

# **Attracting private investment through NAMAs: the role of risk, return and policy design**

## ***Part 2: deep dive into the investor logic***

**Regional workshop on promoting international collaboration to  
facilitate preparation, submission and implementation of NAMAs**

**Mexico City, December , 2013  
Speaker: Tobias Schmidt, ETH Zurich**

# To invest, or not to invest?



Cash flow?

Payback time?

Net present value?

Rate of return?

Capital structure?

Risk?

What to consider when designing NAMAs/LEDS?

## Aims of this clinic

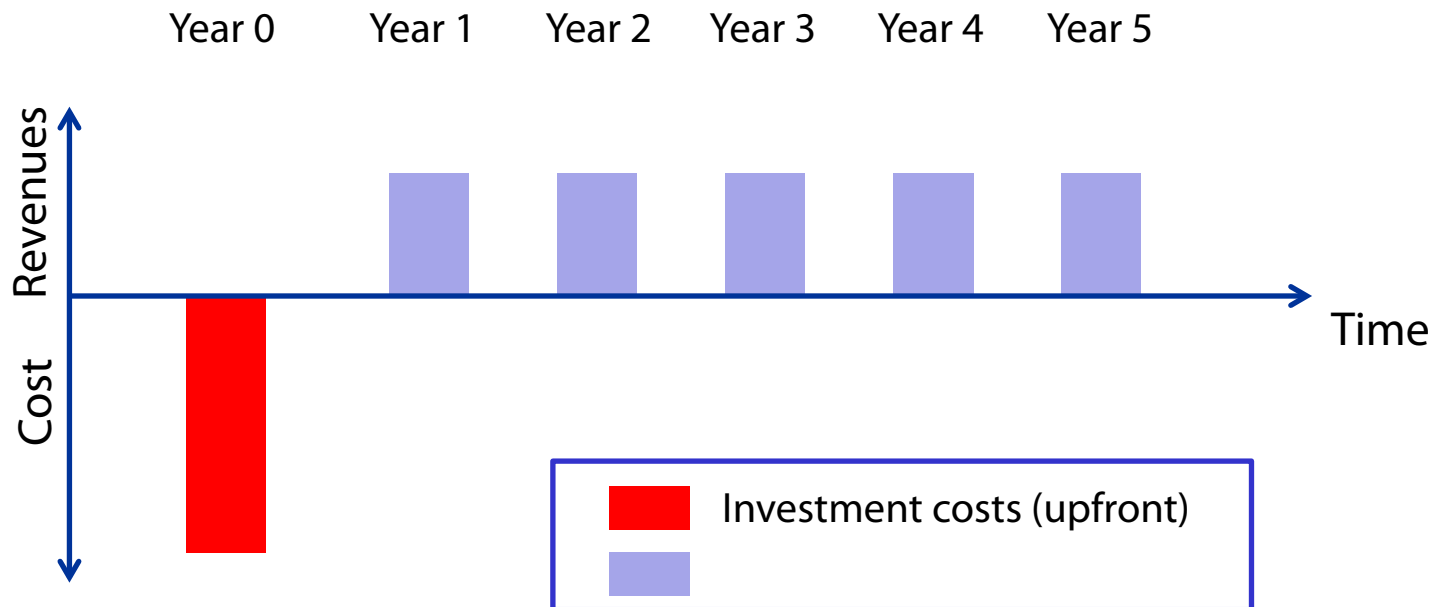
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- Provide basic finance terminology
- Show important concepts that private investors use to assess investment opportunities
- Discuss how NAMAs can be designed in order to address policy

# Cash-flow

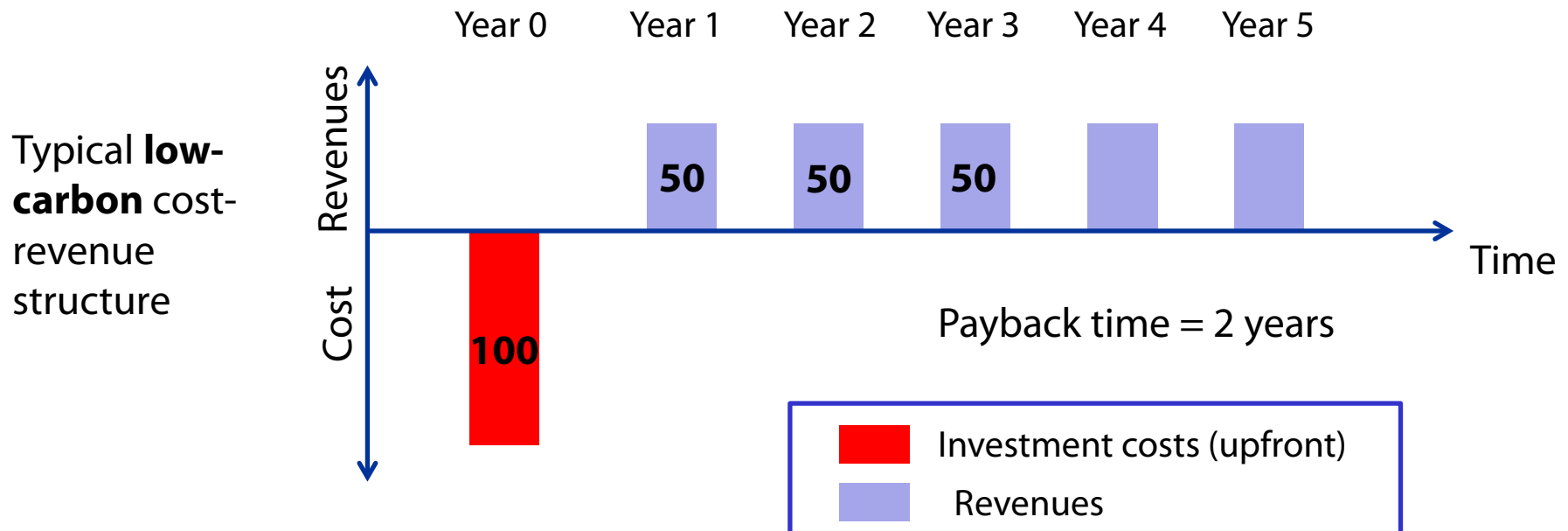
- Cash-flow is the stream of expenses and revenues over a period of time
- Investors need to maintain liquidity => cash-flow matters

