Enhancing Future Rounds of Alberta's REP

CanSIA Discussion with Alberta REP Forum

Webinar, 19 Jan. 2018

CanSIA
CANADIAN SOLAR INDUSTRIES ASSOCIATION | L'ASSOCIATION DES INDUSTRIES SOLAIRES DU CANADA

PRESENTATION OVERVIEW

- Background & Introduction.
- Discussion of Indexed-REC:
  A. Maximizing Competition.
  B. Maximizing Efficiency.
  C. Minimizing Cost.
- Options for Future Rounds of REP.
- Conclusion & Next Steps.

Background & Introduction

BACKGROUND & INTRODUCTION (1/2)

- Alberta's Renewable Electricity Program (REP) implemented by AESO will support 5,000 MW of utility-scale renewables by 2030.
- The "Indexed-REC" & "Fixed-REC" were considered by AESO as approaches to purchasing renewable attributes through the REP.
- Indexed-REC chosen for reasons including that it "allocates risk appropriately", is "likely to draw the highest number of competitors", & "minimizes the total cost of the first competition".

BACKGROUND & INTRODUCTION (2/2)

- First round of REP delivered excellent results, demonstrated long-term revenue certainty minimizes renewable electricity cost, esp. during period of uncertainty (i.e. coal retirement schedule).
- However, the first round of REP did not consider a facility's power pool price capture and thus market price signals are muted.
- Important enhancements could be adopted for future rounds to maximize competition and efficiency and to minimize cost.

Discussion of Indexed-REC

Competition, Efficiency & Cost

A: COMPETITION

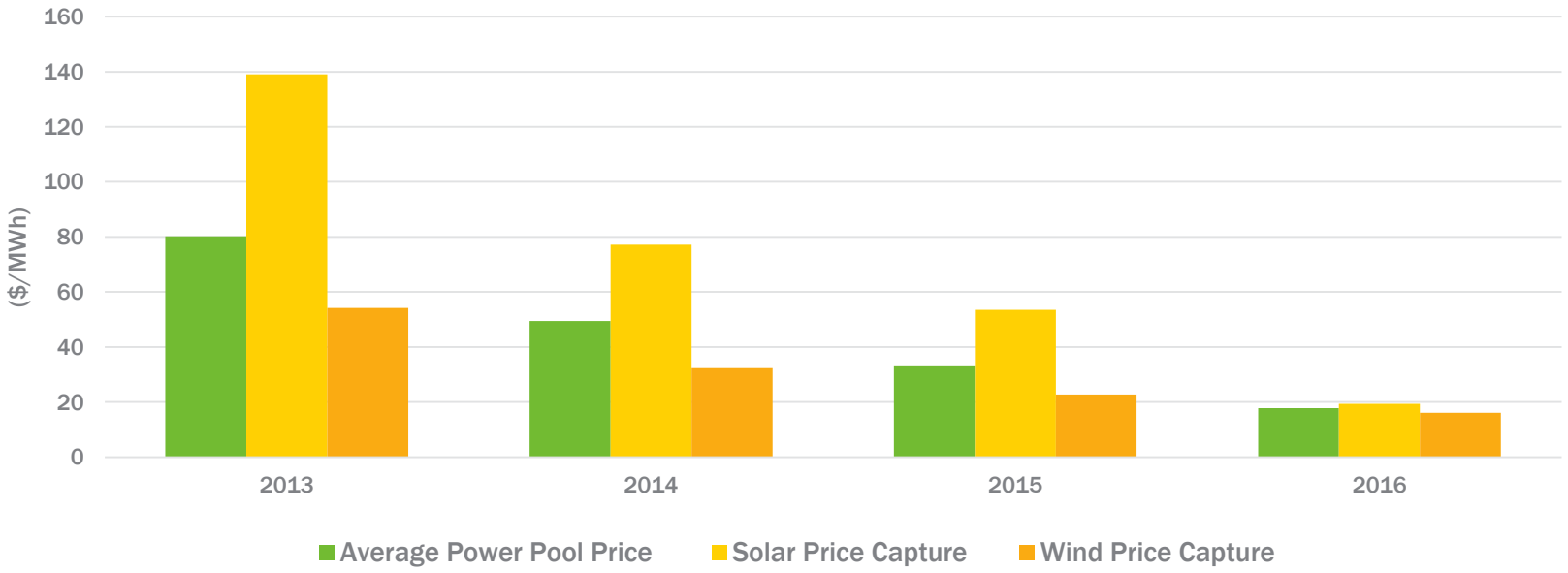
- REP1 attracted 12 Proponents bidding 26 facilities, including a negligible # of solar facilities. Commercial Operation Date (Dec. 2019) limited # of shovel-ready solar facilities.

