The Impact of Rising Interest Rates on the Financial Viability of Renewable Energy Projects in Canada

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Abstract

Canada's commitment to net -zero emissions by 2050 will require substantial capital investments, estimated to reach **two trillion dollars** (RBC).

This paper examines **how rising interest rates increase could impact the speed and breadth of the broader energy transition**.

This is achieved by focusing on project **cost, value, profitability, interest payments, interest** locks and the role of government incentives.

An economic analysis of a hypothetical, utility-scale 250 MW onshore wind project in southeastern Alberta, was conducted using **LCOE calculations, discounted cash flow analysis, and derivatives costing**.

The research identifies **market-based solutions and policy recommendations** to mitigate the effects of interest rate impacts, ensuring a successful energy transition.

Literature Review

The impact of interest rates on electricity production costs Monnin (2015), Council of economic Policy

- Low interest rates make green energies competitive
- A discount of green investment's interest rates to incentivize growth

Cost of Capital by IEA (2020/2021)

- Growing inflation pressure on capital costs
- LCOE cost comparison at different discount rates

Monetary policy tightening & the green transition, ECB (2023)

- Fiscal policy primary tool for energy transition, monetary policy important secondary role
- Tighter monetary policy critical for LT future of transition, for price stability and inflation control

Monetary Policy and innovation by Zimmermann and Ma (2023)

- For every 1 percentage point interest rate hike, a 1-3% reduction in R&D spending and up to a 25% decrease in venture capital investments are expected in the following years - impact on new technologies

Methodology tools

Modelling conducted on NERLs System Advisor Model (SAM) software

LCOE

$$\frac{CAPEX\ (\frac{\$}{mW}) \times CRF(r,n)(\frac{\%}{year}) + FOM(\frac{\$}{year \times mW})}{Annual\ electricity\ production(\frac{mWh}{year})}$$

Profitability

- DCF –NPV
- Profitability

$$Present\ Value\ (PV) = \frac{Future\ Value\ (FV)}{(1+r)^n}$$

$$WACC = (kd \times \frac{D}{D+E}) + (ke \times \frac{E}{D+E})$$

Interest Payments

- Principal + interest amortizations
- Cumulative cost

Interest rate locks

$$Lock\ payment = (\frac{(R-FRA)*NP*p)}{Y} \times (\frac{1}{(1+r)*(\frac{P}{Y})})$$

Government Incentives

- Investment tax credit

Project Assumptions

Located in vicinity of **Pincher Creek, Alberta**

Wind resource, per Canada Wind Atlas

- 9.08 m/s at 80 meters
- 1.74 Weibull K factor

Wind turbines:

- **100 2.5MW turbines** (GE 2.5 xl, 100-meter diameter)

CAPEX: $435 Million

- $1,250 per kW turbine cost
- $500 per kW installation costs

OPEX: $12 Million annually (Fixed + Variable)

Financial:

- 25-year lifecycle, prior to additional investments required
- **18-year maturity loan, 70% debt / 30% equity**
- Inflation 3%; CIT: 15% federal, 8% provincial

Revenue: PPA

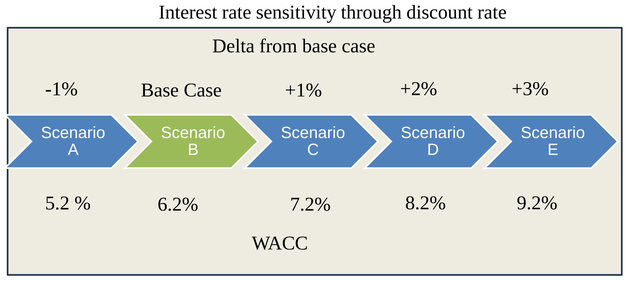
Low price case: ¢5 per kWh

High price case: ¢10 cents per kWh

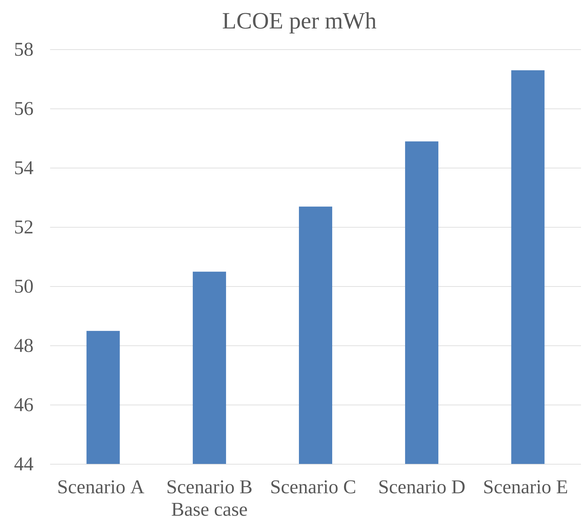
Incentives:

