

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

Part 2: deep dive into the investor logic

UNFCCC Asia Pacific Regional Workshop on NAMAs

Vientiane/Lao PDR, April 24, 2014
Speaker: Tobias Schmidt, ETH Zurich

To invest, or not to invest?



Cash flow?

Net present value?

Capital structure?

Risk?

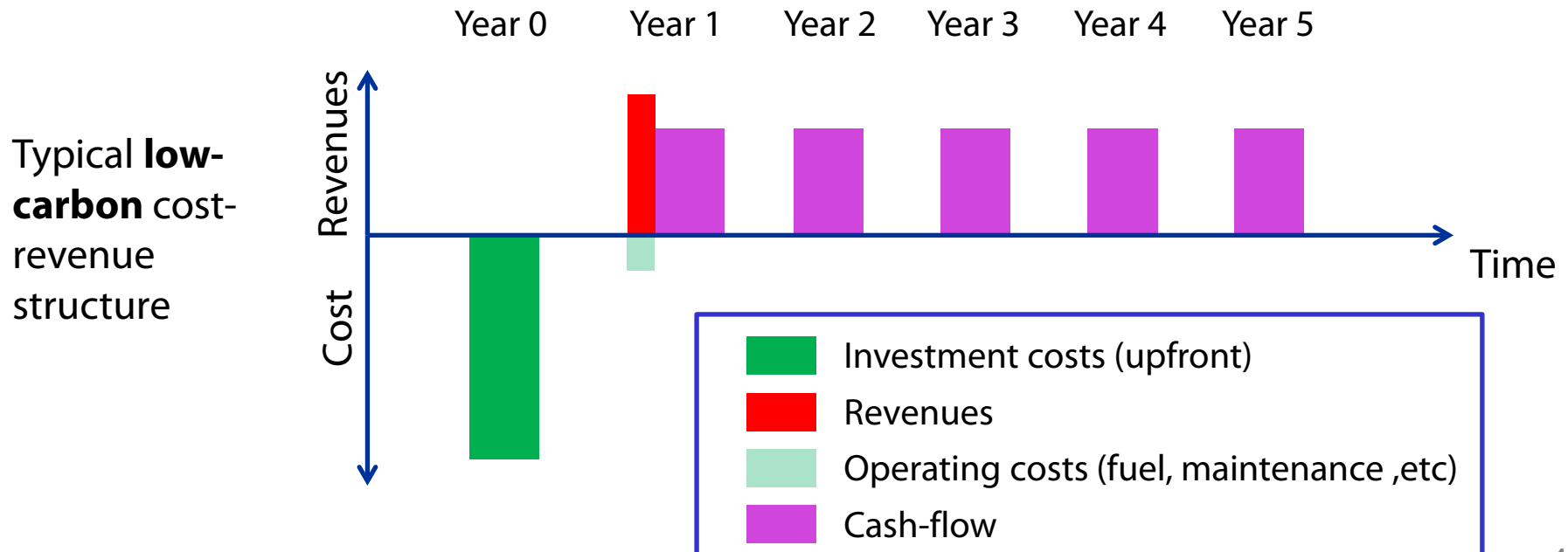
What to consider when designing NAMAs?

Aims of this 2nd part

- 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

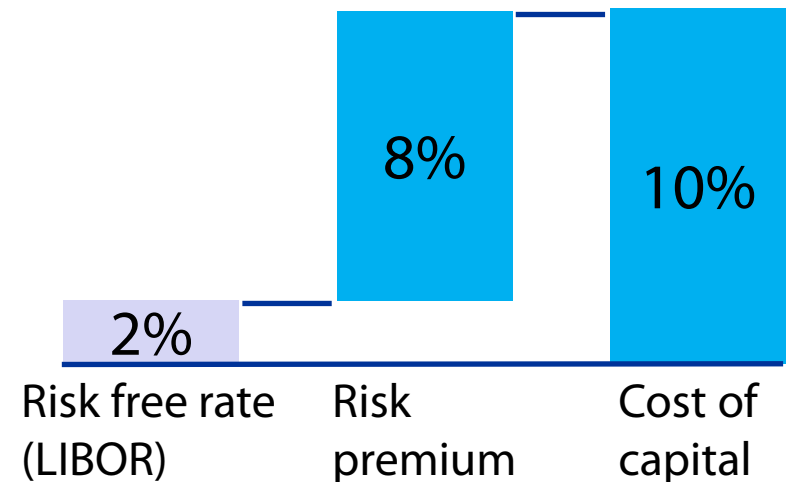
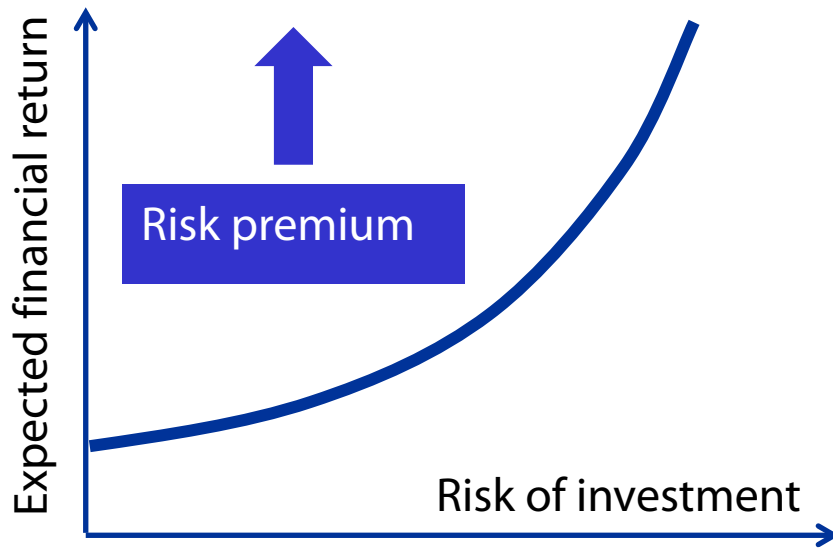
Cash-flow: nominal

