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?
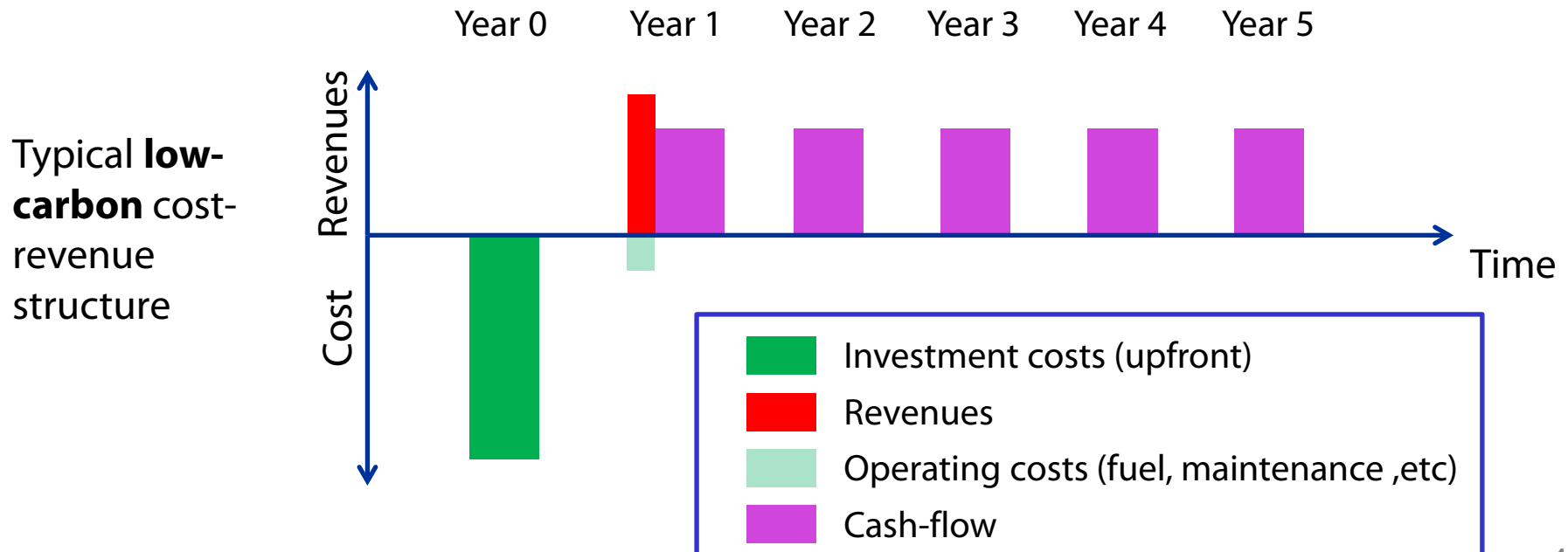Capital structure?
Risk?

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

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

Legend:
- Investment costs (upfront)
- Revenues
- Operating costs (fuel, maintenance ,etc)
- Cash-flow

