

An efficient balance?



**Applying the Total Resource Cost Test to Conservation and Demand Management
Initiatives of Local Electricity Distribution Companies in Ontario:
Assessment and Recommendations for Reform**

Mark S. Winfield, PhD
Assistant Professor
MES/JD Program Coordinator
and

Tatiana Koveshnikova
PhD Candidate

Faculty of Environmental Studies

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Preface

This study has its origins in my participation in the Ontario Power Authority's Conservation and Demand Management Program Development Advisory Committee in 2006 and 2007 while serving as a Program Director with the Pembina Institute. In discussions with local electricity distribution company (LDC) staff involved in conservation and demand management (CDM) activities that served on the committee, one of the issues raised was the role of the Total Resource Cost (TRC) test in the evaluation of proposed CDM initiatives. It became apparent that the test was perceived as a significant barrier to CDM program innovation, development and delivery.

The opportunity to investigate the role of the TRC test in local utility electricity conservation and demand management activities more formally arose as a result of discussions between the Electricity Distributors Association (EDA), the York University Foundation and the Faculty of Environmental Studies. Through the LDC Future Fund the EDA kindly provided a grant for a study of the impact of the TRC test on local utility CDM initiatives.

The resulting study, presented here, recognizes the value of the TRC test in program design and evaluation. At the same time, the study identifies a number of areas where specific modifications and adjustments to the TRC test as currently applied by the Ontario Power Authority (OPA) and Ontario Energy Board (OEB) to LDC proposals for CDM initiatives could be made to encourage and facilitate such activities. More broadly, the study concludes that the most important barriers to LDC-led CDM initiatives do not lie with the TRC test and its application by the OEB and OPA per se. Rather the study finds that the most significant barriers relate to the wider regulatory and institutional framework for electricity CDM within which LDC initiatives occur and the test is applied. These types of barriers are the focus of the recommendations made here.

Mark Winfield
Faculty of Environmental Studies
June 2009

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It should be noted that the findings and conclusions are solely those of the authors and not necessarily those of the interviewees, the reviewers or the EDA.

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About the Authors

Mark S. Winfield, PhD

Assistant Professor in Environmental Studies and MES/JD Program
Coordinator, York University

BA (Science & Technology Studies), MA, PhD (Political Science),
University of Toronto

Mark Winfield's research looks at the design and evaluation of institutions and policy instruments in environmental and energy policy. His most recent work has focused on electricity, energy efficiency and climate change policy in Ontario. His past environmental policy work has included exploring the role of information technology and public access to information in environmental policy, institutional design for drinking water protection (for the Walkerton Inquiry), toxic substances pollution prevention, ecological fiscal reform, and globalization, trade and the environment.

Dr. Winfield joined the Faculty of Environmental Studies at York University in 2007. Prior to joining York University he was the Director of the Pembina Institute's Environmental Governance Program, and before that he was the Director of Research at the Canadian Institute for Environmental Law and Policy. He serves as coordinator of the MES/JD program offered jointly by the Faculty of Environmental Studies and Osgoode Hall Law School.

Tatiana Koveshnikova, PhD Candidate

BA (Economics and Management), Samara State Aerospace University
(Russia)

MES (Master of Environmental Studies), Evergreen State College (Olympia,
USA)

PhD candidate in Environmental Studies, York University

Tatiana Koveshnikova is a PhD candidate at the faculty of Environmental Studies at York University and an Associate Fellow at the York Institute for Research and Innovation in Sustainability (IRIS).

Tatiana's current research in the area of sustainable transportation and energy focuses on understanding the process of decision making and policy strategies that would lead to a technological regime shift to renewable energy and transportation technologies in Canada and worldwide.

Tatiana's other research interests include systems models and their application to sustainable development. She has extensive experience developing dynamic simulation models and applying various statistical techniques for a wide range of economic applications.

Together with other members of the Institute for Research and Innovation in Sustainability (IRIS), Tatiana participated in a project to assess the economic, social and environmental benefits of cleaning up Hamilton Harbour. The study involved developing an integrated benefit assessment framework and dynamic model that can now be used for other environmental projects. She also has worked with DSS Management Consultants Inc. on benefits assessments relating to air pollution and the valuation of fisheries and natural feature impacts on property values.

Table of Contents

Executive Summary	2
1 Introduction	7
1.1 Project Purpose and Research Questions	9
1.2 Research Methods	10
2 CDM, LDCs and the TRC Test in Ontario	12
2.1 The Role of CDM in Ontario Electricity and Climate Change Policy	12
2.2 The Role of LDCs in CDM Programming	14
2.2.1 OPA-funded CDM programs	15
2.3 The Role of the TRC Test in OEB-Approved and OPA-Funded CDM Programming	16
2.3.1 Application of the TRC test by the OEB	16
2.3.2 Application of the TRC test by the OPA	18
2.3.3 Role of the TRC test in the SSM	19
2.4 The Current TRC Test Structure in Ontario	19
3 Cost Effectiveness Tests for CDM Initiatives in North America	21
3.1 Introduction	21
3.2 Cost Effectiveness Tests and their Application in North America	22
3.2.1 Types of cost effectiveness tests for CDM initiatives	22
3.2.2 Application of cost effectiveness tests in North American jurisdictions	24
3.3 Comparative Case Studies	27
3.3.1 British Columbia	27
3.3.2 State of California	29
3.3.3 State of New York	31
3.4 Analysis and Conclusions	34
3.4.1 Overall policy frameworks and supporting regulations	34
3.4.2 Flexibility and special considerations	34
3.4.3 Portfolio versus program level assessment	34
3.4.4 Environmental externalities and social benefits	35
4 The TRC Test in Practice: Interview Results	36
4.1 Introduction	36
4.2 Impact of the TRC Test on CDM Program Design and Delivery in Ontario	36
4.2.1 Serves as a business planning and evaluation tool	36
4.2.2 Barriers to non-standard CDM programs	37
4.2.3 Portfolio fragmentation	39
4.2.4 Specific concerns about OPA and OEB TRC test parameters	39
4.2.5 The Need for Additional Tests	41
4.2.6 Test used depends on policy goals	42
4.3 Conclusions	42

5 Conclusions and Recommendations	44
5.1 The TRC test in Ontario	44
5.2 Policy Framework for the TRC Test in Ontario	45
5.2.1 Overall policy goals for CDM initiatives	46
5.2.2 The CDM funding regime	47
5.2.3 The institutional framework for CDM	48
5.2.4 Specific policy direction regarding the evaluation of CDM initiatives	48
5.3 Impact of the TRC test at the LDC Level	50
5.3.1 Disincentives for non-standard CDM programs	50
5.3.2 Disincentives for programs aimed at long-term behavioural change	51
5.3.3 TRC test parameters: Key concerns	52
5.4 Reporting and Program Evaluation	53
5.5 Conclusions	54
Appendix 1: Sample Interview Questions	55
Appendix 2: Cost-Benefit Tests in the US	57
Appendix 3: The Evolution of the TRC Test in Ontario	59
Endnotes	70

Executive Summary

This study explores the impact of the Total Resource Cost (TRC) test on electricity conservation and demand management (CDM) initiatives in Ontario, particularly those developed and delivered by local electricity distribution companies. The study comprises a literature review, case studies of cost effectiveness tests applied to CDM initiatives in other North American jurisdictions, and interviews with key CDM practitioners in Ontario. Specifically, the study examines

- the existing institutional, policy and regulatory framework for CDM activities in Ontario, including the roles of the Ontario Energy Board (OEB), Ontario Power Authority (OPA) and local distribution companies (LDCs)
- the current role of the TRC test in CDM decision making by the OEB, OPA and LDCs
- the structure of Ontario's approach to the regulation and funding of utility CDM activities relative to provinces and states recognised as leaders in the CDM field
- the impact of the TRC test as currently applied in Ontario by the OEB and OPA on LDC-led CDM activities and initiatives.

The study finds that the TRC test occupies a central place in Ontario's CDM policy framework. Historically, the TRC test was the key test in determining cost effectiveness of CDM programs by natural gas utilities; today it remains a primary screening and evaluation tool for CDM initiatives in both the natural gas and electricity sectors. The TRC test is widely used by LDCs as a planning tool to assist in screening CDM programs at the conceptual stage and as a refining evaluation tool at the design stage. In addition, demonstrating that a proposed CDM activity is TRC positive is the central requirement of the OPA when evaluating LDC requests for CDM program funding. The OEB applies the same requirement when reviewing LDC applications to fund CDM activities through their own rate bases. The TRC test is also central to the shared savings mechanisms (SSM) through which utilities receive a share of the savings associated with reductions in energy consumption flowing from CDM initiatives.

The study identifies a number of ways in which the TRC test as currently structured and applied may limit LDC-led CDM activities and thus prevent the realization of the full range of potentially cost effective

electricity-related CDM opportunities in Ontario. Some of the issues identified in the study relate to specific aspects of the test and its application. In other cases, the issues relate to the overall policy and regulatory framework for CDM activities in the electricity sector within which the TRC test operates.

The Ontario government has made significant commitments to CDM through the June 2006 Supply Mix Directive and other directives to the OPA. However the study finds that the province's CDM policy framework remains relatively incomplete in comparison to other, leading North American jurisdictions reviewed — namely British Columbia, California and New York. In these jurisdictions, the establishment of overall CDM goals and targets has been complemented by a substantial infrastructure of supporting policies intended to encourage and facilitate CDM activities. These supporting policies offer specific direction to regulatory agencies and utilities on the evaluation and assessment of potential CDM initiatives, including the specific tests to be employed in evaluating CDM opportunities. In some cases, such as California and New York, there is direction to consider such factors as the value of environmental externalities avoided as a result of CDM initiatives in the evaluation of CDM opportunities. In other cases, like British Columbia, mechanisms have been established to account for the social benefits flowing from initiatives targeted at low-income households.

The study finds that, by comparison, the policy direction from the Ontario government to the OEB and OPA does not extend beyond setting targets and goals. It has been left to the OEB and OPA to determine how CDM opportunities should be evaluated and assessed, without further direction from the province. Perhaps not surprisingly, the OEB, on whom the bulk of responsibility for developing such frameworks has fallen, responded by building on its past practice with the TRC test. The result has been a relatively restrictive approach to the evaluation of CDM opportunities when compared with California or even British Columbia.

The study identifies a number of steps that need to be taken by the province to strengthen and clarify the overall framework within which CDM activities take place. These steps include the following:

- Providing clear direction to the OPA and OEB that all cost effective and achievable CDM opportunities be pursued before consideration is given to additional supply options in electricity system planning.
- Rationalizing, consolidating and stabilizing the funding regime for CDM initiatives.

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- Strengthening and clarifying the institutional arrangements for the planning and delivery of CDM measures in Ontario, including the establishment of an office of energy efficiency within the Minister of Energy and Infrastructure to lead and coordinate the province's efforts.
 - Providing clear policy direction to the OEB and OPA with respect to the evaluation of proposed CDM initiatives, including consideration of the avoided environmental costs and risks and potential social benefits associated with such initiatives.
 - Promoting program innovation by providing greater flexibility to LDCs in the initial years of new, self-designed program delivery, and applying alternative evaluative frameworks to programs aimed at achieving long-term behavioural changes (e.g., education and awareness programs) that are necessary for constituency and capacity building, but that may not initially perform well under the TRC test framework.

In addition to the policy level concerns identified with respect to the application of the TRC test in Ontario, a number of concerns regarding specific parameters employed within the test emerged in the course of the literature review and interviews. These issues include the following:

- The need to modify the avoided cost structure in the TRC models used by the OPA and OEB to ensure that programs delivering deep savings and market transformations are appropriately valued, as opposed to the current emphasis on demand response and reducing peak demand.
- The desirability of employing actual utility specific avoided distribution costs resulting from CDM initiatives, as opposed to standardized assumptions, for the purposes of TRC assessments wherever possible.

Finally, the study recommends that the provision of greater clarity and flexibility to LDCs in the application of the TRC test to their CDM program proposals should be accompanied by a strengthened public accountability regime regarding the actual results achieved.

The study concludes that while that Ontario has made electricity CDM a central element of its electricity and climate change strategies, in comparison with other leading jurisdictions in North America its electricity CDM policy framework remains incomplete. Significant gaps remain with respect to the policy direction given to key institutional actors within the electricity system, and the CDM funding and institutional framework is fragmented and confusing. The province's new *Green Energy and Green Economy Act*, 2009 has the potential to compound a number of these problems, depending on how it is implemented. A more complete and integrated policy structure is needed to facilitate and encourage the realization of the full potential of

CDM initiatives to contribute to the sustainability of Ontario's electricity system. The recommendations contained in the study are intended to contribute to such an effort.

Summary of Recommendations:

1. The Minister of Energy amend the June 2006 Supply Mix Directive to require that the Integrated Power System Plan (IPSP) to be developed by the OPA incorporate all achievable cost effective opportunities for CDM before additional supply options are considered.
2. The Ontario Energy Board Act be amended to expand the mandate of the OEB to include ensuring, 1) the pursuit of all achievable cost effective opportunities for energy conservation and energy efficiency, and, 2) with respect to the IPSP to be developed by the OPA, the inclusion of all CDM opportunities that are cost effective relative to supply options.
3. The Ministry of Energy and Infrastructure initiate a comprehensive review of CDM funding mechanisms in Ontario, including the roles of the OPA, OEB and ministry, to rationalize and consolidate the regime to facilitate and encourage long-term investments by LDCs in CDM capacity and programming.
4. The Ministry of Energy and Infrastructure establish within the ministry an office known as Energy Efficiency Ontario to provide leadership in planning, co-ordination and delivery of measures for energy efficiency and conservation in Ontario. The office should be managed and supervised by a Director of Energy Efficiency who direct the ministry's energy efficiency and conservation activities, projects and programs and reporting to the Deputy Minister of Energy and Infrastructure.
5. The government of Ontario direct the OPA and OEB that while the review of the potential cost effectiveness of proposed utility CDM initiatives should continue at the program as well as portfolio level to ensure the identification of poorly performing programs, the portfolio level assessment should be determinative of whether a utility's proposed CDM activities are funded.
6. The government of Ontario direct the OPA and OEB to consider the avoided environmental costs of supply in evaluating the cost effectiveness of potential CDM initiatives. In order to avoid the complex challenges associated with determining avoided environmental costs on a case specific basis, avoided environmental costs of supply should be

dealt with as a fixed adder (e.g., 15%) to the benefits of CDM initiatives. Given the importance of these benefits to future generations, they should be subject to a zero or negative discount rate in TRC calculations.

7. The government of Ontario direct the OPA and OEB to incorporate an adder to the benefits of CDM initiatives directed at low-income households and communities in assessing the cost effectiveness of such initiatives.
8. The OEB waive the TRC positive requirement for rate-based funding of new LDC-initiated programs whose value is up to 0.5% of a given LDC's total revenues for the first two years of program operation. Program operators be required to report to the OEB on program results and impacts at the end of the two-year pilot period. SSM benefits associated with these programs be tied to the actual program results achieved.
9. The OEB and OPA develop an alternative evaluative framework to assess the cost-effectiveness of educational and informational CDM programming intended to result in long-term changes in consumer behaviour as opposed to short-term reductions in electricity demand. The evaluative framework consider such factors as program reach and sustained impact on consumer behaviour assessed via appropriately designed and administered customer surveys and other social science research techniques. A portion of the total funding for such programs be held back pending reporting on actual program results.
10. The avoided cost structure in the TRC models used by the OPA and OEB be modified to ensure that programs delivering deep savings and market transformations are appropriately valued.
11. Actual utility specific avoided distribution costs resulting from CDM initiatives, as opposed to standardized assumptions, be employed for the purposes of TRC assessments wherever possible.
12. The OEB require that LDCs report annually on the results achieved through their full portfolio CDM programming. The OEB publish the results of each LDC's CDM portfolio in a clear, easy-to-read consolidated annual report, permitting comparisons of LDC CDM performance.

