

Global Geothermal Development Plan (GGDP) Roundtable  
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# Commercial Financing of Geothermal Power Projects - Challenges and Suggested Solutions

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# Case Study - Star Energy (Wayang Windu) Geothermal

## Fast-track Financings



**USD 298,200,000**

Financial Advisor, Mandated Lead Arranger, Underwriter  
Wayang Windu Project Finance  
Indonesia



2007

- In 2007, project finance banks were skeptical about PLN after it changed IPP tariffs.
- Existing secured lenders could block or delay Unit 2 expansion.
- Unit 2 expansion financing was completed within 8 months.
- SCB attracted bank interest from Indonesian and international financial institutions.



**USD 350,000,000**

Senior, secured and guaranteed notes due 2015  
Joint Bookrunner



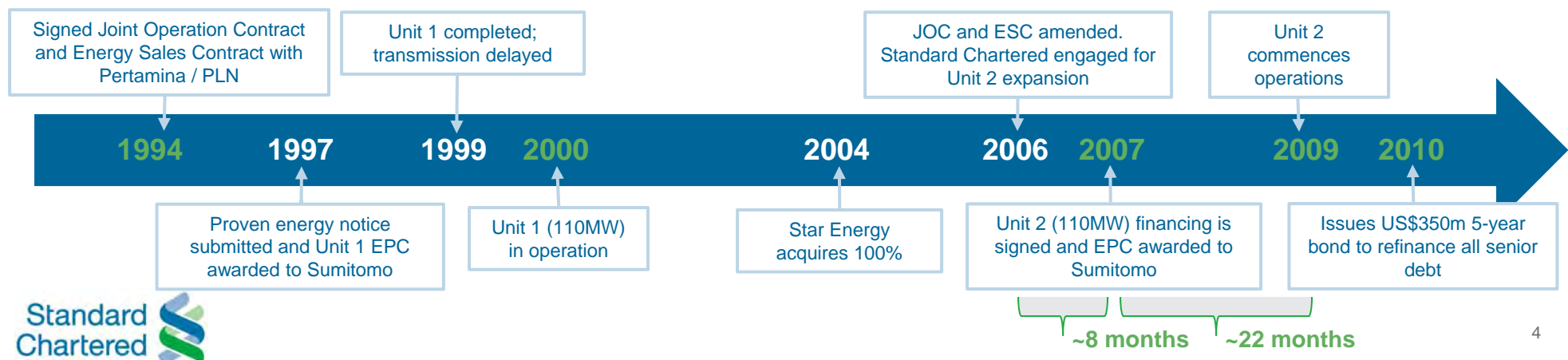
2010

- In 2010, SCB successfully priced a USD 350m senior, secured and guaranteed offering.
- This marks the company's debut in the int'l debt capital markets and first Asian high yield deal from the geothermal energy sector.
- Despite a weak market backdrop, the company was able to garner a final order book of well over USD 1.1b and achieved its target issue size.

## Standard Chartered Bank ("SCB") Solution

- *Financial advisory* – Sole financial advisor, due diligence leader.
- *Underwriting* – 7 year 'mini-perm' project finance debt facilities totaling USD 298m, fully underwritten by SCB.
- *Refinance of Notes* – Prepaid Unit 1 notes to accelerate expansion.
- *Construction Letter of Credit* – Issued SBLC to the EPC contractor.
- *Hedging* – Provided interest rate swaps.
- *Carbon credits* – Solution to offtake the carbon credits.
- *Agency* – Performs intercreditor and collateral agency roles.
- *Accounts services* – All project accounts are opened with SCB and managed by our accounts services department.
- *Project Bond issue* – Joint bookrunner for US\$350m 5-year bond issue.

