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

Part 2: Deep dive into investor logics

UNFCCC Asia Pacific and Eastern Europe Regional Workshop on Nationally Appropriate Mitigation Actions

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To invest, or not to invest?

Cash flow?
Net present value?
Capital structure?
Risk?

What to consider when designing NAMAs?

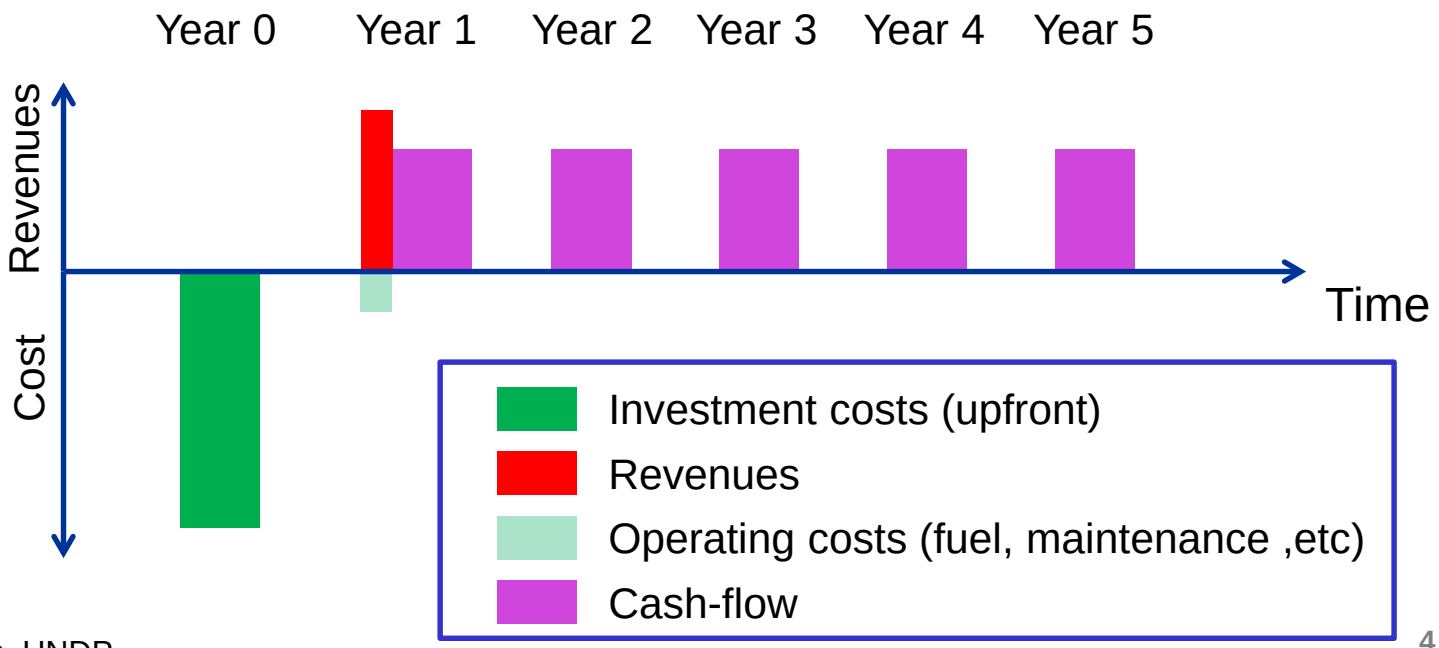
Aims of this 2nd part

- 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

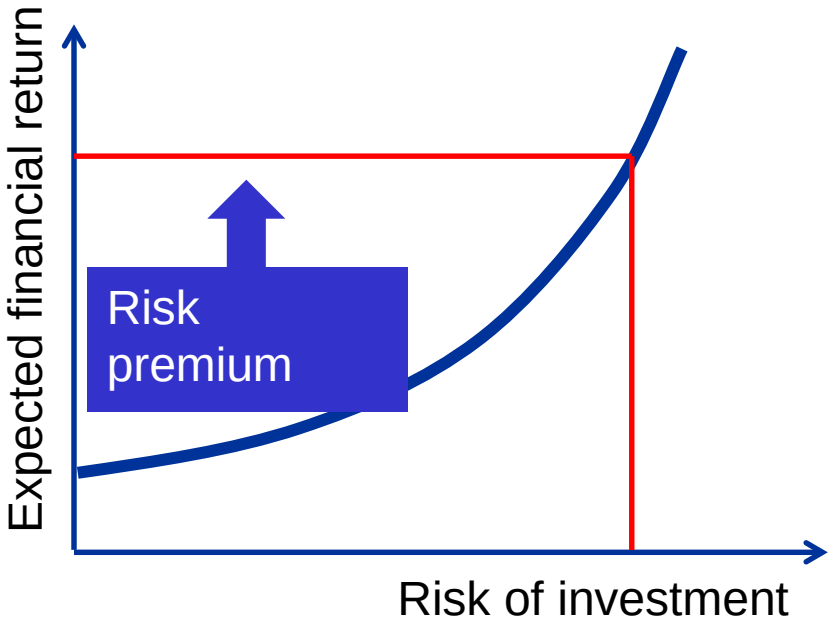
Typical **low-carbon** cost-revenue structure

