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COSTA RICA MOIN Refinery Expansion & ModernizationProject

Financial Feasibility and Risk Analysis

Summary

The following is a financial risk simulation model used to assess what the Internal Rate of Return (IRR) is, and the predictability of reaching the assessed IRR using a Monte Carlo simulation with normal distribution across a random sample of ranges based on historical data provided in the KBC study, and the current economic environment.

The software used to run the simulation is @RISK. This software performs the 10,000 iterations in a Microsoft Excel spreadsheet to show the possible outcome of the calculated IRR.

This report also uses the findings of WorleyParsons process validation work as of 3/26/2012 for the Soresco Moin refinery to create the future scenario of the refinery and providing the basis of the future cash flow calculation.

The tables below detail the results of the financial model. The financial model can be found in the excel files that accompany this analysis. The Financial Model was rigorously put together in conjunction with the Worley Parson Engineering and Finance team, and the Soresco leadership team.

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Financial Results

After careful study of all variables and data, and a thorough validation of the financial model in the mechanics and flow of the data the results are as follows:

A. NPV = $ 1,013,171,744

B. IRR = 19.2%

C. The Monte Carlo Risk simulation puts the success rate of hitting the IRR at a convincing 74%

TABLE 1 – Key assumptions in working capital and operating costs.

Initial Investment (2012) *	1,324,305,000	Units
Premium (2012)	1	US$/bbl
Inflation rate	2.5%	%
Working capital (2016)	10,280,463	bbl
Operating cost (2016)	5.3	US$/bbl
CRUDES FEED	65,000	BSPD

*adjusted using the 6/10 rule by ($33,500,000)

Table 2 – The first 3 years of the monetary investment breakout. Nominal dollars is used in the cash flow analysis.

Construction years	-2	-1	0
Investment schedule	30%	40%	30%
Interest rate loan	0.00%	0.00%	0.00%
Bank Loan	70%	70%	70%

ITEM	US$			TOTAL
Investment	397,291,500	529,722,000	397,291,500	1,324,305,000
Loan investment	278,104,050	370,805,400	278,104,050	927,013,500
Accumulated interest	0	0	0	0
Total investment	397,291,500	529,722,000	397,291,500	1,324,305,000
Nominal Investment	407,223,788	556,539,176	427,839,492	1,391,602,455

Table 3.1 – The 3 Key Variables considered in the Monte Carlo simulation are gross margin, investment, and operating costs. The maximum and minimum margins are based on historical ranges.

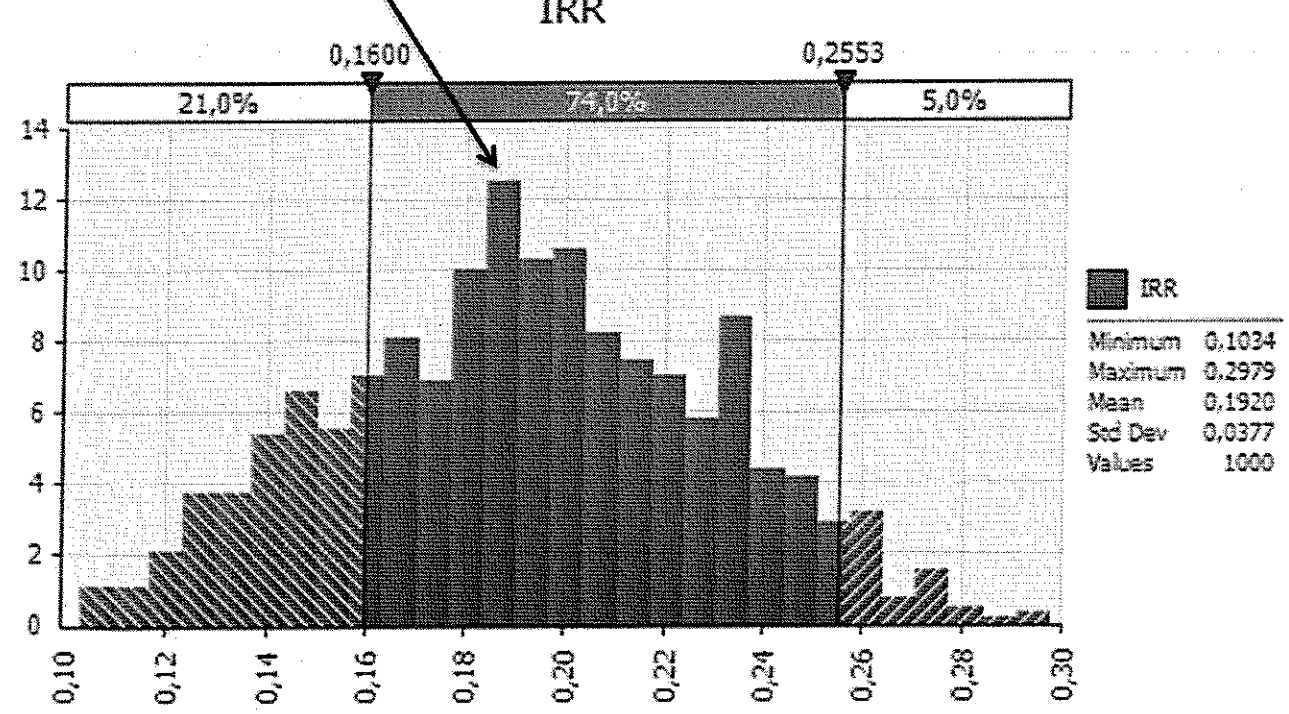
Risk Variables	Base	Max.	Probable	Min.	Standard Deviation	Type of Variable	Type of Distribution
Gross Margin	0%	43%	0%	-32%	0.189	External	Normal
Investment	0%	10%	0%	-15%	0.064	External	Normal
Operation cost	0%	25%	0%	-5%	0.077	External	Normal

