



ACCIONA Energy

Concentrating Solar Power (CSP)

Carbon Expo, October 2010

ACCIONA Energy

- Part of the **ACCIONA group**:
 - A global leader in **renewable energy, water and infrastructure**
 - **Workforce over 35,000** across the **5 continents**
 - A **solid economic position**: Revenue €6,500m; EBITDA €1,040m
 - Established in **Australia** since **2002**
 - **ACCIONA Energy**:
 - Presence across the **entire value chain** – benefits and advantages of our full delivery proposition
 - **Horizontal integration** of renewables – wind, hydro, biomass, solar PV and **solar thermal**
 - Proven **history in CSP** technology
 - Approaching **140,000 hours of O&M experience**
 - **115 MW operational** in USA & Spain
 - **Strong growth pipeline**: 150 MW in construction & 100 MW in development in Spain
-

Our CSP plants

FIVE OPERATIONAL PLANTS IN 2011 (250MW +)

64 MW Nevada Solar One in the US

- The **biggest built** in the world in **20 years**
- Connected to the grid in **June 2007**
- **76.5 kilometers** of solar trough collectors



Spain: 1 plant in operation and 3 under construction

- **Operational:** Alvarado I (Badajoz), **50 MW**, commissioned in Sep 2009
- **Under construction:** 150 MW
- **Under development:** 100 MW

CSP – Unique value proposition



CSP technology uses **solar energy** – matches electricity demand and its peaks, driven by air-conditioning loads



CSP is a commercially **proven technology** (25 yrs+ of experience in parabolic troughs)



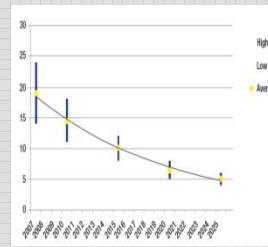
Unlike other renewables, CSP provides a **firmer, more stable output** – fuel-power back-up options (e.g. natural gas boiler) can compensate for cloud cover.



Higher dispatchability due to storage capability options (e.g. molten salts), extending electricity production after sunset. **Cost developments** will make storage viable.







Access to suppliers (e.g. power block components are the same as for gas power plants)



Technology improvement and economies of scale – CSP to be competitive with other base-load sources by 2020/25

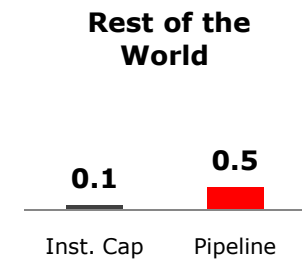
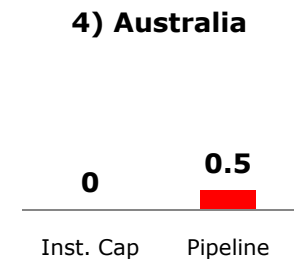
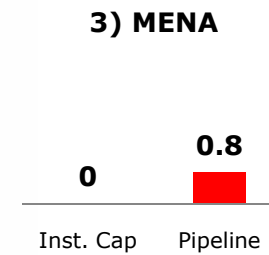
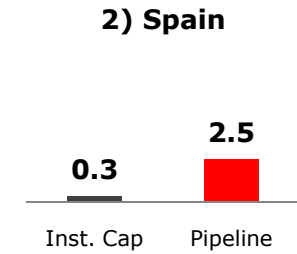
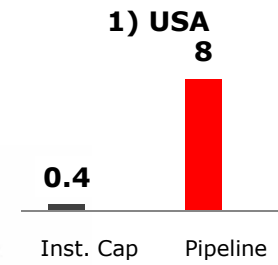
Types of CSP Technologies

<ul style="list-style-type: none"> • Parabolic Trough: Long-term commercially proven technology (25 yrs +); heat storage capabilities and a large number of providers 	
<ul style="list-style-type: none"> • Central Tower: utility-scale projects under demonstration; higher efficiency (higher temperature); heat storage capabilities and capital intensive compared to trough 	
<ul style="list-style-type: none"> • Stirling Dish: Highest temperature of all; direct power generation (stirling engine); very capital intensive compared to trough and tower 	
<ul style="list-style-type: none"> • Linear Fresnel: Early stages; simple production and installation; cost-effective and heat storage capabilities 	

