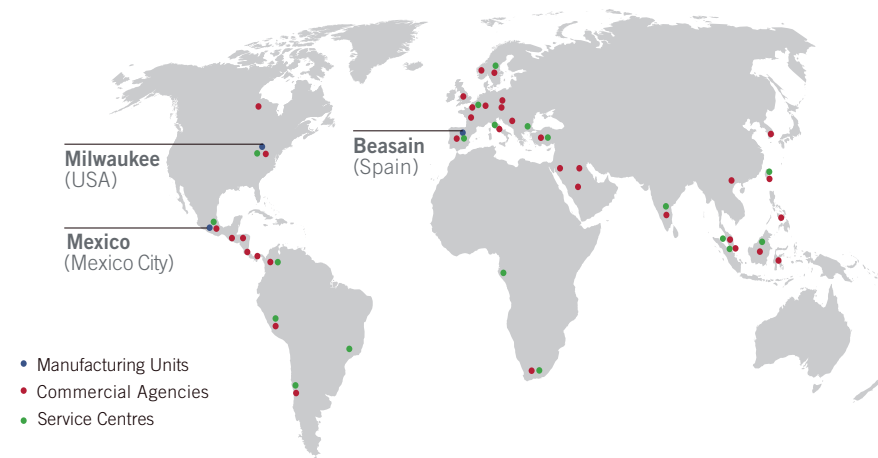


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## ENERGY STORAGE & GRID SUPPORT SERVICES

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# INDAR's value proposal

## A new power generation scenario

The energy generation market has changed and will continue changing drastically in the years to come, basically due to the extensive increase in renewable energies mainly wind and solar power.

Electric grids are facing new challenges for the increasing number of highly variable and unpredictable generation systems. In consequence efficient generating power plants with flexible operation are becoming essential. The highly demanding new grid codes scenario can be addressed by means of the flexibility of the Internal Combustion Engines (ICE) with optimized electrical assets, namely generators and battery energy storage systems.

Internal Combustion Engine (ICE) power plants will supply grid support services such as: black start, power quality, frequency regulation, peak shaving, capacity firming, etc., and additional benefits due to less rotating energy or reduction spinning reserve in order to minimize greenhouse emissions and the fuel consumption of the engines.

Generators, protection and control systems have to be designed in combination with the energy storage system for an optimum cost and lifecycle of the power plant assets.

Optimized plants are already operating, backed with batteries and energy management systems in this new energy ecosystem, offering flexible operation and grid code compliance.

INDAR is well aware of this new scenario, and offers a comprehensive portfolio of services allowing greenfield or already existing power plants to have them operating at their best performance.

## Optimization of generators

Depending on the network codes to which the operation of the plant is subjected and additional auxiliary equipment such as storage, INDAR designs a generator adapted to the specific operating needs for an optimum life cycle and cost.