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
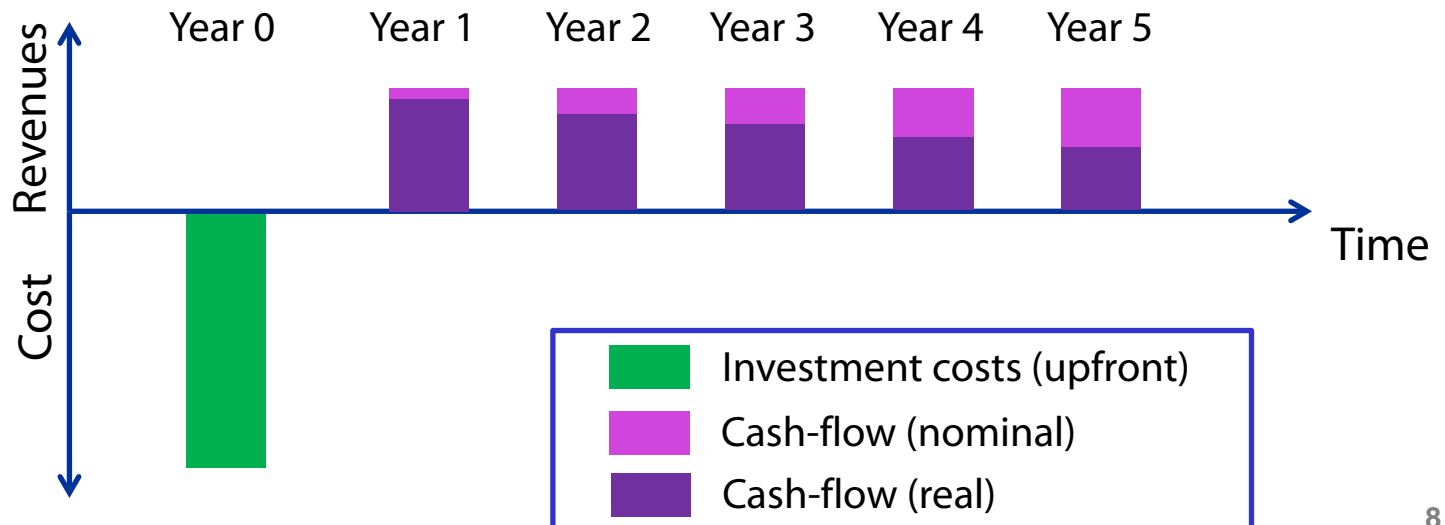
Sources: UNDP, ETH Zurich
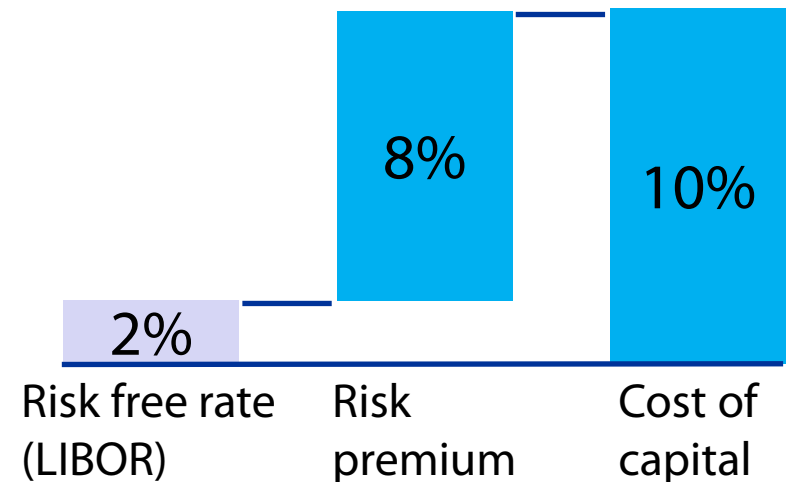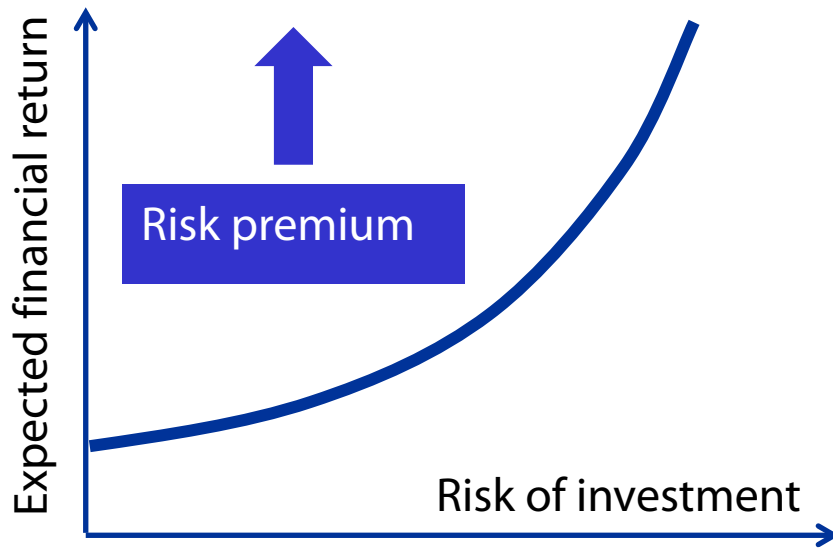
Cash-flow: real

- 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

$$real\ cashflow = \frac{nominal\ cashflow}{(1+r)^t}; \quad \begin{array}{l} r = \text{cost of capital} \\ t = \text{year of cash-flow} \end{array}$$

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

Legend:
- Investment costs (upfront)
- Cash-flow (nominal)
- Cash-flow (real)

Source: ETH Zurich, UNDP

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

Source: ETH Zurich, UNDP
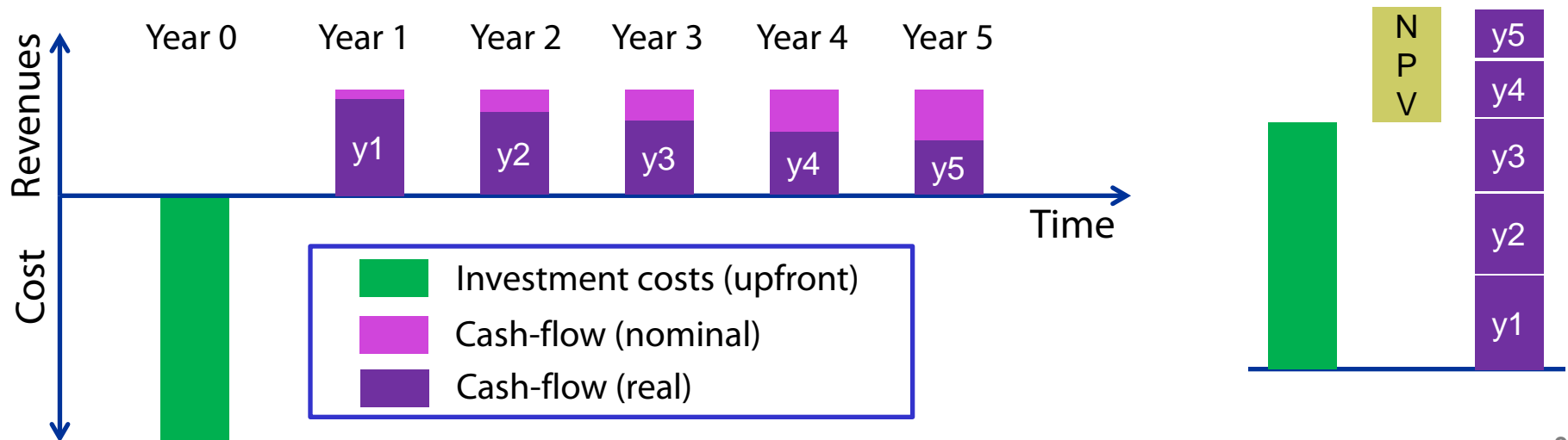
Cost of Capital (2/2)

