



ABENGOA

CSP: A Time for Solid Players

Santiago Seage

Analyst & Investor Day

May 2012

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1

CSP: the clean dispatchable power required to do more intermittent renewables

2

Abengoa: the world CSP leader

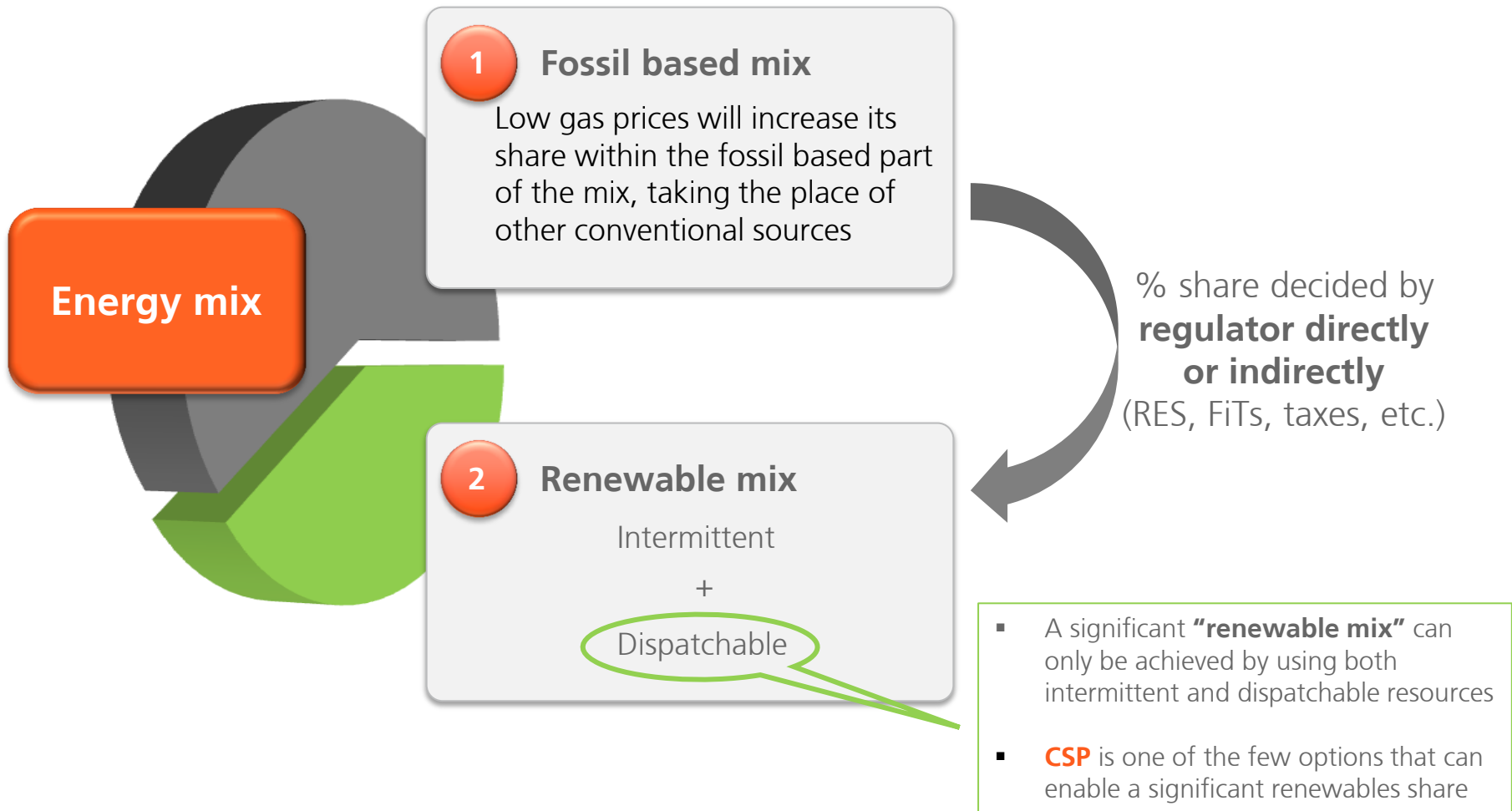
Solar Tower



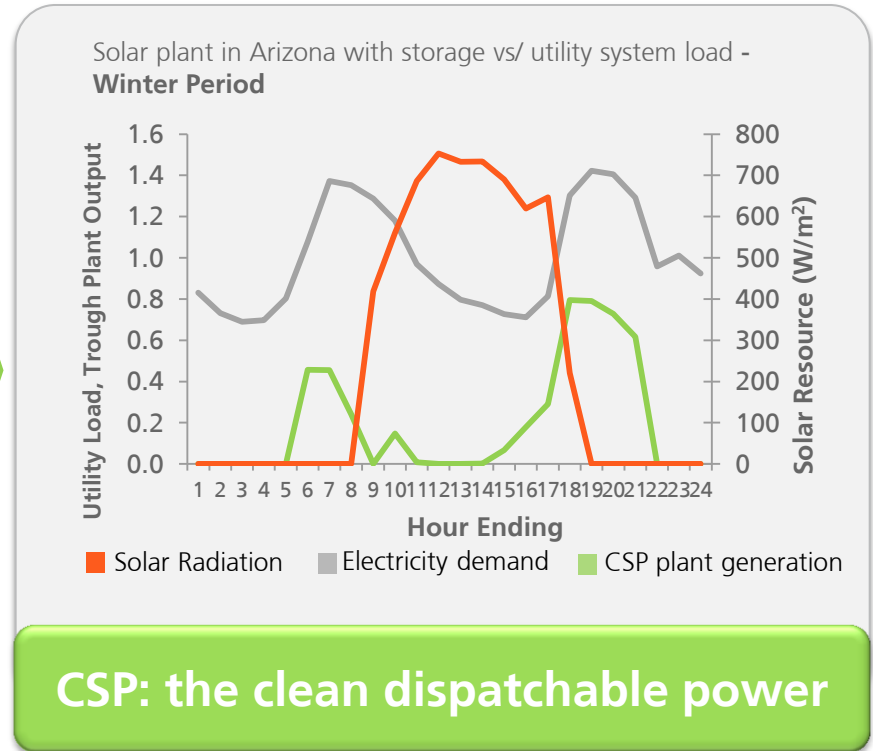
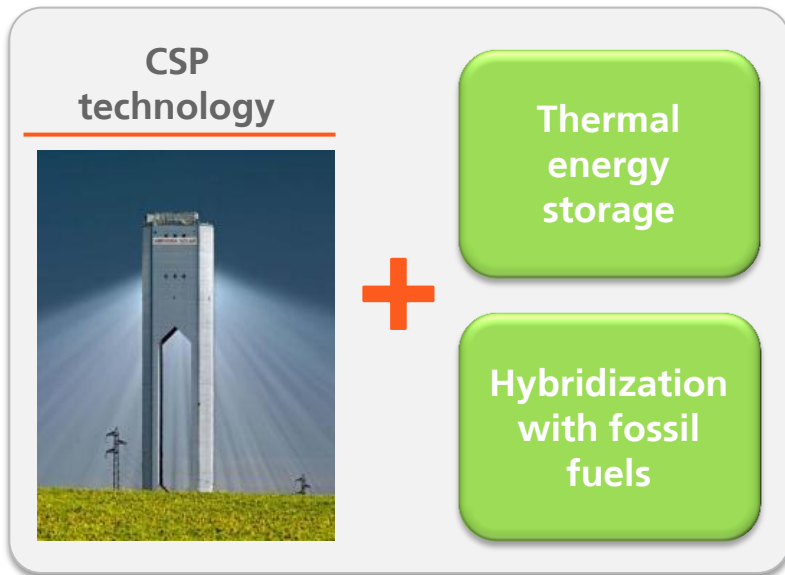
Solar Trough



Renewables share is a regulator's decision. CSP is necessary to enable it



As renewables share in the energy mix becomes higher, CSP's dispatchability becomes more necessary and valued