1 Introduction

Ontario's electricity system faces a series of major challenges. The province's electricity-related emissions of greenhouse gases (GHGs), smog and acid rain precursors, and hazardous air pollutants need to be dramatically reduced. In addition, it is projected that 80% of the province's generating assets will need to be replaced as they reach the end of their operational lives over the next 20 years. Although virtually abandoned from the mid-1990s onwards, province-wide conservation and demand management (CDM) initiatives have re-emerged over the past five years as central components of the province's electricity and climate change strategies. In June 2006 the province established a conservation target for the 20-year Integrated Power System Plan (IPSP)¹ to be developed by the Ontario Power Authority (OPA) of reducing peak demand by 1,350 megawatts by 2010 and 6,300 megawatts by 2025 through CDM measures. This was outlined in the province's *IPSP Supply Mix Directive*² to the OPA. The province's June 2007 *Go Green* GHG emission reduction strategy also identifies CDM initiatives as major components of the plan.³ *The Green Energy and Green Economy Act*, adopted in May 2009, added the promotion of electricity conservation and demand management to the mandate of the Ontario Energy Board⁴ and expanded the mandate of the Environmental Commissioner of Ontario to include reporting on the province's progress on energy conservation.⁵

Local distribution companies (LDCs) have emerged over the past five years as major delivery agents of CDM programming in the electricity sector and are expected to play a larger role in the future. LDCs have the potential to be highly effective CDM program designers and operators, enjoying high levels of trust and credibility with the communities and customers they serve, detailed knowledge of their markets, and growing technical and managerial capacity to design and deliver programs. However, the potential role of LDCs in CDM activities in Ontario has yet to be fully realized,⁶ and the CDM efforts of LDCs to date have been criticized for an excessive focus on education and awareness programs as opposed to more ambitious initiatives that will transform markets and deliver major long-term reductions in electricity consumption.⁷

LDCs currently have three options for financing CDM program delivery: They can deliver a limited range of standard programs with funding provided by the OPA; they can apply to the OPA for funding to design and

deliver non-standard custom programs; and they can apply to the Ontario Energy Board (OEB) to fund self-designed CDM programming out of their distribution rates. The latter two types of custom programming are expected to be a major source of CDM innovation in Ontario. *The Green Energy and Green Economy Act, 2009* has the potential to add two more CDM funding mechanisms. Provisions of the legislation introduce the possibility of rate-based funding for CDM programming offered by the Ministry of Energy and Infrastructure.⁸ This could include funding for programs to be delivered by LDCs. The legislation also adds a mechanism through which the Minister of Energy can issue `directives` to the OEB to establish conservation targets for electricity distributors (i.e., LDCs) and other licensees. Distributors may then apply to the board for approval of CDM initiatives designed to meet these targets.⁹

The primary test applied by both the OEB and the OPA in determining whether to fund custom LDC CDM initiatives is a cost effectiveness test known as the Total Resource Cost (TRC) test.¹⁰ This test is the primary CDM program evaluation tool used in most jurisdictions in North America.¹¹ It is a test that “measures the net costs of a demand-side management program as a resource option based on the total costs of the program, including both the participant’s and the LDC’s costs.”¹² To be approved for rate-based funding by the OEB, LDC CDM initiatives must meet the TRC test requirements. The LDC proponent has to show that the costs of developing and delivering a CDM measure or program will be less than the avoided cost of supply achieved as a result of the CDM measure/program delivered. Similarly, the OPA board has adopted a requirement that all CDM initiatives funded by the authority, including custom LDC programming, be ‘TRC test positive.’

The intention of the TRC test is to ensure that only cost effective CDM programs are funded by consumers through electricity rates. However, the TRC test in its current form has been identified as a potential barrier to LDC-led CDM initiatives by a number of observers and participants in Ontario’s electricity system, including LDCs themselves, and more broadly to the realization of the full range of available cost effective CDM opportunities in Ontario. Some of the key concerns that have been raised with respect to the TRC test and that will be explored in this study include the following:

- The current TRC-based assessment employed in Ontario can work against capacity building conservation initiatives that may not deliver short-term savings, but that contribute to larger reductions in the future.

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- The TRC test may work against innovation as new programs and technologies for which performance data are not available will not perform well under the test.
 - The test as currently applied by the OPA and OEB tends to encourage the fragmentation of CDM programming rather than the integration of activities into comprehensive portfolios.
 - The current test tends to encourage a focus on short-term demand response initiatives as opposed to programming that will deliver longer-term reductions in total energy consumption and market transformations.
 - The current test fails to capture the full range of benefits of CDM programming, particularly as it excludes avoided environmental costs and social benefits from its calculations.

1.1 Project Purpose and Research Questions

Assessments of the impact of the TRC test as applied by the OEB and OPA on CDM programming in Ontario to date have been informal and anecdotal. The goal of the study presented here is to provide a systemic, comprehensive and objective assessment of the impact of the test on the role of LDCs as CDM program innovators and delivery agents. The research was guided by the following questions:

- What is the overall impact of the TRC test applied by the OEB and OPA on LDC CDM initiatives and activities? Are, for example, potentially cost effective CDM activities not being pursued by LDCs as a result of the current application of the TRC test in Ontario? Does the test as currently applied discourage innovation in CDM program design and delivery?
- How does Ontario's approach to the regulation of CDM activities by distribution utilities compare with the approaches taken in other North American jurisdictions that are recognised as leaders in CDM policy and programming, including British Columbia, California and New York?
- How can the TRC test as currently applied by the OEB and OPA be modified to encourage and facilitate CDM initiatives among LDCs in Ontario? Are there other modifications to the existing regulatory and policy framework for CDM activities in Ontario that should be considered to encourage and facilitate such activities?

The underlying premise of the study is that LDCs can and should play a major role in the design and delivery of CDM programming in Ontario. At the same time the study does not exclude the possibility of significant roles for other actors, ranging from provincial agencies to private sector energy service companies providing CDM services. More broadly, the study assumes that the province's overall regulatory, policy and funding framework for CDM should be seeking to ensure the realization of all cost effective CDM opportunities in the province for a range of economic, environmental and energy policy reasons. A recent assessment of the sustainability of the OPA's IPSP filed with the OEB for the purposes of its review of the plan highlighted the central role that CDM initiatives can play in optimizing the environmental, social and economic performance of the province's electricity system.¹³ Finally, analyses of the recently adopted *Green Energy and Green Economy Act, 2009* have highlighted the extent of the changes to the mandates of LDCs with respect to CDM, renewable energy and 'smart grids' flowing from the legislation. The situation has led to suggestions that the OEB needs to reconsider the ways in which it regulates LDC activities.¹⁴ The study explores potential directions for such a 'new deal' with respect to CDM.

1.2 Research Methods

In answering these research questions, the project applies a variety of research methods including a review of the relevant legislation, regulations, policies, regulatory decisions and commentaries on the evolution and current application of the TRC test in Ontario, comparative studies of the practices used in other leading North American jurisdictions, and interviews with Ontario LDC CDM staff and other key informants in the field. The project proceeded through a number of stages:

1. A review of the current TRC test guidelines and their evolution, and of key decisions by the OEB and the OPA with respect to the application of the test to LDC CDM initiatives in order to understand the requirements and operation of the existing test.
2. A review of the application of similar cost-benefit tests to CDM initiatives in other jurisdictions. This stage involved the review of the relevant policies and guidelines and broader regulatory environment with respect to the application of the TRC test or similar tests to CDM initiatives in other leading jurisdictions in North America, namely British Columbia, California and New York.

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3. The conduct of key informant interviews on the impact of the application of the TRC test by the OEB and the OPA on LDC CDM initiatives in Ontario. Key informants included LDC staff involved in the design and delivery of CDM initiatives that have been subject to review by the OPA and the OEB, and OPA staff. The purpose of the interviews was to understand the impact of the TRC test on LDC CDM program design and delivery as well as to better understand the operation of the broader policy and regulatory framework within which the TRC test operates in Ontario. A semi-formal interview structure based on a core set of questions was employed. The questions served as a set of guidelines that allowed the coverage of key research themes while providing flexibility to the interviewees to address other issues around these themes. The interview questions are provided in Appendix 1.
 4. The integration and analysis of the findings from the documentary review of the application of the TRC test in Ontario, the role of similar tests in other comparable jurisdictions, and the results of key informant interviews to provide an assessment of the impact of the existing Ontario test, the status of Ontario's current practice relative to other leading jurisdictions, and potential directions for reforming the design and application of the test. A number of broader observations become evident regarding Ontario's regulatory and policy framework for CDM activities relative to those in place in other leading jurisdictions.
 5. The development of overall project conclusions and recommendations for the reform of the design and application of the TRC test in Ontario, and of the broader regulatory and policy framework for CDM activities in the province as appropriate.

The overall goal of the study is to provide recommendations to the government of Ontario, OEB and OPA for modifications to the TRC test to ensure that it encourages and facilitates the delivery of cost effective CDM programs, while continuing to protect the interests of electricity consumers. Key findings and results of the study may also be transferable to other Canadian jurisdictions where CDM initiatives must meet cost-benefit tests. Although alternative multi-criteria-based policy evaluation frameworks, such as sustainability assessments, are available,¹⁵ the study does not explicitly examine the underlying premise of the TRC test that a cost-benefit framework is the most appropriate means for evaluating proposed CDM initiatives. The implications of applying alternative policy evaluation models may be explored in future research.

2 CDM, LDCs and the TRC Test in Ontario

2.1 The Role of CDM in Ontario Electricity and Climate Change Policy

Within Ontario, electricity CDM (sometimes referred to in other jurisdictions as demand side management (DSM)) has been defined to include a wide range of activities and programs, including conservation behaviour, energy efficiency, demand response, fuel switching and distributed generation.¹⁶ CDM initiatives offer a number of advantages in dealing with the types of environmental, economic and technological challenges currently facing Ontario's electricity system. These advantages include the following:¹⁷

- Ongoing reductions in energy costs for energy consumers. This is particularly important in the context of energy prices that are likely to rise in the future. Investments in energy efficiency can pay for themselves in savings to energy consumers over time, and the resulting savings are permanent and reliable.
- Avoidance of capital costs associated with the construction of new sources of supply of electricity.
- Avoidance of environmental and health impacts that would otherwise flow from the construction and operation of new sources of electricity supply. The life-cycle environmental and health impacts of fuel production for non-renewable energy sources, such as fossil fuels and nuclear, would be avoided as well.
- Avoidance of security risks associated with conventional sources of energy supply, particularly nuclear energy.
- Avoidance of political risks associated with dependency on fuel sources or energy imports from other jurisdictions.
- Reductions in losses of energy through transmission and distribution systems.
- Improved reliability of the electricity system by lightening the load at the end of the supply/delivery chain, thereby enhancing the reliability of each link in the entire chain.¹⁸

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- Employment benefits flowing from investments in energy efficiency initiatives as opposed to new generation.¹⁹

The first serious efforts at province-wide DSM initiatives in the electricity sector in Ontario occurred under the auspices of Ontario Hydro's 1989 Demand Supply Plan. Unfortunately these initial efforts were abandoned in the early and mid-1990s as electricity demand fell in the context of deteriorating economic conditions, and Ontario Hydro and then the electricity sector as a whole were restructured.²⁰ Interest in CDM re-emerged with the November 2002 decision to terminate the competitive retail electricity market that had been launched in May of that year and to freeze electricity rates. These announcements were accompanied by the provincial government's commitment to reduce its own electricity consumption by 10% and by the provision of tax incentives for the purchase of energy efficient equipment by industry and sales tax rebates for consumers on the purchase of high efficiency appliances.²¹ The following June the Minister of Energy directed the OEB to conduct consultations on options for delivering CDM programs in the electricity sector.

The January 2004 final report of the Electricity Conservation and Supply Task Force,²² initiated in June 2003 in the context of the difficulties encountered by the province in moving to a fully competitive electricity market, highlighted the key electricity policy challenges facing Ontario, particularly the need to renew or replace 80% of the province's existing generating assets over the next 20 years and the need for a CDM strategy. The *Electricity Restructuring Act* enacted in December 2004 in the aftermath of the task force's report, in addition to establishing the OPA to take overall responsibility for electricity system planning, provided for the establishment of a conservation bureau within the OPA, lead by a Chief Conservation Officer and mandated to provide leadership in planning and coordinating electricity CDM.²³

The legislation also provided for the issuance of directives to the OPA by the Minister of Energy. Directives were to have two functions under the legislation: First, they were a means through which the minister could provide policy direction to the power authority while the IPSP that the legislation mandated the OPA to draft was under development. Second, directives were to be the primary funding mechanism for the OPA's operations and programming pending approval of the IPSP by the OEB. The authority is permitted to apply to the energy board for funding from the electricity rate base (via the global adjustment mechanism²⁴) to carry out the mandates provided to it through directives. From June 2005 onwards the Minister of Energy began issuing directives to the OPA to begin pursuing CDM initiatives.²⁵

2.2 The Role of LDCs in CDM Programming

Local electricity distribution companies have been actively involved in CDM activities since May 31, 2004, when LDCs in Ontario were granted an approval to apply to the OEB for an increase in their 2005 rates in the form of their third instalment or tranche of the incremental Market Adjusted Revenue Requirement (MARR).²⁶ To get this third instalment LDCs were required to spend the equivalent of one year's return on CDM initiatives. Under this arrangement, in 2005 the OEB approved \$163 million in CDM funding for distribution companies and also allowed distributors to apply for additional funding as part of the 2006 and 2007 distribution rate adjustment processes.

As a result of this funding, LDCs delivered a series of OEB-approved CDM programs (referred to as 'third tranche' conservation programs) from 2005 to 2007. These initiatives covered both residential and business sectors and provided a host of CDM programs ranging from residential and commercial lighting rebates to hot water heater tune-ups.²⁷ In March 2007, the OEB announced that additional funding through distribution rates would be available for continuing third tranche programs until April 2008 and encouraged LDCs to apply. The extension covered a variety of programs, such as distribution system improvements, home retrofits, and school conservation education programs.²⁸

According to reports submitted by the LDCs and compiled by the OEB, LDC-designed and delivered electricity conservation programs resulted in the following electricity savings in Ontario: 163,051 MWh in 2005, 521,228 MWh in 2006 and 361,089 MWh in 2007.²⁹ Overall, LDCs reported that their CDM initiatives reduced peak demand by 257 MW and electricity consumption by 1,045 GWh from 2005 to 2007.^{30, 31} From 2005 to September 2007, LDCs submitted 85 individual plans to the OEB for approval with programs covering conservation, demand response, line loss reduction and distributed generation.³² These results represent only savings from the programs approved by the OEB and funded through distribution rates. In addition to these programs, LDCs have been actively involved in delivering a set of OPA-approved province-wide conservation programs.³³

It was expected that most CDM funding for LDCs beyond 2007 would be provided by the OPA (see below), either through the LDC CDM fund or through other OPA initiatives.³⁴ LDCs still have the option, however, of applying directly to the OEB for funding through distribution rates for "programs for which no OPA funding is available."³⁵

2.2.1 OPA-funded CDM programs

In 2006, the Minister of Energy issued a set of directives to the OPA that were especially relevant to the CDM initiatives and programs delivered by the LDCs.³⁶ A July 13, 2006 directive, following up the June 13 Supply Mix Directive, established a three-year LDC fund of an additional \$400 million for CDM programs to be delivered by LDCs. The OPA was to organize the delivery and funding of these programs through contracts with LDCs.³⁷

The OPA identified four types of CDM programs that would be eligible for this funding, each of them distinct in terms of their design, delivery and overall role the LDCs play in them:³⁸

- OPA-designed programs with third party delivery and reactive LDC support
- OPA-designed programs with third party delivery and proactive LDC support
- Standard programs designed by the OPA and delivered by LDCs
- Custom programs designed and delivered by LDCs.