## Key Project Milestones

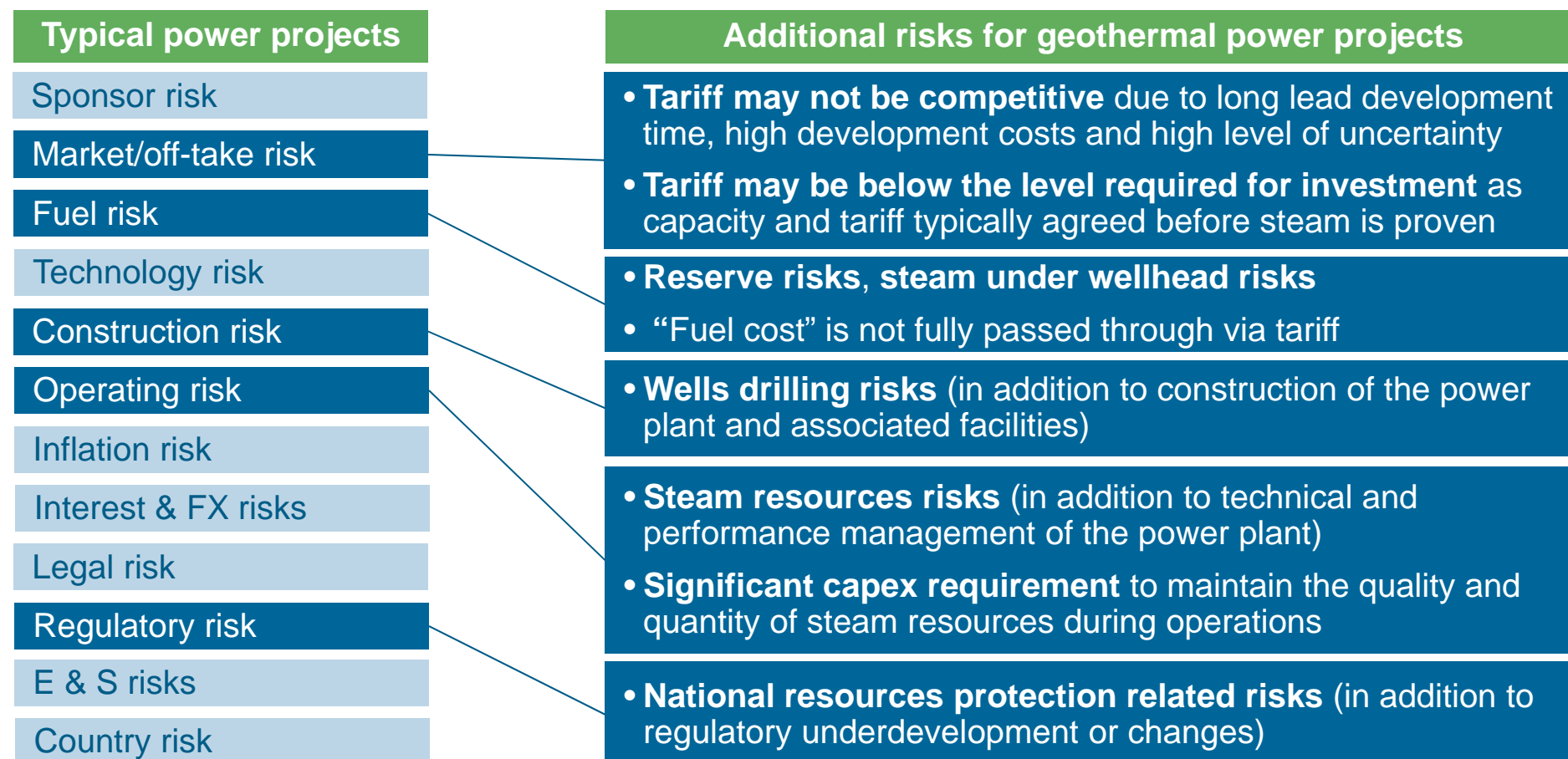


## Case Study - Star Energy (Wayang Windu) Geothermal *(Continued)*



# A “risk profile” comparison with typical power projects

- Typically, geothermal power projects are riskier than power projects which run on gas, LNG or coal. They carry significant additional risks in addition to the usual risks of power projects.





