Sustainable Island Resource Framework Fund

OAS / Department of Environment Antigua and Barbuda

Marko Markov, St. John`s, 22 February 2016

OBJECTIVES

- Introduce key indicators of financial viability
  - ✓ Simple payback period
  - ✓ Net Present Value
  - ✓ Internal Rate of Return
- Examine how debt financing affects financial viability
- Present the RETScreen Financial Analysis page

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SIMPLE PAYBACK PERIOD

- Length of time to recover the cost of an investment
- The advantages of PBP:
  - ✓ Easy to calculate
  - ✓ Provides good ranking of projects that would return money early
- The drawbacks of PBP:
  - ✓ Ignores the time value of money – a discounted PB period is solution
  - ✓ Ignores all benefits that occur after the payback point, hence does not measure profitability
- Investors usually prefer other measures – IRR, NPV, DCFs
- Simple PBP in RETScreen ignores debt impact!!!

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SIMPLE PAYBACK PERIOD

- Project 1 and Project 2 have the same investment costs of USD 10 000 and similar risk profile
- Both projects have useful lifetime of 4 years
- Project 1 brings back USD 5 000 a year – simple PB period is 2 years
- Project 2 earns : USD 3000 in year 1 and 2; USD 10 000 in year 3 and 4 and has longer simple PBP
- Which one would you give priority to?

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ACCOUNTING FOR PREFERENCE TO HAVE MONEY SOONER RATHER THAN LATER

- $1 in your pocket today is worth more than $1 a year from now
  - ✓ Can invest $1 today and have $1.10 in a year
- Present Value – current worth of future sum of money (stream), given specified rate of return (discount rate)
- Discount rate is used to convert dollar values at different points in time
  - ✓ $1 today = $1.10 in a year implies 10% discount rate
  - ✓ Larger positive discount rates make future cash flows less important, because their PV gets smaller
- All future project costs and earnings should be converted to start of project (Year 0) at the discount rate before being added, subtracted or compared

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ACCOUNTING FOR CHANGING PRICES

- Inflation rate: describes how prices increase with time
  - ✓ An item purchased today for $1 might cost $1.02 in a year at a 2% inflation rate
- RETScreen inflates all future costs and credits
- Start Page Method 1 uses single inflation rate
- Start Page Method 2 applies different inflation rates
  - ✓ Inflation rate: Future costs/credits except fuel and electricity
  - ✓ Fuel cost escalation rate: Applied to cost of fuels/electricity
  - ✓ Electricity export escalation rate: Applied to electricity sales

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NET PRESENT VALUE

- Difference between the PV of expected cash inflows and the PV of cash outflows
- Uses discounted cash flows in the calculation (reflects the time value of the money)
- The hurdle rate – WACC or return on similar investments may be used
- Generally:
  - ✓ Positive NPV = profitable investment
  - ✓ Negative NPV = loss from investment
- First step – estimation of net cash inflows over project lifetime
- Second step – discount the expected inflows with the hurdle rate

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INTERNAL RATE OF RETURN

- The discount rate that makes the NPV of all cash inflows from a project equal zero
- Indicates the profitability of a project
- An uniform metric for various types of investments and can be used to compare different projects (e.g. photovoltaic vs energy efficiency)
- Generally for projects with equal initial investment costs, the one with higher IRR should be preferred
- Do not accept projects with IRR lower than the desired rate of return (or hurdle rate)

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PITFALLS WHEN COMPARING INVESTMENTS

- Assume Project 1 and Project 2 have same lifetime
  - ✓ Project 1: IRR is 50%
  - ✓ Project 2: IRR is 12%
- Which do you prefer?

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PITFALLS WHEN COMPARING INVESTMENTS

- Assume Project 1 and Project 2 have same lifetime
  - ✓ Project 1: IRR is 50%, investment of $1,000
  - ✓ Project 2: IRR is 12%, investment of $100,000
- Which do you prefer now?