↑ HIGH
 Level of technological maturity
 LOW ↓

2. CSP, industry vision and positioning

Existing CSP capacity and planned capacity for 2015, GW



Source: Solar Thermal Electricity 2025, A.T. Kearney, ESTELA, June 2010

NOTE: MENA stands for Middle East and North Africa

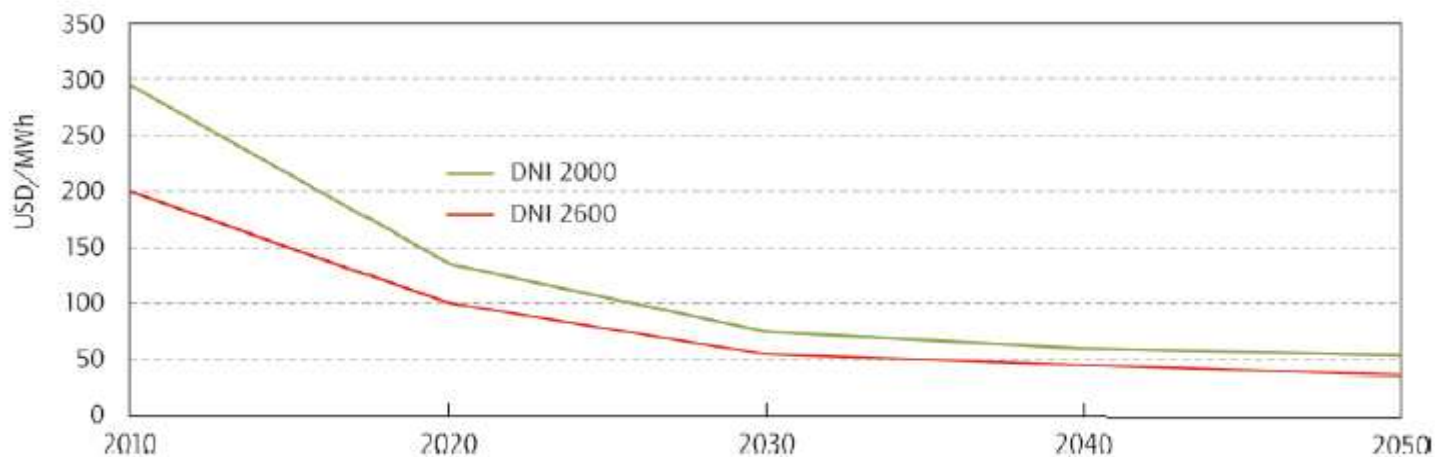
CSP drivers

- **Solar resource** – **DNI** (i.e. sunny and clear skies and high radiation)
- **Grid access**
- **Water availability**
- **Favourable energy policy mechanisms:**
 - Financial support schemes that provide **confidence in industry structure**
 - E.g. FiTs - Spain, Algeria, some Indian states, Israel, South Africa
 - **Spain** first applied FiTs for CSP in 2002, revised in 2004 and in 2007
 - High tariff level – approx. € 0.27/kWh since 2007
 - Long term guaranteed FiT - 25 yrs
 - Natural gas back-up (15%) to firm the output.

Levelised Cost of Energy (LCOE)

- **Technology improvements, cost developments and economies of scale** will drive down the projected LCOE of CSP plants over the coming years. A higher DNI enables a higher annual output for a given plant's CAPEX
- Assuming a 10% learning ratio, CSP investment costs would fall by about 50% from 2010 to 2020, as cumulative capacities would double 7 times