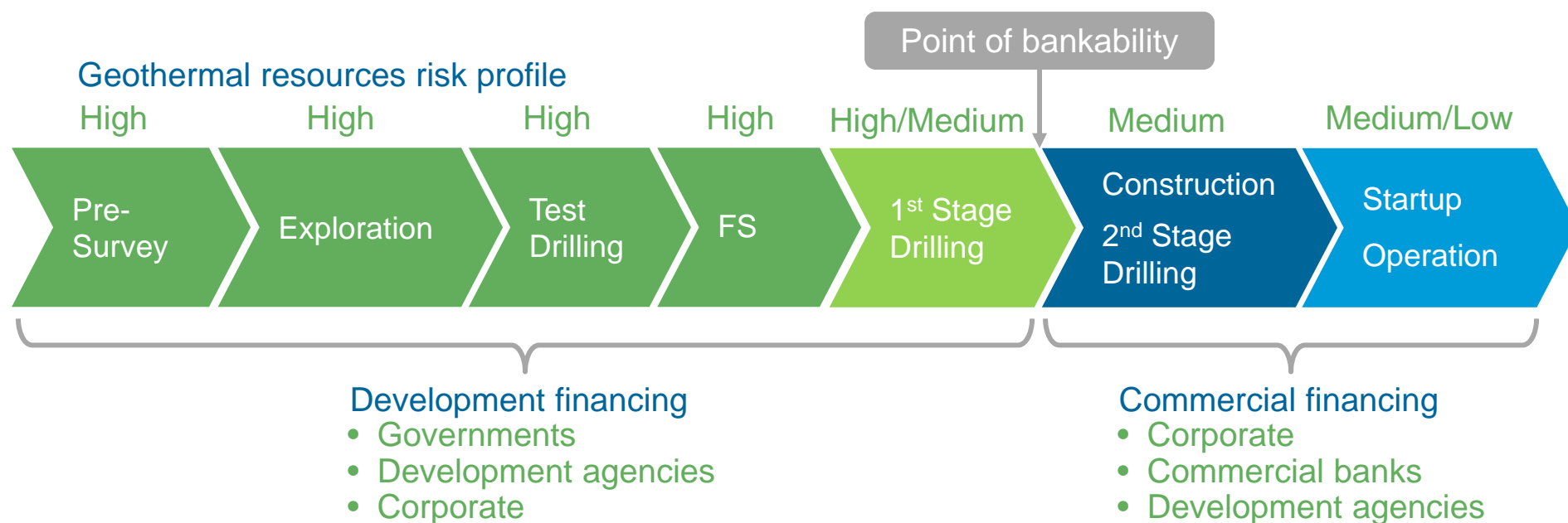
# A comparison with Oil & Gas projects

- Compared to Oil & Gas projects, the resources risk of geothermal power projects is significantly higher. Having sufficient reserve does not mean there will be sufficient steam resources.

Oil & Gas projects	Geothermal power projects
<ul style="list-style-type: none"> <li>Wide references for field and basins</li> <li>Reserve is assessable</li> </ul>	<ul style="list-style-type: none"> <li><b>Unique steam field characteristics</b></li> <li>Reserve is assessable but relatively less accurate</li> <li><b>Steam under wellhead can be unpredictable</b></li> </ul>
<ul style="list-style-type: none"> <li>Reserve certification</li> </ul>	<ul style="list-style-type: none"> <li>Reserve certification</li> <li><b>Proven steam under wellhead</b></li> <li><b>Meeting the capacity and tariff</b> under power purchase agreement (PPA), which are typically agreed before steam is fully proven, otherwise uneconomical</li> </ul>
<ul style="list-style-type: none"> <li>Recovery of all costs</li> </ul>	<ul style="list-style-type: none"> <li><b>No cost recovery</b> – Many discovered steam fields have not fully developed</li> </ul>
<ul style="list-style-type: none"> <li>Upside – Oil prices, adding reserves, production growth</li> </ul>	<ul style="list-style-type: none"> <li><b>Little upside</b> – Fixed tariff under the PPA, no other sources of revenues (carbon credit market collapses)</li> </ul>

# At which stage geothermal power projects are financeable?

- Development of geothermal power projects goes through several stages with geothermal resources risk remaining high until the success of the first stage of drilling.



- During the development stages until the success of first stage of drilling, geothermal power projects are typically financed by governments, development agencies or corporate.
- Once the team resources are proven to be reasonably sufficient, geothermal power projects would be able to attract financing from commercial banks.



# Financing of geothermal power projects – Suggested solutions

The key issues	Suggested solutions
<ul style="list-style-type: none"> <li>• Unique steam field characteristics</li> <li>• Unpredictable steam under wellhead</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Reserve certification</b></li> <li>• <b>Proven steam under wellhead</b> up to a comfortable level</li> </ul>
<ul style="list-style-type: none"> <li>• Meeting the capacity and tariff under the PPA</li> <li>• Tariff may be below the level required for investment</li> </ul>	<ul style="list-style-type: none"> <li>• Capacity under the PPA should adapt to the nature of resources risk, e.g. allowing <b>flexibility in capacity building up</b> according to steam resources found and <b>subsequent expansions</b> once more steam resources are available</li> <li>• <b>Flexible tariff structure</b>, e.g. tariff is more accommodating for early units but less so for the subsequent ones once steam resources are already established</li> </ul>
<ul style="list-style-type: none"> <li>• Tariff may not be competitive</li> <li>• National resources protection related risks</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Clear government support</b> for the projects and the PPA</li> <li>• Subsidy, if any, should be applied across different fuels used</li> <li>• <b>Create favorable tax treatment for geothermal wells</b>, e.g. allowing transferable depreciation allowance</li> </ul>
<ul style="list-style-type: none"> <li>• Maintaining the steam resources during operating period</li> </ul>	<ul style="list-style-type: none"> <li>• Build in a <b>capacity buffer</b>, periodic <b>steam resources update</b></li> <li>• <b>Tariff component for ongoing capex</b> (repair wells, makeup wells, etc.) having an <b>escalation</b> linked to a drilling cost index</li> </ul>

# Thank You



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