Typical **low-carbon** cost-revenue structure



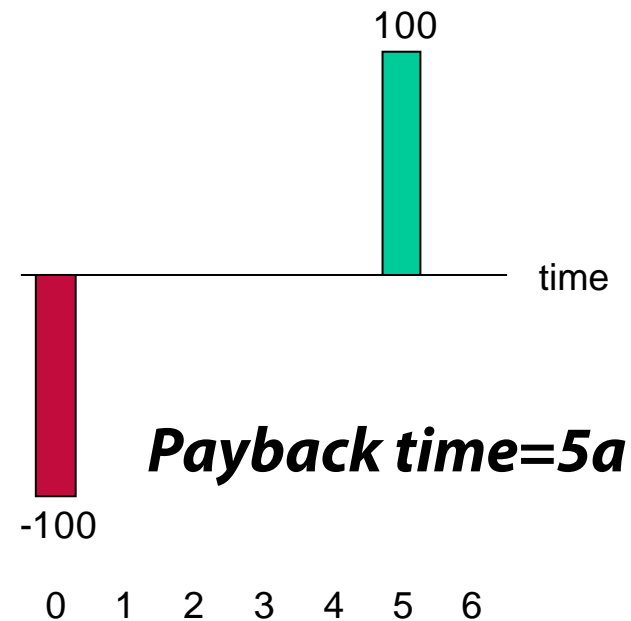
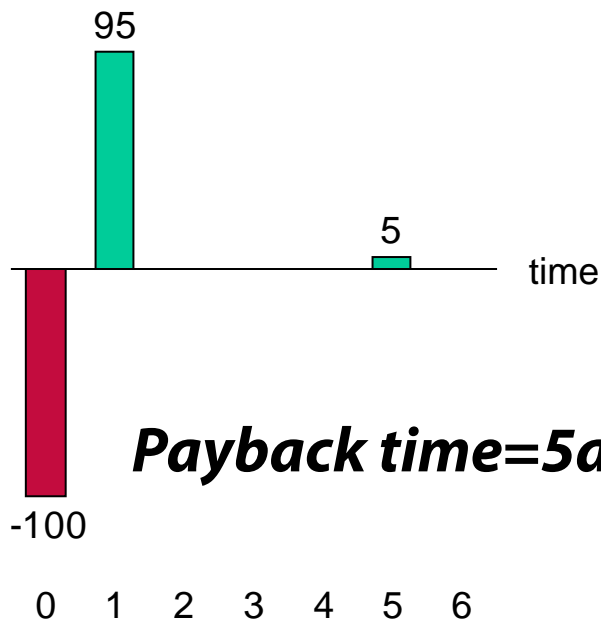
## Payback time (1/2)

- Time taken for a project to recover (i.e., payback) its initial investment
- Investment attractive if Payback time < certain threshold (e.g. 5 years)



## Payback time (2/2)

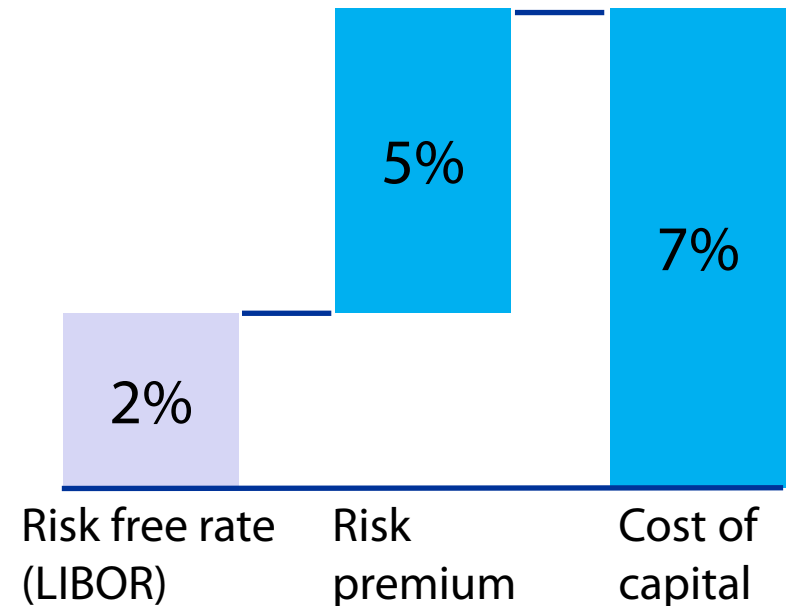
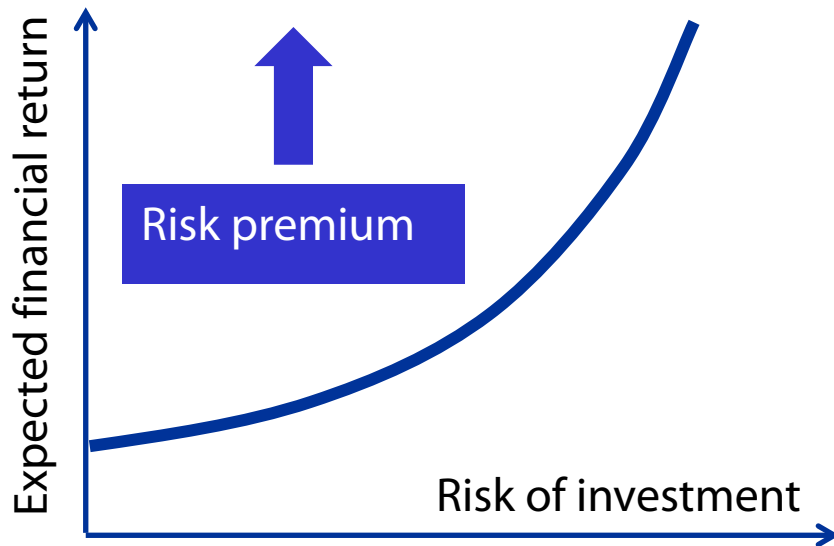
- Payback time important for liquidity, but costs of capital (financing costs) not considered



Which case would you choose?

