Towards Triple-A policies: More renewables at lower cost

Draft results from the RE-SHAPING project

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Vienna, 22 March 2011

Why something needs to happen …

- Investments in RE need to double
- Credit crisis:
  - Lenders review risks more critically
  - Worse financing conditions
  - Less projects bankable – especially affecting independent power producers & technology/country perceived more risky
- RE support cost viewed more critically
- Institutional investors have large sums to spent at moderate rate of return, but risk-averse

… towards Triple-A RE policies

Traditional rating of creditworthiness (not RE sector specific):

- Triple-A rating for country or company
  - = Very creditworthy: Low default risk
  - → Lenders eager to lend, investors eager to invest
  - → Low risk premiums → Low interest rates → Low cost for government/company debt

"Greece angry with Moody's rating cut"

Same applies to RE sector:

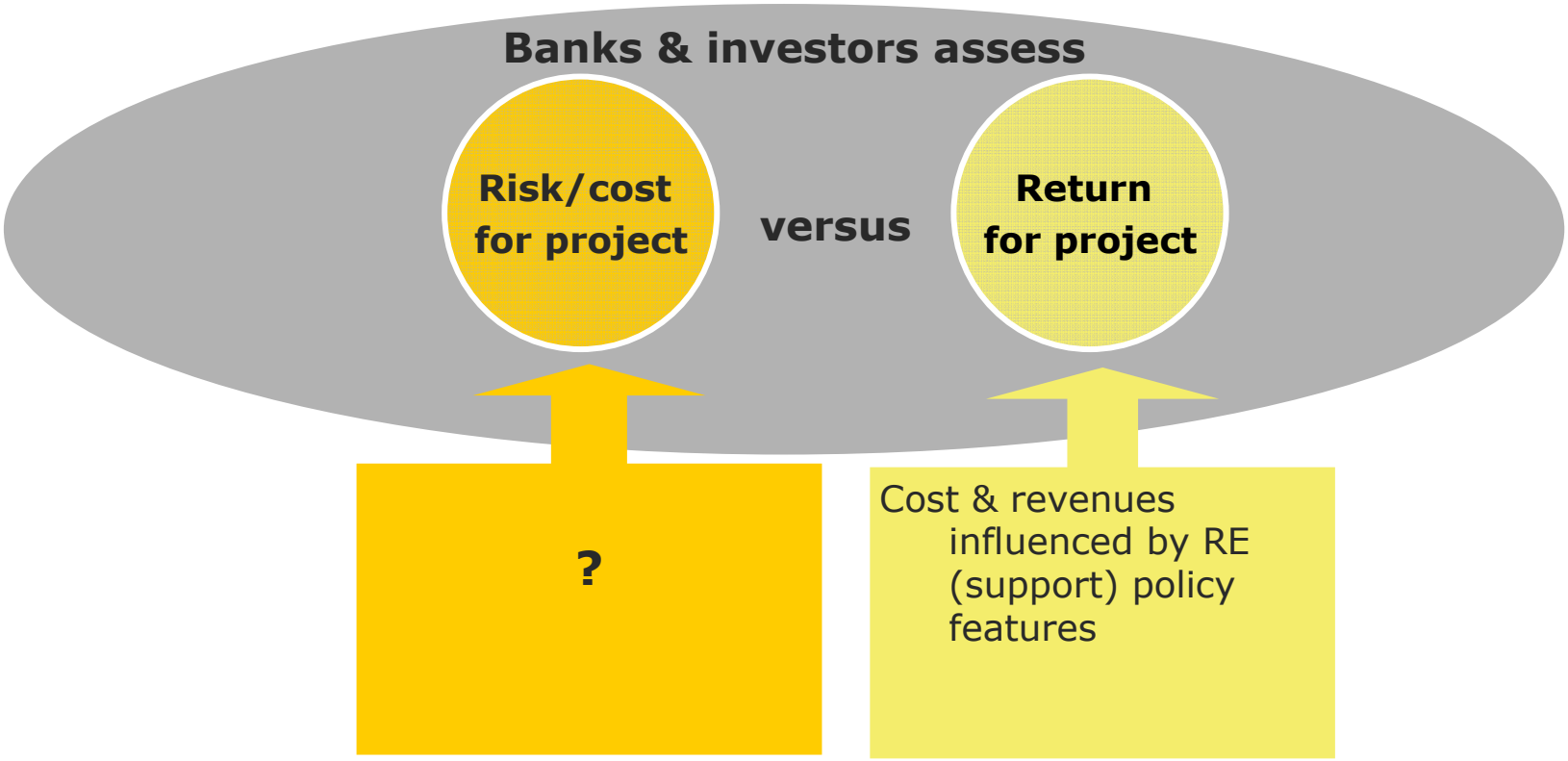
Countries with triple-A RE policies will experience more RE growth at lower cost

