



ABENGOA

Technology, our Competitive Advantage



Completing
Transformation 

9th Annual Analyst and Investor Day

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1

The technological strategy



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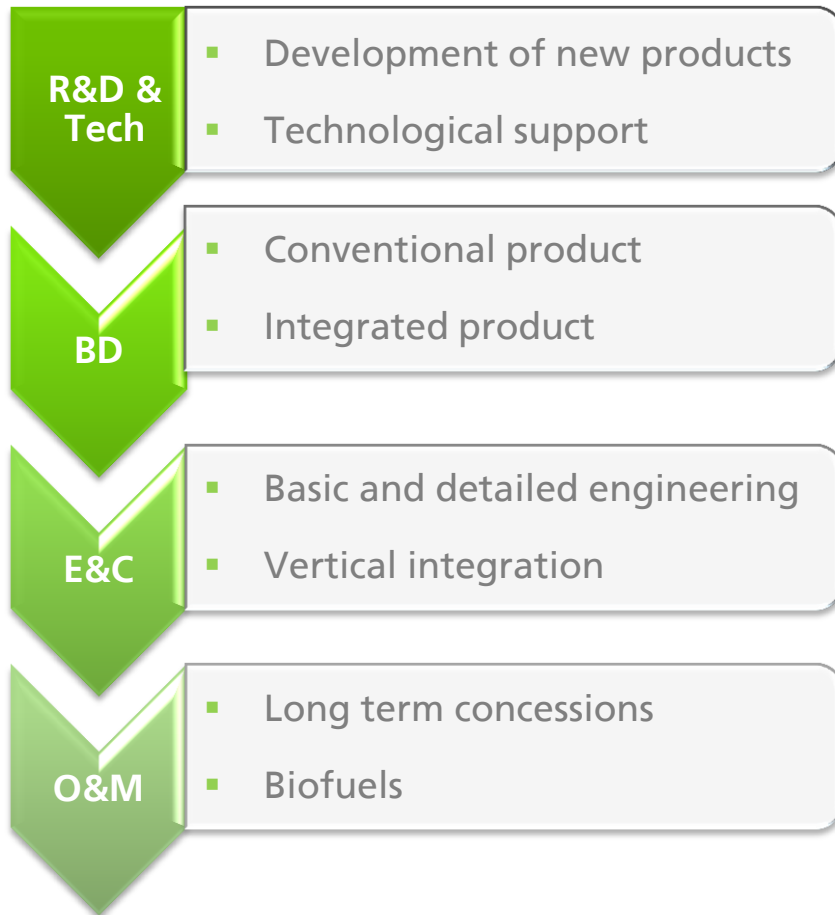
The technologies



1

The technological strategy

Research, development and innovation in Abengoa is conceived as its main source of competitiveness and its engine of growth



In 2014, Abengoa has restructured its internal R&D management and units

Abengoa Research

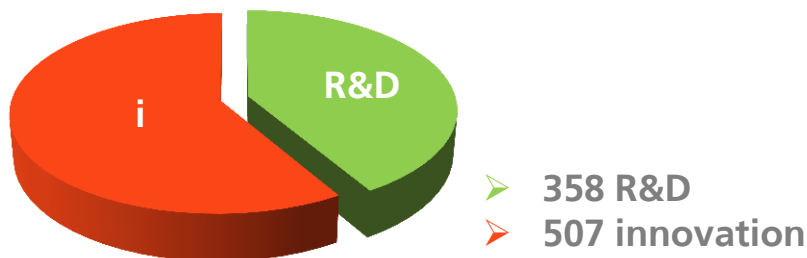
- It **centralizes** all the **R&D activity** of Abengoa, and brings together **science** and **technology**
- It takes advantages of **internal synergies**
- It supplies cross-disciplinary **scientific-technological abilities**
- It **generates** knowledge and **applies** it to new products and services
- It fosters **future developments** and **businesses**
- It **trains researchers** in the areas of interest for Abengoa
- It facilitates **the connection between universities and research centers**