- To compare IRR, investment must be same

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PITFALLS WHEN COMPARING INVESTMENTS

- Assume Project 1, Project 2 and Project 3 have same lifetime (10 years) and same initial investment ($20,000)
  - ✓ Project 1: IRR of 40%
  - ✓ Project 2: IRR of 20%
  - ✓ Project 3: IRR of 15%
- Do you always prefer the project with the highest IRR?

- What if revenues are high at beginning for Project 1, constant for Project 2 and lumped at the end of Project 3?
- And if revenues must be reinvested at 9% return? (9% hurdle rate)

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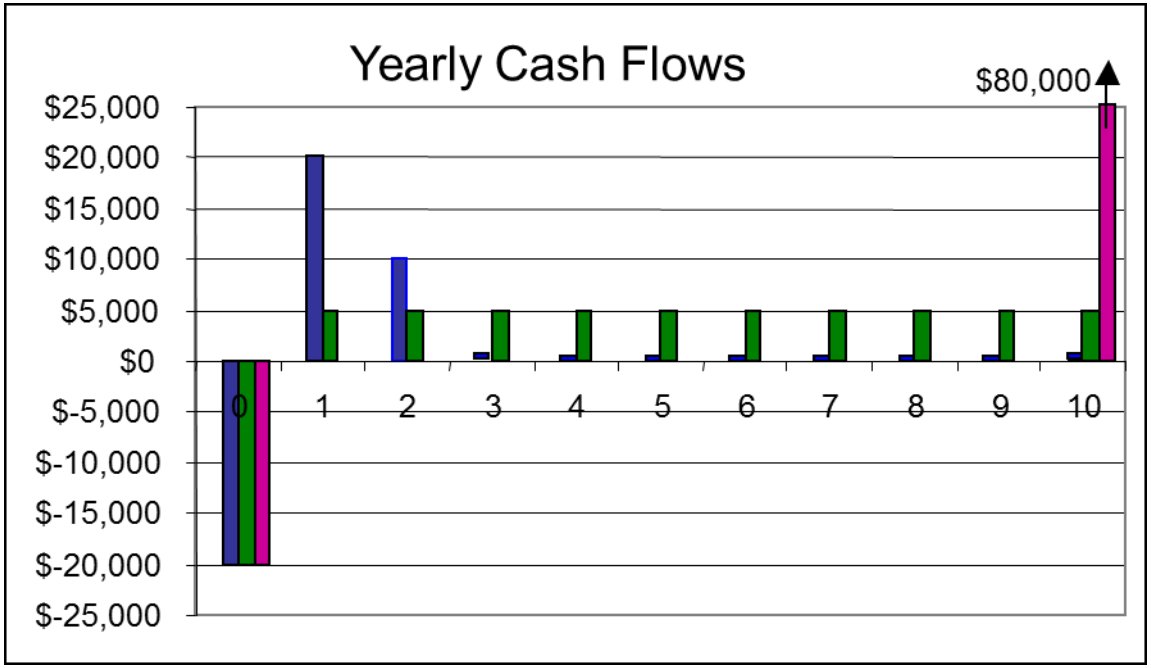
PITFALLS WHEN COMPARING INVESTMENTS



- Project 1: IRR of 40% NPV of $9,100 at a 9% discount rate
- Project 2: IRR of 20% NPV of $10,500 at a 9% discount rate
- Project 3: IRR of 15% NPV of $13,800 at a 9% discount rate

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PITFALLS WHEN COMPARING INVESTMENTS

- Assume Project 1 and Project 2 have same lifetime, same initial investment and revenues stem from fuel savings, which are relatively constant from one year to the next
  - ✓ Project 1: IRR of 15%
  - ✓ Project 2: IRR of 12%
- Which project do you prefer?

- What if Project 1 saves diesel (volatile prices) and Project 2 saves electricity (regulated prices)?