- EU overall by €8bn annually (12%) [EC Communication on Financing SEC(2011)131 based on Ecofys 2010/Green-X]
- This study compiled & quantified 10 policy options that can each reduce levelised cost by 5-20% or more

"High differences observed between countries' financing conditions and RE policy effectiveness & efficiency"

"Up to 50% of revenues"

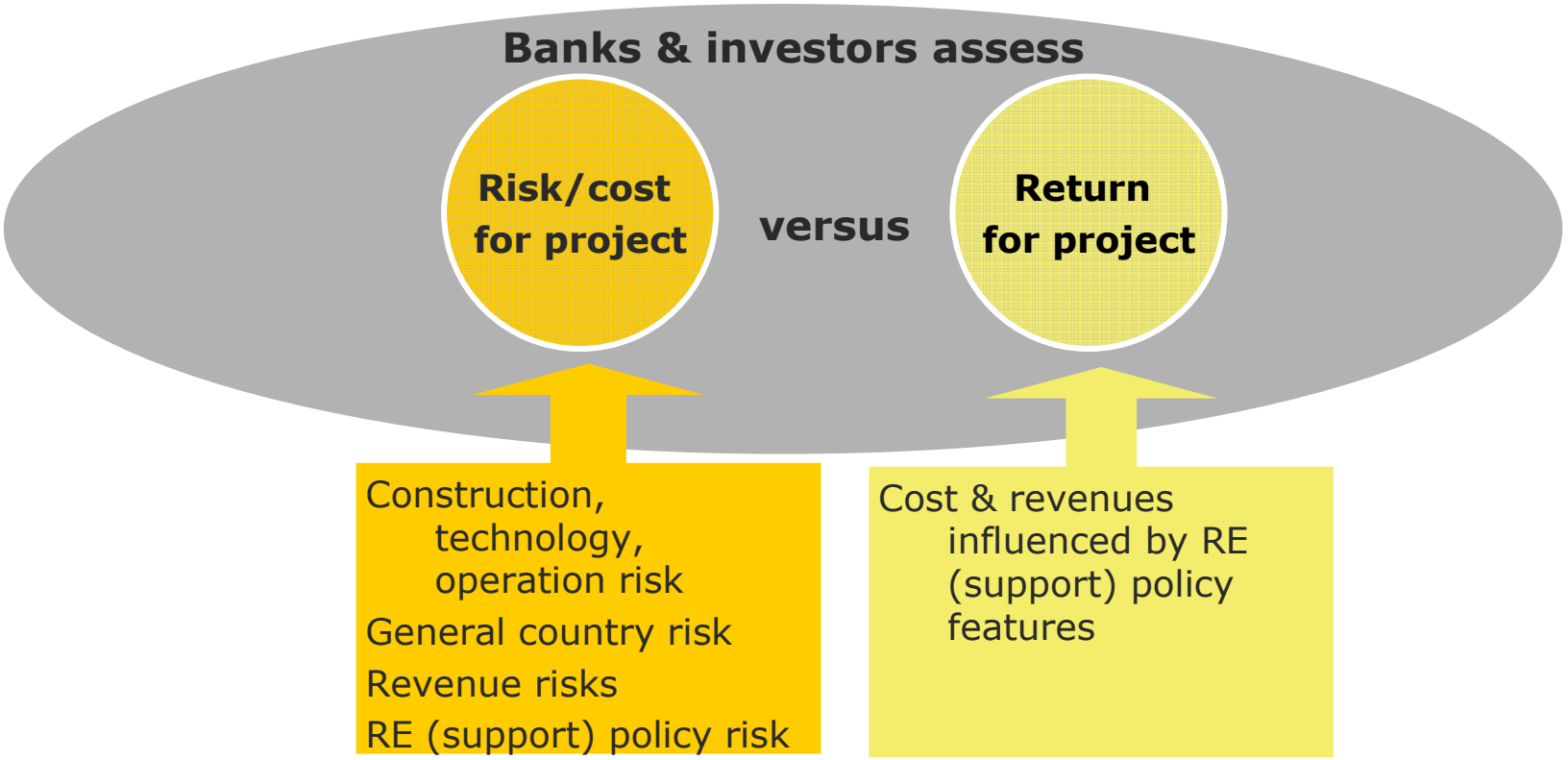
Risk & return 1/2



Risk (and cost) **sources**

	Construction risk
	Technology risk
	Operation risk
	Biomass price fluctuations (cost risk)
	Annual variability of wind/solar (revenue risk)
	Power revenue risk & balancing demand-driven RET (FIP & quota system)
Revenue risks	**Power revenue risk & balancing supply-driven RET** (FIP & quota system)
	Certificate revenue risks (quota system)
	Curtailment in case of grid congestion (revenue risk)
	(Offshore) electricity grid development
	Monetary policy risks - interest rates, exchange rates, inflation
	Permitting & grid access complex & intransparent – cost for delayed or defaulting proj. dev.
Policy risks	**Abrupt policy changes or budget/capacity caps** – sunk cost for defaulting project development
	Retro-active policy changes – Unforeseeable revenue losses

