OSHPC BARKI TOJIK

TECHNO-ECONOMIC ASSESSMENT STUDY FOR ROGUN HYDROELECTRIC CONSTRUCTION PROJECT

PHASE II: FINANCIAL ANALYSIS

P002378.T2-20

August 2014

COYNE ET BELLIER
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ELC
ELECTROCONSULT

IPA
Energy + Water Economics

TECHNO-ECONOMIC ASSESSMENT STUDY FOR ROGUN HYDROELECTRIC CONSTRUCTION PROJECT

Volume 5: Economic and Financial Analysis

Chapter 2: Financial Analysis

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GLOSSARY

Abbreviation	Definition
1290_3200	The recommended Project design option: 1290 masl and 3200 MW installed capacity and the one under evaluation in this Report. Also Ro1290_3200.
Assignment	The TEAS of the Project.
Base Case	The central case in IPA's Financial Analysis.
bn	Billion.
Bond	Refers to FS4: the Project is financed using a hypothecated bond and equity (supplemented by net operating revenues from the Project).
capex	Capital expenditure.
Client	Barki Tojik.
Consortium	The consortium appointed by the Client and the World Bank comprising of Coyne et Bellier, ELC and IPA.
Coyne et Bellier	Consortium partners.
Decommissioning	The closure of a plant and all processes associated with this.
DSCR	Debt Service Coverage Ratio.
EBITDA	Earnings Before Interest, Tax, Depreciation and Amortisation.
EBRD	European Bank for Reconstruction and Development.
ELC	ELC-Electroconsult S.p.A.
Financial Analysis	The financial analysis of the Project as per Chapter 3 ("T2-20: Financial Analysis") of Volume 5 ("Economic and Financial Analysis") of the TEAS of the Project.
FIRR	Financial Internal Rate of Return.
Forecast Horizon	The period under study in this Report: 2013-2050.
Full Self-Financing	FS1: the Project is financed using equity only (supplemented by net operating revenues from the Project).
FS1	Financing Structure 1: Full Self-Financing.
FS2	Financing Structure 2: Preferential Loan.
FS3	Financing Structure 3: Multilateral and Commercial Loan.
FS4	Financing Structure 4: Bond.
GoT	Government of Tajikistan.
GW	Gigawatt. 10^9 Watt.
GWh	Gigawatt hour. Unit of electrical energy equal to one billion (10^9) watt hours, one thousand megawatt hours, 3.6 TJ, or 3.41 BBTU.
h	Hour.
HPP(s)	Hydroelectric Power Plant(s).
Hydro	Hydroelectric power.
IDB	Islamic Development Bank.
IFC	International Finance Corporation.
IMF	International Monetary Fund.
IPA	IPA Energy + Water Economics Limited.
kW	Kilowatt. 10^3 Watt.
kWh	Kilowatt hour. Standard unit of electricity or consumption equal to 1,000 watts over one hour, and equivalent to 3,600 kJ or about 3,412 BTU.
LIBOR	London Interbank Offered Rate.
M	Mega (10^6).
masl	Metres above sea level.
mn	Million.
Multilateral and Commercial Loan	FS3: the Project is financed using a debt from multilateral agencies/international financing institutions and commercial lenders, and equity (supplemented by net operating revenues from the Project).
MW	Megawatt. 10^6 Watt.

Abbreviation	Definition
MWh	Megawatt hour. Standard unit of electricity or consumption equal to 1,000,000 watts over one hour, and equivalent to about 3,412,000 BTU.
NPV	Net Present Value.
O&M	Operating and Maintenance.
PPA	Power Purchase Agreement.
Preferential Loan	FS2: the Project is financed using a loan with preferential terms, which envisages the participation of a friendly foreign government with a strategic interest in the Project, and equity (supplemented by net revenues from early generation while construction is ongoing).
Project	Rogun Hydroelectric Power Project, located on the Vakhsh river in Tajikistan.
PV	Present Value.
Reference Case	The central case in IPA's Economic Analysis.
Report	*Techno-Economic Assessment Study for Rogun Hydroelectric Construction Project – Phase II Financial Analysis.*
Shadow Price	The marginal cost of meeting demand.
SRMC	Short Run Marginal Cost. Cost of generating an additional unit incorporating only expenses that vary with generation such as fuel and carbon costs as well as VOM.
TEAS	Techno-Economic Assessment Study.
USD	United States Dollar.
Vakhsh cascade	The HPPs that lie along the Vakhsh river.
VOM	Variable O&M. Non-fuel cost component of operating a power plant that does varies with a plant's electricity generation.
W	Watt. Unit of power.
WACC	Weighted Average Cost of Capital.
WEO	World Economic Outlook database published by the IMF.
y	Year.

EXECUTIVE SUMMARY

Introduction

Barki Tojik (the "Client") appointed a consortium comprising Coyne et Bellier, ELC-Electroconsult S.p.A. ("ELC") and IPA Energy + Water Economics ("IPA") (together the "Consortium") to undertake a Techno-Economic Assessment Study ("TEAS") of the Rogun Hydroelectric Power Project (the "Project" or "Rogun"), located on the Vakhsh river in Tajikistan (the "Assignment"). IPA was responsible for the economic and financial analysis (Volume 5: Economic and Financial Analysis) which, in the initial phase of the Assignment, consists of the following tasks:

- (Chapter 1) T2-18: Initial assessment of potential export markets & calculation of indicative netback prices;
- (Chapter 2) T2-19: Economic Analysis; and,
- (Chapter 3) T2-20: Financial Analysis.

In our Economic Analysis, we determined the recommended design option for the Project as that with the highest dam height of 1,290 meters above sea level ("masl") and intermediate installed capacity of 3,200MW ("1290_3200"). The financial analysis of the Project (the "Financial Analysis") builds upon the results of the Economic Analysis under the central case ("Reference Case") and as such, is undertaken on the 1290_3200 design option only. Note that all references to the Project in the remainder of this report (the "Report") refer to the recommended design option, 1290_3200.

The Report summarises the assumptions, approach, and results of our Financial Analysis under the central case (the "Base Case") from 2013 to 2050 (the "Forecast Horizon"). We also consider a sensitivity in which construction cost overruns increase the capital expenditure ("capex") requirement for the Project by 20% ("Higher Capex Case"). At this stage, this analysis aims to identify a high-level range of funding possibilities for the Project, subject to assumed costs for various potential sources.

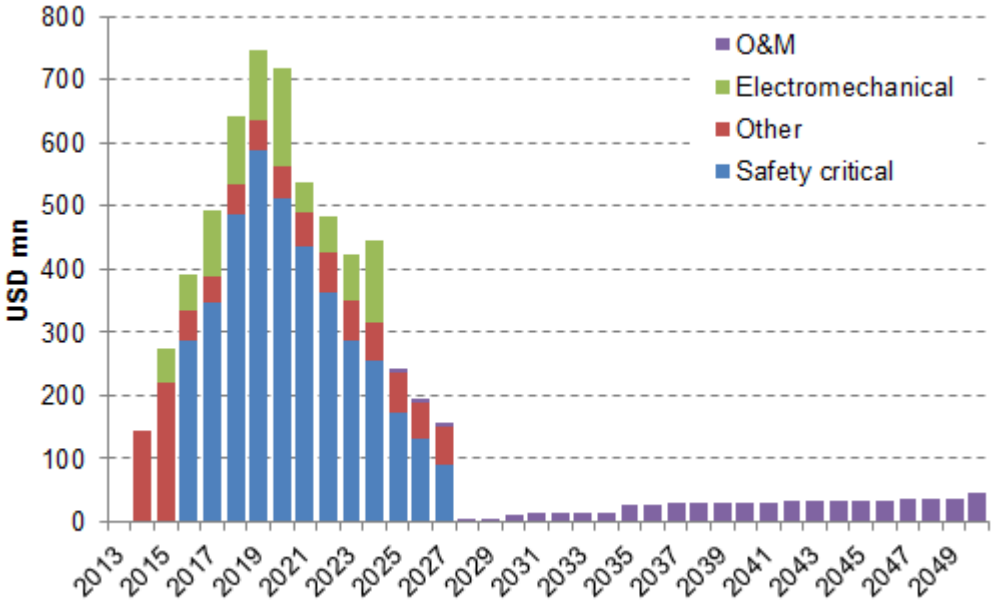
In contrast to the Economic Analysis, all monetary figures presented in the Report are stated in nominal price terms and United States Dollars ("USD"), unless otherwise stated. Input costs and revenues from the Economic Analysis have been inflated from real 2013 price terms at the annual USD inflation rate forecast by the International Monetary Fund ("IMF") World Economic Outlook ("WEO") to 2018 and a long-term assumption of 2% per annum thereafter.

Project assumptions

The breakdown of capex was provided by Coyne et Bellier and ELC. Total capex is assumed at 5,875USD million ("mn"). Please note that the costs of domestic transmission reinforcement and interconnector build are not taken into account in the capex figure. As such, additional capital funding beyond that estimated in our Financial Analysis would be required to realise the value of the Project.

There are certain aspects of the Project which must be fully completed for safety reasons once construction has commenced and, hence, for which it is crucial to ensure that full financing is available at the start. For this purpose, we have split the capex into "safety critical", "electromechanical", and "other" categories, as shown in Figure 1 below.

Figure 1: Project cost breakdown over the Forecast Horizon



Source: Coyne et Bellier, ELC, IPA assumptions.

Project revenues are based on electricity prices and generation of electricity for Tajikistan and the export markets. Electricity generation assumptions are taken from the results for the Reference Case in our Economic Analysis. Electricity prices in Tajikistan are based on the expected electricity tariff in the country, whilst electricity prices in the export markets are assumed to be half the electricity prices derived under the Reference Case of our Economic Analysis.

Financing assumptions

The following four financing structures have been examined, in all cases supplemented by net operating revenues from early generation during the construction period:

1. **Full Self-Financing ("FS1")**: The capital requirements will be fully funded through equity from the Government of Tajikistan ("GoT").

2. **Preferential Loan ("FS2")**: This structure envisages a friendly foreign government with a strategic interest in the Project prepared to offer preferential terms for a loan. The financing structure reflects the maximum amount of preferential loan, subject to the constraint that at least 10% of the total external funding is equity from the GoT, which can be supported by the Project whilst maintaining a positive cash flow and a Debt Service Coverage Ratio ("DSCR") above 1.25 throughout the Forecast Horizon.

3. **Multilateral and Commercial Loan ("FS3")**: The third option considers debt from both multilateral agencies (international financing institutions) and commercial lenders. The financing structure reflects the maximum amount of multilateral and commercial loans, subject to the constraint that the level of debt be no more than 90% of total external funding, which can be supported by the Project whilst maintaining a positive cash flow

and a DSCR above 1.25 throughout the Forecast Horizon. We have assumed that the commercial loan may only be drawn down to meet the cost of the electromechanical equipment for the Project and cannot be used for any other elements of the capex.

4. **Bond ("FS4")**: This structure examines the potential for the issuance of a hypothecated bond. In order to provide security as to the funding of the repayment, a dedicated cash fund (or bond set-aside) is retained. The financing structure reflects the minimum amount of equity funding required in combination with a bond to maintain a positive cash flow throughout the Forecast Horizon.

In addition to the revenues earned directly by the Project from early generation, other net exports will secure foreign currency for the Government which could be used towards the financing.

The assumptions regarding the sources of funding are summarised in Table 1 below.

Table 1: Sources of funding assumptions

Item	Units	Source of funding			
		Bond	Preferential loan	Multilateral loan	Commercial loan
Cost of funding					
LIBOR[1]	%/year	-	3.30%	3.30%	3.30%
Premium	%/year	-	1.70%	1.30%	9.00%
Coupon / interest rate	%/year	10%	5.00%	4.60%	12.30%
Upfront fee	%	-	0.50%	0.25%	1.50%
Commitment fee	%/year	-	0.50%	0.25%	1.50%
Drawdown and repayment schedule					
First year available	-	2020	2015	2015	2020
Bond duration / loan tenor	years	25	25	20	15
First year of coupon/ interest repayment	-	2020	2025	2025	2025
Maturity	-	2044	2039	2034	2034

[1]: London Interbank Offered Rate ("LIBOR").

Source: Client and IPA assumptions.

