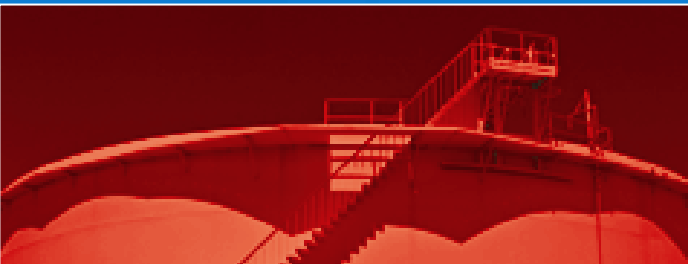


Unlocking Value from the Feed-in Tariff in the Ontario *Green Energy Act*

Executive Summary

October 30th , 2009



Energy Practice

The presentation will outline the key findings from the report which addresses three questions

3 Primary Questions the Study Will Address

Business Case

(Why should we do this as a utility, power generator or investor?)

- What is the potential total NPV-positive business case to be generated for utilities and power generators in responding to the *Green Energy Act*?
- What drives this value and how can it be maximized?
- What is the investment required to create this value?

Integration Issues

(What are the costs and risks in integrating renewables?)

- What are the operational interferences and costs associated with owning and operating a renewable facility, expanding the electricity distribution assets in order to connect renewable facilities and to implement advanced connectivity (sometimes called the “Smart Grid”) and enhance and expand transmission assets?
- What is the economic impact of the integration issues?

Project Execution Issues

(How will we execute the projects to overcome the risks?)

- What are the execution problems to leverage the GEA to deliver projects on-time and within budget while meeting the operational targets?
- What is the economic impact of these problems?
- What execution practices can be implemented in order to enhance value?

The act has the potential to create significant value for LDC's^[1], transmitters and renewable generators provided the barriers to implementation are removed

Recognise Significant value: At least \$4.5bn (2009 Canadian Dollars) of value is available to be captured by LDC's, renewable generators and transmitters *only*. Equal, yet not necessarily additive, to approximately 1% of Ontario's GDP.

Positive Sector Impact^[2]: In the base case, value is created and the returns broadly match investor expectations while increasing productivity. The net cash-flow-at-risk in the generating sector decreases.

Define Critical Path: A key step is developing an implementation plan which can highlight the critical path to remove structural barriers and coordinating stakeholders around this plan. Forge greater alignment between the supply-side, renewable generators, utilities, regulators, government agencies, manufacturers, and energy consumers. Part of unlocking the market implies creating a manufacturing supply base which can cost-effectively serve the generators

Adapt & Refine: The stakeholders governing, managing and participating in the electricity network need to have their roles refined, and codes and standards agreed to manage the changes.

Open Market: The value hinges on effectively addressing the structural (enabling) barriers which can open the market for investment.

Play to Win: There are project execution challenges, as well as opportunities to increase the value of the business case.

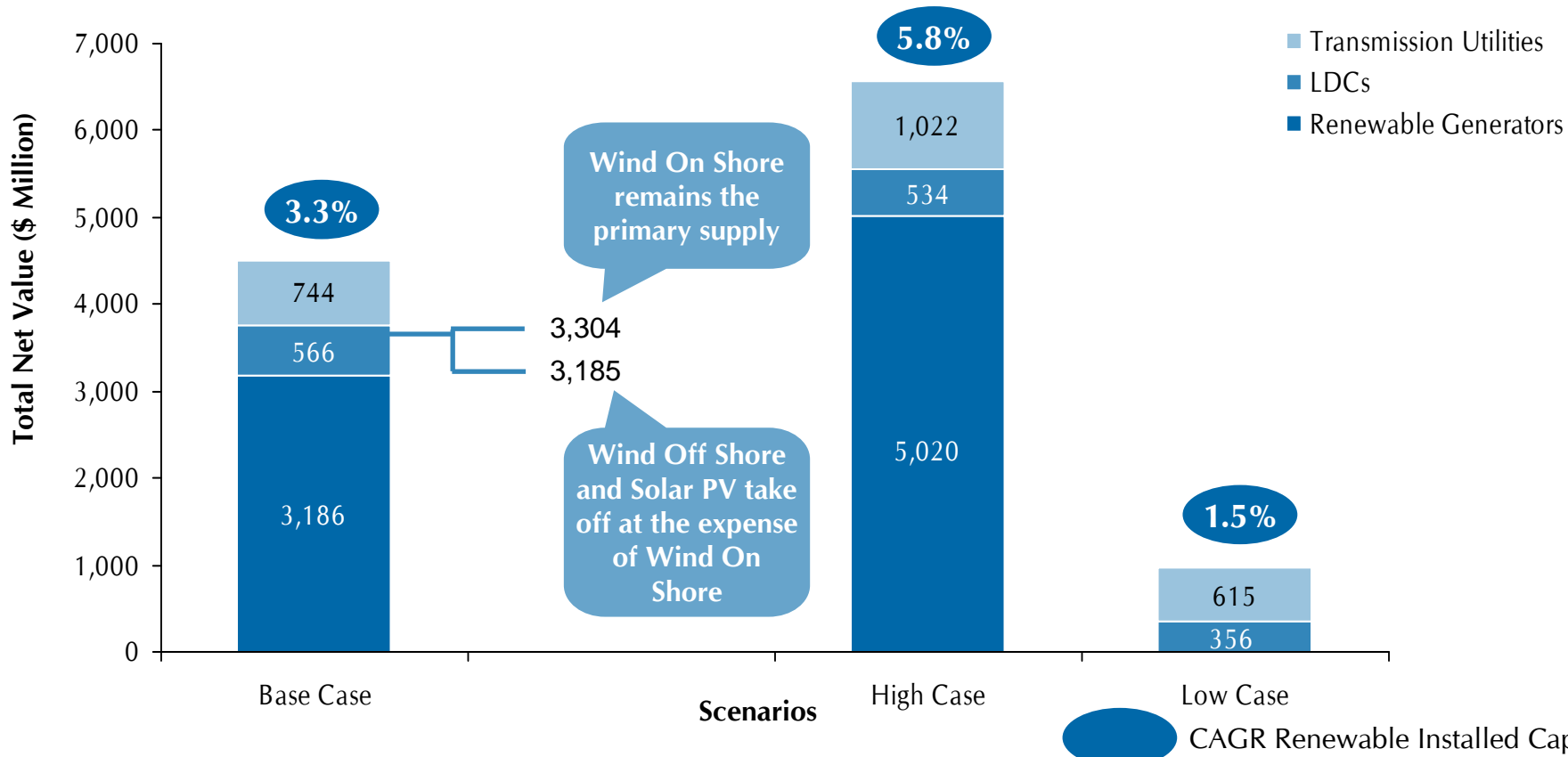
Note:

[1] Local Distribution Company

[2] The impact is positive for value creation, returns and productivity only for the renewable generation and, LDC and Transmission asset based increases directly a consequence of the FIT programme. The risk reduction applies to the entire generation sector beyond renewables. Socio-economic impact is excluded in this study.

\$4.5bn of value can be created for the three sectors if the OPA IPSP^[1] projections of 16,084 MW renewable installed capacity is achieved by 2025

Total Net Value under the different scenarios^[1]



Source: HMC Analysis

Note:

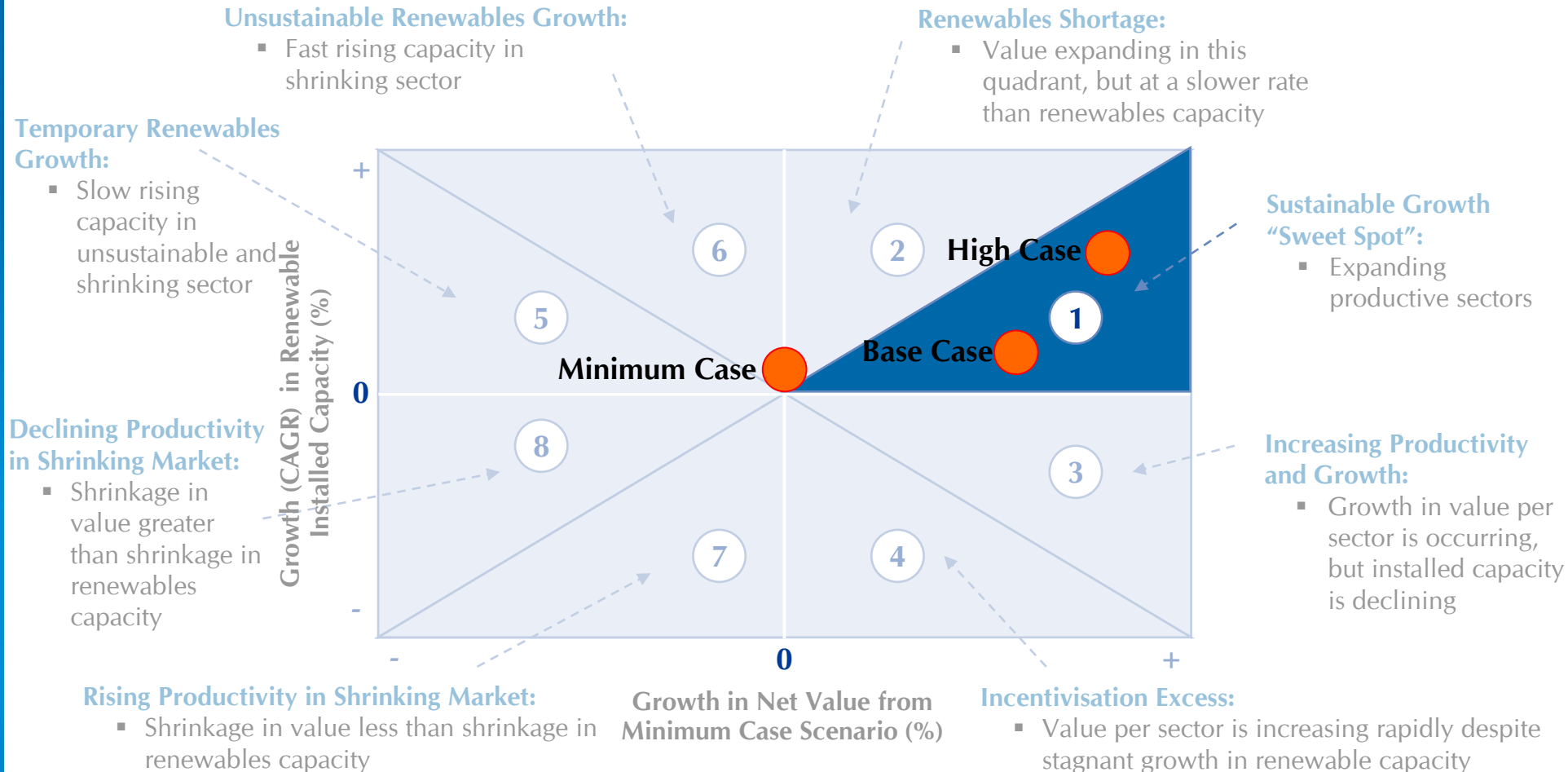
[1] The new transmission directive has been analysed separately. The IPSP was selected as there was more data available at the time of the study. The differences between using the IPSP and Tx Directive are not significant for the purposes of the study.

