

Joint IEA-RETD and IRENA Workshop

The Business case of New Generation RE-COST1 STUDY *Preliminary Results*

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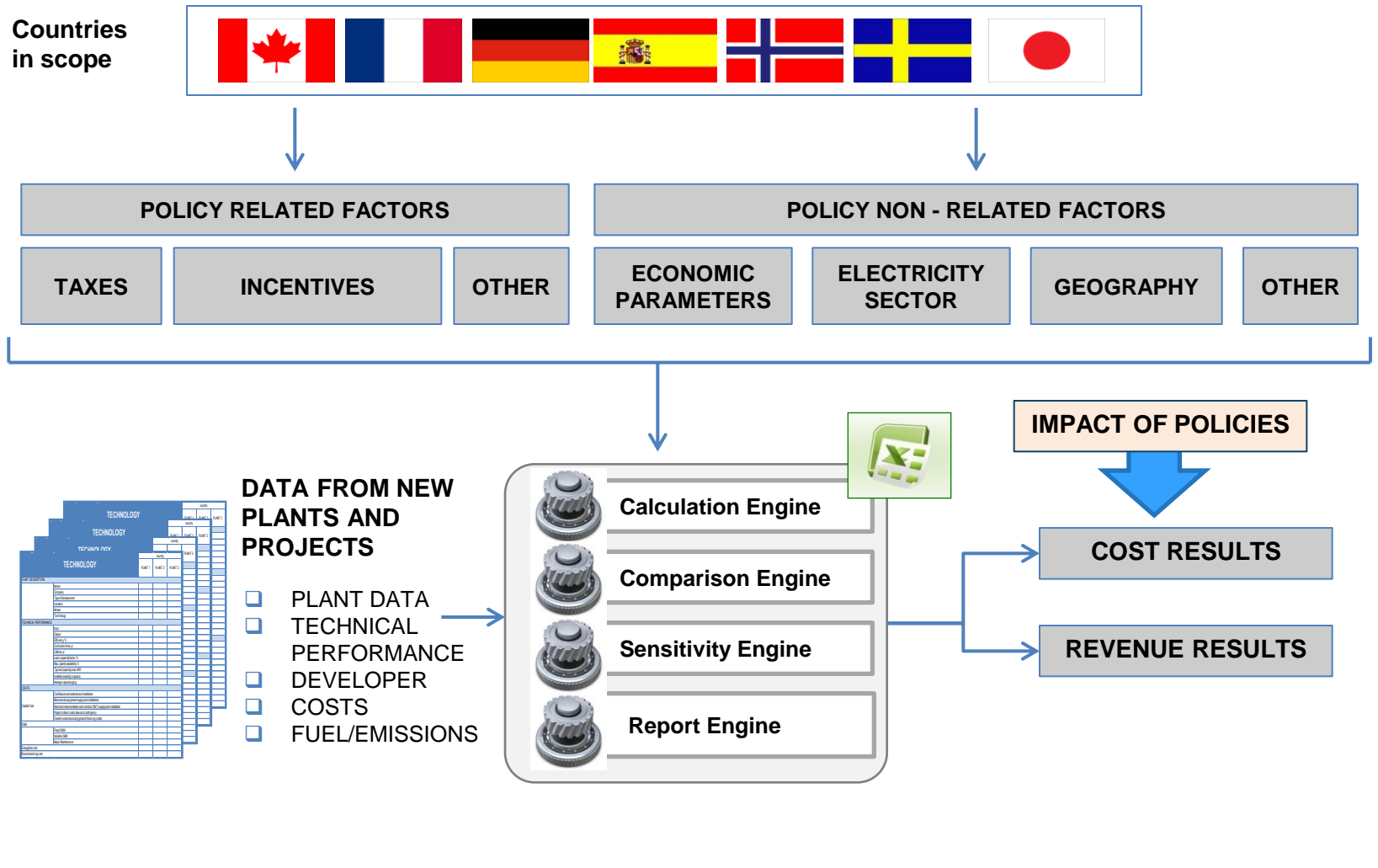


RE-COST1 Study - Objectives

“To carry out a comparison of different electricity generation technologies – both non renewable and renewable – using **data from new and projected generation plants** in a **number of developed countries**, to provide fresh, data based insights and recommendations to key actors in the energy sector, that contribute to stimulate and foster the implementation of renewable energies.”