Table 3.2 – The dollar figures of the above ranges for the 3 key variables are shown below.

Variables	Max.	Probable	Min.
Gross Margin ($/bbl)	25.0	17.5	12.0
Investment (MM$)	1,457	1,324	1,126
Operating cost ($/bbl)	6.6	5.3	5.0

Table 4 – The calculation of the IRR is 19.2%, and the Monte Carlo simulation success rate for achieving this IRR is displayed on the graph as 74%.

IRR	19.2%



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Risk Analisys

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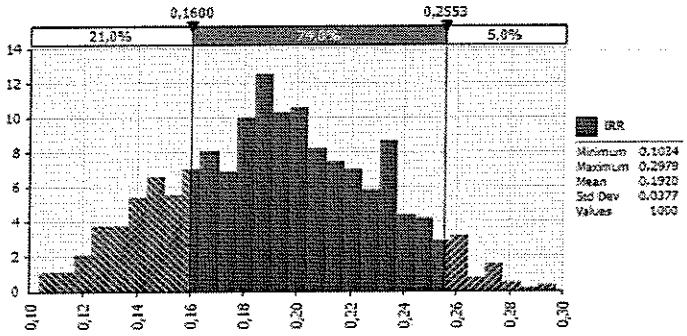
IRR



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Product	Units	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LPG (nominal)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LPG (constant)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
95 Super Gasoline, New (nominal)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
95 Super Gasoline, New (constant)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
92 Regular Gasoline, New (nominal)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
92 Regular Gasoline, New (constant)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Jet kerosene (nominal)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Jet kerosene (constant)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Diesel, New (nominal)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Diesel, New (constant)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fuel Oil 1%S (nominal)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fuel Oil 1%S (constant)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fuel Oil 3.5%S (nominal)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fuel Oil 3.5%S (constant)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sulphur (nominal)	$/ton	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sulphur (constant)	$/ton	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Coke (nominal)	$/ton	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Coke (constant)	$/ton	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ethanol (nominal)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ethanol (constant)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Vacuum (nominal)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Vacuum (constant)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] (nominal)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] (constant)	$/bbl	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

PROYECCIONES DE INFLACIÓN INTERNACIONAL PARA PRECIOS KBC

[illegible]

PROYECCIONES DE INFLACIÓN INTERNACIONAL PARA COSTOS OPERATIVOS Y PREMIUM

[illegible]

PROYECCIONES DE INFLACIÓN INTERNACIONAL PARA INVERSIÓN

[illegible]

	[illegible]
LPG (nominal)	[illegible]
LPG (constant)	[illegible]
95 Super Gasoline, New (nominal)	[illegible]
95 Super Gasoline, New (constant)	[illegible]
92 Regular Gasoline, New (nominal)	[illegible]
92 Regular Gasoline, New (constant)	[illegible]
Jet kerosene (nominal)	[illegible]
Jet kerosene (constant)	[illegible]
Diesel, New (nominal)	[illegible]
Diesel, New (constant)	[illegible]
Fuel Oil 1%S (nominal)	[illegible]
Fuel Oil 1%S (constant)	[illegible]
Fuel Oil 3.5%S (nominal)	[illegible]
Fuel Oil 3.5%S (constant)	[illegible]
Sulphur (nominal)	[illegible]
Sulphur (constant)	[illegible]
Coke (nominal)	[illegible]
Coke (constant)	[illegible]
Ethanol (nominal)	[illegible]
Ethanol (constant)	[illegible]
Vacuum (nominal)	[illegible]
Vacuum (constant)	[illegible]
[illegible] (nominal)	[illegible]
[illegible] (constant)	[illegible]

