

# **Funding Ontario's Renewable Energy Deployment: the Design of Innovative and Alternative Financing Models**

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## I. Acknowledgements

I would not be on this fulfilling path without my mother, sister, and especially my father, who sparked a sense of environmental responsibility early on our fishing trips.

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## II. Abstract

The primary aim of this research is to analyse and synthesise findings related to i) the prevailing renewable energy (RE) context in Ontario as well as global RE financing trends; ii) financing model design criteria and trade-offs; iii) key supporting policies for RE deployment; iv) alternative RE financing models; and v) an integrated financing model in Ontario, Canada. This research begins by reviewing the financing gap for RE deployment and proposing a design 'toolbox' for RE financing models. Subsequent chapters analyse key RE policies and alternative financing models before recommending an integrated financing model consisting of project finance, green bonds, community bonds, and crowdfunding. As the mechanism that combines cash flow needs with funding sources, financing models are one of the most crucial elements in RE project development. Therefore, the overarching vision here is to develop financing models that provide accessible and low-cost funding to projects, as well as competitive, risk-adjusted returns to investors. In doing so, it is hoped that investors, community members, and project developers may easily engage with new RE projects – thereby launching a large-scale (and timely) transition to a more sustainable energy system.

### III. Foreword

The research and work conducted throughout my Master in Environmental Studies (MES) program have centered on several main themes: sustainable energy policy, business sustainability, behavioural economics, and financial modelling. The Area of Concentration for my program – “Sustainable Energy Systems Development” – integrates the supply and demand-side energy requirements into a cohesive long-term, comprehensive strategy. This concentration consists of 3 components: i) understanding the sustainability of energy systems; ii) analysing energy policy; and iii) developing alternative business and financing models. As such, most of my coursework, research, extra-curricular projects, and fieldwork have focused on analysing the technical, policy, and financing solutions required for the design of a (more) sustainable energy system in Ontario, Canada.

Given the critical need to shift to energy systems that respect ecological realities while promoting economic development, it is disappointing to witness the lethargic response of global economies and societies. One of the key barriers for rapid and widespread RE deployment remains the lack of accessible financing options. As such, my aim throughout the past two years has been to explore the intersection of RE and corporate finance, and to highlight solutions-based alternatives to overcome the RE financing gap. I hope some of the results found herein prove valuable to policy-makers, project developers, and finance professionals – especially as global economies create more economically rewarding, ecologically respectful, and structurally resilient energy systems.

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## V. Acronyms

CB – Community Bond  
CC – Climate Change  
CCGT – Combined Cycle Gas Turbine  
CCS – Carbon Capture and Sequestration  
CF – Capacity Factor  
CREB – Clean Renewable Energy Bond  
DE – Decentralised Energy  
DSCR – Debt Service Coverage Ratio  
EROI - Energy Return on Energy Invested  
ET-RAM – Emerging Technology Reverse Auction Mechanism  
FIT – Feed-in Tariff  
GEA – Green Energy and Green Economy Act  
GB – Green Bond  
GHG – Greenhouse Gas  
GW – Gigawatt  
IEA – International Energy Agency  
IRENA – International Renewable Energy Agency  
kW – Kilowatt  
kWh – Kilowatt-hour  
LDC – Local Distribution Company  
LTEP – Long Term Energy Plan  
MW – Megawatt  
MWh – Megawatt-hour  
OBF – On-Bill Financing  
OPA – Ontario Power Authority  
PACE – Property Assessed Clean Energy  
PV – Photovoltaic  
RE – Renewable Energy  
REC – Renewable Energy Certificate  
RED – Renewable Energy Deployment  
REF – Renewable Energy Finance  
ROE – Return on Equity  
ROI – Return on Investment  
RPS – Renewable Portfolio Standards  
SBC – System Benefit Charges  
T&D – Transmission & Distribution  
TW – Terawatt

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