Risk & return 2/2



Higher risk

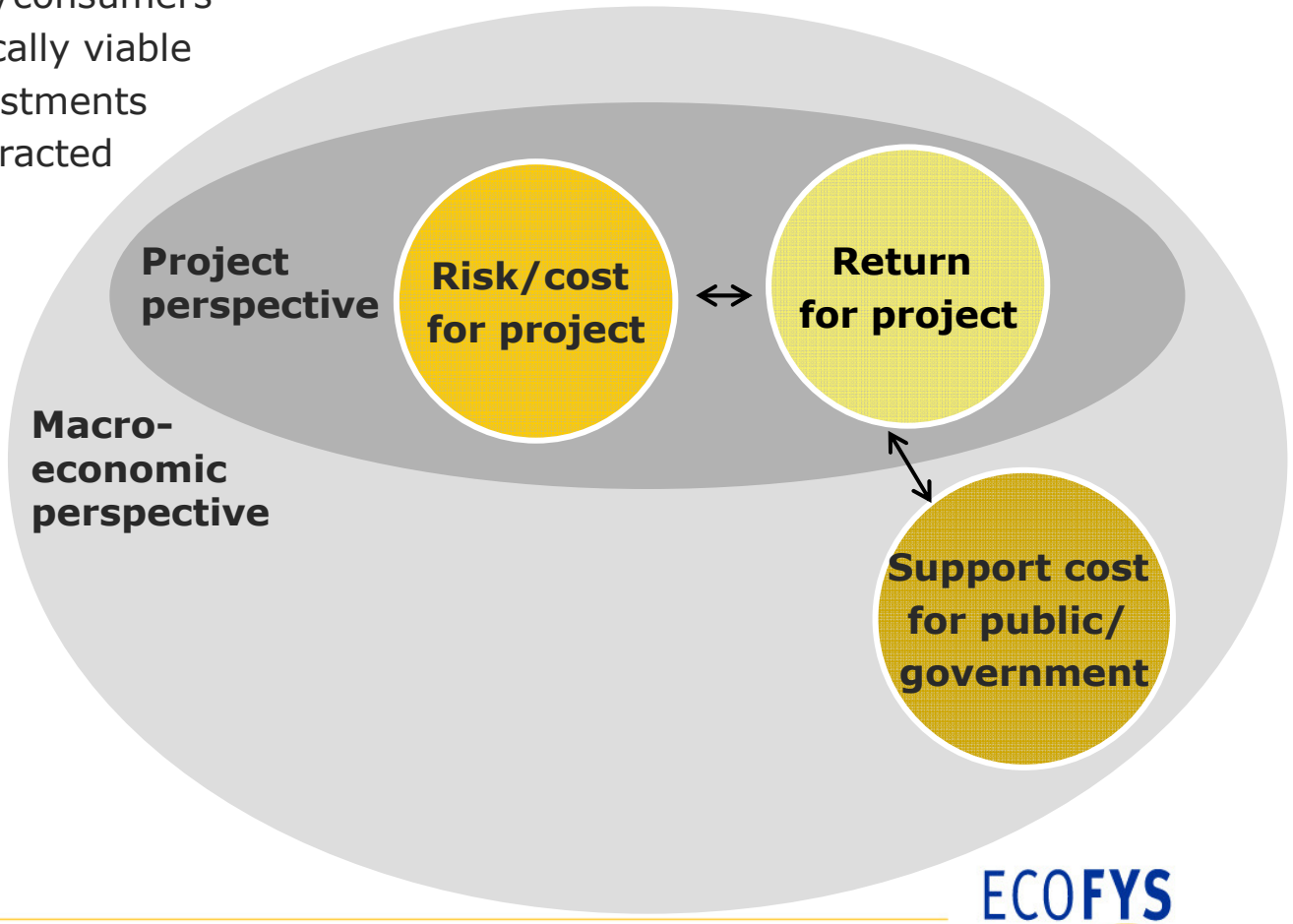
- ➔ Investors require higher return
- ➔ Banks offer worse loan conditions (leverage, DSCR, term)
- ➔ Banks only lend if overall risk not too high ➔ less RE realisable

Triple-A* RE policy 1/2

- Does not introduce much policy-related cost and risks
- Ensures adequate revenues via support and appropriate (electricity market) framework conditions

➔ Low cost for loans and equity ➔ Low levelised cost of electricity ➔ low financial support needed from governments/consumers

➔ More RE projects economically viable and bankable ➔ More investments into RE projects can be attracted



*Triple-A synonyms:

- *Investment-grade*
- *risk-conscious*

Who is best prepared to bear the risk (and cost)?