To date the focus of the OPA has been on standard province-wide CDM programs delivered by LDCs. In 2007, the OPA provided funding to distributors for four standard programs.³⁹ In 2008–2010 this increased to five standardised programs:⁴⁰ Appliance Retirement Program; Electricity Retrofit Incentive Program; Every Kilowatt Counts Summer Sweepstakes Program; Residential and Small Commercial Demand Response Program; and Small Commercial Direct Install Program.

The overall result of the minister's directives to the OPA and the OEB's initiatives is that LDCs currently have three options for funding CDM activities:

1. Deliver standard province-wide programs approved and funded by the OPA.
2. Apply to the OPA for funding for customised CDM initiatives.
3. Apply to the OEB for funding for self-designed programs though their distribution rates.⁴¹

Additional funding has been provided from time to time to LDCs as a result of CDM directives issued by the Minister of Energy under the *Electricity Restructuring Act, 2004* in relation to CDM programming targeted at specific markets and income groups. The *Green Energy and Green Economy Act* of 2009 extends the directive mechanism for CDM purposes beyond the approval of the IPSP⁴² and introduces the possibility of rate-based funding for Ministry of Energy and Infrastructure-delivered

CDM programs and for LDC programming designed to meet conservation targets set out in directives issued to the OEB.⁴³ At the same time, the new legislation eliminates the Conservation Bureau and position of the Chief Conservation Officer within the OPA. These institutional structures had been established through the 2004 legislation.⁴⁴

2.3 The Role of the TRC Test in OEB-Approved and OPA-Funded CDM Programming

The primary criteria used by both the OEB and the OPA to assess applications by LDCs for funding for CDM programming is the Total Resource Cost (TRC) test.^{45, 46} The TRC test was first developed in California by the California Public Utility Commission (CPUC) and the California Energy Commission (CEC) who jointly published *The Standard Practice Manual* in 1983.⁴⁷ This document provided a standardized methodology for conducting benefit–cost analyses of all utility programs in California, including load management and energy efficiency.⁴⁸ The manual set up several tests for assessing the cost effectiveness of energy efficiency programs, including the Ratepayer Impact Measure (RIM) Test, the Utility Cost Test (UCT), the Participant Cost Test (PCT), and the TRC Test.⁴⁹ These tests were intended to be used in combination to reduce energy consumption and increase economic performance of an overall portfolio of CDM activities. Since then, the TRC test has become one of the most popular CDM program evaluation tools used in North America.⁵⁰ The TRC test has been used by Ontario gas utilities since 1995 to assess the cost effectiveness of potential conservation and DSM programs and to measure their CDM performance.⁵¹

2.3.1 Application of the TRC test by the OEB

The OEB’s current *Guidelines for Electricity Distributor Conservation and Demand Management* adopted by the board on March 28, 2008⁵² outline the application of the TRC test to electricity CDM initiatives. The March 2008 guidelines replaced several policies and guidelines previously issued by the OEB, including the *Total Resource Cost Guide* issued in September 2005⁵³ and revised in October 2006;⁵⁴ the *CDM Framework Report* issued in March 2007;⁵⁵ and sections of the *Filing Requirements for Transmission and Distribution Applications* that dealt with CDM-related applications.⁵⁶

The development of a common cost–benefit analysis framework for electricity CDM in Ontario, including the adoption of the TRC test as a key mechanism for screening and evaluating CDM initiatives undertaken by LDCs, was a long-term process that involved a variety of stakeholders and was influenced by various policy and regulatory developments. The experience of the OEB and Ontario gas utilities with natural gas CDM initiatives played a significant role in designing a framework for CDM activities in the electricity sector.⁵⁷ By 2004 Ontario gas utilities (Enbridge Gas Distribution and Union Gas) already had about a decade of experience with CDM programs. According to the evidence provided by Pollution Probe, these utilities had implemented a range of innovative and cost effective CDM initiatives that had reduced their customers’ bills by over \$1 billion.⁵⁸ The OEB indicated on multiple occasions that it would be building on the natural gas experience in Ontario. As a result, the cost–benefit framework developed for the utility-delivered electricity CDM initiatives included a variety of elements from the gas CDM framework, including the use of the TRC test as a primary screening and evaluation tool. In addition to the natural gas utilities, a number of stakeholders, including the OPA, LDCs, industry associations and NGOs, contributed to the development of the TRC framework by participating in the OEB’s Advisory Group or other stakeholder consultations, filing motions to the OEB or submitting comments on various policy proposals.

Most of the comments and concerns expressed throughout the process of the TRC development were specific and addressed particular components or assumptions of the test. The issue of excluding environmental externalities from the TRC calculations was one of the key themes actively discussed from the outset.⁵⁹ Concerns with the calculation and attribution of avoided costs and benefits, free ridership rates, discount rate and consistency of the TRC inputs and assumptions were expressed throughout the process of the TRC framework development. A detailed description of the development of the current OEB guidelines is provided in Appendix 3.

The application of the TRC test to all LDC CDM initiatives is not universal, particularly with respect to education and awareness programs. On November 4, 2008 the OEB approved an application for distribution rate funding by Greater Sudbury Hydro for several CDM programs, including a community awareness program. In its decision the board stated that “as a market support program, the Community Awareness program does not have any direct demand or energy savings associated with it and therefore this program is not measured by TRC test results.”⁶⁰

2.3.2 Application of the TRC test by the OPA

For its part, in its 2007 expenditure and revenue review application to the OEB, the OPA reported that it would use a TRC test to screen CDM programs implemented in 2007, except for educational programs. The OPA stated that the TRC test it planned to use would build on the OEB TRC model. The OPA also stated its intention to produce a standardized process for evaluating and reporting on all CDM programs funded by the OPA.⁶¹

The OPA has developed a number of processes and documents, including the *OPA Evaluation, Measurement & Verification Framework for Ontario Power Authority Conservation Programs*,⁶² *OPA Evaluation Protocols*,⁶³ *OPA Measures and Assumptions List*,⁶⁴ *OPA Cost Effectiveness Test Guide*,⁶⁵ and *OPA Cost Effectiveness Tests Tool*.⁶⁶ One of the key EM&V documents created by the OPA — *Evaluation, Measurement and Verification Framework for Ontario Power Authority Conservation Programs* — provides a detailed description of the process of evaluating CDM activities.⁶⁷ In particular, it reaffirms the role of the TRC test as the primary metric for assessing CDM program cost effectiveness and lists information required for conducting the TRC. It also states that the OPA will use the TRC test in accordance with the *Total Resource Cost Guide* published by the OEB.⁶⁸ The TRC test methodology described in the OEB TRC guide has been integrated into the *OPA Cost Effectiveness Tests Guide*, which describes several standard cost effectiveness tests (including the TRC test) as well as describes and provides examples of how to apply the tests.⁶⁹

Currently, a TRC-positive requirement exists for both standard (province-wide) CDM programs as well as for customised applications funded by the OPA. One of the key criteria for LDC custom programs is that all CDM programs “be cost effective and pass TRC, based on the OPA TRC tool and *Measures and Assumptions List*.”⁷⁰ For customised CDM programs with measures not included on the *OPA Measures and Assumptions List*, LDCs have to apply to the OPA first to have any new measures added and to provide the results of the supporting research substantiating their assumption data. Some programs, such as promotional activities and local community events, theoretically had access to the OPA-administered Community Initiatives Fund (~\$ 5.1 million). Programs funded in this way would not be subject to the TRC test. However, the program is currently suspended while under review. No LDC CDM activities were funded directly through the program while it was in operation.⁷¹

2.3.3 Role of the TRC test in the SSM

In addition to its role in the assessment of proposed CDM initiatives the TRC test also plays a major role in the Shared Savings Mechanism (SSM) that has been established by the OEB in relation to LCD CDM programs. SSM is an incentive mechanism that allows utilities to retain a portion of their net benefit from CDM initiatives.⁷² The mechanism, along with the Lost Revenue Adjustment Mechanism (LRAM) is intended to help distribution utilities overcome their reluctance to engage in CDM activities due to concerns they will lose revenues as a result of reduced energy consumption by consumers stemming from their CDM efforts.

The SSM was first established by the OEB in December 2004⁷³ in response to a motion from Pollution Probe.⁷⁴ Pollution Probe's initiative was based on the success of conservation programs offered by Enbridge Gas Distribution Inc. supported by an SSM. According to Pollution Probe's estimates, after nearly a decade of CDM activities Enbridge conservation programs had reduced customers' bills by \$785 million. The TRC is central to the structure of the SSM, as the OEB's current guidelines reward LDCs with 5% of the net savings estimated by the TRC test.⁷⁵

The LRAM, for its part, is determined by calculating the energy savings for each type of customer and valuing those energy savings using the distributor's board-approved variable distribution charge appropriate to each type of customer. In the result, the LRAM is calculated based on the kW or kWh impacts of each program and for each type of consumer (both gross and net of free riders) and not on the TRC test results.⁷⁶

2.4 The Current TRC Test Structure in Ontario

Under the TRC test, benefits are defined as avoided resource costs.⁷⁷ These result from a reduction in the costs associated with generating, transmitting and distributing electricity, as well as those that accompany marginal capacity for the periods when there is a load reduction. For some CDM programs savings of other resources (e.g., natural gas, heating fuel oil, water) are also realized.⁷⁸ Costs include the incremental cost of any equipment and all associated program support costs paid by both the utility and the participants. These include costs associated with equipment operation, maintenance, installation and removal, and administration costs. Any tax credits are considered a reduction to costs under the TRC test.

Based on the calculated costs and benefits specific to a particular measure or project, the TRC test then examines the potential benefits and costs of the project and uses a discounting technique⁷⁹ to express these benefits and costs over the life of the program as a single number, referred to as the Net Present Value (NPV). For a program to be considered cost effective, the NPV should be greater than zero — that is, the benefits should exceed the costs.⁸⁰

In Ontario, the evaluation of the cost effectiveness of CDM is a three-stage process that is applied at the levels of technologies or measures,⁸¹ programs⁸² and portfolios.^{83, 84} TRC tests have to be performed at each stage. First, a TRC test is conducted to evaluate the cost effectiveness of the CDM measure or technology. If the measure or technology proves to be cost effective, a program that supports it is developed and the cost effectiveness of the program is then assessed using the TRC test. Finally, several CDM programs can be grouped together and assessed as a whole. In this case all indirect administration and management costs are included and the TRC test is conducted to evaluate the cost effectiveness of the CDM distributor's portfolio. This three-stage structure (measure/technology, program and portfolio) is a key element of TRC analysis in Ontario.

The following chapter examines the approaches taking by US and other Canadian jurisdictions to the evaluation of proposed electricity and energy CDM initiatives, including the application of cost-benefit tests, including the TRC. The chapter then compares Ontario's approach to those seen in other leading jurisdictions, particularly British Columbia, California and New York.

3 Cost Effectiveness

Tests for CDM Initiatives in North America

3.1 Introduction

Ontario has not been alone in its efforts to promote CDM activities as part of its long-term electricity strategy. In fact, the province is a relative latecomer to the inclusion of major CDM efforts in its energy strategy relative to other North American jurisdictions. Rising energy costs along with growing demand for energy, the difficulty of adding new generation, and rising environmental concerns have significantly increased interest in the development and implementation of energy efficiency resources during the past decade. Government, industry and local utility companies in North America have become actively involved in promoting CDM programs to lower energy consumption, defer additional generation capacity, and meet environmental commitments.

Energy efficiency programs are broadly defined to include both demand response and demand reduction measures. A wide range of CDM initiatives have been developed and delivered in North American states and provinces. Jurisdictions differ in their leadership style and level of interest in pursuing energy efficiency programs, the responsibilities assigned to key players, and the actual process of designing and implementing CDM programs.

Similar CDM programs implemented in different locales or by different utilities can produce varying benefits and costs depending on the assumptions used and the way programs are implemented in Ontario.⁸⁵ In most jurisdictions, regulators have established a requirement for CDM programs to meet certain criteria in some form of benefit–cost test. The cost–benefit analyses are primarily aimed at ensuring that CDM programs actually deliver energy savings and that spending on CDM is the more economical option compared to investing in new supply. In many cases the approaches taken in other jurisdictions are quite different from those employed in Ontario.

In most jurisdictions cost–benefit tests are used as a screening tool to ensure that CDM programs or portfolios are developed cost effectively, as well as a retrospective evaluation tool to assess the programs delivered and to identify potential improvements in program design and delivery.⁸⁶ The cost–benefit method chosen for the screening and evaluation of CDM programs by a regulator or an LDC within a particular jurisdiction can have significant impact on the scope, scale and type of the CDM initiatives delivered in that jurisdiction. In addition to being used to decide what measures or programs are considered to be economic and worth pursuing,⁸⁷ the financial incentives provided to utilities to offer CDM programming, like the LRAM and SSM in Ontario, are often linked to the cost–benefit results achieved by these activities.

3.2 Cost Effectiveness Tests and their Application in North America

3.2.1 Types of cost effectiveness tests for CDM initiatives

The TRC test is the primary CDM program evaluation tool used in most jurisdictions of North America.⁸⁸ It is, however, not the only cost effectiveness test available. Other tests, such as the Societal Cost Test (SCT), the Rate Impact Measure (RIM) test, and the Participant Cost Test (PCT), have been developed and implemented either as a supplement or an alternative to the TRC test. Although a detailed overview of these tests is beyond the scope of this report, this section provides a brief description of alternatives to the TRC test. This overview is largely based on the description of tests provided in the California Standard Practice Manual and the discussion of the cost effectiveness tests by Amann (2006).⁸⁹

3.2.1.1 Societal Cost Test (SCT)

The SCT is a modification of the TRC test. Structurally similar to the TRC test, it expands the test to include the effects of externalities (environmental, energy security, and so on) as CDM program costs, excludes tax credit benefits, and uses a societal discount rate rather than market rate.^{90, 91} Marginal costs used in the SCT include avoided costs of power generation, transmission and distribution not captured by the market. An example would be external costs of environmental damage resulting from emissions of common air pollutants or GHGs. Another example of an externality would be the benefit of increased system reliability or increased customer satisfaction with the service provided by the LDC.