- However, many solar facilities could be shovel-ready by 2020, 75 solar facilities (3,800 MW) in AESO Connection Queue (Jan. 2018).

- Attracting higher level of participation from solar facilities would draw a higher number of bids to future rounds and increase competition.

B: EFFICIENCY (1/2)

- Price signals based on supply/demand dynamics (rewarding highest value generation) delivers most efficient outcomes in market.
- Solar captures premium to the average power pool price, averaging 50% higher than the average (9 – 73%) in years 2013 – 2016.



B: EFFICIENCY (2/2)

- However, Indexed-REC mutes price signals by not taking a facility's power pool price capture into consideration.
- In example below, "A" would be contracted despite requiring more support (i.e. out-of-market payments) than "B".
- Considering power pool price capture during bid selection would ensure only the most viable facilities receive support.

	Renewable Facility "A"	Renewable Facility "B"
Strike Price ($/MWh)	Lower than "B"	Higher than "A"
Power Pool Price Capture	Discount to Average Power Pool	Premium to Average Power Pool
Out-Of Market Payments Required	Higher than "B"	Lower than "A"
Result	Receives Support	Does not Receive Support

C: COST

- By not considering power pool price capture, bids requiring higher out-of-market payments can win, thus higher cost to Carbon Levy.
- On average, between 2013 – 2016 a solar strike price of <$77/MWh would require less out-of-market payments than wind at $37/MWh.

	Wind Strike-Price ($/MWh)	Equivalent Solar Strike-Price ($/MWh)	Wind:Solar Ratio
2013	37	120	0.31
2014	37	81	0.46
2015	37	68	0.54
2016	37	39	0.95
Average	37	77	0.48

- In addition to potentially lower unit costs ($/REC), solar has lower capacity factor (MWh/MW) thus lower costs per MW in given round.

Options for Future REP's

Indexed-, Benchmark- & Fixed-REC/Floor

OPTIONS TO ENHANCE REP (1/2)

- CanSIA has explored several alternative options for future rounds of the REP including:
  - Indexed-REC:
    - Business as usual (as per REP 1).
    - With Adjustment Factor (applied during bid selection).
    - Technology Carve-Outs (i.e. “capacity set-asides”).
  - Benchmark-REC (preserve risk reduction, but incents value).
  - Floor (preserve risk reduction, but incents value).
  - Fixed-REC (as per Climate Leadership Report).

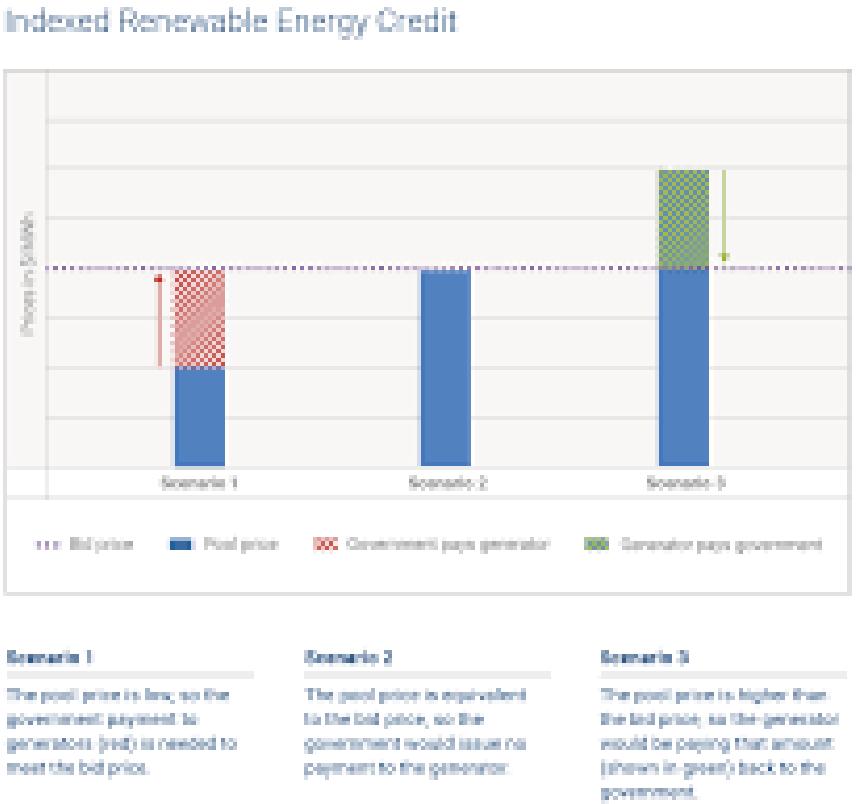
OPTIONS TO ENHANCE REP (2/2)

- Each option varies in three key respects:
  - Revenue Certainty:
    - Proportion achieved by generator (i.e. full or partial).
    - Full revenue certainty minimizes cost of capital (thus LCOE).
  - Down-Side Risk:
    - Effectively how out-of-market payments are structured.
    - Mitigation approaches vary (i.e. CfD, weight for price capture etc.).
  - Up-Side Risk:
    - Allocation to generators and/or government.
    - Potential trade-off between price-signals & revenue certainty.