- ❑ **Reduce the informational gaps** on costs and business cases for different non-RE and RE technologies by investigating primary data across a number of countries and technologies
- ❑ Understand the **impact of existing policy measures** on the costs of electricity generation.
- ❑ **Document the decision making process** of energy utilities and investors when it comes to choosing investments in power generation capacities, considering costs and revenue streams.
- ❑ **Support policy makers** in defining policies that are suited for direct investment decisions towards RET.

A calculation model based on “real data” allows to identify the impact of policy and non-policy factors



Results are based on a dataset built with information from plants and projects in the countries in scope

	ONSHORE WIND	OFFSHORE WIND	SOLAR PV	HYDRO	CCGT	COAL	NUCLEAR	
Alberta	5	NO	NO	(pub)	1*	?	NO	1 new 4 old
Ontario	>6	?	1	(pub)	1*	NO	?	
Quebec	5	NO	NO	(pub)	NO	NO	NO	
France	2	1*	2	(pub)	2	2	√	
Germany	3	1*	2	(pub)	2	2	?	
Norway	4	1*	NO	(pub)	1*	NO	NO	
Sweden	3*	1*	NO	(pub)	1*	NO	?	
Spain	3	NO	3	(pub)	3	2	?	
Japan	2	√	1	(pub)	2*	1*	?	

NO Not included

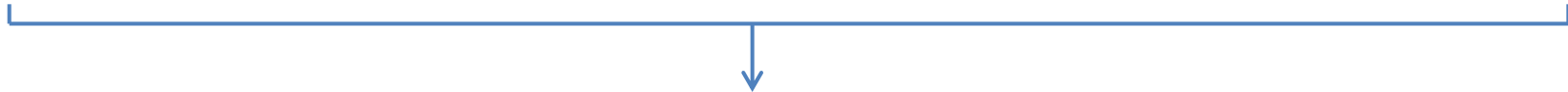
(pub) Data from publications

X* Compl. w/ publications and interviews

? Is the analysis relevant?

This is a differential methodology from other cost comparisons -- with some advantages

ADVANTAGES	DRAWBACKS
<ul style="list-style-type: none"> • Data are “real”: correspond to specific plants or projects in a given country • Possible to identify the impact of policy changes over components of costs 	<ul style="list-style-type: none"> • Necessary to conduct large numbers of interviews to grasp the actual meaning of the data • Not possible to use generic templates: feedback and assessment of results are essential
<ul style="list-style-type: none"> • Evaluation of current data bring new insights on the evolution of technologies and costs 	<ul style="list-style-type: none"> • Care has to be taken when extrapolating results to the whole installed basis of a country or region • Necessary to understand the differences between new and old technologies when assessing country-level situations
<ul style="list-style-type: none"> • The datasets can grow as more data become available • Possible to enhance the model with insights and feedback from experts 	<ul style="list-style-type: none"> • COMMON TO MOST COST COMPARISON STUDIES – low total number of total generation projects in this initial phase



ADVANTAGES OUTWEIGH DRAWBACKS: USEFUL INSIGHTS ARE EMERGING

Necessary to understand the characteristics of the electricity sector in each of the countries in scope ...