NREL* estimates the value of dispatchability in up to 4 cents/kWh relative to non-dispatchable energy sources

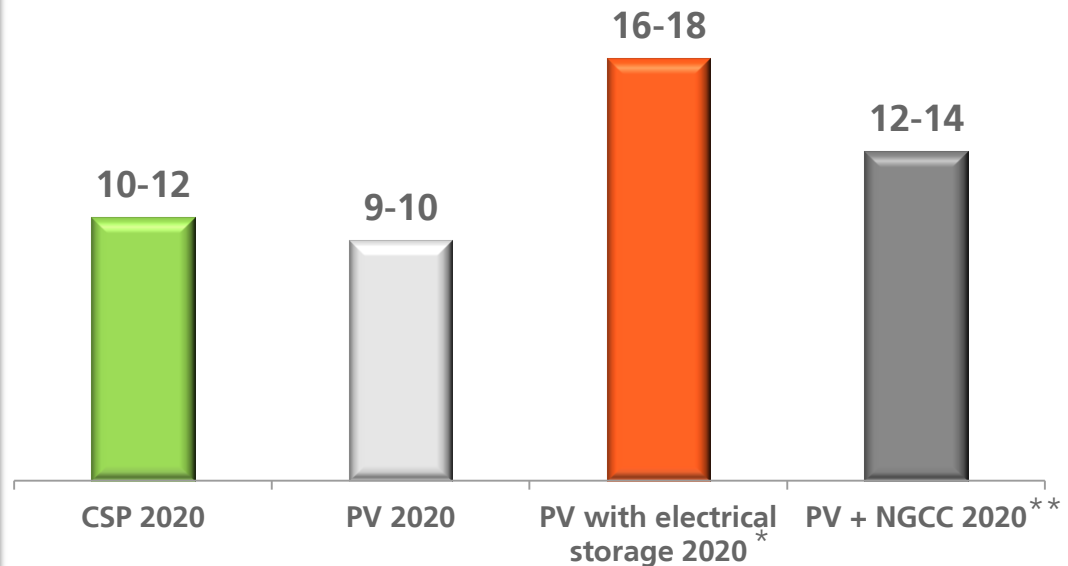
(*) NREL study "Tradeoffs and Synergies between CSP and PV at High Grid Penetration"

PV and CSP are two different, but complementary, products

- Even if PV modules had a cost of 0,3 USD/Wp in 2020, PV is intermittent and will **not** be able to offer dispatchability
- **A utility would need to cover wind and PV** with idle combined cycles, electric storage or a dispatchable energy source like CSP



c\$ / kWh (Southwest US)