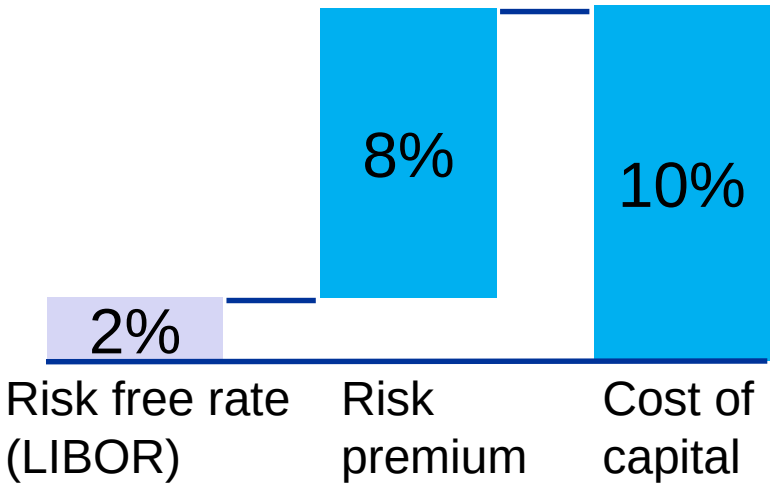


Source: EPG/ETH Zurich, UNDP

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





Source: EPG/ETH Zurich, UNDP

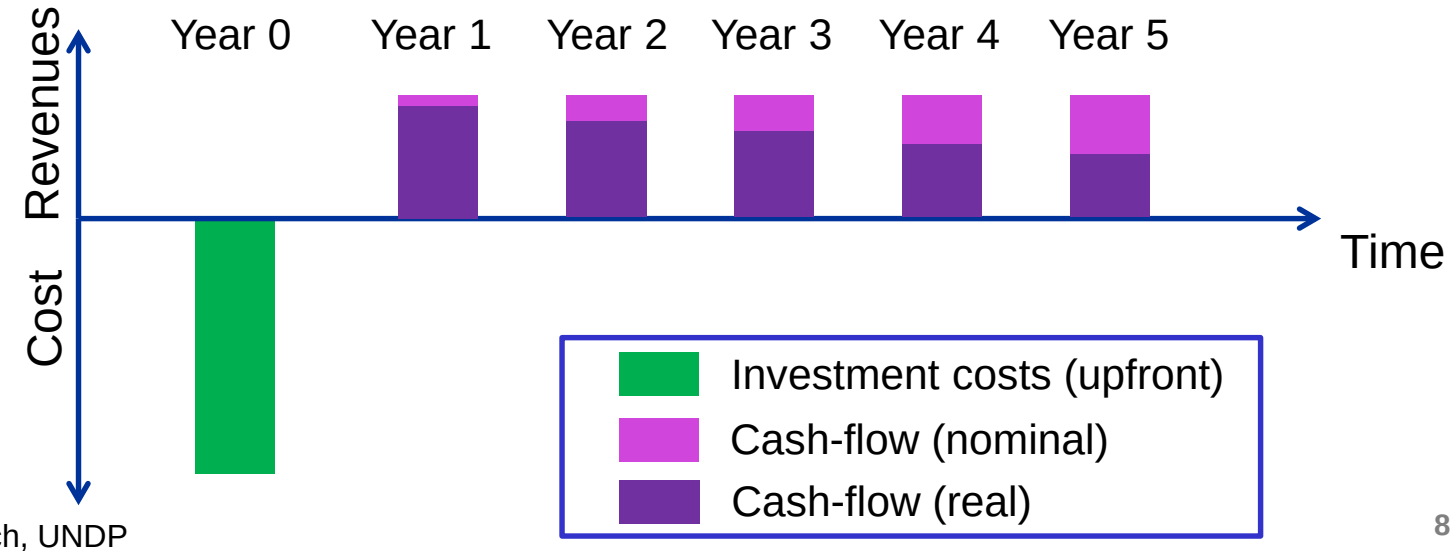
Cash-flow: real

- 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 = cost of capital
t = year of cash-flow