[2] To connect eligible renewable facilities into the grid.

[3] All scenarios assumed Mix 1: "Wind Off-Shore takes off in Ontario" and incrementally increases to 65% of the renewables installed capacity by 2027.

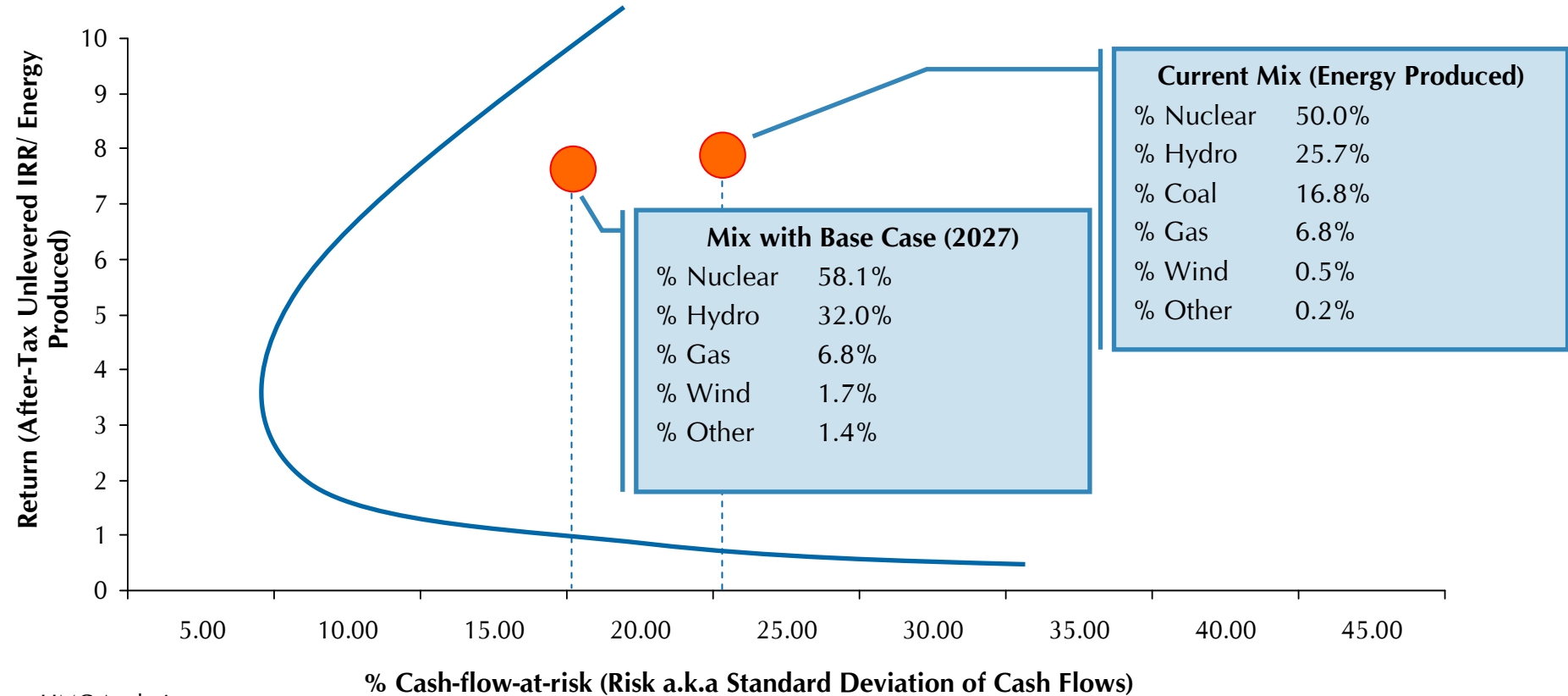
If scale is reached and the FIT is maintained, productive value can be created in the LDC, transmission and renewable generation sectors

Growth in Net Value vs Growth in Installed Capacity



In addition to creating productive value, renewables will also reduce the total financial risk of the total generation sector (renewables and non-renewables)

Risk Profile Changes as Renewables are Increased



Source: HMC Analysis

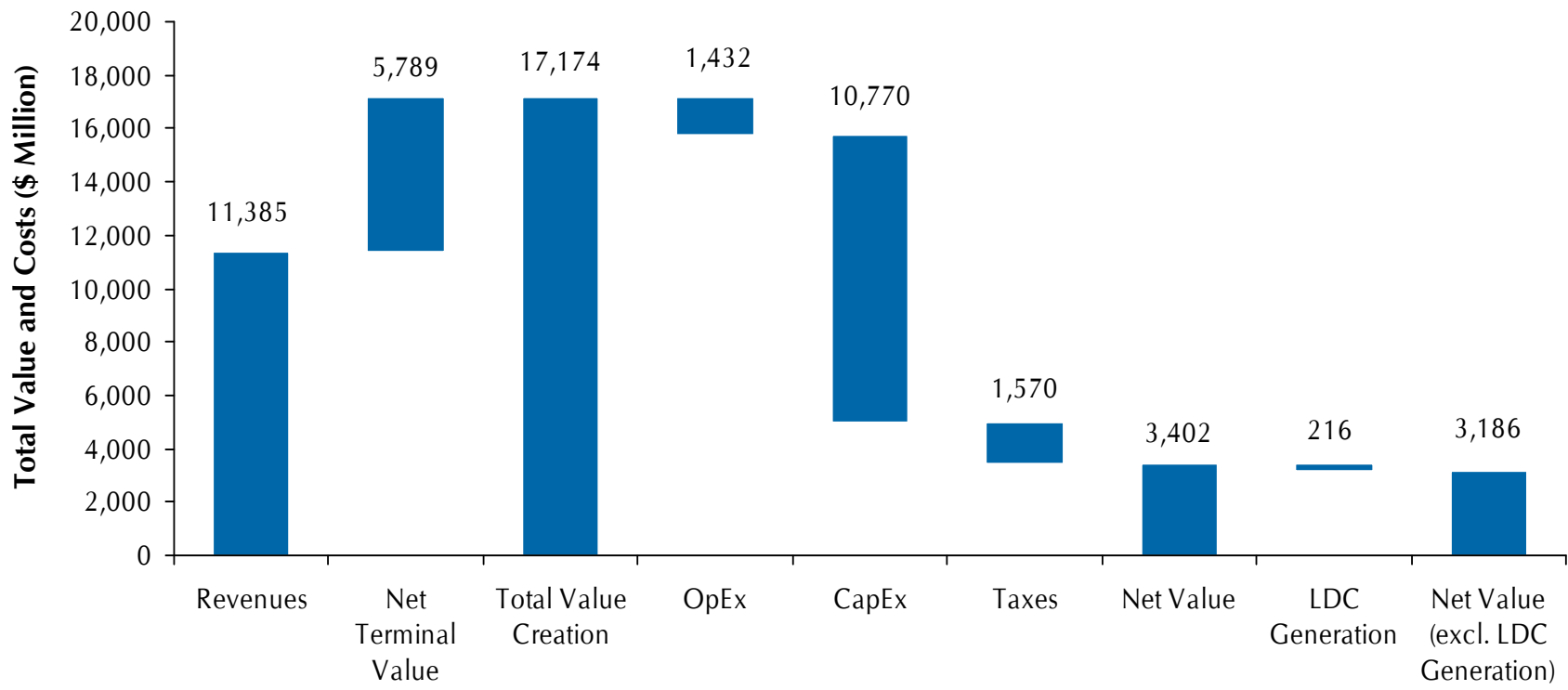
Note:

[1] The analyses assumes IRR is a function of the operating constraints.

[2] It is assumed increased nuclear output will replace some of the coal capacity losses. The rest will be replaced by the FIT eligible technologies and the difference by large Hydro. An assumption is made that Large Hydro receives the same returns as FIT eligible hydro facilities < 50MW.

Generators could capture 71% (\$3.2bn) of the total value and present the largest opportunity to maximise value

Renewable Generators – Value Breakdown (Base Case)