- Cash-flow is the sum of expenses and revenues over a period of time (e.g., a project's lifetime)
- Investors need to maintain liquidity => cash-flow matters
- Important: nominal cash-flow does not consider cost of capital



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



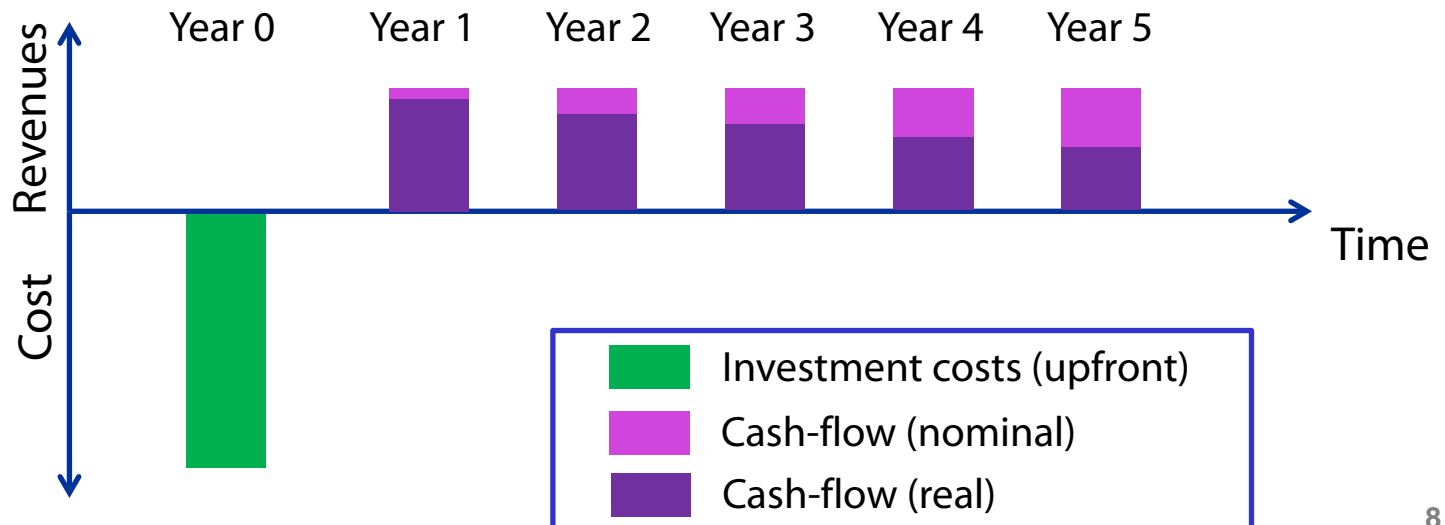
Cash-flow: real

- The real cash flow is the nominal cash flow corrected for the cost of capital
- The following formula is used to convert the nominal to the real cash flow