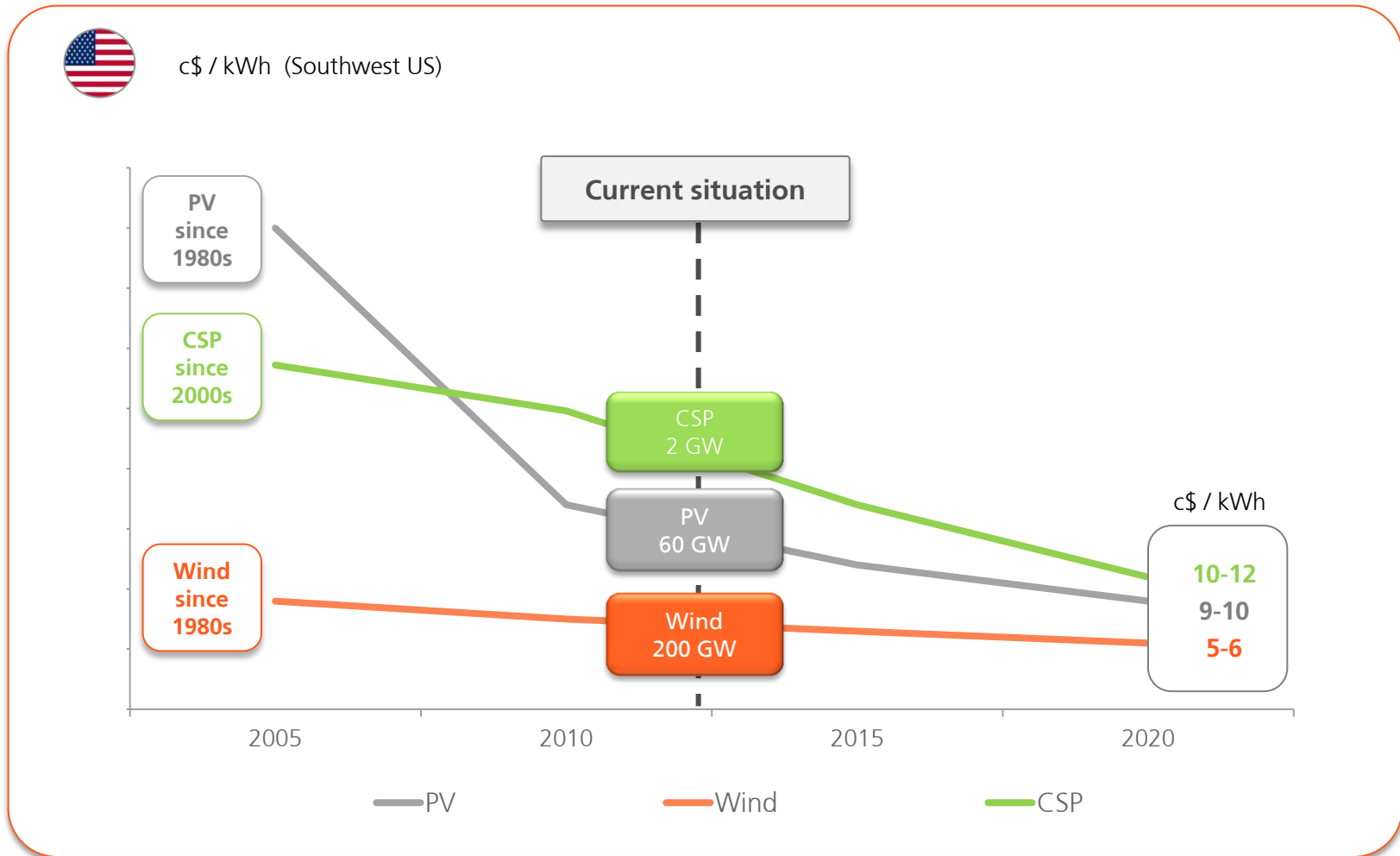


(*) PV with electrical storage (nominal power electrical storage = 50% nominal power PV)

(**) PV with 50% of natural gas combined cycle (NGCC) back-up capacity

Source: Abengoa in-house analysis without any subsidies

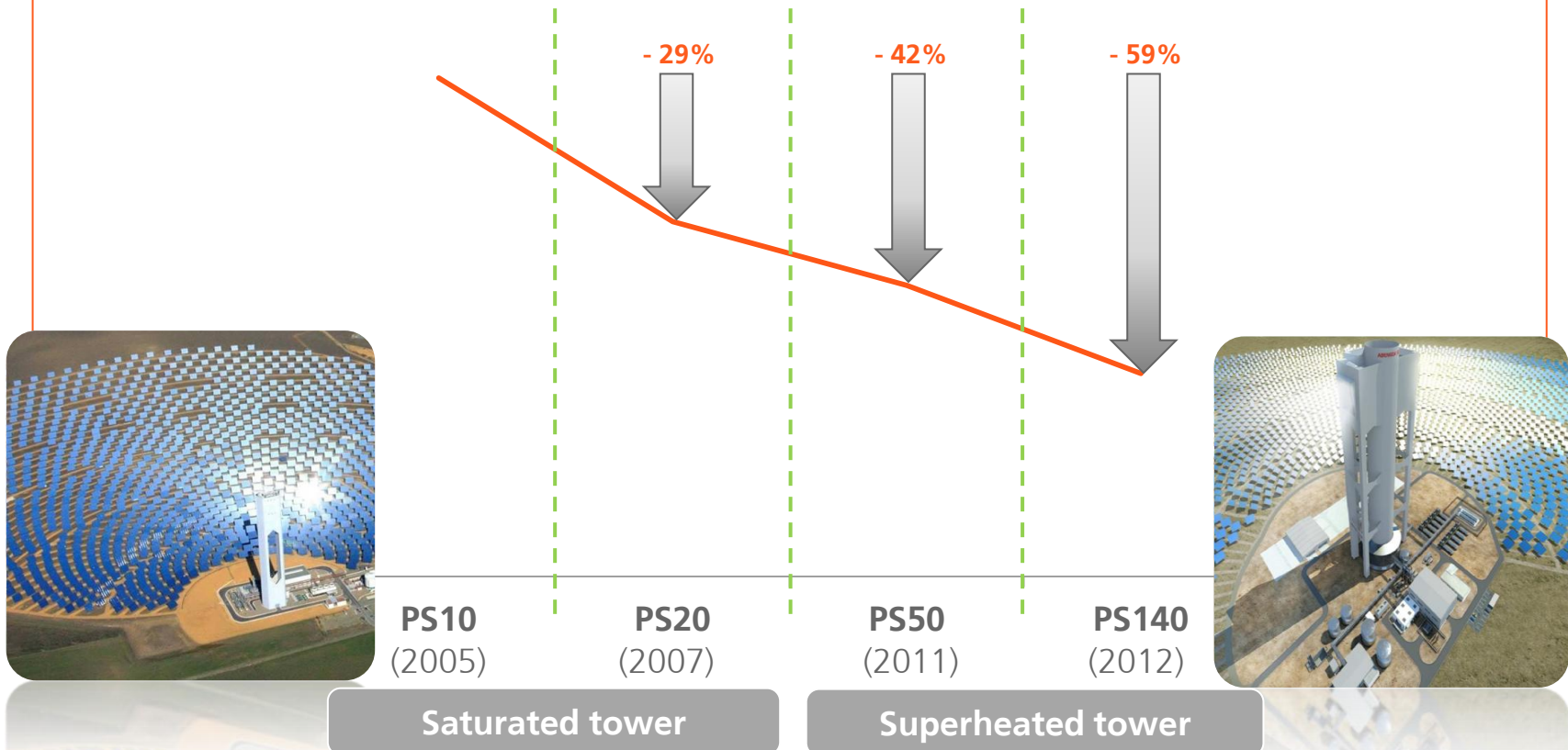
CSP has a huge cost reduction potential, especially considering that other renewables already have significantly more installed capacity