OPTION 1: INDEXED-REC (AS PER REP 1)

- The Indexed-REC in REP1:
  - Provided full revenue certainty for Generator.
  - Down-side and up-side held by Government.
  - No market price signals considered.

- Net-effect:
  - Inefficiency (i.e. higher out-of-market payments).
  - Cost (i.e. higher $/MWh).
  - Non-diverse (i.e. technology or region)



OPTION 1A & B: CARVE-OUT & ADJUSTOR

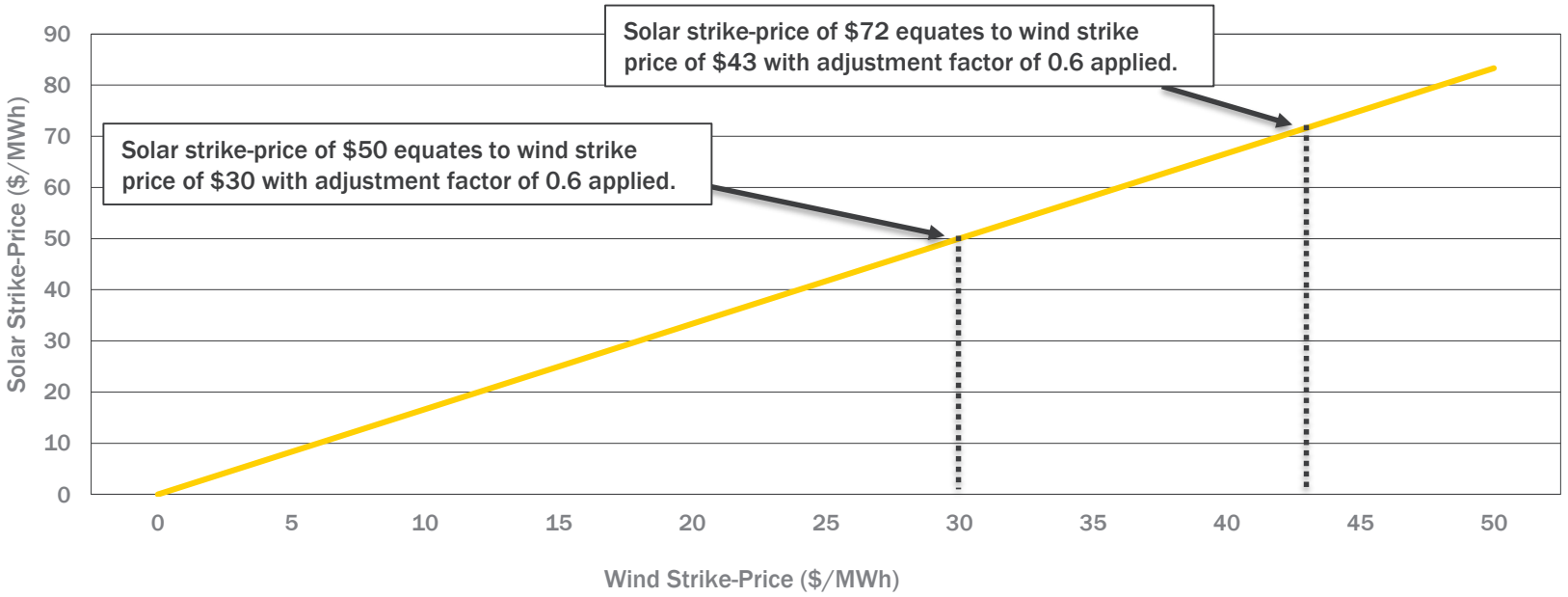
- CanSIA explored two options to enhance the Indexed-REC:
  - "Technology Carve-Outs": capacity procured is allocated by technology.
  - "Strike-Price Adjustment Factor": a factor applied to strike-prices bid to account for inter-technology power pool price captures.