Results

The four financing structures and their associated Financial Internal Rates of Return ("FIRR"), expressed in post-tax nominal terms, are summarised in Table 2 below. Note that these financing structures have been considered to help identify the funding requirements given the constraints that would need to be considered in the following phases of any financial analysis.

Table 2: Total external funding and returns by financing structure

Item	Units	FS1	FS2	FS3	FS4
Sources					
Equity	USD mn	4,190	596	600	2,794
Bond	USD mn	-	-	-	2,350
Preferential loan	USD mn	-	5,199	-	-
Multilateral bank loan	USD mn	-	-	4,700	-
Commercial loan	USD mn	-	-	525	-
Total	**USD mn**	**4,190**	**5,795**	**5,825**	**5,144**
Project					
FIRR	**%**	11.88%	12.07%	12.05%	12.17%
NPV	USD mn	908	999	989	1,042
Payback					
Nominal	years	18	18	18	18
Discounted	years	30	29	29	28
Equity					
FIRR	**%**	10.97%	22.25%	22.52%	11.18%
NPV	USD mn	478	2,082	2,156	488
Payback					
Nominal	years	19	16	16	19
Discounted	years	36	17	18	36

Source: IPA analysis.

Our results suggest that under the Base Case, the Project requires between 4,190USD mn (in FS1) and 5,825USD mn (in FS3) of external funding to cover the costs of construction, O&M, decommissioning, and the costs associated with the sources of funding. Equity requirements range from 596USD mn (in FS2), when Project funding is supported by a preferential loan, to 4,190USD mn (in FS1), when equity makes up 100% of total external funding. Our results under FS2 and FS3 suggest that the Project can support a ratio of debt to total external funding of close to 90%.

Under the Base Case, the Project achieves a FIRR of around 12%, above an indicative 10% Weighted Average Cost of Capital ("WACC"), for all financing structures. The Equity FIRR is higher under FS2 and FS3 as the levels of equity required to finance the Project are much lower than under FS1 and FS4. With increased capex, higher levels of equity are needed under all four financing structures, reducing the IRRs and increasing the payback period. The Equity FIRR falls marginally below the 10% indicative WACC under FS1 and FS4 in this instance.

In the next stage of the Project's appraisal, when more detailed analysis is undertaken on the design, specific discussions would need to be held with potential funders in order to gauge the precise level of external financing which could be available for its construction, and the costs thereof.

1. INTRODUCTION

Barki Tojik (the "Client") appointed a consortium comprising Coyne et Bellier, ELC-Electroconsult S.p.A. ("ELC") and IPA Energy + Water Economics ("IPA") (together the "Consortium") to undertake a Techno-Economic Assessment Study ("TEAS") of the Rogun Hydroelectric Power Project (the "Project" or "Rogun"), located on the Vakhsh river in Tajikistan (the "Assignment"). IPA was responsible for the economic and financial analysis (Volume 5: Economic and Financial Analysis) which, in the initial phase of the Assignment, consists of the following tasks:

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The Report summarises the assumptions, approach, and results of our Financial Analysis under the central case (the "Base Case") from 2013 to 2050 (the "Forecast Horizon"). We also present the results of our sensitivity analysis in which we assess the impact of a higher capital expenditure ("capex") for the Project ("Higher Capex Case").

In contrast to the Economic Analysis, all monetary figures presented in the Report are expressed in nominal price terms and United States Dollars ("USD"), unless stated otherwise. Inputs from the Economic Analysis have been inflated from real 2013 price terms at the annual USD inflation rate forecast by the International Monetary Fund ("IMF") World Economic Outlook ("WEO") to 2018 and a long-term assumption of 2% per annum thereafter.

This Report is structured as follows:

- **Section 2** provides an overview of the assumptions regarding the Project.
- **Section 3** presents our key financial assumptions.
- **Section 4** summarises our approach to the financial modelling.
- **Section 5** sets out the Base Case results.
- **Section 6** provides the results of our sensitivity analysis.
- **Section 7** presents our conclusions.
- **Annex A** provides the cash flow profiles by financing structure under the Base Case.

The complete set of results has also been provided separately in spreadsheet format in a file entitled *IPA-Rogun Financial Results Summary-2014-06-05.xlsm* (the "Results Summary") which provides detailed financial statements for each of the funding structures and cases considered.

2. PROJECT ASSUMPTIONS

This Section 2 provides a summary of the assumptions for the preferred design option for the Project. Subsection 2.1 summarises the phasing of the Project. Subsection 2.2 presents the breakdown of capex and Operating and Maintenance ("O&M") costs whilst subsection 2.3 provides an overview of electricity generation, prices and revenues for the Project.

2.1. Phasing

Table 2 below summarises our assumptions regarding the phasing of the Project.

Table 3: Project phasing

Item	Units	Assumption
Forecast Horizon		
Start	-	2013
End	-	2050
Project phasing		
Construction period		
Start	-	2014
River diversion	-	2016
End	-	2027
Operational period		
Start	-	2020
Full capacity	-	2025
Final capex payment	-	2027
End	-	2131
Project lifetime	years	115

Source: Coyne et Bellier, ELC, and IPA assumptions.

2.2. Costs

The breakdown of the capex was estimated by Coyne et Bellier and ELC as shown in Table 4 below. In our Base Case, the total capex is assumed at 5,875USD million ("mn"). It should be noted that the costs of domestic transmission reinforcement, estimated at around 456.2USD mn (in real 2013 terms) by Coyne et Bellier, and interconnector build, estimated at 600USD mn for 1GW, are not taken into account in this capex figure. As such, additional funding beyond that which we estimate herein would be required to finance these additional capital investments on similar timescales to the Project's construction in order to fully realise the value of the Project.

There are certain aspects of the Project which must be fully completed for safety reasons once construction has commenced and, hence, for which it is crucial to ensure that full financing is available at the start. For this purpose, we have disaggregated the capex into three categories, shown in Table 5 and Figure 2 below, as follows:

1. **Safety critical** includes the civil works (dam and underground works) once river diversion has occurred in 2016, existing and new hydro-mechanical equipment and transmission lines.

2. **Electromechanical** includes the permanent equipment that is not safety critical, that is, the electromechanical equipment.

3. **Other** comprises all the capex elements that do not fall into either of the above categories, that is, civil works pre-2016, administration and engineering, infrastructure replacement and resettlement costs.

The O&M cost assumptions, taken from the Economic Analysis, are presented in Table 6 and Figure 2 below.

Table 4: Capex breakdown

USD mn	Civil works	Permanent equipment	Administration and engineering	Infrastructure replacement & resettlement	Total
2014	104	-	7	32	**143**
2015	176	54	12	33	**274**
2016	251	91	14	34	**391**
2017	330	122	19	23	**494**
2018	450	145	22	23	**642**
2019	537	163	25	24	**749**
2020	469	199	26	24	**719**
2021	399	84	26	28	**537**
2022	326	95	24	39	**483**
2023	249	112	22	40	**423**
2024	212	173	20	41	**444**
2025	173	-	17	46	**236**
2026	132	-	15	42	**189**
2027	90	-	12	49	**150**
Total	**3,898**	**1,237**	**261**	**479**	**5,875**

Source: Coyne et Bellier, ELC, and IPA assumptions.

Table 5: Capex breakdown for financial modelling

USD mn	Safety critical	Electromechanical	Other	Total
2014	-	-	143	**143**
2015	-	54	221	**274**
2016	288	55	48	**391**
2017	348	105	42	**494**
2018	488	108	46	**642**
2019	588	112	49	**748**
2020	514	155	50	**718**
2021	436	46	55	**537**
2022	364	56	63	**483**
2023	288	74	61	**423**
2024	255	130	60	**444**
2025	173	-	63	**236**
2026	132	-	57	**189**
2027	90	-	62	**152**
Total	**3,962**	**893**	**1,019**	**5,875**

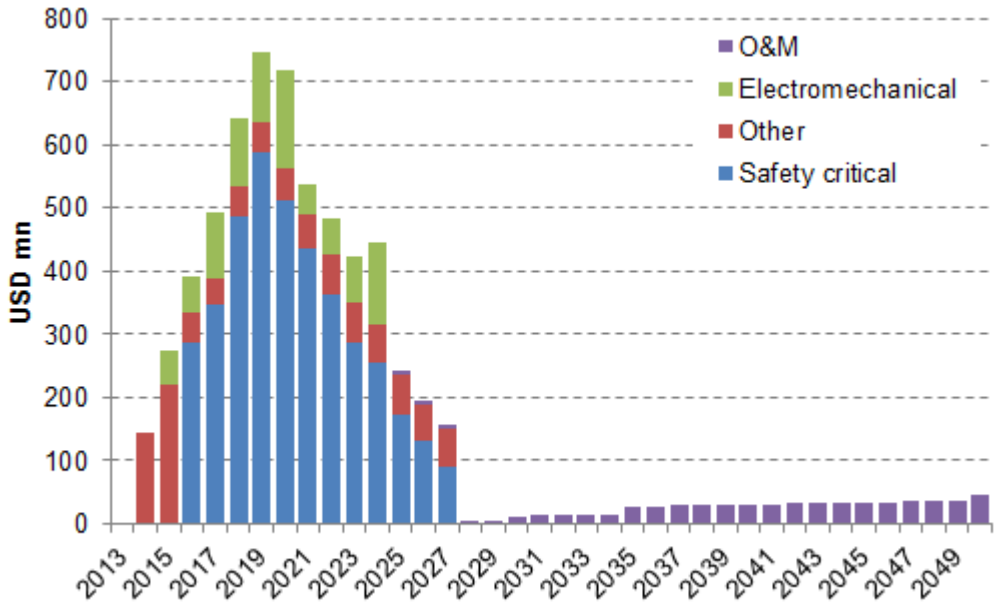
Source: Coyne et Bellier, ELC, and IPA assumptions.

Table 6: O&M costs

Year	Costs (USD mn)
2025	5.73
2026	5.84
2027	5.96
2028	6.08
2029	6.20
2030	12.65
2031	12.90
2032	13.16
2033	13.43
2034	13.69
2035	27.94
2036	28.49
2037	29.06
2038	29.65
2039	30.24
2040	30.84
2041	31.46
2042	32.09
2043	32.73
2044	33.39
2045	34.05
2046	34.73
2047	35.43
2048	36.14
2049	36.86
2050	46.61

Source: Coyne et Bellier, ELC and IPA assumptions.

Figure 2: Total costs over the Forecast Horizon



Source: Coyne et Bellier, ELC, IPA assumptions.

2.3. Revenues

Revenues from the Project are derived from electricity consumption domestically and exports to neighbouring countries. The revenues will therefore depend on how much electricity generated by the Project is consumed in Tajikistan and exported abroad, and on the electricity prices in each of these respective markets. This subsection 2.3 provides a summary of our assumptions regarding electricity generation from the Project, electricity prices and revenues in Tajikistan and the export markets.

2.3.1. Generation

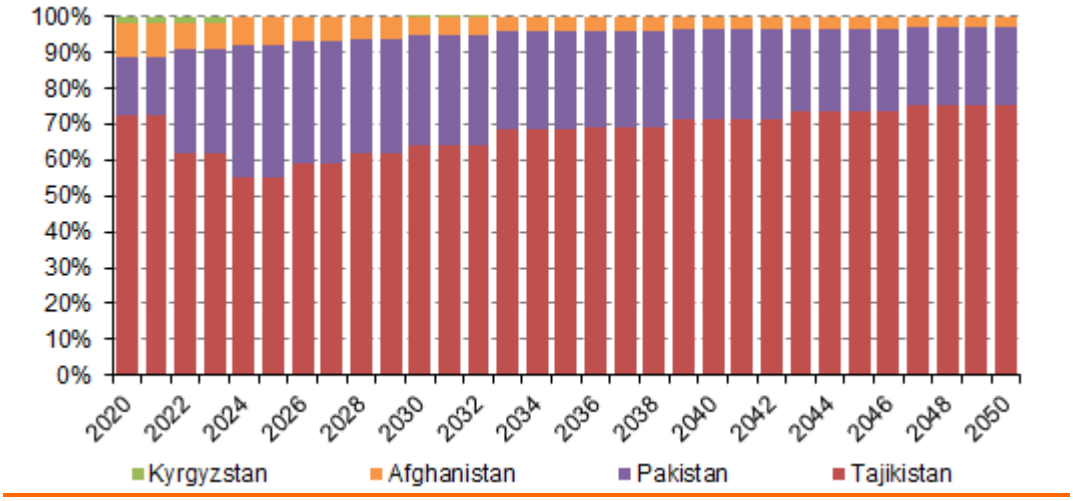
In the absence of specific contracts for the sale of electricity generated by the Project, generation attributed to each destination has been calculated *pro rata* with the share of total generation in Tajikistan, as also assumed in the Economic Analysis. Based on the Reference Case, the split is shown in Table 7 and Figure 3 below. As can be seen, the majority of the Project's generation is assumed to be consumed domestically, with approximately 30% exported mainly to Pakistan.

