



# **Endesa in the Balearic Islands**

## **How the Balearic island system works**

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8 June 2006

- **Introduction**
- Key parameters
- Current Generation assets
- Distribution Network
- Specifics of an isolated system
- Special operating characteristics
- Main projects for the future

**Endesa is the sole production, transmission-distribution company in the Balearic Islands. It also sells gas. It acts as a supplier in the deregulated market.**

**The Balearic Islands have two independent, isolated electricity systems: Mallorca-Menorca, with 1,365 nominal MW installed and Ibiza-Formentera, with 258 nominal MW installed**

**The island systems which are essential for the development of the area in which they are located, are different to mainland or larger scale systems given their size, isolation, technical, economic and regulatory conditions.**

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## Key parameters

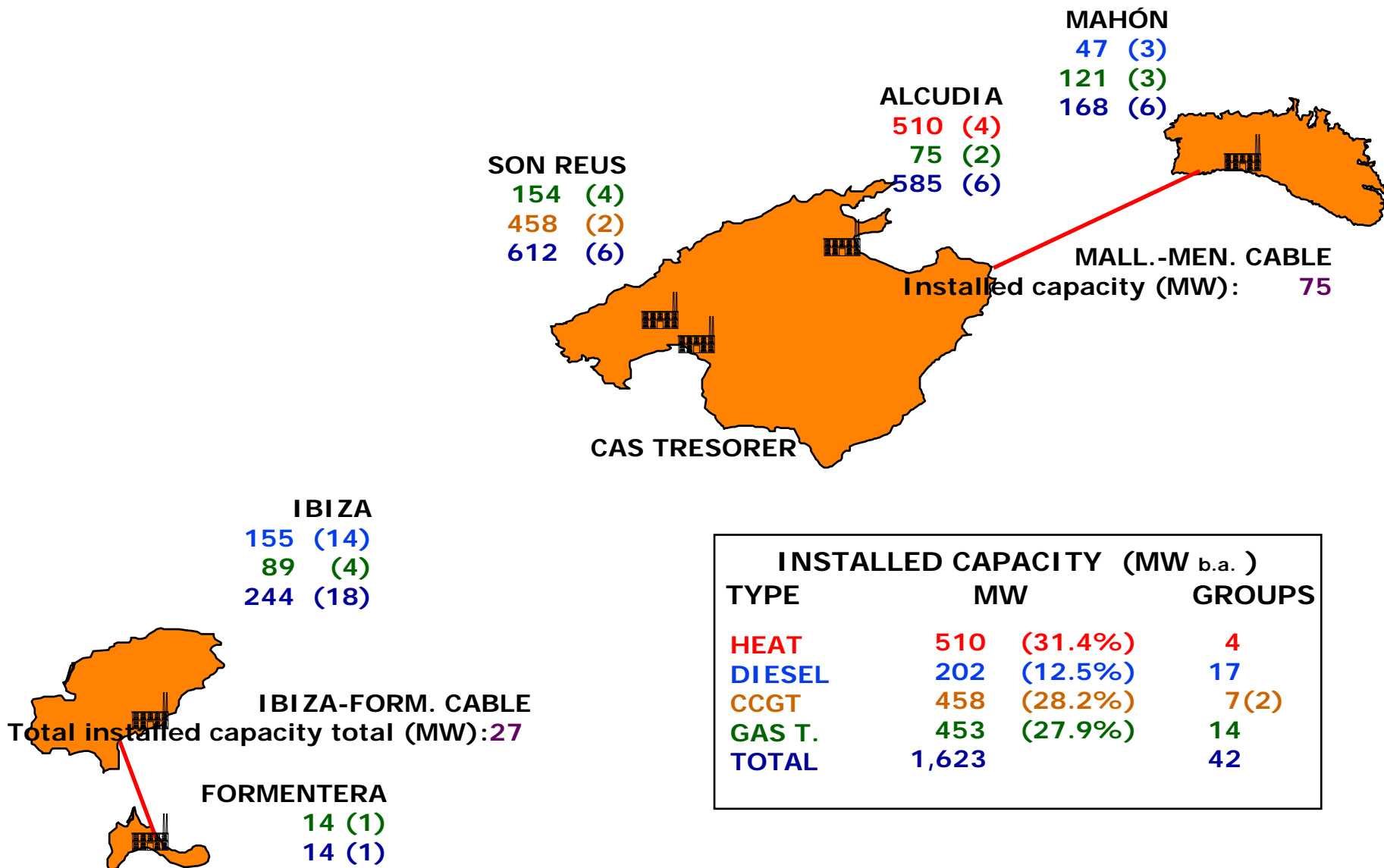
Generation	Distribution	Sales
Installed capacity: <b>1,623 MW</b>	Substations: <b>38</b>	Customers: <b>0.6 million</b>
Net production: <b>5,514 GWh</b>	Transformer Center: <b>10.173</b>	Customer services: 94% of our customers are less than 10 km away from a customer service centre. 100% are less than 30 km away
	Lines: <b>14,892 km</b>	Energy sold: <b>5,185 GWh</b>
	Distributed Energy: <b>5,649 GWh</b>	

Gas

Endesa Gas distributes gas to **86,130** customers in the Balearics (**536** GW p.a., an 8.5% increase vs. 2004).