# Cost of Capital (1/2)

- Represent the opportunity cost of capital (private discount rate)
- Opportunity cost of capital is the return foregone by investing in the project rather than investing in securities
- A project's specific risks drive the cost of capital



# Net Present Value (NPV) (1/2)

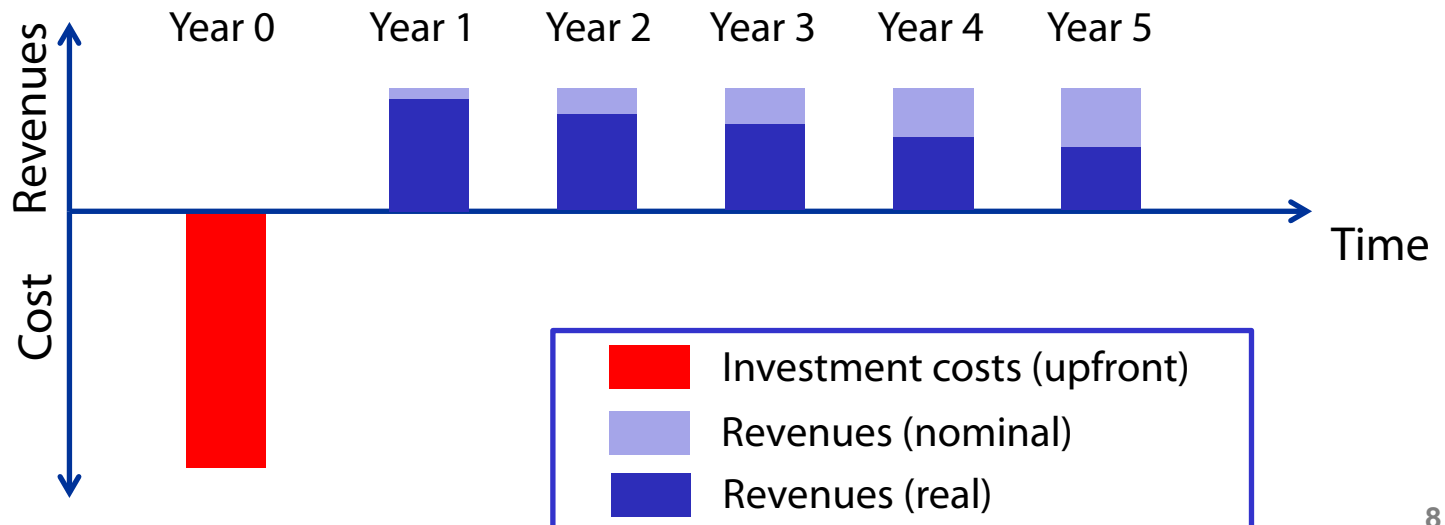
- Takes into account the cost of capital
- A project's net contribution to wealth (beyond cost of capital)
- Expresses the expected money to be earned by the investment at today's value

$$NPV = investment_0 + \sum_{t=1}^n \frac{cashflow_t}{(1+r)^t}$$

r= cost of capital

n= expected lifetime of investment

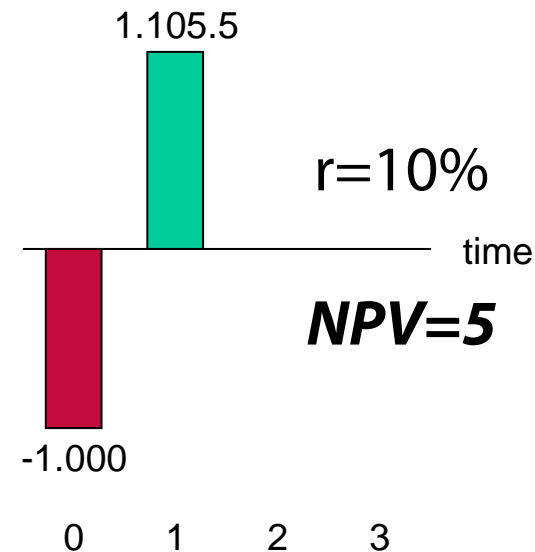
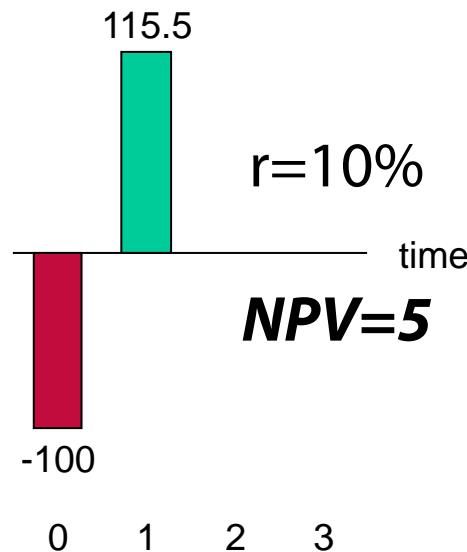
Typical **low-carbon** cost-revenue structure





# Net Present Value (NPV) (2/2)

- NPV = 1USD => 1USD earned above cost of capital
- Rules for investor:
  - Investment attractive if  $NPV > 0$
  - Alternative chosen based on highest NPV



Which case would you choose?

# Internal Rate of Return (IRR)

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- Rate (in %) at which the investment has zero net present value (NPV)
- Expresses the return rate of an investment

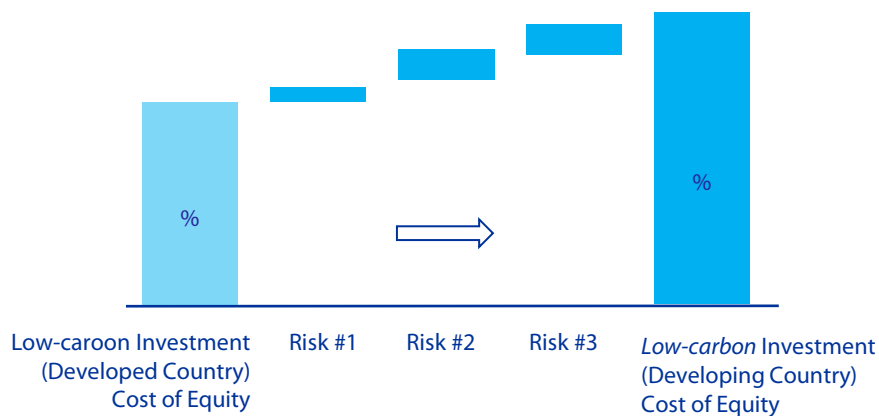
$$NPV = investment_0 + \sum_{t=1}^n \frac{cashflow_t}{(1+r)^t} = 0 \quad \Rightarrow \quad r = IRR$$