$$real\ cashflow = \frac{nominal\ cashflow}{(1 + r)^t};$$

$r = \text{cost of capital}$
 $t = \text{year of cash-flow}$

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

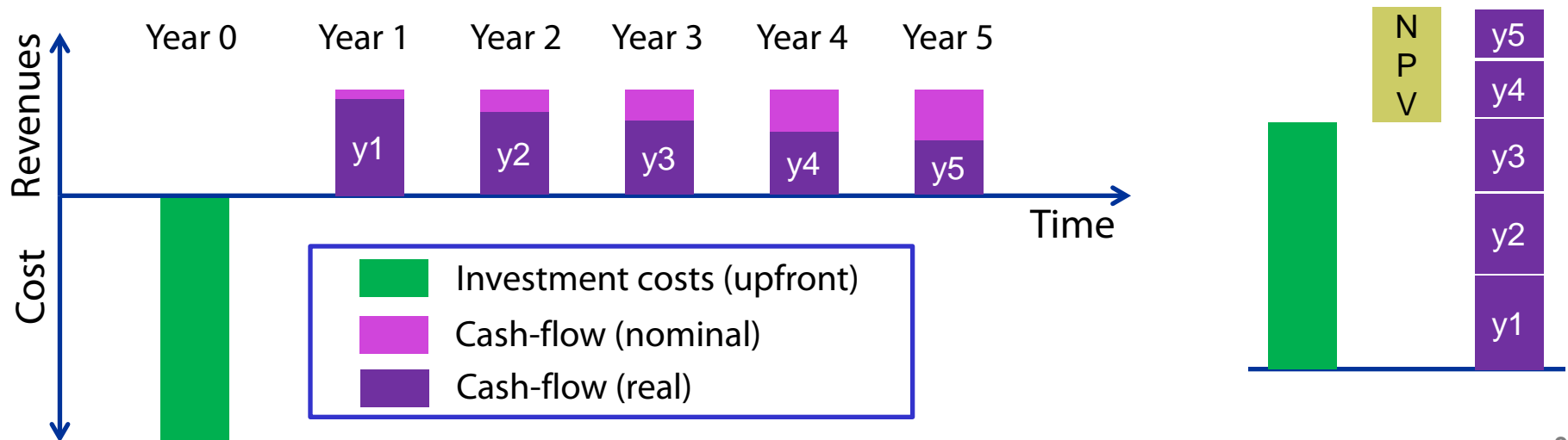


Net Present Value (NPV) (1/2)

- Is the sum of the discounted cash-flow over life time minus upfront investments
- 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
- When NPV=0, all costs (including cost of capital) are covered; this corresponds to the profitability threshold (see LCOE in exercise)

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

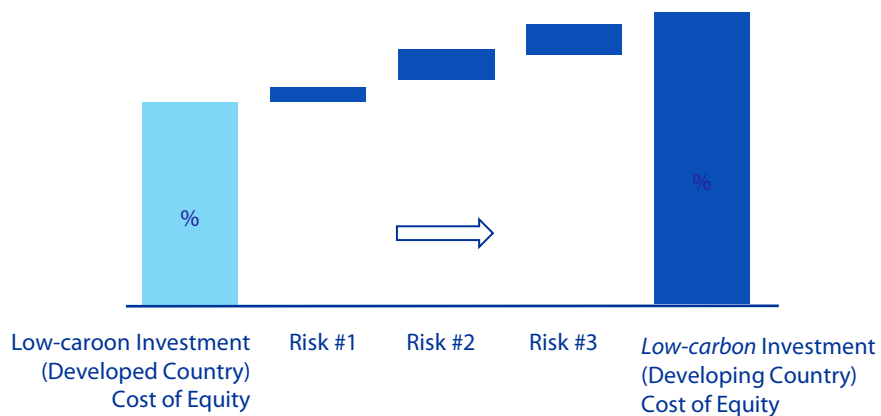
r = cost of capital
 t = year of cash-flow
 n = expected lifetime of investment



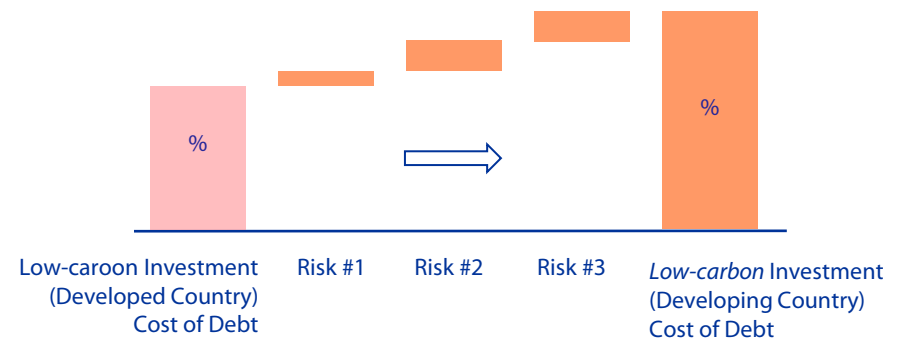
Cost of Capital (2/2)