Abengoa has eight R&D centers in Spain and USA

R&D and innovation staff

867 R&D and innovation employees

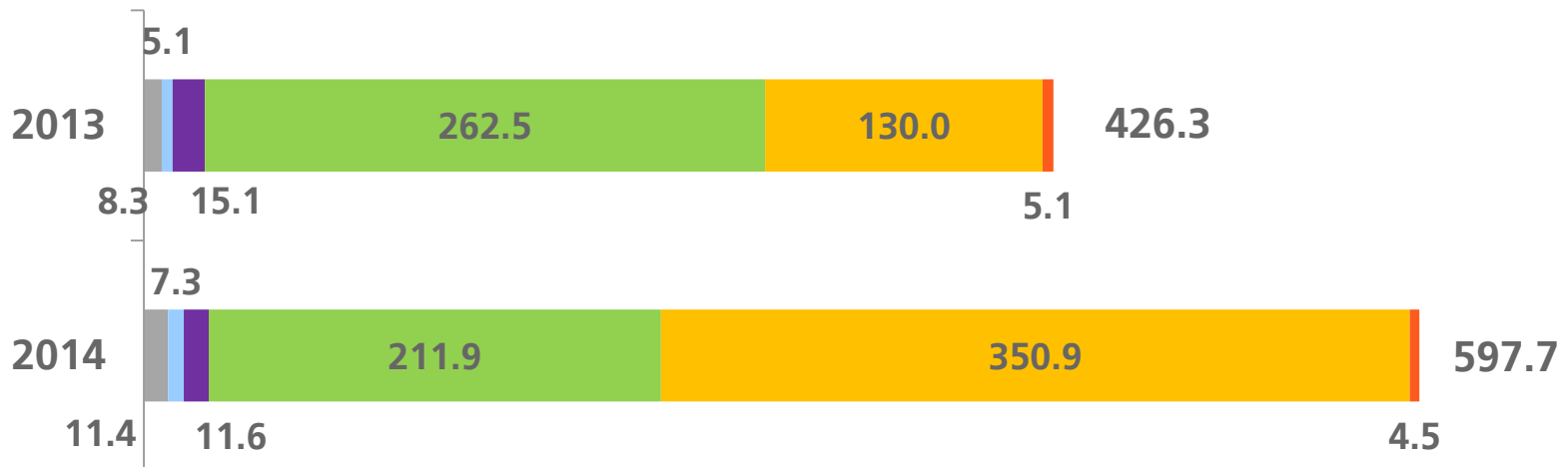


10.833 m² in R&D centers

R&D centers in Spain and USA

							
CPA	Soland	Babilafuente	CIDI	Madrid	Denver Lakewood	St.Louis	York
Seville(Spain)	Seville(Spain)	Salamanca(Spain)	Seville(Spain)	Madrid(Spain)	Colorado(USA)	Missouri(USA)	Nebraska(USA)
4.456 m ²	2.253 m ²	2.052 m ²	300 m ²	108 m ²	240 m ²	60 m ²	1.364 m ²
Basic science	Solar	Biotechnology	Water	Electronics	Solar	Biofuels	Biotreatment

Abengoa allocated more than €1,000 M within the last two years to research, development and innovation projects; of which €817 M were allotted to innovation in Khi, Hugoton and Atacama 1



- Others
- Environment
- Hydrogen
- Bioenergy
- Solar
- Basic investigation

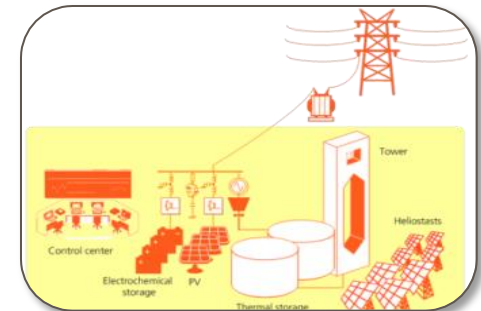
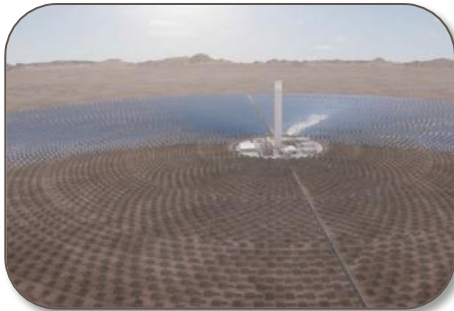
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The technologies

Solar Thermal Energy

Business goals

- Increase plants competitiveness (LCOE)
- Start up plants under construction
- Improvements in O&M
- Support EPC
- New geographies



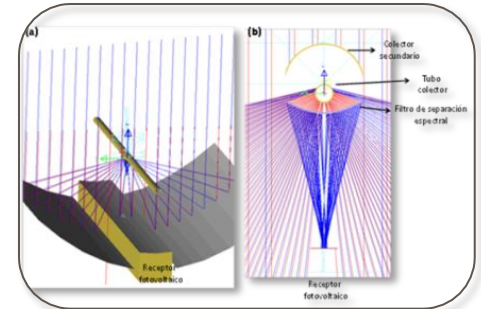
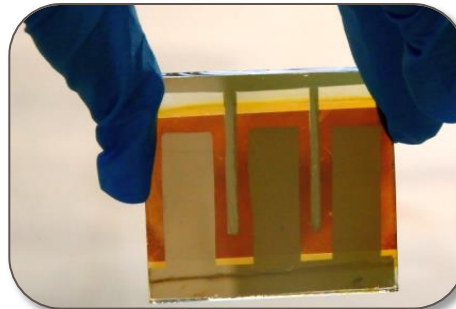
R&D goals

- Improve performance
- New storage systems
- New thermodynamic cycles
- Improve the dispatchability of the plants
- New components designs

Photovoltaics

Business goals

- Reduce generation costs
- Improvements in O&M
- New geographies
- Manufacture and assembly of plants