Table 7: Sales of electricity generated by the Project by country

GWh	Tajikistan	Kyrgyzstan	Afghanistan	Pakistan	Total exports	Total
2020	957	27	119	218	363	**1,320**
2021	957	27	119	218	363	**1,320**
2022	2,316	59	289	1,089	1,437	**3,753**
2023	2,316	59	289	1,089	1,437	**3,753**
2024	4,522	-	627	3,018	3,645	**8,166**
2025	4,522	-	627	3,018	3,645	**8,166**
2026	5,649	-	642	3,297	3,939	**9,588**
2027	5,649	-	642	3,297	3,939	**9,588**
2028	6,971	-	717	3,560	4,277	**11,247**
2029	6,971	-	717	3,560	4,277	**11,247**
2030	8,317	26	648	3,942	4,616	**12,933**
2031	8,317	26	648	3,942	4,616	**12,933**
2032	8,317	26	648	3,942	4,616	**12,933**
2033	9,739	-	561	3,943	4,504	**14,243**
2034	9,739	-	561	3,943	4,504	**14,243**
2035	9,739	-	561	3,943	4,504	**14,243**
2036	9,875	-	536	3,825	4,361	**14,236**
2037	9,875	-	536	3,825	4,361	**14,236**
2038	9,875	-	536	3,825	4,361	**14,236**
2039	10,126	-	506	3,597	4,103	**14,229**
2040	10,126	-	506	3,597	4,103	**14,229**
2041	10,126	-	506	3,597	4,103	**14,229**
2042	10,126	-	506	3,597	4,103	**14,229**
2043	10,453	-	462	3,303	3,765	**14,219**
2044	10,453	-	462	3,303	3,765	**14,219**
2045	10,453	-	462	3,303	3,765	**14,219**
2046	10,453	-	462	3,303	3,765	**14,219**
2047	10,726	-	424	3,058	3,482	**14,208**
2048	10,726	-	424	3,058	3,482	**14,208**
2049	10,726	-	424	3,058	3,482	**14,208**
2050	10,726	-	424	3,058	3,482	**14,208**

Source: IPA analysis.

Figure 3: Share of electricity generated by the Project by country



Source: IPA analysis.

2.3.2. Electricity prices

For the prices of these electricity sales in Tajikistan, we have used tariff rates estimated as being necessary to help alleviate the issue of winter electricity shortages. End-user tariffs are assumed to increase from 2.25US¢/kWh to 9US¢/kWh (in real 2012 terms) between 2014 and 2025, of which 1.5US¢/kWh is attributed to transmission and distribution costs. Thus a real cost of 75USD/MWh from 2025 has been used for the domestic sales of electricity from Rogun.

For the export sales to neighbouring countries, we have assumed that the importers secure electricity at a 50% discount to the electricity prices resulting from the Reference Case[2] as part of sales negotiations.

These assumptions are identical to the "Tariffs" sensitivity undertaken in the Economic Analysis. The realised electricity prices are shown in Table 8 and Figure 4 below. The resultant assumed export prices are thus much lower than the Tajikistan tariff level.

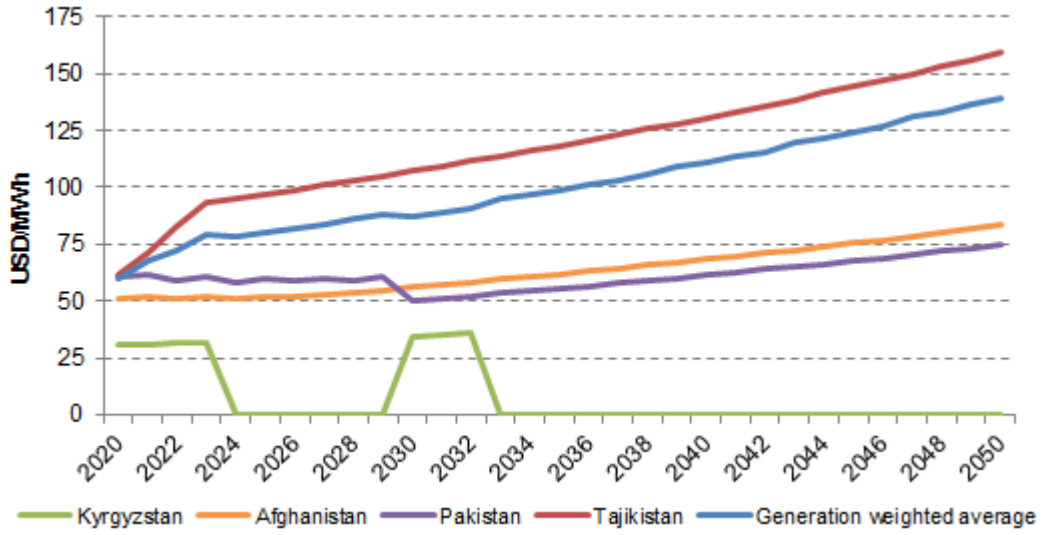
[2] The prices from the Economic Analysis are based on the shadow value of electricity in each of the export markets.

Table 8: Realised electricity price assumptions by country

USD/MWh	Tajikistan	Kyrgyzstan	Afghanistan	Pakistan	Generation weighted-average price
2020	61.53	30.45	51.10	60.52	59.80
2021	71.73	31.06	52.12	61.73	67.50
2022	82.31	31.28	50.95	59.38	72.43
2023	93.28	31.90	51.97	60.57	79.64
2024	95.15	-	50.81	58.29	78.12
2025	97.05	-	51.83	59.46	79.69
2026	98.99	-	51.77	58.73	81.98
2027	100.97	-	52.81	59.91	83.62
2028	102.99	-	53.86	59.14	85.98
2029	105.05	-	54.94	60.33	87.70
2030	107.15	34.71	56.04	49.98	87.02
2031	109.29	35.40	57.16	50.97	88.76
2032	111.48	36.11	58.30	51.99	90.53
2033	113.71	-	59.47	53.24	94.83
2034	115.98	-	60.66	54.3	96.73
2035	118.30	-	61.87	55.39	98.66
2036	120.67	-	63.11	56.75	101.33
2037	123.08	-	64.37	57.88	103.35
2038	125.54	-	65.66	59.04	105.42
2039	128.05	-	66.97	60.25	108.74
2040	130.61	-	68.31	61.46	110.92
2041	133.23	-	69.68	62.69	113.14
2042	135.89	-	71.07	63.94	115.40
2043	138.61	-	72.49	65.09	119.38
2044	141.38	-	73.94	66.4	121.77
2045	144.21	-	75.42	67.72	124.21
2046	147.09	-	76.93	69.08	126.69
2047	150.03	-	78.47	70.41	130.76
2048	153.04	-	80.04	71.81	133.38
2049	156.10	-	81.64	73.25	136.05
2050	159.22	-	83.27	74.72	138.77

Source: IPA analysis and assumptions.

Figure 4: Realised electricity price assumptions by country



Source: IPA analysis and assumptions.

2.3.3. Revenues

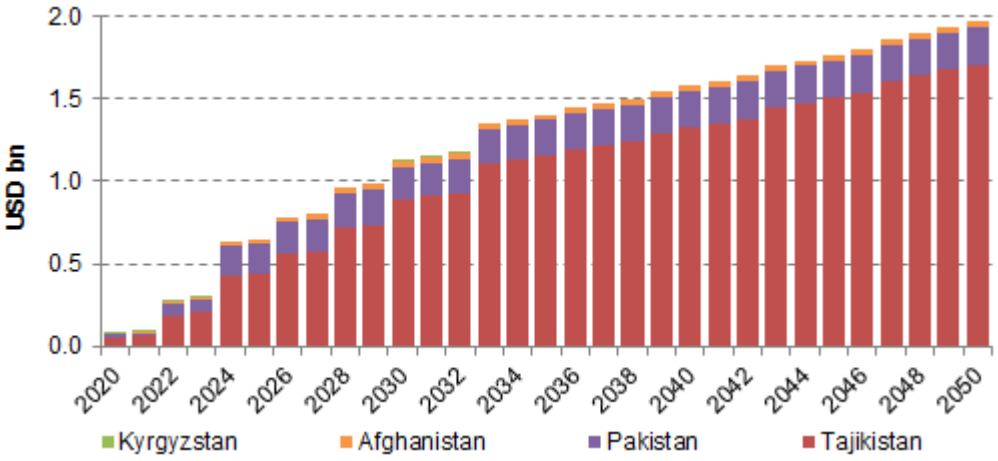
Using the generation split and respective prices in each country as described above, total revenues for the Project are presented in Figure 5 and Table 9 below. With the majority of generation sold domestically at considerably higher prices, over 80% of the total revenues are forecast to be derived in Tajikistan.

Table 9: Revenues from electricity generated by the Project by country

USD mn	Tajikistan	Kyrgyzstan	Afghanistan	Pakistan	Total exports	Total
2020	59	1	6	13	20	**79**
2021	69	1	6	13	20	**89**
2022	191	2	15	65	81	**272**
2023	216	2	15	66	83	**299**
2024	430	-	32	176	208	**638**
2025	439	-	32	179	212	**651**
2026	559	-	33	194	227	**786**
2027	570	-	34	197	231	**802**
2028	718	-	39	211	249	**967**
2029	732	-	39	215	254	**986**
2030	891	1	36	197	234	**1,125**
2031	909	1	37	201	239	**1,148**
2032	927	1	38	205	244	**1,171**
2033	1,107	-	33	210	243	**1,351**
2034	1,130	-	34	214	248	**1,378**
2035	1,152	-	35	218	253	**1,405**
2036	1,192	-	34	217	251	**1,442**
2037	1,215	-	35	221	256	**1,471**
2038	1,240	-	35	226	261	**1,501**
2039	1,297	-	34	217	251	**1,547**
2040	1,323	-	35	221	256	**1,578**
2041	1,349	-	35	225	261	**1,610**
2042	1,376	-	36	230	266	**1,642**
2043	1,449	-	34	215	249	**1,697**
2044	1,478	-	34	219	253	**1,731**
2045	1,507	-	35	224	259	**1,766**
2046	1,538	-	36	228	264	**1,801**
2047	1,609	-	33	215	249	**1,858**
2048	1,642	-	34	220	254	**1,895**
2049	1,674	-	35	224	259	**1,933**
2050	1,708	-	35	228	264	**1,972**

Source: IPA analysis.

Figure 5: Revenues from electricity generated by the Project by country



Source: IPA analysis.

3. FINANCIAL ASSUMPTIONS

This Section 3 presents our Base Case financial assumptions. Subsection 3.1 presents a summary of our background research regarding potential sources of funding for the Project. Subsection 3.2 presents our assumptions regarding the different sources of funding. Subsection 3.3 describes the four financing structures proposed for the financial evaluation of the Project, whilst subsection 3.4 describes our financial cost assumptions.

3.1. Potential sources of funding

A review of recent large national dam projects and their financial structures, presented in Table 10 below, shows several possible sources of funding for the Project:

1. Domestic equity;
2. Government bond;
3. Commercial loan;
4. Multilateral bank loan;
5. Foreign government loan; and
6. Foreign utilities (equity).

Our review suggests that there is a general requirement for domestic funding to provide a significant proportion of overall financing. Within the domestic financing framework, countries have relied on a range of public finance mechanisms, government bonds, and commercial lending. In some instances, sources of domestic funds may be opaque due to various forms of cross-subsidies or tax-funded national organisations functioning independently from government institutions. In Venezuela, for example, the national oil company indirectly financed the Caruachi dam through a utility subsidiary.

The viability of domestic financing depends on a range of factors such as the level of development of local capital markets, political capacity to cross-subsidise the electricity sector, and attractiveness of government bond yields. The borrowing capacity of large dam projects can also be a function of their economic and risk parameters, so projects that can secure long-term Power Purchase Agreements ("PPAs") are much more likely to obtain external finance.