	A	B	C
Approach	Business As Usual	Strike-Price Adjustment Factor	Technology Carve-Outs
Revenue Certainty	Full	As per "A"	As per "A"
Down-Side Merchant Risk	Held by Government as "CfD"	As per "A"	As per "A"
Up-side Merchant Risk	Held by Government as "CfD", as a result market price signals absent.	As per "A", however "Adjustment Factor" serves as proxy for market price-signal.	As per "A", however central-planning can seek to serve as proxy for market-signal.

- Aversion to carve-out as Alberta is not centrally-planned. "Strike-price adjustment factor" could serve as near-term "stop-gap" measure.

OPTION 1B: "ADJUSTMENT FACTOR"

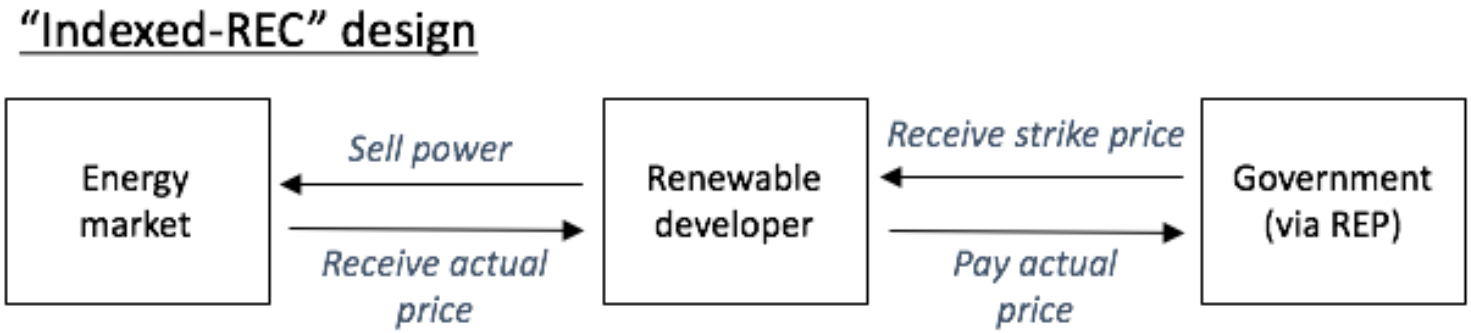
- Adjustment factor should be set to reflect the range of solar:wind strike-price ratios (weighted average = 0.48, see slide 9).
- The graph below demonstrates how a solar adjustment factor of 0.6 would relate to the winning wind strike-prices from REP 1.



OPTION 2: BENCHMARK-REC

- While “strike price adjustment factor” serves as a proxy for “inter-technology market price signals, it doesn’t account for “intra” tech.
- I-REC & B-REC are similar, they pay difference between fixed-price (i.e. “strike-price” determined by auction) and a floating price.
- They are dissimilar in two key ways:
  - Floating Price:
    - I-REC: the facility’s actual power pool price capture.
    - B-REC: a weighted average benchmark of “peers”.
  - Risk Allocation:
    - I-REC: Government holds down-side and up-side risk.
    - B-REC: Government holds down-side, generator receives up-side.