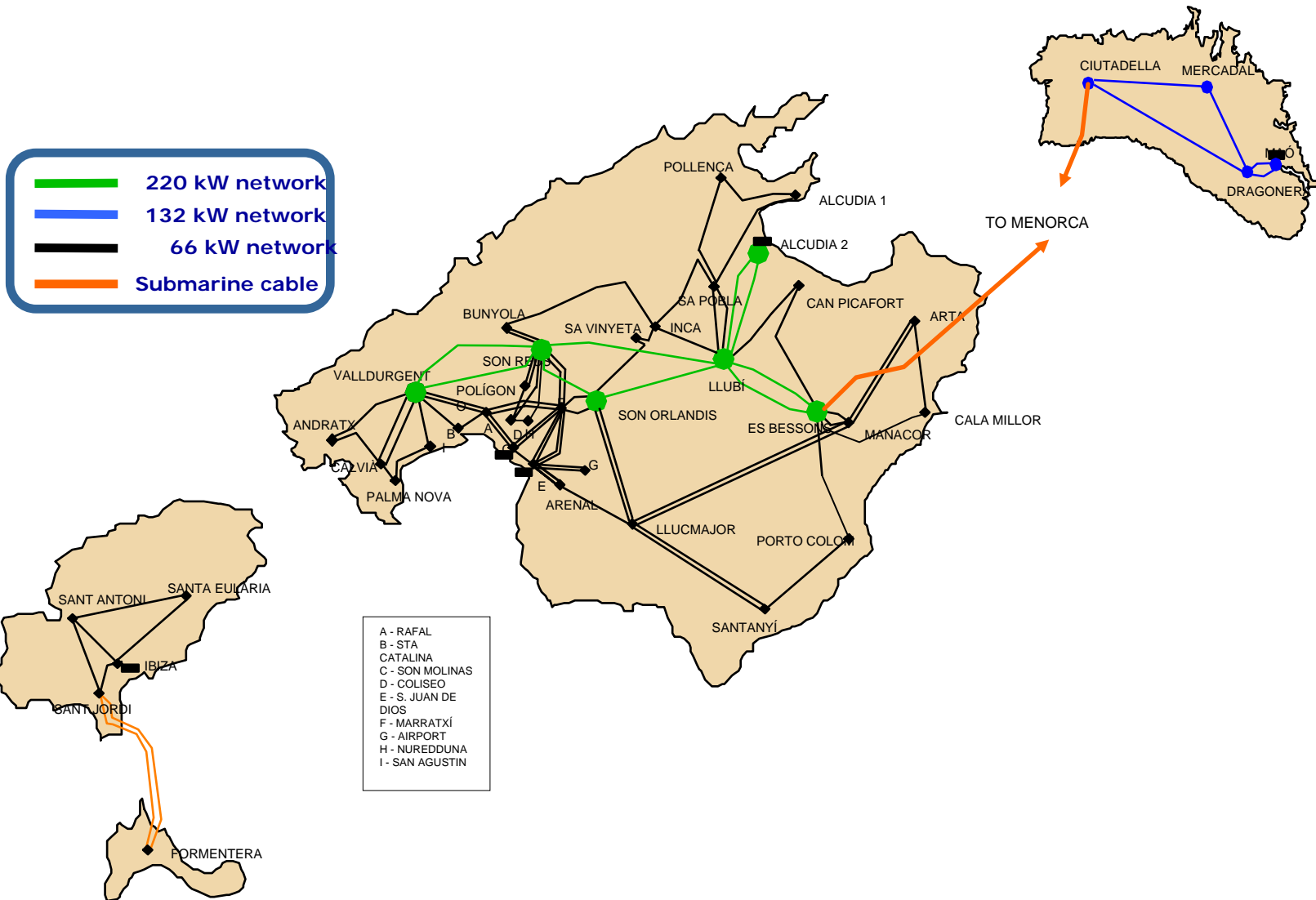
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## Current sites