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



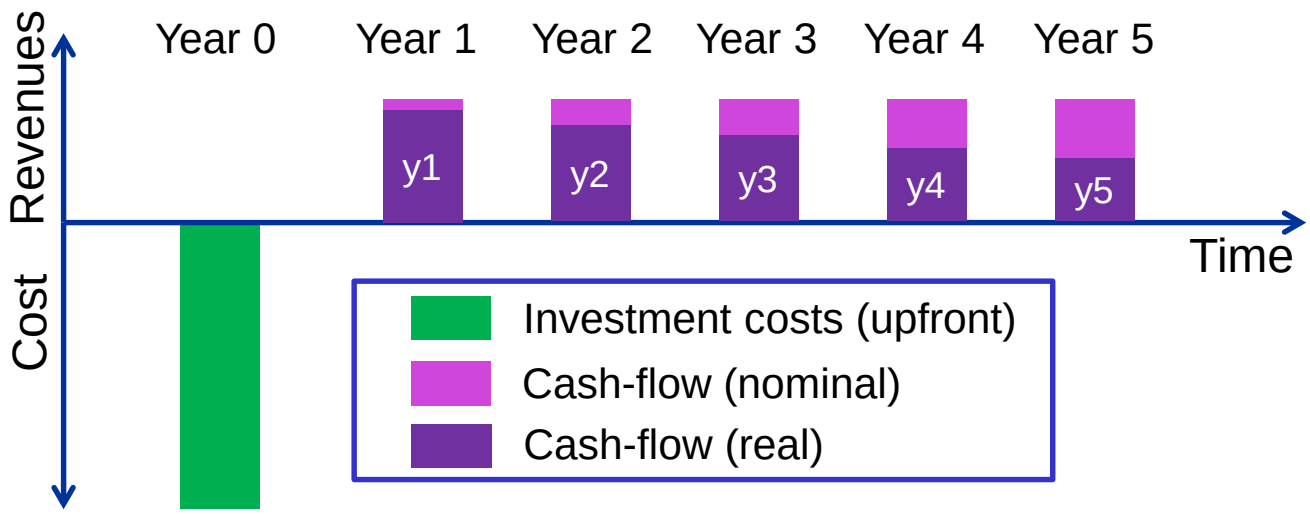
Source: EPG/ETH Zurich, UNDP

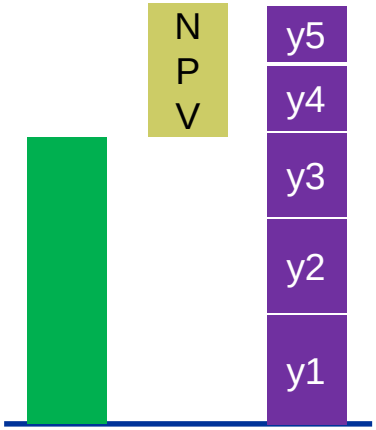
Net Present Value (NPV) (1/2)

- 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





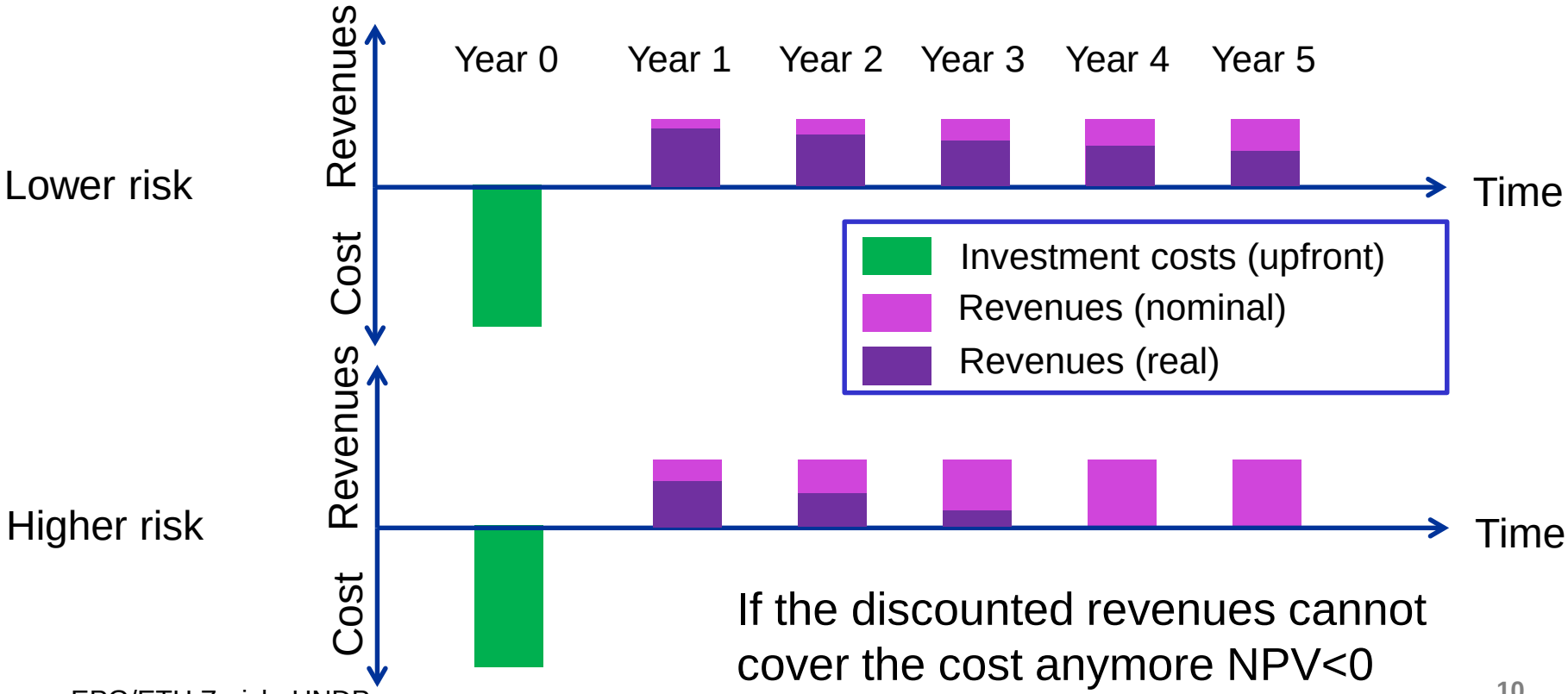
Source: EPG/ETH Zurich, UNDP

The role of risk for NPV

- Higher risks results in higher Cost of capital
- Higher cost of capital 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