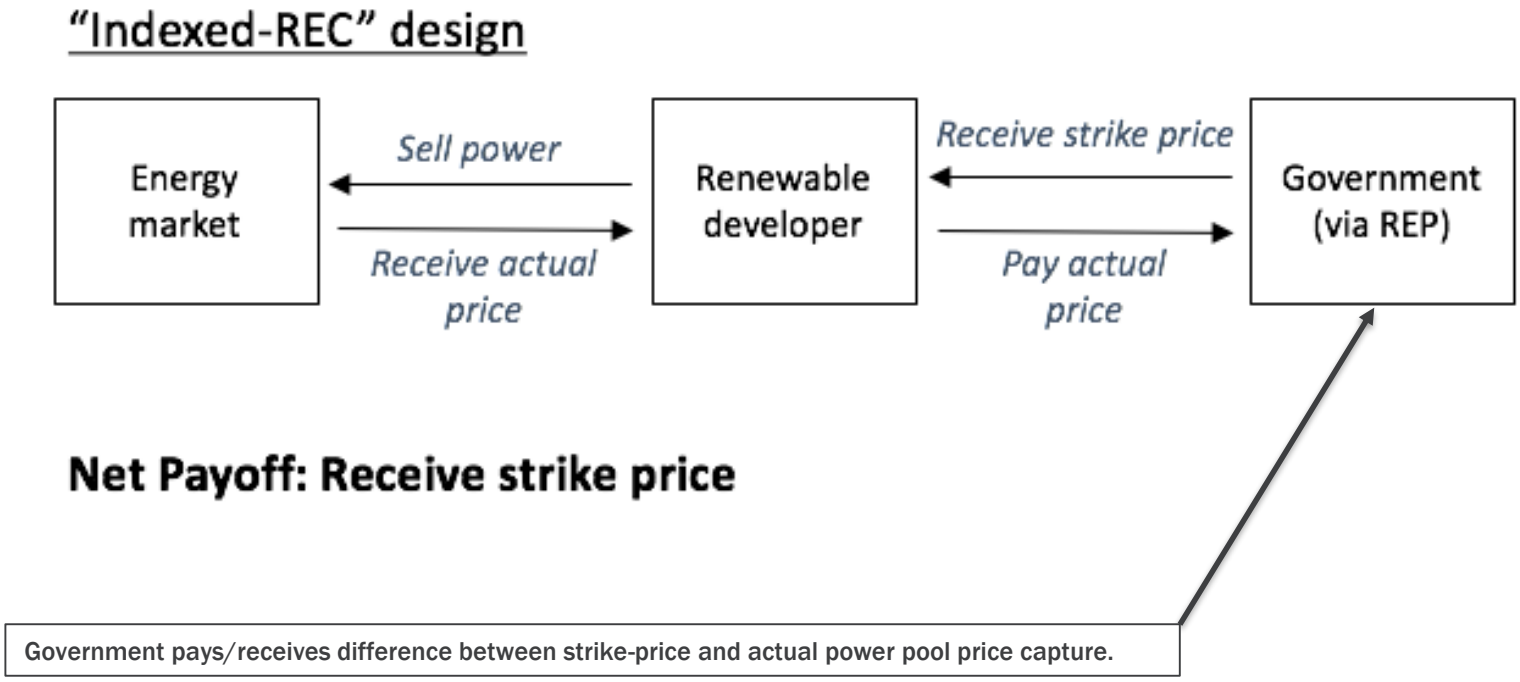
OPTION 2: B-REC CONCEPT (1/3)



Net Payoff: Receive strike price

Reference: Blake Shaffer (November, 2017) "Assessing Alberta's Renewable Electricity Program: Solar Electricity, the "Indexed REC" & Cost to the Carbon Levy

OPTION 2: B-REC CONCEPT (1/3)



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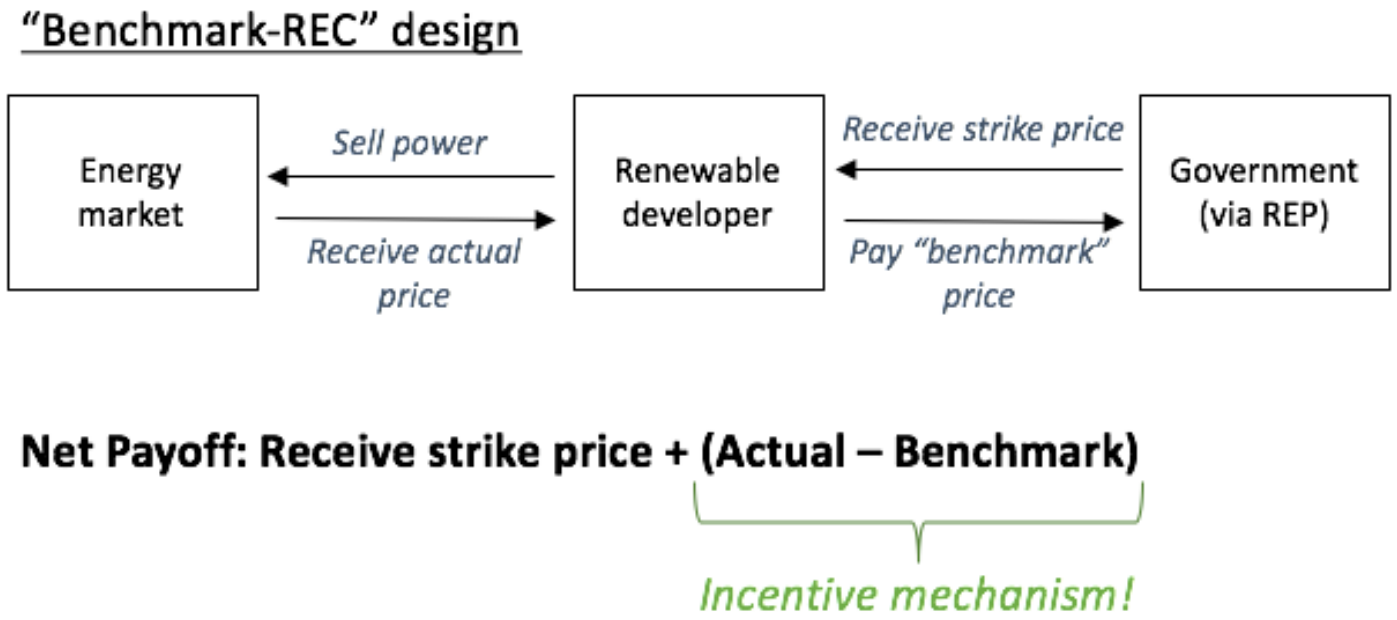
OPTION 2: B-REC CONCEPT (2/3)