	Alberta	Ontario	Quebec	France	Germany	Spain	Norway	Sweden	Japan
Market	Liberalized market	Hybrid: competitive -regulated	Gov. owned integrated utility	Liberalized but with one historical company	Dereg. market with 4 vertically integrated players	Liberalized market with 3 large utilities	Liberalized market with large state owned utilities	Liberalized market with large state owned utilities	10 regions each with a vertical integrated utility (EPCO)
Main Technology	Thermal	Nuclear	Hydro	Nuclear	Coal	Thermal	Hydro	Hydro	Thermal
FIT	No	Yes	No	Yes	Yes	Yes	No	No	Yes
PPA	No	Yes	Yes	Yes	No	No	No	No	No
Other	Offsets / RECs	No	No	No	No	No	Green Cert.	Green Cert.	No

EPCO: Electric Power Company

PPA: Power Purchase Agreements

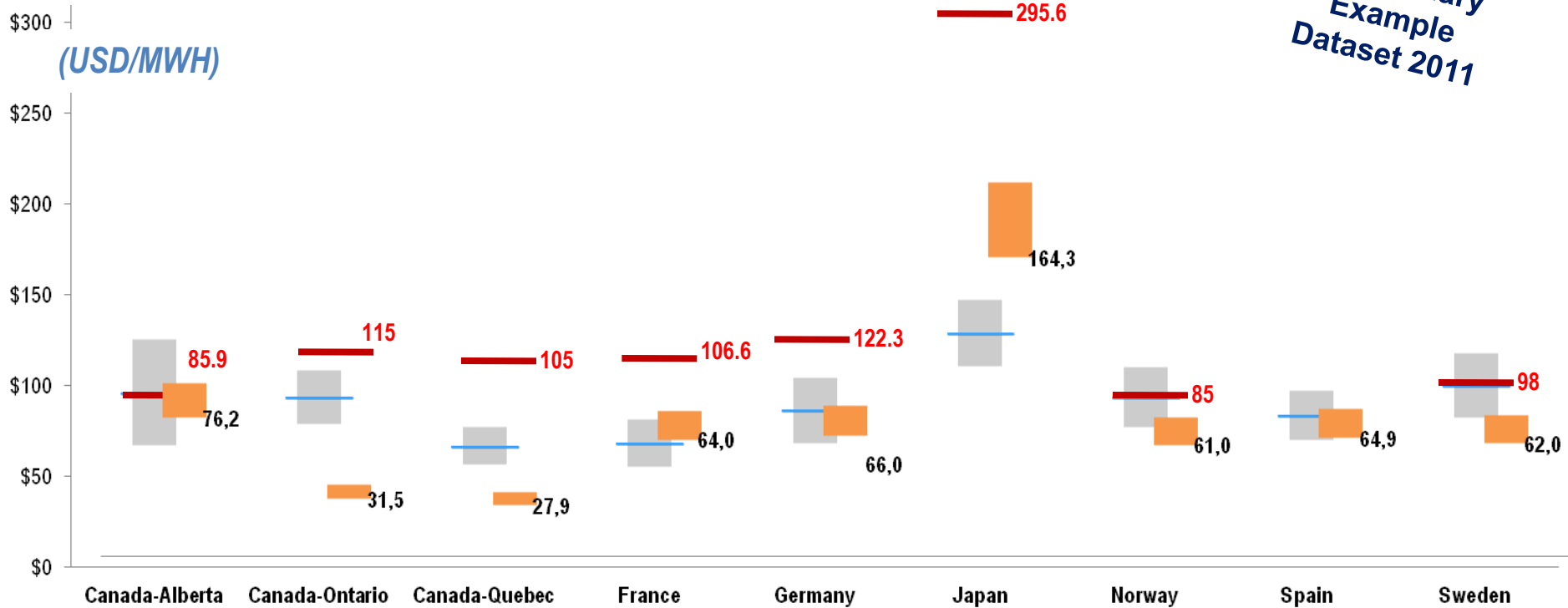
RECS: Renewable Energy Credits


...as well as the factors that influence the evolving costs of generation for each technology

