



Mphanda Nkuwa Hydropower Plant





Project data (cont'd)

Power Plant

Installed capacity	1300 MW
Max. discharge	2,200 m ³ /s
Firm Power at 95% availability	760 MW
Plant factor	0.59
Mean energy production	9,070 GWh/a
Firm energy production	7,253 GWh/a
Secondary energy	1,817 Gwh/a



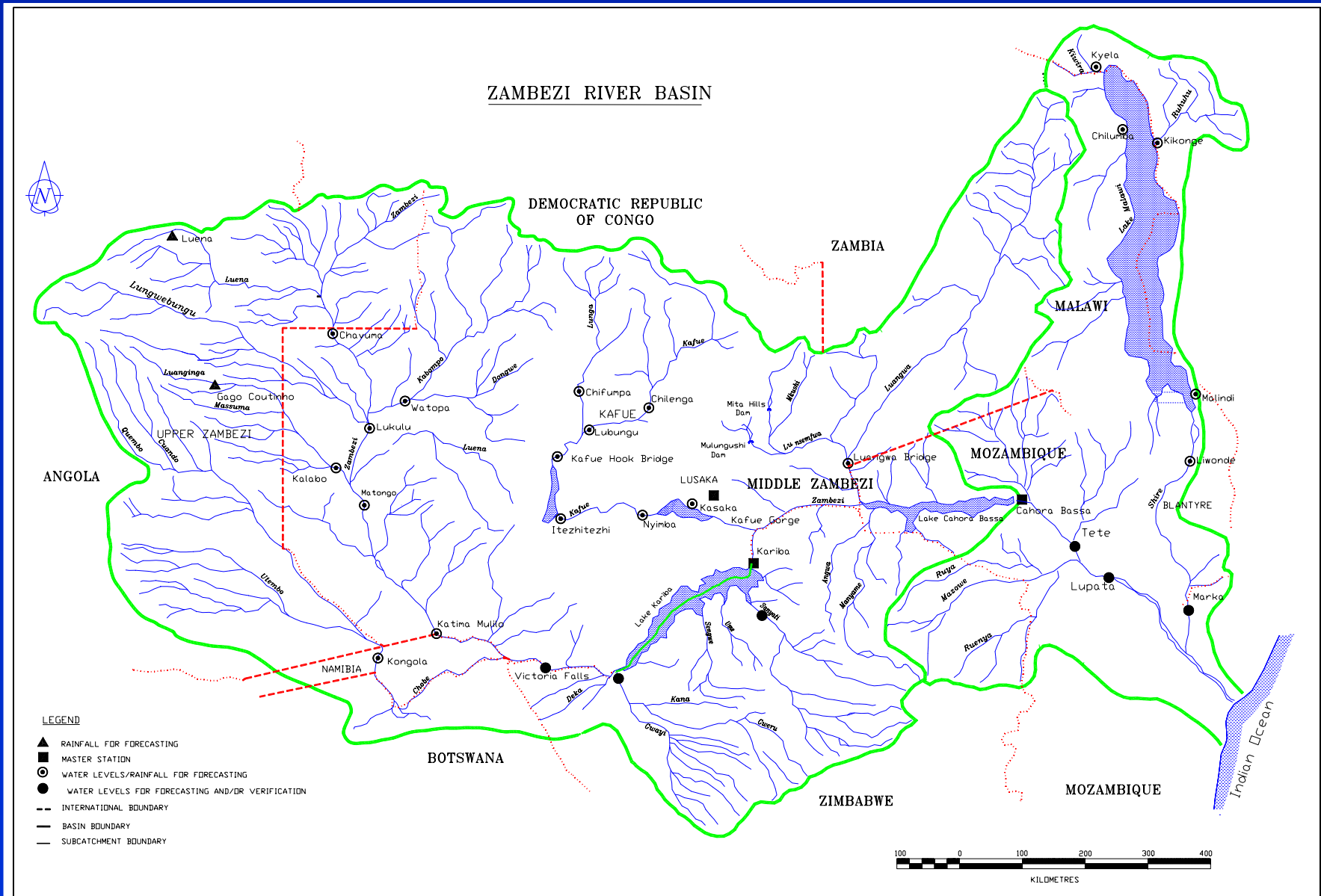
Mphanda Nkuwa

LOCATION

- 60km downstream C.B. in narrow steep gorge;
- Reservoir up toe C.B.;
- Reservoir inundate area aprox. (60x1.5)km .