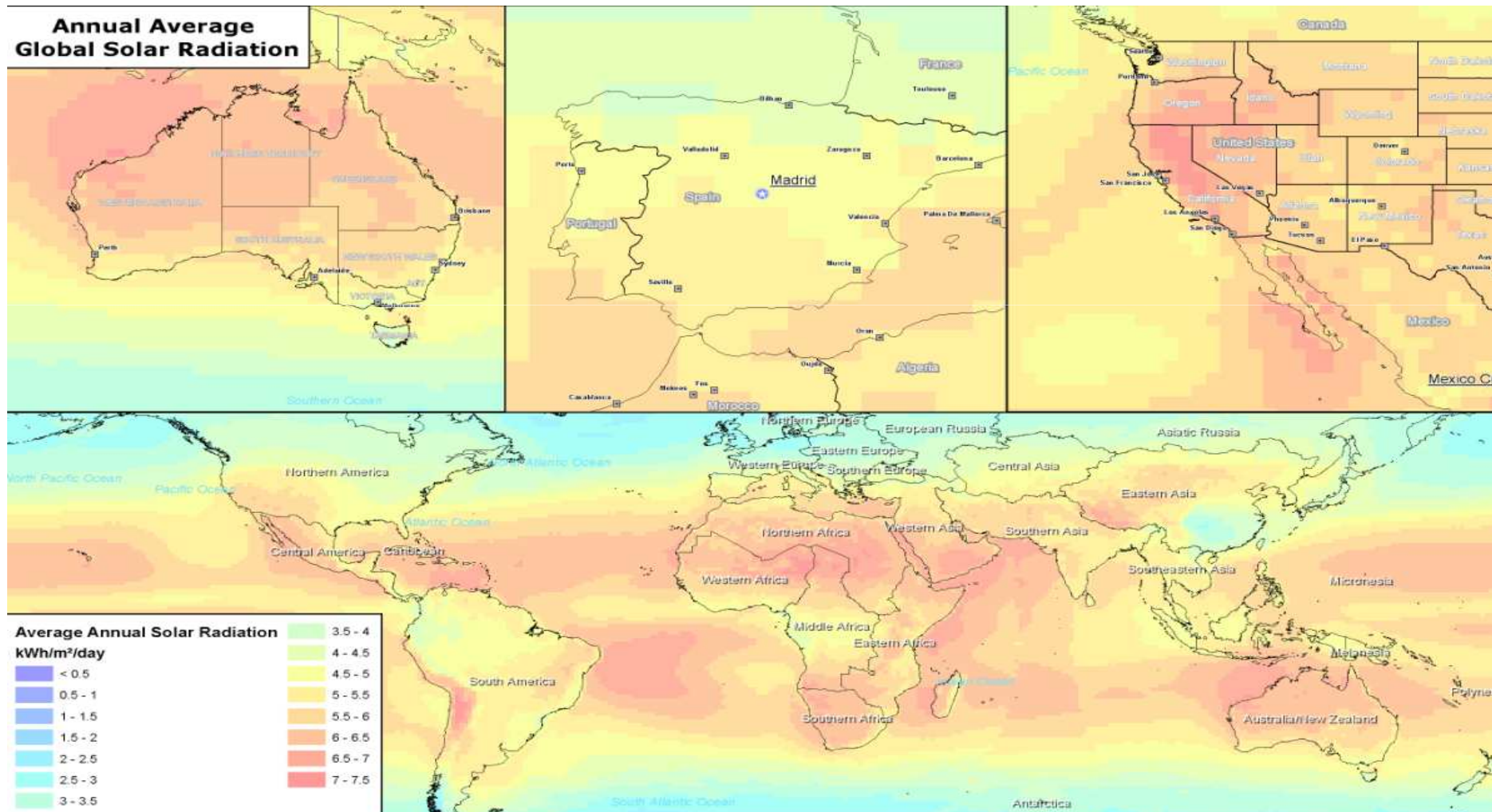
Projected evolution of the LCOE from CSP plants, in USD/MWh, under two different DNI levels in kWh/m²/y



Source: "Technology Roadmap - Concentrating Solar Power" by the International Energy Agency 2010.

3. CSP in Australia

- **Australia's solar resource** is one of the best in the world – DNI (kWh/m²/y)



Source: NASA Surface meteorology and solar energy (SSE)

Key Challenges for CSP in Australia

- **Location** (grid access, water, workforce)
- Immature **supply chain**
- **Policy drivers** (financial schemes)
 - The **RET** is not enough to drive the development of large-scale solar energy
 - The **Solar Flagships Program (A\$1.5b)**
 - Aims to encourage the deployment of 1,000MW of solar power generation capacity
 - Objective to see “commercially viable” projects
 - We are one of the shortlisted parties for Stage 2 – Round One
 - Recently announced **State FiTs**



ACCIONA's 64 MW 'Nevada Solar One' CSP plant, in the Nevada Desert (USA)