WIND	<ul style="list-style-type: none"> ▪ Mature technology now – reliable, dependable ▪ Reduction in turbine prices driven by heightened competition ▪ Priority in “merit curve” may result in higher utilization than expected
SOLAR PV	<ul style="list-style-type: none"> ▪ Coming down the learning curve ▪ Some producers claim module prices at 0.6-0.7 US\$/W – credible? ▪ With adequate financing sources may need much lower tariffs
CCGT	<ul style="list-style-type: none"> ▪ Should be cost effective with low prices of gas, if utilization is “reasonable”
COAL	<ul style="list-style-type: none"> ▪ New designs (supercritical pulverized) with some emission reduction, help compensate emission costs
HYDRO	<ul style="list-style-type: none"> ▪ Backbone of generation in countries with low electricity prices ▪ Large differences in costs between large plants that are already amortized and new plants in less attractive locations
NUCLEAR	<ul style="list-style-type: none"> ▪ Current plant base is cost attractive (positive business case) ▪ New plants appear to have higher capital costs, but their business case is still attractive under current policy conditions

LCOE of Wind appears to be getting closer to the prices of electricity

Preliminary Example Dataset 2011

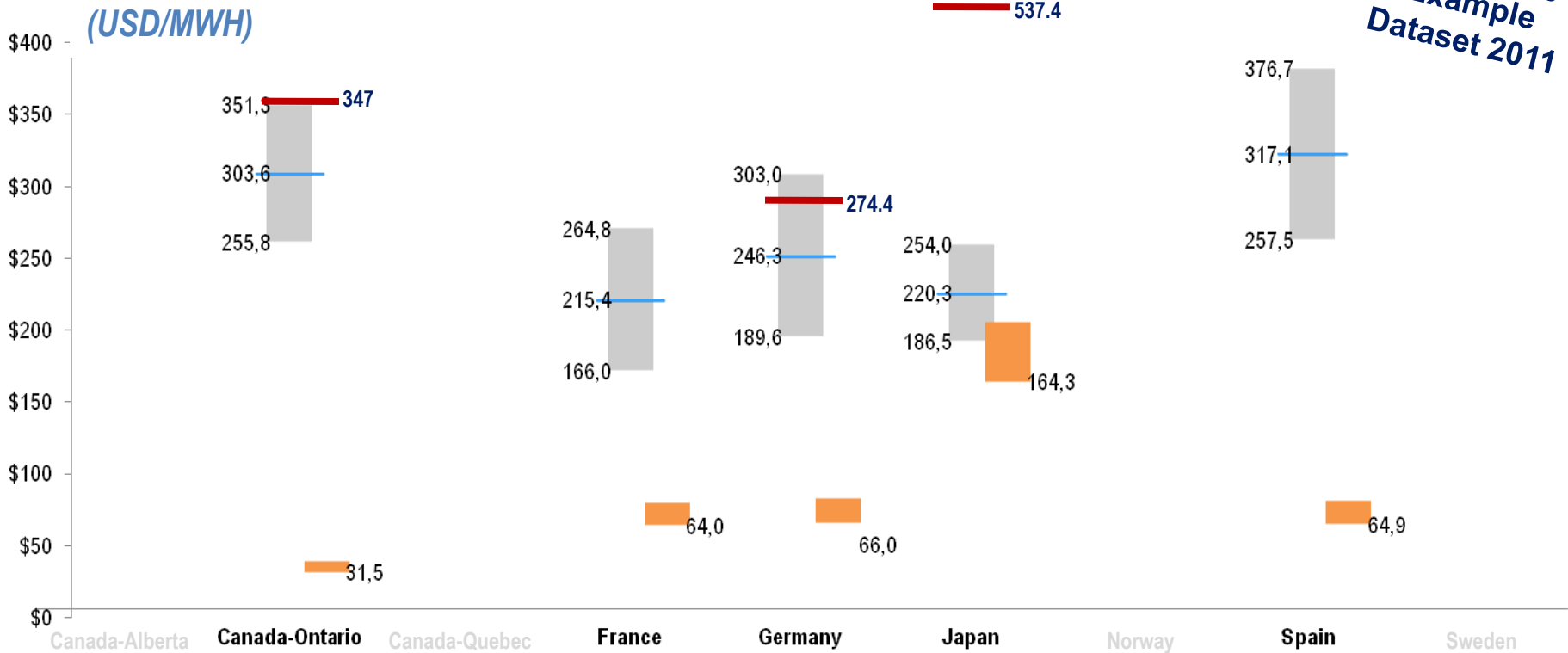


 LCOE with different financing structures
„r“ depends on country and technology

 Electricity price
Maximum: Average Spot Market Price 2011 +25%
Minimum: Average Spot Market Price 2011 (USD/MWh) - *quoted*
 Price with incentives (USD/MWh) – Have used current (2012)

Solar PV still has some way to go before being able to forego incentives

Preliminary Example Dataset 2011

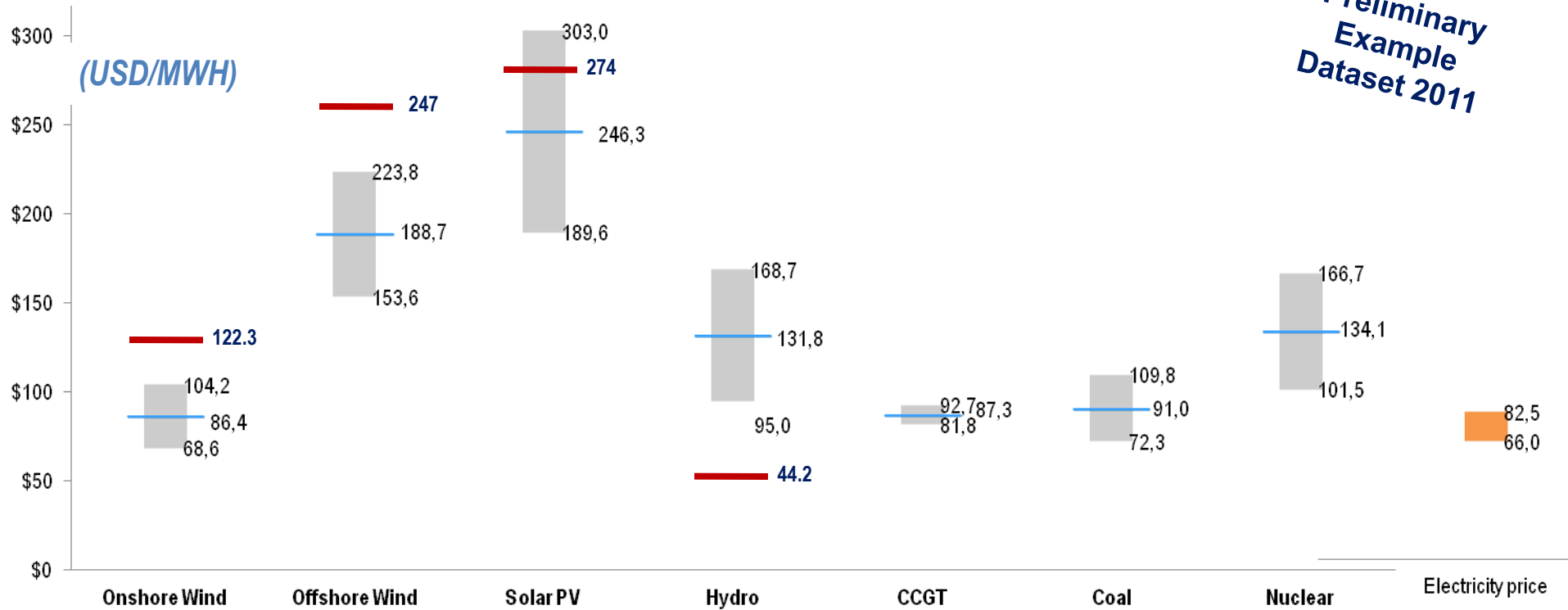



LCOE with different financing structures
„r“ depends on country and technology

Electricity price
Maximum: Average Spot Market Price 2011 +25%
Minimum: Average Spot Market Price 2011 (USD/MWh) - *quoted*
Price with incentives (USD/MWh) – Have used current (2012)