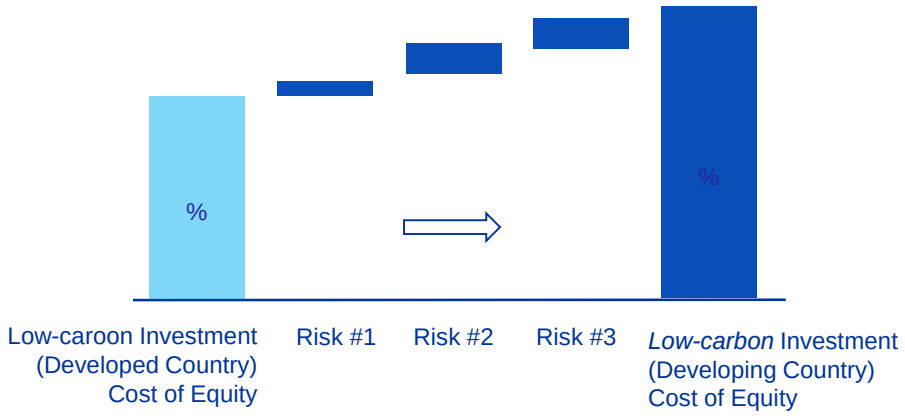
If the discounted revenues cannot cover the cost anymore NPV<0

Source: EPG/ETH Zurich, UNDP

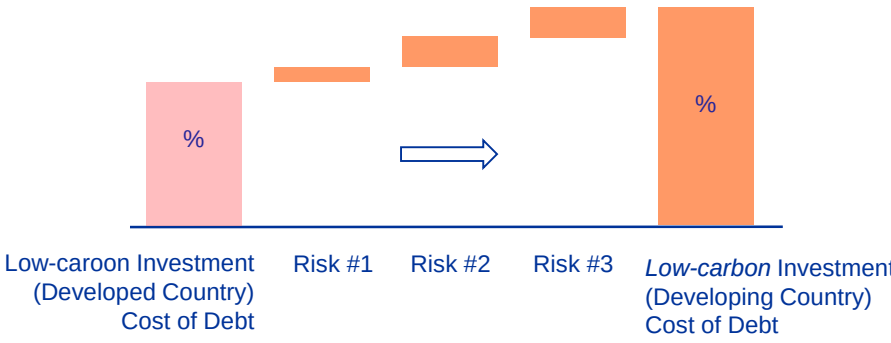
Cost of Capital (2/2)