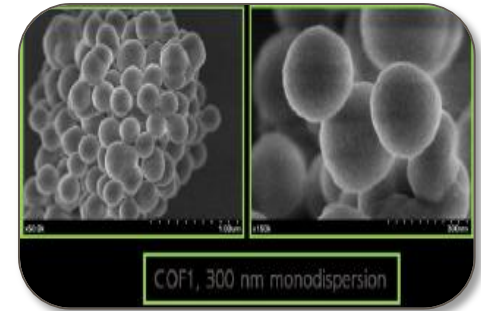
R&D goals

- Increase cells efficiencies
- New modules for concentration (HCPV, LCPV)
- Hybrid PV-STE
- New materials (perovskites, Thin films)
- New concepts

Water

Business goals

- Reduce Capex and Opex
- Support EPC
- Improvements in O&M
- Acquire references in water treatment
- New geographies



R&D goals

- Reduction of energetic costs in desalination plants
- Development of new water treatments
- Nanotechnology applied to water treatment
- Membranes improvements

Bioenergy

Business goals

- Reduce costs of enzymes
- Start up ABBK, Hugoton
- Improvements in O&M
- W2B
- Sale of enzymes to third parties



R&D goals

- Enzymes (2G)
- Butanol through fermentation
- Lignin valorization
- Biorefineries
- 2G Brazil

Energy Crops

Business goals

- Reduce costs
- Trading of biomass
- Logistic services
- Promotion of energy crops



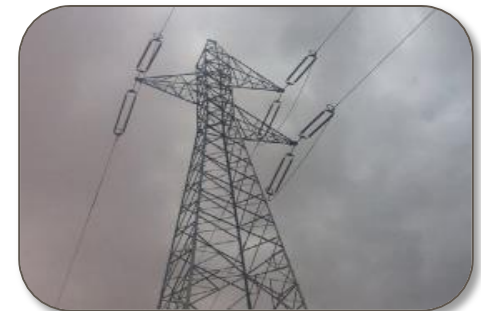
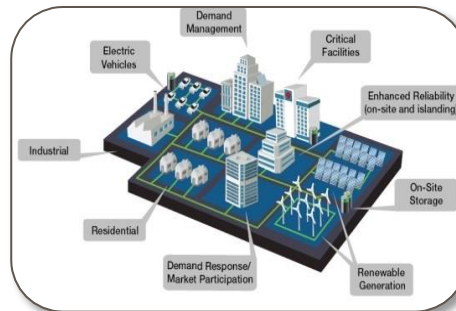
R&D goals

- Increase of energetic capacity through genetic selection for northern temperate and southern temperate
- Maximize biomass production
- GIS application for the development of new businesses

Power Systems

Business goals

- Transmission lines
- Distributed generation
- Unification of new technologies
- New geographies



R&D goals

- Hybrid power plants
- Knowledge generation for technology unification (HVDC)
- Power converters

Storage

Business goals

- New markets for energy storage (California, Germany)
- Molten salts (energy management)
- Thermochemical (power management)



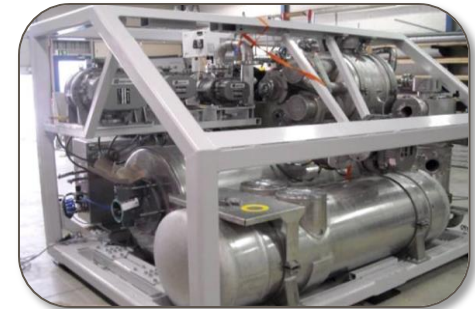
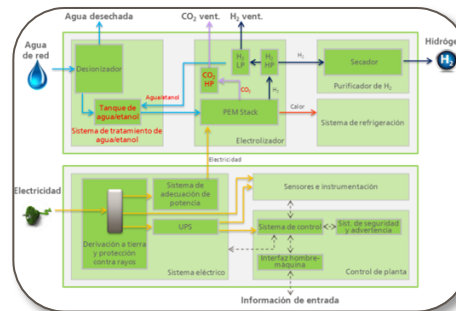
R&D goals

- Increase storage capacity
- SSP plant
- Direct and indirect storage with molten salts
- Storage with flow batteries
- Storage with hydrogen as energy carrier

Hydrogen

Business goals

- Reduce costs in O&M
- Commercialize AIP systems
- Cogeneration plants
- New markets



R&D goals

- Start up S-80
- Energy storage systems
- Electrocatalytic technology
- Hydrogen production

- 1 Abengoa has evolved from an E&C company to a technological company
- 2 Abengoa's competitive advantage is based on its proprietary technology
- 3 In recent years, Abengoa has reached important technological goals such as Solana, Hugoton or hydrogen equipment
- 4 Over €1,000 M invested in R&D and innovation projects, including Khi, Hugoton and Atacama
- 5 Thanks to Abengoa Research, we are able to offer innovative solutions
- 6 Our future is full of opportunities based on our technology



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Thank you