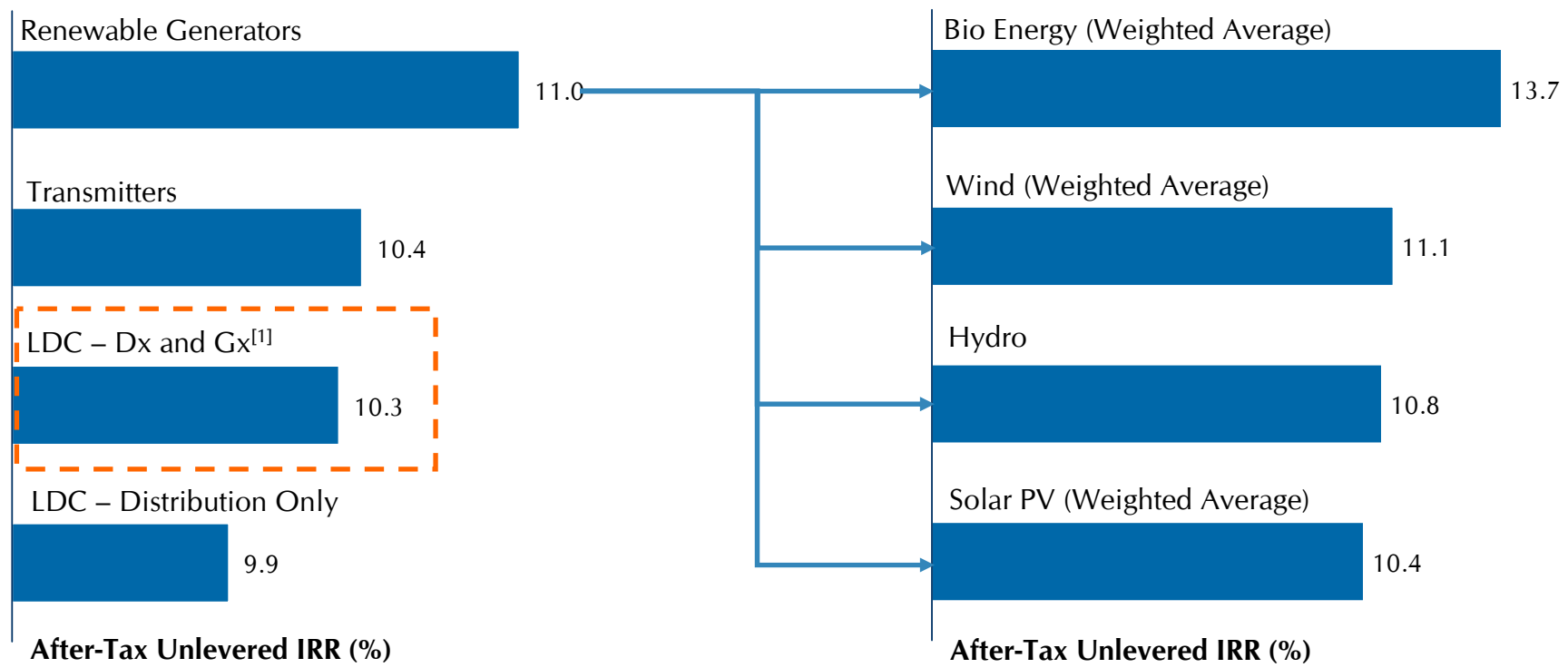
Value Breakdown

Source: HMC Analysis

Note: The terminal value represents the total value of the continuous operation beyond 2027 assuming no additional growth and capital investment beyond maintaining existing capacity in 2027.

Generators could earn the targeted 11% After-Tax Unlevered IRR under the conservative assumptions used

After-Tax Unlevered IRR in the Base Case



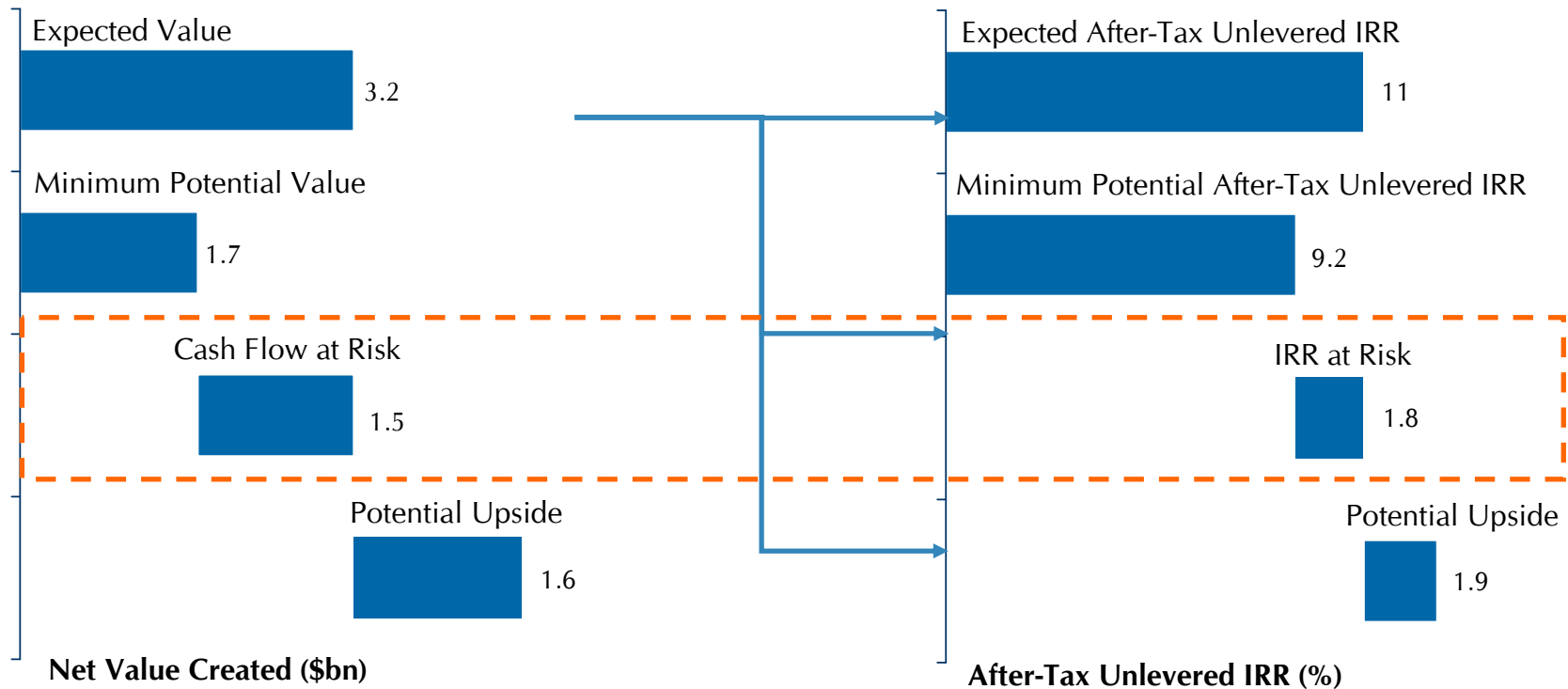
Source: HMC Analysis

Note: [1] Assumes half of Ontario's 91 LDC's embark on renewable generation (<10MW) and build facilities of an average 5MW size.

The risks in capturing this return, however, could lead to 40% (\$1.4bn) of the potential value unrealised

Generators – Net Value Created

Generators – After-Tax Unlevered IRR



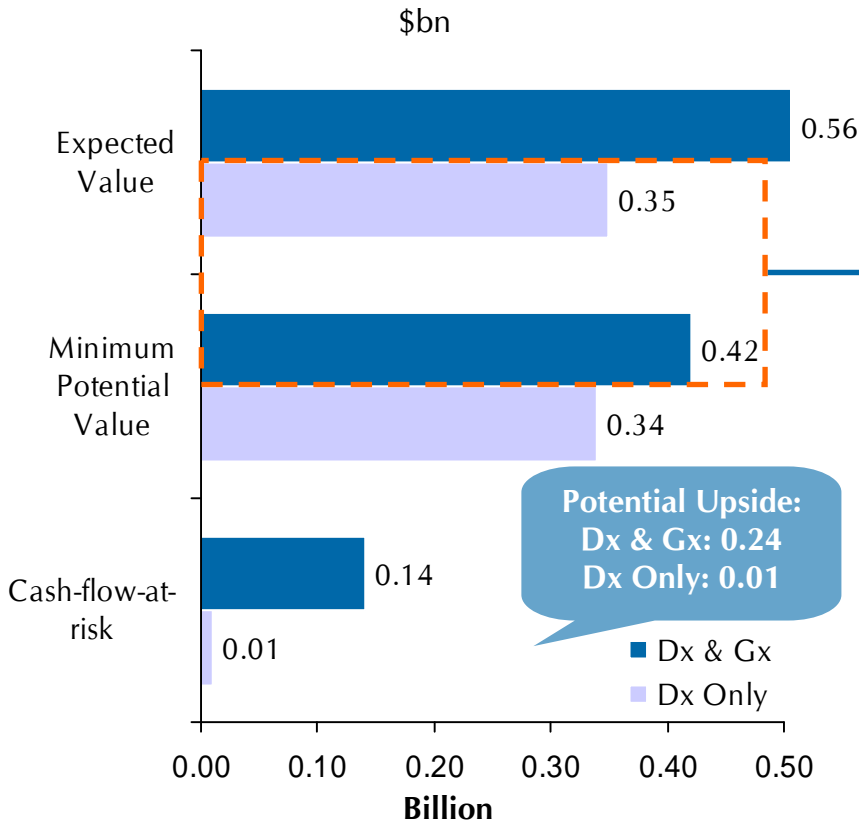
Source: HMC Analysis

Note:

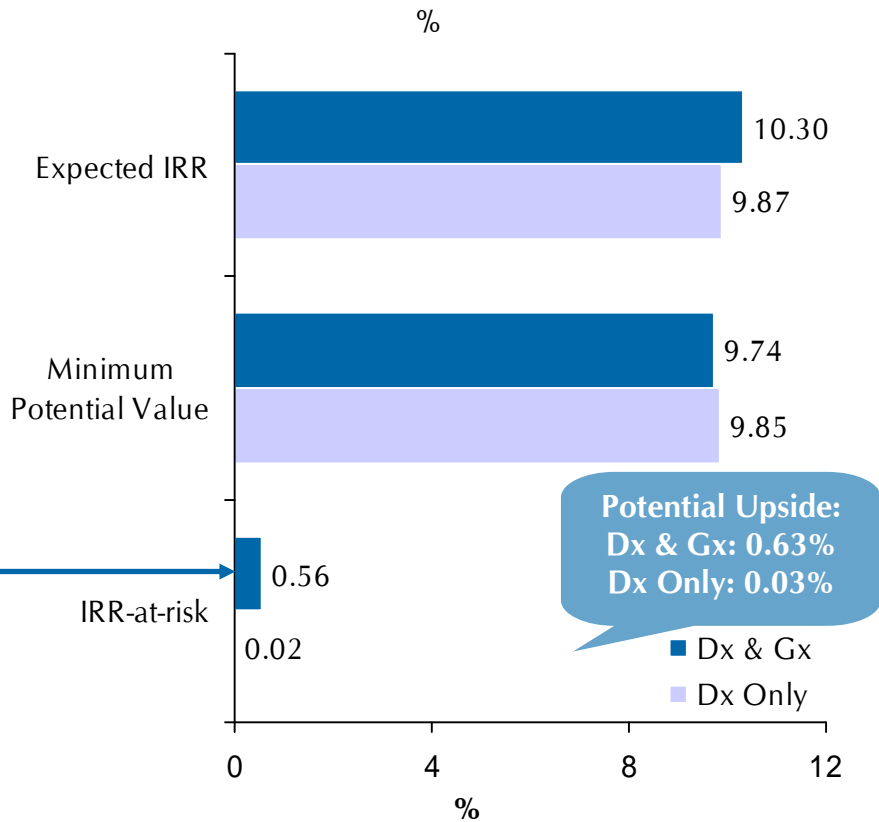
[1] Based on a simulation analyses of total value and return considering a best, most likely and worst case parameter for each model variable.