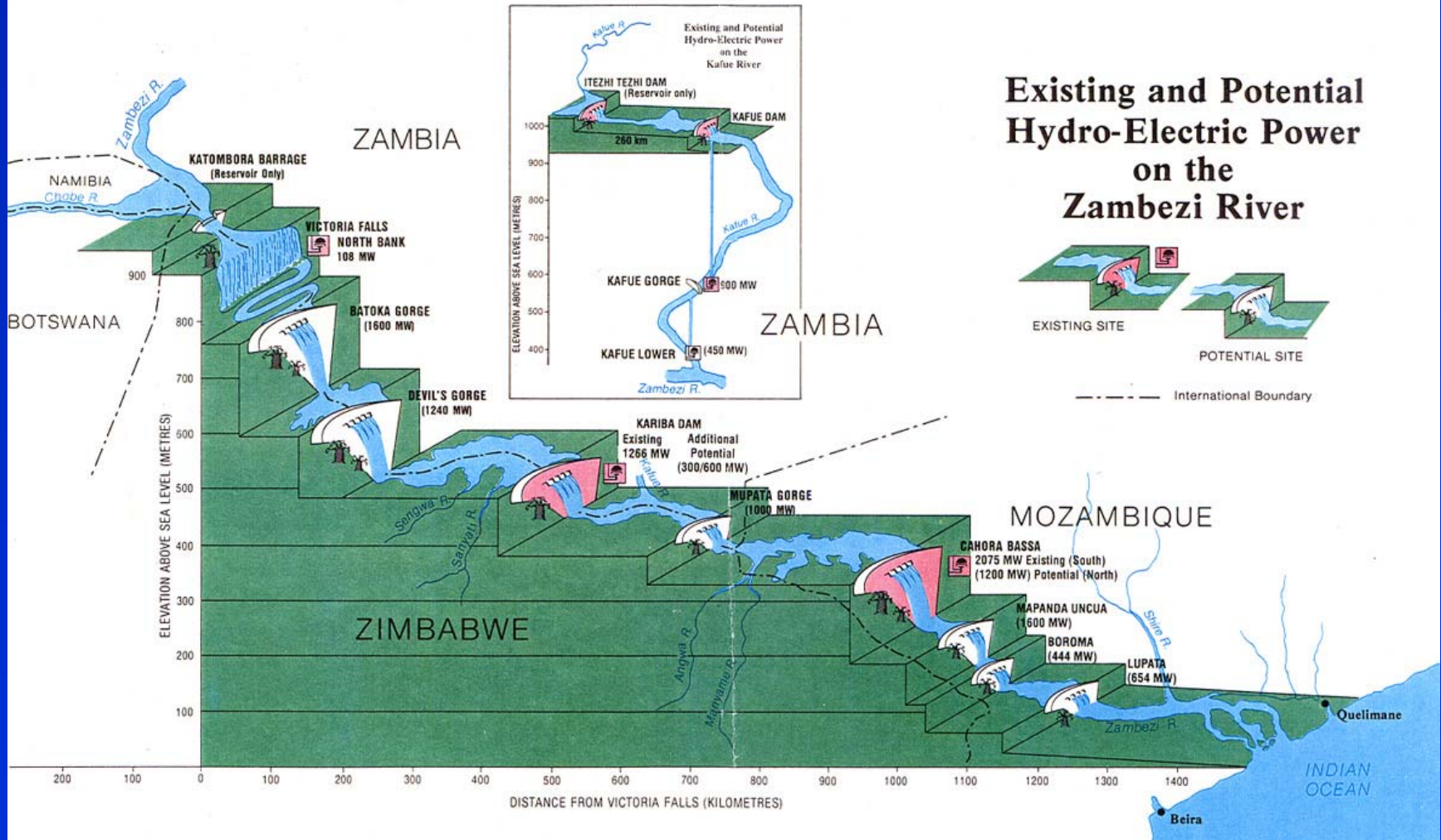
MPHANDA NKUWA HPP (1300 MW)



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Zambezi River Authority



MPHANDA NKUWA HPP (1300 MW)