- $IRR > \text{cost of capital} \Rightarrow$  project is more profitable as minimal desired return
- Rules for investor:
  - Investment attractive if  $IRR > \text{Cost of Capital}$
  - Alternative chosen based on highest IRR

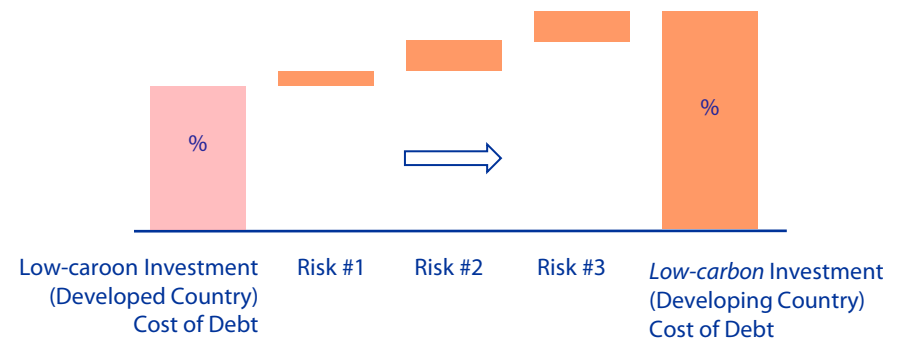
# Cost of Capital (2/2)

- Typically an investment has different sources of capital:
  - Equity by an equity sponsor (e.g. a project developer)
  - Debt (in form of a bank loan)
- Due to their seniority debt has lower cost than equity