	Construction risk
	Technology risk
	Operation risk
	Biomass price fluctuations (cost risk)
Revenue risks	**Annual variability of wind/solar** (revenue risk)
	Power revenue risk & balancing demand-driven RET (FIP & quota system)
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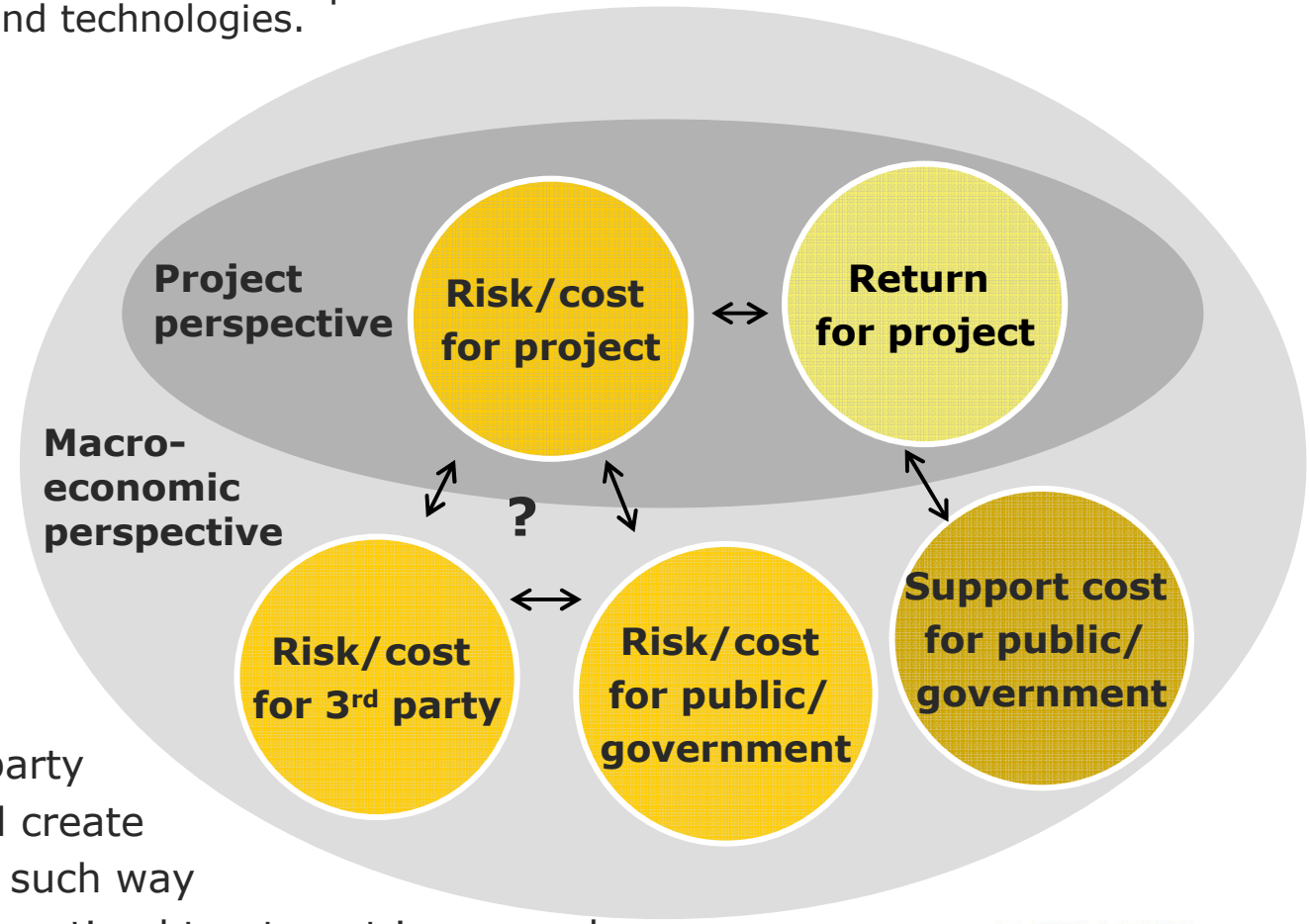
Triple-A* RE policy 2/2

1. Recognize that different parties can bear the risk
2. Recognize that different parties have different options to mitigate the risk at different cost and with different societal benefits ➔ macro-economic result will vary
3. Recognize that one policy does not fit all: Optimal allocation and treatment of risk will differ between countries and technologies.