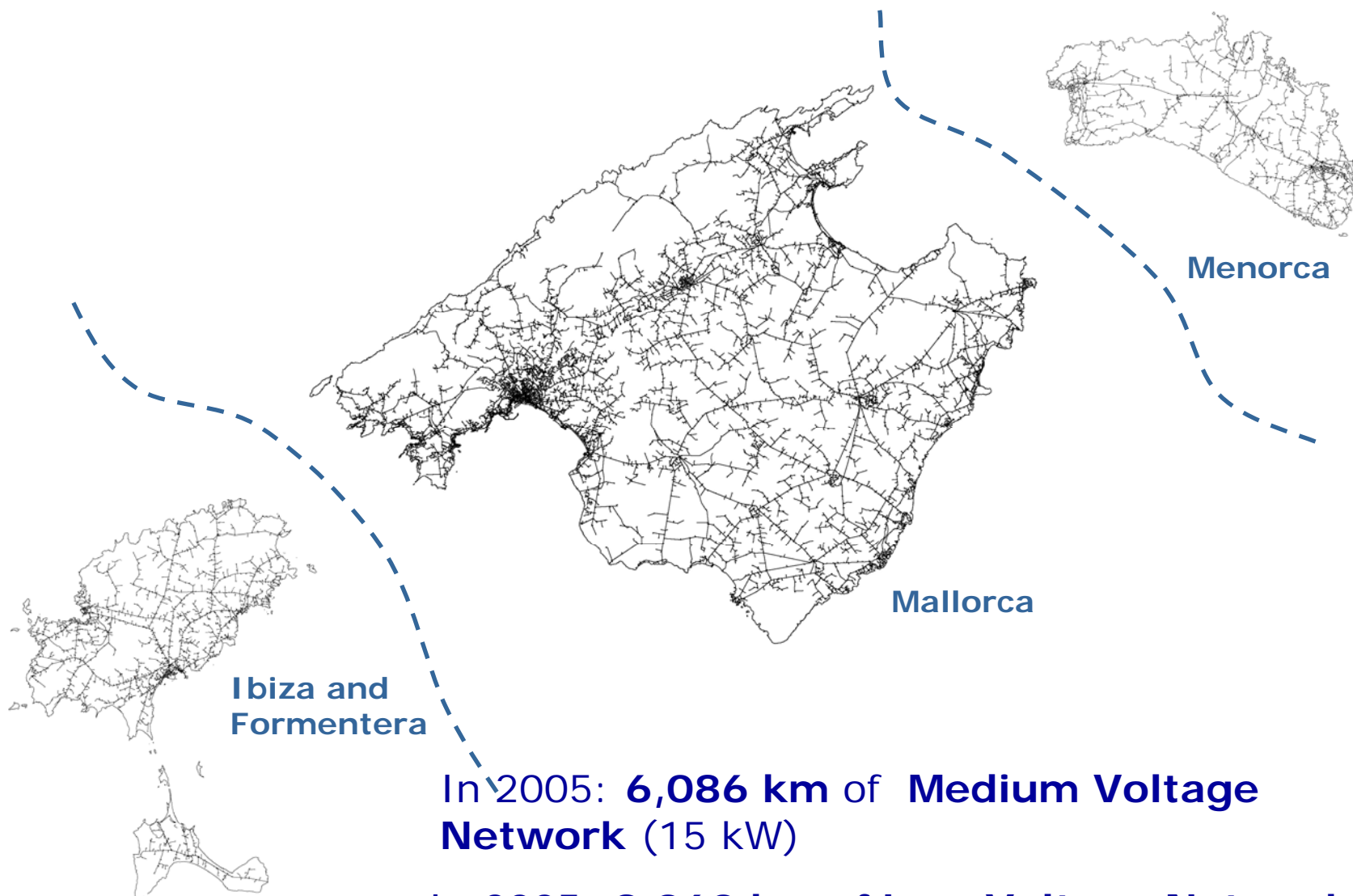
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# Transmission Network (December 2005)





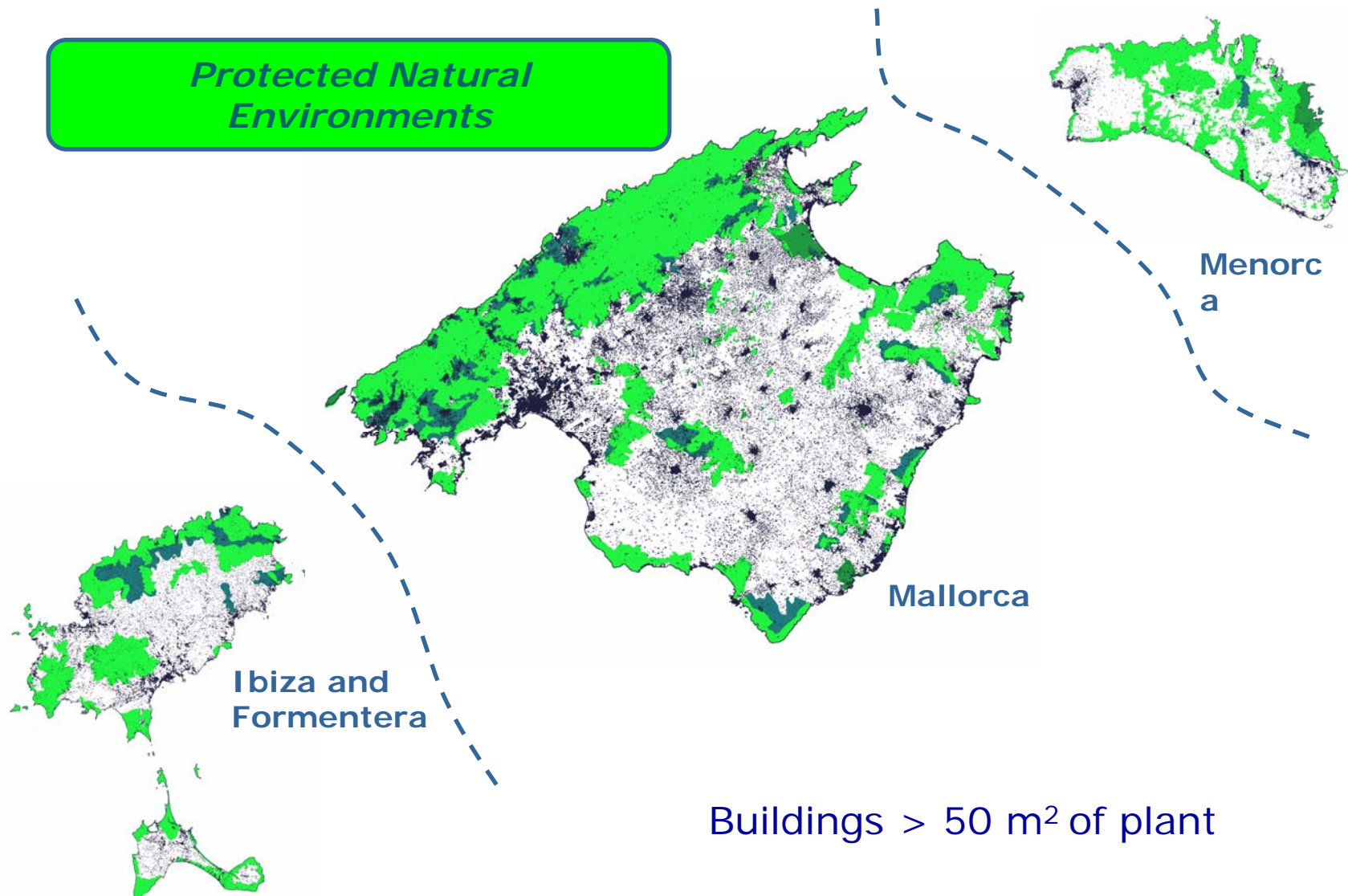
## Medium Voltage Transmission Network (December 2005)