- 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



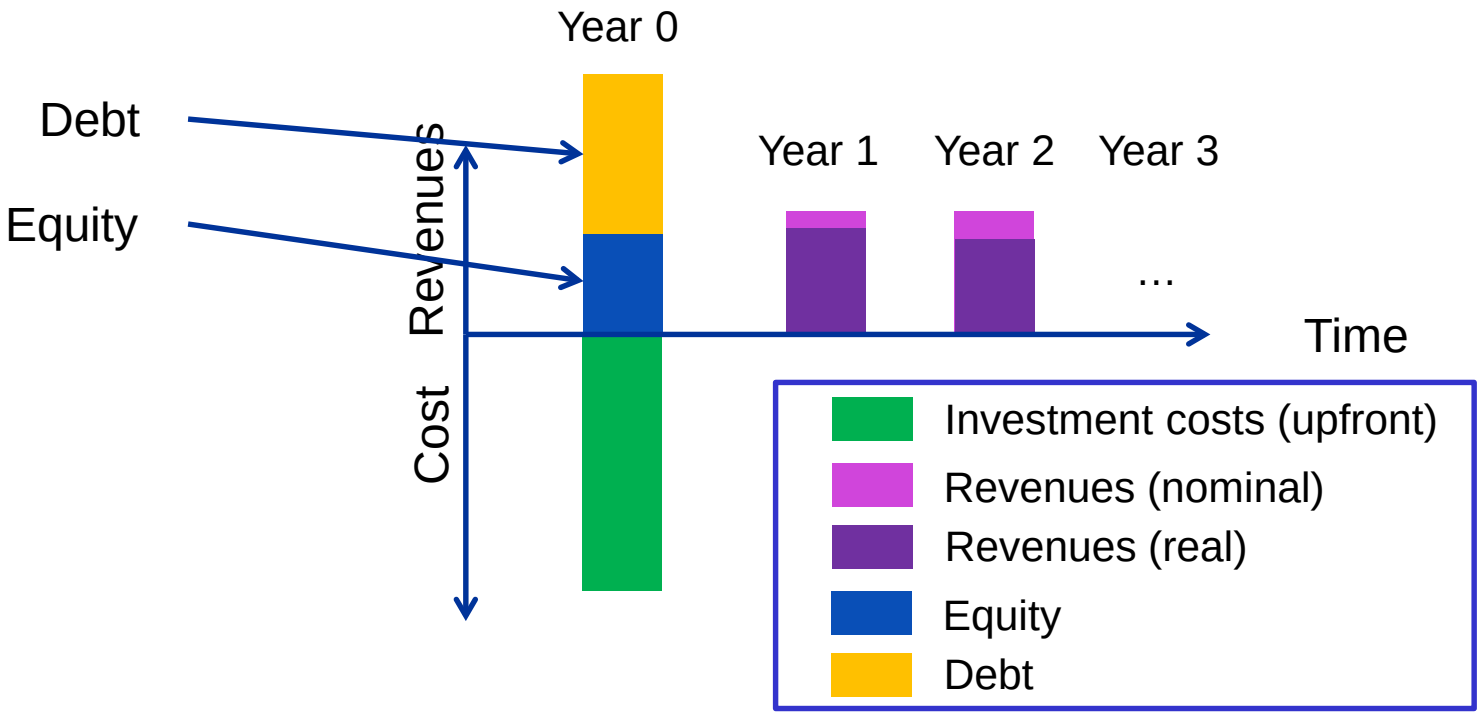
Cost of Debt



Source: EPG/ETH Zurich, UNDP

Capital Structure

- The capital structure indicates the share of debt and equity



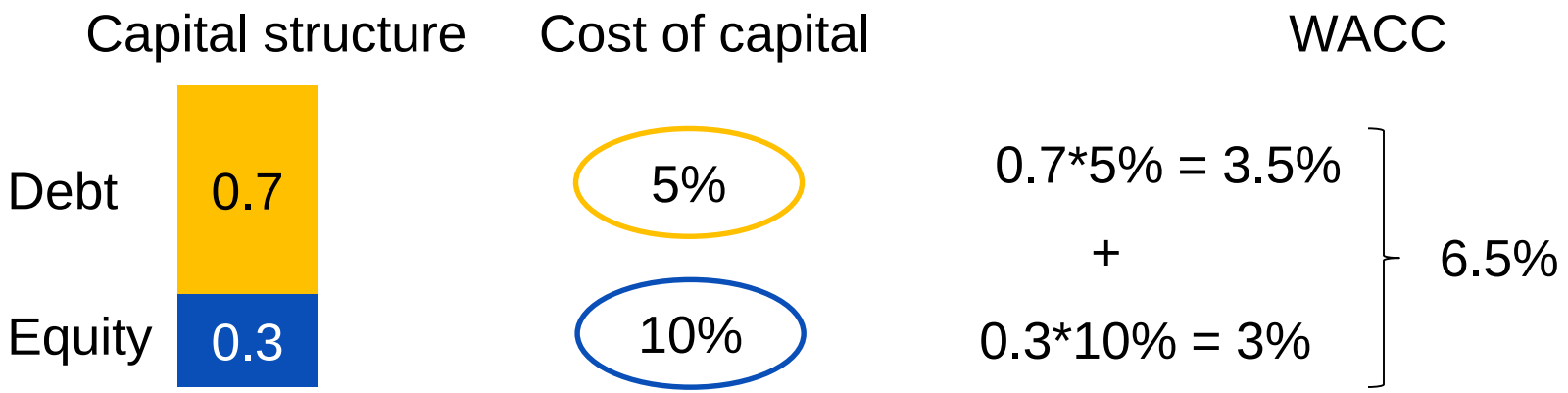
Source: EPG/ETH Zurich, UNDP

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



Source: EPG/ETH Zurich, UNDP

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

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

Capital structure		Cost of capital	WACC	
Debt	0.5	8%	0.5*8% = 4%	11.5%
			+	
Equity	0.5	15%	0.5*15% = 7.5%	

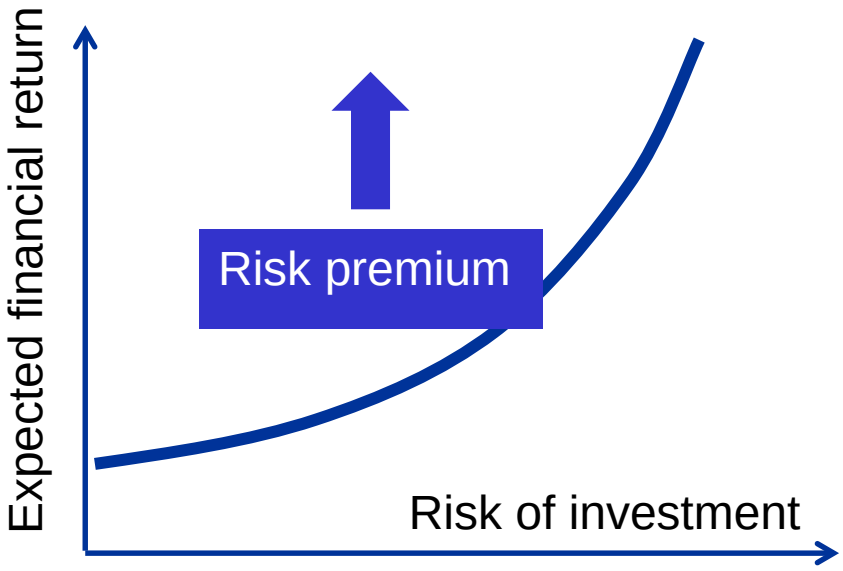
Which case would you prefer as investor or policy maker?

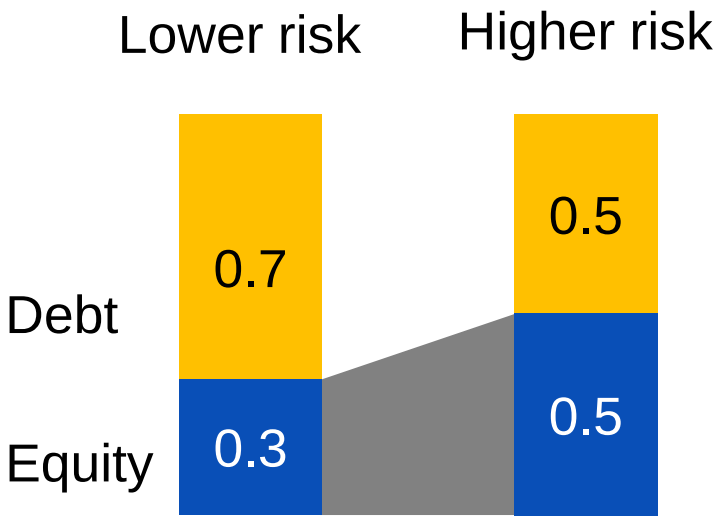
Source: EPG/ETH Zurich, UNDP

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





=> 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

Source: EPG/ETH Zurich, UNDP

The role of risk for NPV

- Higher risks results in higher Cost of capital
- Higher cost of capital result in a lower NPV