## Cost of Equity

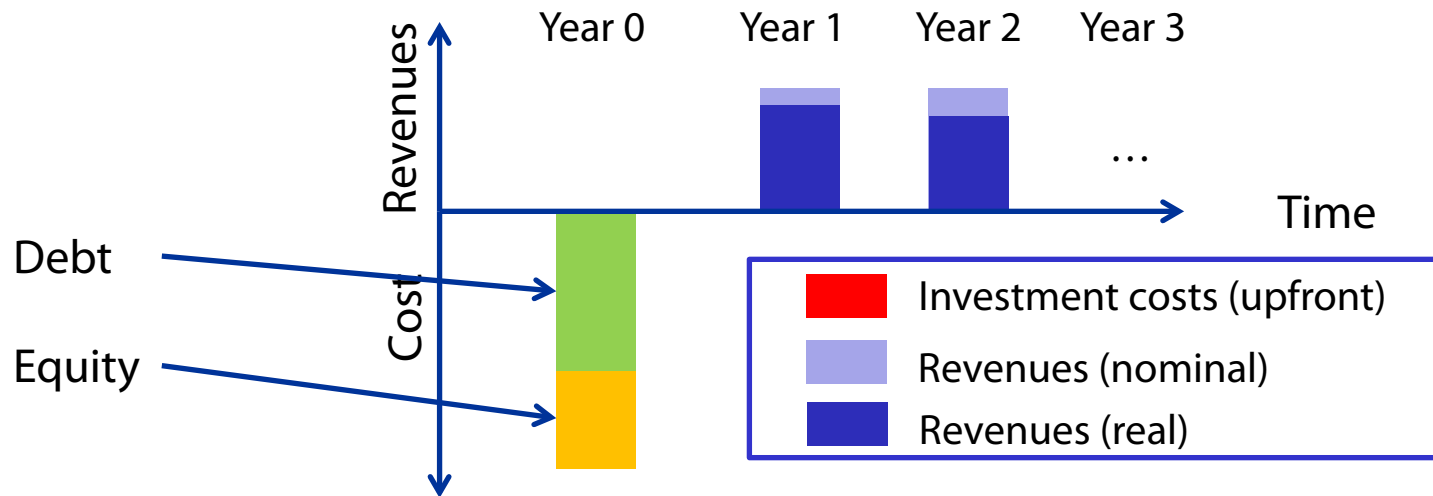


## Cost of Debt



# Capital Structure

- The capital structure indicates the share of debt and equity



# Weighted Average Capital Cost (WACC) (1/2)

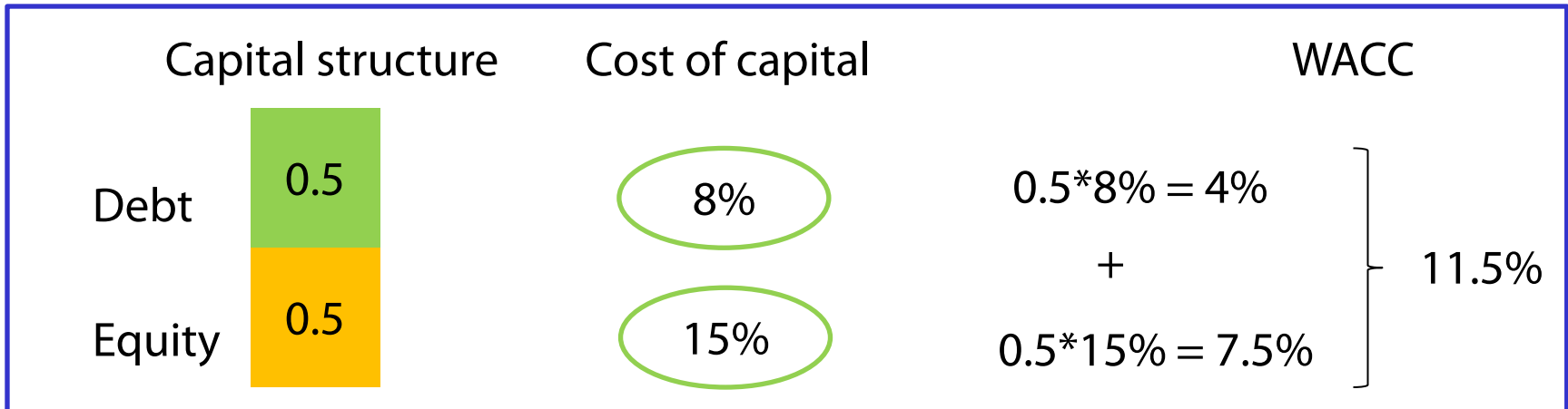
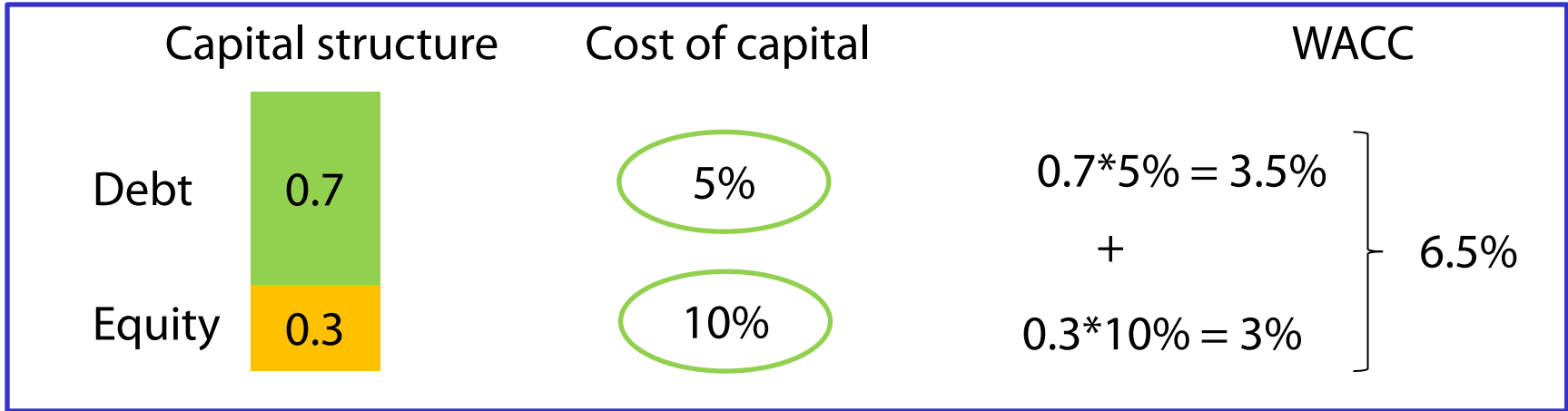
- The Weighted Average Capital Costs (WACC) combine the capital structure and the cost of debt and cost of equity in one number