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Variable cost	Cost (2011) Value	Unit	Consumption Value	Unit	% COST
Imported fuel oil	500	BSPD	175,000	bbl/Y	14%
Fuel Gas	0.00	US$/MMBTU	1,104,800	MMBTU/Y	0%
Electricity	251,240,000	kW/year	26,631,664	US$/Y	24%
Catalysts & Chemicals	3,067,503	US$/Y	3,067,500	US$/Y	3%
Make-up water from river	0.00012	US$/m³	2,486,994	m3/Y	0%
Potable water	0.5	US$/m³	54,460	m3/Y	0%
Sewage Charge	197	US$/Y	197	US$/Y	0%

Variable cost	2016	2017	2018	2019	2020	2021	2022	2023
Imported fuel oil	17,175,176	17,909,602	18,664,579	19,488,896	20,250,251	20,868,815	21,454,077	22,099,940
Fuel Gas								
Electricity	29,396,595	30,131,510	30,884,797	31,656,917	32,448,340	33,259,549	34,091,037	34,945,313
Catalysts & Chemicals	3,365,946	3,470,595	3,557,360	3,646,294	3,737,451	3,830,887	3,926,659	4,024,826
Make-up water from river	320	328	337	345	354	363	372	381
Potable water	30,134	30,887	31,660	32,451	33,262	34,094	34,946	35,820
Sewage Charge	217	223	228	234	240	246	252	258

Variable cost	2024	2025	2026	2027	2028	2029	2030	2031
Imported fuel oil	22,715,502	23,333,065	24,096,977	24,850,210	25,609,569	26,365,765	27,122,027	28,776,611
Fuel Gas								
Electricity	35,816,856	36,712,309	37,630,127	38,570,880	39,535,152	40,523,531	41,536,619	42,575,034
Catalysts & Chemicals	4,125,446	4,228,583	4,334,297	4,442,655	4,553,721	4,667,564	4,784,250	4,903,859
Make-up water from river	390	400	410	420	431	441	453	464
Potable water	36,715	37,633	38,574	39,539	40,527	41,540	42,579	43,643
Sewage Charge	265	272	278	285	292	300	307	315

Variable cost	2032	2033	2034	2035	2036	2037	2038	2039	2040
Imported fuel oil	30,097,716	32,007,719	33,408,367	35,193,066	36,567,754	37,990,271	39,469,110	41,005,050	42,600,769
Fuel Gas									
Electricity	43,639,410	44,730,395	45,848,655	46,994,871	48,169,744	49,373,987	50,608,337	51,873,543	53,170,384
Catalysts & Chemicals	5,026,456	5,152,117	5,280,920	5,412,943	5,548,267	5,686,974	5,829,148	5,974,877	6,124,248
Make-up water from river	476	488	500	512	525	538	552	565	580
Potable water	44,734	45,853	46,999	48,174	49,378	50,613	51,878	53,175	54,504
Sewage Charge	323	331	339	348	356	365	374	384	393

Fixed cost	Value	Unit	Value	Unit	% COST
Employee expenses	20	US$/man hour	69,338	man hour/month	35%
Maintenance **	3.50%	CAPEX	46,556,675	US$/YEAR	41%
Insurance & Local taxes	4.35	US$/bbl	30,662	US$/YEAR	3%

Fixed cost	2016	2017	2018	2019	2020	2021	2022	2023
Employee expenses	18,367,616	18,826,832	19,297,208	19,779,731	20,274,224	20,781,079	21,300,606	21,833,122
Maintenance **	51,163,073	52,441,536	53,752,573	55,096,387	56,473,797	57,885,642	59,332,783	60,816,102
Insurance & Local taxes	3,867,293	3,963,980	4,064,092	4,166,145	4,270,819	4,378,121	4,508,074	4,620,776

Fixed cost	2024	2025	2026	2027	2028	2029	2030	2031
Employee expenses	22,378,950	22,938,423	23,511,884	24,099,681	24,702,173	25,319,727	25,952,721	26,601,539
Maintenance **	62,336,505	63,894,917	65,492,290	67,129,598	68,807,838	70,528,033	72,291,234	74,098,515
Insurance & Local taxes	4,736,293	4,854,700	4,976,070	5,100,472	5,227,983	5,358,683	5,492,650	5,629,966