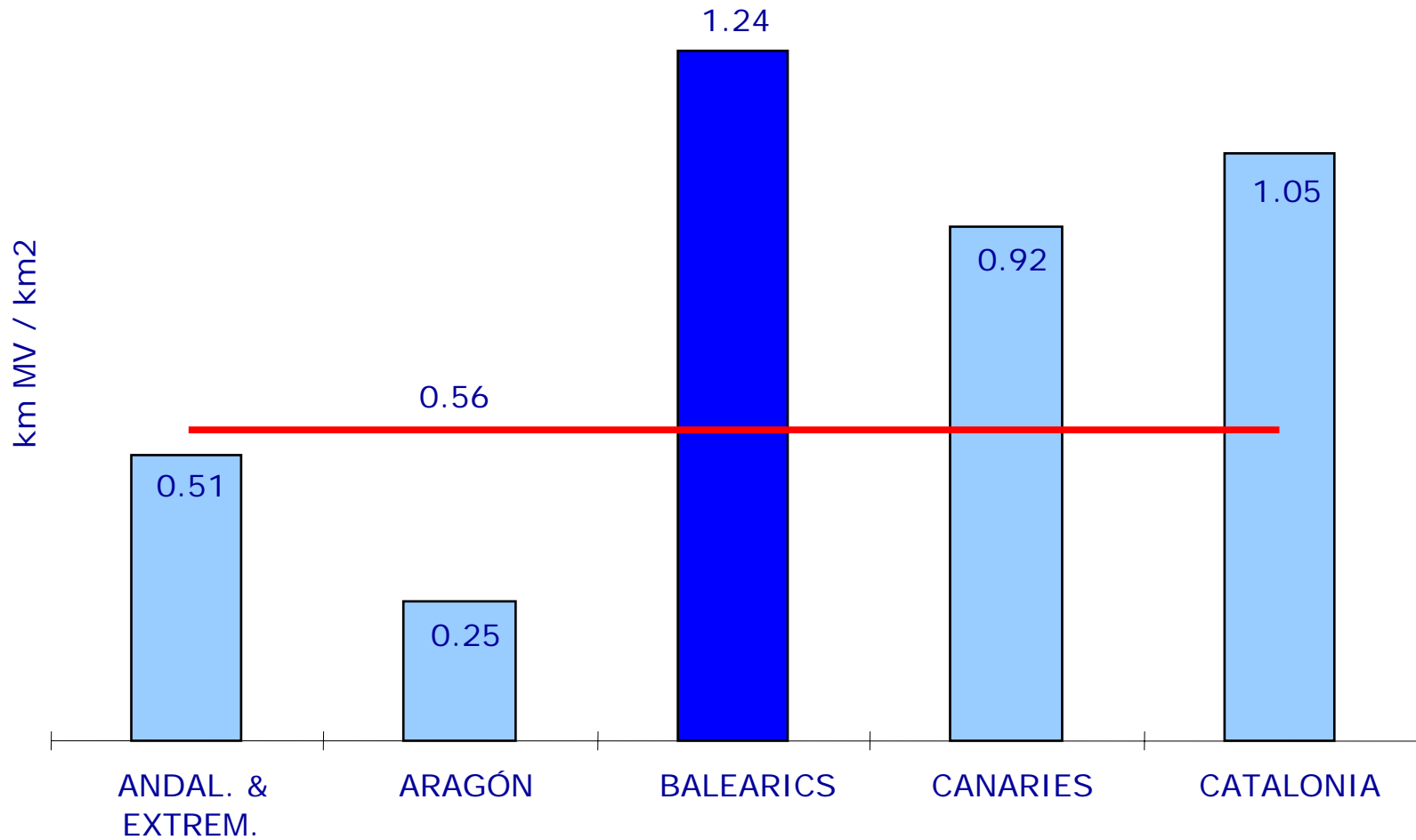
In 2005: **6,086 km of Medium Voltage Network (15 kW)**

In 2005: **8,060 km of Low Voltage Network** ,

## Market Dispersion and Protecting the Land



Areas covered (km MV/km<sup>2</sup>)



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- **Specifics of an isolated system**
  - Strong electricity system
  - Key parameters
  - Isolated vs extensive system
- Special operating characteristics
- Main projects for the future

## Strong electricity system

**GENERATORS**

dispersed or in power plants

**CUSTOMERS**

very different and different geographic distribution

**NETWORK**

radial, fenced or mixed allowing correct quality of customer supply

**Operating bases**

energy produced equals energy consumed at all times (not taking into account losses) as there is no means of storing the electricity

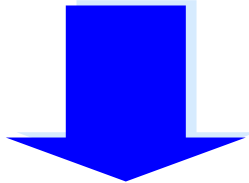
## Key parameters



periods by second (Hz)



electrical pressure throughout entire network, especially with customers



electricity companies are obliged to keep these prices at their nominal value

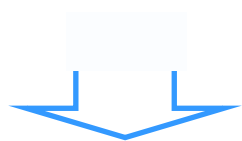
## Isolated vs extensive system

It is not the size of the key parameters which define the system but rather its variations compared to unbalances in the network.