### Service

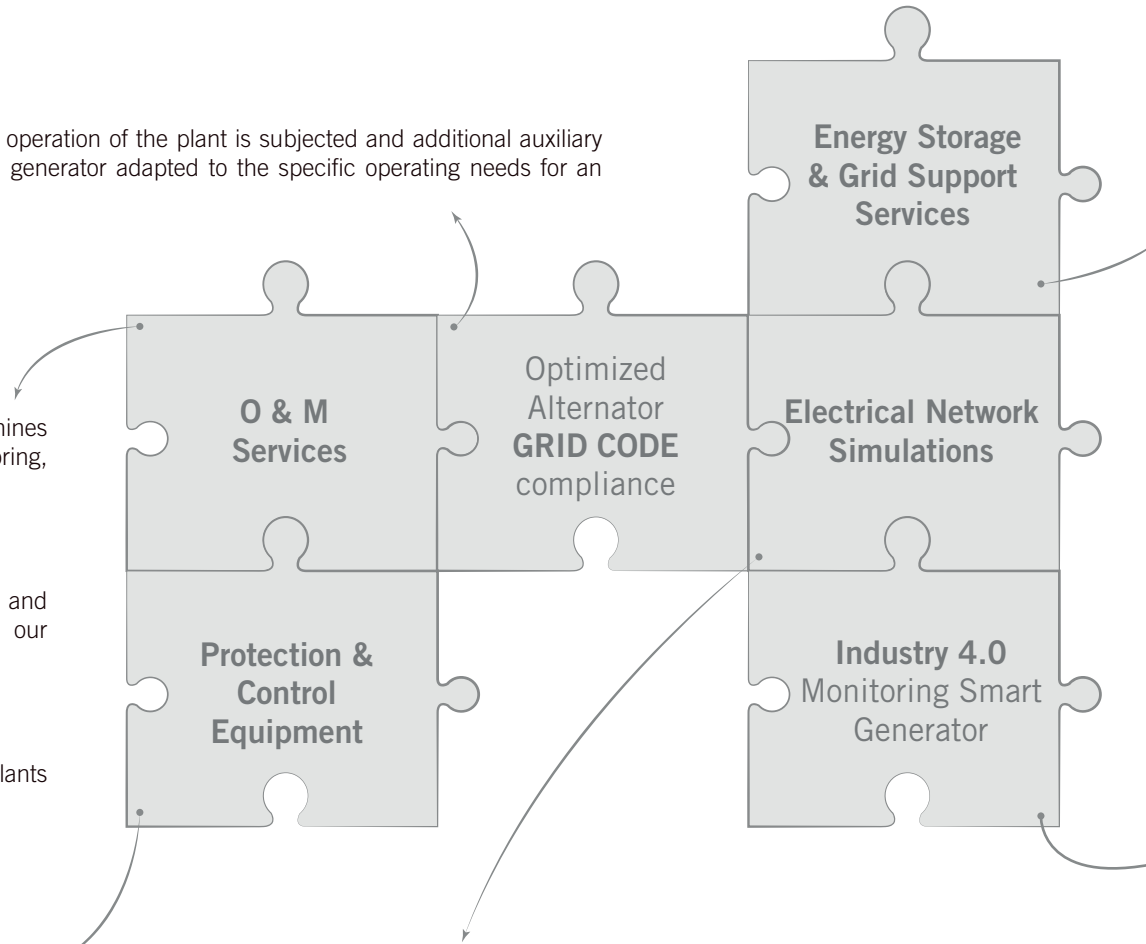
- Preventive-predictive maintenance to our machines and third parties equipment, offering monitoring, inspection and maintenance service packages.
- Reactive maintenance.
- Training courses for basic operation and maintenance of our machines, at site or in our headquarters.
- Supply of spare parts.
- Replacement or retrofit of existing power plants generators.

### Protection and Control Equipment

Protection and control cabinets are designed to fulfill incoming grid code compliance.

### Electric Network Simulations

Simulation model specifically developed for each single power plant, allow us to adapt our generator design to the new grid codes requirements.



## Energy Storage Systems **INGEGRID**

The emergence of energy storage is the technology response to the grid services need where the power is being generated, thus, counteracting the intermittency and volatility of renewable energies.

The use of energy storage system in a stationary power plant provides a wide range of services and advantages enhancing the role of the power plant in the network management.

INDAR as an independent electrical equipment supplier offers a comprehensive energy storage solution for power plants such as: **INGEDRIVE** frequency converters, EMS / PMS (Energy Management System/ Power Management System), BSS (Battery Storage System), etc. The power and energy required is customized depending on the installation of each power plant and the network needs.

## Industry 4.0. Monitoring: Smart Generator

Monitoring systems on our generators allow us to carry out preventive maintenance schedules, prediction and estimation of the life cycle of the machines, operation and evolution over time. Monitoring can be also implemented in the energy storage system.



## Thermal and Hybrid Plants

Energy storage systems with batteries are used in both stationary generation plants and hybrid power plants (Thermal + Wind and / or Solar).

Stationary power plants provide a number of network benefits, increasingly needed, due to grid code requirements, environmental regulations.

The EMS / PMS (Energy Management System / Power Management System) system in hybrid plant increases the benefits of a stationary plant, since it integrates energy management with the use of the most economical resource at any given time based on its cost and availability.

## The main benefits of the stationary power plant with storage system:

<p>€</p> <p><b>Savings on energy management</b></p>	<p>✗</p> <p><b>Black-start mode</b></p>
<p><b>O &amp; M optimization and savings</b></p>	<p><b>Instant power</b></p>
<p><b>Reduction of spinning reserve requirement</b></p>	<p><b>Frequency control</b></p>
<p><b>Fuel consumption savings</b></p>	<p><b>Voltage control</b></p>
<p><b>Improved plant performance</b></p>	<p><b>Grid code compliance</b></p>
<p>🌱</p> <p><b>Reduction of emissions</b></p>	<p><b>Optimization of plant operation</b></p>
	<p><b>Power quality</b></p>