For LDCs, the worst case value with generation is better than the expected value without generation, yet at the risk of obtaining a lower IRR

LDC – Net Value Created



LDC – After-Tax Unlevered IRR



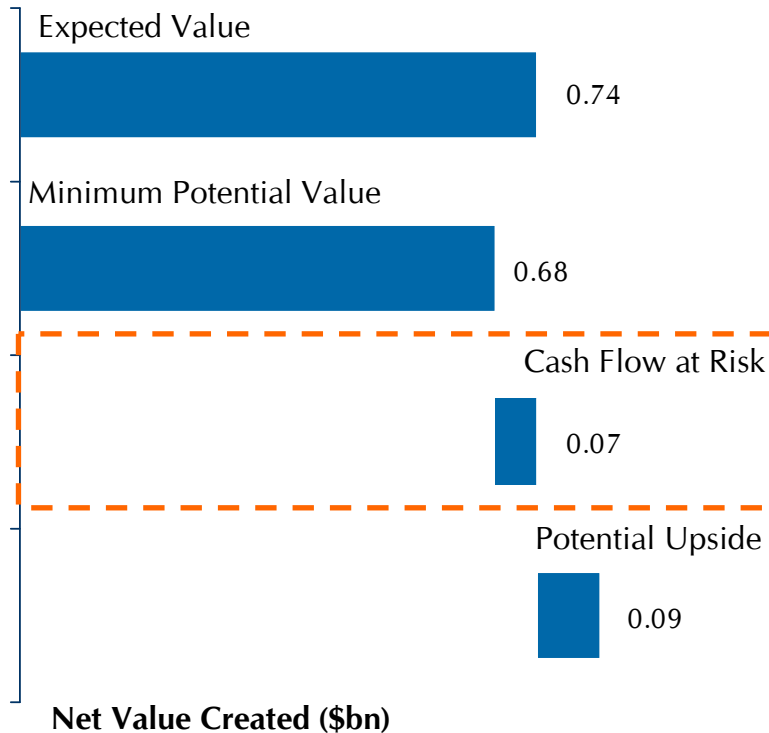
Source: HMC Analysis

Note:

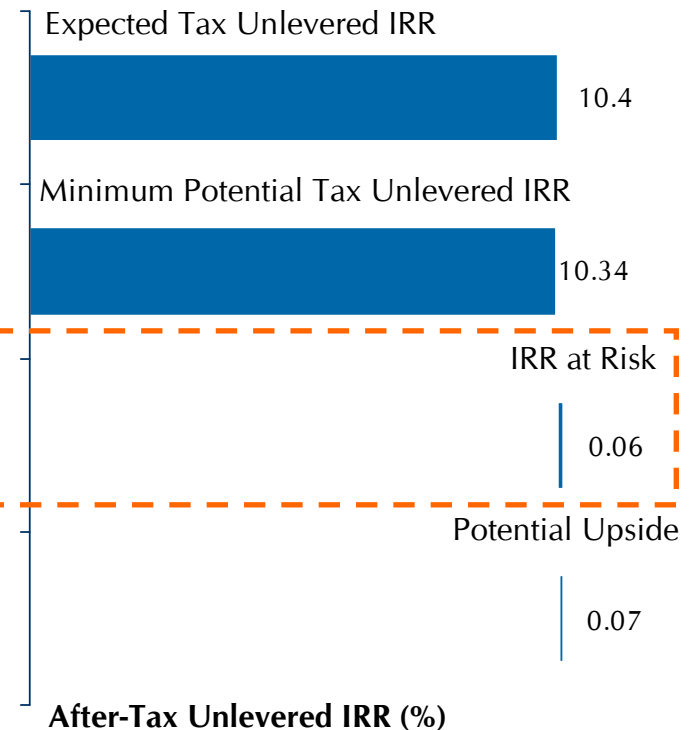
[1] Based on a simulation analyses of total value and return considering a best, most likely and worst case parameter for each model variable.

Transmission utilities have the least to lose given their regulated return

Transmitters – Net Value Created



Transmitters – After-Tax Unlevered IRR



Source: HMC Analysis

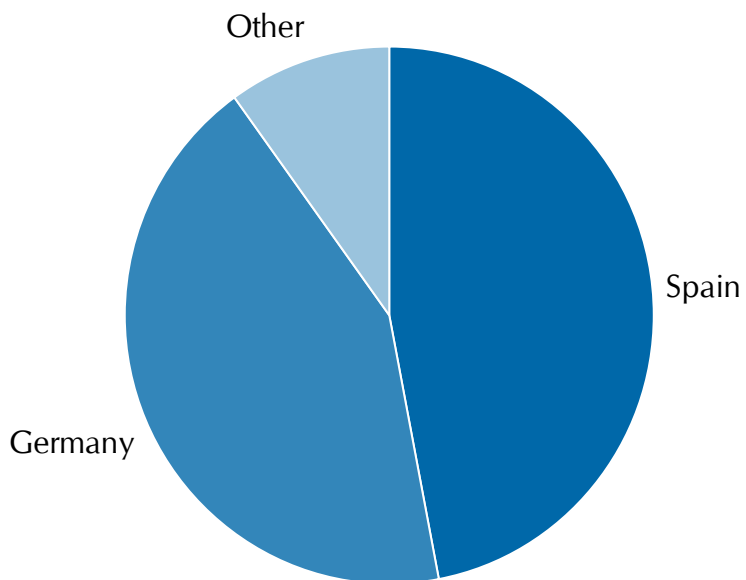
Note:

[1] Based on a simulation analyses of total value and return considering a best, most likely and worst case parameter for each model variable.\

Despite the potential value and interest expressed there had been few Ontario orders placed for equipment with solar manufacturers in 2009

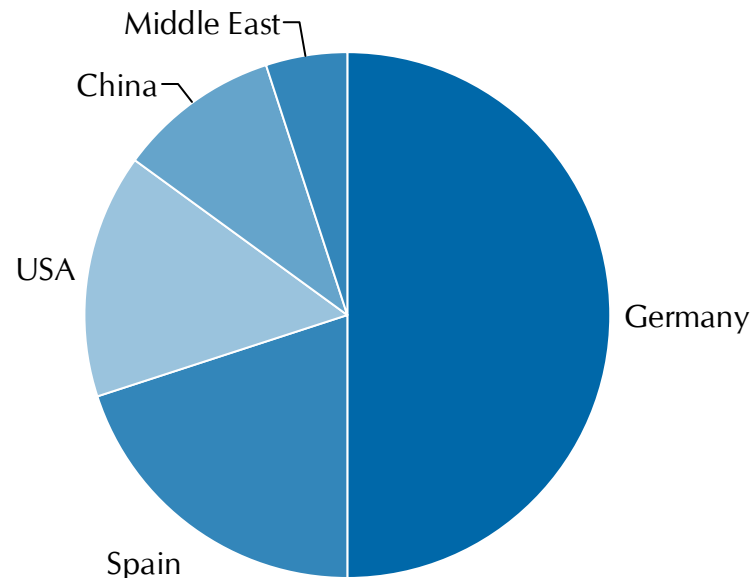
2008 Order Book

Modules Ordered and Delivered in 2008 (%)



2009 Order Book (2 Quarters)

Modules Ordered and Planned for delivery in 2009 (%)



Source: Interviews with the 11 largest solar module manufacturers in China, 4 wind manufacturers in India, 3 solar manufacturers in Germany and 1 US supplier. HMC Analysis.

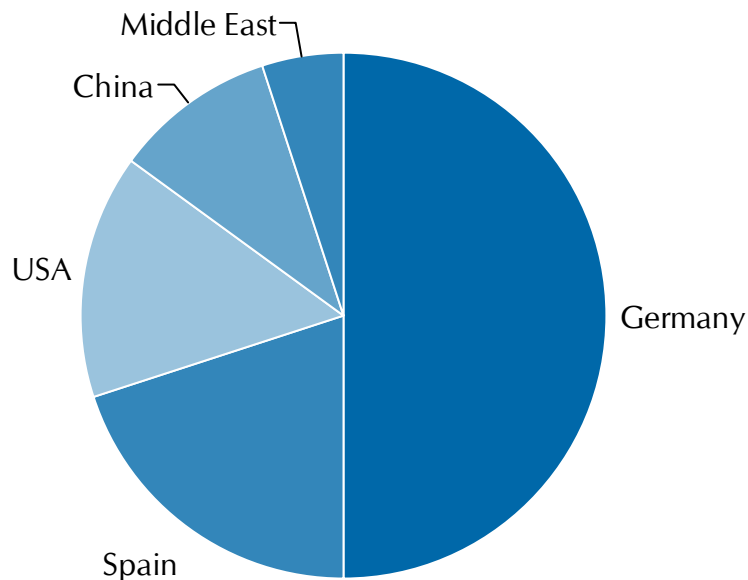
Note: Manufacturers interviewed only manufacture-to-order and have based these estimates on actual orders as of 2 September 2009.

However, since the announcements in late September, there has been an increase in committed capital

2009 Order Book (2 Quarters)

Modules Ordered and Planned for delivery in 2009 (%)

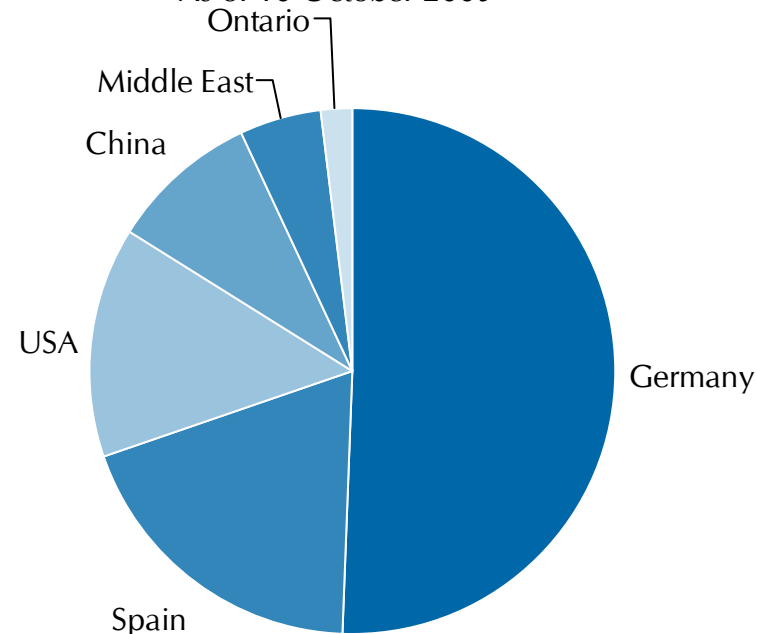
As of 2 September 2009



2009 Order Book (2 Quarters)

Modules Ordered and Planned for delivery in 2009 (%)

As of 10 October 2009



Source: Interviews with the 11 largest solar module manufacturers in China, 4 wind manufacturers in India, 3 solar manufacturers in Germany and 1 US supplier.