Triple-A policies

- Allocate the risk to the party that can best bear it and create regulatory framework in such way that macro-economically optimal treatment is ensured

Who is best prepared to bear the risk (and cost)?

rather the
RE project

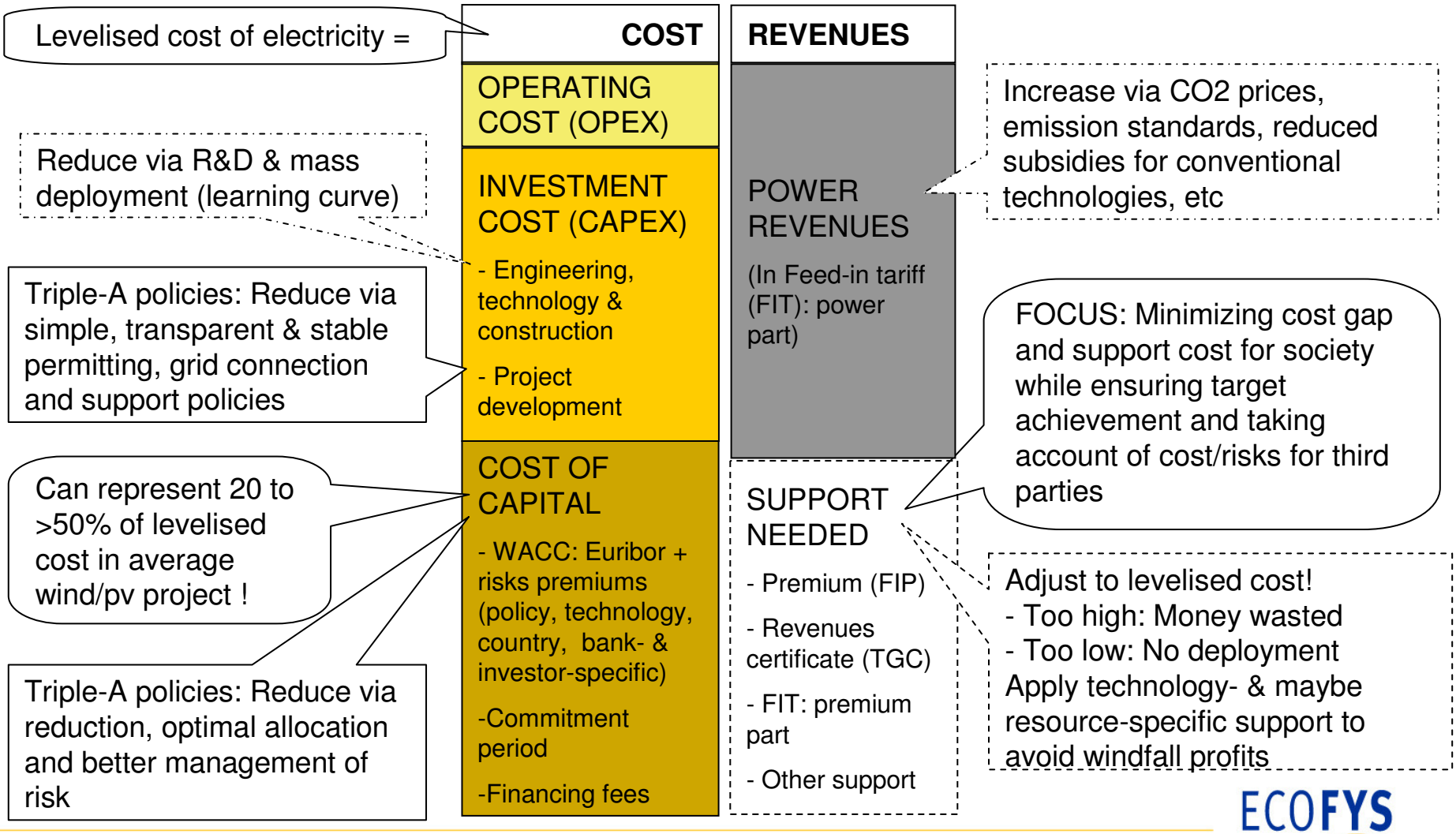
Macro-economially optimal allocation and treatment of risk & cost will differ between countries and technologies based on

1. Technology-specific risks and technology maturity
2. Country-specific deployment status of that technology
3. Country-specific electricity market design and structure
4. Project size and investor group
5. Influenced by dominating macro-economic paradigms

rather the
'public'

- **Construction risk**
- **Technology risk**
- **Operation risk**
- **Biomass price fluctuations** (cost risk)
- **Annual variability of wind/solar** (revenue risk)
- **Power revenue risk & balancing demand-driven RET** (FIP & quota system)
- **Power revenue risk & balancing supply-driven RET** (FIP & quota system)
- **Certificate revenue risks** (quota system)
- **Curtailment in case of grid congestion** (revenue risk)
- **(Offshore) electricity grid development**
- **Monetary policy risks** - interest rates, exchange rates, inflation
- **Permitting & grid access complex & intransparent**
- **Abrupt policy changes or budget/capacity caps**
- **Retro-active policy changes**

Cost categories, focus of policy options & wider policy context



Structure for analysing policy options

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
€=e.g. -50bp	€=-2.5%	€=-8%			>10%	+++

Observed effect in practice leading to this cost

€	**= Cost are reduced** or **revenues increased** by an amount **corresponding to ~2% lower levelised cost of electricity** (for average wind/pv project - no fuel cost)
€ (bold)	**= minimum** confirmed by most interviewees/literature
€ **(not bold)**	**= range** depending on technology, project, country, literature and interviewee

Example: No retro-active policy changes

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
>€€€€€				€€€€€	>20%	+++

10-30% [Lüthi]

Risk of **retro-active policy changes** reduces investment certainty and leads to higher (policy) risk premiums.

