ACWA Power’s perspective on successful CSP programs

World Bank MENA CSP KIP Workshop on CSP Markets, System Value & Financing
Ouarzazate 7 March 2017
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In 12 years we have become the second largest power & desalinated water developer in the GCC region.

12/3 Countries/Continents
32 +14 Assets in Operation + under development
3500 Employees
30 Nationalities
60+% Local Nationals
8% Renewable Energy in Total Portfolio
USD 40 Billion Value of Assets in operation + development
Our journey with CSP

• Launch of Morocco’s Solar Plan and South Africa’s REIPPPP after ACWA Power’s decision to expand internationally.

• Both frameworks are competitive and transparent

• ACWA Power assembled a winning developer consortium and contractor (same contractor for NOORo I and Bokpoort).

• ACWA Power to build 2 CSP plants trough with storage simultaneously in Morocco and South Africa between 2013-2015.

• In early 2015, ACWA Power was selected to build 2 CSP plants (trough and tower)

• Today’s CSP Portfolio: 560 MW
NOORo I

- **160 MW Capacity**
- **3 Hours**
  Thermal Energy Storage
- **4.5 Km² Area**

- **$ 840 Million**
  Cost
- **$ 0.189/kWh**
  25 Years PPA
- **240,000 tons/y**
  Avoided CO₂ emissions
NOORo I timeline

- Preferred Bidder: 24 Sep 2012
- Construction start: 12 June 2013
- Production Start: Nov 2015
- Commercial Operation: 31 Dec 2015
NOORo I lessons learnt

1. It’s all about people… (developer, contractor, supply chain, offtaker, lender)
2. Heavy transport and logistics require great attention
3. Selection of experienced and well equipped contractors
4. Prepare for weather conditions
5. Industrial integration is doable
6. Relationship with the community and CSR are essential
7. Once the plant is built to specifications, generation depends on DNI and operating strategy
8. NOORo I delivered to expectation from the 1st month and along the 1st year of operation
200 MW Capacity
7.2 Hours Thermal Energy Storage
6.8 Km² Area

$1,091 Million Cost
$0.156/kWh 25 Years PPA
533,000 tons/y Avoided CO2 emissions
NOORo II timeline

- **RFQ**: January 2013
- **RFP Release**: December 2013
- **RFP v2 Release**: July 2014
- **Preferred Bidder**: January 2015
- **Construction Start**: July 2015

- **Prequal**: March 2013
- **Initial Bid Submission**: March 2014
- **Final Bid Submission**: September 2014
- **Financial Close**: May 2015
- **Production start**: Q4 2017
- 150 MW Capacity
- 8 Hours Thermal Energy Storage
- 7.5 Km² Area

- $849 Million Cost
- $0.163/kWh
- 25 Years PPA
- 533,000 tons/y Avoided CO2 emissions
NOORo III timeline

- **RFQ**: January 2013
- **RFP Release**: December 2013
- **RFP v2 Release**: July 2014
- **Preferred Bidder**: January 2015
- **Construction Start**: May 2015
- **Prequal**: March 2013
- **Initial Bid Submission**: March 2014
- **Final Bid Submission**: September 2014
- **Financial Close**: May 2015
- **Production start**: Q4 2017
Our approach: obsessed about tariff endurance...

Electricity and water are basic commodities that enable socio economic development of communities and countries. But provision of these commodities at an adequate and affordable level in a reliable manner is a very capital intensive business.

Money spent up-front to provide such assets and then operate and maintain them year in year out can only be recovered through the delivery of services over a very long time horizon by charging the Governments and/or the consumer.

This of course means that the growth, development and sustainability of the countries in which we operate and the local communities we serve is of central importance as the real assurance of us getting paid is ultimately dependent on the health, wealth and happiness of these people and willingness of the Government to pay.

We therefore seek to foster a close and collaborative partnership that extends well beyond the legal frameworks of the offtake contracts, with the countries and communities in which we live and with whom we work.
Our approach: Constantly driving down costs...