- 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

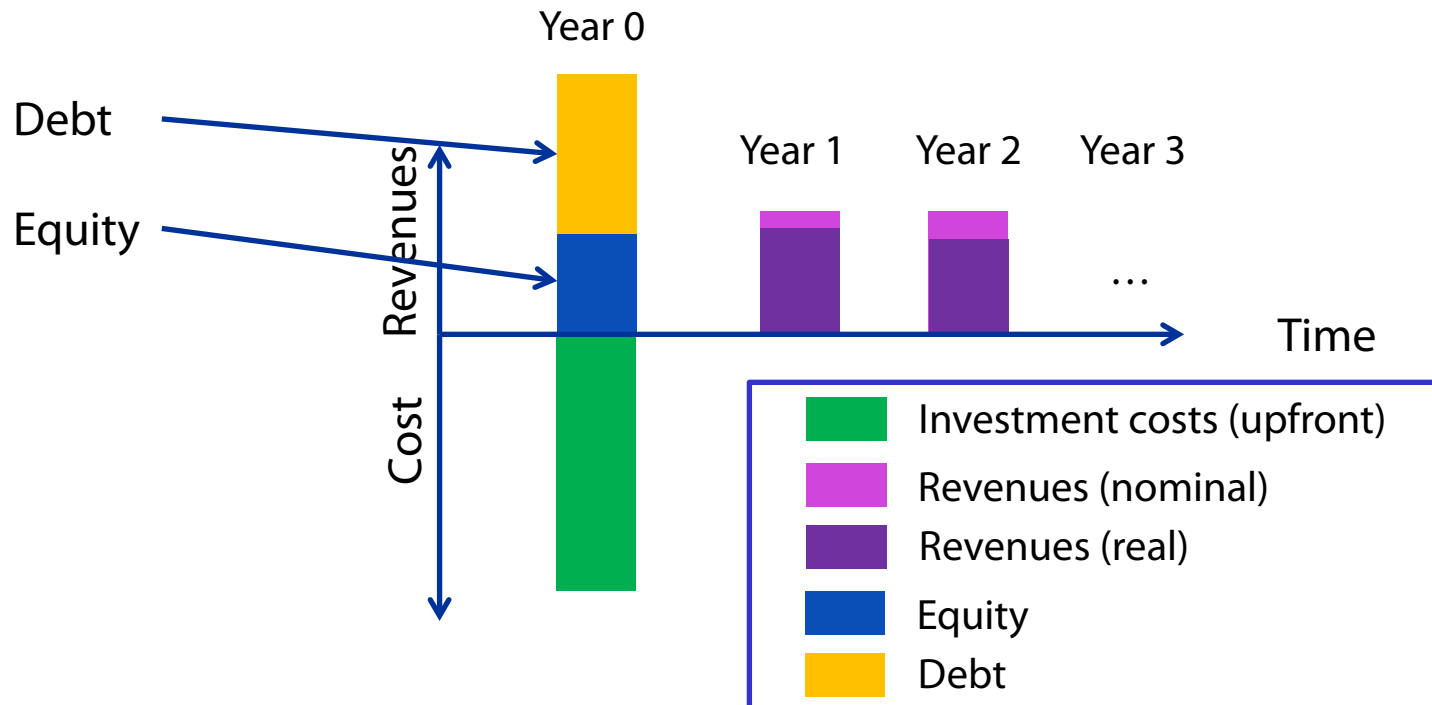


Cost of Debt



Capital Structure

- The capital structure indicates the share of debt and equity



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

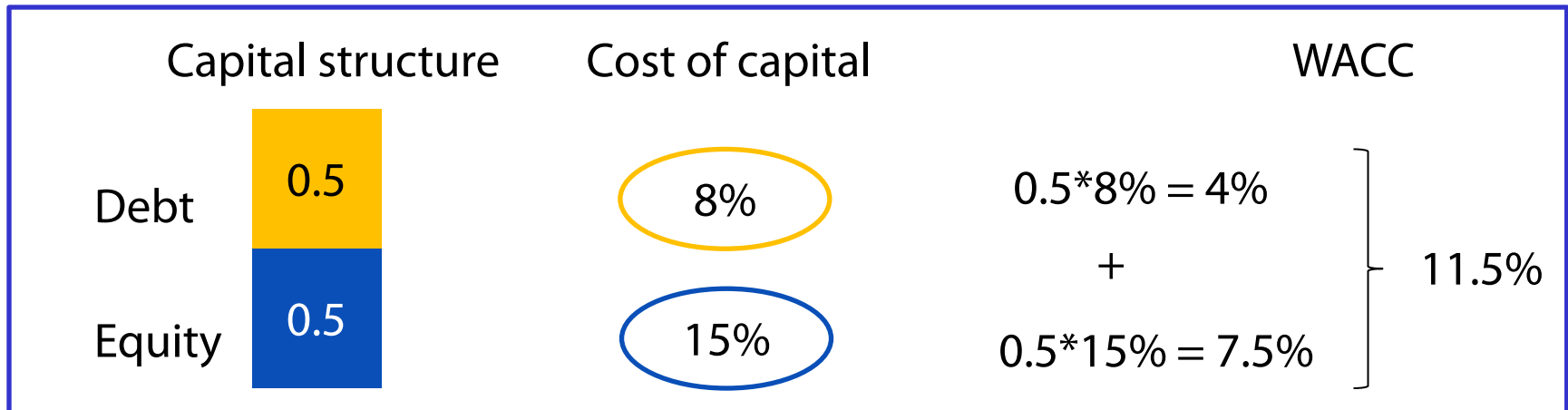
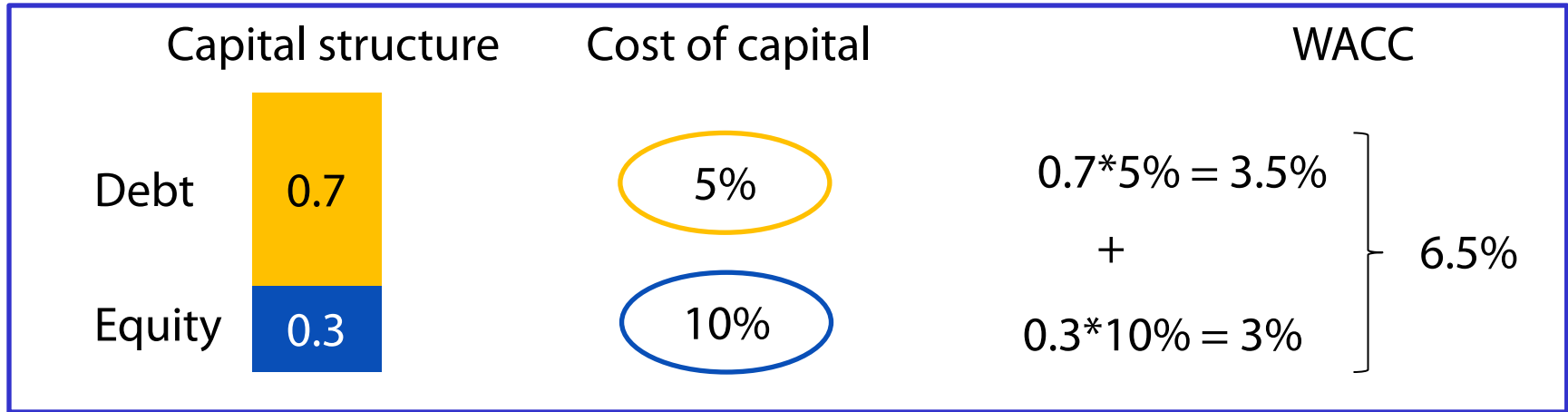
- The Weighted Average Capital Costs (WACC) combine the capital structure and the cost of debt and cost of equity in one number