$$r = WACC_{pretax} = \text{Equity share} * k_E + \text{Debt share} * k_D$$

$k_e$  = cost of equity  
 $k_d$  = cost of debt

	Capital structure	Cost of capital	WACC
Debt	0.7	5%	0.7*5% = 3.5%
			+
Equity	0.3	10%	0.3*10% = 3%
			} 6.5%

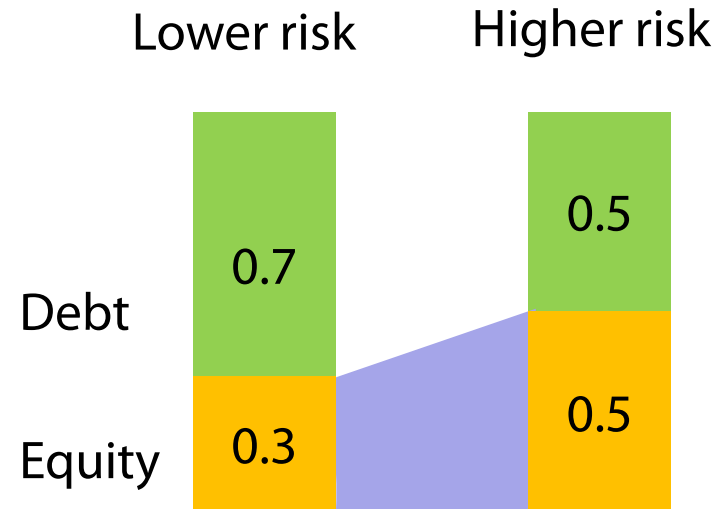
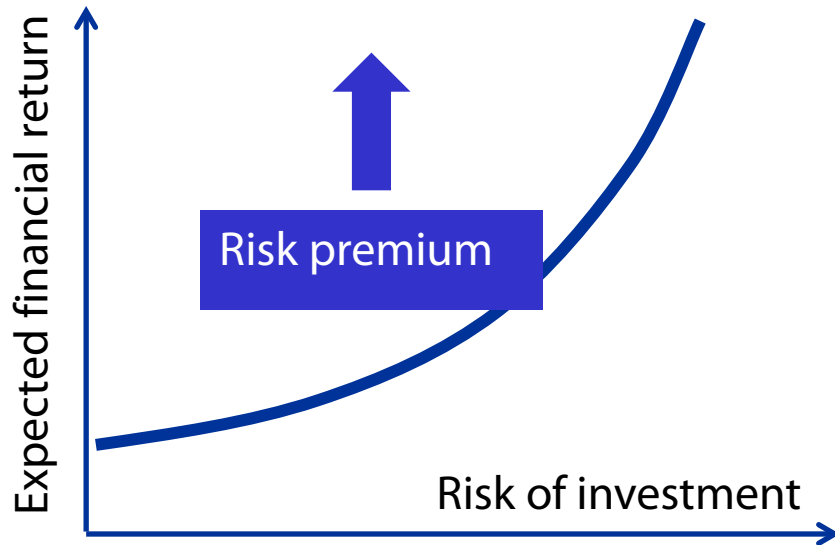
## Weighted Average Capital Cost (WACC) (2/2)



Which case would you prefer as investor or policy maker?

