IPP Case Study: Coega Fast Track CCGT 1,600 MW
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Coega Fast Track CCGT Project

- Project located in Port Elizabeth, South Africa
- Serving the aluminium and ferro-manganese smelters of the Coega Industrial Development Zone (IDZ)
- Over US $1 billion invested by South African Government in IDZ facilities
- Coega is intended to be the primary metals processing centre for South Africa
- IPSA is the principal private sector IPP power developer at Coega
Coega Fast Track CCGT Project - Specifications

- Base load power plant of 1,600 MW – 2 x 800 MW - when in full configuration
- Fuel source: liquefied natural gas (LNG)
- Initial phase to operate on fuel oil until completion of LNG regasification plant in 2011 or sooner if LNG bridge ship used
- Two units of around 500 MW each initially operating in open cycle
- Conversion to combined cycle (CCGT) with the addition of steam turbines in 2011
- CCGT conversion to be financed through carbon credits
South African Power Market (1)

- 95 per cent. of all power generation still owned by state electricity company, Eskom

- Government policy, however, is to encourage independent power producers (IPPs) for new generation

- IPSA has developed and owns South Africa’s first gas-fired IPP power plant

- Development of Coega Fast Track CCGT based on experience of IPC/IPSA in LNG and CCGT projects in other countries
South African Power Market (2)

- No new power plants built in South Africa for 15 years
- Current power demand growth of c 7 per cent. per annum
- Power shortages originally forecast for 2006
- Actual regional power cuts: 2006
- National reserve capacity shortfall forecast for 2007
- National power cuts: 2007
- "Energy Crisis" declared in January 2008
Coega First 500 MW Turbine Choice

- Turbines have to be suitable for CCGT conversion
- Possible future steam sales from CHP
- 24 month lead time on new turbines so need to use existing
- "Grey market" turbines only solution for fast installation
- Significant cost savings from buying grey market machines
- Original turbine manufacturers prepared to guarantee performance and upgrade specifications
Coega First 500 MW Turbine Specifications

- Four 125 MW Fiat Avio 501 D gas turbines
- Manufactured in Italy under licence from Westinghouse
- Medium efficiency – D Technology – heat rate
- Siemens Turbocare have now upgraded turbines to F Technology - Turbines are now effectively new, with an operating life of 25 years
Transmission Grid of South Africa and Neighbours

The map indicates the South African power network and interconnections with neighbouring countries.
Coega First 521 MW Turbine Specifications

- Output rises from 500 MW to 521 MW with performance improvements fully supported by Siemens
- First turbines ready for delivery First Quarter 2008
- First 521 MW block could be operational in first half of 2009
Coega First 521 MW Costs

- Turbines acquired by IPSA in March 2007 for US $42 million
- Cost equates to c. US $80,000 per MW
- Total 521 MW open cycle unit budgeted at around US $150 million but sensitive to foreign exchange movements plus commodity plus labour price movements
- Target installed cost in open cycle: US $300,000 per MW
Coega First 521 MW Costs

- IPSA has received approaches through Siemens to sell same turbines to another developer for over US $100 million

- Current open market value of turbines alone in excess of US $150 million as at April 2008

- Replacement cost of typical open cycle gas turbine capacity is over US $1 million per MW with two year lead time on turbines
Coega CCGT Conversion

- Additional 300 MW from conversion to CCGT after first 500 MW operational
- Cost of conversion budgeted at US around US $150 million
- Incremental capacity cost: US $500,000 per MW
- CCGT conversion to be financed using carbon credits
- Methodology for obtaining certified emission reduction certificates (CERs) for CCGT conversion projects pioneered at United Nations by IPSA management
Conclusions

- Coega project can be expanded from 1,600 MW to 3,200 MW
- The IPSA fast track approach at Coega can be replicated in other parts of South Africa
- Coega Case Study has important lessons for capacity expansion projects in other countries, including Russia, where new capacity is needed on site to support smelters
- IPSA/IPC has track record in successfully supplying uninterruptible power to Samsung smelters in Kazakhstan in 1990s
- IPC now developing 500 MW of CCGT for Alcan smelter in Holland using same approach as at Coega
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