- 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

Low-caroon Investment
(Developed Country)
Cost of Equity

Risk #1 Risk #2 Risk #3

Low-carbon Investment
(Developing Country)
Cost of Equity

Cost of Debt

Low-caroon Investment
(Developed Country)
Cost of Debt

Risk #1 Risk #2 Risk #3

Low-carbon Investment
(Developing Country)
Cost of Debt

Sources: UNDP, ETH Zurich
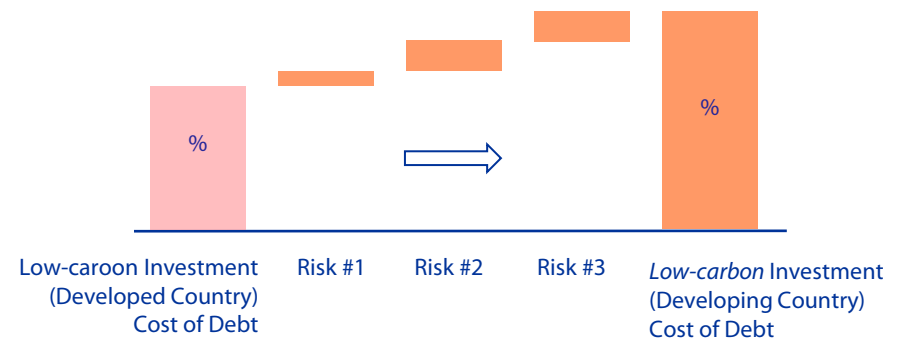
Capital Structure

- The capital structure indicates the share of debt and equity
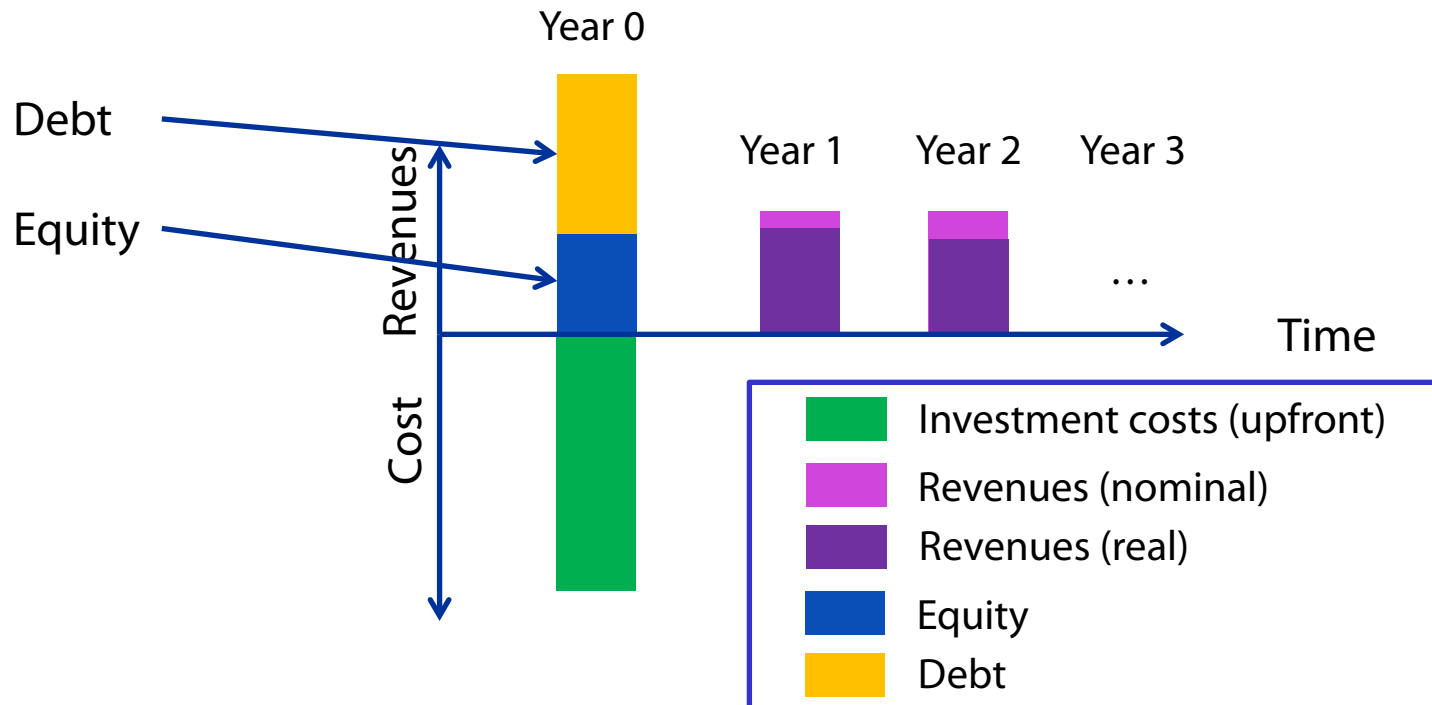
Weighted Average Capital Cost (WACC) (1/2)