A view of total generation is necessary to discuss policies – Example Germany

Preliminary Example Dataset 2011



 LCOE with different financing structures
 „r“varies with country and technology
 Assumes the plant starts operation in 2012

 Electricity price
 Maximum: Average Spot Market Price 2011 +25%
 Minimum: Average Spot Market Price 2011 (USD/MWh) - quoted
 Price with incentives (USD/MWh) – Have used current (2012)

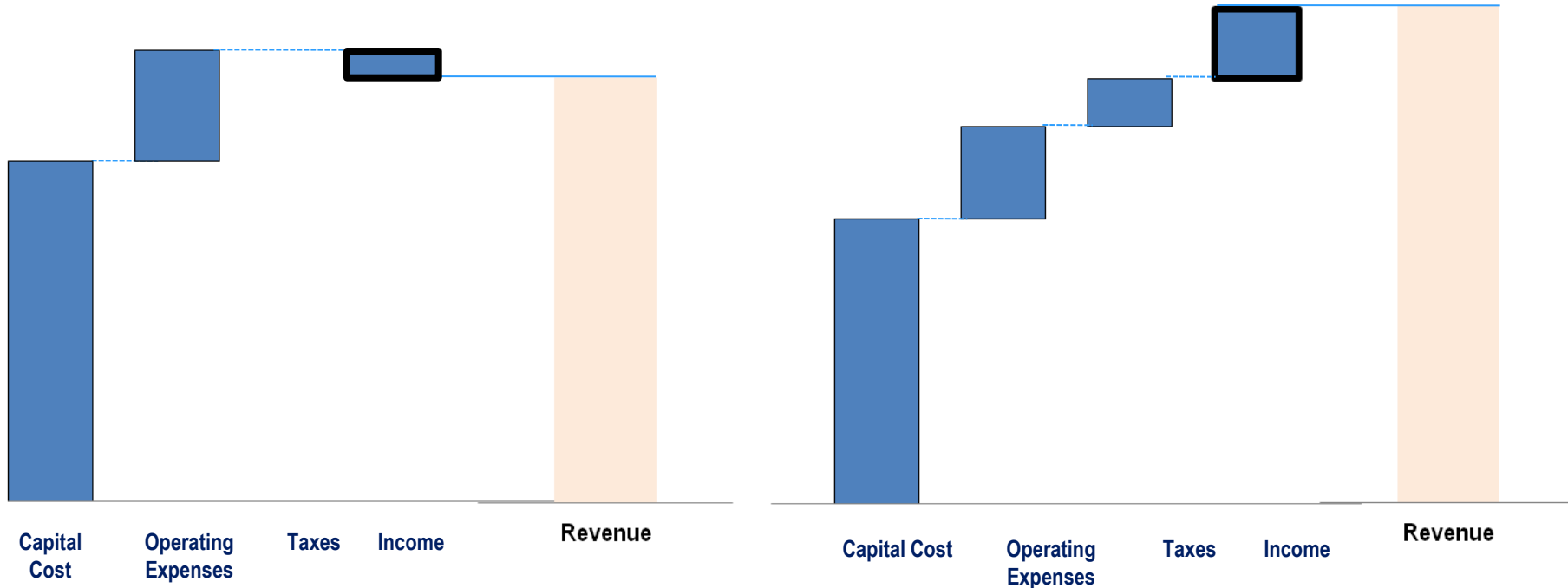
An example of tariffs impact – PPAs in Quebec

Conceptual

EXAMPLE OF BUSINESS CASE. WIND ONSHORE QUEBEC -- (USD/MWh)

Plant with policies (1)

Plant with policies (2)



Capacity factor	%	% Equity	%	% Debt	%
Gross MW	XX	Cost of Equity	%	Cost of Debt	%