The question of whether environmental externalities should be included in cost–benefit tests of CDM measures is highly debated. Proponents of the SCT point to the fact that including externalities will bring more conservation projects to the market and, therefore, have a positive impact on the environment. Others counter that assigning an economic value to externalities can be an ambiguous and highly subjective process. SCTs, including consideration of avoided externalities, are current employed (alone or in combination with other benefit–cost tests) in Oregon, Vermont, Minnesota, Maine and Wisconsin.⁹² In Ontario, a variation of the SCT was used in the first few years of gas CDM programs before switching to the current TRC practice that excludes externalities.⁹³

3.2.1.2 Participant Cost Test (PCT)

The PCT measures the quantifiable benefits and cost of the CDM initiative to program participants. It aims to answer the following questions: Will the customer be better off by participating in the program than not? That is, will the savings realized exceed the cost of participating (e.g., the investment in energy-efficient equipment)?⁹⁴

Customer benefits include the reduction of energy utility bills, incentives paid out by a utility or third party, and tax credits. Costs to the participant include all out-of-pocket expenses (such as the cost of equipment purchases, operations and maintenance) and any increases in energy bills. The results of the PCT can be expressed in a variety of ways: as a net present value for the total CDM program, as a net present value per average participant, as a benefit–cost ratio or as discounted payback.

One of the strengths of the PCT is that it can serve as an indicator of the benefit or desirability of the CDM program to customers. A drawback of the test, however, is that it is unable to fully capture all costs and benefits to participating consumers as well as to account for all factors affecting customers' decision making.⁹⁵ The test also ignores any impact on the utility and non-participants.⁹⁶ It is usually used in combination with the TRC or other cost effectiveness tests.

The PCT is used in New York and California in conjunction with other tests to assess CDM program cost effectiveness.⁹⁷

3.2.1.3 Ratepayer Impact Measure (RIM) Test

The RIM test evaluates the impact of CDM programs on utility revenues and operating costs and the ways these are likely to affect utility rates and non-participating customer bills.⁹⁸ Rates will be reduced if the change in revenues from a program is greater than the change in utility costs.

Conversely, if program costs are greater than revenues collected after a program's implementation, rates will increase.

The costs accounted for in the RIM test include costs to the utility of running the program, additional operation and maintenance, installation costs paid by the utility, cost of the efficiency technology if paid by the utility, and revenue lost by the utility as a result of the program over the lifetime of the efficiency technology or measure.⁹⁹ The benefits used in the RIM test are similar to the avoided supply costs used in the TRC test.

Also similar to the TRC test, the RIM test's results are expressed as the net present value of the benefits minus costs. If the value is positive, this indicates that utility revenue has increased, and thus customer rates can be reduced. This test thus can serve as an indicator of the direction and scale of the expected change in customer bills or rates.¹⁰⁰

3.2.1.4 Utility Cost Test (UCT) or Program Administrator Cost (PAC) Test

The Utility Cost Test (UCT) or Program Administrator Cost (PAC) test evaluates the impacts of CDM initiatives on the utility or administrator of the program.¹⁰¹ This test measures the net costs of a CDM program based on the costs borne by the program administrator (utility).¹⁰² Benefits include generation cost savings (energy and capacity), transmission cost savings, and distribution cost savings. The only costs included are the administration program costs and incentives paid to the participants.

3.2.2 Application of cost effectiveness tests in North American jurisdictions

The TRC test along with other cost effectiveness tests is used by distribution companies and regulatory agencies as both a screening tool to assess the cost effectiveness of potential CDM programs and a retrospective evaluation tool for programs that have been in place for several years.¹⁰³

The cost effectiveness of CDM initiatives can be assessed from several perspectives — those of customers, of utilities and of society in general. The costs and benefits to different stakeholders vary according to the test. The RIM test, for instance, measures benefits from the perspective of an individual consumer, while the TRC test estimates costs and benefits from a broader societal point of view. Unlike the SCT, however, neither the RIM nor the TRC test accounts for non-energy related social and environmental benefits to society. All tests have advantages and limitations and are thus often used in combination to better analyze the cost effectiveness of CDM programs.

The TRC test remains one of the most commonly used benefit–cost tests in North America; it is often used in combination with other tests.¹⁰⁴ Although using several tests to assess CDM has its advantages, it should be noted that tests differ in the costs and benefits they include; CDM programs can thus be rated quite differently by different tests. For instance, programs with relatively high kWh reductions are more likely to be cost effective under the TRC test than under the RIM test.¹⁰⁵ Programs with higher kWh reductions can result in higher revenue losses (considered as a cost under the RIM test, but not under the TRC test) and can reduce the potential for cost effectiveness when the RIM test is applied.

Given that all cost effectiveness tests have their advantages and limitations, when deciding which test to use consideration must be given to the broader context of the jurisdiction’s energy conservation goals and the policy environment with respect to CDM initiatives. Most jurisdictions require CDM programs to be assessed using at least one of the standard program cost effectiveness tests in accordance with the methodology established in the California Standard Practice Manual.¹⁰⁶ Tables 5.1 and 5.2 summarize the primary and secondary cost–benefit tests adopted in different states in the US. A more detailed list of cost effectiveness tests used in each state is provided in Appendix 2.

Table 3-1 Primary Cost Tests Used by Various US States

Participant Cost Test (PCT)	Utility Cost Test (UCT)	Ratepayer Impact Measure (RIM) Test	Total Resource Cost (TRC) Test	Societal Cost Test (SCT)
none	CT, UT, TX	FL	CA, MA, MO, NH, NM,	AZ, ME, MN, VT, WI

Table 3-2 Secondary Cost Tests Used by Various US States

Participant Cost Test (PCT)	Utility Cost Test (UCT)	Ratepayer Impact Measure (RIM) Test	Total Resource Cost (TRC) Test	Societal Cost Test (SCT)
AR, FL, GA, HI, IA, IN, MN, VA	AT, CA, CT, HI, IA, IN, MN, NO, NV, OR, UT, VA, TX	AR, DC, FL, GA, HI, IA, IN, KS, MN, NH, VA	AR, CA, CO, CT, DE, FL, GA, HI, IL, IN, KS, MA, ME, MN, MO, MT, NH, NM, NY, UT, VA	AZ, CO, GA, HI, IA, IN, MW, MN, MT, NV, OR, VA, VT, WI

Source: Price, S. “Summary of Energy Efficiency Cost-Effectiveness Issues”, E3, October 17, 2008, <http://www.docstoc.com/docs/2319130/Summary-of-Energy-Efficiency-Cost-effectiveness-Issues>

Only a few states require that programs meet all five tests.¹⁰⁷ Since each of the standard tests analyses the cost effectiveness of a CDM measure or program from the perspective of a particular stakeholder (i.e., consumers, ratepayers, utilities, society as a whole), most states use more than one test for CDM program screening and assessment. Usually at least one required test is supplemented by one or two either optional or required tests.¹⁰⁸

The TRC test is the most common screening and evaluation tool for CDM activities. However, many jurisdictions also use the SCT, a variation of the TRC test that includes consideration of social and environmental costs that may be avoided as a result of CDM programs.

Although the TRC test is not as restrictive as the RIM test, CDM program administrators in several jurisdictions recognise its limitations, especially the fact that it does not include non-energy benefits to society, such as avoided air pollution or GHG emissions or realized benefits to low-income households. To correct these limitations of the TRC test, some jurisdictions adopted some form of an SCT (effectively a TRC test plus externalities). Since it is difficult to put a precise price on environmental and social externalities, these jurisdictions often apply a rough ‘adder,’ such a fixed percentage of program costs, to the calculation of program benefits to account for the non-energy benefits of CDM programs.

The Maine Public Utility Commission, for instance, uses the Modified Societal Test to screen CDM programs. The structure of the test is similar to Ontario’s TRC test, except that it includes non-energy benefits, such as reduced operation and maintenance costs, productivity improvements, economic development benefits and environmental benefits, “to the extent such benefits can be reasonably quantified and valued.”¹⁰⁹ In Washington State, conservation is identified as the ‘Resource of Choice’ and all CDM programs are given a 10% adder to the TRC test in accordance with the *Northwest Public Power Planning Act* of 1980.¹¹⁰

Another shortcoming of the TRC test is that certain types of CDM activities do not perform well under its framework. Specifically, with activities such as education and awareness programs that are needed to achieve long-term conservation goals, it can be difficult to establish the direct link between the activity and projected energy savings. In an attempt to rectify this problem, some jurisdictions have adopted special provisions for such programs. In Kansas, for example, the regulatory agency, the Kansas Corporation Commission, mandates that all energy efficiency programs be accompanied by educational programs to bring awareness to

customers in their homes and businesses.¹¹¹ Although the commission uses TRC and RIM tests to evaluate its CDM programs, educational programs are exempt from these benefit–cost tests.

In addition to variances among agencies in regulating which tests should be applied, there are also different perspectives on the appropriate level at which the tests should be applied. Many states focus on cost effectiveness at the utility program portfolio level rather than at the level of each individual CDM program. Applying the tests to the CDM portfolio as a whole has the effect of allowing some room for pilot projects and education and awareness programs that may not be able to meet the requirements of a given test individually.¹¹²

The following section explores the approaches taken with respect to the evaluation and approval of CDM programs in three leading North American jurisdictions: British Columbia, California and New York. These jurisdictions were selected based on their combination of past achievements in CDM programming and more recent adoption of significant policy and regulatory measures intended to facilitate and encourage the pursuit of cost effective CDM opportunities.

3.3 Comparative Case Studies

3.3.1 British Columbia

3.3.1.1 Policy and Regulatory Context

British Columbia has been actively involved in CDM programs since the early 1990s and has recently emerged as a leader in CDM in Canada. The BC Energy Plan, released in 2007, set a goal of reducing the growth in electricity demand so that a currently projected additional demand of 10,000 GWh by 2020 would be met through demand reduction measures, including energy efficiency, conservation, load displacement, fuel switching and small distributed generation.¹¹³ With this energy plan the BC Government has mandated an ambitious conservation target.¹¹⁴ The plan directs BC Hydro,¹¹⁵ the leading utility company in the province, “to acquire 50 per cent of [its] incremental resource needs through conservation by 2020” and encourages all utilities to pursue cost effective CDM opportunities.¹¹⁶

To facilitate the achievement of these and other policy objectives in the BC Energy Plan, the BC Government made significant modifications to the *Utilities Commission Act* (UCA) — the statutory framework that governs public utilities in British Columbia. The resulting *Utilities Commission Amendment Act* (Bill 15) was adopted in 2008 with the aim of establishing a legal and regulatory framework to realize the objectives of the BC

Energy Plan. One of the most important elements of the legislation was a requirement that utilities pursue all cost effective CDM opportunities before relying on supply-side resources.¹¹⁷ The principal target of the provision is BC Hydro, which serves over 94% of British Columbia’s population and is subject to regulatory oversight by the British Columbia Utility Commission (BCUC).¹¹⁸

The amendments to the UCA laid the groundwork for the Demand-Side Measures Regulation of November 2008 that outlined in greater detail how CDM programs were to be managed and evaluated.^{119, 120}

3.3.1.2 CDM Programs: Administration and Evaluation

To assess cost effectiveness of its CDM programs, BC Hydro relies primarily on the TRC test as a screening tool, though it also conducts the UCT and the RIM test on all CDM programs to evaluate program costs to the utility and its customers. The regulator, the British Columbia Utility Commission (BCUC), looks at the results of the TRC and RIM tests¹²¹ to determine whether to approve CDM initiatives. In the case of the RIM test, a threshold of 0.8 is applied (i.e., program costs to ratepayers to exceed costs by 20%) allowing for a small adverse impact on non-participants, provided the TRC test at least meets the threshold of 1, meaning that program costs and benefits are equal.¹²²

The November 2008 Demand-Side Measures Regulation included several important provisions related to the screening and evaluation of CDM programs.¹²³ One of the most important changes was the requirement for the BCUC to evaluate the cost effectiveness of a specified DSM “by determining whether the portfolio is cost effective as a whole.” Those specified DSMs include educational and community engagement programs, energy efficiency training, and technology innovation programs. The provision essentially acknowledged the benefits of these types of programs; though they do not perform well under the traditional cost–benefit analysis framework, they are necessary for the long-term success of CDM initiatives.

Another important requirement of the regulation is the consideration of the adequacy of the proposed CDM measures.¹²⁴ For a portfolio to be considered ‘adequate’ by the BCUC it must include¹²⁵

- a DSM measure aimed at assisting residents in low-income households to reduce their energy consumption
- a DSM measure aimed at improving the energy efficiency of rental accommodations (after June 1, 2009)
- an education program for students in schools in the utility’s service area.

While mandating these required elements in the CDM portfolio mix, the regulation does not specify program designs, giving utilities some flexibility in terms of what CDM options to pursue. BC Hydro, for its part, offers two types of CDM measures for low-income households: free energy saving kits (small savings, broad target) and free home audits (bigger savings, smaller targeted audience).¹²⁶

A final important provision under BC's DSM regulation deals with externalities — social benefits not normally included in traditional cost effectiveness tests. To acknowledge the fact that low-income CDM programs provide significant social benefits not reflected in standard TRC test calculations, the regulation directs the BCUC to apply a 30% adder to the benefits of low-income programs in the TRC test. According to the testimony by BC Hydro, this 30% adder increased the low-income program's TRC benefit–cost ratio from 0.9 to 1.2, so it no longer falls below the TRC threshold of 1.0.¹²⁷

3.3.2 State of California

3.3.2.1 Policy and Regulatory Context

California has been a leader in CDM initiatives for over 30 years. Its energy efficiency programs and policies have had a significant impact on per capita electricity use, which has remained unchanged since the mid-1970s.¹²⁸ Interest in CDM in California intensified in the 2000s. Public funding for CDM initiatives was significantly increased by the state government in response to the summer 2000 blackouts. In 2002, California adopted a policy of restructuring its electricity system to place an increasing emphasis on CDM programs.¹²⁹

In 2003 the California Public Utilities Commission (CPUC), the California Energy Commission (CEC), and the California Power Authority (CPA) released the Energy Action Plan (EAP) that set out targets for CDM activities as well as for renewable energy and distributed generation.¹³⁰ The EAP also set a 'loading order of energy resources' that placed conservation and energy efficiency before new energy sources.¹³¹ In accordance with the plan, the CPUC mandated that local utility companies use all available cost effective CDM options before developing or obtaining additional supply resources.¹³²

In 2004, the CPUC established annual efficiency savings goals for utilities: investor-owned utilities (IOUs) are expected to save about 1–1.5% of total forecast electricity sales per year. By 2013 total annual electricity consumption is expected to be reduced by 23,183 GWh and peak demand by 4,885 MW.¹³³ In 2006, California's investor-owned utilities reported CDM expenditures of \$357 million and electric energy efficiency savings of 1,912 GWh.

3.3.2.2 CDM Programs: Administration and Evaluation

California's state-wide and utility-specific CDM programs are designed and delivered by both investor-owned utilities and publicly owned utilities. The CPUC¹³⁴ provides general oversight, sets key policies and guidelines, and approves spending levels and rates. California's utilities fund some of their programs through procurement funds and through a public goods charge (PGC) (0.48 cents/kWh) on customer bills that helps cover the cost of energy efficiency, renewable energy and R&D programs and initiatives.¹³⁵ In 2003, the CPUC approved supplemental funding from the utilities' procurement funds (\$245 million for 2004–2005), in addition to the existing PGC funds, for conservation and demand response programs.¹³⁶

Various evaluation and screening frameworks have been used in California to assess the cost effectiveness of CDM programs since their origins in the 1970s. The *California Standard Practice Manual*, published jointly in 1983 by the CPUC and the CEC, provided a standardized methodology for conducting benefit–cost analyses of all utility programs in California, including load management and energy efficiency.^{137, 138} The manual set up several tests for assessing the cost effectiveness of energy efficiency programs, including the RIM test, the UCT, the PCT and the TRC test.¹³⁹

Currently, the CPUC requires utilities to conduct the TRC test and the UCT on CDM initiatives. The tests are weighted, with the TRC test being given twice the weight of the UCT.¹⁴⁰ Although the tests are applied for screening purposes to individual programs as well as at the portfolio level, the key requirement is that the utility's portfolio as a whole meets the tests. This approach allows utilities to pursue pilot programs or emerging conservation technologies, even though they may not meet the TRC test and UCT on an individual program basis.