In quota systems lower price in certificate sales contracts.

Triple-A policy options shown here …

- … are based on
  - many years consortium expertise evaluating RE policies in all EU Member States
  - existing literature, partly based on conjoint analysis
  - **Perception of market parties**: > 20 interviews with lenders, equity investors, project developers and project financing experts – each active in several Member States and able to compare RE policy frameworks in different Member States
    - Quantification is no exact science!
- … are work in progress
  - Your feedback on qualitative & quantitative description of policy options is highly appreciated!
- … can partly explain
  - observed differences in RE support effectiveness and efficiency and differences in financing conditions (not windfall profit part)
  - why high support does not always lead to high growth

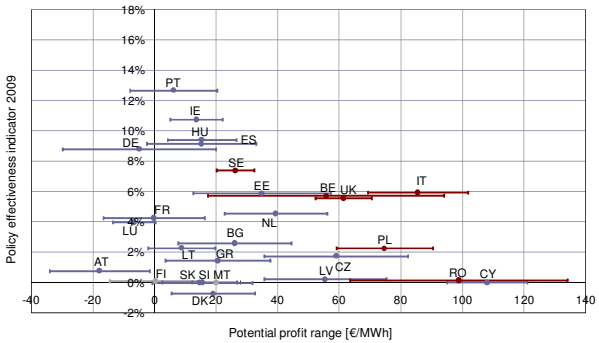
Policy options 1/2

		Levelized cost saving potential		Removing development constraint
Policy stability	⇨ ⇨No retro-active policy changes for existing projects		> 20%	
	⇨ ⇨ Simple & transparent permitting/grid procedures		> 10%	+++
	⇨ ⇨ No abrupt policy changes for upcoming projects		> 10%	+++
	⇨ ⇨ FIT/FIP: Continual open access & no budget or capacity caps	Plus	10%	+++
	⇨ ⇨ FIT/FIP: Support financed via consumer surcharge (off budget)	Plus	3%	
Revenue risks	Certificate revenue risks			
	⇨ ⇨ Risk reduction: Long time horizon and serious penalties		14%	++
	⇨ ⇨ Risk reduction: Price floor applied	Plus	7%	
	⇨ ⇨ Risk removal: FIP instead of quota system	Or	>10%	
	Power revenue risks and balancing cost/risk			
	⇨ ⇨ Risk removal: FIT instead of FIP		8%	
	⇨ ⇨ Priority in case of grid congestion		10%	
	⇨ ⇨ Compensation for forced curtailment (grid congestion)	Plus	4%	
	⇨ ⇨ Compensate annual variability wind/solar		2%	
	Comparable: Wind/solar derivatives			