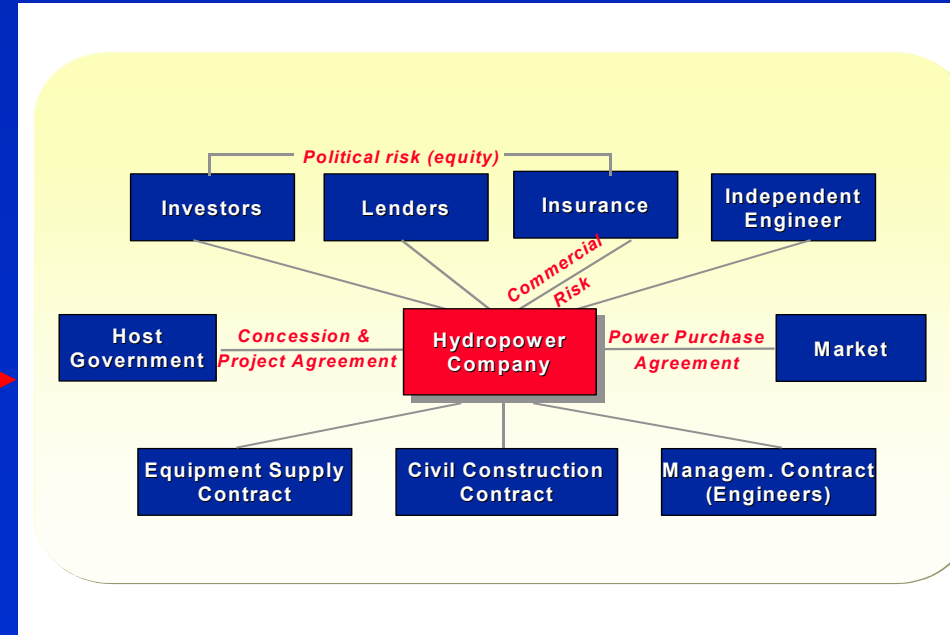
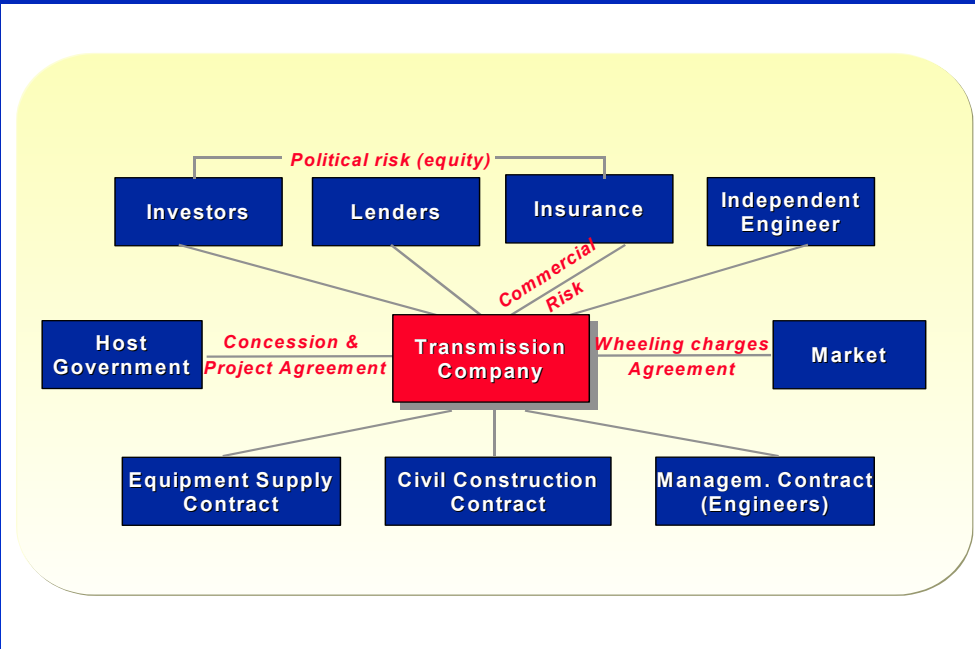