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

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)



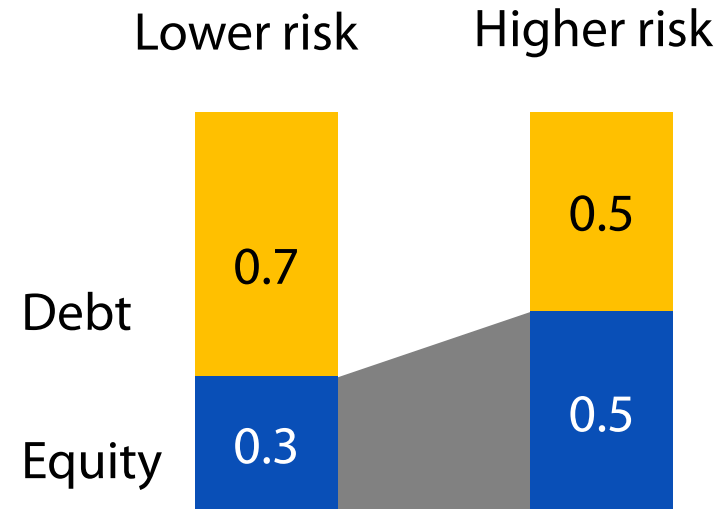
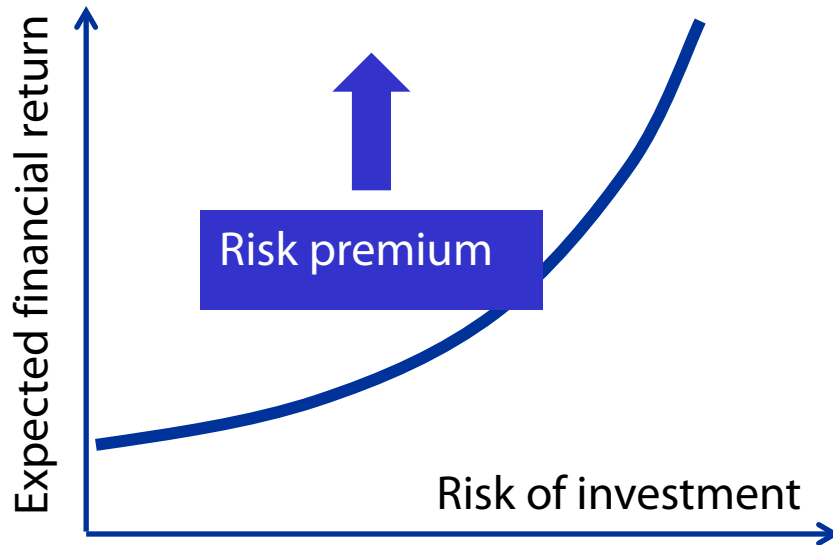
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Which case would you prefer as investor or policy maker?

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*

* Risk can also affect other financing terms (e.g., the loan tenor) and thereby even further increase the financing costs