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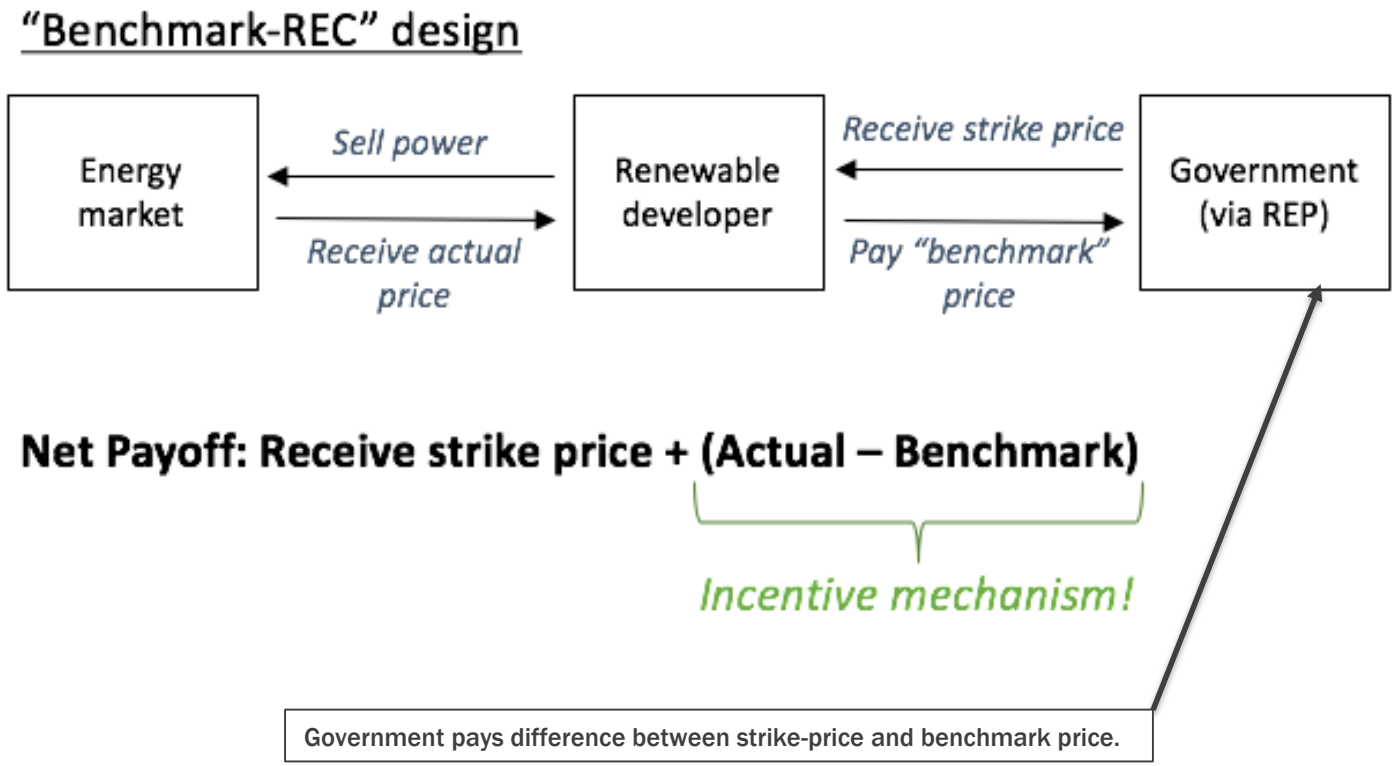
OPTION 2: B-REC CONCEPT (2/3)