HMC Analysis

Note:

Manufacturers interviewed only manufacture-to-order and have based these estimates on actual orders as of 2 September 2009.

Unlocking Value from the FIT in the Green Energy Act

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Structural Barriers: Comprise initiatives, currently underway, which must be completed to open the “market” for investment

Structural Barriers

- The critical path to successfully unlock value from the act is fragmented amongst numerous stakeholders.
- No one group, technology, region or sector by itself can capture the opportunity province wide.
- Several critical steps reside in the domain of entities who do not directly benefit from the act.
- It is not clear if completing these critical steps is a priority for everyone.

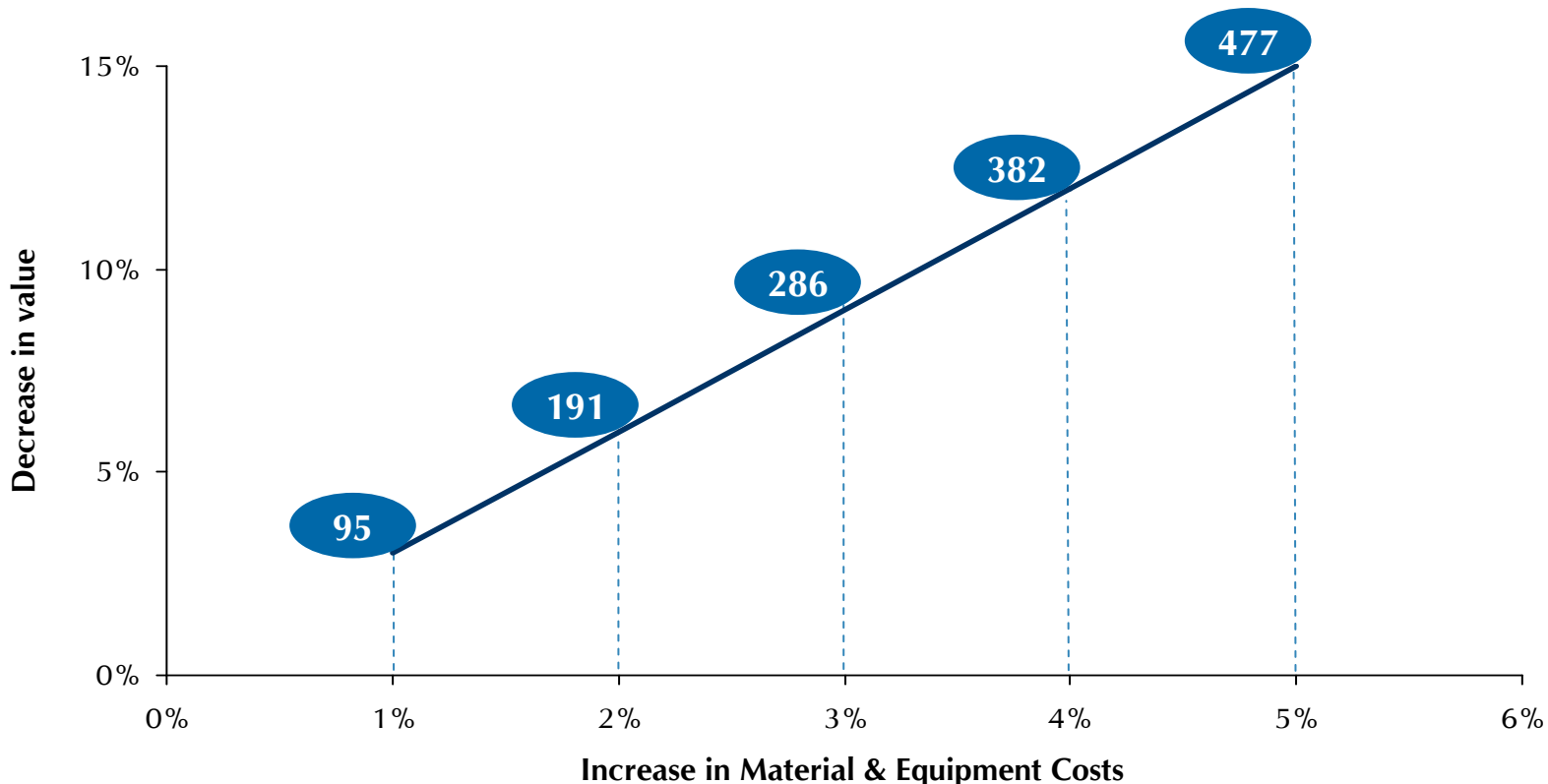
Summary of Structural Barriers

	Barrier	Primary	Secondary
System Wide	■ Fragmentation of critical path	X	
	■ Uncertainty in regulation, codes and standards	X	
	■ Length of permitting process	X	
	■ Lack of a suitable precedent		X
	■ System-wide implementation plan		X
	■ Enabling facilities/structures in transition		X
LDC's / Transmitters / Generators	■ Will a installed capacity renewables cap be imposed?	X	
	■ Prioritising CDM	X	
Industrial Supply Side	■ Cost increases		X
	■ How will the supply side be incentivized		X

Source: HMC Analysis

Barrier: Moving local production to Ontario would create employment, yet will have an uncertain impact on the costs and returns of generators

Base Case Sensitivity to Changes in the Material & Equipment Costs^[1]



Source: HMC Analysis

Note: [1] The local content sourcing encourages only specific equipment to be sourced from Ontario. The figure above shows a general increase in equipment costs

● NPV (\$Million) Value destroyed

Project Barriers: Potential developers have incomplete information to compare the risk and return on investments and need to ensure effective delivery

Project Barriers

- Most investors are apprehensive about locking-in value during the actual project development stage.
- Most potential investors are concerned that a cap will be imposed on renewables, if demand is high.
- There are widely differing estimates and assumptions used to calculate the business cases.

Summary of Project Barriers

	Barrier	Primary	Secondary
Business Planning	■ Ambiguity about a cap on renewables	X	
	■ Uncertainty about metrics for the business case	X	
	■ Identifying entry points in the market	X	
	■ Permitting delays	X	
	■ Contrasting the risk/return trade-off	X	
	■ Funding		X
	■ CDM versus Generation		X
Project Execution	■ Minimising risk of execution	X	

Source: HMC Analysis

Barrier: There is still uncertainty as to whether there will be a cap on renewables or if the planned transmission lines will be completed as announced

“Specifically show us where it says there will not be a cap imposed on renewables in the future. We have not seen this [as] it is a major consideration before making any large investments”

“What happens if the transmission lines are delayed (or) not built in time? There is angst that this major piece will be delayed”

“We only intend making 4 investments so the cap is not a concern to us in any way”

“We think demand will be so high that the government [will] have to step in [and] impose a cap on renewables”

“The most important concern for our board would be the cap on renewables”

“Who will pay for the transmission lines?”

Source: Interviews with LDC's and investor groups

Individual Barriers: Embedded generation on the scale recommended is new and only moderately appealing due to long payback periods

Individual Barriers

- Applies primarily to Rooftop Solar PV and Ground mounted Solar PV Facilities of a smaller size.
- The payback period may extend beyond the period of actual home/site ownership thereby reducing the benefits/value investors receive.
- Consumers tend to apply higher discount rates to investments which have longer payback periods – hyperbolic discounting^[1].
- When consumers need to incur a cost to receive a potential gain, the gain must significantly outweigh the loss – loss aversion^[2].

Individual Bias

Summary of Individual Barriers

Barrier	Primary	Secondary
■ Communication and explanation of the benefits	X	
■ Status Quo Bias ^[3] (recession driven)	X	
■ Hyperbolic discounting		X
■ Loss aversion		X

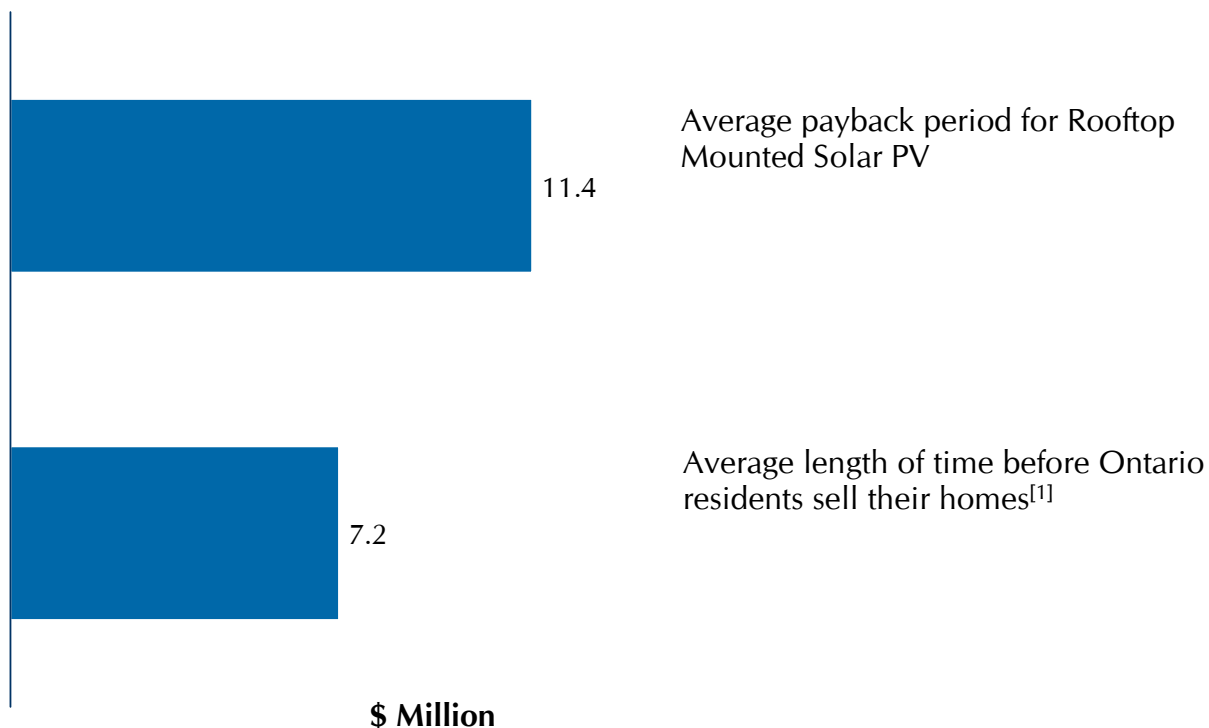
Source: [1] George Ainslie. "Specious Reward: A Behavioural Theory of Impulsiveness and Impulse Control," *Psychological Bulletin*, 1975

[2] Daniel Kahneman and Amos Tversky, "Prospect Theory: An Analysis of Decision Under Risk", *Econometrica*, 1979

[3] William Samuelson and Richard Zeckhauser, "Status Quo Bias in Decision Making", *Journal of Risk and Uncertainty*, 1988

Barrier: Long payback periods discourage the use of technologies where the owner cannot capture the full duration of benefits before ownership transfer

Benefit Capture for Rooftop Mounted Solar PV



Implications

Ontario residents may be unwilling to incur a large upfront capital investment with a long payback period. Recent surveys in London (UK)^[2], however, indicate that homeowners may pay more for homes with solar facilities.