The costs and benefits of the TRC test and UCT are currently calculated using a methodology and input assumptions developed by Energy and Environmental Economics, Inc. (E3) for the CPUC in 2004.¹⁴¹ In addition to avoided generation costs and transmission and distribution costs, avoided environmental externalities, such as releases of GHGs and other air pollutants,¹⁴² are considered in the calculation of the benefits of CDM initiatives. In particular, when calculating avoided costs, a carbon adder of \$8 per ton of carbon dioxide is applied. The input assumptions for avoided costs are based on the most recent available estimates of market-based avoided costs differentiated by time of use (super-peak, mid-peak and off-peak for summer and winter seasons) and location, allowing for better estimates of capacity savings.

The CPUC recognises that there are certain limitations to the TRC test and the UCT: the *Energy Efficiency Policy Manual* provides a description of the programs that may be exempt from the regular test threshold requirements. Emerging technologies programs must demonstrate only that they meet the test requirements on a prospective basis.¹⁴³ In cases where the entire portfolio including emerging technologies programs does not pass the Dual Test (both the TRC test and the UCT), utilities must describe the program benefits beyond those reflected in the standard tests and the long-term benefits of these programs for California ratepayers.

The CPUC also acknowledges the limitations of using the TRC test as a primary indicator of cost effectiveness in instances where the link between the programs and savings cannot be easily established. Programs in this category may include demonstration programs for promising emerging energy efficiency technologies, programs aimed at long-term structural market changes, and outreach and educational ‘information-only’ programs.¹⁴⁴ In such cases, the CPUC and utilities consider alternative or additional factors and performance characteristics when screening program proposals and assessing their results.

3.3.3 State of New York

3.3.3.1 Policy and Regulatory Context

New York State is another leading jurisdiction with respect to CDM initiatives. In a recent report by the American Council for an Energy-Efficient Economy, New York was ranked fifth among US states for its CDM efforts, moving up two places from its 2007 position.¹⁴⁵

The pursuit of cost effective energy efficiency opportunities over the near- and long-term has been established as one of the state’s highest energy priorities. Energy efficiency policy is considered within the broader context of the state’s energy and environmental initiatives, including the adoption of a Renewable Portfolio Standard, participation in the Regional Greenhouse Gas Initiative (RGGI), and improvements in the state’s energy building codes and appliance efficiency standards. New York State recently adopted an ambitious goal of reducing forecast electricity consumption by 15% by the year 2015 (15 x 15).¹⁴⁶

New York was one of the first North American jurisdictions to set up a systems benefits charge to support energy efficiency and energy research and development programs, as well as energy programs targeting low-income consumers.^{147, 148} Since its establishment in 1996, the range of programs and level of funding under the system benefits charge system have expanded significantly.

3.3.3.2 CDM Programs: Administration and Evaluation

A comprehensive set of state-wide energy efficiency, load reduction, and market transformation initiatives has been established under a systems benefits energy structure through the New York Energy SmartSM Program. Energy SmartSM is administered by a state government agency — the New York State Energy Research and Development Authority (NYSERDA).¹⁴⁹ Two publicly owned utilities — the New York Power Authority and the Long Island Power Authority — offer similar programs to their customers. Customers of distribution utilities are required to pay a system benefits charge on their utility bills. The New York Public Service Commission is responsible for reviewing initiatives under the Energy SmartSM program and establishing funding levels.

On June 23, 2008, the Public Service Commission issued the Order Establishing Energy Efficiency Portfolio Standard and Approving Programs to help achieve the goal of reducing forecast electricity usage by 15% by 2015 (15 x 15).¹⁵⁰ The order addressed several issues fundamental to CDM activities, including adopting three-year targets for energy use reduction, and approving so-called ‘fast track’ energy efficiency programs to be administered by NYSERDA and certain ‘expedited’ programs to be managed by utilities.¹⁵¹ The order signified the shift from a single provider model to a multiple administrators’ structure; the aim was to encourage independent program administrators to submit proposals “to further expand the range of program proposals and to encourage innovation.”¹⁵²

3.3.3.3 Cost Effectiveness Tests Used

For the CDM programs offered under the New York Energy SmartSM umbrella, the NYSERDA evaluation team uses a benefit–cost analysis framework that calculates the TRC test and UCT under three different scenarios.¹⁵³ The scenarios differ in terms of the non-energy benefits included in the calculations of avoided costs, with “1” being the least inclusive of benefits and “3” being the most inclusive. The 2007 scenarios were as follows:

- Scenario 1 is similar to the combined traditional TRC test and UCT. It includes avoided costs associated with reduced electricity generation and capacity, reduced consumption of natural gas and water, and ‘capacity market price effect’ resulting from the decreasing price of capacity due to reduced demand. Different assumptions are used when calculating energy and capacity costs for upstate and downstate regions. The analysis also uses load profiles to differentiate savings by time of day and season.¹⁵⁴

- Scenario 2 adds participant non-energy impacts that can be quantified in financial terms, including values for comfort, safety and productivity.
- Scenario 3 includes macroeconomic benefits.

Table 4-3 lists the cost–benefit ratios for each of these three scenarios for the TRC test and the UCT.

Table 3-3 Cost–Benefit Ratios for the New York Energy \$martSM Portfolio, 2007

	TRC test	UCT
Scenario 1	2.1	6.2
Scenario 2	3.3	9.9
Scenario 3	4.4	13.2

NYSERDA recognises that some programs, including emerging or R&D CDM programs cannot be adequately assessed by the benefit–cost methodology because “these programs are designed to accomplish a range of objectives, many of which cannot be monetized in the early years.”¹⁵⁵ For these programs, benefits are assessed qualitatively and progress toward achieving energy, economic and environmental benefits is monitored continuously.

For CDM proposals submitted by utilities in accordance with the Order Establishing Energy Efficiency Portfolio Standard and Approving Programs of June 23, 2008, the commission confirmed that the TRC test is the primary test used to assess program effectiveness of proposed CDM initiatives.¹⁵⁶ The commission, however, acknowledged that the TRC test does not consider non-energy benefits, and that as a result programs with high societal value (e.g., residential low-income programs) or high global climate change mitigation potential may fail the TRC test. The commission stressed the importance of providing “enough flexibility to guard against vital programs being eliminated, or not funded, because of a failure to pass this test.”¹⁵⁷

In its Program Opportunity Notice, developed as a guide for utilities willing to submit their proposals to be evaluated by NYSERDA first and then considered by the commission subsequently, NYSERDA has provided a detailed list of Efficiency Program Selection Criteria.¹⁵⁸ In particular, in addition to calculating the standard TRC benefit–cost ratio, utilities have to provide a benefit–cost ratio with carbon externality added, assuming a carbon value of \$15 per ton for each measure/program. If more than one program is proposed, a detailed description of various benefits at the portfolio level should be provided, including benefits other than direct energy savings and demand reduction benefits, such as increased employment, positive influence on low-income customers, or environmental benefits.

3.4 Analysis and Conclusions

3.4.1 Overall policy frameworks and supporting regulations

Like Ontario, all jurisdictions reviewed in this chapter have established major targets for CDM savings. However, while Ontario established a conservation target through the June 2006 Supply Mix Directive, British Columbia, California and New York have taken a different approach. In addition to pursuing specific goals and targets, each of these jurisdictions has mandated the pursuit of all cost effective CDM opportunities prior to the approval of additional supply resources. This approach avoids the situation that has emerged in Ontario, where it is argued that the established conservation target has been treated as a cap beyond which CDM activities do not need to be pursued, even if additional cost effective opportunities are available.¹⁵⁹

In addition, all three jurisdictions reviewed in detail in this chapter have developed extensive regulatory and policy frameworks beyond the establishment of overall CDM targets and objectives to facilitate and encourage CDM activities by utilities and other actors. Ontario, for its part, has made significant policy commitments with respect to energy efficiency and conservation. However, the province's overall CDM policy framework remains fragmented and incomplete compared to that of British Columbia, California or New York.

3.4.2 Flexibility and special considerations

British Columbia, California and New York use the TRC test as a primary test supplemented by one or two additional tests for screening/evaluation of CDM programs. However, all three jurisdictions have made specific modifications and refinements to their cost effectiveness assessment frameworks to allow some flexibility for those CDM programs that might fail the TRC test but that provide other important benefits. The modifications can be roughly grouped into two broad categories: assessment at the portfolio level and incorporation of social and environmental benefits/externalities. These are briefly summarised below.

3.4.3 Portfolio versus program level assessment

The cost effectiveness of CDM programs can be assessed at three different levels: measure, program and portfolio. In Ontario, the evaluation of CDM cost effectiveness takes place at all three levels. A portfolio level approach to evaluation, by focussing on the benefit–cost ratio for all programs in the CDM mix, allows programs with high ratios to compensate for those with low ratios but with potentially high social or environmental benefits, as well as those programs that are necessary for the long-term success of CDM initiatives.

In British Columbia, for instance, the portfolio approach is applied while evaluating the cost effectiveness of specified demand-side measures, including education and awareness programs and technology innovation programs. There is a similar requirement for the assessment of CDM initiatives in California.

3.4.4 Environmental externalities and social benefits

The question of whether environmental externalities should be accounted for while calculating CDM costs and benefits is not without controversy. However, an advantage of incorporating positive environmental externalities into the cost–benefit assessment is self evident: it will increase the benefit-to-cost ratio of the proposed CDM measure or program and will eventually bring more conservation projects to the market. In addition, it has been argued that the inclusion of these benefits would reflect the wider goals, beyond the least-cost provision of energy services, that are now being established by governments for CDM initiatives, such as reductions in GHG emissions.¹⁶⁰ In this context, it has also been argued that discount rates of zero or even negative discount rates should be applied to the environmental benefits of CDM activities, as benefits such as reductions in GHG emissions may actually be of greater value to future generations than to present generations.¹⁶¹ On the other hand, the precise value of environmental and social benefits is difficult to estimate in monetary terms.

There are various ways to account for externalities. CDM programs in California, for example, are structured to include environmental externalities (such as avoided costs of GHGs and other air pollutants). To achieve this, when calculating avoided costs a carbon adder of \$8 per ton of carbon dioxide is applied. New York follows a slightly different approach by calculating the cost–benefit tests for its Energy SmartSM Portfolio Programs with two tests (the TRC test and the UCT) under three different scenarios, excluding and including non-energy benefits. Another option is a qualitative assessment of various non-energy benefits provided by the CDM initiative at the portfolio level. NYSERDA uses this approach for the recently developed Efficiency Program Selection Criteria list that requires utilities to provide a detailed description of various benefits at the portfolio level, such as increased employment and environmental gains.

Another way to approach the issue of quantifying social benefits is to assign a certain percentage of program benefits as an adder or a multiplier. British Columbia has done this for its low-income efficiency programs under its DSM regulation that required the BCUC to increase the benefits in the TRC test by 30% when considering the cost effectiveness of a low-income program.

4 The TRC Test in Practice: Interview Results

4.1 Introduction

To better understand the impact of the existing CDM regulatory framework on CDM initiatives and programming by Ontario LDCs, a series of interviews was conducted with LDC staff involved in the design and delivery of such initiatives. Interviews were also conducted with a number of other key informants in the CDM field in Ontario. The interviews were aimed at gaining insight into the impact of the TRC test on CDM programming by LDCs, as well as the broader policy and regulatory context within which CDM activities take place in Ontario.

In total, seven interviews — five with staff of different LDCs and two with OPA staff — were conducted.¹⁶² The interviews were carried out either in person or over the phone and lasted from 30 minutes to one hour each. Since the goal of the interviews was to obtain both specific and broader contextual information, a semi-formal interview structure based on a core set of questions was employed. The questions served as guidelines that ensured coverage of key research themes while also providing flexibility to the interviewees to address other issues around these themes. The interview questions are provided in Appendix 1.

Despite variances in respondents' answers to the interview questions, several consistent messages emerged from the interviews. These are summarised below.

4.2 Impact of the TRC Test on CDM Program Design and Delivery in Ontario

4.2.1 Serves as a business planning and evaluation tool

All interviewees described the TRC test as a useful business planning tool that serves several important functions. It is used to screen potential programs at the design and development stage, as well as to refine certain

elements of programs once they are implemented. The TRC test also drives the SSM incentive mechanism in cases where CDM programs are funded through distribution rates. The TRC test measures the overall economic efficiency of CDM measures, programs or portfolios from the perspective of society. It also gauges the effects of a CDM activity on both the distribution company and its customers.

The TRC test, however, is not without limitations. These limitations can be associated with the structure of the test, the way it is applied or the broader policy and regulatory environment in which CDM activities occur.

4.2.2 Barriers to non-standard CDM programs

A number of interviewees noted that the TRC test is an inherent disincentive for LDCs to pursue customised programs as opposed to delivering programs from the OPA's standard program list. Gathering information on inputs for the TRC cost-benefit analysis and estimating costs and benefits for non-standard programs for the purposes of a rate application to the OEB or a funding request to the OPA can be a costly and time-consuming exercise. The requirements are especially challenging for smaller LDCs that lack in-house analytical capacity or financial resources for contracting outside expertise.

TRC test-related barriers to non-standard programs need to be viewed within a broader policy and regulatory context for CDM activities in Ontario. Many interviewees noted that their LDCs offered a wider range of customised programs when they received funding (subject to OEB approval) through their distribution rates. However, many of these programs were downsized or eliminated when the OPA assumed the role of primary funder of CDM activities. The OPA's lack of interest in non-standard CDM programs was commonly cited as one of the reasons for not continuing to pursue customised programs. While LDCs still have the option of applying directly to the OEB for funding through distribution rates for "programs for which no OPA funding is available,"¹⁶³ as noted above, this route can be problematic for smaller LDCs as they typically lack the financial and staff resources needed to conduct TRC test analyses of custom programs.

Two types of programs were consistently identified during the interviews as being negatively affected by the TRC test:

- new measures or programs with limited data on their performance
- educational types of programs, which can be essential to increasing the portion of consumers participating in programs and improving their ability to make use of the technologies, practices and information offered through CDM programs.

4.2.2.1 Impacts on New or Innovative Programs

A number of interviewees stressed the importance of experimentation and innovation in conservation and energy efficiency, pointing out that staying with the limited range of standard programs may bring some short-term energy savings, but will be insufficient to achieve longer-term conservation goals. The TRC test can become a barrier for such innovative CDM programs simply as these projects are still being tested and have not been tried out at a market scale. Proven statistical data on the impacts of new technologies (such as in-home energy consumption monitors or parking lot plug-in control devices) on energy consumption may be lacking, yet their potential benefits may be high. The only way to discover whether these programs deliver actual energy savings is to experiment with them.

There was a consistent message that the requirement to meet the TRC test upfront discourages LDCs from experimenting with or implementing innovative programs. Several respondents suggested that there should be special provisions for innovative pilot programs, similar to that provided in the TRC test guide by the OEB, which would allow promising innovative projects to proceed despite the lack of solid TRC test data.