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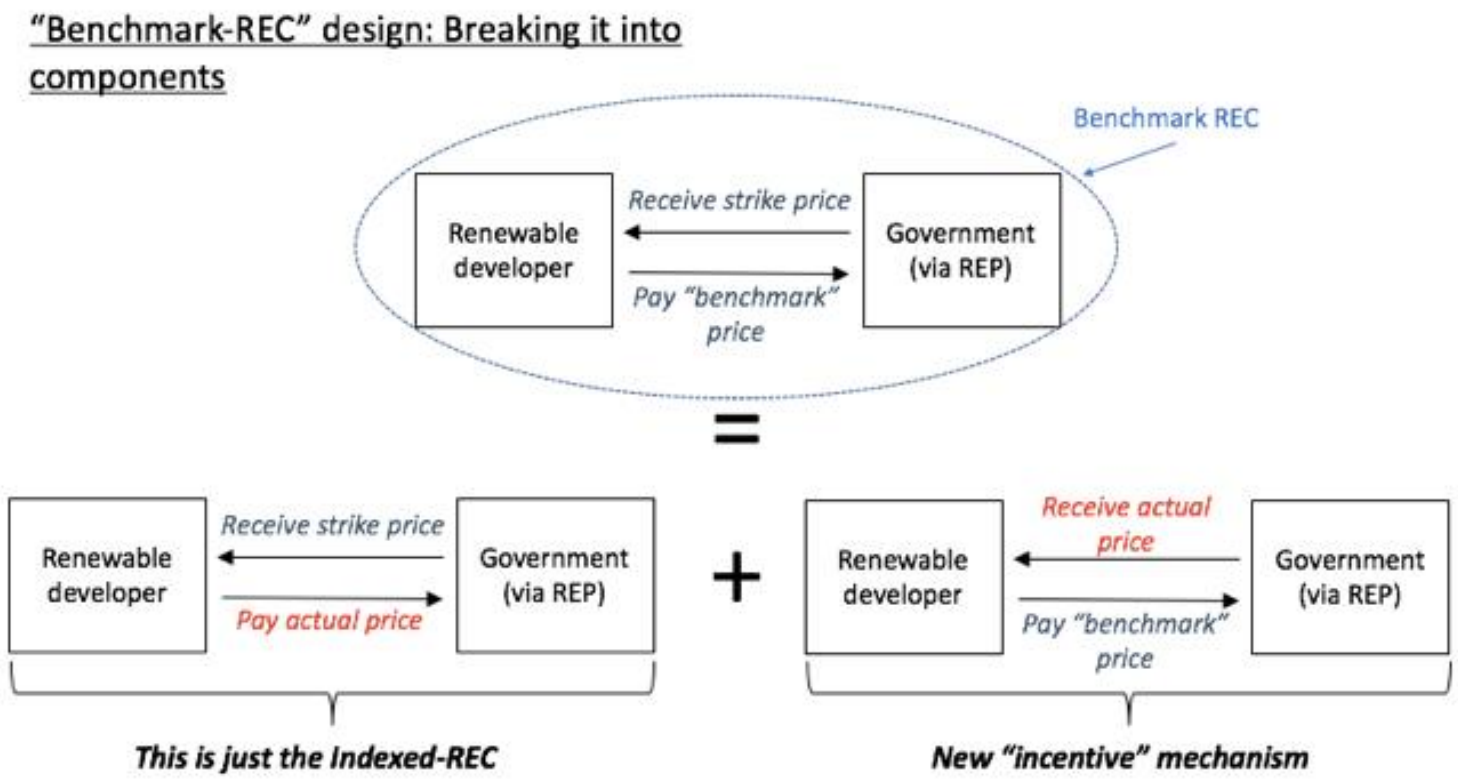
OPTION 2: B-REC CONCEPT (3/3)



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B-REC: BENCHMARK COMPOSITION (1/2)

- What should the “group of peers” be composed of?
  - Option 1 – All renewable facilities, regardless of technology type:
    - Recognizes inter- & intra-technology differences (technology-neutral).
    - “Beating benchmark” enables competition between low- & high-LCOE.
    - Market allocates tech. choices (not an administrator i.e. carve-outs).
    - However, disparity in profiles & capture prices introduces uncertainty.
  - Option 2 – Separate benchmarks by technology (e.g. wind, solar etc.):
    - Motivation would be purely to decrease facility-specific risk.
    - Developers still try to “beat benchmark” of group of peers.
    - Doesn’t recognize inter-technology differences (i.e. low- & high-LCOE).
    - Thus, tech.-specific benchmarks occur with “Carve-Outs”.

B-REC: BENCHMARK COMPOSITION (2/2)

- What should the “group of peers” be composed of?
  - Option 3 – A “virtual” benchmark:
    - Consists of a predetermined hourly profile of generation.
    - E.g. Alberta’s wind fleet historic profile on a go-forward basis.
    - Reflects expected average gen. profiles, lacks hourly correlation with prices (e.g. increased wind discount without geo. diversity)
    - Holding constant a historical profile would not recognize this negative correlation.