With the market uncertainties, Ontario residents may not change their homes as rapidly as in the last 4 years.

Source:

[1] Filings with the Ontario Canadian Housing and Renewal Association

[2] Energy Saving Trust (<http://www.est.org.uk/housingbuildings>)

The structural barriers can be overcome by focusing on six themes of solutions

Complete a sector wide implementation plan for the critical path and secondary items.

Better communication, information and education.

Reduce uncertainty in the act and regulation.

Finalise the codes and standards.

Develop a supply-side industrial plan to incite production.

Adapt and refine the roles of the players in the electricity sector.

When the barriers to discourage projects are removed, execution challenges should be addressed to ensure that value is unlocked

Proper site and technology selection which impacts capacity factors, efficiencies and delays due to permitting.

Effectively designing and building the facilities.

Developing a strategic sourcing strategy to lock-in supply and lower costs.

Maximising value from the Aboriginal adder.

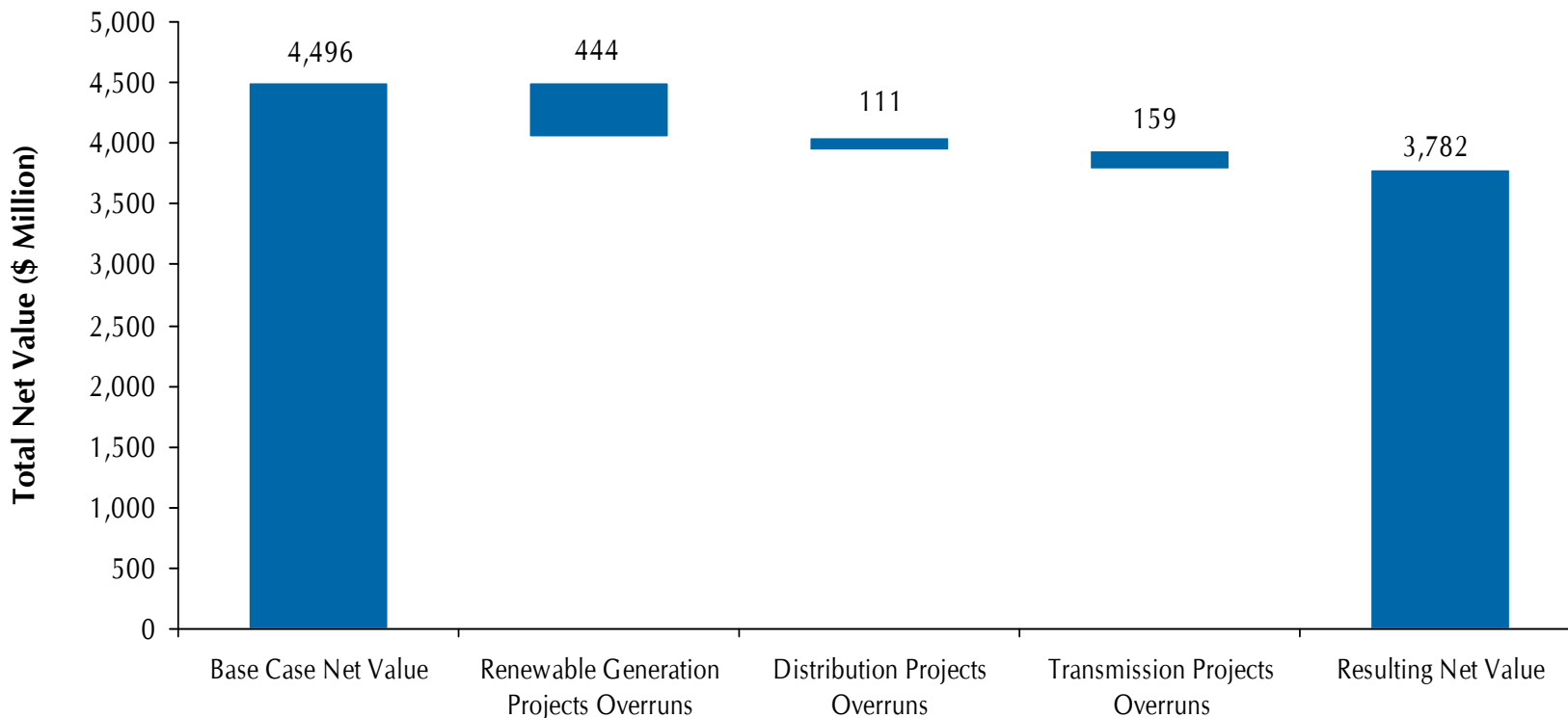
Managing the integration risks.

Improving operating performance of the facilities to capture more value from the FIT.

Preventing project delivery problems is a process that starts before the actual project commences

Potential Value for Generators: \$444m

Project Execution – Effect of Typical Schedule Overruns (Base Case)



Net Value / Value Destruction

Source: HMC analysis based on interviews with investors

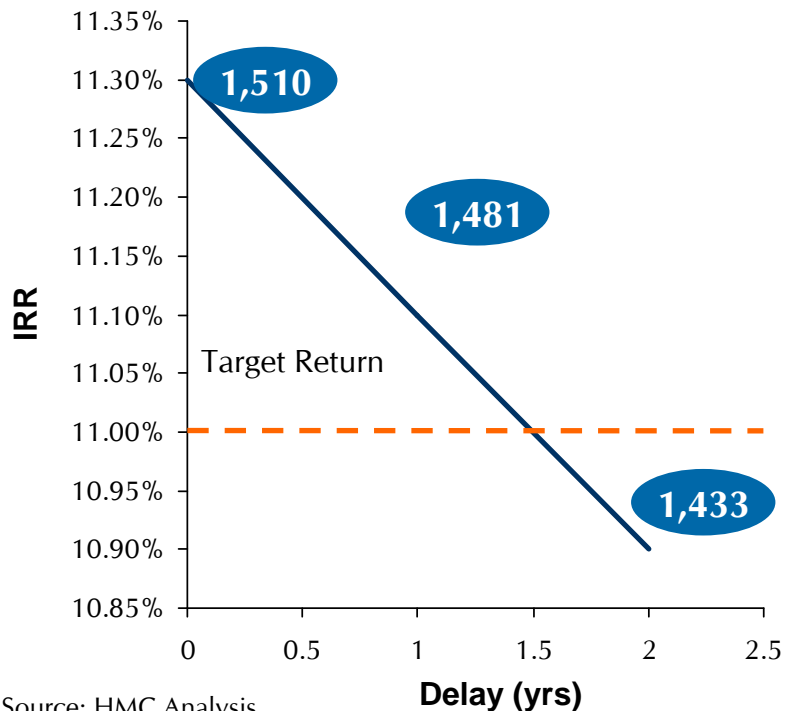
Note: The cost is calculated as increases in the project schedules and not as price increases. This saving is already added to the base case and it is assumed developers will not experience these savings.

Aboriginal projects could increase their IRR by 0.3% by reducing the expected project delays

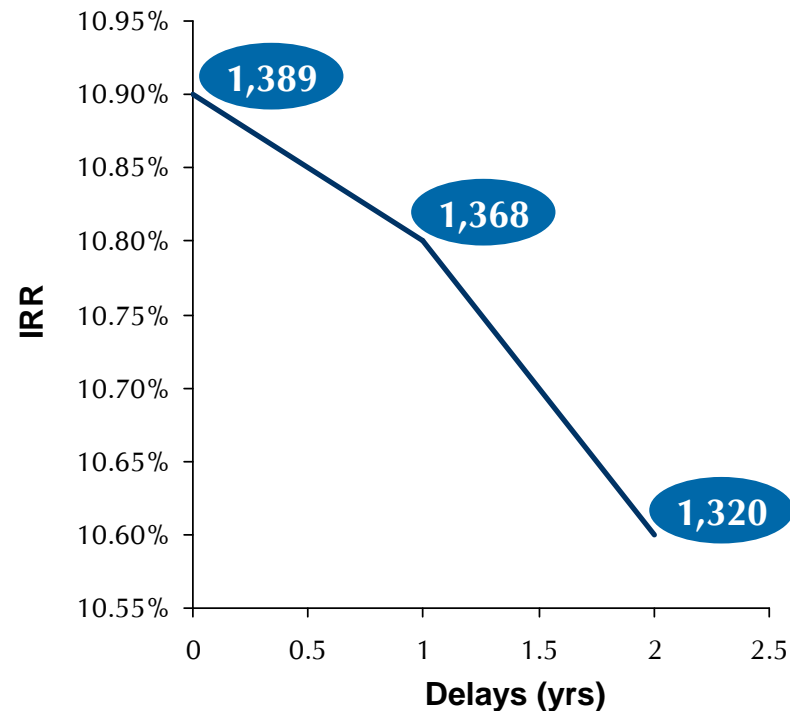
Potential Value:
0.3% increase
in IRR

Aboriginal IRR Sensitivity (at 30% equity) to Capital Costs^[2]

Assuming no Capex increase



Assuming a 2.5% Capex increase



Source: HMC Analysis

Note:

[1] The value potential from the aboriginal adder is not cumulative and should not be added to the base case.

[2] Assuming a 30% mean aboriginal equity stake modelled around a distribution.

[3] It is assumed only 25% of FIT eligible projects have an aboriginal equity participation.