The Government of Tajikistan ("GoT") is therefore likely to be the main source of funding for the Project as capital markets are not sufficiently developed for substantial domestic private sector participation. The GoT will need to rely on public financing mechanisms funded by taxes, surcharges or credit lines.

Information on GoT lending is limited, chiefly because the government bond market is not well developed. While the available information on short-term GoT lending rates cannot accurately reflect future Project borrowing costs, we can add a long-term bond

premium to publicly available short-term lending rates to private investors such as, for example, a short-term risk-free rate of 3% plus a risk premium of 20%, and a duration premium of 2%[3].

Multilateral institutions have occasionally financed large dam projects. One of these few cases is the Diamer-Bhasha dam in Pakistan for which the Islamic Development Bank ("IDB") reportedly pledged 1.5 USD billion ("bn"), alongside several other multilaterals and development funds. The Government of Pakistan securitised assets of several other dams to secure funds from the international community in addition to directly paying off accumulated debt that had accrued due to non-payments and theft. A valuable contribution to large dam financing by multilaterals is in the provision of insurance and loan guarantees. This can enhance the funding prospects of a borrower by enabling longer tenor terms, larger principal amounts, and lower interest rates.

Multilateral institutions could therefore be one source of funding for the Project, particularly those with existing mandates or investments in Tajikistan, such as the IDB or the European Bank for Reconstruction and Development ("EBRD"). However, to date, there have only been few cases of significant financial contributions by multilateral institutions to large dams and there has been no recent occurrence of any multilateral financing for large-scale infrastructure projects in Tajikistan.

There are numerous reasons for the limited role of multilaterals in large dam finance including the potential social costs, construction cost risks, frequent political implications, and competition for funds from more common, smaller dams.

In addition to multilateral funding, funding from foreign institutional banks and governments could be available and has been an important catalyst of industrial development in Tajikistan in recent years. Inter RAO, Russia's largest utility, is a 75% shareholder in the Sangtuda 1 hydroelectric dam. Similarly, Iran receives the revenues from Sangtuda 2 hydroelectric dam in exchange for capex finance, with Tajikistan becoming the main beneficiary of these revenues only later, when Iran transfers the operation of the project back to the GoT. Moreover, Chinese institutions are active lenders in the global hydropower industry, often lending at very low interest rates of less than 1%. Chinese loans, for example, have contributed 40%, 45% and 16% towards Tajik capex financing in 2010, 2011 and 2012 respectively. Concessional interest rates could be offered in exchange for revenues from the Project over a given period of time. However, although credit-export agencies such as China Export-Import Bank could contribute towards financing the Project, they are unlikely to offer the majority of funding. Furthermore, these concessional loans often have hidden costs with borrowers having to fulfil a set of criteria, such as, for example, the use of Chinese equipment in construction, or direct export income transfers to the lenders.

[3] Source: *Risk Premium on Lending* from the IMF, International Financial Statistics database, World Development Indicators (http://data.worldbank.org/indicator/FR.INR.RISK/countries/).

Table 10: National interest dams

Dam	Country	Capacity (MW)	Height (Metres)	Cost (USD bn)	Financing
Sangtuda 1	Tajikistan	670	75	0.72	Russia (Inter RAO): 75%; Government of Tajikistan ("GoT") 25%. GoT purchases electricity from Sangtuda 1.
Sangtuda 2	Tajikistan	220	32	0.22	Iran: 80%; GoT: 20%. GoT purchases electricity from Sangtuda 2.
Belo Monte	Brazil	11,233	-	15.5	Brazilian National Development Bank: 80%; Norte Energia consortium: 20%.
Tucuruí	Brazil	8,370	78	-	Eletronorte, Eletrobrás, Banco Nacional de Habitação, Banco do Brasil, Caixa Econômica Federal, and Banco Nacional do Desenvolvimento Finame; American and Canadian institutions, to a lesser extent.
Three Gorges	China	18,200	186	22.5	China Development Bank Three Gorges Construction Fund; domestic and foreign commercial banks; dam revenues; profits from other dams; corporate bonds; surcharge
Grand Renaissance	Ethiopia	6,000	145	4.8	3USD bn Ethiopian Government and bonds subscribed by public officers and state-owned banks.
Gibe III	Ethiopia	1,870	250	2.0	Ethiopian Government: 75% (1.5USD bn); China Export-Import Bank: 25% ($0.5bn)
Kaleta	Guinea	240.5	-	0.526	The Government of Guinea: 25%; China International Water & Electric Corporation: 75%.
Xayaburi	Laos	1,285	33	3.8	Several major Thai banks.
Nam Theun 2	Laos	1,075	39	1.3	Electricité de France International: 40%; Electricity Generating Company of Thailand: 35%; Lao Holding State Enterprise: 25%.
San Roque	Philippines	345	200	1.19	Marubeni: 42.45% of the stocks of the company; Kansai Electric: 7.5%; and Sithe Energies: 50.05%.
Merowe	Sudan	1,250	-	1.8	China Export Import Bank; Arab financiers.
Caruachi	Venezuela	2,160	55	1.4-2.1	Edelca (Venezuelan utility): 58%; Andean regional multilateral bank: 23%; American Development Bank: 19%; very small portion by commercial banks.
Son La Dam	Vietnam	3,600	177	3.6	Domestic: 70%; external: 30%.

Source: IPA research.

3.2. Sources of funding

Table 11 below summarises the assumptions regarding the cost and drawdown and repayment schedule of the different sources of funding considered in this financial analysis.

Table 11: Funding assumptions by source

Item	Units	Source of funding			
		Bond	Preferential loan	Multilateral loan	Commercial loan
Cost of funding					
LIBOR[1]	%/year	-	3.30%	3.30%	3.30%
Premium	%/year	-	1.70%	1.30%	9.00%
Coupon / interest rate	%/year	10%	5.00%	4.60%	12.30%
Upfront fee	%	-	0.50%	0.25%	1.50%
Commitment fee	%/year	-	0.50%	0.25%	1.50%
Drawdown and repayment schedule					
First year available	-	2020	2015	2015	2020
Bond duration / loan tenor	years	25	25	20	15
First year of coupon/ interest repayment	-	2020	2025	2025	2025
Maturity	-	2044	2039	2034	2034

[1]: London Interbank Offered Rate ("LIBOR"). Approximate rate of 20-year maturity USD interest rate swaps (http://markets.ft.com/RESEARCH/markets/DataArchiveFetchReport?Category=BR&Type=ICAP&Date=05/01/2014).

Source: Client; IPA assumptions.

- **Equity**: As explained further in subsection 4.3 below, 100% of the minimum of net income and cash flow remaining after the set asides for bond repayment and Project decommissioning are paid out as dividends. We assume that dividends are only paid from 2028, once Project construction has finished.
- **Bond**: 10% coupon on the bond. The bond is first made available in 2020, when the Project first becomes operational, so that coupon payments can be made partly from net revenues from early generation.
- **Multilateral loan**: 4.6% interest rate on the multilateral loan. This is the sum of 3.3%, the USD swap rate for an average 20-year maturity, and a risk premium of 1.3%. We also assume an upfront fee and commitment fee of 0.25% of the total loan available respectively.
- **Preferential loan**: 5.0% interest rate on the preferential loan and front-end and commitment fees of 0.5% respectively. This loan is envisages the participation of a friendly foreign government with a strategic interest in the Project who would be prepared to offer preferential terms for a loan.
- **Commercial loan**: 12.3% interest rate on the commercial loan, which represents a country risk premium of 6.0% and a Project risk premium of 3.0%.

As explained in more detail in subsection 4.2 below, the upfront fees are payable in the year prior to the loan first being made available and are made regardless of the debt drawdown schedule. The commitment fees are paid by the Project to the lenders in order

to keep the loan available during the development of the Project, and are based on the level of debt still available for drawdown.

Finally, we assume that loans are only repaid from 2025, when the Project reaches full capacity. This implies a grace period of 10 years for the preferential and multilateral loans, and of 5 years for the commercial loan. For this analysis, we have assumed a constant annual debt repayment (split appropriately between principal and interest) with no profiling to meet the target Debt Service Coverage Ratio ("DSCR").

3.3. Financing structures

Four financing structures are proposed for the Financial Analysis of the preferred dam option for the Project. These suggested options have been derived with a condition on cash flows remaining positive, a DSCR above 1.25 when applicable, and a ratio of debt to total external funding no higher than 90%. The drawdown of each source of funding is explained in subsection 4.1 below.

In all financing structures, net revenues from early generation while construction is ongoing are assumed to contribute towards the funding of the Project. As detailed in Table 9 above, these are forecast to total almost 3.6USD billon net of operating costs. The foreign currency earned from net exports could be particularly useful in financing the capex.

3.3.1. Full Self-Financing

Under this first financing structure ("Full Self-Financing" or "FS1"), the capital requirements will be fully funded through equity from the GoT.

The financing structure reflects the minimum amount of equity financing that the GoT needs in order to generate a positive cash flow throughout the Forecast Horizon without any debt.

3.3.2. Preferential Loan

This financing structure ("Preferential Loan" or "FS2") envisages a friendly foreign government with a strategic interest in the Project prepared to offer preferential terms for a loan.

The financing structure reflects the maximum amount of preferential (or foreign government) loan, subject to the constraint that the level of debt be no more than 90% of total external funding which can be supported by the Project whilst maintaining a positive cash flow and a DSCR above 1.25 throughout the Forecast Horizon.

3.3.3. Multilateral and Commercial Loan

The third financing structure ("Multilateral and Commercial Loan" or "FS3") considers debt from both multilateral agencies (international financing institutions) and commercial lenders.

The financing structure reflects the maximum amount of multilateral and commercial loans, subject to the constraint that the level of debt be no more than 90% of total external

funding, which can be supported by the Project whilst maintaining a positive cash flow and a DSCR above 1.25 throughout the Forecast Horizon. We have assumed that the commercial loan may only be drawn down to meet the cost of the electromechanical equipment for the Project and cannot be used for any other elements of the capex.

3.3.4. Bond

The final financing structure ("Bond" or "FS4") examines the potential for the issuance of a hypothecated bond. In this instance, the interest (coupon) would be paid annually over the lifetime of the bond with the principal repayable on maturity. In order to provide security as to the funding of the repayment, net cash flow would be retained in the Project (as a bond set-aside). This cash flow is set aside from the year the Project reaches full operation at a constant annual rate. Since the coupon would typically be payable from the first anniversary of issuance, it is assumed that the bond would only be raised in 2020 such that early generation revenues could contribute towards the coupon payment. Equity would thus be required for the capital requirements at least up until 2019.

The financing structure reflects the minimum amount of equity funding required in combination with a bond to maintain a positive cash flow throughout the Forecast Horizon.

3.4. Financial costs

Table 12 below summarises our cost assumptions under the Base Case:

Table 12: Depreciation, tax and set asides assumptions

Item	Units	Assumption
Depreciation		
Depreciation rate	%/year	1.00%
First year for depreciation	-	2020
Tax inputs		
Income tax rate	%/year	13.00%
Bond set aside		
First year	-	2025
Bond maturity	-	2044
Decommissioning set aside		
First year	-	2025
Final year before decommissioning		2131
Decommissioning cost	USD mn	4,875

Source: Client and IPA assumptions.

- **Depreciation**: Straight-line depreciation schedule and a depreciation rate of 1.00% per annum for all physical assets as well as for commitment fees, upfront fees, and capitalised interest. Depreciation is assumed to start in 2020, when the Project first becomes operational.
- **Income tax**: The Project will be subject to an income tax rate of 13.00%. Taxes are payable from the first year pre-tax income becomes positive. We assume that there is no tax grace period and that no taxes are deferred.

- **Bond set aside**: Part of the cash flow generated by the Project is set-aside from 2025 when the Project reaches full capacity, in order to ensure full repayment of the bond in 2044, when it reaches its maturity. The annual cash flow set aside over the 19 years (from 2025 to 2044) is dependent on the size of the bond issue.

- **Decommissioning set aside**: We assume a total decommissioning cost of 500USD million in real 2013 terms at the end of the Project's 115-year lifetime in 2132, equivalent to 4,875USD mn in nominal terms. To cover this commitment, 46USD mn per year must be set aside from cash flows generated by the Project from 2025, when the Project reaches full capacity.