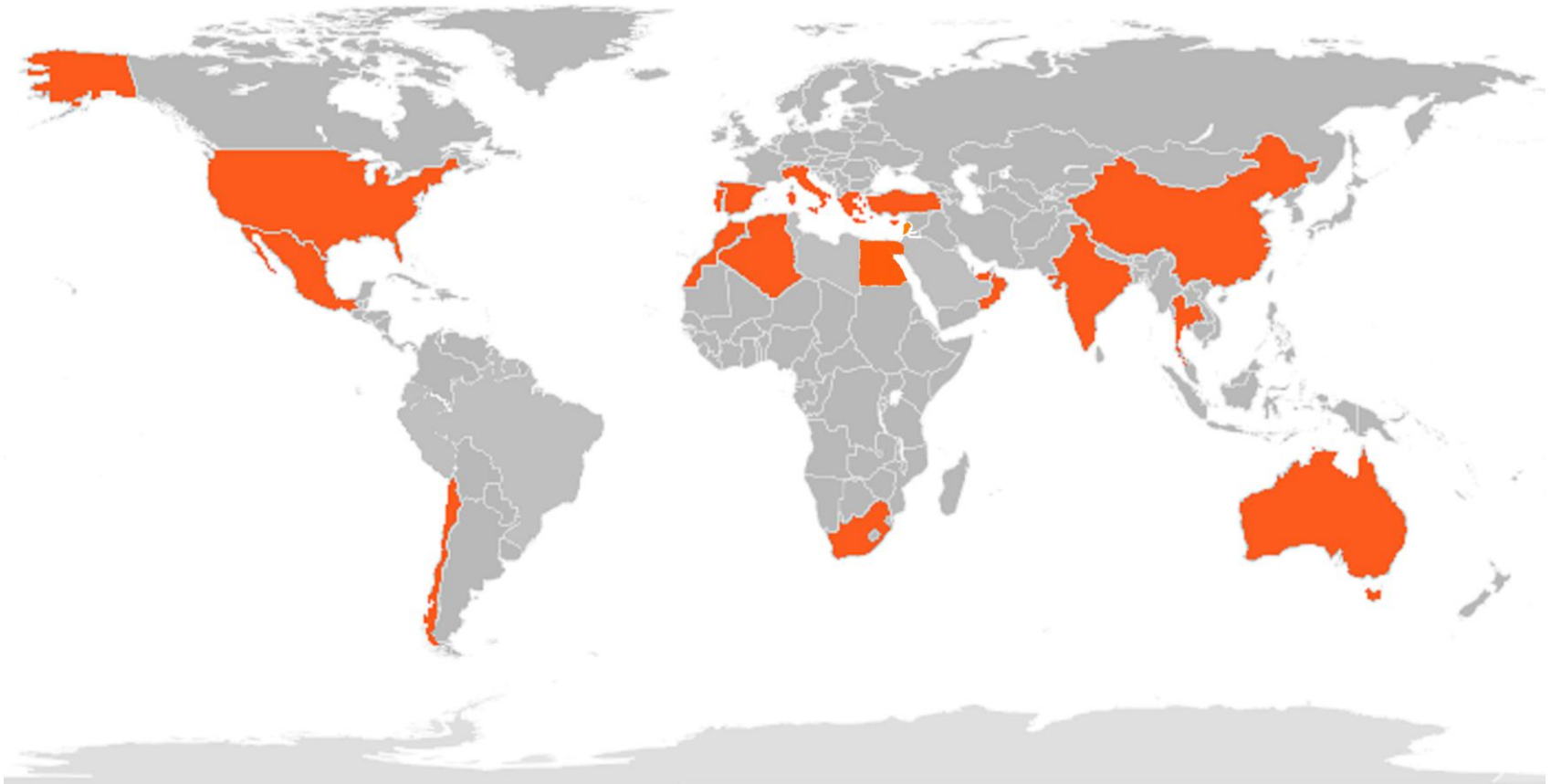
Source: Abengoa in-house analysis

Abengoa's CSP has followed its predicted roadmap and will keep reducing costs according to it