Unlocking Value from the FIT in the Green Energy Act

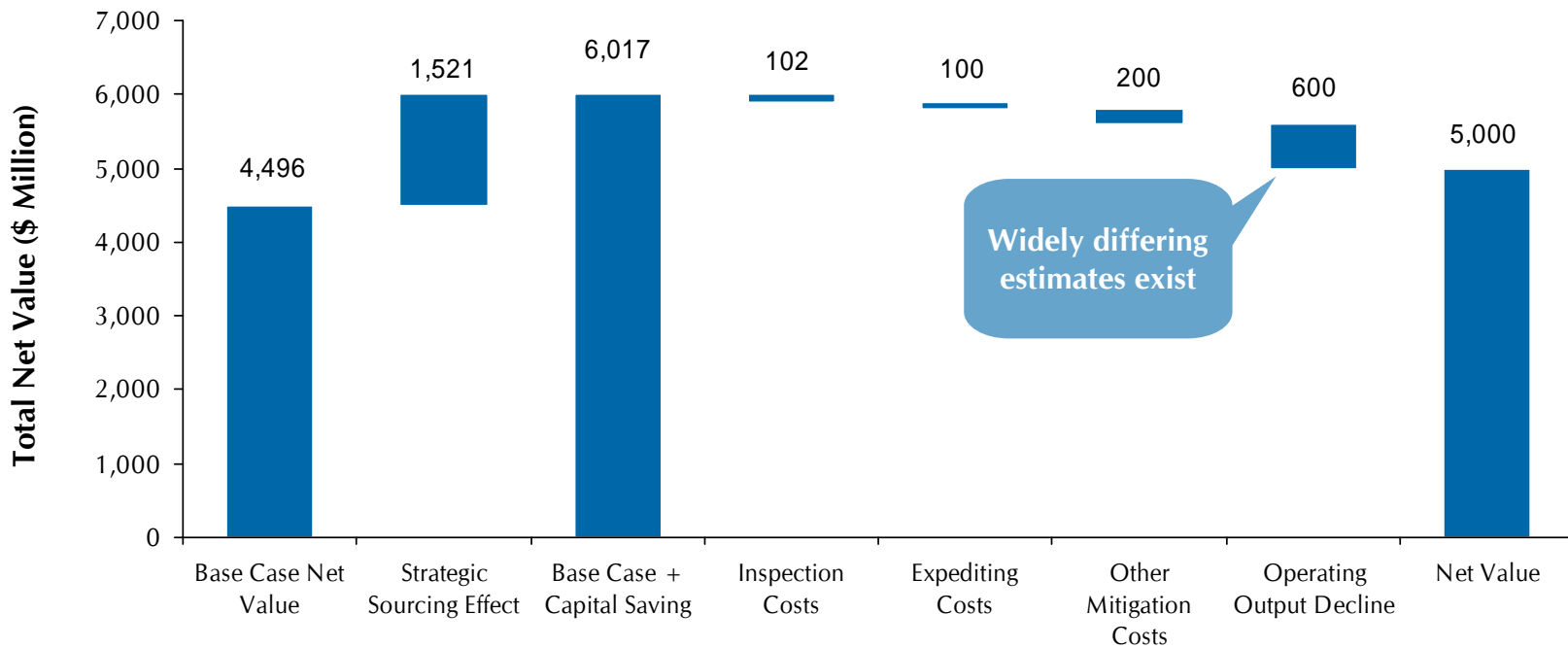
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 NPV (\$Million)

Potential procurement savings will occur if the risk mitigation measures can be undertaken and lock-in life cycle savings

Potential Value for all sectors: Up to \$1bn

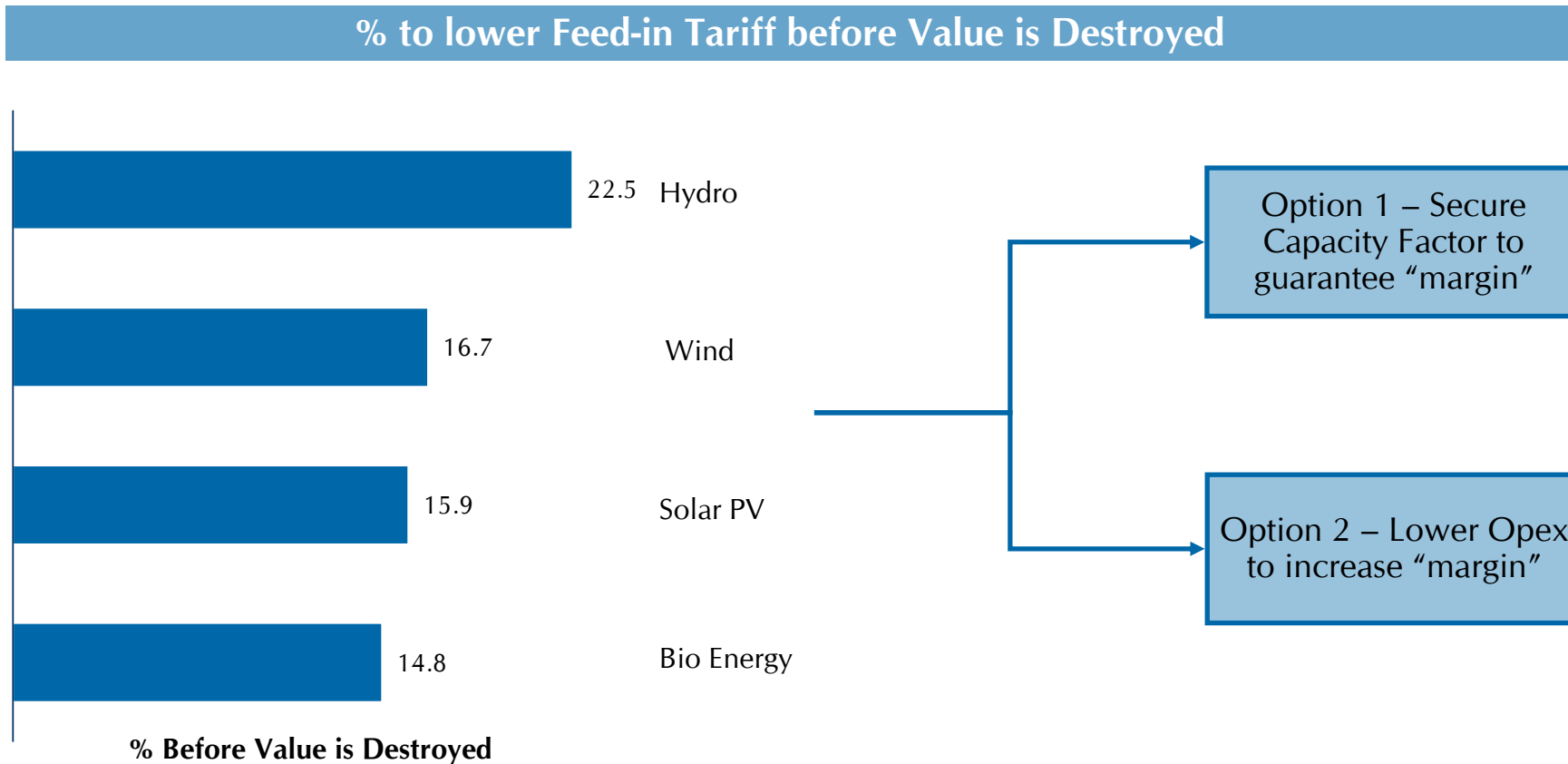
Project Execution – Effect of Strategic Sourcing (Base Case)



Value Breakdown

Source: HMC Analysis

Managing efficiency is critical as a cost creep of 2.3 cents/kWh (16.7% of the FIT) in wind will make the technology unviable



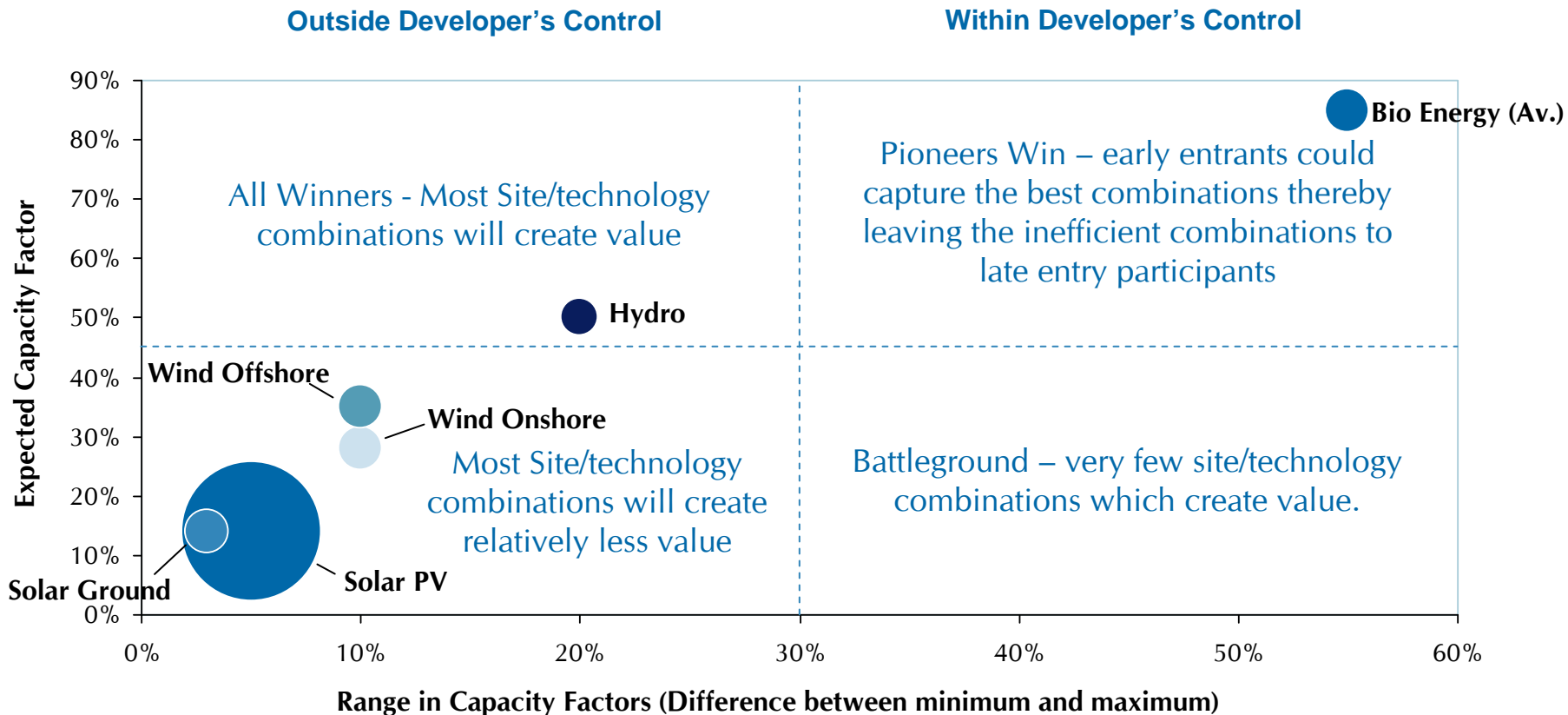
Source: HMC Analysis

Note: [1] FIT sensitivity values are calculated using Hatch’s most likely estimates for all other variables.