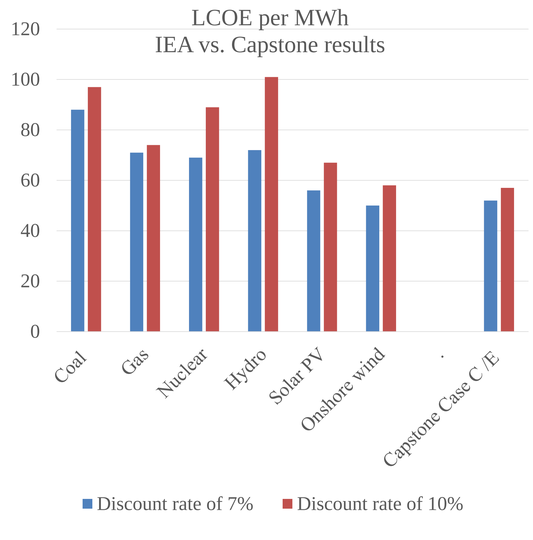
- **ITC: 30%**

Interest rate sensitivity through discount rate



Results





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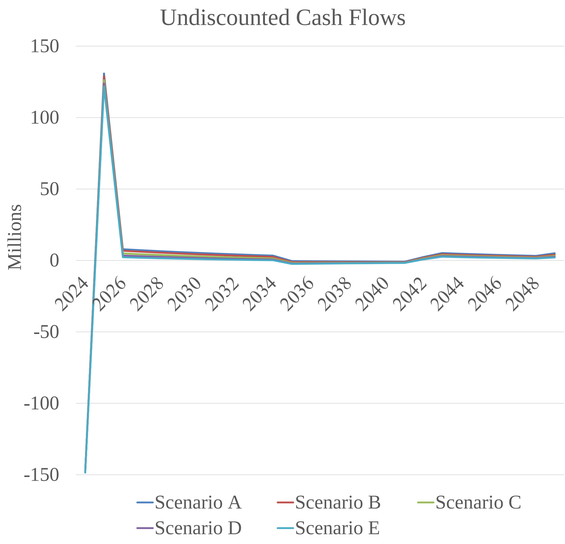
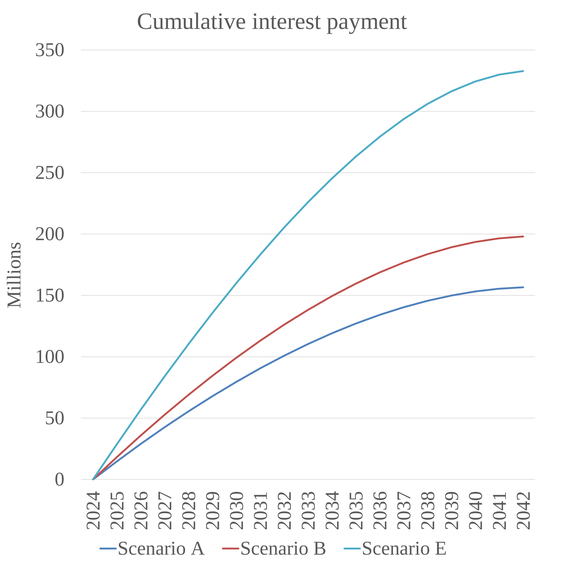
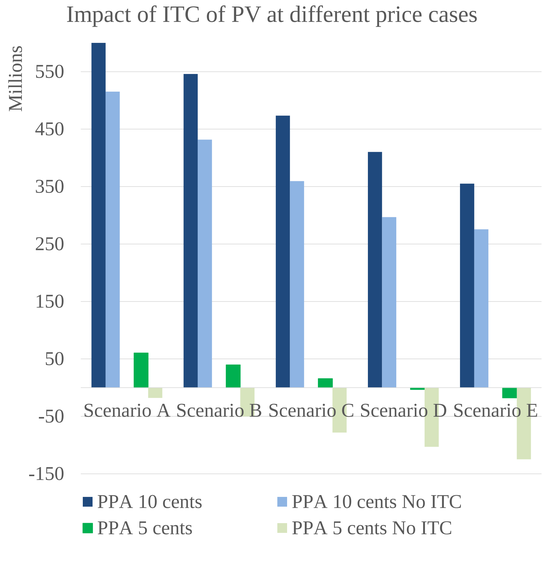


Scenarios PV in Millions	A	B	C	D	E
PPA at ¢5	$60	$40	$16	-$3	-$18
PPA at ¢10	$630	$546	$474	$410	$355





Conclusions and recommendations

Critical outcomes

- For every 1% increase in discount rate, LCOE increases by 5%
- Under a low-price case, the profitability of the project is challenging
- Under a high-price case, the project is more resilient to interest rate rises
- Interest rates can impact negatively cash flow and profitability
- ITC remain critical to ensure profitability and to attract investment. For how long should these remain?

Market based recommendations

Interest rate derivatives

- Market risk management strategy
- Interest rates swap, options and locks
- Costly and associated risks

Variable PPAs

- Avoid fixed priced PPAs
- Index a portion to incorporate inflation, interest rates, and fuel prices

Innovative financial structures

- Green bonds
- Project financing
- Tax-equity structures

Fiscal policy

- ITC is still crucial to achieve financial viability and to attract private investment
- ITC rules must be predictable and transparent
- Changes must be communicated with ample time

Loan guarantees and green loans

- Government backed loans may mitigate default risk for lenders
- Central banks and development banks may incentivize investment through green loans (differential rate)

R&D support

- In periods of high interest, government should amplify its support for R&D

Domestic and regional supply chains

- Support the development of supply chains vital to reduce costs, achieve economies of scale and enhance energy security

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