4. FINANCIAL MODELLING APPROACH

This Section 4 describes the methodology that we use in our Financial Analysis. In subsection 4.1, we describe the funds drawdown waterfall. Subsection 4.2 summarises how we account for financing fees and interest on loans, whilst subsection 4.3 explains how we determine dividends, bond and decommissioning set asides in our Financial Analysis.

4.1. Funds drawdown

In order to determine the amount required from each source of funding, we set up a funds drawdown waterfall, as shown in Figure 6 below. This drawdown waterfall works as follows:

1. The annual funding requirement before the drawdown from sources of funding is calculated as cash available, i.e. Earnings Before Interest, Tax, Depreciation and Amortisation ("EBITDA") less the required amount to be spent in the year in capex, principal and interest payments, upfront fees, commitment fees, and cash set aside for bond repayment.

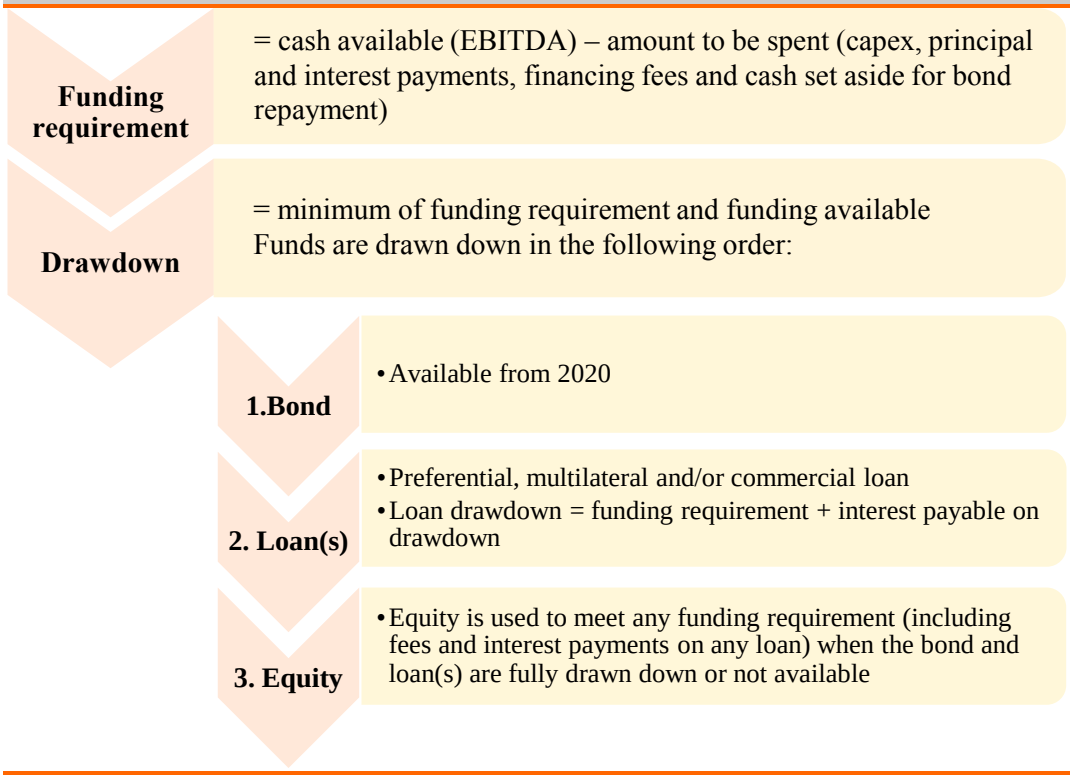
2. Once the funding requirement before the drawdown of any sources of funding is determined, we have assumed that the minimum between the funding requirement in the year and the amount of funding available from the particular source is drawn down. For the three types of loans (preferential, multilateral, and commercial), the amount drawn down in any one year is equivalent to the funding requirement in that year plus the interest payable on the amount drawn down.

3. With the drawdown waterfall, funding sources will be drawn, subject to availability, in the following order: the bond first, any loans second and equity last. For example, any equity will only be drawn down once any available bond and preferential loan funding have been fully drawn out. Note that we have assumed that the commercial loan only goes towards the funding of the electromechanical equipment.

The availability of each source of funding varies according to the funding structure, assumptions on the first and final year that the loan is expected to be available, and how much of any given source of funding has already been drawn out in previous years.

Please note that we allow any interest and principal payments, commitment and upfront fees incurred by one source of funding to be paid back using another source of funding.

Figure 6: Drawdown waterfall



Source: IPA assumptions.

4.2. Financing fees and interests

Upfront fees are payable in the year prior to the loan first being made available. Commitment fees are payable from when the loan is first available until it is fully drawn down. Interest rates are payable from the year the loan is first drawn down until the end of the loan tenor.

The financing fees and interest on loans are capitalised until the Project reaches full capacity and are depreciated from the start of the Project's operational period, as detailed in subsection 3.4 above.

4.3. Dividends, bond and decommissioning set asides

The amount of cash flow set aside for dividends, bond repayment and decommissioning is determined as follows:

1. The cash flow available before set asides and dividends is equal to the operating cash flow and funds drawn down, less the capex, principal paid, financing fees, interest and tax paid.

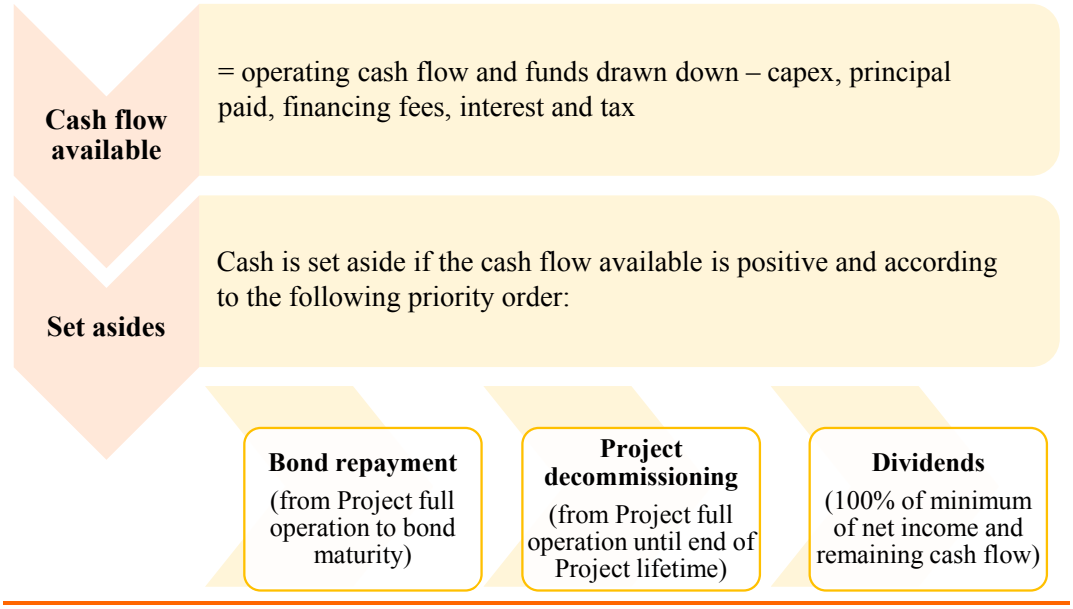
2. Cash is first set aside for bond repayment from when the Project reaches full capacity until the bond reaches maturity.

3. Then, cash is set aside for the decommissioning of the Project from when the Project reaches full capacity until the end of its lifetime, and only if the cash flow that is available after the set aside for bond repayment is positive. Shortfalls in the decommissioning fund from the initial years are made up in subsequent years as cash is available.

4. Finally, dividends are paid out at a value equal to 100% of the minimum of net income and of the cash flow remaining after the set asides for bond repayment and Project decommissioning.

This hierarchy of cash flow is illustrated in Figure 7 below.

Figure 7: Dividends, bond and decommissioning set asides



Source: IPA assumptions.

4.4. Output metrics

For each of the financing structures, we have calculated the Financial Internal Rates of Return ("FIRR"), Net Present Value ("NPV"), and expected payback period at both a total project and equity level.

The net cash flows from which we estimate the Project FIRR, NPV and payback periods are based on capex, set aside for decommissioning, EBITDA, and taxes paid. In addition, we have included the post-2050 value of the Project to the end of its life in an identical manner as in the Economic Analysis: assuming that the net cash flow in 2050 drops linearly to zero in 2131 to account for the fact that increasing sedimentation will reduce the output from the Project towards the end of its life. (In reality, sedimentation will be more gradual and significant only in the last few years, so this provides a conservative estimate of the Project's value.) The net cash flows from which we estimate the Equity FIRR, NPV and payback periods are based on equity drawdown and dividends paid, and also include assumed post-2050 value calculated as above.

For the NPV and discounted payback period calculations, we have used an indicative post-tax nominal Weighted Average Cost of Capital ("WACC") of 10% for all funding structures. (This 10% discount rate is not the same as the *pre-tax real* 10% opportunity cost of capital used in our Economic Analysis.)

5. BASE CASE RESULTS

In this Section 5, we present the results of our Financial Analysis for each of the four financing structures under the Base Case. These results include the estimated Project and Equity returns and a breakdown of the resulting sources and uses of funds across each of the four financing structures.

5.1. Sources of funds

Table 13 and Table 14 below provide the breakdown of sources of funds under each of the four financing structures for the construction period and full operation of the Project respectively. The construction period extends from 2014 until 2027, the last year in which capex payments are made, whilst the full operation period extends from 2028 until 2050, the end of the Forecast Horizon.

Table 13: Sources and uses of funds during construction (2014-2027)

USD mn	FS1	FS2	FS3	FS4
Sources				
Operating revenues	3,615	3,615	3,615	3,615
Equity	4,190	596	600	2,794
Bond	-	-	-	2,350
Preferential loan	-	5,199	-	-
Multilateral bank loan	-	-	4,700	-
Commercial loan	-	-	525	-
Total sources	**7,805**	**9,410**	**9,440**	**8,759**
Uses				
Project cost				
Construction costs	5,875	5,875	5,875	5,875
Operating costs	18	18	18	18
Tax	417	303	297	222
Bond				
Coupon	-	-	-	1,880
Set aside	-	-	-	371
Loan A	-	**Preferential**	**Multilateral**	-
Capitalised interest & fees	-	1,731	1,416	-
Principal	-	343	466	-
Interest	-	763	628	-
Loan B	-	-	**Commercial**	-
Capitalised interest & fees	-	-	273	-
Principal	-	-	47	-
Interest	-	-	189	-
Decommissioning fund	**137**	**137**	**137**	**137**
Free cash	**1,359**	**241**	**97**	**257**
Total uses	**7,805**	**9,410**	**9,440**	**9,150**

Source: IPA analysis.

Table 14: Sources and uses of funds during operation (2028-2050)

USD mn	FS1	FS2	FS3	FS4
Sources				
Operating revenues	34,977	34,977	34,977	34,977
Total sources	**34,977**	**34,977**	**34,977**	**34,977**
Uses				
Project cost				
Operating costs	608	608	608	608
Tax	4,292	3,926	4,042	3,773
Equity				
Dividends	28,726	24,633	25,698	23,482
Bond				
Coupon	-	-	-	3,995
Principal	-	-	-	2,350
Set aside	-	-	-	1,979
Loan A	**-**	**Preferential**	**Multilateral**	**-**
Principal	-	2,007	1,365	-
Interest	-	2,419	1,186	-
Loan B	**-**	**-**	**Commercial**	**-**
Principal	-	-	198	-
Interest	-	-	350	-
Decommissioning fund	**1,048**	**1,048**	**1,048**	**1,048**
Free cash	**303**	**335**	**481**	**92**
Total uses	**34,977**	**34,977**	**34,977**	**34,977**

Source: IPA analysis.

In summary:

1. **FS1**: The results suggest that with 3,615USD mn of net operating revenues, an additional 4,190USD mn of equity will be needed to fund the Project, maintaining a positive cash flow throughout the Forecast Horizon. Note that we assume that operating cash flows from 2020 go towards funding the Project. As such, the safety critical category of capex is partially covered by operating cash flows. As of 2023, the remaining equity available would not be sufficient to cover the safety critical category of capex without the operating cash flow. In order to ensure sufficient funding for the safety critical category in the event that there are no operating cash flows, an additional 727USD mn would be required between 2023 and 2027, bringing total equity to 4,917USD mn.