- Is option 1 best as it enables competition inter- and intra-technologies and is correlated with hourly prices?

B-REC: BENCHMARK UPDATING

- Should composition be updated as new facilities come online? If so, how?
  - Option 1 – Pre-existing REP winners
    - Include past winners of the REP in the creation of the benchmark.
    - Such a benchmark would be known and clear to current bidders.
  - Option 2 – Benchmarked by cohort
    - Each REP retains its benchmark for the duration of the contract.
    - For example benchmark set based on ~400MW procured during each REP.
    - Cohort stays fixed for duration of contract.
    - One issue, however, is that 400MW may consist of only a few facilities.
    - A very large facility's Benchmark-REC very similar to Indexed-REC of REP1.
  - Option 3 – Updated benchmark
    - Another option would be to update the benchmark as more facilities come into being based on future REP rounds.
    - This is potentially problematic for early REP winners, as their baseline will be unknown at the time of bidding.
- Is option 1 best as it minimizes risk for bidders in each successive procurement round?

B-REC: BENCHMARK TIME-FRAME

- What should the time-frame for calculating the benchmark price be?
  - Option 1 – Monthly
    - Aligns with payment cycles within AESO, and provides reasonably frequent updating.
    - Reflects differences across all hours of a month (intraday & daily value differences).
  - Option 2 – Annually
    - Extending timeframe to annual basis would better differentiate value captured by resources that generate more in higher valued period of year, not just within a month.
    - It would apply a weight to a different monthly generation volumes, whereas the monthly timeframe treats each month with equal weight.
    - Issues would include delay in settlement payments for the REP contract, although an interim plus true-up settlement process could be easily designed.
- Option 3 – Quarterly (or Seasonally)
  - This timeframe offers a compromise between the above methods, to pick up differences in volumes within quarters (or seasons), but not across them.
- Is option 1 best as it sends the clearest price signal?

B-REC: PROPOSED DESIGN SUMMARY

- Does a Benchmark composed of “all renewables”, fixed for the term of the contract (i.e. “pre-existing”), using “monthly” generation weighted prices best balance all pros/cons?

COMPOSITION	Efficiency	Cost	Value	Risk Allocation	Diversity	Simplicity
1. All renewables						
2. Separate by technology						
3. Virtual benchmark						

UPDATING	Efficiency	Cost	Value	Risk Allocation	Diversity	Simplicity
1. Pre-existing						
2. Cohort						
3. Updated						

TIMEFRAME	Efficiency	Cost	Value	Risk Allocation	Diversity	Simplicity
1. Monthly						
2. Annual						
3. Quarterly (or Seasonal)						

OPTION 3 A & B: FIXED-REC OR FLOOR

- A Fixed-REC (as proposed in the Climate Leadership Report) and a Floor are additional alternative options.

- They are similar in that:
  - Revenue Certainty: proponents bid price representing min. threshold.
  - Down-side risk: higher LCOE generation accepts more (%) than lower.
  - Up-side risk: generators are incented to respond to price signals.

- They differ in that Fixed-REC payment is made regardless of the power pool price, Floor only paid when power pool < floor.

- Both options approaching ideal from market-signals/out-of-market perspective, but lenders need comfort with merchant risk (i.e. liquidity in forward hedge market, role for Canada Infrastructure Bank?)

SUMMARY

- Indexed-REC:
  - Provides full revenue certainty thus delivers lower LCOE ($/MWh).
  - Doesn't send efficient price signal, low $/MWh beats low $/REC.
- Benchmark-REC:
  - Provides most revenue certainty (%) for lower LCOE generation.
  - "Beating benchmark" sends price signal and preserves risk reduction.
- Fixed-REC/Floor:
  - Provides more revenue certainty (%) for lower LCOE generation.
  - Allocating up-side risk to generators sends clearer market signals.
  - Down-side risk for higher LCOE generation = higher costs of capital.

Conclusion

Discussion, Q&A and Next Steps

CONCLUSION & NEXT STEPS

- First round of REP delivered excellent results, demonstrated long-term revenue certainty can minimize renewable electricity cost.
- Enhancements would maximize competition/efficiency, reduce costs:
  - Near-Term: ensure level playing-field for solar.
  - Long-Term: guide facility contracting with market price signals.
- CanSIA is proposing a “strike-price adjustment factor” for Member consideration for near-term future rounds of REP.
- CanSIA is seeking proposals from Members for long-term future rounds of REP (i.e. benchmark-, fixed-, floor or other?) and asking that Government consult with stakeholders on a long-term plan.

CONTACT DETAILS

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