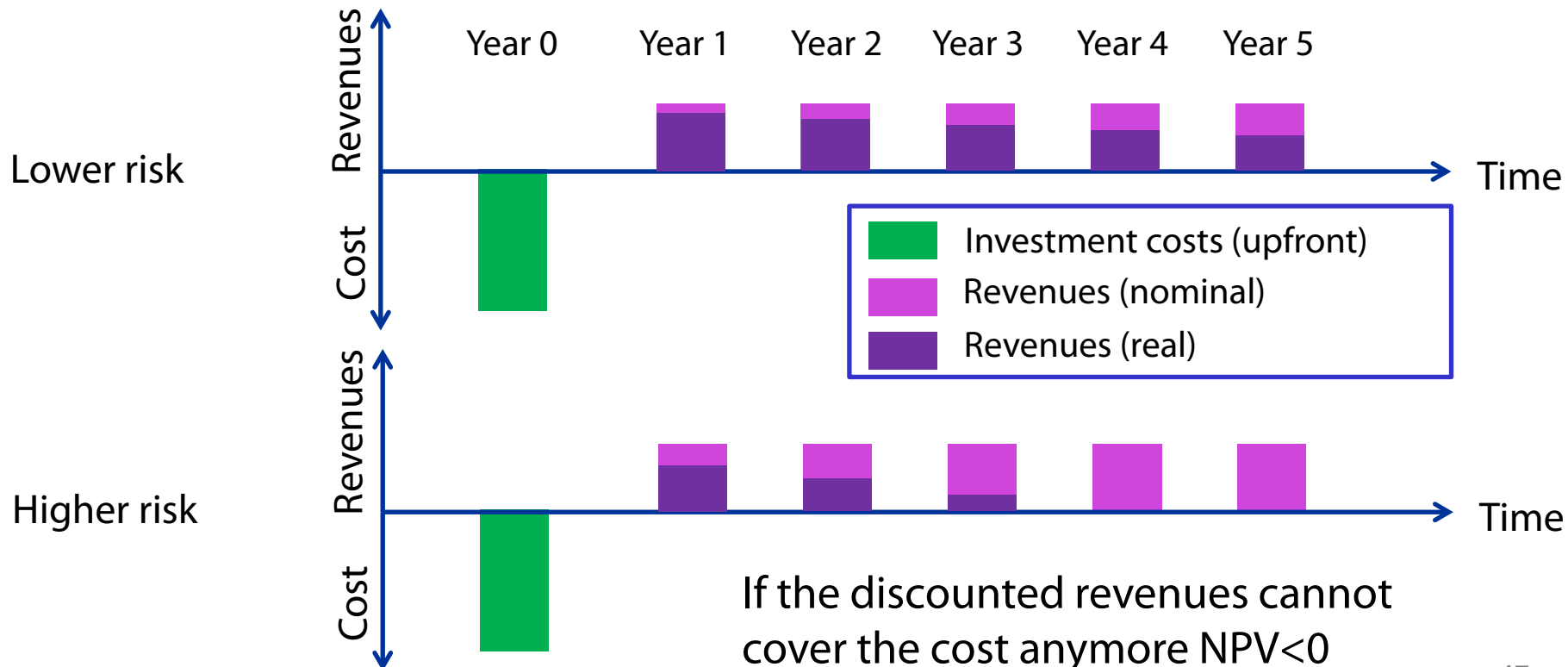
The role of risk for NPV

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

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

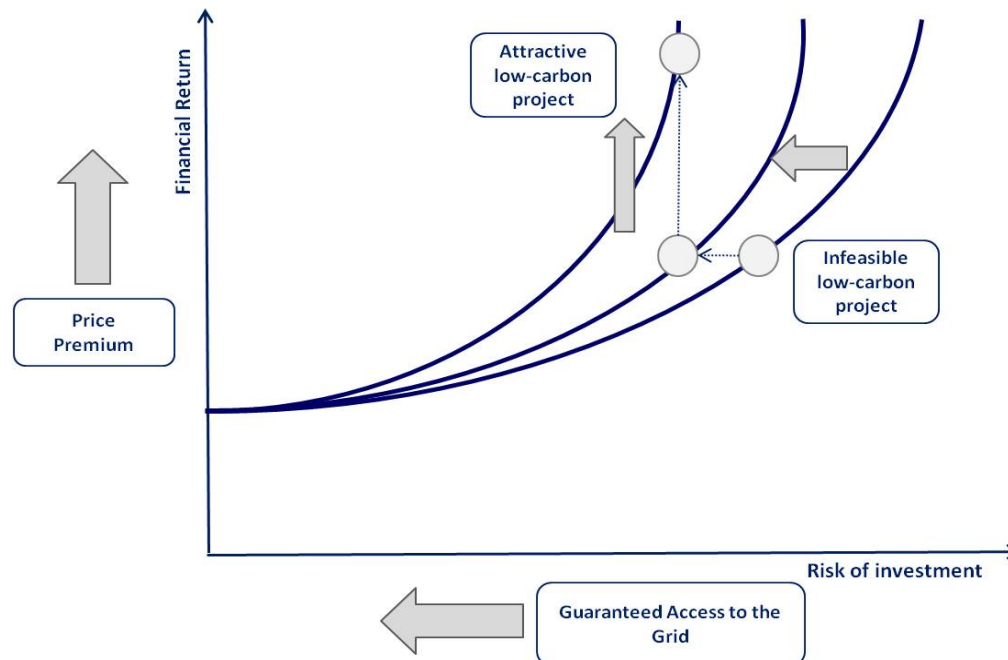
r = cost of capital