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

r= cost of capital
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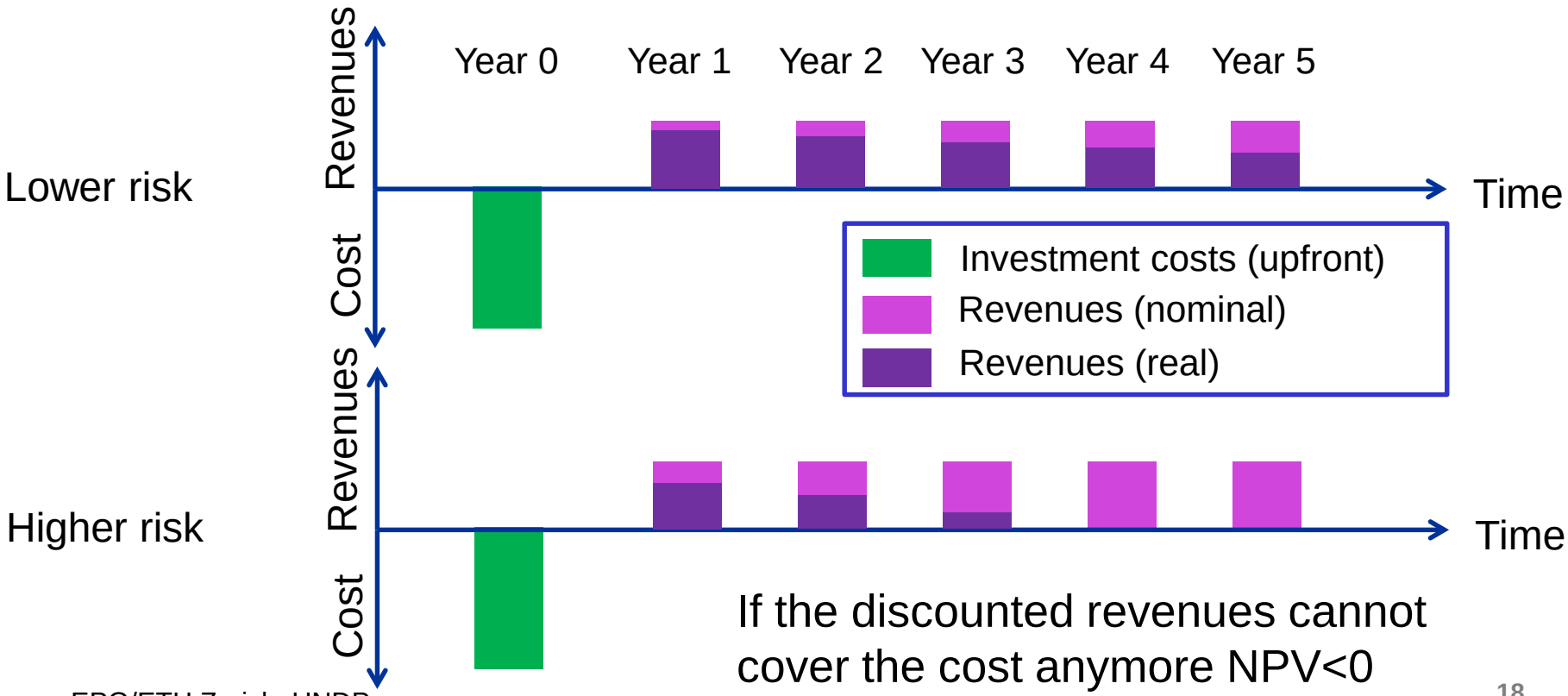
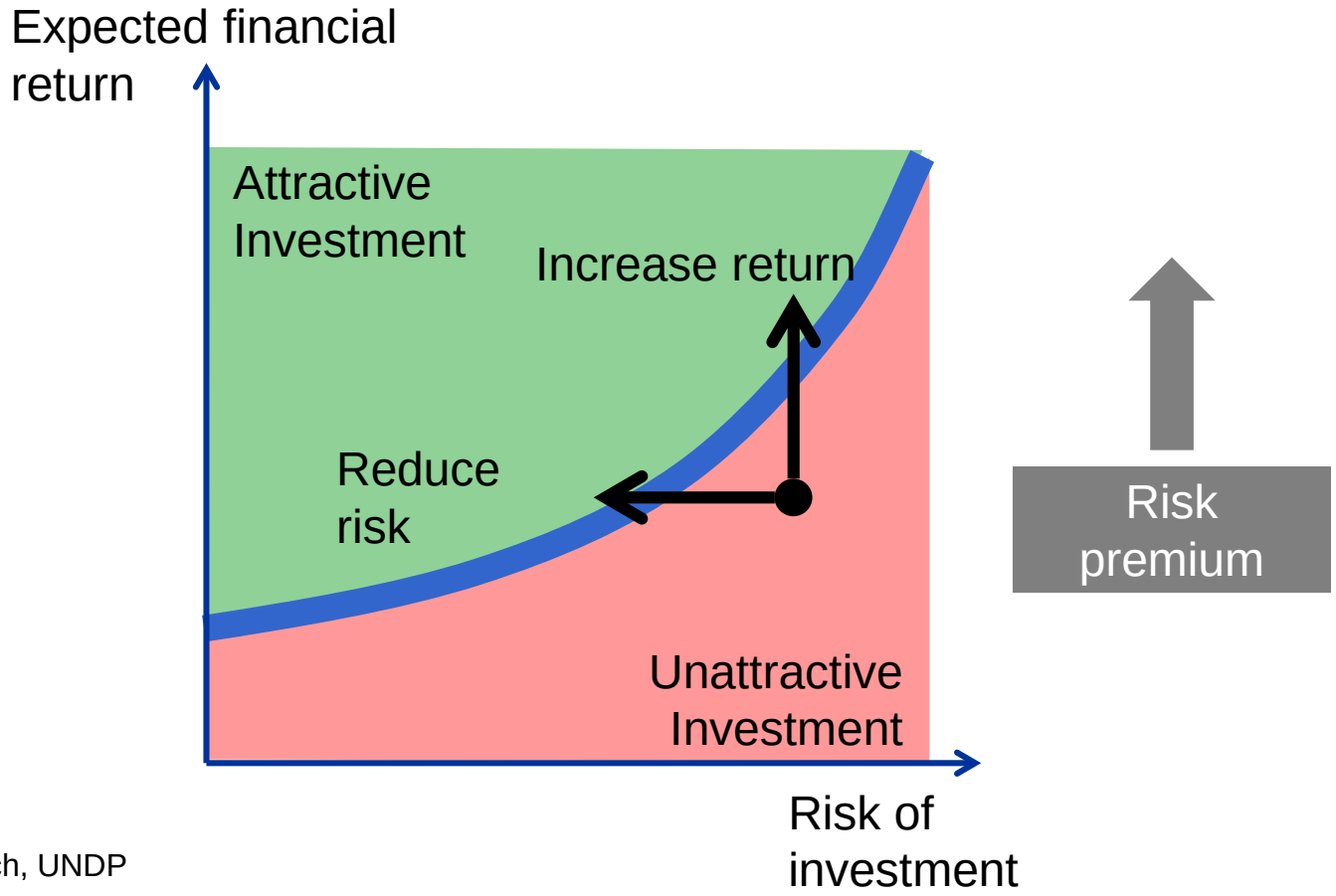