Project Development Concept

Transmission Company

Hydropower Company



Debt: Partly sovereign guarantee
 Equity: Lead Investor & Minority shareholders

Debt: No sovereign guarantee
 Equity: Lead Investor & Minority shareholders

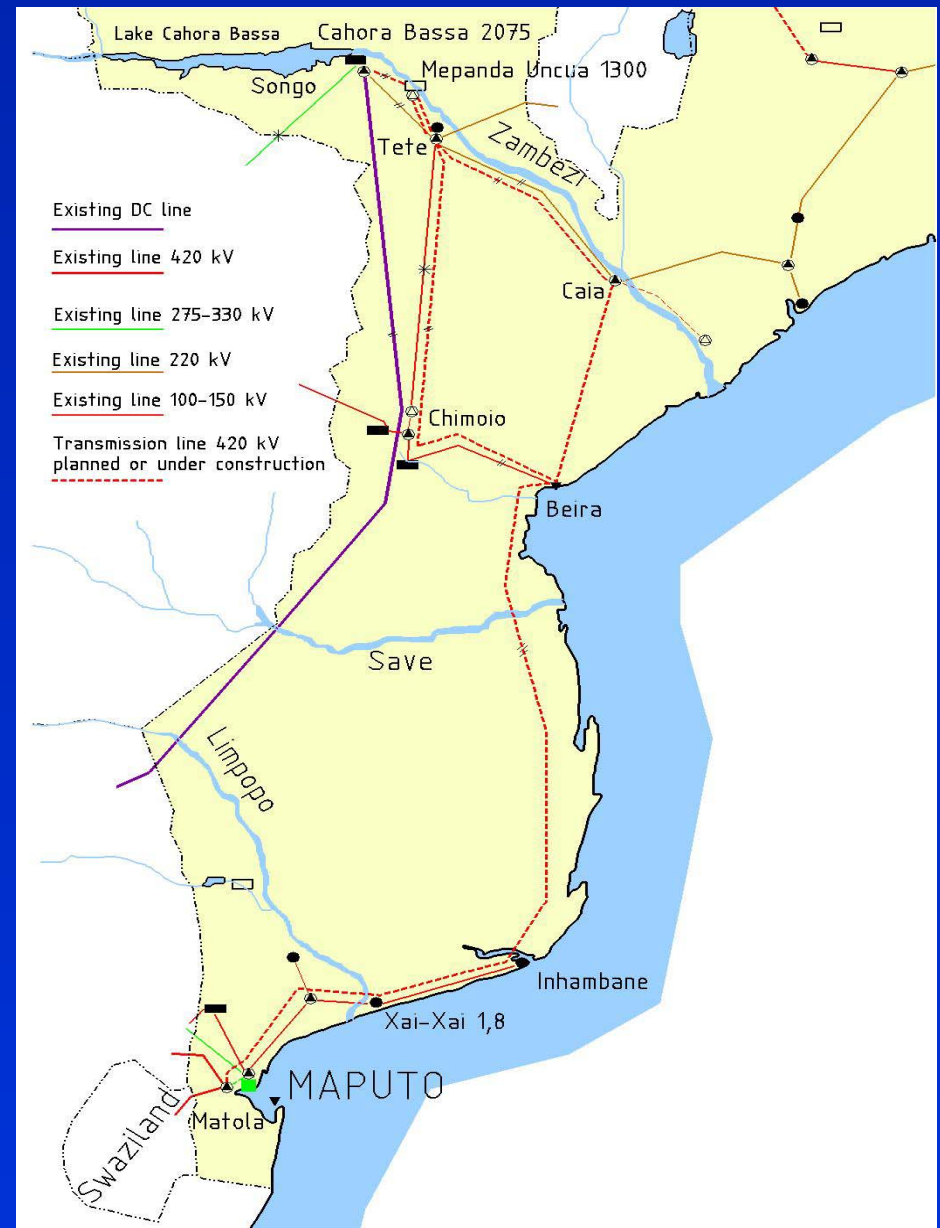


Components of The Project

- Mphanda Nkuwa comprehende:
 - Dam and Hydropower Station
 - H.V. Line interconnected to S.A. regional grid;
(Becomes evidente that is regional project)
 - Infrastructures requirem. to facilitate implementation