2. **FS2**: The Project can be funded using 5,199USD mn of preferential loan supported by 596USD mn of equity. Note that in order to ensure sufficient funding for the safety critical category in the event that there are no operating cash flows, an additional 425USD mn would be required between 2024 and 2027, bringing total equity to 1,021USD mn.

3. **FS3**: The Project can be funded using 4,700USD mn of multilateral bank loan and 525USD mn of commercial loan, supported by 600USD mn of equity. We assume that the commercial loan, available from 2020 onwards, is only used to cover the electromechanical category of capex and any interest on the loan. Note that in order to ensure sufficient funding for the safety critical category of capex in the

event that there are no operating cash flows, an additional 317USD mn would be required between 2025 and 2027, bringing total equity to 917USD mn.

4. **FS4**: Our results suggest that with operating revenues of 3,615USD mn, the Project can be funded by a combination of 2,350USD mn of bond and 2,794USD mn of equity. The bond raising is limited by the need to set aside a fixed amount annually from 2025 for the repayment of the principal in 2044. Note that in order to ensure sufficient funding for the safety critical category of capex in the event that there are no operating cash flows, an additional 459USD mn would be required between 2024 and 2027, bringing total equity to 3,253USD mn.

5.2. Returns by financing structure

Table 15 below presents the resulting Project and Equity FIRR, NPVs, and expected payback periods for each of the financing structures described in subsection 3.3 above.

Table 15: Returns by financing structure

Item	Units	FS1	FS2	FS3	FS4
External funding					
Equity	USD mn	4,190	596	600	2,794
Bond	USD mn	-	-	-	2,350
Preferential loan	USD mn	-	5,199	-	-
Multilateral bank loan	USD mn	-	-	4,700	-
Commercial loan	USD mn	-	-	525	-
Total	**USD mn**	**4,190**	**5,795**	**5,825**	**5,144**
Project					
FIRR	**%**	11.88%	12.07%	12.05%	12.17%
NPV	USD mn	908	999	989	1,042
Payback					
Nominal	years	18	18	18	18
Discounted	years	30	29	29	28
Equity					
FIRR	**%**	10.97%	22.25%	22.52%	11.18%
NPV	USD mn	478	2,082	2,156	488
Payback					
Nominal	years	19	16	16	19
Discounted	years	36	17	18	36

Source: IPA analysis.

Note that, as explained in subsection 3.3 above, the levels of debt, bond and equity in each of the financing structures are constrained by the following conditions:

1. Annual cash flow must be positive,

2. The annual DSCR, when applicable, must be above 1.25, and

3. The ratio of debt to total funding must be no higher than 90%.

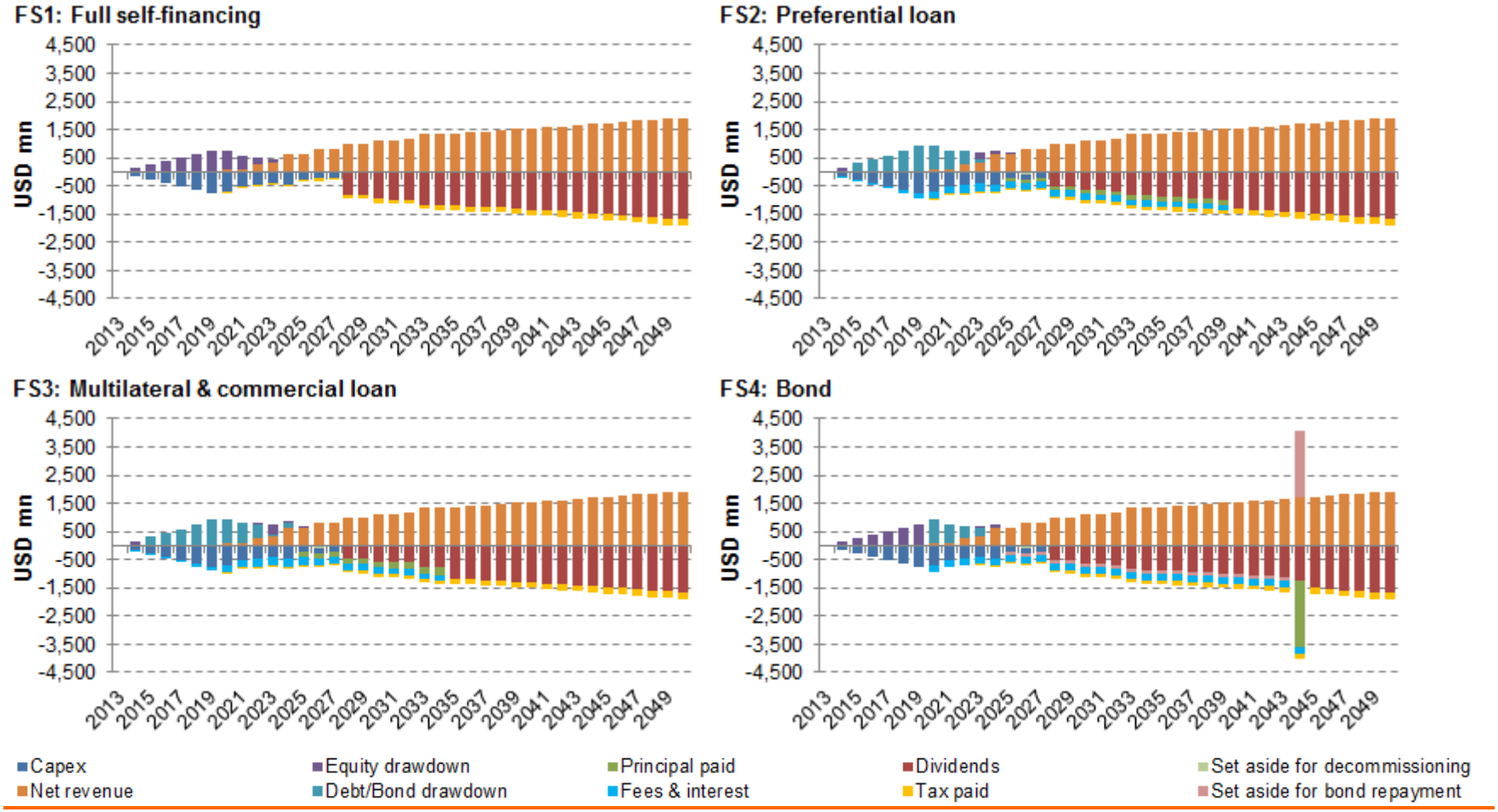
As we can see from Table 15 above, the Project FIRR is estimated at above 10% under all four financing structures. The Project FIRR increases as debt is added into the funding

mix as a result of the tax shield provided by interest payments. The Equity FIRR under FS1 and FS4 is lower than the Project FIRR due to the deferral of dividend payments until 2028, i.e. cash is retained in the Project. With the two loan structures, FS2 and FS3, our results suggest that the Project can support a ratio of debt to total funding of close to 90% at the assumed costs of each loan – subject to these levels actually being available. As a result, the amount of equity required is much reduced and only drawn down at the start and end of construction, thus giving very high Equity FIRRs and very short payback periods.

5.3. Cash flow and debt service profiles

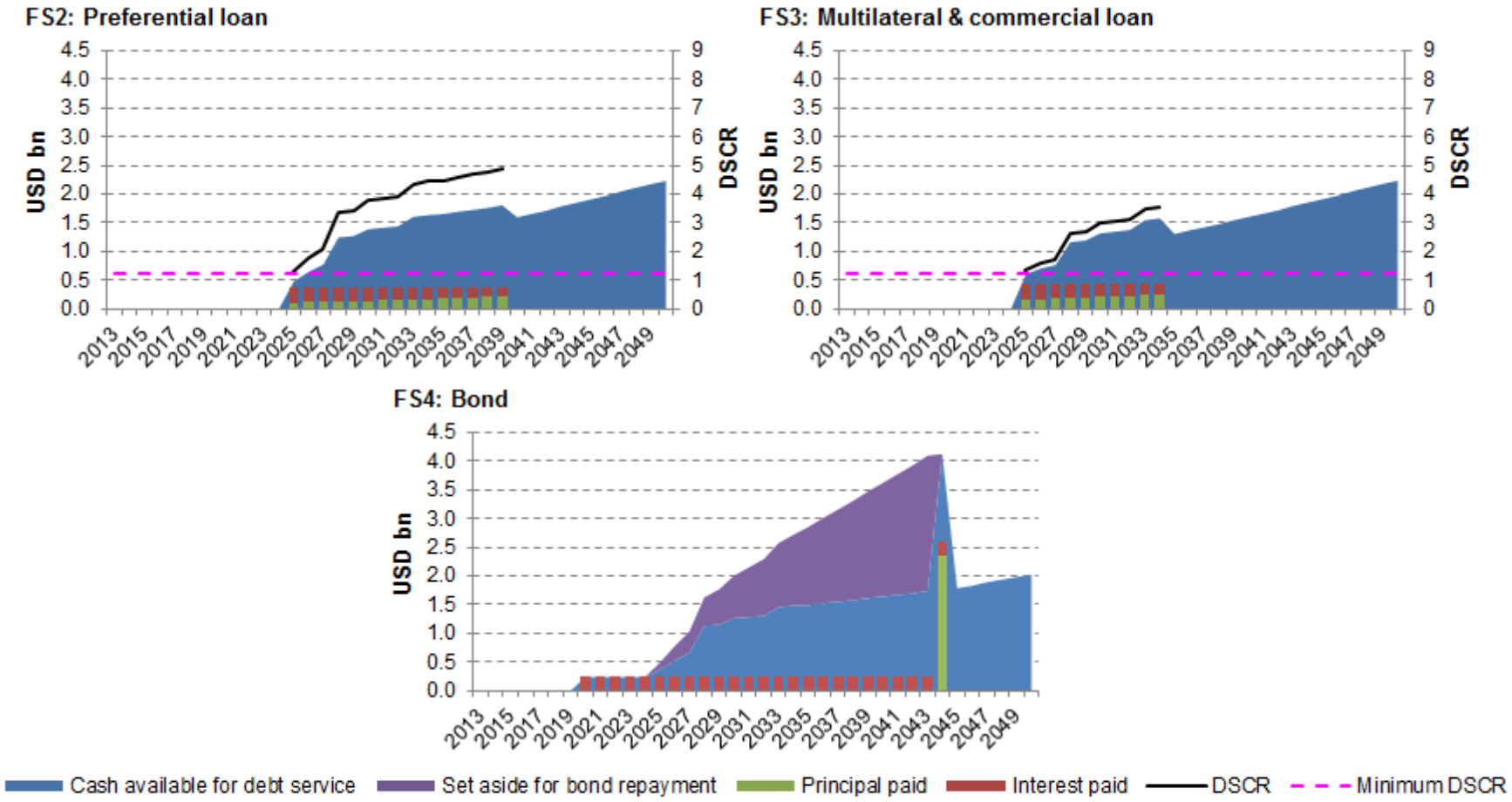
Figure 8 and Figure 9 below respectively show the resulting cash flow profiles and debt service for each of the financing structures under the Base Case, with the detailed results given in Annex A.

Figure 8: Cash flow profile by financing structure



Source: IPA analysis. (Data in Table 19, Table 20, Table 21 and Table 22 in Annex A.)

Figure 9: Debt service by financing structure



Source: IPA analysis.