If the discounted revenues cannot cover the cost anymore NPV<0

Source: EPG/ETH Zurich, UNDP

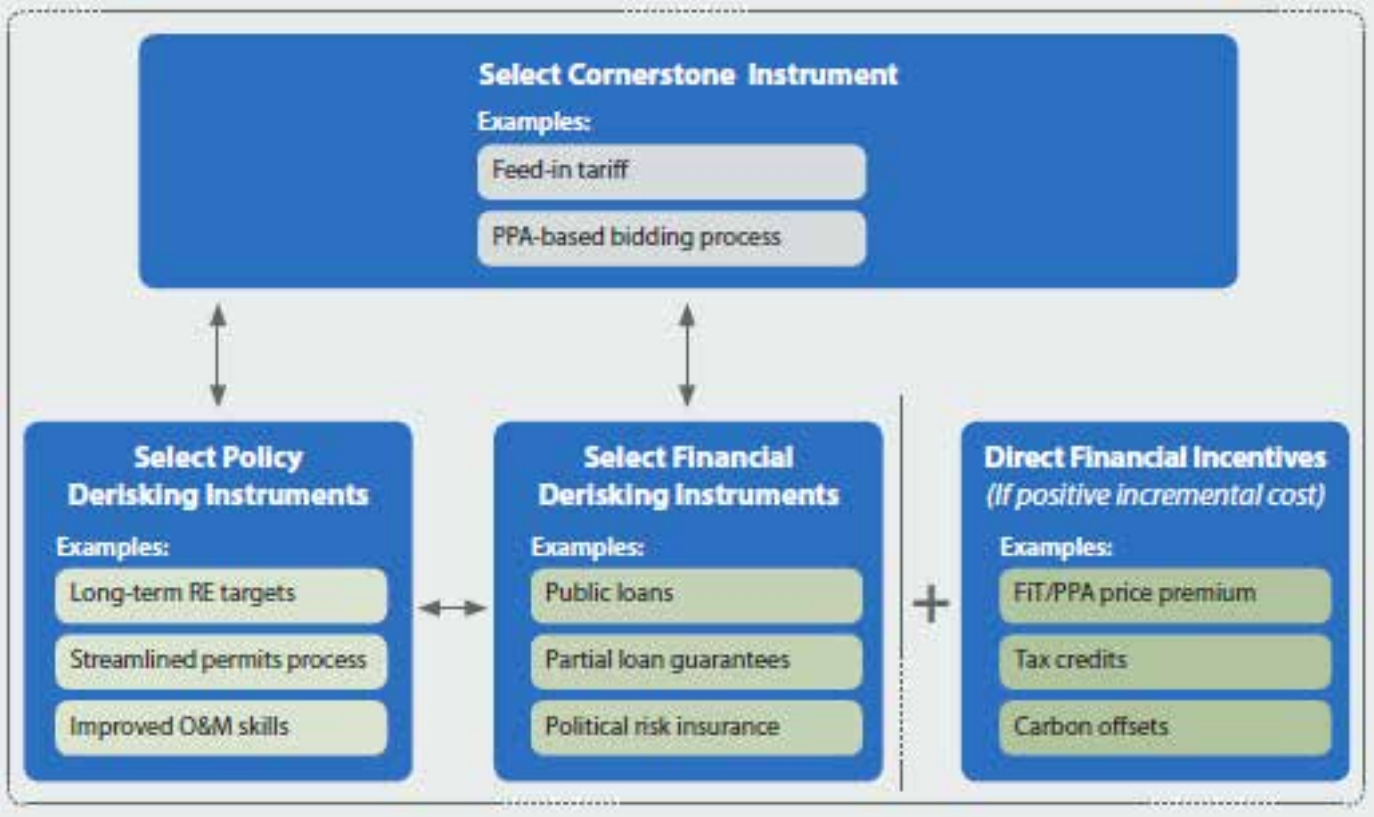
Policy implications

- 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)