Transmission line routing





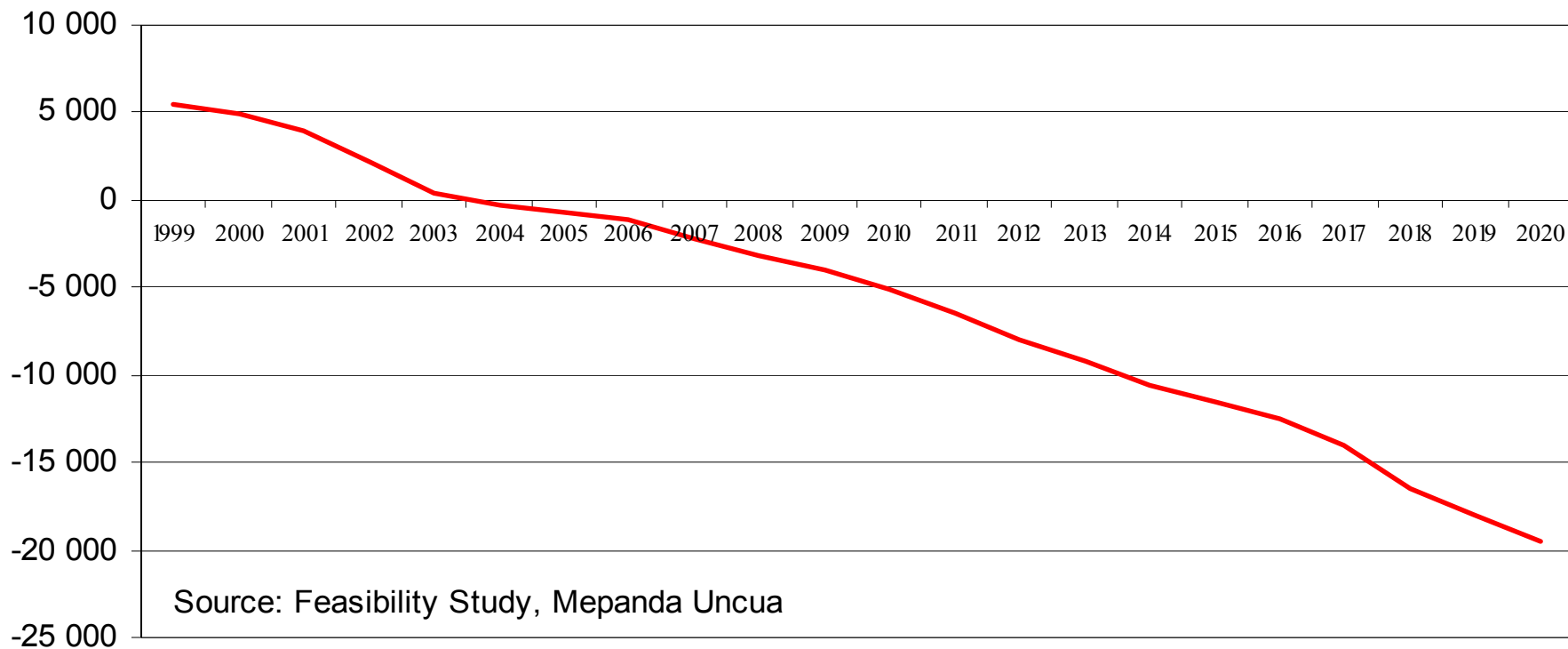
Transmission line (Beneficiaries)

- 2x400kV AC 1600km length
- Unifies the three isolated National grids;
- Closes ring CB-ZBWE-BOTS-RSA-MPTO;
- Provides additional transport capacity in the North-South Corridor;
- Facilitates trade of energy within SADC;



Power Market

Power Balance Southern Africa, MW





Estimated Project Cost

Fixed prices, 2001

	Euro million	Unit costs
Basic cost incl. physical contingencies	1 841	1 316 USD / kW ¹⁾
• Power Plant	895	640 USD / kW ¹⁾
• Transmission lines	946	250 000 USD per km

Current prices incl. price contingencies and IDC

Financing requirement	2 636	~ 2 000 USD / kW ¹⁾
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1) of installed capacity



Financial Viability

First year of full operation, Euro mn

	Cash-flow (2011)	Total cost (2011)
Total Revenues	505	2 636
• “Wheeling charges”	<u>220</u>	<u>1 303</u>
• Gross revenue Generation	285	
• Operating cost	6	
• Net cash income	279	1 333



Financial Viability (cont'd)