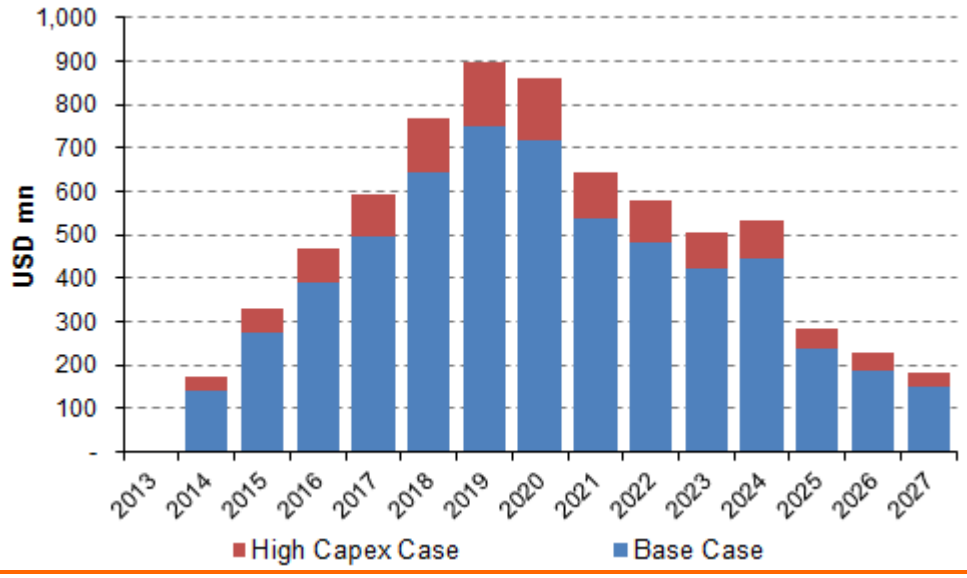
6. SENSITIVITY ANALYSIS

In this Section 6, we examine the impact of an increase in capex due to construction overruns on the results of our Financial Analysis ("High Capex Case"). The assumptions for this sensitivity are presented in subsection 6.1. The resulting Project and Equity returns and the breakdown of the resulting sources and uses of funds for each of the four financing structures are presented in subsection 6.2.

6.1. Assumptions

In the High Capex Case, we assume that capex is 20% higher than under the Base Case, increasing from a total of 5,875USD mn to 7,050USD mn. The capex is assumed to be increased uniformly across every category and over time with the difference in resulting annual capex between the Base Case and High Capex Case shown in Figure 10 below.

Figure 10: Project capex under the Base Case and High Capex Case



Source: Coyne et Bellier, ELC, IPA analysis and assumptions.

6.2. Results

This subsection 6.2 presents the resulting Project and Equity FIRR, NPV, and expected payback period and the breakdown of sources of funds under each of the four financing structures under the High Capex Case.

The external funding required and the resulting Project and Equity FIRR, NPVs, and expected payback periods are summarised in Table 16 below.

Table 16: Returns by financing structure – High Capex Case

Item	Units	FS1	FS2	FS3	FS4
External funding					
Equity	USD mn	5,156	744	767	3,901
Bond	USD mn	-	-	-	2,326
Preferential loan	USD mn	-	6,662	-	-
Multilateral bank loan	USD mn	-		6,098	-
Commercial loan	USD mn	-		631	-
Total	**USD mn**	**5,156**	**7,406**	**7,496**	**6,227**
Project					
FIRR	**%**	10.54%	10.75%	10.73%	10.78%
NPV	USD mn	292	409	399	423
Payback					
Nominal	years	19	19	19	19
Discounted	years	37	37	37	37
Equity					
FIRR	**%**	9.81%	20.30%	20.43%	9.82%
NPV	USD mn	(105)	1,839	1,899	(83)
Payback					
Nominal	years	20	17	17	21
Discounted	years	38	19	20	38

Source: IPA analysis.

Higher levels of equity are required than under the Base Case for all four financing structures. The additional amount required varies between around 100USD mn and 1,200USD mn depending on the funding structure. Under FS4, the higher capex funding requirement limits the amount of cash available to set aside for the bond repayment and hence reduces the total size of the bond which can be raised compared to the Base Case. Consequently, in all cases, the FIRRs are reduced by between 1.3 and 2.1 percentage points, and the payback periods are extended. Note that the Equity FIRR is marginally below the 10% indicative WACC under FS1 and FS4, hence the negative Equity NPVs.

Table 17 and Table 18 below provide the breakdown of sources of funds under each of the four financing structures for the construction period and full operation of the Project respectively. Figure 11 and Figure 12 below respectively show the resulting cash flow profiles and debt service for each of the financing structures under the High Capex Case, respectively.

Table 17: Sources and uses of funds during construction (2014-2027) – High Capex Case

USD mn	FS1	FS2	FS3	FS4
Sources				
Operating revenues	3,615	3,615	3,615	3,615
Equity	5,156	744	767	3,901
Bond	-	-	-	2,326
Preferential loan	-	6,662	-	-
Multilateral bank loan	-		6,098	-
Commercial loan	-		631	-
Total sources	**8,771**	**11,021**	**11,111**	**9,843**
Uses				
Project cost				
Construction costs	7,050	7,050	7,050	7,050
Operating costs	18	18	18	18
Tax	407	261	254	217
Bond	-	-	-	
Coupon	-	-	-	1,861
Set aside	-	-	-	367
Loan A	-	**Preferential**	**Multilateral**	-
Capitalised interest & fees	-	2,150	1,761	-
Principal	-	440	604	-
Interest	-	978	815	-
Loan B	-	-	**Commercial**	-
Capitalised interest & fees	-	-	327	-
Principal	-	-	56	-
Interest	-	-	226	-
Decommissioning fund	**137**	**125**	**-**	**137**
Free cash	**1,161**	**-**	**-**	**194**
Total uses	**8,771**	**11,021**	**11,111**	**9,843**

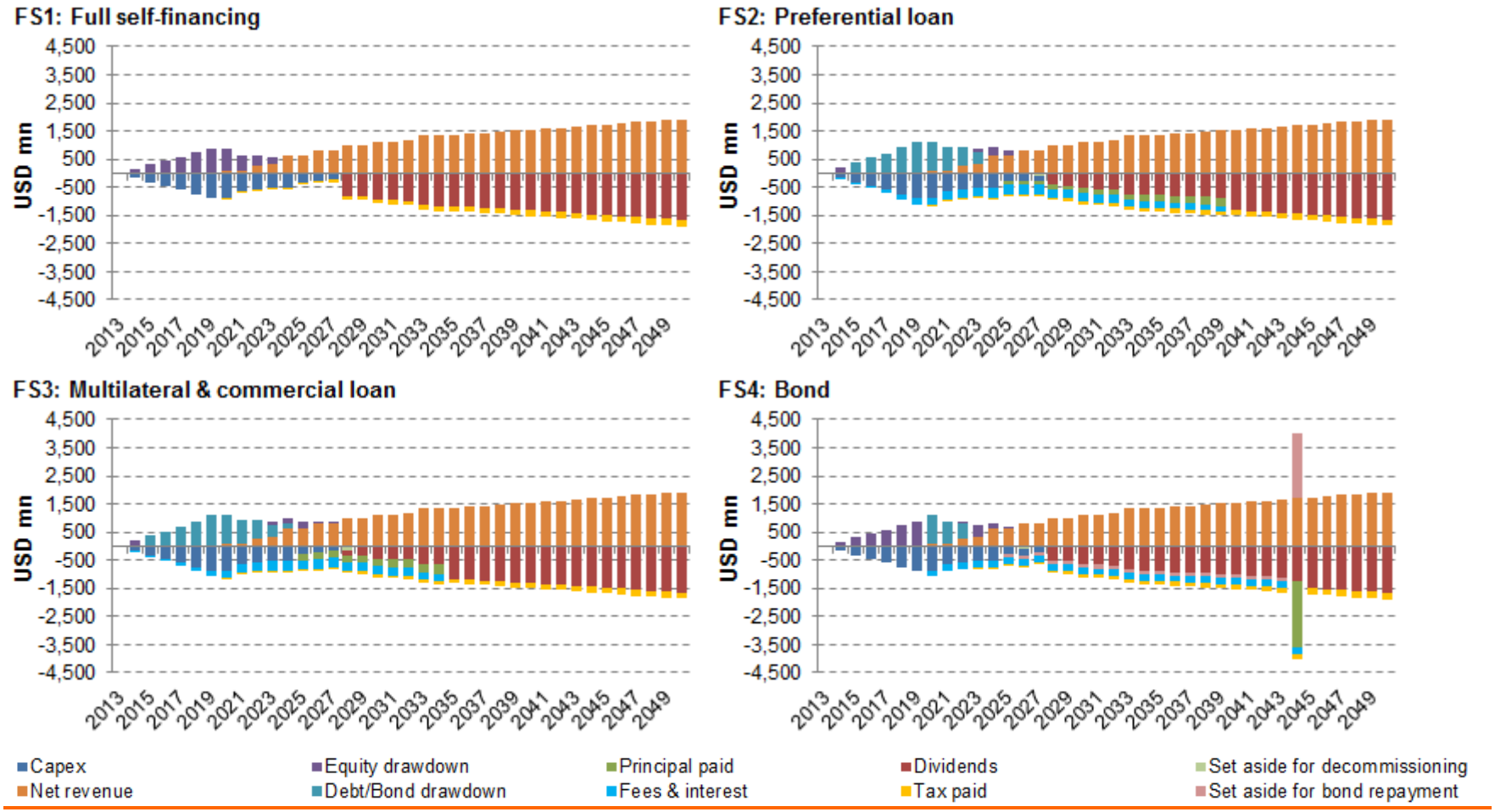
Source: IPA analysis.

Table 18: Sources and uses of funds during operation (2028-2050) – High Capex Case

USD mn	FS1	FS2	FS3	FS4
Sources				
Operating revenues	34,977	34,977	34,977	34,977
Total sources	**34,977**	**34,977**	**34,977**	**34,977**
Uses				
Project cost				
Operating costs	608	608	608	608
Tax	4,257	3,790	3,940	3,743
Equity				
Dividends	28,490	23,336	24,543	23,490
Bond	**-**	**-**	**-**	
Principal	-	-	-	2,326
Coupon	-	-	-	3,955
Set aside	-	-	-	1,959
Loan A	**-**	**Preferential**	**Multilateral**	**-**
Principal	-	2,572	1,771	-
Interest	-	3,100	1,539	-
Loan B	**-**	**-**	**Commercial**	**-**
Principal	-	-	238	-
Interest	-	-	420	-
Decommissioning fund	**1,048**	**1,060**	**1,185**	**1,048**
Free cash	**573**	**511**	**733**	**175**
Total uses	**34,977**	**34,977**	**34,977**	**34,977**

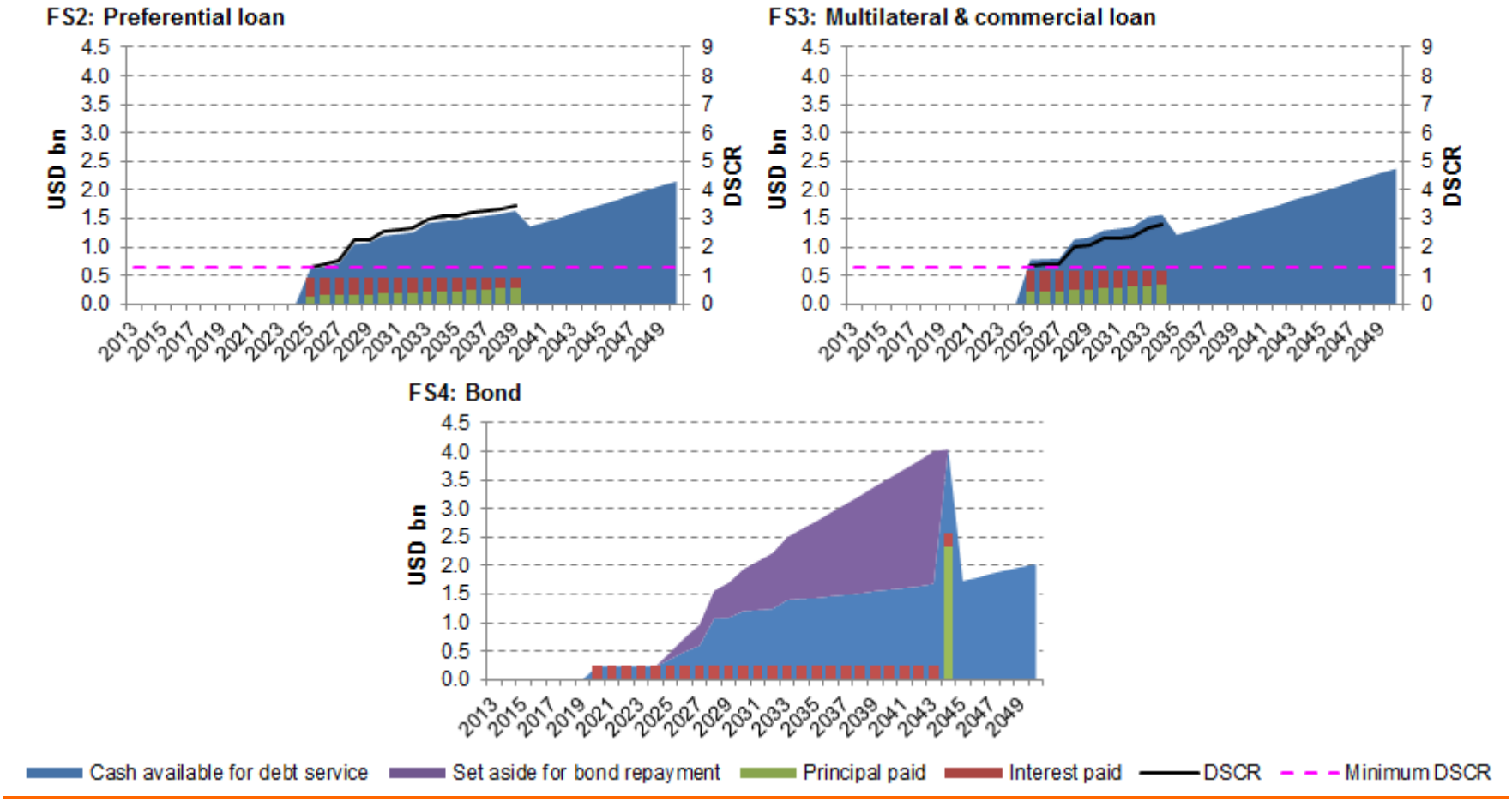
Source: IPA analysis.