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

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

k_e= cost of equity
k_d= cost of debt

Capital structure   Cost of capital   WACC

Debt   0.7

Equity   0.3

5%

10%

0.7*5% = 3.5%

+

0.3*10% = 3%

6.5%

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%

Capital structure		Cost of capital	WACC
Debt	0.5	8%	0.5*8% = 4%
			+
Equity	0.5	15%	0.5*15% = 7.5%

11.5%
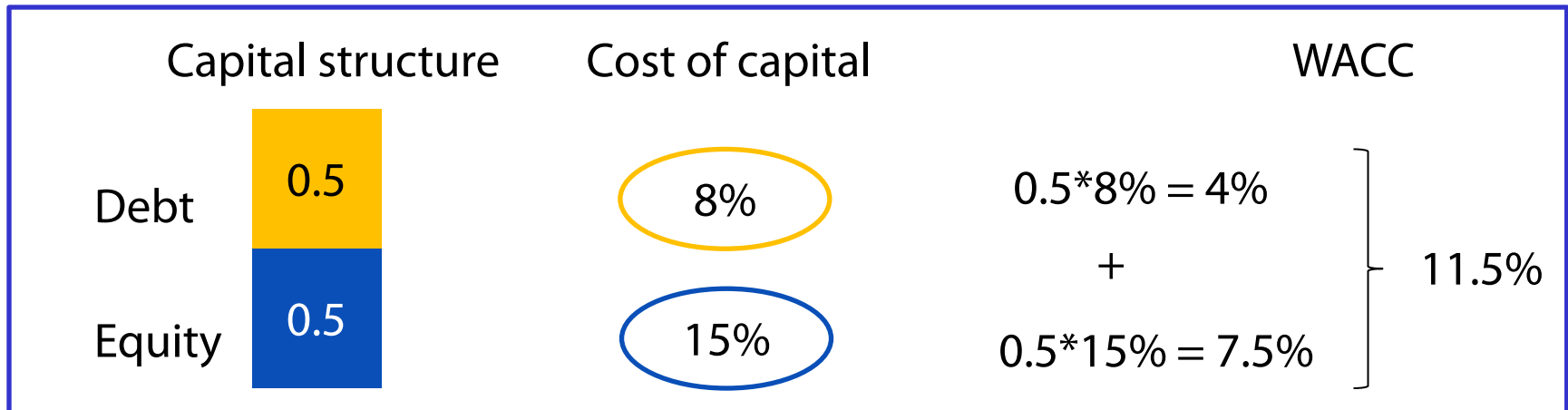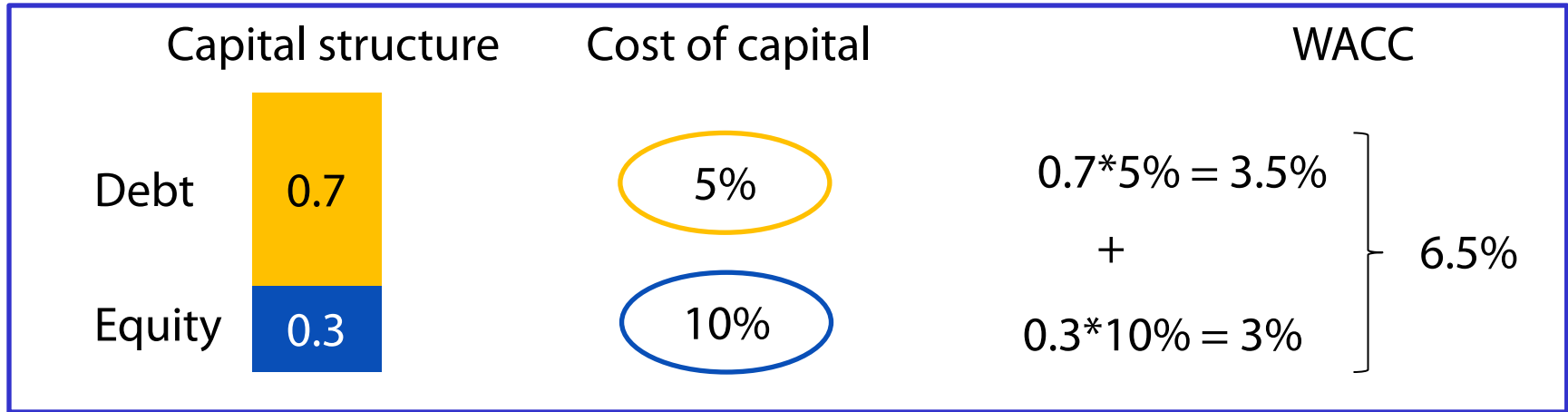
Which case would you prefer as investor or policy maker?