# The role of risk for WACC

- Higher risks increase the cost of capital, as investors (debt and equity) want to see more return
- Additionally banks are less willing to lend => more equity in capital structure



=> Higher risks increase the WACC in two ways

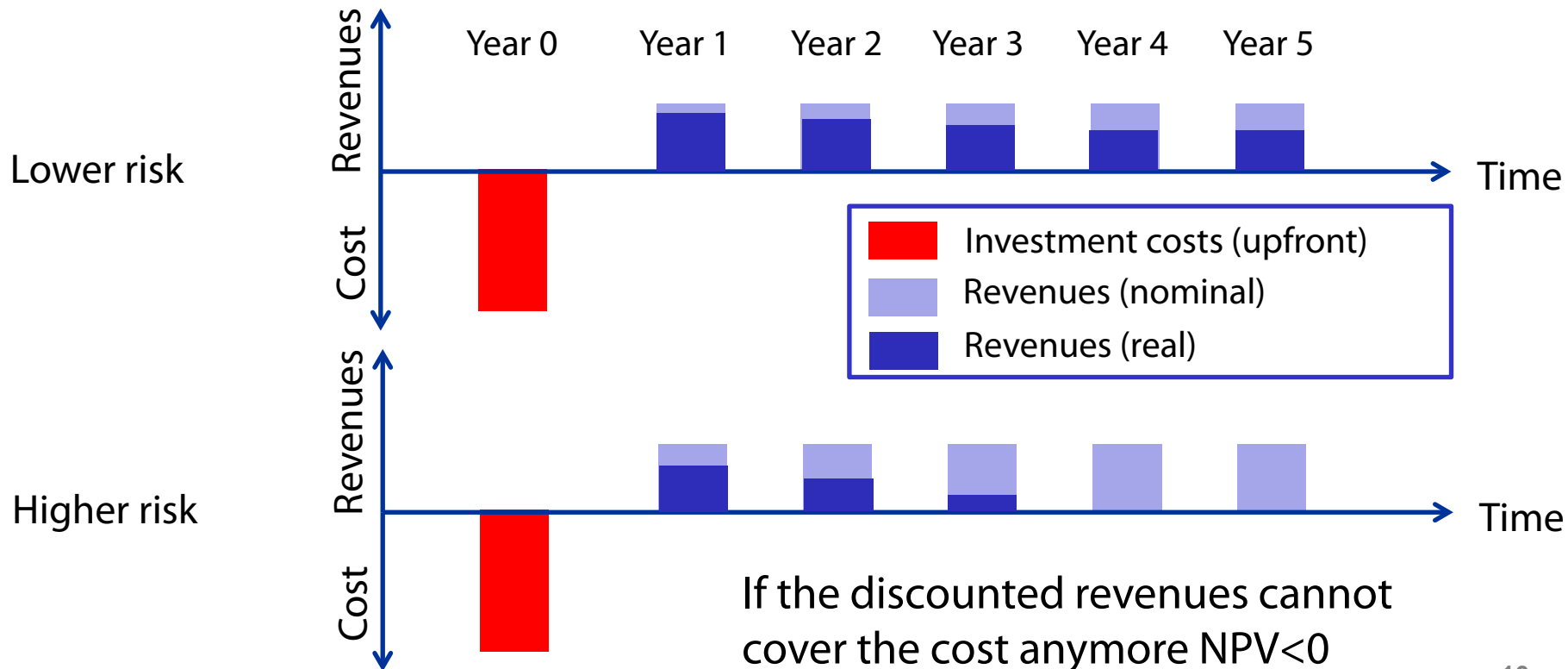
# The role of risk for NPV

- Higher risks results in higher WACC
- Higher WACC result in a lower NPV

$$NPV = investment_0 + \sum_{t=1}^n \frac{cashflow_t}{(1+r)^t}$$

r = cost of capital

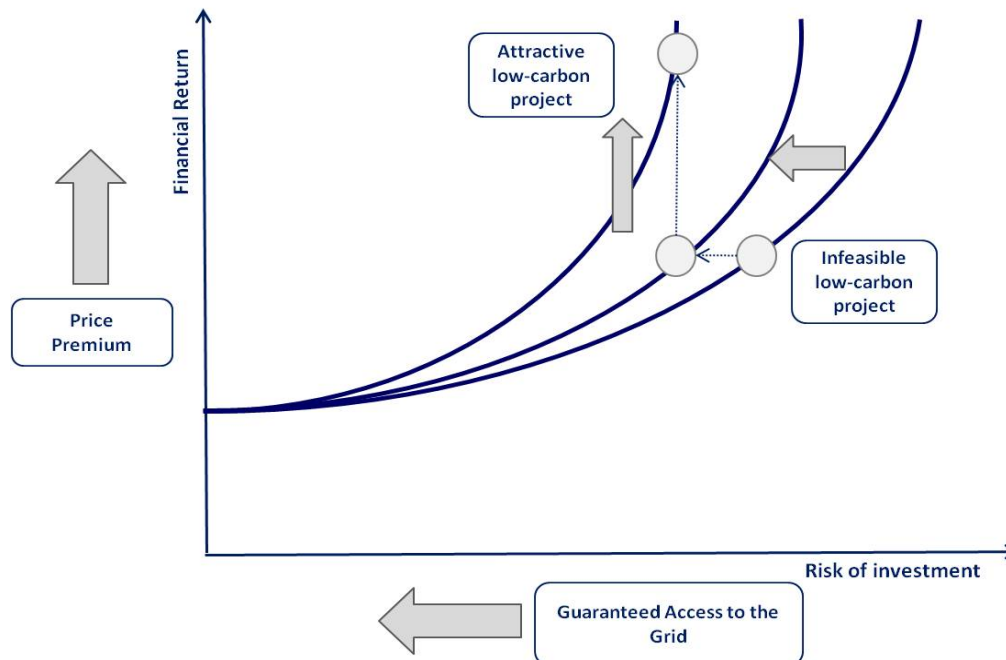
n = expected lifetime of investment



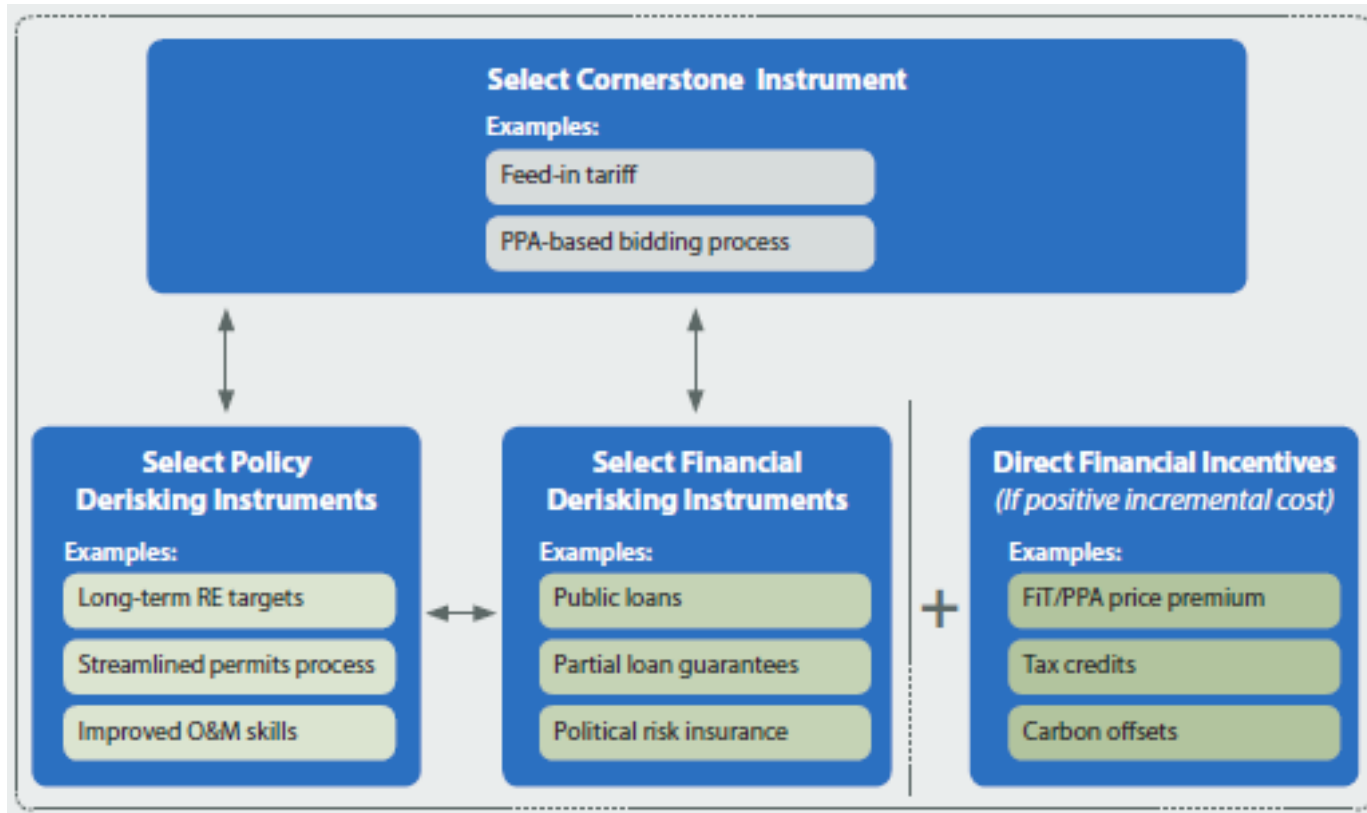


# Policy implications

- In order to attract investors risk-return profiles must be attractive
- NAMAs can provide such attractive risk-return profiles by addressing both return and risk (the CDM was a mere revenue instrument)