n = expected lifetime of investment

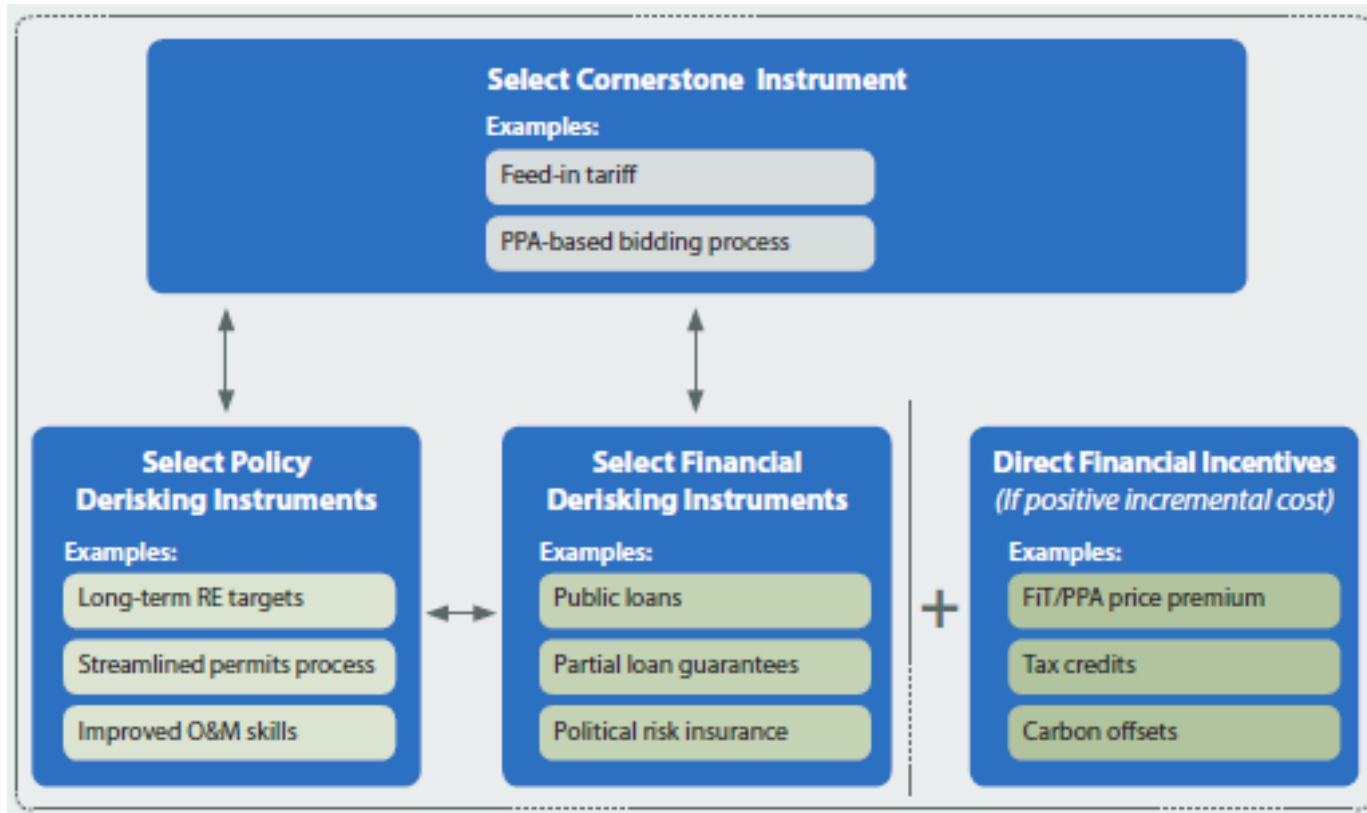


Policy implications

- 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 revenue-increasing instrument)

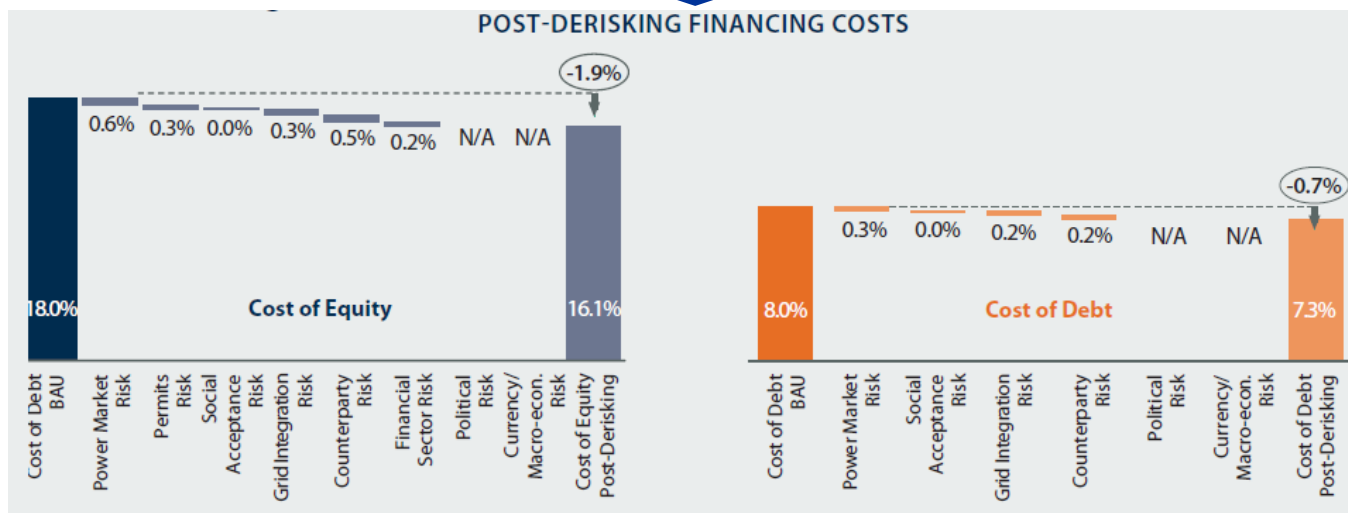
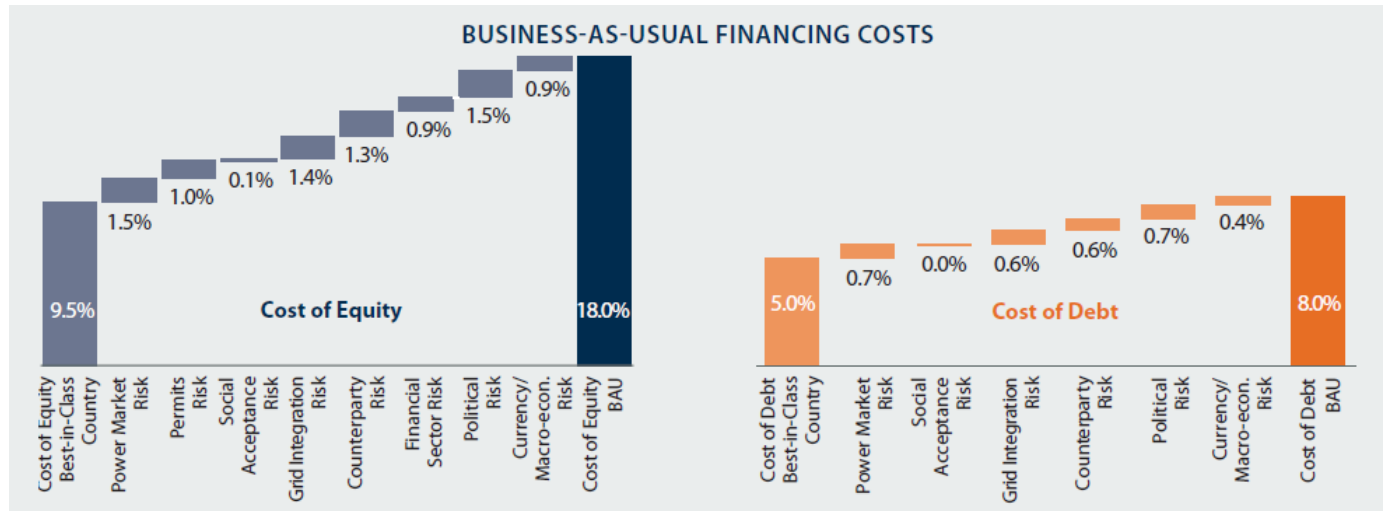