Capex /generation



Countries where CSP is already a reality

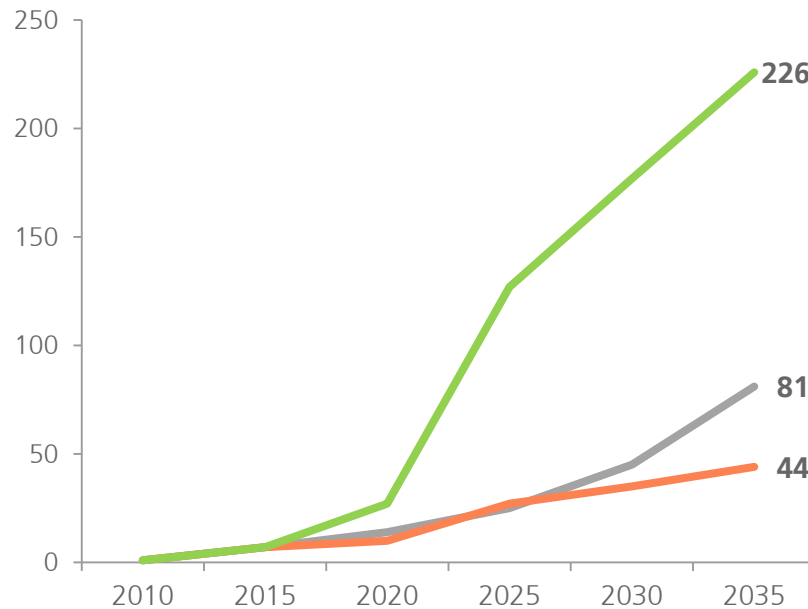


Countries with CSP plants in operation, construction, existing regulation or bidding processes under way

CSP will be a significant part of the future energy mix

IEA CSP forecast

GW



- 450 Scenario:** adds new policies to limit the concentration of greenhouse gases to 450 ppm CO₂-eq
- New Policies Scenario:** incorporates the new policies that have been announced by Governments around the world
- Current Policies Scenario:** includes continuation, without change, of the policies that had been adopted by mid-2011

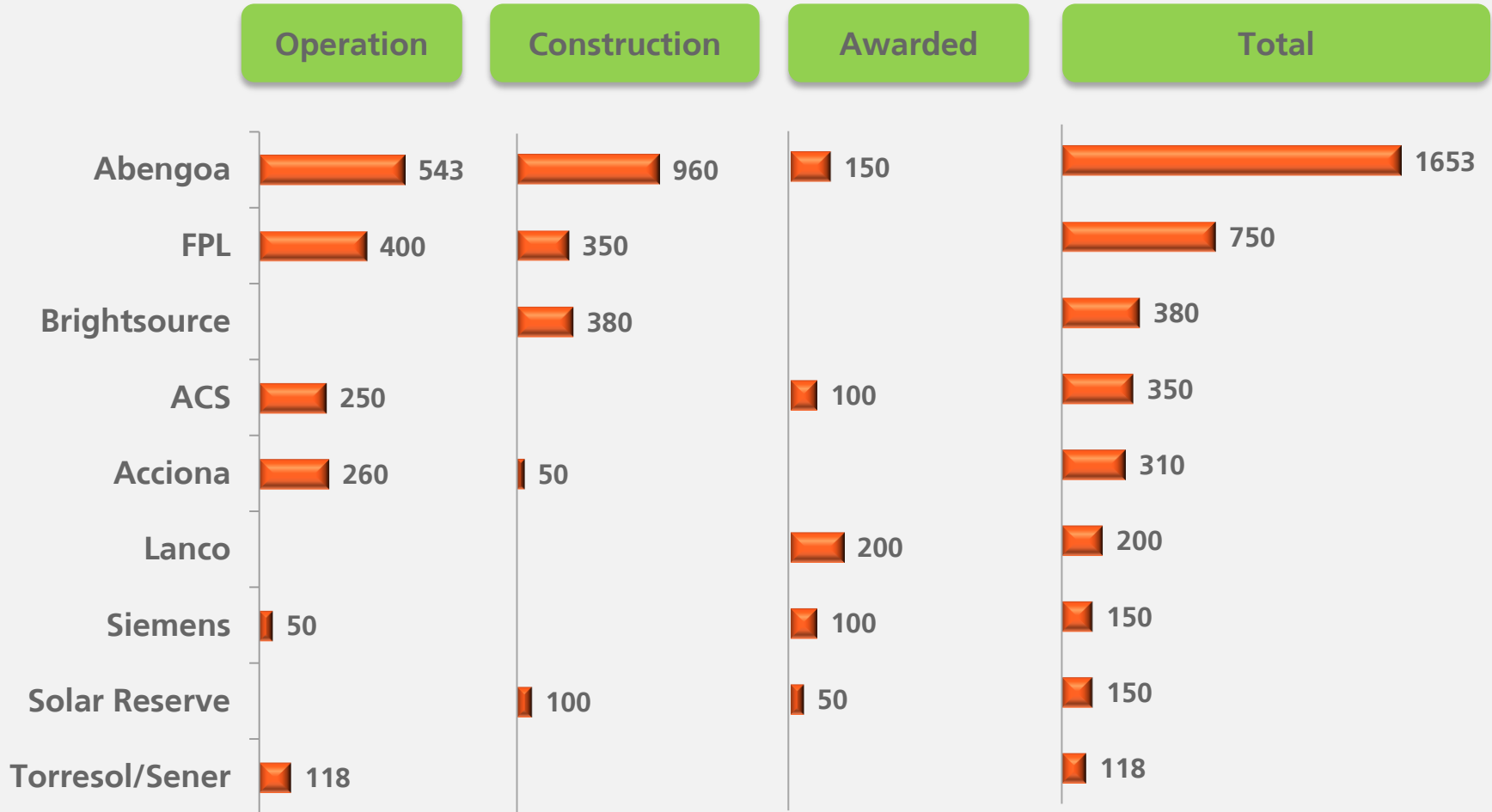
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CSP: the clean dispatchable power required to do more intermittent renewables