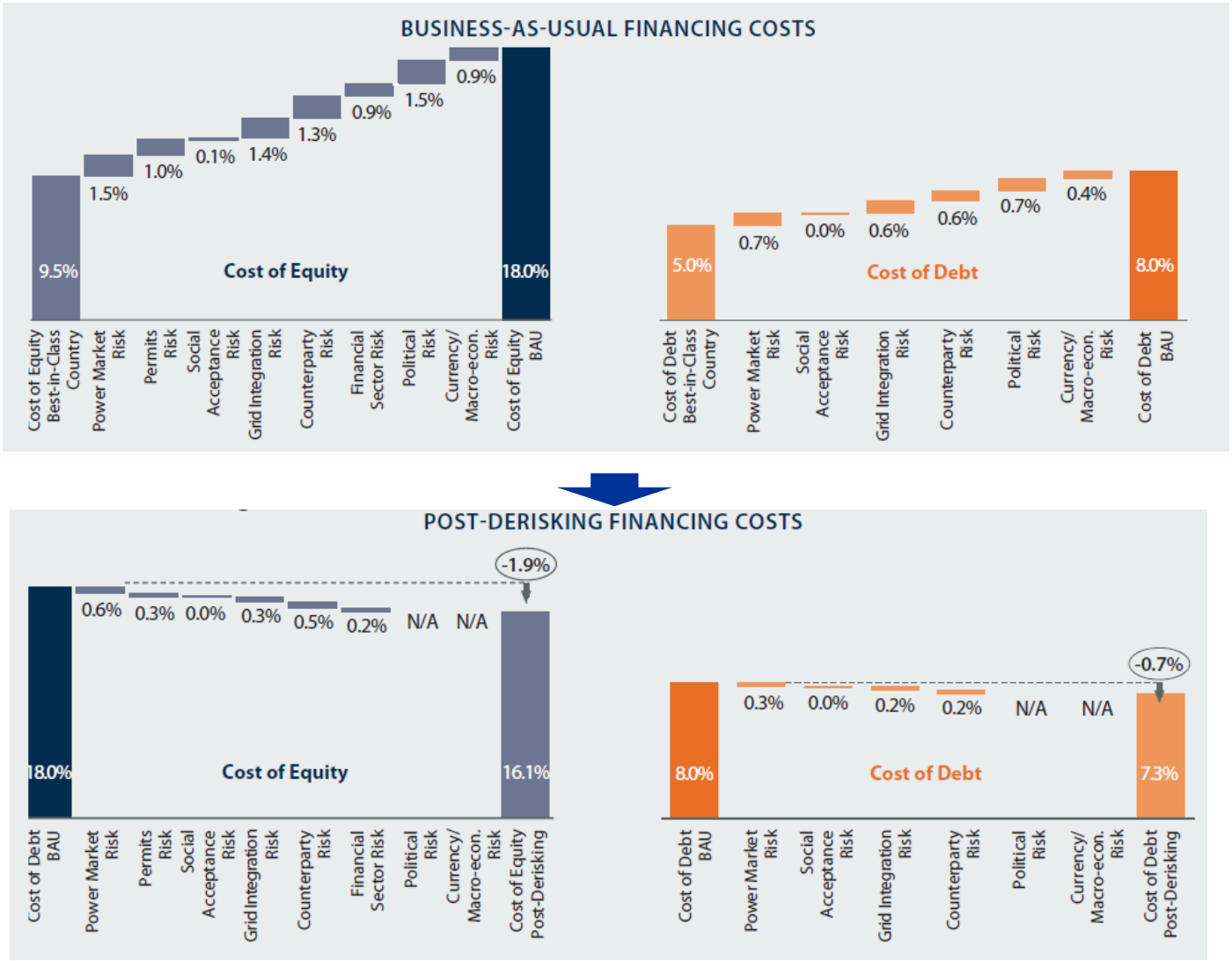
Source: EPG/ETH Zurich, UNDP

Designing NAMAs that attract private investors



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.

Illustrative case-study – Mongolia (1 GW, wind)
Cost of Capital waterfalls



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Derisking Renewable Energy Investment Reports, Papers, Financial Tool – free downloads

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Attracting private investments into rural electrification — A case study on renewable energy based village grids in Indonesia

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COMMENTARY:

Low-carbon investment risks and de-risking

Tobias S. Schmidt

Effective mitigation of climate change requires investment flows to be redirected from high- to low-carbon technologies. However, especially in developing countries, low-carbon investments often suffer from high risks. More research is needed to address these risks and allow sound policy decisions to be made.

Climate policy has to address a global investment challenge. The International Energy Agency estimates that in the energy sector alone, infrastructure investments of US$37 trillion will be needed by 2035[1] to meet the rising global energy demand. To achieve an atmospheric CO_2 concentration below 450 parts per million, these investment flows have to be redirected from high-carbon to low-carbon technologies and topped up by a further US$17 trillion[2]. This can realistically be achieved only by successfully mobilizing private capital[3]. Consequently, climate policy needs to create attractive conditions for private low-carbon investments, especially in countries not belonging to the Organisation for Economic Co-operation and Development where the

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