Policy options 2/2

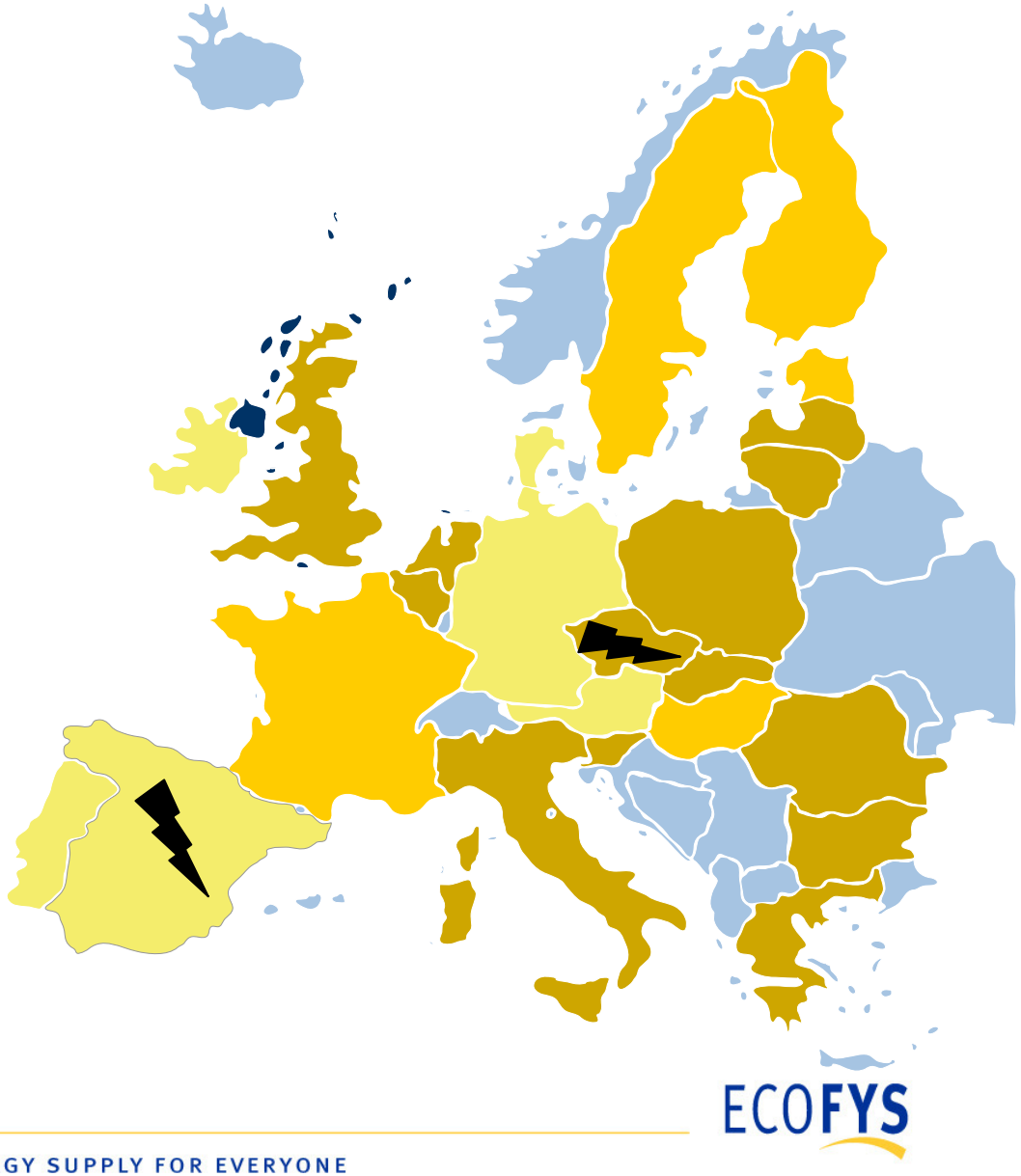
		Levelized cost saving potential	Removing development constraint
Sharing risk to build trust & as lever to policy policy stability	⇨ (Temporary) government participation (e.g. wind offshore)	5%	
	⇨ ⇨ Loan guarantee	5%	
	EU Minimum policy design standards and rules for conducting policy change	…	
Use risk-free interest	⇨ ⇨ Front-loading the support payment stream (FIT, FIP, Quota) Comparable: cash grants or flexible depreciation	2% + 4%	
	⇨ ⇨ Soft loan	2% + 4%	+
Market facilitation & transformation	⇨Establishing process standards for risk assessment & rating	4%	
	⇨ ⇨ Availability of insurance for risks not yet insurable	2%	
	Refinancing	0%	++
	⇨ ⇨ TSO responsible for grid connection (esp. wind offshore)	2%	

Country-specific cost saving potential



Saving potential	
	Large
	Medium
	Small

In Member States with too low support levels or too high barriers Triple-A policies would not reduce cost but enable growth to start in the first place.



Conclusions

- Market player perception of policy option's effect on the different cost categories can explain observed differences in policy efficiency & effectiveness
- Triple-A policies help reaching the 2020 target and enabling growth to start in some countries/technologies in the first place
- Triple-A policies can reduce levelised cost by up to 50% for specific technologies/Member States
  - Effect on support cost even higher
  - EU average effect on support cost: ~ -12%
- Most effective policy options:
  1. Policy stability & removal of barriers
  2. Reducing project revenue risks
  3. Sharing risk

Thank you for your attention!

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Report will be available as of June on
www.reshaping-res-policy.eu

Simple & transparent permitting & grid access procedures

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
	>€€€€€				>10%	+++

10-40% [Lüthi]

1) Long, complex procedures increase project development cost.

2) High default rate leads to sunk cost for developing projects that do never materialize

-> Sunk cost need to be recovered in successful projects

-> higher project development cost

3) Often sunk cost cannot be fully recovered (e.g. due to support level limiting maximum % of project development cost in CAPEX)

-> less new project development will be started – developers stop or focus on other countries.

-> Project pipeline dries up, less future growth opportunities.

➔ In permitting & grid access procedures: Requirements to project (=investment at stake) should not increase faster than success chance

No abrupt (unexpected) policy changes

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
	€€€€€			€€€€€	>10%	+++

Abrupt **policy changes** increase project development cost.

High default rate leads to sunk cost -> Difficulty to recover -> Negative effect on pipeline and future growth

In quota systems lower price in certificate sales contracts.

10-30% [Lüthi]

Continual open access & no budget or capacity caps (in FIT/FIP)

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
	€€€€€			€€€€€	>10%	+++

Caps increase project development cost for projects being implemented later than envisaged or sunk cost for developing projects that do

never materialize.

High default rate leads to sunk cost -> Difficulty to recover -> Negative effect on pipeline and future growth

Cap = Gamble

10-30% [Lüthi]

If cap is to be applied:

Make support decision early in project development when investments at stake are still low.