Source: ETH Zurich, UNDP

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

Lower risk **Higher risk**

Debt: 0.7 (lower risk), 0.5 (higher risk)
Equity: 0.3 (lower risk), 0.5 (higher risk)

Risk premium

Expected financial return — Risk of investment
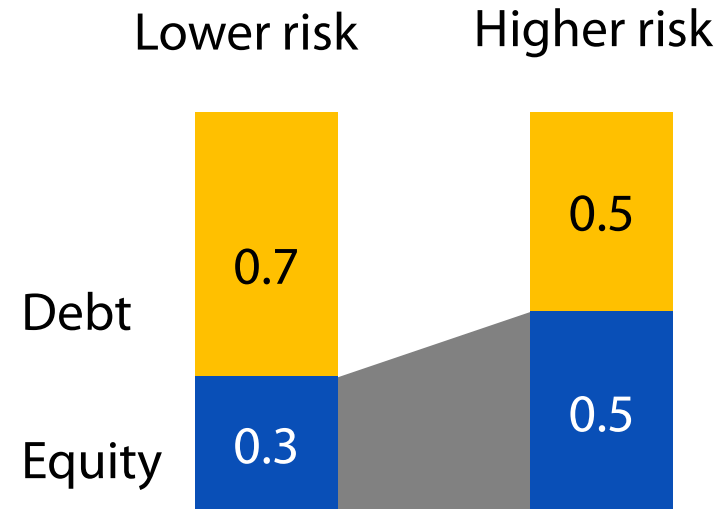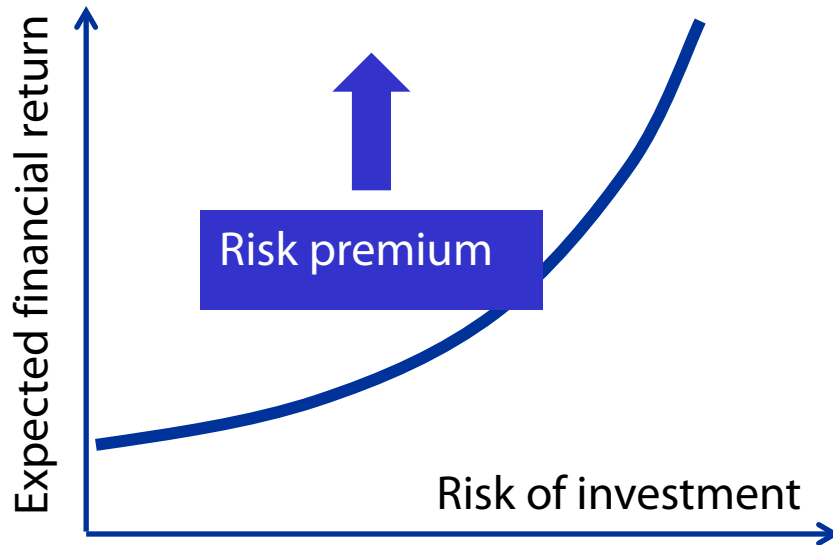
=> Higher risks increase the WACC in two ways*

* 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

Lower risk

Higher risk

Legend:
- Investment costs (upfront)
- Revenues (nominal)
- Revenues (real)