A 40 MW interruption produces a frequency change of:

Mainland: **0.015** Hz

Mallorca-Menorca: **0.80** Hz



The difference between both systems is over **55** higher

Losing a group:

Mainland System: Nuclear generation

$$\text{Peak}_{2003} \frac{1,000}{38,000} = 2.6\% \quad \text{Trough}_{2003} \frac{1,000}{16,546} = 6.0\%$$

Island System: Coal generation

$$\text{Peak}_{2003} \frac{130}{914} = 14.2\% \quad \text{Trough}_{2003} \frac{70}{278} = 25\%$$

Losing a group means easing the load

## Result of previous unbalance in the ISOLATED SYSTEMS ...

### GENERATORS



unable to respond immediately to this load

In order to offset this deficiency:

- Primary reserve (margin in each generator)
- Secondary reserve (higher variable cost of generator margin)
- Third reserve (group stopped)



Very low utilisation factor  
(**43%** in 2005)

### NETWORK



in order to aid recovery,  
it is necessary to reduce the system's load  
**to 49 Hz**  
(partial blackout in some point of network)

**49 Hz** —————> To protect upsurge in small group (**37.5 MW**)

**48.8 Hz** —————> To protect upsurge in medium-sized group (**70 MW**)

**48.6 HZ** —————> To protect upsurge in large group (**130 MW**)

- Sharp frequency changes for the same load is around 55 higher than on the mainland
- The loss or surge of a generation group almost inevitably means easing the load
- Any change in the network frequency leads to capacity changes in the groups (no fewer than 30 incidents a year)

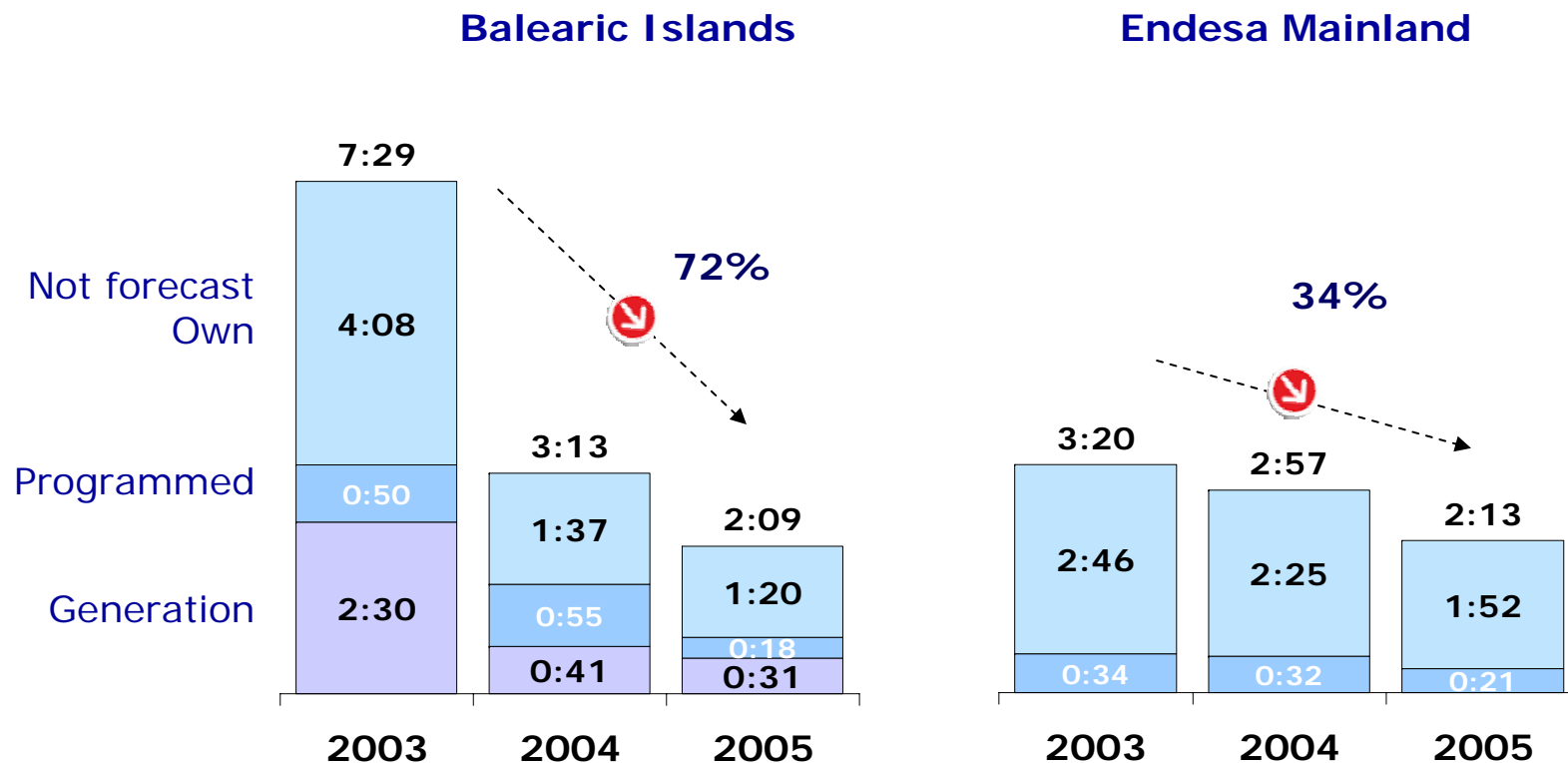
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  - Supply quality
- Main projects for the future