Investors need to be more focused on capturing the correct sites/technology combinations for Bio-Energy facilities

Potential Value:
3.44% increase
in IRR

Developing a Site Selection Strategy



Source: HMC Analysis

Note:

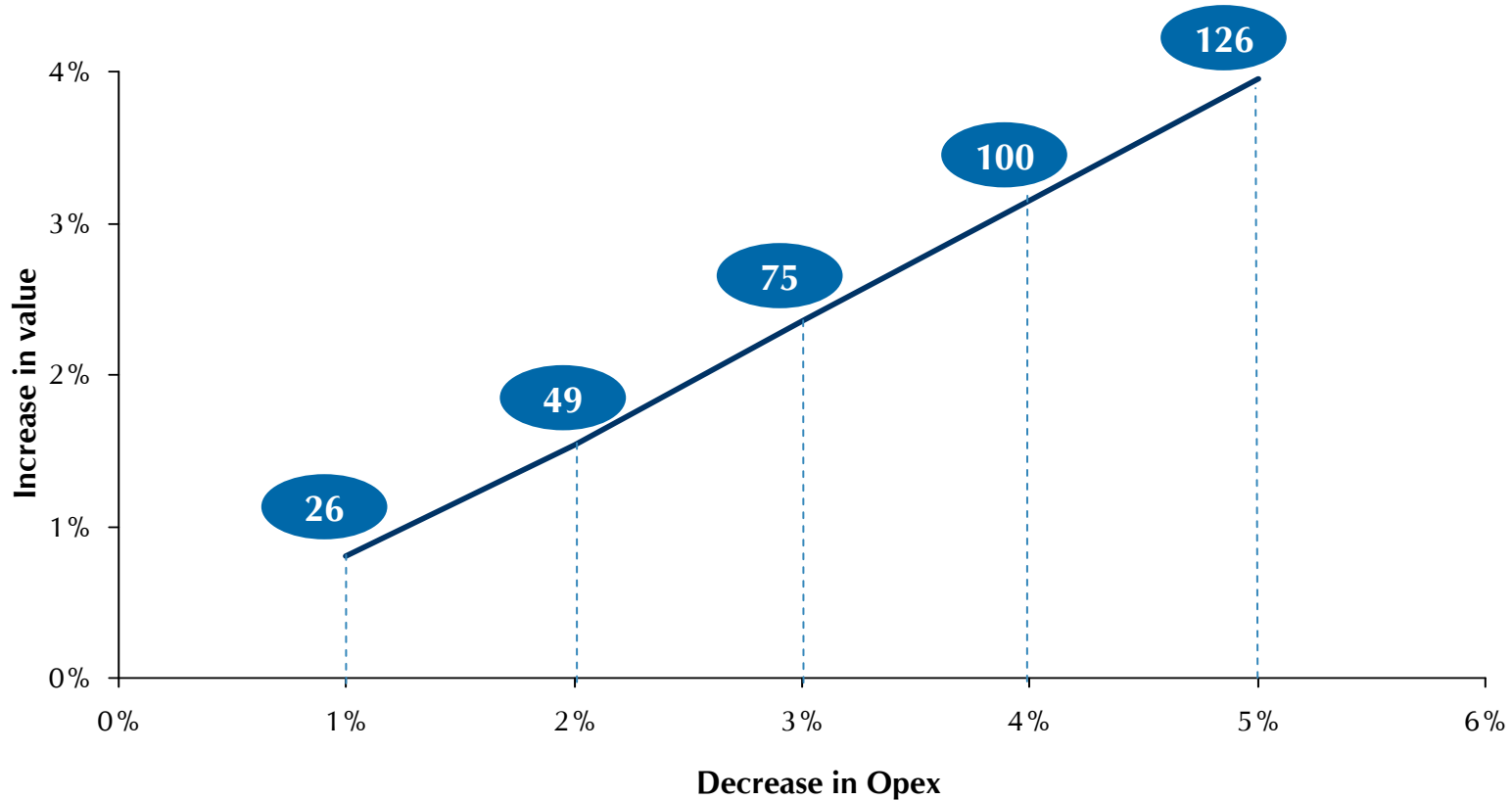
Size of the bubble is the Estimated Range in Permitting Delays (Difference between minimum and maximum)

This may not apply to LDCs who may have less options for site selection.

There is some value to be created by squeezing out operational efficiency from the generating facilities

Potential Value: \$130m

Sensitivity to the Base Case as Operating Costs Decrease



 NPV (\$Million) Value Created

Source: HMC Analysis
Unlocking Value from the FIT in the Green Energy Act
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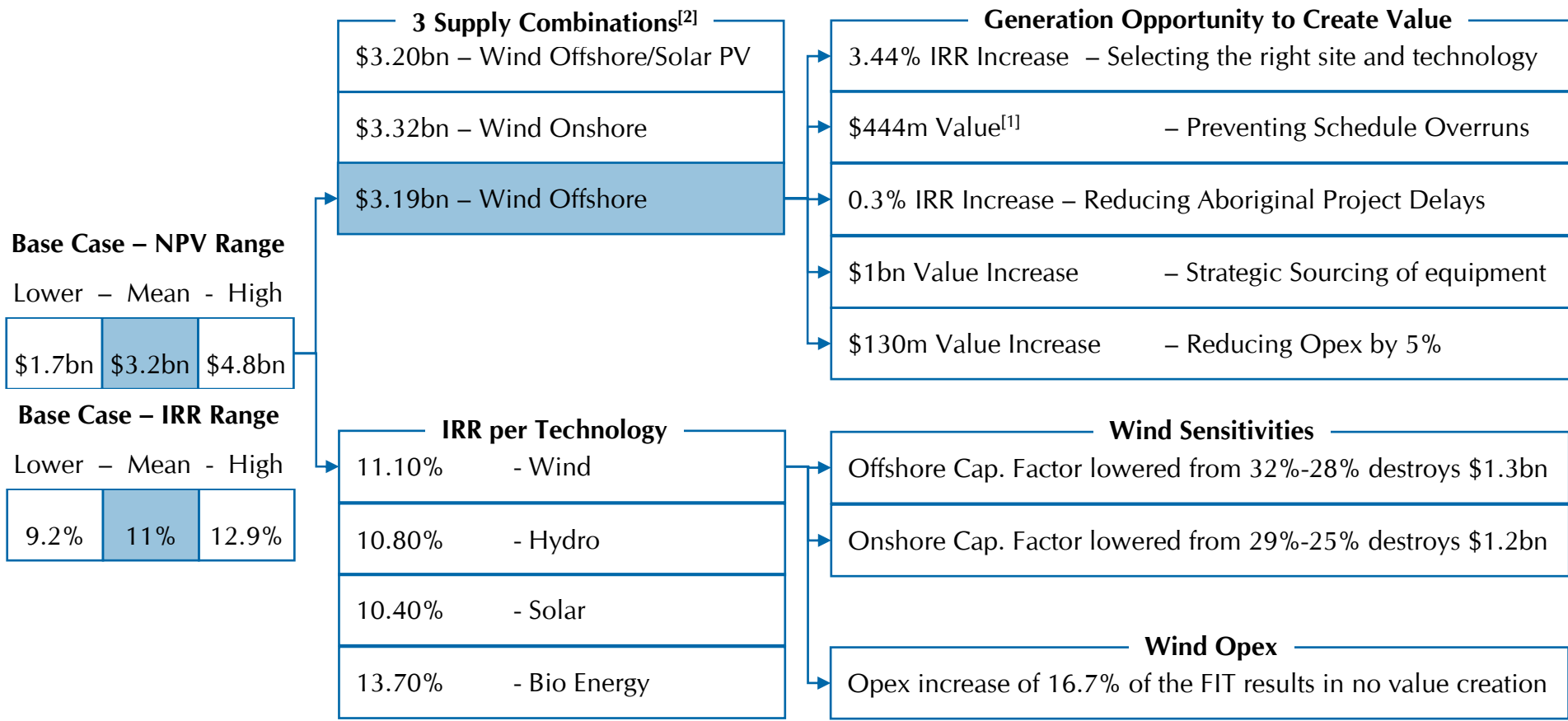
Solutions to the structural, project and individual barriers should be rolled-out by leveraging two principles

Enable Target: Recognize that renewables technology under the proposed regulation can generate significant value creation for LDC's, renewables generators and transmitters. It is important for this "target" (\$4.4bn) of value creation to be enhanced and secured with pending changes to regulations.

Further catalyse industry: The provincial government can catalyse the formation of a green sector by encouraging investment in and research of an integrated portfolio of proven and emerging renewable technologies and planning tools.

We conclude by emphasizing that effectively managing the structural and project barriers is possible and could unlock significant value from the FIT

Overview of Base Case Scenario for Renewable Generators



Note:

[1] The Base Case of \$3,2bn assumes no schedule overruns. Therefore this value is already captured in the Base Case.

[2] Three portfolio mixes have been modelled. Mix 1 assumes that over time, wind offshore and solar PV become the dominant source, Mix 2 assumes wind onshore remains the dominant source and Mix 3 assumes only wind offshore displaces wind onshore.

About Us

Hatch Management Consulting is the management consulting practice of Hatch, a leader in technical and consulting services to the global minerals, energy and infrastructure sectors with more than 9,000 professionals in more than 65 offices worldwide. Hatch Management Consulting advises leaders within or allied to the mining and metals, energy and infrastructure sectors. We are well positioned to deploy our global knowledge at a local level.

We are unique in blending management expertise with deep sector and technical knowledge to help our clients develop an holistic solution to their issues.

Sectors: Mining & Metals, Infrastructure and Energy.

Practices: Investment & Business Planning, Implementation, Innovation, Operations, Risk & Finance, and Strategy.

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