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Abengoa: the world CSP leader

Abengoa is the largest CSP player in the world



Source: Public information

3 key concepts that make us world leader

1

Technology

Technology as a source of competitive advantage

2

Discipline

Discipline leading to excellence in operation and construction

3

Diversification

Abengoa is the only global CSP player

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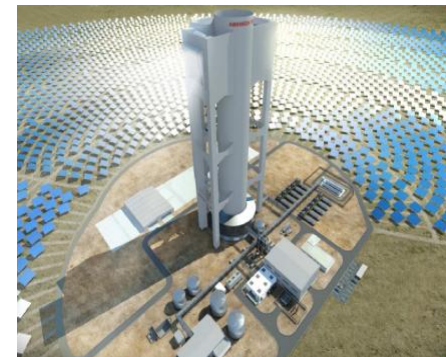
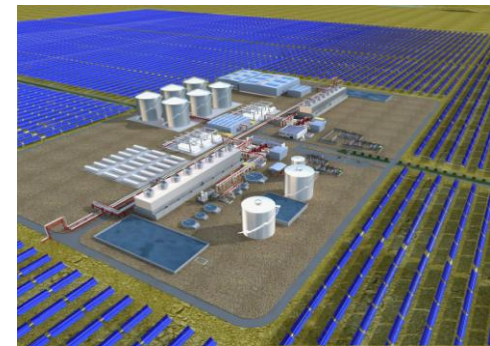
Technology as a competitive advantage for Abengoa

R&D

Pilot Plant or Real Test

Commercial Project

- +100 in-house researchers
- R&D center in Denver, CO
- R&D center in Seville, Spain
- Abengoa Research
- Collaboration with key research institutions and companies worldwide



1

Abengoa is a technology leader in the 3 key areas within CSP

Tower



Trough



Storage



1

3 new technologies with significant cost reduction potential

3rd generation trough

Currently working in a 3rd generation trough pilot plant



► **Technology status:**

- New large aperture collector designed
- New mirrors and reflective materials being tested
- New optics under analysis
- New fluids being tested
- New key components being tested

Superheated Tower

Commercial tower is already a reality and we keep on working in larger towers



► **Technology status:**

- Commercial
- Exhaustive receiver tests ran successfully in Eureka
- Storage
- PS50 engineering ready
- PS140 engineering will be ready soon

Molten Salt Tower

Molten salt tower pilot plant just built in Solúcar platform



► **Technology status:**

- Pilot plant ready
- Proprietary receiver
- Commercial tower engineering under development
- Research on higher temperature materials and salts

1

2 new technologies with high potential in many markets and extremely competitive costs

ISCC & ISCoal

Currently working in hybridization with all types of fuels and higher efficiencies



► **Technology status:**

- 150 MW ISCC commercial plant in operation in Algeria
- ISCoal integration under development
- More efficient solar-gas technologies under development

Solugas

Solugas is a revolutionary concept of solar-gas hybridization involving the use of gas turbines.
LCOE will be extremely competitive



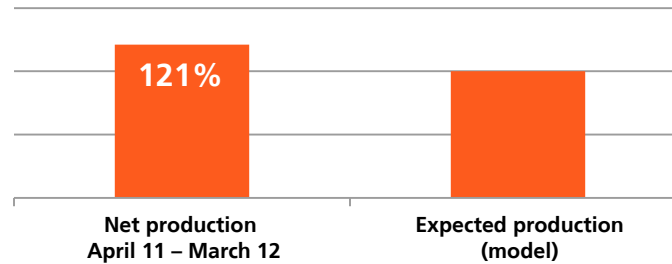
► **Technology status:**

- Pilot plant already built (April 2012) and starting up
- Research to increase temperature from 800°C to 1000°C
- Commercial tower engineering under development
- Research on higher temperature materials and salts

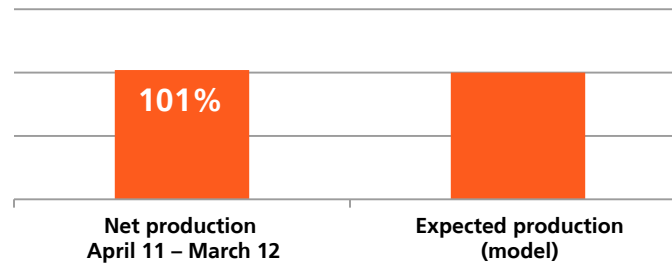
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Our discipline leads to good performance in operating plants