Return on total capital invested in Generation and Transmission

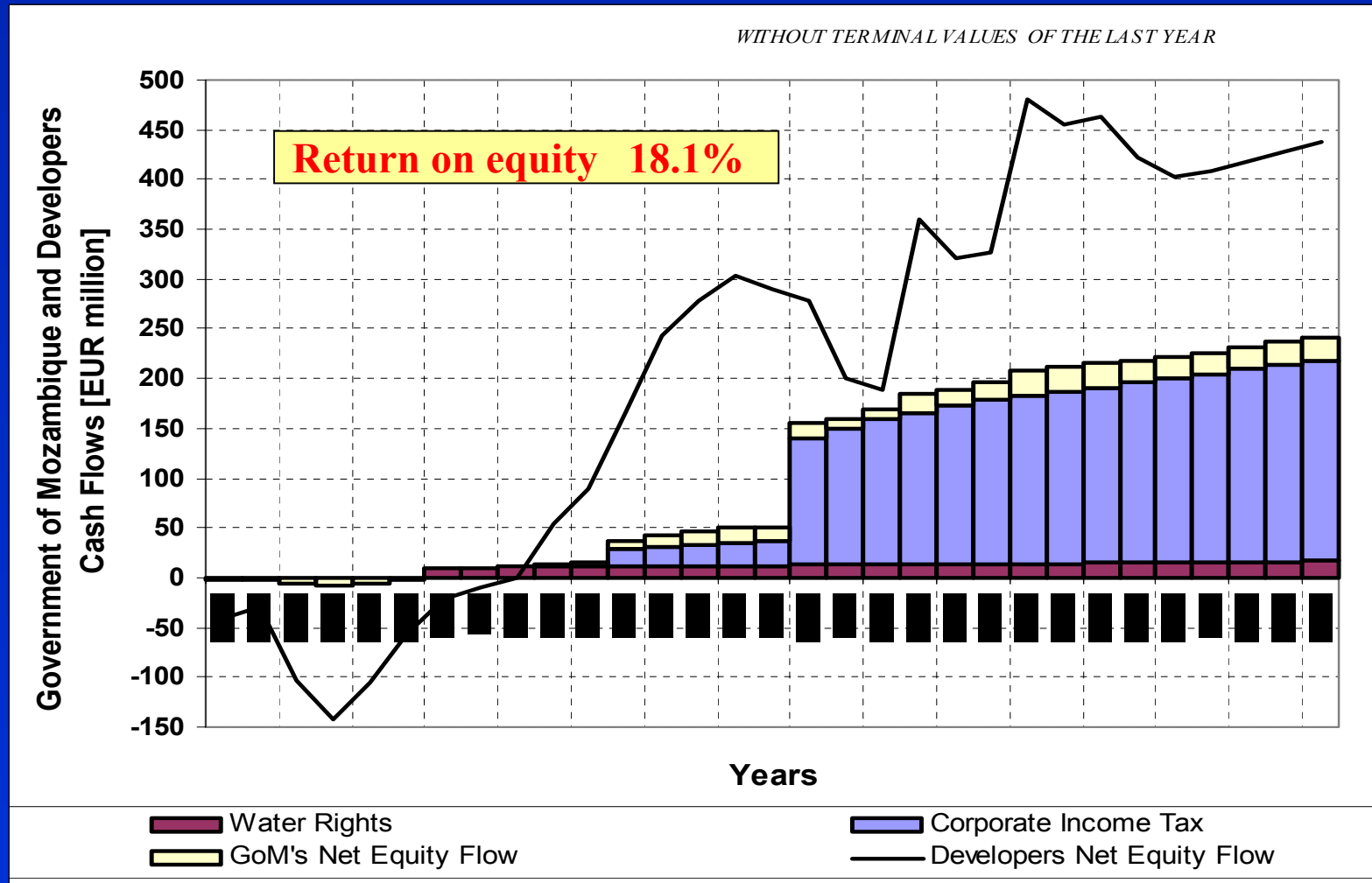
- **FIRR** **17 % (nominal rate !)**

Weighted average cost of capital

- **Transmission** **10.5 %**
- **Generation** **12.0 %**



Cash Flow – Developer and GoM





Legal Framework of particular relevance

- 1993 - Investment legislation
- 1995 - Special fiscal and customs regime for the Zambezi River Valley
- 1997 - Electricity Law No. 21 of 1 October 1997



Environmental and Social Issues

- Inundation, resettlement and compensation
- Downstream impacts from peaking operation
- Climate change mitigation (reduction of CO₂ emissions)
- Other

Detailed EIA/SIA by Developer





Environmental Impacts

Reservoir small

	Area (km2)	km2/MW
Mphanda Nkuwa	97	0.075
Cahora Bassa	2, 675	1.29
Kariba	5, 577	4.13

Resettlement modest

260 families (1 400 people)

Ratio of oustees (persons per MW)	MN	CBS	Kariba
	1.08	12.0	42.2



Conclusion

Mphanda Nkua Hydropower Project

- **A highly attractive investment proposition even with long transmission lines and all cost of lines covered by Project**

Upside potential

- **Cost of lines shared with other users**
- **Lower construction cost of transmission line than anticipated**
- **Energy intensive industry closer to site being offtaker of some base load generation, mid-merit and peak load on existing network reinforced**