If the discounted revenues cannot cover the cost anymore NPV<0
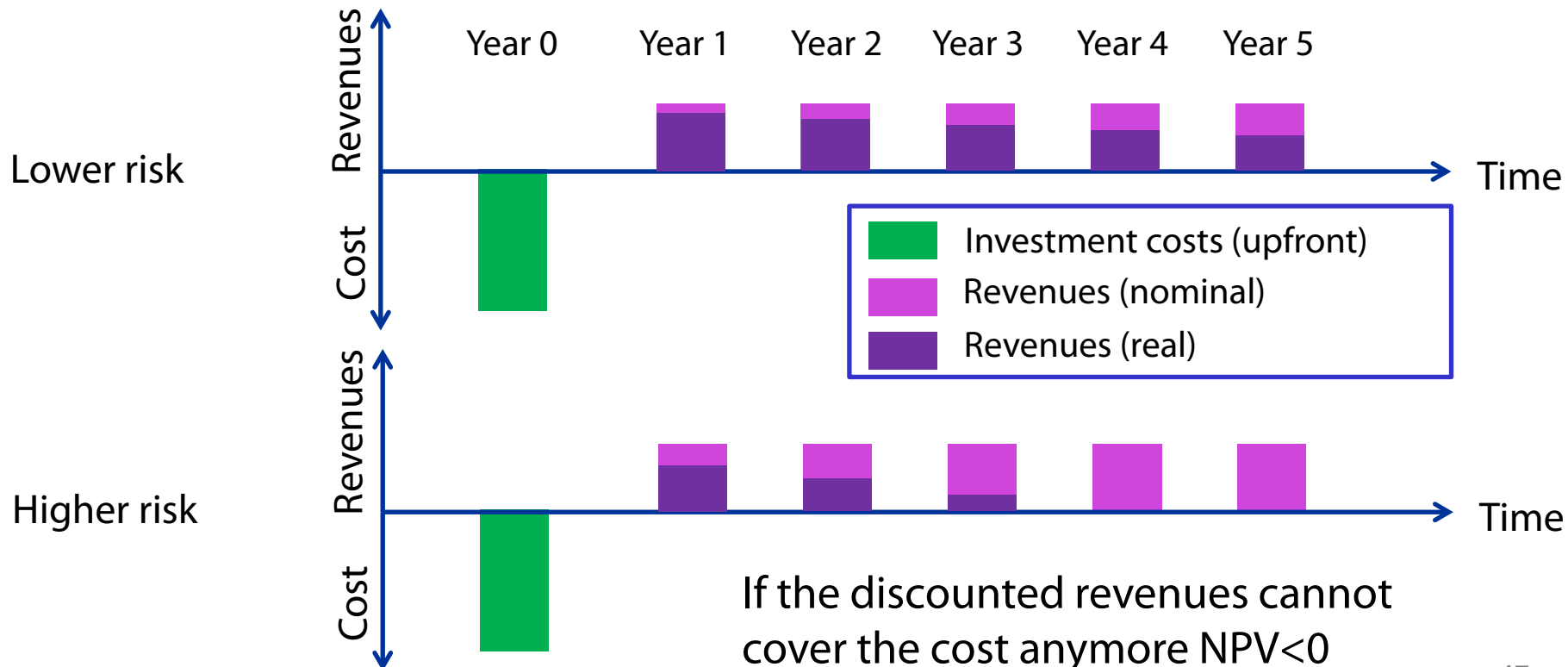
Policy implications

