Fact Sheet 8

SAF – Project Economics

The below five examples demonstrate the sensitivity of a hypothetical project to small changes in the input assumptions. Further, they highlight **how policy can be effectively applied to influence a projects financial viability**. While a 'real life' project will have significantly more line items and additional complexity, these examples provide an illustration of how policy decision could impact the projects economic merit.

The analysis metric used is Net Present Value (NPV). NPV is derived using a stochastic discounted cash flow (DCF) model and this analysis is a standard method for using the time value of money to appraise long-term projects.

Example 1:

Example 1 is a base case scenario. This is an example where purchasing land, equipment and constructing a SAF refining plant cost $260 million. Both operating costs and revenues ramp up, then remain consistent from year 3. In a real-world scenario these are not likely to be linear but this does not impact the example. A discount rate of 9% is used. This is the rate that must be achieved to deliver a NPV of $0. This example delivers a forecast NPV of -$83.28 million or an internal rate of return on the funds employed of 3.82%. This does not meet the hurdle rate (of 9%) hence a rational firm would not undertake this project.

EXAMPLE: 1	*Simplified cost-benefit example - base case project CBA*										
Project analysis (Million USD)											
Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Capital costs											
Project construction	-250										187.5
Improvements						-25					17.5
Equiptment	-10					-10					5
Total	-260	0	0	0	0	-35	0	0	0	0	210
Operating costs											
Aggregate annual costs		-5	-15	-20	-20	-20	-20	-20	-20	-20	-20
Revenues											
Annual aggragate revenues		15	25	40	40	40	40	40	40	40	40
Net Cash Flow	-260	10	10	20	20	-15	20	20	20	20	230
Discount rate	9%										
NPV	**-$83.28**										
IRR	**3.82%**										

Example 2:

Example 2 replicates example 1, except in this case a project grant of $100 million is received. This could be a government grant. A grant is often contingent on satisfying certain criteria, however in this case it is assume this criterion is met and the funds are received without attached conditions.

While the aggregate of the grant is only 2.5 years of projected revenue, it represents 40% of the total assumed construction cost. The advantage of receiving these funds at project inception is significant, particularly with high discount rates.

This change to the project delivers a $16.72 million positive NPV at an IRR of 10.43%. A rational firm would undertake this project.

EXAMPLE: 2	*Simplified cost-benefit example - project grant*										
Project analysis (Million USD)											
Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Capital costs											
Project construction	-250										187.5
Project grant	100										0
Improvements						-25					17.5
Equiptment	-10					-10					5
Total	-160	0	0	0	0	-35	0	0	0	0	210
Operating costs											
Aggregate annual costs		-5	-15	-20	-20	-20	-20	-20	-20	-20	-20
Revenues											
Annual aggragate revenues		15	25	40	40	40	40	40	40	40	40
Net Cash Flow	-160	10	10	20	20	-15	20	20	20	20	230
Discount rate	9%										
NPV	**$16.72**										
IRR	**10.43%**										

Example 3:

Example 3 replicates example 1 except in this case the firm acquires an interest free loan for 10 years of $100 million. This could be provided from a government program and when the project is more mature this debt could easily be refinanced and repaid. Further, conceptually the idea of an interest free loan could be substituted with non-dilutive equity.

While the project NPV remains negative at -$25.52 million it is substantially improved on example 1. Further, the IRR of 6.37% may be feasible for some investors.

EXAMPLE: 3	*Simplified cost-benefit example - interest free loan*										
Project analysis (Million USD)											
Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Capital costs											
Project construction	-250										187.5
Interest free loan	100										-100
Improvements						-25					17.5
Equiptment	-10					-10					5
Total	-160	0	0	0	0	-35	0	0	0	0	110
Operating costs											
Aggregate annual costs		-5	-15	-20	-20	-20	-20	-20	-20	-20	-20
Revenues											
Annual aggragate revenues		15	25	40	40	40	40	40	40	40	40
Net Cash Flow	-160	10	10	20	20	-15	20	20	20	20	130
Discount rate	9%										
NPV	**-$25.52**										
IRR	**6.37%**										

Example 4:

Example 4 replicates example 1 however in this case the SAF supplier receives a subsidy. While in this case the subsidy is not sufficient to generate a positive project NPV it demonstrates that the annual subsidy improves the forecast IRR from 3.82% in example 1 to 5.23% in example 4.

EXAMPLE: 4	*Simplified cost-benefit example - revenue subsidy*										
Project analysis (Million USD)											
Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Capital costs											
Project construction	-250										187.5
Improvements						-25					17.5
Equiptment	-10					-10					5
Total	-260	0	0	0	0	-35	0	0	0	0	210
Operating costs											
Aggregate annual costs		-5	-15	-20	-20	-20	-20	-20	-20	-20	-20
Revenues											
Subsidy		1.5	2.5	4	4	4	4	4	4	4	4
Annual aggragate revenues		15	25	40	40	40	40	40	40	40	40
Net Cash Flow	-260	11.5	12.5	24	24	-11	24	24	24	24	234
Discount rate	9%										
NPV	**-$61.16**										
IRR	**5.23%**										

Example 5:

Example 5 incorporates some of the policy features of the other examples. It includes a revenue subsidy of 10% of revenues, a project grant of $50 million and an interest free loan of $100 million repayable in 10 years.

This example clearly demonstrates how combining some policy mechanisms can make an otherwise unattractive project successful. Example 5 generates a forecast NPV of $46.59 million at an IRR of 15.1%. Even at a discount rate of 9% this project is comfortably acceptable. This shows how when connected stakeholders such as the project owner and operator, the government, product demand e.g. an airline and debt financiers work collaboratively, policy mechanisms can combine to build a strong business case.

EXAMPLE: 5	*Simplified cost-benefit example - project grant*										
Project analysis (Million USD)											
Year	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Capital costs											
Project construction	-250										187.5
Project grant	50										0
Interest free loan	100										-100
Improvements						-25					17.5
Equiptment	-10					-10					5
Total	-110	0	0	0	0	-35	0	0	0	0	110
Operating costs											
Aggregate annual costs		-5	-15	-20	-20	-20	-20	-20	-20	-20	-20
Revenues											
Subsidy		1.5	2.5	4	4	4	4	4	4	4	4
Annual aggragate revenues		15	25	40	40	40	40	40	40	40	40
Net Cash Flow	-110	11.5	12.5	24	24	-11	24	24	24	24	134
Discount rate	9%										
NPV	**$46.59**										
IRR	**15%**										

It is, and should be assumed that subsidies either reduce or 'fade out' over time. If this is articulated by policy makers, it does not need to impact project feasibility. It is assumed that both the technology learning curve and project economies of scale will reduce the unit cost of production over time, thus reducing the reliance on subsidies. Interest free loans or project grants simply tackle the high discount rate conundrum at the start of a capital intense project in an embryonic industry.