Alvarado I CSP plant (50 MW), the first one built by ACCIONA in Spain

ACCIONA Energy
Global leader in renewable energy





Additional Information

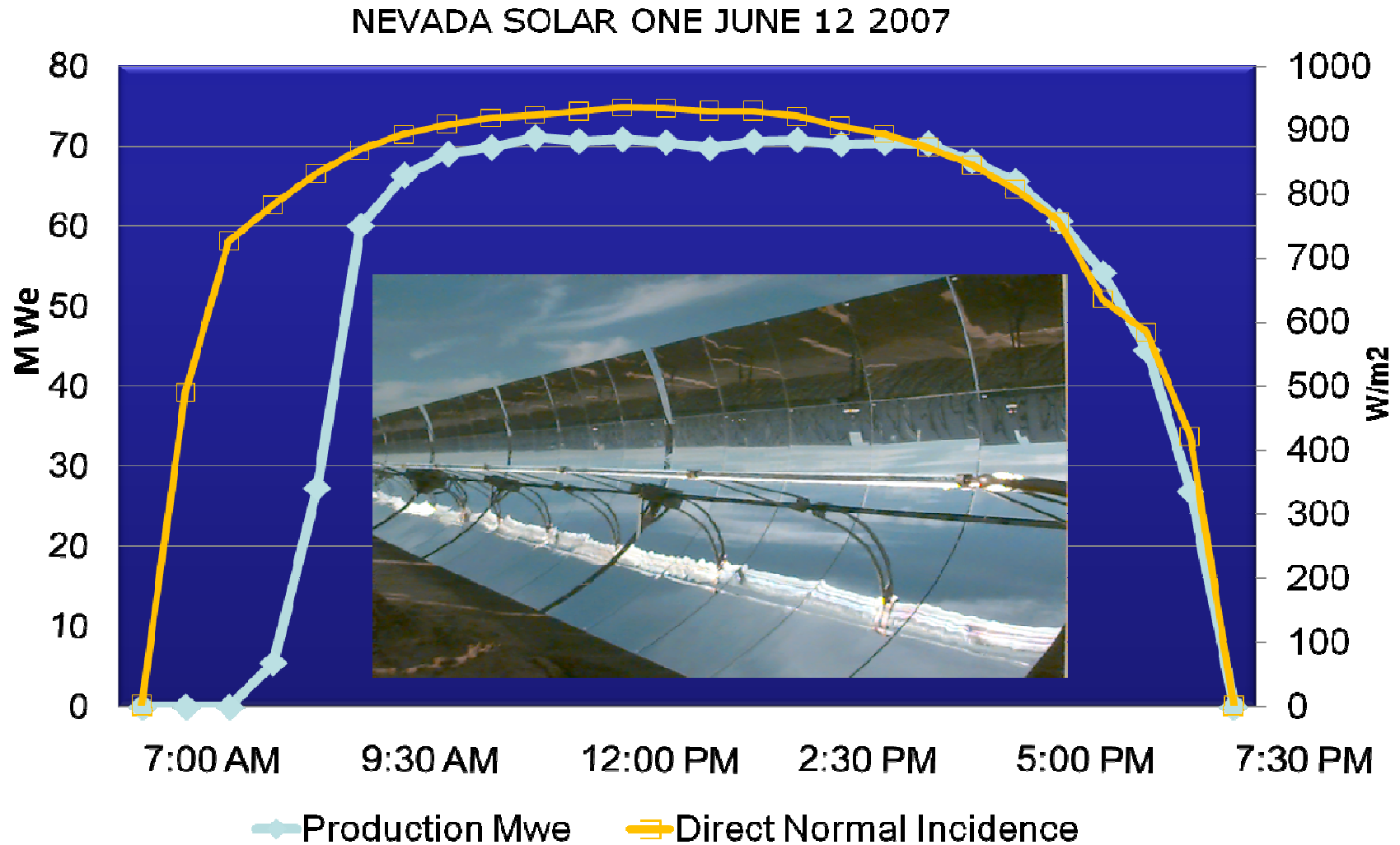
Nevada Solar One

NSO, proven success record

- Site-wide record of three years, accident-free service
- Continually meet or exceed projected plant expectations
- Daily solar production record: 810 MW
- 2010: 5% increase from expected solar production
- 2009: Met expected solar production and had record low mirror breakage of .005%
- 2008: 6% increase from expected solar production



Power Profile



Power Profile (with and without storage)

- **Thermal storage** can make renewable energy economically feasible, by enabling generation during **off-peak hours**
- Energy storage is really one of the most promising new development areas for the renewable energy industry