- 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)
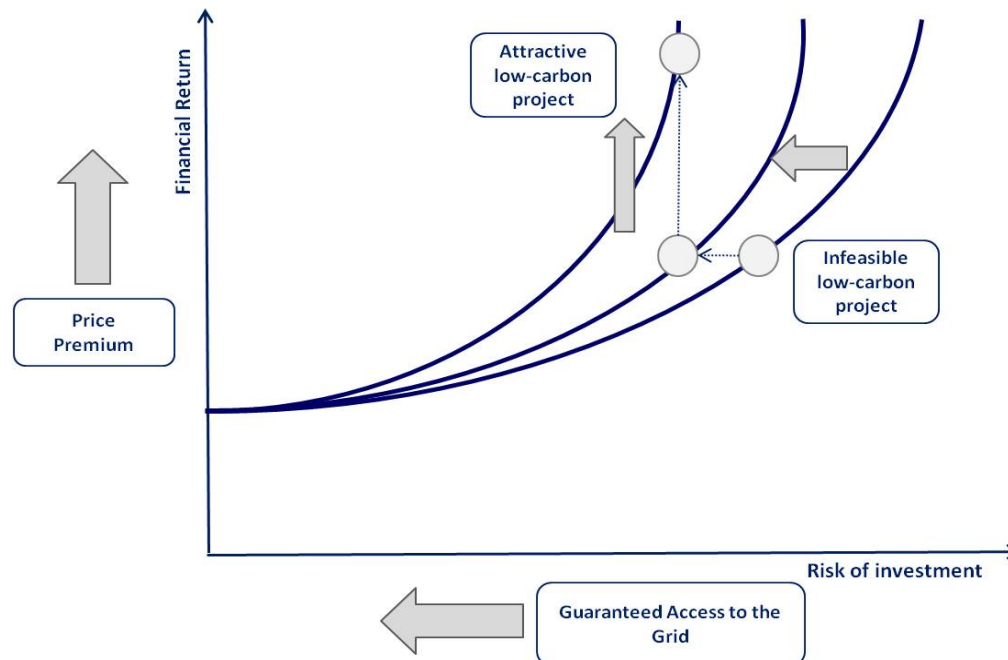
Designing NAMAs that attract private investors
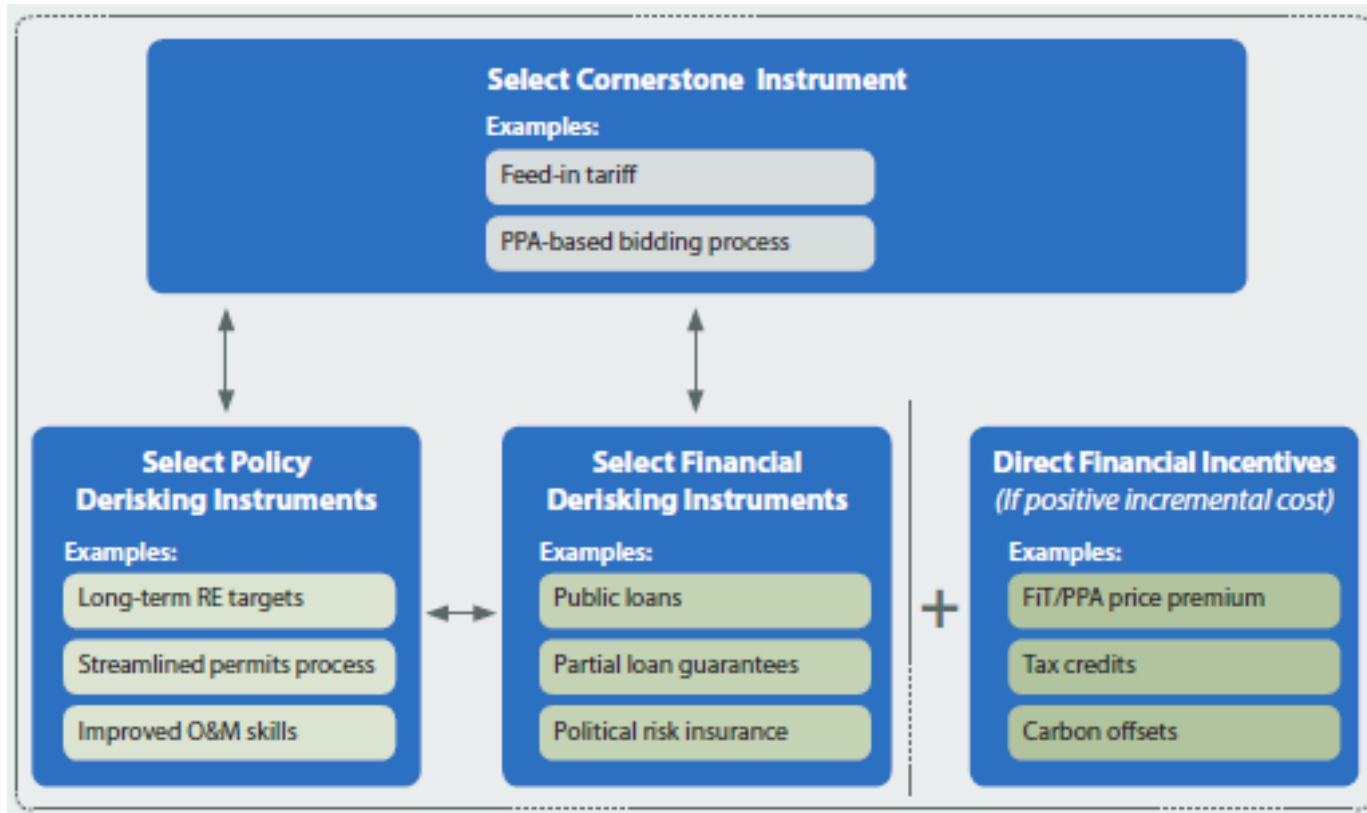
Illustrative case-study – Mongolia (1 GW, wind) Risk waterfalls