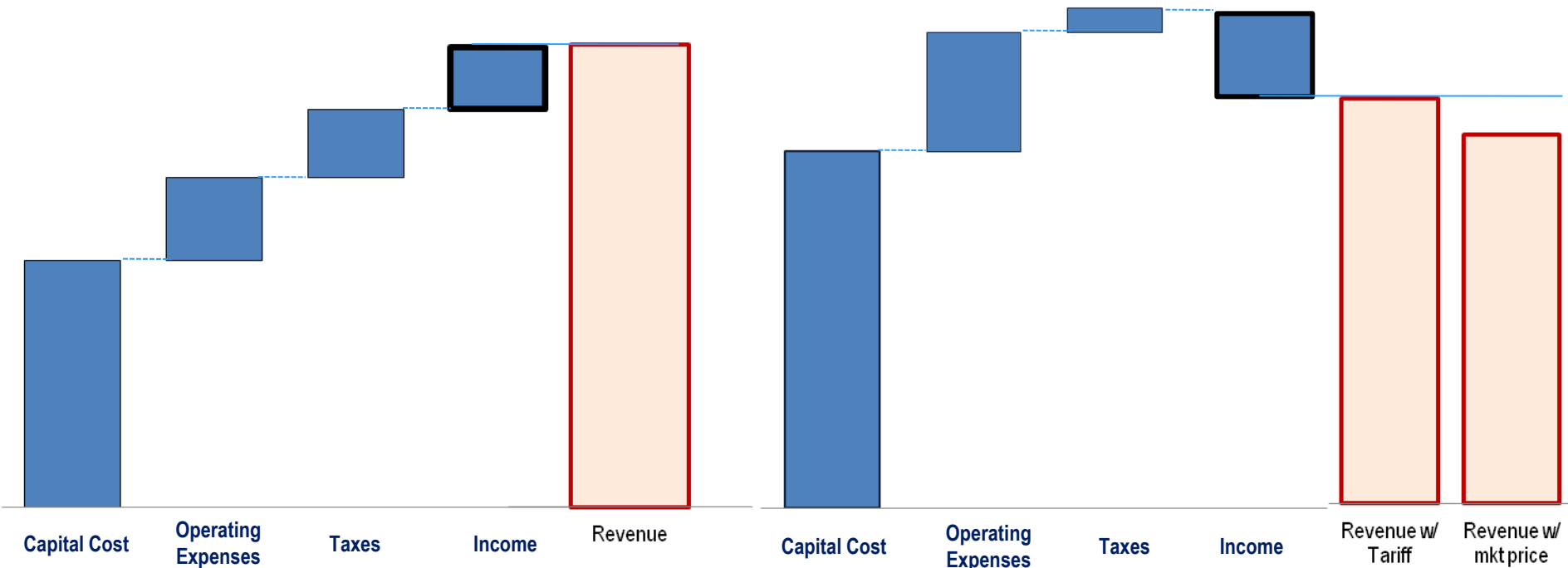
What if tariffs decrease for future developments? – Germany and onshore Wind

EXAMPLE OF BUSINESS CASE. WIND ONSHORE GERMANY -- (USD/MWh)

Conceptual

Plant established now

Plant established in the future



Capacity factor	%	% Equity	%	% Debt	%
Gross MW	XX	Cost of Equity	%	Cost of Debt	%

Preliminary results – “new technologies” renewable and non-renewable

- ❑ **Cost of Wind onshore generation is getting close to current market prices**

 - Current low turbine prices
 - High utilization rates
 - Pressure to reduce operating costs

- ❑ **Solar PV has still some way to go before it may reach market prices – but perspectives appear to be good**

 - If module prices continue to significantly drop
 - With adequate sources of “cheap” financing

- ❑ **The business case for CCGT and Coal becomes more “difficult” in many countries...**

 - ...prevailing low utilization rates

- ❑ **All new renewable and non renewable technologies cannot easily compete in situations with existing alternative sources of “low cost generation”**

 - *Are we trying to sell a new car in the second hand market?*