Figure 11: Cash flow profile by financing structure – High Capex Case



Source: IPA analysis.

Figure 12: Debt service by financing structure – High Capex Case



Source: IPA analysis.

7. CONCLUSIONS

This initial Financial Analysis has sought to provide a high-level range of funding possibilities for the Project, subject to the assumed costs of various sources.

Our results suggest that, under the Base Case, the Project requires between 4,190USD million (in FS1) and 5,825USD mn (in FS3) of external funding to cover the costs of construction, O&M, decommissioning, and the costs associated with the financing. Equity requirements range from 596USD mn (in FS2), when Project funding is supported by a preferential loan, to 4,190USD mn (in FS1), when equity makes up 100% of total external funding. Our results under FS2 and FS3 suggest that the Project can support a ratio of debt to total external funding of close to 90%, assuming that lenders would be willing to lend up to these amounts.

Under the Base Case, the Project achieves a FIRR of around 12%, above the indicative 10% WACC, for all financing structures. The Equity FIRR is higher under FS2 and FS3 as the levels of equity required to finance the Project are much lower than under FS1 and FS4.

In the next stage of the Project's appraisal, when more detailed analysis is undertaken on the design, specific discussions would need to be held with potential funders in order to gauge the precise level of external financing which could be available for its construction, and the costs thereof.

ANNEX A: DATA FOR CASH FLOW PROFILES

This Annex A presents the cash flow profiles for the four financing structures under the Base Case.

7.1. Full Self-Financing

Table 19: Cash flow profile for FS1

USD mn	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Capex	-	(143)	(274)	(391)	(494)	(642)	(748)	(718)	(537)	(483)	(423)	(444)	(236)	(189)	(152)	-	-	-	-
EBITDA	-	-	-	-	-	-	-	79	89	272	299	638	645	780	796	961	980	1,113	1,135
Equity drawdown	-	143	274	391	494	642	748	645	455	241	157	-	-	-	-	-	-	-	-
Debt/Bond drawdown	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Principal paid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Interest paid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fees & interest capitalised	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(785)	(802)	(917)	(936)
Tax paid	-	-	-	-	-	-	-	(6)	(6)	(30)	(33)	(76)	(77)	(94)	(96)	(117)	(120)	(137)	(140)
Set aside for decommissioning	-	-	-	-	-	-	-	-	-	-	-	-	(46)	(46)	(46)	(46)	(46)	(46)	(46)
Set aside for bond repayment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2032	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**
Capex	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EBITDA	1,158	1,337	1,364	1,377	1,414	1,442	1,471	1,517	1,547	1,578	1,610	1,665	1,698	1,732	1,767	1,822	1,859	1,896	1,925
Equity drawdown	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt/Bond drawdown	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Principal paid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Interest paid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fees & interest capitalised	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	(956)	(1,112)	(1,136)	(1,147)	(1,179)	(1,204)	(1,229)	(1,269)	(1,295)	(1,322)	(1,350)	(1,397)	(1,426)	(1,456)	(1,486)	(1,534)	(1,566)	(1,598)	(1,624)
Tax paid	(143)	(166)	(170)	(171)	(176)	(180)	(184)	(190)	(194)	(198)	(202)	(209)	(213)	(218)	(222)	(229)	(234)	(239)	(243)
Set aside for decommissioning	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)
Set aside for bond repayment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Source: IPA analysis.

7.2. Preferential Loan

Table 20: Cash flow profile for FS2

USD mn	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Capex	-	(143)	(274)	(391)	(494)	(642)	(748)	(718)	(537)	(483)	(423)	(444)	(236)	(189)	(152)	-	-	-	-
EBITDA	-	-	-	-	-	-	-	79	89	272	299	638	645	780	796	961	980	1,113	1,135
Equity drawdown	-	169	-	-	-	-	-	-	-	-	287	140	-	-	-	-	-	-	-
Debt/Bond drawdown	-	-	316	454	584	767	915	850	689	496	129	-	-	-	-	-	-	-	-
Principal paid	-	-	-	-	-	-	-	-	-	-	-	-	(109)	(114)	(120)	(126)	(132)	(139)	(146)
Interest paid	-	-	-	-	-	-	-	-	-	-	-	-	(260)	(255)	(249)	(243)	(236)	(230)	(223)
Fees & interest capitalised	-	(26)	(42)	(63)	(90)	(125)	(167)	(205)	(235)	(257)	(261)	(260)	-	-	-	-	-	-	-
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(463)	(479)	(593)	(612)
Tax paid	-	-	-	-	-	-	-	(5)	(5)	(28)	(31)	(74)	(41)	(59)	(61)	(83)	(87)	(105)	(109)
Set aside for decommissioning	-	-	-	-	-	-	-	-	-	-	-	-	-	(91)	(46)	(46)	(46)	(46)	(46)
Set aside for bond repayment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2032	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**
Capex	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EBITDA	1,158	1,337	1,364	1,377	1,414	1,442	1,471	1,517	1,547	1,578	1,610	1,665	1,698	1,732	1,767	1,822	1,859	1,896	1,925
Equity drawdown	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt/Bond drawdown	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Principal paid	(153)	(161)	(169)	(177)	(186)	(196)	(205)	(216)	-	-	-	-	-	-	-	-	-	-	-
Interest paid	(216)	(208)	(200)	(191)	(183)	(173)	(163)	(153)	-	-	-	-	-	-	-	-	-	-	-
Fees & interest capitalised	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	(631)	(786)	(808)	(819)	(849)	(873)	(897)	(935)	(1,280)	(1,307)	(1,334)	(1,382)	(1,411)	(1,441)	(1,471)	(1,519)	(1,551)	(1,583)	(1,609)
Tax paid	(113)	(137)	(141)	(144)	(150)	(155)	(160)	(167)	(191)	(195)	(199)	(207)	(211)	(215)	(220)	(227)	(232)	(237)	(240)
Set aside for decommissioning	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)
Set aside for bond repayment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Source: IPA analysis.

7.3. Multilateral and Commercial Loan

Table 21: Cash flow profile for FS3

USD mn	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Capex	-	(143)	(274)	(391)	(494)	(642)	(748)	(718)	(537)	(483)	(423)	(444)	(236)	(189)	(152)	-	-	-	-
EBITDA	-	-	-	-	-	-	-	79	89	272	299	638	645	780	796	961	980	1,113	1,135
Equity drawdown	-	155	-	-	-	-	-	-	-	6	344	23	72	-	-	-	-	-	-
Debt/Bond drawdown	-	-	300	436	564	744	906	853	693	498	84	148	-	-	-	-	-	-	-
Principal paid	-	-	-	-	-	-	-	-	-	-	-	-	(162)	(171)	(180)	(189)	(199)	(210)	(222)
Interest paid	-	-	-	-	-	-	-	-	-	-	-	-	(281)	(272)	(263)	(254)	(243)	(233)	(221)
Fees & interest capitalised	-	(12)	(26)	(45)	(70)	(103)	(158)	(208)	(240)	(265)	(274)	(290)	-	-	-	-	-	-	-
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(390)	(406)	(520)	(538)
Tax paid	-	-	-	-	-	-	-	(5)	(5)	(28)	(31)	(74)	(38)	(56)	(59)	(82)	(86)	(105)	(109)
Set aside for decommissioning	-	-	-	-	-	-	-	-	-	-	-	-	-	(91)	(46)	(46)	(46)	(46)	(46)
Set aside for bond repayment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2032	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**
Capex	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EBITDA	1,158	1,337	1,364	1,377	1,414	1,442	1,471	1,517	1,547	1,578	1,610	1,665	1,698	1,732	1,767	1,822	1,859	1,896	1,925
Equity drawdown	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt/Bond drawdown	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Principal paid	(234)	(247)	(261)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Interest paid	(209)	(196)	(182)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fees & interest capitalised	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	(556)	(710)	(732)	(1,132)	(1,164)	(1,189)	(1,214)	(1,254)	(1,280)	(1,307)	(1,335)	(1,383)	(1,411)	(1,441)	(1,471)	(1,520)	(1,551)	(1,584)	(1,609)
Tax paid	(114)	(139)	(144)	(169)	(174)	(178)	(181)	(187)	(191)	(195)	(199)	(207)	(211)	(215)	(220)	(227)	(232)	(237)	(240)
Set aside for decommissioning	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)
Set aside for bond repayment	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Source: IPA analysis.

7.4. Bond

Table 22: Cash flow profile for FS4

USD mn	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Capex	-	(143)	(274)	(391)	(494)	(642)	(748)	(718)	(537)	(483)	(423)	(444)	(236)	(189)	(152)	-	-	-	-
EBITDA	-	-	-	-	-	-	-	79	89	272	299	638	645	780	796	961	980	1,113	1,135
Equity drawdown	-	143	274	391	494	642	748	-	-	-	15	87	-	-	-	-	-	-	-
Debt/Bond drawdown	-	-	-	-	-	-	-	875	683	446	346	-	-	-	-	-	-	-	-
Principal paid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Interest paid	-	-	-	-	-	-	-	(235)	(235)	(235)	(235)	(235)	(235)	(235)	(235)	(235)	(235)	(235)	(235)
Fees & interest capitalised	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	(470)	(487)	(602)	(621)
Tax paid	-	-	-	-	-	-	-	-	-	-	(2)	(46)	(46)	(63)	(65)	(87)	(89)	(106)	(109)
Set aside for decommissioning	-	-	-	-	-	-	-	-	-	-	-	-	(4)	(87)	(46)	(46)	(46)	(46)	(46)
Set aside for bond repayment	-	-	-	-	-	-	-	-	-	-	-	-	(124)	(124)	(124)	(124)	(124)	(124)	(124)
	2032	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**
Capex	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EBITDA	1,158	1,337	1,364	1,377	1,414	1,442	1,471	1,517	1,547	1,578	1,610	1,665	1,698	1,732	1,767	1,822	1,859	1,896	1,925
Equity drawdown	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debt/Bond drawdown	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Principal paid	-	-	-	-	-	-	-	-	-	-	-	-	(2,350)	-	-	-	-	-	-
Interest paid	(235)	(235)	(235)	(235)	(235)	(235)	(235)	(235)	(235)	(235)	(235)	(235)	(235)	-	-	-	-	-	-
Fees & interest capitalised	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dividends	(641)	(797)	(821)	(832)	(864)	(889)	(914)	(954)	(980)	(1,007)	(1,035)	(1,082)	(1,222)	(1,456)	(1,486)	(1,534)	(1,566)	(1,598)	(1,624)
Tax paid	(112)	(136)	(139)	(141)	(146)	(149)	(153)	(159)	(163)	(167)	(171)	(178)	(183)	(218)	(222)	(229)	(234)	(239)	(243)
Set aside for decommissioning	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)	(46)
Set aside for bond repayment	(124)	(124)	(124)	(124)	(124)	(124)	(124)	(124)	(124)	(124)	(124)	(124)	2,350	-	-	-	-	-	-

Source: IPA analysis.