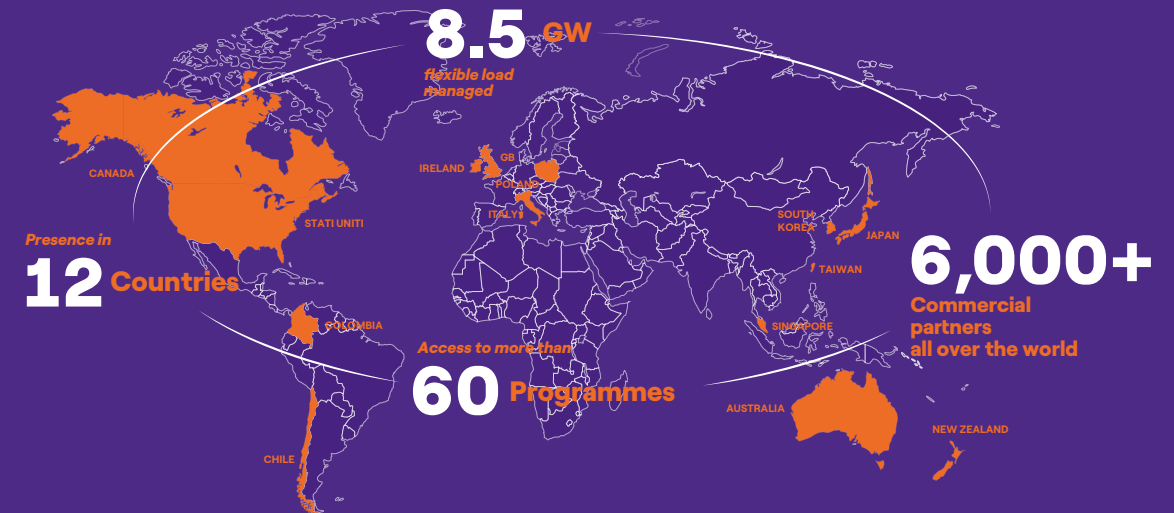
# Why do companies select Enel X for flexibility energy solutions?

Enel X is the world's leading Demand Response aggregator, with a flexible load of 7.4 GW and unparalleled expertise

in making customer energy assets remunerative in increasingly complex energy markets.

- Part of Enel Group, with more than **60 years** of experience in the energy sector.
- It is present in **12 countries**, and offers customers access to more than **60 demand response programmes** world-wide.
- It has earned the trust of more than **6,000** commercial customers.
- Streaming data from **more than 12,000** enterprise sites on a global level.
- **Network Operations Centre** with customer support 24x7.
- More than **US\$ 200 million** invested in new technologies.
- More than **3,000** employees in offices all over the world.

## Why choose Enel X for Demand Response?



We are the world's leading Demand Response, with unparalleled expertise in the terms of making customers' energy assets remunerative in increasingly complex energy markets.

Part of Enel Group with more than **60** years of experience in the energy sector

real-time data more than **12,000** enterprise sites

**Network Operations Center** with customer assistance 24x7

more than **€ 200 M** invested in new technologies

**3,000+** employees in offices all over the world

# Enel x About us

Enel X is a company of the Enel Group created to help companies, cities and consumers use energy in an efficient and remunerative way, while contributing to global decarbonization. As a leader in the sustainable transition, Enel X accelerates electrification and decarbonization practices thanks to the development of innovative products and digital solutions. The company is a world leader in advanced energy solutions. It manages 8.5 GW of Demand Response on a global level, 760 MW Battery Energy Storage installed capacity\* all over the world, and is a leader in electric mobility, with approx 410K EV Charging sessions\*\* all over the world.

## **Enel X for companies.**

Enel X offers a complete suite of energy services that range from professional energy consultancy services to the development and financing of assets for the generation of distributed energy, the installation of charging stations for electrical vehicles and financial services. In addition to the opportunity to monetise the energy assets and the consumption loads of commercial and industrial customers with the Flexibility solutions. Enel X has the ability to increase the economic returns of multiple energy assets thanks to its Virtual Power Plant (VPP) platform. Enel X offers a one-stop-shop of innovative energy solutions.

Our approach is to optimise our clients' energy portfolio in an integrated fashion, maximising our clients' competitive advantage by constantly scouting for competitive energy prices, reducing companies' costs and risk exposure, extracting the full advantage of market specific trends and regulatory

framework, while achieving sustainability goals. We have unparalleled expertise and are uniquely positioned to monetise our customers' energy assets in increasingly complex energy markets. Our solutions are designed around our clients' needs and tailored to suite their business priorities.

To discover more about our Flexibility solutions, visit our website at [enelx.com](https://enelx.com)



\*BTM, FTM, Enel Plants

\*\*comulated

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