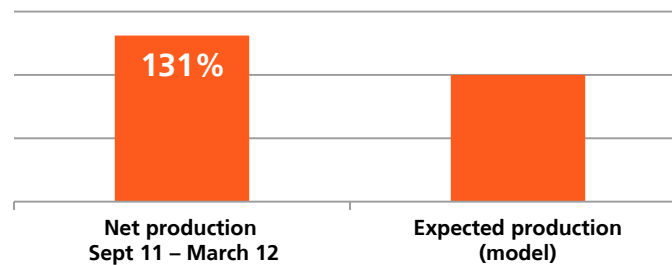
PS20



Solnova 1



Helioenergy 1

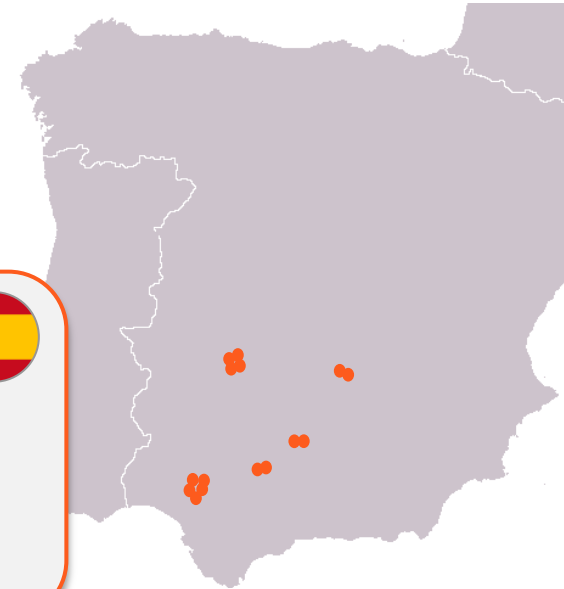


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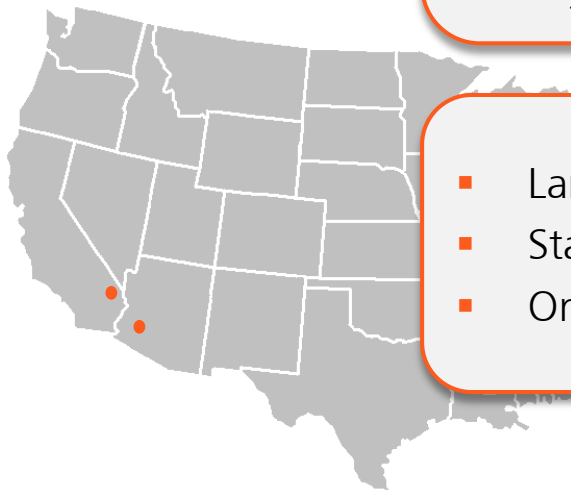
Critical mass as a key factor for operational performance

- Global excellence in O&M
- 15 plants in operation by the end of 2012
- Technology know how as a key competitive advantage

- Plants co-located in complexes
- Plants share same basic design
- Standardized main equipment
- Shared specialists in key areas, logistics, systems, procedures



- Large size plants
- Standardized main equipment
- One O&M team

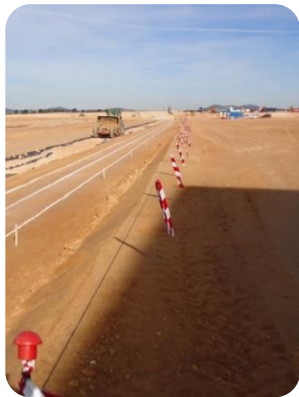


Business Model: «New Technology + Efficient Developer & Operator»



Develop diversified portfolio of technologies and key components for internal and third-party use

- Technology development is key to be competitive
- Key to secure good partners
- Incremental value creation by sale of technology and key components to third parties
- Additional profitability in own projects