Trade-off: Projects not materializing delay growth

FIT/FIP: Financed via consumer surcharge (off-budget)

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
€	€				3%	

Reduces **risk of retro-active policy changes** due to state budget constraints

Reduces **risk of policy changes affecting project development**

Quota: Long time-horizon and serious penalties

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
€€€€€				€€	14%	++

Reduced risk of lower certificate prices/revenues due to low future demand.

Lower certificate prices/revenues due to uncertain future demand.

Quota: Price floor applied

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
€€				€€	7%	

Reduced certificate revenue risk

Lower risk premium for certificate counterparty

Price floor =

UK headroom + buy-out

BE minimum prices

Large share of certificate value ensured, part remains risky

The quota system comes closer to a feed-in premium system.

'Upside' for projects remains -> cost to consumer

FIP instead of quota (Removing certificate revenue risk)

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
€€	€€ + €€€	€€		€€ + €€€	>10%	

Reduced (certificate) revenue risk

or

Higher cost for structuring contracts.

In quota system banks may require only contracting established companies/ technology providers in order to minimize overall project risk.

Idem dito: Additional performance guarantees

Not getting paid average certificate spot price due to counterparty taking margin and part of upside.

Project taking upside at consumer cost.

In most quota systems currently higher prices/margins for technology and project development can be observed. Due to / or causing high certificate prices?

FIT instead of FIP

(Removing power revenue risk & balancing cost/risk)

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
€€	€	€	€€		8%	

Reduced power revenue and balancing risk

-1% WACC [Pöyri]

-2% WACC (4% RoE / 1% debt) [Giebel]

-1.3% WACC [Green-X]

Higher cost for structuring contracts.

Higher cost for forecasting / balancing.

On top of balancing cost: Not getting paid average power (exchange) price due to PPA counterparty taking margin and part of upside.

Project taking upside at consumer cost (only in fixed premium).

Priority in case of grid congestion
or Compensation for forced curtailment

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
€€ + €			**€€ + €**	€€ + €	10% + 4%	

Reduced/no risk of lost power (& support) revenues due to reduced production in case of grid congestion (curtailment)

Reduced/ no power revenue losses.

Reduced / no support revenue losses.

Effect compensation on top of grid priority:
-0.9% WACC
[Giebel]

Compensation for annual variability wind/solar

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
€					2%	

Reduced/no risk of lost power (& support) defaulting project due to one or more exceptionally bad wind/solar years -> better financing conditions (leverage)

-0.5% WACC [Giebel]

Comparable to wind derivatives

Front-loading the support payment stream (FIT, FIP, Quota)

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
€ + €€					2% + 4%	

Less risk due to earlier repayment of loan/equity.

+ interest subsidy:

Interest has to be paid over shorter period and/or for less loan/equity.

Support has to be paid earlier, but for support risk-free discount rate can be assumed.

Comparable to cash grants or flexible depreciation

Soft loans

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
€ + €€					2% + 4%	+

Soft loan conditions set standard which may lead to **longer loan tenure / shorter tail.**
Observed e.g. in Germany with bank loan tenure being influenced by KfW refinancing tenure.

Less 'commercial' loan required.

More banks triggered to engage in RE financing may lead to **improved loan availability**.

+ interest rate subsidy

Loan guarantee

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
€€€					5%	

Lenders have lower risk in case of default or underperformance of the project.

-> **Higher leverage, or lower interest rate, or longer debt terms.**

More projects become financeable.

Cost for government for defaulting projects.

Sharing risk to build trust & as lever to policy stability (self-discipline due to own investment at stake)

(Temporary) government participation

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
€€€					5%	

Increased trust by investors and banks.

-1.4% WACC (-3.5% RoE/-0.5% debt) [Taskforce NL].
-5% LCe [Ecofys 2010]

Sharing risk to build trust & as lever to policy stability (self-discipline due to own investment at stake)

Establishing process standards for risk assessment & rating

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
€€	€				4%	

Standardized independent opinion / rating on the likelihood of a project's ability to deliver the expected returns **increases investor/lender confidence.**

Reduced cost for risk assessment / structuring finance

Availability of insurance for risks not yet insurable

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
€	€				2%	++

Lower, due to risk being covered by insurance.

Reduced cost in structuring finance.

Facilitate e.g. by making empirical data (internationally) available.

TSO responsible for grid connection (esp. offshore)

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
	€				2%	

Investment for a (offshore wind) project can be reduced by up to one third, however, cost for TSO increase in almost the same order of magnitude.

But 2% investment cost can be saved because TSO core business, can buy cables cheaper, design grid more efficient, gets cheaper loans, can depreciate over cable lifetime (40a) instead of wind farm lifetime (20a).

Refinancing

Cost			Revenues		Levelized cost saving potential	Removing development constraint
Cost of capital	Investment cost	Operating cost	Power revenues	Support		
€	€				3%	

Reduces **risk of retro-active policy changes** due to state budget constraints

Reduces **risk of policy changes affecting project development**