The Balearic Islands, which mainly depend on tourism, are very sensitive to their international image and, therefore, the quality of its basic services

The Interruption Time should be no higher than on the mainland although there, only T+D contribute to this whereas in the islands, generation also contributes.

In order to keep the LOLE below 0.1 days/year a costly capacity reserve is required

## Interruption time



Despite the peculiarities of the Balearic system, the quality has continued to improve in recent years and is now the same as on the mainland

## Other peculiarities

### Primary energies limited

- The lack of certain energy sources makes introducing certain technologies impossible

### Stranded costs and maintenance of operation

- Generation groups distributed over 5 sites: Alcudia, Son Reus, Cas Tresorer, Ibiza, Mahón plus a gas turbine in Formentera remote controlled from Ibiza
- Varied technologies: steam –coal, diesel, open cycle gas turbine, CCGT to meet demand

### Size of units

- Small unit size of groups in order to conform with daily load curve, seasonability and operational limits of larger group

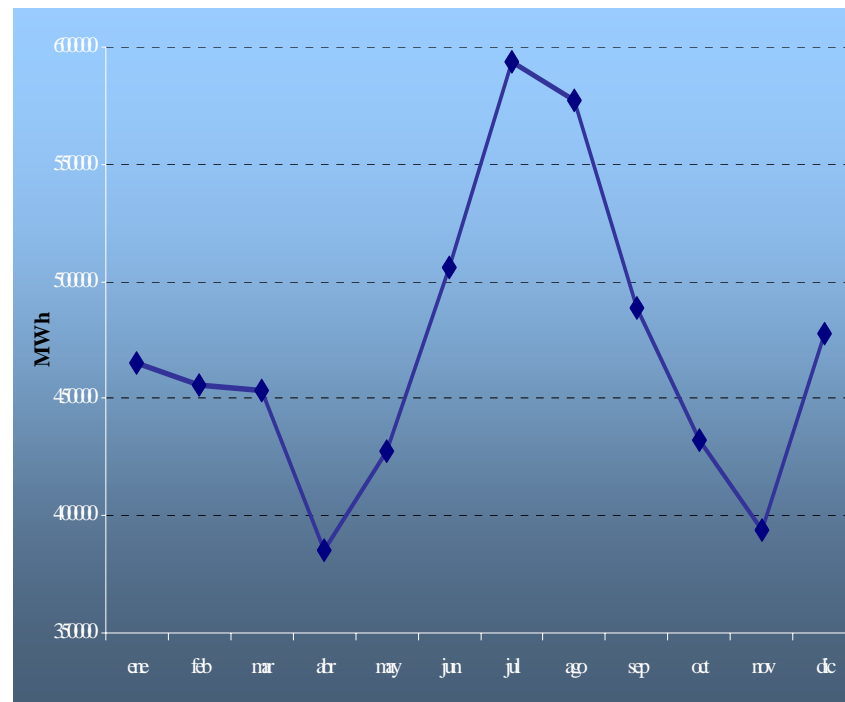
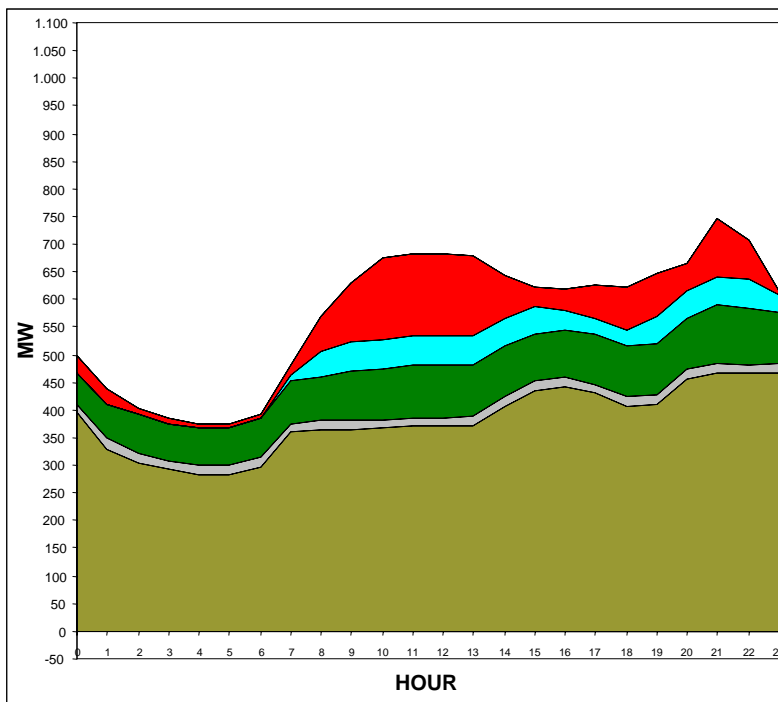
### Sites and infrastructures