Fixed cost	2032	2033	2034	2035	2036	2037	2038	2039	2040
Employee expenses	27,266,577	27,948,211	28,646,918	29,363,131	30,097,209	30,849,629	31,620,870	32,411,392	33,221,676
Maintenance **	75,950,978	77,849,753	79,795,996	81,790,896	83,835,669	85,930,560	88,079,017	90,281,046	92,538,042
Insurance & Local taxes	5,770,716	5,915,003	6,062,858	6,214,429	6,369,790	6,529,035	6,692,261	6,859,567	7,031,057

Total Cost per barrel with maintenance =

Investment Operation rate Employees			** maintenance global factor		
			FUEL	CONSUMPTION	
400	1,374 335,000	US $	FUEL OIL	500	BLS/Y
400	67,000	bbl/day	FUEL GAS	1 024,800	MMBTU

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Feedstock Purchases	Units	DAY	YEAR
Pennington	BSPD	25,000	8,750,000
Vasconia	BSPD	40,000	14,000,000
Etanol	BSPD	2080	728,000
Total Purchases	BSPD	67,080	23,478,000
Product Sales	**Units**	**DAY**	**YEAR**
LPG	BSPD	749	262,150
Unleaded Premium	BSPD	14,480	5,068,000
Unleaded Regular	BSPD	5,600	1,960,000
Kero/Jet	BSPD	9,070	3,174,500
Diesel	BSPD	35,490	12,421,500
Coke	MTONS*	526	184,100
Sulfur	MTONS*	53	18,515
Total liquid	BSPD	65,389	22,886,150

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Financial Feasibility and Risk Analysis

Summary

The following is a financial risk simulation model used to assess what the Internal Rate of Return (IRR) is, and the predictability of reaching the assessed IRR using a Monte Carlo simulation with normal distribution across a random sample of ranges based on historical data provided in the KBC study, and the current economic environment.

The software used to run the simulation is @RISK. This software performs the 10,000 iterations in a Microsoft Excel spreadsheet to show the possible outcome of the calculated IRR.

This report also uses the findings of WorleyParsons process validation work as of 3/26/2012 for the Soresco Moin refinery to create the future scenario of the refinery and providing the basis of the future cash flow calculation.

The tables below detail the results of the financial model. The financial model can be found in the excel files that accompany this analysis. The Financial Model was rigorously put together in conjunction with the Worley Parson Engineering and Finance team, and the Soresco leadership team.

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Financial Results

After careful study of all variables and data, and a thorough validation of the financial model in the mechanics and flow of the data the results are as follows:

A. NPV = $ 1,013,171,744

B. IRR = 19.2%

C. The Monte Carlo Risk simulation puts the success rate of hitting the IRR at a convincing 74%

TABLE 1 – Key assumptions in working capital and operating costs.

Initial Investment (2012) *	1,324,305,000	Units
Premium (2012)	1	US$/bbl
Inflation rate	2.5%	%
Working capital (2016)	10,280,463	bbl
Operating cost (2016)	5.3	US$/bbl
CRUDES FEED	65,000	BSPD

*adjusted using the 6/10 rule by ($33,500,000)

Table 2 – The first 3 years of the monetary investment breakout. Nominal dollars is used in the cash flow analysis.

Construction years	-2	-1	0
Investment schedule	30%	40%	30%
Interest rate loan	0.00%	0.00%	0.00%
Bank Loan	70%	70%	70%

ITEM	US$			TOTAL
Investment	397,291,500	529,722,000	397,291,500	1,324,305,000
Loan investment	278,104,050	370,805,400	278,104,050	927,013,500
Accumulated interest	0	0	0	0
Total investment	397,291,500	529,722,000	397,291,500	1,324,305,000
Nominal investment	407,223,788	556,539,176	427,839,492	1,391,602,455

Table 3.1 – The 3 Key Variables considered in the Monte Carlo simulation are gross margin, investment, and operating costs. The maximum and minimum margins are based on historical ranges.

Risk Variables	Base	Max.	Probable	Min.	Standard Deviation	Type of Variable	Type of Distribution
Gross Margin	0%	43%	0%	-32%	0.189	External	Normal
Investment	0%	10%	0%	-15%	0.064	External	Normal
Operation cost	0%	25%	0%	-5%	0.077	External	Normal

Table 3.2 – The dollar figures of the above ranges for the 3 key variables are shown below.

Variables	Max.	Probable	Min.
Gross Margin ($/bbl)	25.0	17.5	12.0
Investment (MM$)	1,457	1,324	1,126
Operating cost ($/bbl)	6.6	5.3	5.0

Table 4 – The calculation of the IRR is 19.2%, and the Monte Carlo simulation success rate for achieving this IRR is displayed on the graph as 74%.

IRR	19.2%