4.2.2.2 Impacts on Programs Designed to Achieve Long-Term Behavioural Changes

Another consistent message conveyed in the interviews concerned the negative impact of the TRC test on programs aimed at achieving long-term changes in customers' behaviour. These types of education and awareness programs do not necessarily deliver short-term energy savings but they are necessary for making the transition towards a culture of conservation and for long-term market transformation and capacity building. Examples of such programs mentioned during the interviews included presentations in schools by LDC representatives and the demonstration and promotion of new technologies (e.g., plug-in meters). Using the TRC test to assess the cost effectiveness of such programs is problematic as the programs are unlikely to yield measurable short-term conservation benefits, and in most cases it is difficult to establish a direct link between the program and actual energy savings.

The requirement to demonstrate the impact of these programs, and the challenge in being able to do so, has led LDCs to reject them altogether or to seek funding for such programs from sources other than the OPA. Some LDCs combine education and awareness programs with other CDM measures/programs that show strong positive TRC test results to ensure that their CDM initiatives are TRC positive as a package. Another common way for LDCs to fund these programs is to use some of the money received for delivering other standard CDM programs to run education and awareness

programs. Finally, some LDCs opt to apply directly to the OEB to finance education and awareness programs through their distribution rates.

4.2.3 Portfolio fragmentation

Another concern with the TRC test expressed during the interviews was that applying the test to individual program measures or components rather than to the program as a package discourages integration of CDM activities and programs.¹⁶⁴ This point is in keeping with the concern about the impact of the TRC test on education and awareness programs that often fail the TRC test. It was noted that such programs can be critical for the long-term success of CDM initiatives and can add to their total positive value in the future. Interviewees implied that it would be beneficial if programs were assessed under the TRC test as a whole package rather than as discrete components.

4.2.4 Specific concerns about OPA and OEB TRC test parameters

4.2.4.1 Encourages Demand Response/Peak Shaving

There was a consistent message in the interviews that the current avoided cost structure in the TRC test models of the OPA and OEB favours CDM programs targeting peak demand (especially summer peak demand) as opposed to those that aim to improve energy efficiency long term and reduce overall energy consumption.

There were two major issues of concern expressed by several interviewees with respect to the avoided cost structure in the TRC test. The first addressed the way capacity costs are allocated throughout the year and the fact that the OPA only prices summer peak reductions. There was a view that focusing only on summer peak demand-reduction measures can cause LDCs to forego potentially effective winter peak programs. It was noted that the system can be in need of capacity at any time of the year and that further refinements to avoided capacity costs depending on the time of the day and season should occur.

The second issue of concern was the focus of the OPA and the OEB on reducing peak demand as opposed to total energy demand. Several LDCs provided examples of efficiency-based programs that failed the TRC test because the current avoided cost structure favours demand response programs. It was noted, however, that the current situation is not the fault of the OEB or the OPA but rather is a result of a poor policy design. There is a built-in policy bias that encourages LDCs to deliver programs that shave peak use as opposed to improve overall long-term efficiency. This bias needs to be corrected for utilities to be able to deliver both demand response and base load reduction programs.

4.2.4.2 Fails to Consider Avoided Environmental Externalities

The current TRC tests employed by the OPA and OEB do not take into consideration avoided environmental externalities resulting from CDM initiatives, such as the benefits of avoided GHG emissions or reduced air pollution. Although there were concerns expressed by some interviewees with the way the value of avoided externalities might be calculated and the potential issue of adding to the overall complexity of the cost–benefit calculations, there was general agreement that incorporating avoided environmental externalities into the tests used by the OEB and OPA would be highly beneficial to CDM initiatives in Ontario.

It was noted that, given the rising concerns about climate change, and the provincial government’s own commitments regarding the reduction of GHG emissions, it might be the right time to implement a societal test (essentially a TRC test that includes avoided externalities) to encourage and facilitate CDM program development in the province. It was noted however that direction to do this would need to come from the provincial government. The OPA and OEB are unlikely to undertake such an initiative on their own.

British Columbia with its recently implemented carbon tax was often cited as an example of a jurisdiction that is clearly recognising the value of reducing CO₂ emissions. Most interviewees stressed the importance of the value of avoided environmental costs being established by the provincial government (either in absolute terms, e.g., \$10/ton of CO₂ as in BC, or as a certain percentage adder) rather than calculated on a case-by-case basis. The latter would be a potentially costly and contentious exercise.

4.2.4.3 Lacks Program Specific Free Ridership Rate

Two major concerns with free ridership rates employed in the OPA TRC test were repeatedly expressed in the interviews. The first had to do with using a universal free ridership rate as opposed to program specific assumptions. The second dealt with the failure to consider the potential for free ridership to be reduced over time.

A number of the interviewees expressed concern regarding the standard (30%) free ridership rate that has been assigned to all CDM programs by the OPA. There was a strong feeling that free ridership rates should be program specific. In addition it was felt that the free ridership rate should be allowed to be reduced over time since the number of free riders usually decreases as LDCs acquire more experience with programs and refine them over time.

The issue may be resolved as the OPA has recently recognised that the free ridership rate is a function of program design and delivery and should be determined through the program monitoring and evaluation process.¹⁶⁵

4.2.4.4 Uses Non-specific Avoided Distribution Costs

The current test applied by the OPA employs standard assumptions regarding the avoided distribution costs that can be attributed to CDM initiatives.

Many of the LDC interviewees noted that avoided distribution costs can be highly case specific, and in some cases the avoided costs are significantly higher than the assumptions embedded in the current test. The result is that the actual avoided costs may be significantly undervalued in TRC assessments. It was noted that CDM can result in savings on distribution and transmission costs, which in combination can amount to approximately 20% of utility bills.

4.2.5 The Need for Additional Tests

Given the above mentioned limitations of the TRC test identified in the interviews, all interviewees agreed that although the TRC can be a useful decision-making tool it should not be the only one employed for decision-making purposes with respect to CDM programs. This point was emphasized with respect to programs that do not perform well under the test but have other important benefits, such as educational programs or innovative programs necessary for capacity building.

Although there was no universal agreement on what other tests should be used, interviewees mentioned most of the standard cost effectiveness tests, including the RIM test, the PCT and PAC test,¹⁶⁶ that could be used in addition to the TRC test. It was noted that all tests have limitations, but using tests in combination allows for the assessment of a CDM measure/program from different perspectives. The key message was that the TRC test can be used as a first screen, but if some programs/measures fail the TRC test they should be assessed with other tests rather than being rejected out-of-hand. Another suggestion was to use a TRC-based ranking to see how different CDM programs compare.

There was considerable discussion of potential evaluation tools for programs that do not perform well under the TRC test, such as pilots, education and awareness programs and programs targeting certain social groups/segments (e.g., low-income households). Although there was no universal opinion on how the benefits of such programs should be calculated, there was a clear message that the TRC test alone was insufficient for determining benefits of such programs and that other criteria (either qualitative or quantitative when possible) must be considered when deciding whether to pursue such programs.

4.2.6 Test used depends on policy goals

Determining the appropriate test to use when screening and evaluating CDM programs depends in large part upon the overall policy and regulatory framework. Several interviewees stressed that the choice of test depends to a large extent on the requirements of the provincial government concerning a particular CDM initiative. The TRC test fits well under the current policy framework in Ontario: it allows the pursuit of some CDM initiatives that are less expensive than supply options while protecting ratepayers' interests. However, while the Ontario government has made significant commitments to CDM, unlike other jurisdictions strongly committed to CDM, it does not pursue conservation for reasons other than cost effectiveness. It was also noted by several respondents that an SCT that considers the social and environmental benefits of CDM initiatives would be beneficial for CDM activities in Ontario. Clear policy direction from the government with respect to the value of conservation would be needed to make such an approach effective. The provincial government would have to mandate the OPA and OEB to consider avoided externalities, and give clear direction as to how the value of such externalities would be calculated.

4.3 Conclusions

CDM practitioners interviewed about the TRC test in Ontario voiced many of same concerns as did stakeholders during the test's development. These concerns were also in keeping with those revealed in the comparative analysis of the approaches taken in other jurisdictions to the regulation and funding of utility CDM activities. In particular, while interviewees highlighted the usefulness of the TRC test as a tool for CDM program design and evaluation, they also emphasized that the results of TRC evaluations should not be the only determinant of whether programs receive support, either from the OPA or from an LDC's own rate base. Interviewees noted that the test as currently applied in Ontario can be a barrier to CDM program innovation at the LDC level. Certain types of programs needed to achieve long-term behavioural change, such as education and awareness programs, do poorly under the current TRC framework. It was also noted that the current structure of the test encourages the fragmentation rather than the integration of CDM activities, and may place an excessive emphasis on demand response and peak shaving activities as opposed to longer-term reductions in overall electricity consumption. Finally, a number of specific concerns with the existing tests applied by the OEB and OPA were raised, including the failure to consider in TRC calculations the value of avoided environmental and social externalities resulting from successful CDM initiatives.

A number of interviewees noted in their concluding remarks that, as increasingly more LDCs begin to develop and deliver customised programs, the TRC test is likely to become a more significant barrier to CDM activities. There was a broad consensus that the conservation potential of standardised CDM programs is limited and that greater innovation and experimentation in CDM programming will be needed if the full range of opportunities for cost effective CDM initiatives is to be realized.

5 Conclusions and Recommendations

The TRC test is the central evaluative tool applied to electricity CDM initiatives in Ontario. This study was intended to explore the impacts of applying this test to such initiatives, particularly those generated by LDCs. The study comprised a literature review, case studies of cost effectiveness tests applied to CDM initiatives in other North American jurisdictions, and interviews with key CDM practitioners in Ontario. Specifically the study sought to develop an understanding of

- the existing institutional, policy and regulatory framework for CDM activities in Ontario, including the roles of the OEB, OPA and LDCs
- the current role of the TRC test in CDM decision making by the OEB, OPA and LDCs
- the structure of Ontario's approach to the regulation and funding of utility CDM activities relative to provinces and states that are recognised as leaders in the CDM field
- the impact of the TRC test as currently applied in Ontario by the OEB and OPA on LDC-led CDM activities and initiatives.

5.1 The TRC test in Ontario

The TRC test occupies a central place in Ontario's CDM policy framework. Historically, it was the key test in determining cost effectiveness of CDM programs by natural gas utilities; today it remains a primary screening and evaluation tool for CDM initiatives in both the natural gas and electricity sectors. The TRC test is widely used by LDCs as a planning tool to assist in screening CDM programs at the conceptual stage and as a refining evaluation tool at the design stage. In addition, demonstrating that a proposed CDM activity is TRC positive is the central requirement of the OPA when evaluating LDC requests for CDM program funding. The same test is applied by the OEB when reviewing LDC applications to fund CDM activities through their own rate bases, and for reimbursements under the SSM mechanism.

The study identifies a number of ways in which the TRC test as currently structured and applied in Ontario may deter LDCs from realizing the full range of potentially cost effective electricity related CDM measures in Ontario. Some of the issues identified in the study relate to specific aspects of the test and its application, while others relate to the province's overall policy and regulatory framework for CDM activities in the electricity sector.

5.2 Policy Framework for the TRC Test in Ontario

The Ontario government has made significant commitments to CDM through the June 2006 Supply Mix Directive and other directives to the OPA. The province's CDM policy framework, however, remains relatively incomplete in comparison to other, leading North American jurisdictions reviewed in depth in the study, namely British Columbia, California and New York. Like Ontario, all of these jurisdictions have identified overall goals and targets with respect to CDM. However, unlike Ontario, these goals and targets have been complemented by a substantial infrastructure of supportive policies intended to encourage and facilitate CDM activities. These policies have included specific direction to regulatory agencies and utilities on the evaluation and assessment of potential CDM initiatives, including the specific tests to be employed in evaluating CDM opportunities, the consideration of the value of avoided externalities in the evaluation of CDM measures, and mechanisms to account for the social benefits flowing from initiatives targeted at low-income households.

By comparison, policy direction from the Ontario government to the OEB and OPA did not extend beyond setting targets and goals. It was left to the OEB and OPA to determine how CDM opportunities should be evaluated and assessed, without further direction from the province. Perhaps not surprisingly, the OEB, on whom the bulk of responsibility for developing such frameworks fell, responded by building on its past practice with the TRC test. The result was a relatively restrictive approach to the evaluation of CDM opportunities when compared with California or even British Columbia.

There are a number of specific areas where Ontario could strengthen its policy and regulatory framework with respect to electricity related CDM opportunities. These areas are outlined in the following sections.

5.2.1 Overall policy goals for CDM initiatives

Ontario's conservation goals are limited to specific targets in ministerial directives to the OPA. California and British Columbia, on the other hand, not only have established ambitious energy saving targets, but also require the pursuit of all cost effective CDM opportunities prior to the acquisition of additional supply resources. The approach taken in these jurisdictions avoids the problem that many actors in the electricity policy field argue has emerged with Ontario's directive-based approach — that the OPA has treated the conservation target established through the supply mix directive as a cap beyond which CDM activities do not need to be pursued, even if additional cost effective opportunities are available.¹⁶⁷

The recently enacted *Green Energy and Green Economy Act, 2009* establishes a new rate-based funding mechanism for CDM programming offered by the Ministry of Energy and Infrastructure and extends the directive mechanism with respect to CDM activities first established through the *Electricity Restructuring Act, 2004*. Directives can also now be issued to the OEB regarding CDM targets to be met by electricity distributors and other licensees. In addition, the legislation adds the promotion of electricity conservation and demand management to the mandate of the Ontario Energy Board and expands the mandate of the Environmental Commissioner of Ontario to include reporting on the province's progress on energy conservation. However, beyond establishing a requirement for five year reviews of the energy conservation provisions of the building code,¹⁶⁸ the legislation provides no further statutory direction regarding CDM on the part of the OPA, LDCs, the Ministry of Energy and Infrastructure or other agencies involved in CDM activities. Effectively extending the target-focussed directive mechanism to LDCs and other distributors and licensees may simply transfer from the OPA to LDCs the risk of directive CDM targets being treated as maximums beyond which CDM efforts need not be pursued. Additional policy direction regarding the ongoing pursuit of all achievable and cost effective CDM opportunities is needed to avoid such an outcome.

Recommendations:

1. The Minister of Energy amend the June 2006 Supply Mix Directive to require that the IPSP to be developed by the OPA incorporate all achievable cost effective opportunities for CDM before additional supply options are considered.

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2. The *Ontario Energy Board Act* be amended to expand the mandate of the OEB to include ensuring, 1) the pursuit of all cost effective opportunities for energy conservation and energy efficiency, and, 2) with respect to the IPSP to be developed by the OPA, the inclusion of all CDM opportunities that are cost effective relative to supply options.

5.2.2 The CDM funding regime

The existing funding regime for CDM activities in Ontario is complex, confusing and variable. In effect, a number of different regimes have emerged: OPA funding for ‘standard’ programs delivered by LDCs; OPA funding for LDC-designed ‘custom’ programs; self-initiated rate based funding for LDCs subject to OEB approval; and rate-based funding for specific programs flowing from ministerial directives under the *Electricity Restructuring Act*. The *Green Energy and Green Economy Act, 2009* adds new rate-based mechanisms for programs offered the Ministry of Energy and Infrastructure and LDC and other licensee programs initiated in response to CDM directives issued to the OEB with respect to conservation targets for electricity distributors. Although potentially useful, funding provided through these new mechanisms would be fundamentally at the discretion of the Minister of Energy and Infrastructure. As a result, the new mechanisms carry with them the same risks of instability and changes in policy direction that have been features of the CDM funding regime to date. By comparison, in most US states stable and long-term funding for utility CDM activities has been provided through rate-based mechanisms, usually a ‘public benefits charge’ added to electricity rates. Public benefits charges generate stable pools of funding on which utilities and other actors can draw to deliver CDM programming.¹⁶⁹ The funding regime for LDC CDM activities and other CDM initiatives in Ontario needs to be similarly clarified and stabilized.