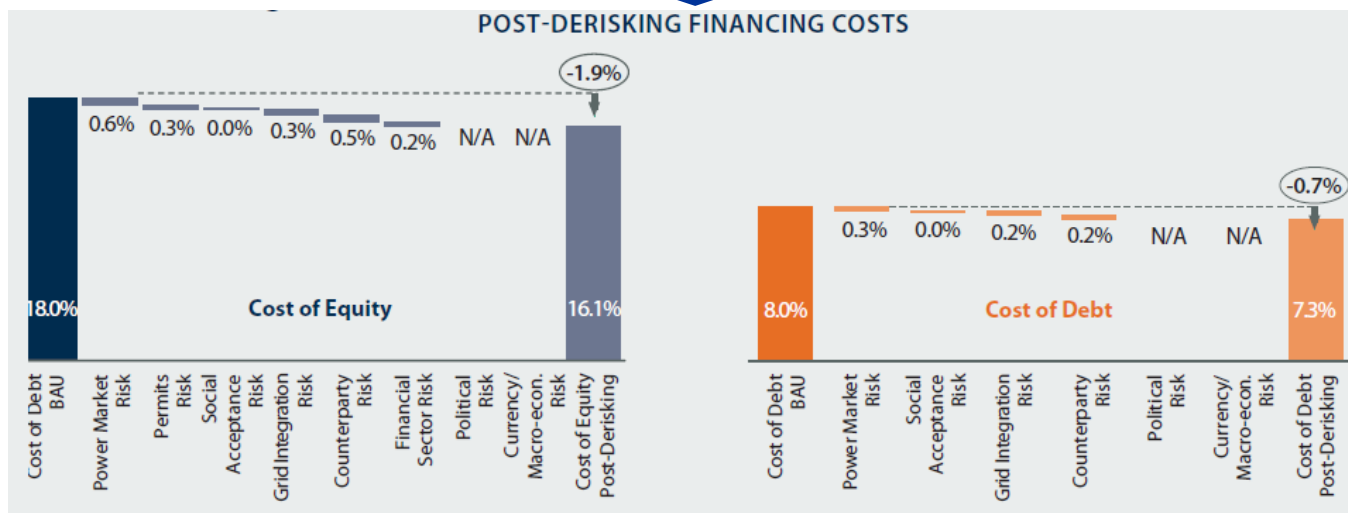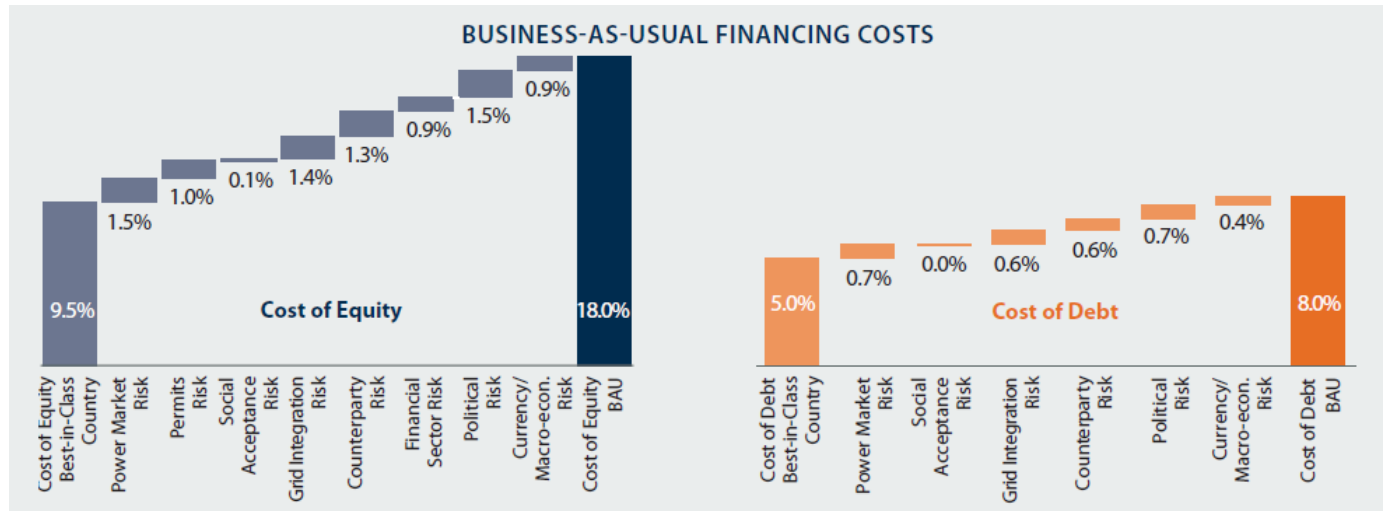
Derisking Renewable Energy Investment Reports & Financial Tool
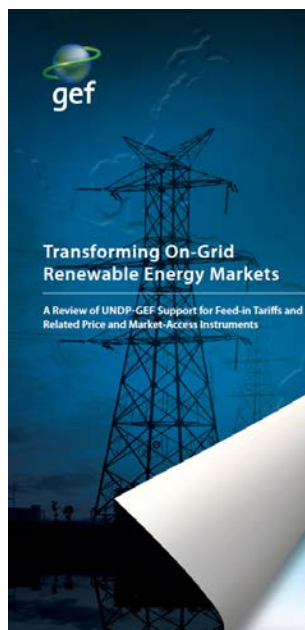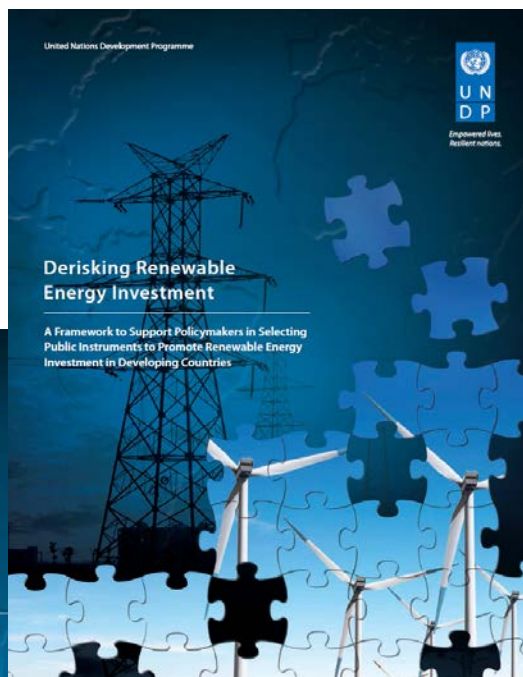
Available at **www.undp.org/DREI**