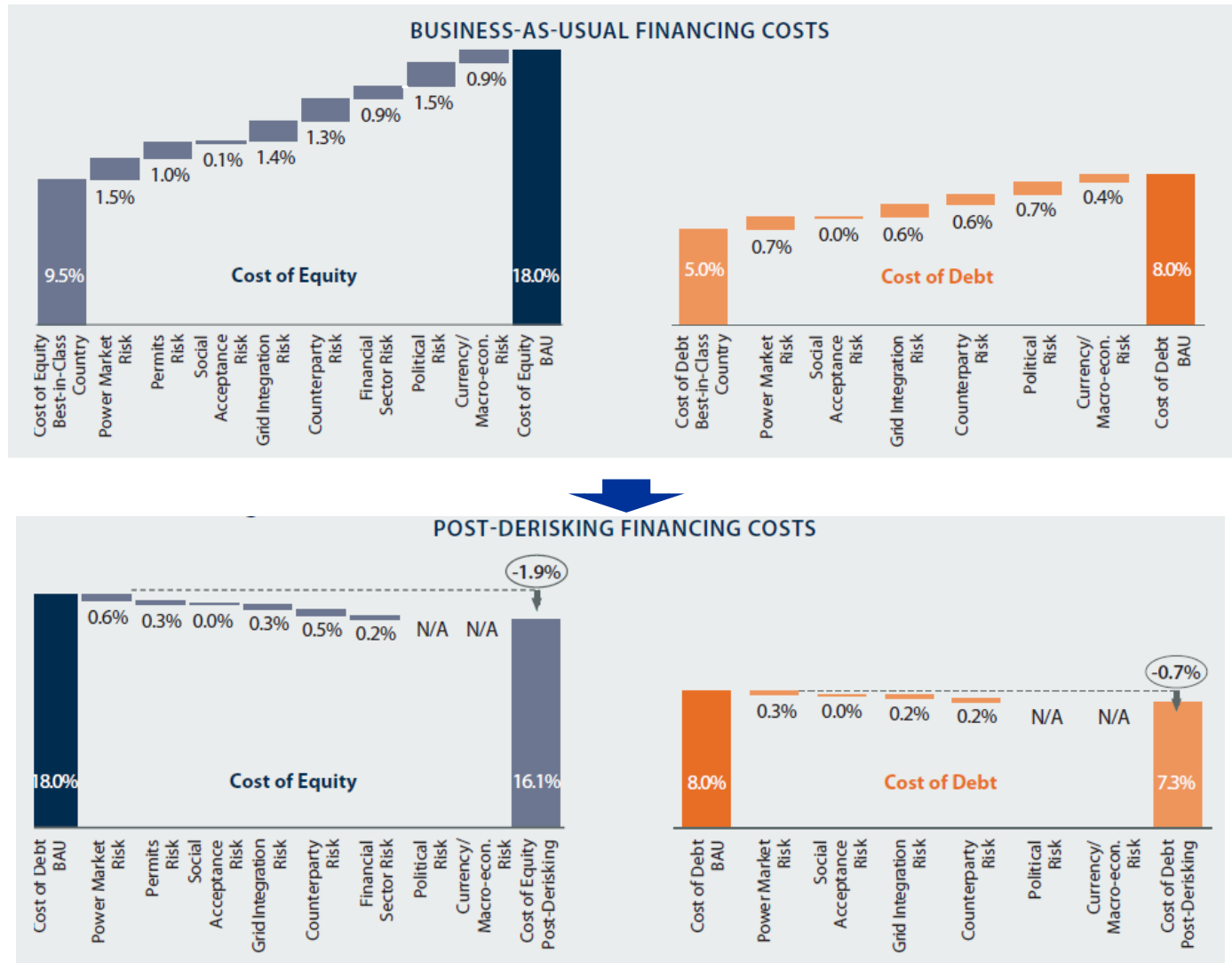


# Designing NAMAs that attract private investors



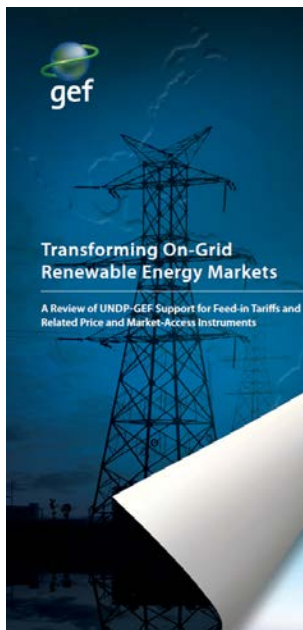
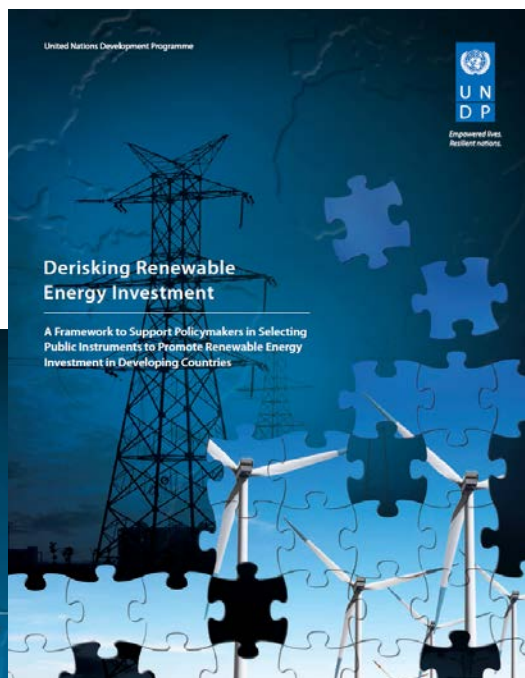
# Illustrative case-study – Mongolia (1 GW, wind)

## Risk waterfalls



Source: UNDP, *Derisking Renewable Energy Investment* (2013). Data obtained from interviews with wind investors and developers. See Annex A of the report for full assumptions. The post-derisking cost of debt and equity show the average impacts over a 20 year modelling period, assuming linear timing effects.

# Derisking Renewable Energy Investment Reports & Financial Tool



Available at [www.undp.org/DREI](http://www.undp.org/DREI)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	UNDP, VERSION 1.0 (APRIL 2013)																
2																	
3	<b>DERISKING RENEWABLE ENERGY INVESTMENT</b>																
4	<b>FINANCIAL TOOL</b>																
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10	<b>A. OVERVIEW</b>																
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12	This financial tool supports the framework presented in UNDP's Derisking Renewable Energy Investment report to assist policymakers in selecting public instruments to promote renewable energy investment. The financial tool calculates the levelised cost of electricity (LCOE) for a given country's baseline energy mix and the LCOE of onshore wind energy, before and after the introduction of public instruments.																
13																	
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16	Please go to UNDP's website to download the report, latest versions of this financial tool and other materials:																
17	<a href="http://www.undp.org/content/undp/en/home/library/energy/environment-energy/low_emission_cimaters/en/development/derisking-renewable-energy-investment/">http://www.undp.org/content/undp/en/home/library/energy/environment-energy/low_emission_cimaters/en/development/derisking-renewable-energy-investment/</a>																
18																	
19	<b>B. TABLE OF CONTENTS</b>																
20																	
21	This financial tool is organised into the following eight sheets:																
22																	
23	<b>I. Summary Outputs</b>																
24	<b>II. Inputs, Baseline Energy Mix</b>																
25	<b>III. Inputs, Wind Energy</b>																
26	<b>IV. LCOE, Baseline Energy Mix</b>																
27	<b>V. LCOE, Wind Energy</b>																
28	<b>VI. Additional Data</b>																
29	<b>VII. Supplementary Information</b>																
30	<b>VIII. User Notes</b>																
31																	
32	<b>C. IMPORTANT GUIDANCE</b>																
33																	
34	The following modelling conventions are used throughout this tool:																
35																	
36	<b>Input cells</b>																
37	- Input cells require the user to enter numeric data or to select an option from a drop-down menu.																
38	- Input cells are formatted in blue font. An example of the format is as follows: <input type="text" value="\$0"/>																
39	- Sometimes input cells may be formatted in purple font. This signifies that default input data is inserted to act as an initial guide. Users are invited to input their own data.																
40																	
41	<b>Output cells</b>																
42	- An output cell consists of a pre-existing formula. Do NOT enter data into an output cell. If the formula is overwritten, this could compromise the financial tool.																
43	- Output cells are formatted in black font.																
44																	
45	<b>Guidance comments</b>																
46	- The input sheets have a column with guidance comments. These comments provide explanatory notes, definitions and address common issues.																
47	- The column with guidance comments is initially hidden from view. To view the comments click on the ungroup symbol (which appears as a "-" sign) in the top right-hand corner of the sheet.																
48																	
49	<b>Checks</b>																
50	- Check cells will appear when there is an invalid entry of some sort. Check cells are formatted in red font. If it appears, the check cell provides guidance on how to rectify the invalid entry.																
51																	
52	<b>Protected sheets and cells</b>																
53	- In order to ensure that the tool maintains its functionality and formulae are not accidentally deleted and/or compromised, this tool is distributed with sheets and cells in 'protected' mode.																
54	Introduction   I. Summary Outputs   II. Inputs, Baseline Energy Mix   III. Inputs, Wind Energy   IV. LCOE, Baseline Energy Mix   V. LCOE, Wind																
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