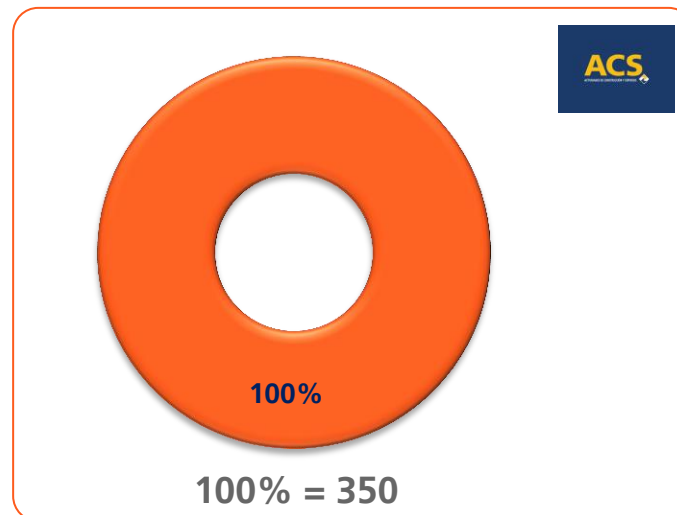
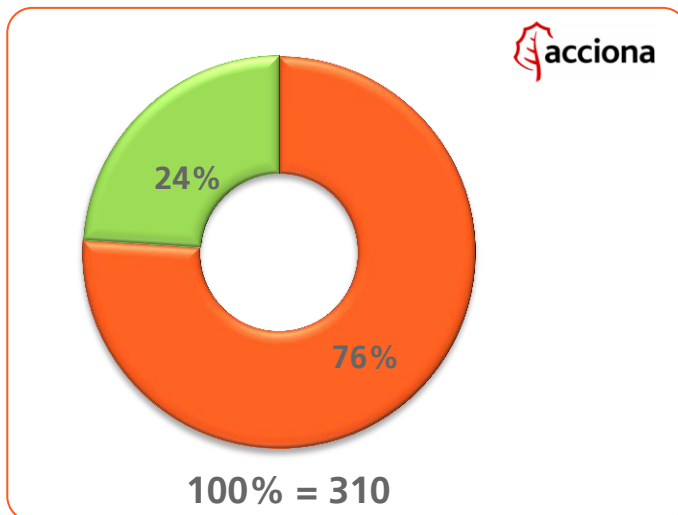
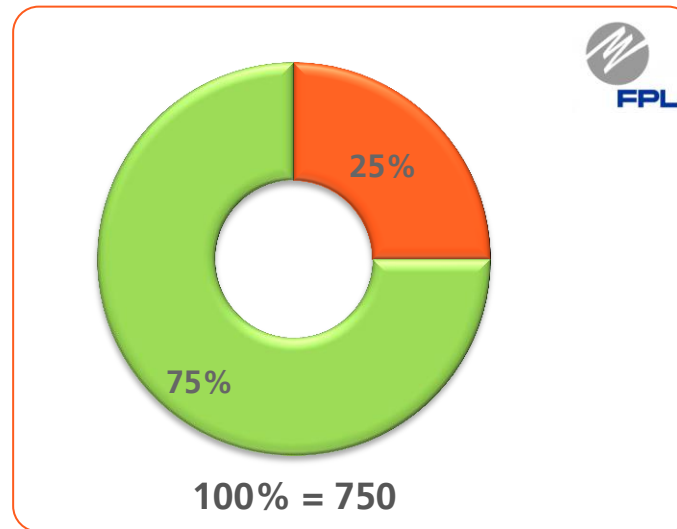
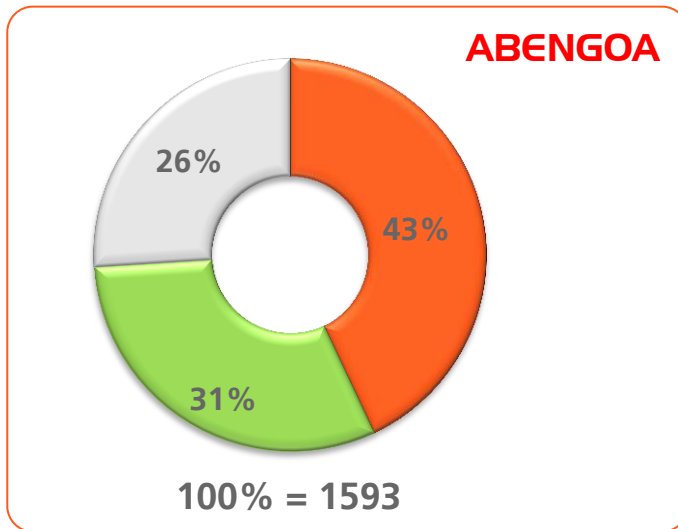


Develop, own and operate a large diversified portfolio of CSP plants

- In-house development teams in 12 key markets
- Diversified by geography
- Selected partner of choice by large international players
- Own and operate, divesting selectively when it maximizes value
- Project by project approach

3

Abengoa, through geographical diversification, avoids concentration risk



- Spain
- USA
- Others

150 MW awarded in South Africa through a competitive tender



KaXu Solar One

- 100 MW trough plant
- 3 hours molten salts storage
- Dry cooling technology
- 51% Abengoa & 49% IDC*
- Construction start expected in H2 2012



Khi Solar One

- 50 MW superheated tower
- 2 hours steam storage
- Dry cooling technology
- 51% Abengoa & 49% IDC*
- Construction start expected in H2 2012

*IDC = Industrial Development Corporation, the largest financial development institution in South Africa

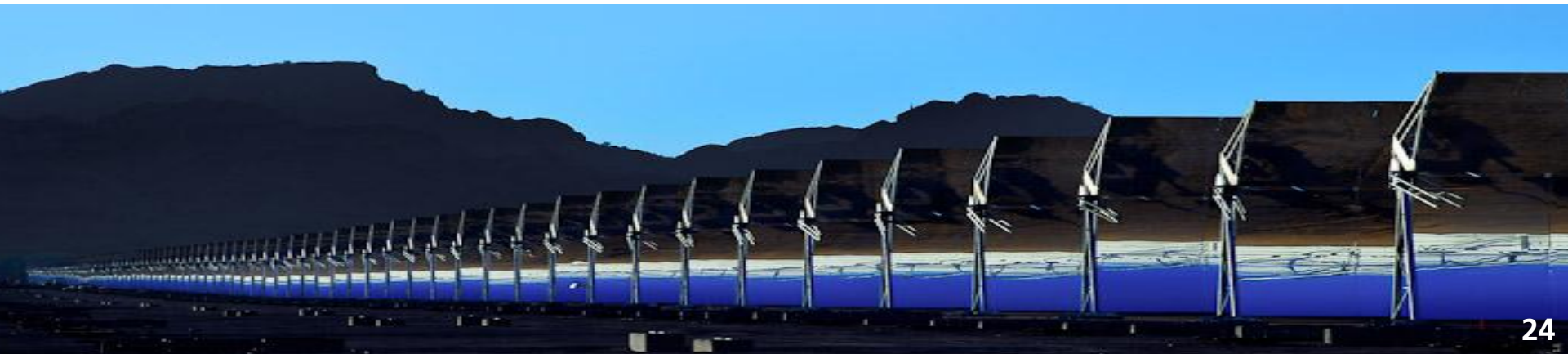
CSP: clean dispatchable power competing alone and hybridized with gas with combined cycles by 2020

Already a global market with high growth potential

CSP is following its predicted cost reduction roadmap

**Abengoa is a unique CSP player:
technology leader and efficient developer and operator of assets**

Asset portfolio of 1,593 MW, without including development





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Thank you!

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