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DEALING WITH UNCERTAINTY – RETSCREEN RISK AND SENSITIVITY ANALYSIS

- At the preliminary feasibility stage, there is much uncertainty about many input parameters

- How is project profitability affected by errors in the values provided by the user RETScreen offers tools to assess

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SENSITIVITY ANALYSIS

- Shows how the profitability of project changes when two key input parameters vary simultaneously
- For example:
  - ✓ Electricity export rate 5% lower than estimated
  - ✓ Initial costs 5% higher than estimated
  - ✓ Does the IRR exceed the 15% IRR threshold desired by the user?

Perform analysis on	After-tax IRR - equity	
Sensitivity range	10%	
Threshold	15	%

			Initial costs			$
Electricity export rate		2 121 578	2 239 444	2 357 309	2 475 174	2 593 040
$/MWh		-10%	-5%	0%	5%	10%
148,50	-10%	14,5%	13,3%	12,2%	11,2%	10,3%
156,75	-5%	16,0%	14,7%	13,6%	12,5%	11,6%
165,00	0%	17,6%	16,2%	**15,0%**	13,9%	12,8%
173,25	5%	19,1%	17,7%	16,4%	15,2%	14,1%
181,50	10%	20,7%	19,1%	17,7%	16,5%	15,4%

- No, the ROE is 12,5%

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SENSITIVITY ANALYSIS - PARAMETERS

- RETScreen calculates sensitivity of …
  - ✓ Internal Rate of Return (for equity and total asset investment)
  - ✓ Equity payback period
  - ✓ Net Present Value (NPV)

Perform analysis on	After-tax IRR - equity	
Sensitivity range	10%	
Threshold	20	%

- To simultaneous changes in (for example) …
  - ✓ Initial costs & electricity export rate
  - ✓ Initial costs & debt ratio
  - ✓ Debt interest rate & debt term
  - ✓ O&M & debt interest rate

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RISK ANALYSIS

- User is uncertain of many parameters:

Perform analysis on: Equity payback

Parameter	Unit	Value	Range (+/-)	Minimum	Maximum
Initial costs	$	2 357 309	10%	2 121 578	2 593 040
O&M	$	47 240	10%	42 516	51 965
Electricity export rate	$/MWh	165,00	10%	148,50	181,50
Debt ratio	%	50%	20%	40%	60%
Debt interest rate	%	5,00%	20%	4,00%	6,00%
Debt term	yr	12	20%	9,6	14,4

- User specifies range of uncertainty for each parameter (e.g., ±10-20%)
- All parameters simultaneously and independently deviate from estimate
- How does this affect the financial indicators?