- New sites difficult to find
- Ports in the Balearics are overloaded, making entry and logistics of fuels expensive

## Other peculiarities

### Variations in demand

- Demand monitoring means load at base groups must be reduced to minimum every night throughout the year
- The seasonability of demand detracts from capacity usage



■ Cables 
 ■ Coal steam 
 ■ Purchases 
 ■ Diesel 
 ■ CCGT 
 ■ Gas turbine 
 ■ No Supplied by Endesa

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  - Increase generation capacity
  - Electricity interconnections
  - Gas interconnections



## Increase generation capacity

	2007	2008	2009	2010	2011
MALLORCA	1 CC Steam turbine 75MW			1 Gas T. 75MW	1 Gas T. 75MW
MENORCA			1 Gas T. 40MW		
IBIZA	2 Diesel 18MW		1 Gas T. 40MW		

- No reductions are forecasted for the period indicated
- All of the groups are included in the review of the Balearic Energy Sector Plan.
- All of the planned incorporations in Mallorca (combined cycles) relate to the new Ca's Tresorer site included in the review of the Balearic Energy Sector Plan

## Interconnections



● ● Conversion Stations

### ELECTRICITY

	Year	Capacity kW	Voltage kW	km	
MALLORCA-IBIZA	2008	100	132	120	ca
IBIZA-FORMENTERA	2007	1x50	66	30	ca
BALEARICS-MAINLAND	2011	2x220	??	250	cc

### GAS

#### MALLORCA-DENIA

Year	Pressure (b)	"	km
2008	220 (underwater)	20 (underwater)	267 (underwater)
	80 (land)	24 (underwater)	65 (underwater)



## Endesa in the Canary Islands



8 June 2006

**Generation**

Installed capacity:

**2.202 MW**

Net production:

**7.950 GWh**

**Distribution**

Substations:

**117**

Transformer Center:

**9.515**

Lines:

**23.405 km**

Distributed Energy:

**8.548 GWh**

**Sales**

Customers:

**+ 1 million**

Customer services:

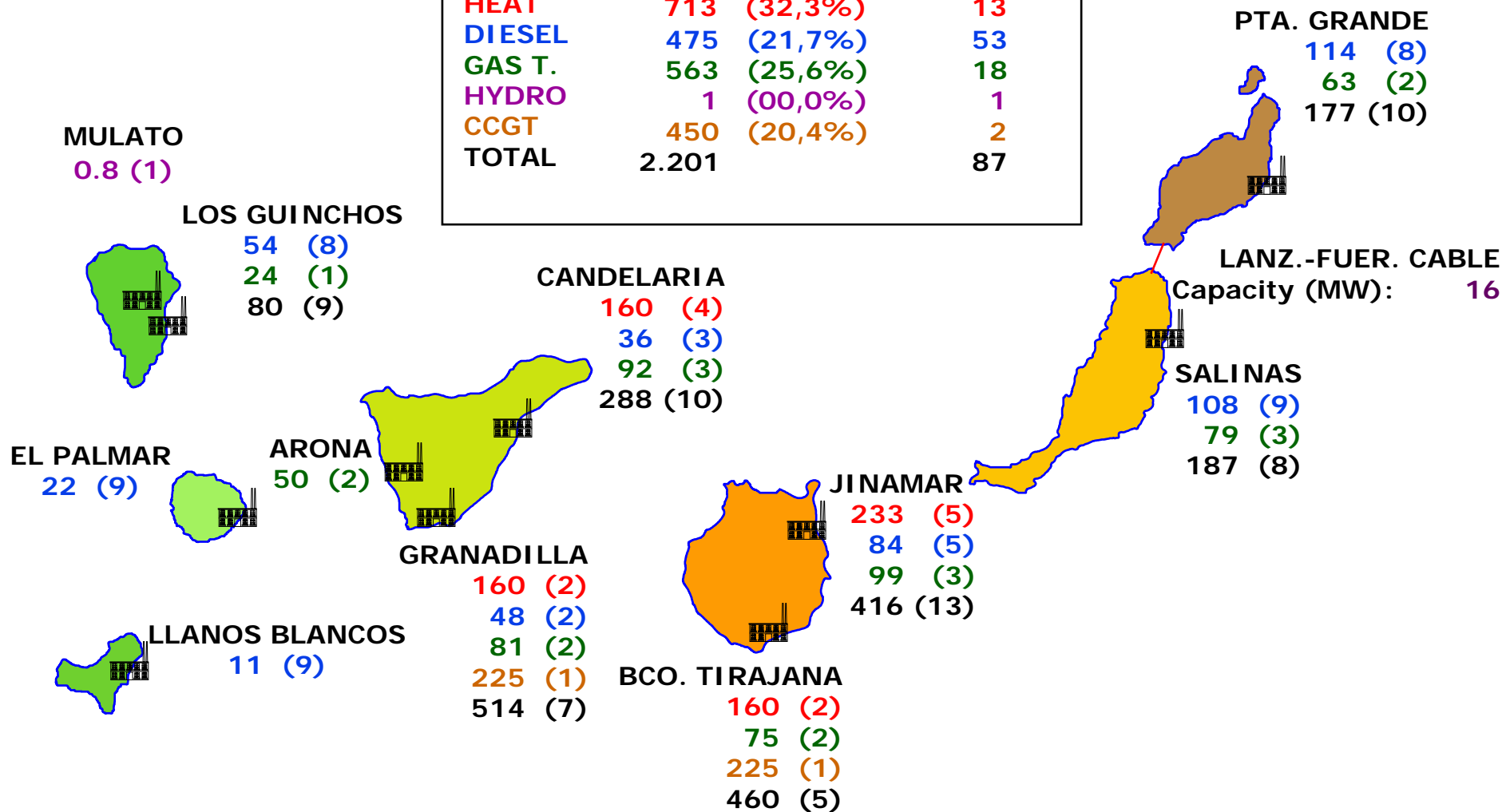
89% of our customers are less than 10 Km away from a customer service center. 99% are less than 30% Km away