Recommendation:

3. The Ministry of Energy and Infrastructure initiate a comprehensive review of CDM funding mechanisms in Ontario, including the roles of the OPA, OEB and ministry, to rationalize and consolidate the regime to facilitate and encourage long-term investments by LDCs in CDM capacity and programming.

Potential options for a long-term CDM funding regime identified in the course of the development of this study include

- limiting the role of the OPA to the delivery of province-wide programs either directly or via contracts with LDCs or other service providers

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- providing a funding pool for LDC and other CDM initiatives via the global adjustment mechanism, permitting LDCs to access up to 2% of their annual revenues for CDM purposes
 - requiring LDCs to demonstrate consideration of cost effective options, including CDM and distributed generation when seeking funding for system expansions, effectively requiring them to engage in localized integrated resource planning.

5.2.3 The institutional framework for CDM

As with the funding regime, the institutional framework within which CDM activities take place in Ontario is complex and involves multiple actors including the OPA, OEB, Independent Electricity System Operator (IESO), individual LDCs, Environmental Commissioner of Ontario, Ministry of Energy and Infrastructure and, at times, other ministries including finance, municipal affairs and housing, and government services. Surprisingly the *Green Energy and Green Economy Act, 2009* eliminated the one existing statutorily mandated institutional coordination mechanism for the province's electricity CDM efforts, the position of the Chief Energy Conservation Officer and the Conservation Bureau established within the OPA through the *Electricity Restructuring Act, 2004*.¹⁷⁰ Given the centrality of energy CDM to the province's electricity and climate change policy goals, a strong coordinating mechanism is needed to ensure the success of Ontario's CDM efforts.

Recommendation:

4. The Ministry of Energy and Infrastructure establish within the ministry an office known as Energy Efficiency Ontario to provide leadership in planning, co-ordination and delivery of measures for energy efficiency and conservation in Ontario. The office should be managed and supervised by a Director of Energy Efficiency who will direct the ministry's energy efficiency and conservation activities, projects and programs and report to the Deputy Minister of Energy and Infrastructure.

5.2.4 Specific policy direction regarding the evaluation of CDM initiatives

In addition to establishing more detailed policy direction with respect to CDM activities, British Columbia, California and New York have all made specific modifications and refinements to the cost-benefit tests applied to CDM programs to encourage LDCs and other key delivery agents to

pursue CDM opportunities. The modifications can be grouped into two broad categories: assessment at the portfolio versus program level, and incorporation of social and environmental benefits and avoided costs into the cost–benefit evaluation framework.

5.2.4.1 Assessment at the CDM portfolio level

The OPA and OEB currently require CDM activities to be TRC positive at both the individual program level and the portfolio level. The application of the TRC test at the individual program level was identified in a literature review, comparative studies and interviews as presenting a number of challenges in terms of CDM program design and delivery, including the following:

- The practice encourages fragmentation as opposed to integration of CDM activities and programming.
- The practice works strongly against programs that may be important in terms of achieving long-term behavioural changes, such as education and awareness initiatives, but for which it may be difficult to associate specific short-term reductions in electricity demand and consumption.
- The practice works against new and innovative programs for which there may not be sufficient data to establish an impact on electricity consumption.

Assessments of CDM activities at the portfolio level allow programs with high TRC ratios to compensate for programs with low ratios but with potentially high social or environmental benefits — programs that may be necessary for the long-term success of CDM initiatives and new or innovative activities. Two of the three jurisdictions studied have emphasized portfolio level assessments in their evaluations of potential CDM initiatives. In British Columbia CDM programs are required to be assessed only at the portfolio level. In California the TRC test is applied at the level of both the program and the portfolio, but the TRC-positive requirement only applies at the portfolio level.

Recommendation:

5. The government of Ontario direct the OPA and OEB that, while the review of the potential cost effectiveness of proposed utility CDM initiatives should continue at the program as well as portfolio level to ensure the identification of poorly performing programs, the portfolio level assessment should be determinative of whether a utility’s proposed CDM activities are funded.

5.2.4.2 Consideration of avoided environmental costs and social benefits

Two of the three jurisdictions studied in detail provide for consideration of avoided environmental costs in the evaluation of the cost effectiveness of CDM initiatives. California, for example, includes the value of avoided GHG emissions and air pollution in the calculation of the potential benefits of CDM activities. Including these considerations improves the benefit-to-cost ratio of CDM initiatives, making more initiatives cost effective. More generally such an approach would reflect the broader policy goals, such as reductions in GHG emissions, that the province has established with respect to CDM initiatives.

Recommendation:

6. The government of Ontario direct the OPA and OEB to consider the avoided environmental costs of supply in evaluating the cost effectiveness of potential CDM initiatives. In order to avoid the complex challenges associated with determining avoided environmental costs on a case specific basis, avoided environmental costs of supply should be dealt with as a fixed adder (e.g., 15%) to the benefits of CDM initiatives. Given the importance of these benefits to future generations, they should be subject to a zero or negative discount rate in TRC calculations.

Other jurisdictions are attempting to capture the wider social benefits of CDM initiatives in their evaluations as well. The British Columbia government, for example, has directed the BC Utilities Commission to apply a 30% adder to program benefits when conducting TRC assessments of CDM programs targeted at low-income participants.

Recommendation:

7. The government of Ontario direct the OPA and OEB to incorporate an adder to the benefits of CDM initiatives directed at low-income households and communities in assessing the cost effectiveness of such initiatives.

5.3 Impact of the TRC test at the LDC Level

5.3.1 Disincentives for non-standard CDM programs

The TRC test is widely used by Ontario LDCs to plan programs, help screen programs at the design/concept phase and refine the design of programs to

maximize cost effectiveness. Unfortunately, applying the test as a condition of access to funding carries with it an inherent disincentive for LDCs to pursue programs beyond the limited standard package of CDM activities for which the OPA offers financial support. This is especially true for smaller LDCs that lack in-house analytical capacity, or financial resources to contract outside expertise, needed to conduct TRC analyses so they can apply to the OPA for custom program funding or the OEB for rate-based funding. LDCs may be further discouraged from embracing innovation in program design and delivery as any new programs will necessarily be experimental and therefore lacking in actual data on which to base assessments of potential performance. These programs, then, will fail the TRC test and likely not be approved for funding.

A move to portfolio level assessments, as proposed above, would help to address these barriers. However, additional steps could be taken to encourage the development of new and innovative CDM programming by LDCs.

Recommendation:

8. The OEB waive the TRC positive requirement for rate-based funding of new LDC-initiated programs whose value is up to 0.5% of a given LDC's total revenues for the first two years of program operation. Program operators be required to report to the OEB on program results and impacts at the end of the two-year pilot period. SSM benefits associated with these programs be tied to the actual program results achieved.

5.3.2 Disincentives for programs aimed at long-term behavioural change

The need to meet the TRC-positive requirement can also serve as a barrier for programs aimed at achieving long-term behavioural changes (e.g., education and awareness programs) that are necessary for constituency and capacity building. Applying the TRC test to assess the cost effectiveness of such programs is challenging as such programs may not yield measurable short-term energy savings. Additionally, in most cases it is difficult to establish a direct connection between the measure/program and actual energy savings. The OEB, for its part, indicated a willingness to waive TRC requirements for community awareness programming in its November 2008 decision regarding Greater Sudbury Hydro.¹⁷¹

Assessing CDM activities on a portfolio basis, as per the recommendation above, would partially address this issue as well. However, consideration should be given to the use of alternative evaluative frameworks to assess the effectiveness and value for money of these types of programs.

Recommendation:

9. The OEB and OPA develop an alternative evaluative framework to assess the cost-effectiveness of educational and informational CDM programming intended to result in long-term changes in consumer behaviour as opposed to short-term reductions in electricity demand. The evaluative framework consider such factors as program reach and sustained impact on consumer behaviour assessed via appropriately designed and administered customer surveys and other social science research techniques. A portion of the total funding for such programs be held back pending reporting on actual program results.

5.3.3 TRC test parameters: Key concerns

In addition to the policy level concerns identified with respect to the application of the TRC test in Ontario, a number of concerns regarding specific parameters employed within the test were identified in the course of the literature review and interviews. These are outlined below.

5.3.3.1 Emphasis on Demand Response/Peak Shaving

The current avoided cost structure in the TRC models used by both the OPA and the OEB favours CDM programs that target peak demand as opposed to encourage long-term energy efficiency and conservation. The strong emphasis on summer peak reductions can result in missed opportunities for potentially effective winter peak programs. In addition, the focus on reducing peak demand as opposed to reducing total energy consumption can result in the loss of opportunities to decrease future overall supply requirements as well as short-term peaking capacity. The approach embedded in the current models reflects immediate concerns with meeting summer peaks midway through the current decade. As demand response programs and increased peaking supply capacity are now being deployed, greater emphasis can be placed on deep savings and market transformation, which in addition to avoiding the need for additional baseload supply can avoid significant long-term environmental costs and risks as well.

Recommendation:

10. The avoided cost structure in the TRC models used by the OPA and OEB be modified to ensure that programs delivering deep savings and market transformations are appropriately valued.

Modifications to the SSM, which currently strongly rewards high TRC measures/programs above medium and low TRC initiatives, may also be required to encourage programming targeted at market transformation as opposed to short-term demand response ‘cream skimming.’

5.3.3.2 Avoided Distribution Costs

The current test applied by the OPA employs standard assumptions regarding the avoided distribution costs that can be attributed to CDM initiatives. Many of the LDCs interviewed for the project note that avoided distribution costs can be highly case specific, and in some cases the avoided costs are significantly higher than the assumptions embedded in the current test. The result is that actual avoided costs may be significantly undervalued in TRC assessments.

Recommendation:

11. Actual utility specific avoided distribution costs resulting from CDM initiatives, as opposed to standardized assumptions, be employed for the purposes of TRC assessments wherever possible.

5.4 Reporting and Program Evaluation

The provision of greater clarity and flexibility to LDCs in the application of the TRC test to their CDM program proposals should be accompanied by a strengthened public accountability regime regarding the actual results achieved. The *Green Energy and Green Economy Act, 2009* makes provision for the OEB to require licensees to report publicly on their CDM performance with respect to CDM directives.¹⁷² While the provision is an important first step with respect to public reporting of CDM outcomes, a more integrated and comprehensive reporting framework should be established.

Recommendation:

12. The OEB require that LDCs report annually on the results achieved through their full portfolio CDM programming. The OEB publish the results of each LDC’s CDM portfolio in a clear, easy-to-read consolidated annual report, permitting comparisons of LDC CDM performance.

5.5 Conclusions

Ontario has made electricity CDM a central element of its electricity and climate change strategies and has set ambitious CDM targets for its electricity system. However, in comparison with other leading jurisdictions in North America, its electricity CDM policy framework remains incomplete. Significant gaps remain with respect to the policy direction given to key institutional actors within the electricity system, and the CDM funding and institutional framework is fragmented and confusing. The province's new *Green Energy and Green Economy Act* has the potential to compound a number of these problems, depending on how it is implemented.

There are a number of well-established models that Ontario can draw on in the refinement of both its overall CDM policy framework, and the more specific criteria employed to evaluate and assess CDM opportunities and initiatives. LDCs in particular have begun to build capacity to design and deliver CDM programming across Ontario. The province needs to provide a policy and funding environment that facilitates and encourages the realization of the full potential of these actors to contribute to the sustainability of Ontario's electricity system. The recommendations presented in this report are intended to contribute to the development of such a 'new deal' for LDCs.

Appendix 1: Sample Interview Questions

General: Impact of the TRC test on CDM activities

- Do you feel that the TRC test can deter LDCs from undertaking CDM initiatives? In other words, do you feel that potentially effective CDM activities or programs are not being pursued because of the TRC test? Can you think of any specific type of conservation measures or programs that are not being pursued (even though they may be important to the long-term success of CDM programs)?
- Did the results of the TRC test affect your decisions regarding what CDM initiatives to undertake? Did the TRC test affect your CDM program design and delivery in a negative way? If yes, how?
- Could you give an example of a CDM program that could have been designed and delivered, but was not because of the need to meet the TRC test criteria?

The TRC Test: Design and Implementation Issues

- Should the TRC test be the only test used for the assessment of DSM projects/programs?
- What do you think of the idea that the TRC test should be used in combination with other tests to assess a DSM project from different perspectives? (e.g., that of participants, non-participating customers, distribution company, and so on)?
- Do you have any concerns about particular components the TRC test or the way it is implemented?
- Would you suggest any modifications to the TRC test or to the assessment procedure to address these concerns? If yes, what are they?

The TRC Test: Specific Components of the Test

- Do you think that the Ontario Energy Board has set an appropriate discount rate for the benefit–cost assessment? If not, what rate should be used instead and why?

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- Do you think that current benefits (avoided costs) accounted for in the TRC test are too narrowly defined? What other avoided costs/benefits should be included?
 - Should environmental and other externalities be included?
 - Do you think that avoided system distribution losses should be included as a benefit of the CDM program/project? Do you see any problem in the way distribution system losses are defined and reported?
 - Can you comment on the standard assumptions list established by the Ontario Energy Board for the TRC calculations? Are the values used for calculating cost/benefits reasonable and up-to-date?
 - LDCs are allowed to use their own data (where appropriate and justified). Have you ever used this option? Why or why not?
 - Do you have any concerns with the attribution of benefits or free ridership rates under the TRC test procedure? What modifications (if any) would you propose with respect to the attribution of benefits (free ridership rates)?
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Appendix 2:

Cost–Benefit Tests in the US

State	Primary Test	Total Resource Cost Test	Societal Cost Test	Participant Cost Test	Utility Cost Test	Ratepayer Impact Measure Test	Other	No Specific Test Required
Arizona	Societal (proposed)		X					
Arkansas		X		X	X	X		
California	TRC	X			X			
Colorado		X	X					
Connecticut	Utility	X			X			
District of Columbia						X	X	
Delaware		X						
Florida	RIM	X		X		X		
Georgia		X	X	X		X		
Hawaii		X	X	X	X	X		
Iowa			X	X	X	X		
Idaho								X
Illinois		X						
Indiana		X	X	X	X	X		
Kansas		X				X		
Kentucky								X
Massachusetts	TRC	X						
Maryland								X
Maine	Societal		X					
Minnesota	Societal	X	X	X	X	X		
Missouri	TRC	X			X			
Montana		X	X					
North Carolina								X
North Dakota								X
New Hampshire	TRC	X				X		
New Jersey							X	
New Mexico	TRC	X						
Nevada			X		X		X	

State	Primary Test	Total Resource Cost Test	Societal Cost Test	Participant Cost Test	Utility Cost Test	Ratepayer Impact Measure Test	Other	No Specific Test Required
New York	TRC	X						
Oklahoma								X
Oregon			X		X			
Pennsylvania								X
Rhode Island							X	
South Carolina								X
Utah	Utility	X			X			
Virginia		X	X	X	X	X		
Vermont	Societal		X					
Texas	Utility				X			
Washington		X			X		X	
Wisconsin	Societal		X					
Wyoming								X

Sources:

1. Illinois Commerce Commission, *States with Cost Effectiveness Tests for Evaluating Energy Efficiency Programs*, http://www.icc.illinois.gov/downloads/public/en/StateCosteffectivenessTests_7-14-08-cm-bh.xls
2. Amann, J.T., *Valuation of Non-Energy Benefits to Determine Cost Effectiveness of Whole-House Retrofits Programs: A Literature Review* (Washington, DC: American Council for an Energy-Efficient Economy, 2006), <http://www.aceee.org/conf/07neb/A061.pdf>
3. Violette, D. and R. Sedano, *Demand-Side Management: Determining Appropriate Spending Levels and Cost-Effectiveness Testing*. Report prepared for the Canadian Association of Members of Public Utility Tribunals (2006), http://www.camput.org/documents/2006-02-13DSMFinalReport_002.pdf (main report) and http://www.raonline.org/showpdf.asp?PDF_URL=%22Pubs/CAMPUT_Appendix_A_Summaries_Final_Revised.pdf%22 (Appendix A: Summaries by Jurisdiction)

Appendix 3:

The Evolution of the TRC Test in Ontario

Origins

The current regulatory and funding framework for electricity CDM activities in Ontario has its origins in a June 18, 2003 directive from the Minister of Energy to the OEB. The directive mandated that OEB conduct a stakeholder consultation to review options for delivering demand-side management and demand response (DSM&DR) programs in the Ontario electricity market. Out of 118 stakeholders who expressed their interest in participating in the consultation process, 31 representatives from varying sectors (electricity generators and distributors, gas distributors, energy user groups and non-governmental organizations)¹⁷³ were chosen to participate in an advisory group.¹⁷⁴ Although the focus of the OEB Advisory Group consultation was on the development and assessment of governance models (and the potential roles of non-market and market participants, especially LDCs) for CDM in the Ontario electricity market, one of the aspects discussed in the group's final report was the process of monitoring and evaluating CDM initiatives.