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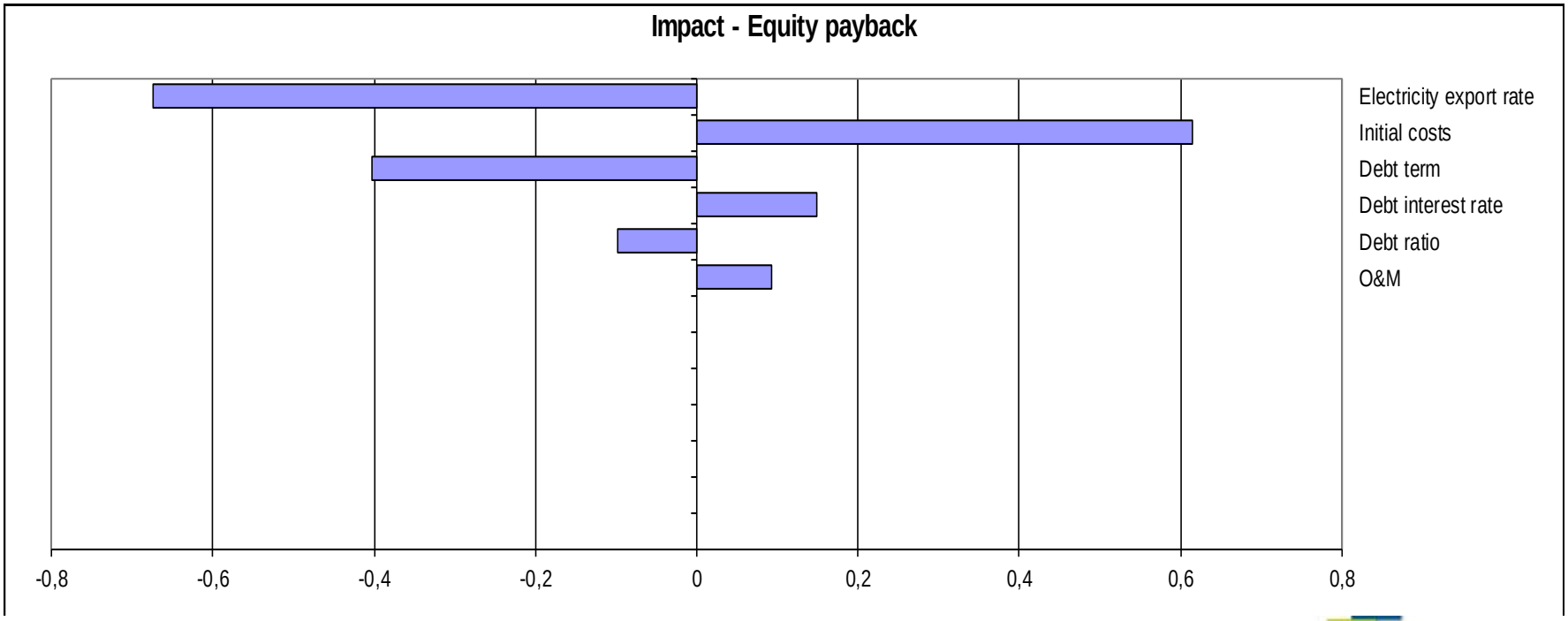
RISK ANALYSIS – INFLUENCE OF THE PARAMETERS

- "Tornado chart" reveals:
  - ✓ Which parameters have the most influence
  - ✓ How changes in parameters affect after-tax IRR, NPV or equity payback



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RETURN ON INVESTMENT

- Used to evaluate the efficiency of a project or compare the efficiency of various investments
- Measures the amount of return (net benefits) against the investment cost
- Expressed as % (alternatively as a ratio). E.g. 20% or 0,2x
- Universal metric – helps comparing different types of projects
- Adjust ROI on an annual basis to correctly compare the return of projects with different lifetime
- ROI does not pertains to a specified time period. Use NPV to assess the benefits for more accurate evaluation

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RETURN ON EQUITY

- Measures the amount of net income generated as a percentage of shareholders equity
- A measure for profitability
- Calculated on annual basis – Net income/Shareholder`s equity
- In SIRFF`s case own funds invested in a project may be considered Equity

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CURRENT RATIO

- Measures liquidity – company`s ability to pay its short term debt
- Current assets vs Short term liabilities
- CR<1 indicates potential default on ST liabilities (not always, though)
- Too high a CR may indicate deficiencies in company`s assets allocation (too much idle capital not generating return)
- Healthy CR levels may vary widely for different business operations. Use it to compare performance of companies within same sector (e.g. tourism)
- Quick ratio (excl. inventory, work in progress)

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EQUITY RATIO

- A solvency ratio – measures the amount of assets financed by company owners
- Total equity / Total assets
- Shows how leveraged the company is
- Generally – the higher Equity ratio, the better. Owners show commitment to their business by investing their own money in it
- Again standard values may vary, depending on the type of business

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DEBT TO EQUITY RATIO

- Almost inverse to the Equity ratio
- Reveals management`s willingness to fund business operations with debt, rather than equity
- Total debt/Total equity – high D/E rate implies that the debt has reached unsustainable levels
- When examining D/E ratio always pay attention to debt`s maturity structure and repayment schedule
- Try to project how the D/E ratio will change in the following several years (a large debt may be borrowed for future acquisition)

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THANK YOU!

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