Designing NAMAs that attract private investors



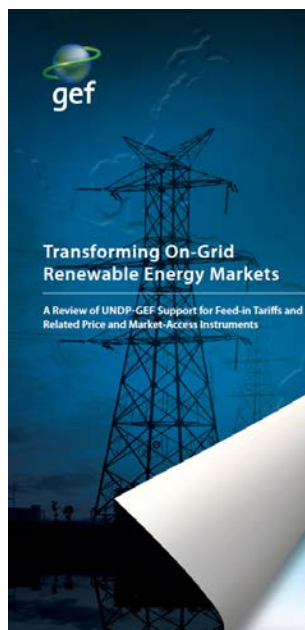
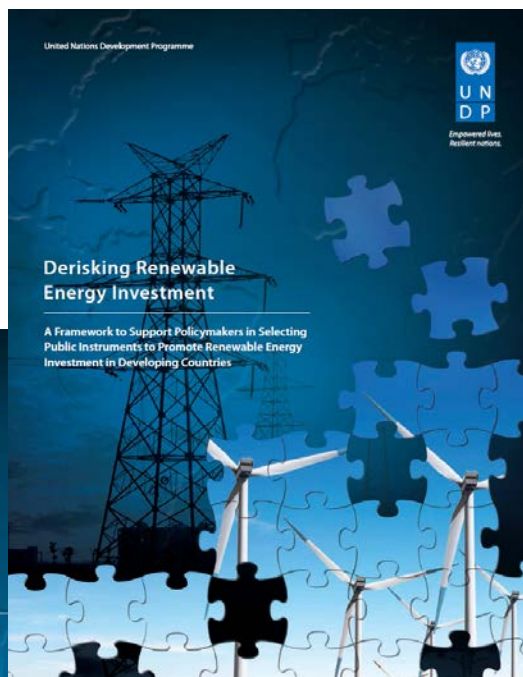
Illustrative case-study – Mongolia (1 GW, wind)

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

	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	DERISKING RENEWABLE ENERGY INVESTMENT																
4	FINANCIAL TOOL																
5																	
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10	A. OVERVIEW																
11																	
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																	
14	Please go to UNDP's website to download the report, latest versions of this financial tool and other materials:																
15	http://www.undp.org/content/undp/en/home/library/energy/environment-energy/low_emission_cimaters/levelised_cost_of_electricity_derisking_renewable_energy_investment/																
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19	B. TABLE OF CONTENTS																
20																	
21	This financial tool is organised into the following eight sheets:																
22																	
23	I. Summary Outputs																
24	II. Inputs, Baseline Energy Mix																
25	III. Inputs, Wind Energy																
26	IV. LCOE, Baseline Energy Mix																
27	V. LCOE, Wind Energy																
28	VI. Additional Data																
29	VII. Supplementary Information																
30	VIII. User Notes																
31																	
32	C. IMPORTANT GUIDANCE																
33																	
34	The following modelling conventions are used throughout this tool:																
35																	
36	Input cells																
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	Output cells																
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	Guidance comments																
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	Checks																
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	Protected sheets and cells																
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																
Ready																	