Energy sold:

**7.926 GWh**

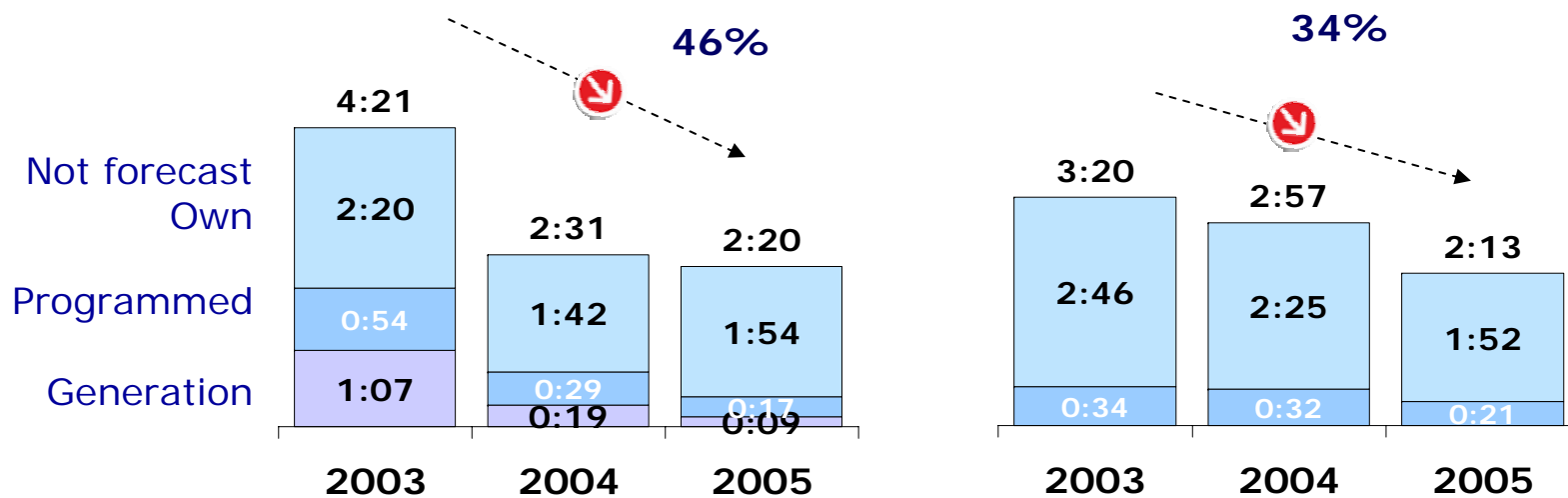
## Current sites

INSTALLED CAPACITY (MW b.a.)			
TYPE	MW		GROUPS
HEAT	713	(32,3%)	13
DIESEL	475	(21,7%)	53
GAS T.	563	(25,6%)	18
HYDRO	1	(00,0%)	1
CCGT	450	(20,4%)	2
<b>TOTAL</b>	<b>2.201</b>		<b>87</b>



Canary Islands

Endesa Mainland



As of the Balearic system, despite its peculiarities, the Canary system reaches mainland's indexes

## Increase generation capacity

	2007	2008	2009	2010	2011
LANZAROTE	1 Diesel 18MW		1 Diesel 18MW	1 Diesel 30MW	
FUERTEVENTURA	1 Diesel 18MW		1 Diesel 30MW		1 Diesel 30MW
LA PALMA	1 T. Gas 15 MW				
TENERIFE	1 T. Gas 46 MW (Los Vallitos)				1 T. Gas 75 MW (CCGT Granadilla)
G. CANARIA		1 T. Steam 75 MW (CCGT Tirajana 2)	1 T. Gas 75 MW (CCGT Tirajana 3)		
GOMERA	1 Diesel 3,5 MW			1 Diesel 3,5 MW	
EL HIERRO		1 Diesel 2 MW			

- Shutdown of a 14 MW electric generating set in 2007 Playa Blanca (Lanzarote-Fuerteventura).
- All the expected groups are included in the Canary Sectorial Plan review.



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The principal assumptions underlying these forecasts and targets relate to economic, market and regulatory environment. In addition to other factors described under “Risk Factors” in our annual report on Form 20-F for the most recent fiscal year and in the Documento Registro de Acciones presently in force registered with the Comisión Nacional de Valores, the following important factors could cause actual financial and operating results and statistics to differ materially from those expressed in our forward-looking statements:

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