- **FUEL**: Driving efficiency/better heat rate, lower fuel consumption.

- **FINANCING**: Creating value through rigorous risk analysis, appropriate risk mitigation, financial structuring and achieving better pricing.

- **OPEX**: As our portfolio grows, we lower costs by sharing inventory, improved access to supply chain and optimization of human resources.

- **CAPEX**: We deliver the best fit solution through tech optimization and by convincing OEMs and EPC Contractors to develop designs and price in detail at bid stage itself and adhere to the principle of cost + reasonable margin and not market price.
Consistently delivering value… few examples

| Shuqaiq IWPP (2007)  
900MW + 212,000 cum/day | 16.8% USD 0.6 Bn (SAR 2.3 Bn) |
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<tbody>
<tr>
<td>Developer</td>
<td>Water Hal/cuM</td>
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<tr>
<td>ACWA Power/GIC/MC</td>
<td>385.59</td>
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<tr>
<td>Marubeni/NBC</td>
<td>499.00</td>
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<tr>
<td>Powertek/Jumai</td>
<td>532.66</td>
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| Marafiq IWPP (2007)  
2700MW + 800,000 cum/day | 22.4% USD 0.5 Bn (SAR 1.8 Bn) |
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<tr>
<td>Developer</td>
<td>Water Hal/cuM</td>
</tr>
<tr>
<td>Suez/ACWA Power/GIC</td>
<td>311.25</td>
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<tr>
<td>IP/Sumitomo/Oger</td>
<td>307.50</td>
</tr>
<tr>
<td>Mitsui/KEPCO/NPC</td>
<td>273.75</td>
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| Rabigh IPP (2009)  
1200MW                          | 31.5% USD 0.9 Bn (SAR 3.3 Bn) |
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<tr>
<td>Developer</td>
<td>Power Hal/kWh</td>
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<tr>
<td>ACWA Power/KEPCO</td>
<td>12.59</td>
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<tr>
<td>GDF Suez/IP</td>
<td>16.56</td>
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| Qurayyah IPP (2011)  
4000 MW                          | 15.5% USD 0.3 Bn (SAR 1.2 Bn) |
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<tr>
<td>ACWA Power/ Samsung/MENA Fund</td>
<td>7.41</td>
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<tr>
<td>Marubeni</td>
<td>8.56</td>
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| Noor 1 IPP (2012)  
160MW + 3 Hour Storage CSP | 28.0% USD 0.2 Bn (MAD 2.0 Bn) |
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<tr>
<td>Developer</td>
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<tr>
<td>ACWA Power/ Aries/TSK</td>
<td>159.79</td>
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<td>Enel Green/ ACS Corba</td>
<td>205.72</td>
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| Rabigh 2 IPP (2013)  
2000 MW                          | 4.8% USD 0.1 Bn (SAR 0.4 Bn) |
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<tr>
<td>Developer</td>
<td>Power Hal/kWh</td>
</tr>
<tr>
<td>ACWA Power/Samsung/MENA Fund</td>
<td>8.82</td>
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<tr>
<td>IP/POSCO/Al-Jomaih</td>
<td>9.24</td>
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Note: Figures in callouts show the NPV saving between lowest and next lowest bid.
CSP risks and opportunities

1. CSP technical risks are well known in the industry:
   • Trough: HTF, molten salts, weather (DNI, wind), etc.
   • Tower: Height, receiver, weather, etc.

2. CSP risks are not extraordinary and they should be mitigated during construction and throughout operation.

3. Modularity of the solar field and quantity of components is both an opportunity for industrial manufacturing and cost reduction but sometimes a challenge for local players...

4. CSP projects offer sizeable amount of business to local supply chain and contractors.

5. Pricing could be further improved if the guarantee structure is simplified (6 years of corporate finance is too long). Cost of guarantees is an extra unnecessary burden.

6. ICOD-FCOD period: justified for tower but not for the trough
Thank you