On December 12, 2003, the OEB Advisory Group issued its report to the OEB. Given a wide range of interests and opinions, the advisory group decided to “attempt to present generic options to the Board, identifying advantages and disadvantages of each without taking an advocacy role in favour of one or the other.”¹⁷⁵ The pros and cons of various models and frameworks were assessed and presented in the final report by the advisory group, but one of the key suggestions was that the TRC test would be an appropriate measure for the screening and evaluation of CDM programs in the electricity sector.¹⁷⁶ The TRC-based evaluation framework was presented in the report's chapter entitled “Ontario Energy Board/Wires Companies DSM Framework,” which outlined an OEB regulatory framework and the role of Ontario's electric utilities in designing and delivering innovative and cost effective CDM programs. Along with acknowledging some limitations of the TRC test,¹⁷⁷ the report stated that “the positive TRC requirement ensures that the programs are in the economic self-interest of customers and have an overall societal benefit from a financial point of view.”^{178, 179}

In response, the OEB released its staff report, *Demand-Side Management and Demand Response in the Ontario Energy Sectors*, on January 23, 2004. The report essentially provided a range of recommendations on the potential role of various actors in the provincial electricity and natural gas markets (including the OEB, LDCs and a new central agency) in regulating, developing and delivering DSM&DR initiatives in Ontario.¹⁸⁰ Although an overview of stakeholders' comments submitted in response to the staff report is beyond the scope of this study,¹⁸¹ the comments provided by Green Energy Coalition (GEC) and Pollution Probe are of particular interest since they directly addressed the issue of choosing an appropriate measure for screening and evaluating utility-led CDM initiatives.

In its staff report the OEB suggested that all utility CDM programs should be required to pass the utility cost test. Both GEC and Pollution Probe criticised the use of the utility cost test as a screening measure, deeming it too restrictive and exclusionary of customer and societal benefits of CDM initiatives.¹⁸² Pollution Probe pointed to the positive experience of Ontario's gas utilities in using the TRC test for evaluating the cost effectiveness of their CDM programs and suggested that Ontario's electric utilities be required to use the TRC test as well. Pollution Probe also suggested introducing a shared savings mechanism (SSM) — an incentive reward to utilities — and recommended that it be TRC based, i.e., calculated as a fixed percentage of the net present value of the TRC benefits achieved by CDM initiatives annually.

On March 1, 2004 the OEB issued its Report to the Minister of Energy that included recommendations for the delivery of CDM activities within the electricity sector, including the role of LDCs and the potential role of a new conservation agency.¹⁸³ According to the report, the conservation agency would “lead and promote conservation efforts by bringing together ideas, plans, and best practices from its own research and a range of market participants.”¹⁸⁴ The report suggested that one of the key tasks of the newly established agency would be screening and selecting CDM initiatives submitted by any organisation, including LDCs. It also suggested that all proposals would be subject to common screening and selection criteria and recommended using the TRC test as a common tool for selecting and prioritizing CDM activities. Along with making recommendations on the potential use of the TRC as an assessment tool, the OEB reiterated its suggestion that LDCs be required to use the UCT to ensure that ratepayers would not subsidize societal benefits.¹⁸⁵

The March 2004 report was followed up on May 31, 2004 with a decision granting LDCs approval to apply to the OEB for an increase in their 2005 rates in the form of the third tranche of their incremental Market

Adjusted Revenue Requirement,¹⁸⁶ effectively giving them the opportunity to become involved in the delivery of CDM initiatives. To get their third instalment LDCs were required to spend the equivalent of one year's return on CDM initiatives. In response to the board's directive, several LDCs submitted CDM plans to the OEB in December 2004 and January 2005 for approval and implementation.¹⁸⁷

A procedural order was issued by the board on October 5, 2004 establishing the process for approving CDM plans submitted by LDCs and outlining requirements for filing proposed plans.¹⁸⁸ Although the order did not specify the cost effectiveness procedure that the LDCs should use, it set a requirement that any distributor filing an application for approval of a CDM plan had to provide the anticipated program benefits, including quantifiable benefits when possible (i.e., energy savings in kW or kWh). LDCs were not required to conduct a TRC test to submit a CDM initiative to the OEB, though they were advised to use the test when "all of the costs and energy savings impacts [were] available" to ensure that programs developed were cost effective.¹⁸⁹

On December 10, 2004 the OEB approved applications by several LDCs¹⁹⁰ for recovery of funds to be invested in CDM programs on the condition that the applicants file quarterly and annual reports including a cost-benefit analysis on their CDM activities.¹⁹¹ One of the key issues raised during the hearings was the lack of a cost-benefit analysis in the CDM applications.¹⁹² The OEB acknowledged that due to the absence of a common assessment framework and lack of sufficient data "there is an understandable inability, at this point, to provide the Board with cost-benefit analysis that would be meaningful."¹⁹³ It, however, stated that in their annual reports the distributors would have to attempt a cost-benefit analysis. The OEB also assured that in the meantime it would continue to work on the methodology for the purpose of the cost-benefit analysis.

Following that decision, the OEB prepared the *Draft Guide to Total Resource Cost Analysis* to assist LDCs in meeting the filing requirements for 2005 CDM initiatives and in applying for CDM funding through 2006 distribution rates. The guide aimed to provide a detailed description of the methodology of cost-benefit analysis (the TRC test) that would be required by the board. On July 6, 2005, the OEB posted the draft guide on its website and invited all interested parties to comment on the document. A number of organizations submitted their comments on the draft.^{194, 195} The submissions addressed a variety of issues, most of which were summarised in Appendix A of the revised version of the *Total Resource Cost Guide*.¹⁹⁶ While most of the submissions sought clarification of some aspects of the draft TRC guide, some specifically addressed the structure or the process of implementation of the TRC test. The latter are briefly summarized below.

- **The Discount Rate**

Hydro One submission referred to the study by Enbridge Gas Distribution and suggested that a social discount rate of between 5% and 9% be used for the purpose of the cost–benefit analysis. In response to that submission, the OEB stated that although it recognises that CDM has many societal benefits, it continues to hold the view that LDCs should use a discount rate equal to the incremental after-tax cost of capital.

- **The Treatment of Environmental Externalities**

Appliance Recycling Canada Inc., referring to the examples in several North American jurisdictions, suggested that the OEB recognise the avoided environmental externalities and include them as avoided costs in the TRC analysis. In its reply, the OEB stated that although it recognised the benefits associated with the avoided environmental damage, “it has not been the practice of parties before the Board to include these benefits,” and the environmental externalities therefore would not be included in the TRC calculations.¹⁹⁷

- **The Custom Project Free Ridership Rate**

Several parties, including the Electricity Distributors Association (EDA) and several distribution companies, voiced their concerns with the use of 30% as the default free ridership rate for CDM custom projects. Pollution Probe submitted that the free ridership rate is a function of program design rather than technology or measure, and thus suggested that the OEB examine the program design of each CDM project to assign the free ridership rate. The OEB responded by referring to studies commissioned by Enbridge Gas Distribution Inc. and Union Gas Limited that indicated the average free ridership rate was 30% or greater. The board concluded that in the absence of better information it would continue to use the default values.

- **Avoided Costs and Other Inputs into the TRC Analysis**

Vulnerable Energy Consumers’ Coalition (VECC) raised concerns about using avoided costs developed in the Hydro One Networks Inc. June 2005 report, *Avoided Cost Analysis for the Evaluation of CDM Measures*, as inputs in the TRC analysis without addressing the issue of uncertainty of these values. In response to this concern, the OEB acknowledged the uncertainties and the fact that for some LDCs (e.g., Hydro One) avoided capacity cost values were likely to be higher than for other provincial LDCs.

The OEB concluded that it was in the interests of both LDCs and ratepayers to establish a TRC framework that would allow CDM initiatives to be conducted using the best information available. The OEB further reaffirmed that if LDCs had better information they were encouraged to use it provided they could submit supporting evidence to the board.

On September 8, 2005, after reviewing stakeholder comments received on the TRC draft, the OEB issued the *Total Resource Cost Guide*.¹⁹⁸ The guide contained two major sections:

- A detailed manual on how to conduct the TRC analysis, including specific instructions, the mathematical formulae, and examples of calculating TRC net benefits at the technology, program and portfolio level.
- An Assumptions and Measures List that provided all required TRC input data for over 100 CDM measures. This list provided assumptions for a range of standard CDM activities and technologies in residential, commercial and industrial applications.

A Notice of Motion filed by Pollution Probe on October 14, 2005, prompted further changes to the guide. In its Notice of Motion Pollution Probe sought to, 1) abandon the list of standardised free ridership rates included in the *Total Resource Cost Guide* in favour of program-specific estimates, and, 2) revise provisions of the guide concerning the attribution of net benefits of joint CDM programs to ensure that LDCs could only claim attribution for the incremental benefits (as opposed to 100% of benefits) resulting from their CDM efforts with a third party. Both issues of free ridership rates and attribution rates are of particular importance for LDC-delivered CDM programs since they directly affect the assessment of TRC benefits and, hence, the amount of the utility incentive payment tied to the net benefits of the CDM program.

The OEB's March 3, 2006 decision responding to Pollution Probe's motion¹⁹⁹ stated that there was not "sufficient evidence or argument in this proceeding to overturn the use of the free ridership rates set out in the TRC Guide."²⁰⁰ With respect to the attribution rates, however, the OEB declared that "attribution of TRC benefits must be made on a case by case basis, determined by the centrality of the role played by the LDC in the program."²⁰¹ The OEB indicated that a change was required to the *Total Resource Cost Guide* respecting the attribution of benefits. The revised guide reflecting the OEB decision was issued on October 2, 2006.

The TRC Test in the SSM

The development of the screening and evaluation framework for CDM in the electricity sector was accompanied by the development of financial mechanisms such as the Lost Revenue Adjustment Mechanism (LRAM) and Shared Savings Mechanism (SSM) that linked LDCs' CDM performance to their ability to reduce their customers' bills. LRAM is a technique that allows the utility to recover the revenue loss associated with a CDM measure or program; SSM is a TRC-based incentive mechanism that allows utilities to retain a portion of their net benefit from CDM initiatives.²⁰²

On November 12, 2004, Pollution Probe filed a motion requesting the OEB to establish an LRAM and SSM for Ontario's electric utilities. With respect to the SSM, the submission referred to the positive experience of natural gas utilities with the incentive mechanism and suggested that a reward be set at 5% of the net present value of the TRC net benefit created by an LDC's CDM programs.²⁰³ Pollution Probe referred to the success of the conservation programs at Enbridge Gas Distribution Inc. supported by an SSM. According to Pollution Probe's estimates, after nearly a decade of CDM activities Enbridge conservation programs had reduced customers' bills by \$785 million.

The OEB's December 7, 2004 decision in response to Pollution Probe's motion, allowed LDCs to apply for the SSM to encourage and facilitate CDM initiatives. Following this decision, OEB staff issued *Draft Guidelines for Electricity Distributors Wishing to Apply for SSM Incentive for 2005 Implementation of CDM Plans*. The guidelines were developed to assist LDCs in preparing their applications for SSM approval. After reviewing comments received on the draft, on April 28, 2005 the board issued *Guidelines for Electricity Distributors Wishing to Apply for SSM Incentive for 2005 Implementation of CDM Plans*.²⁰⁴ The guidelines not only set out the general approach of the OEB to considering and approving SSM applications, but also outlined key elements of the screening and valuation framework for LDC-led CDM initiatives. The guidelines stated that the applicant should use the TRC test to calculate net benefits as well as specified benefits and costs of a CDM program or a portfolio, and explained how to conduct the TRC test (including the need for free ridership adjustment) and how to present the final results. The guidelines also reaffirmed that a distributor may recover 5% of the net benefits resulting from the OEB-approved CDM program or set of programs. With respect to the inputs and assumptions that should be used in the TRC test, the board recommended using the standard inputs from the OEB's conservation

manual or using LDCs' own inputs. An LDC that wanted to use its own assumptions would have to provide "supporting evidence, an explanation of its choice and, for comparison, the TRC test results using the inputs contained in the Conservation Manual."²⁰⁵

The TRC-based screening and evaluation framework was further advanced during the process of developing the 2006 Electricity Distribution Rates (EDR). The 2006 EDR process was initiated in June 2004 with the purpose of creating a thorough and consistent framework that would assist LDCs in preparing applications for their 2006 distribution rates.²⁰⁶ On May 11, 2005, after almost a year of conducting stakeholder consultations and reviewing extensive comments received on the first two drafts, the OEB issued the *2006 Electricity Distribution Rates Handbook* and the board report. The board report primarily addressed the following areas of concern:

- **Choice of the cost effectiveness test**

The report stated that most parties indicated a preference for using the TRC test as a tool for evaluating the costs and benefits of CDM initiatives, including calculating the incentive rewards.

- **Inputs for calculating costs and benefits**

Most stakeholders supported the pre-approval of TRC inputs and suggested that the OEB provide a conservation manual that would describe a common methodology for conducting TRC-related analyses and provide the LDCs with data to use in their analysis and reporting on the CDM initiatives to the board. The OEB agreed with stakeholders and indicated that the process of obtaining inputs for the cost-benefit analysis was under way.²⁰⁷

- **Shareholder incentives**

In its previous decision the OEB permitted LDCs to apply for an SSM incentive equal to 5% of net benefits (based on the results of the TRC test) created by the customer side of the CDM expenditures.²⁰⁸ The decision was made in response to the motion made by Pollution Probe. In the process of developing the 2006 EDR, several groups, mostly represented by industry associations, opposed the introduction of the SSM, while other organisations, including environmental groups and non-governmental organisations, supported the use of incentives for CDM programs. Those parties that supported the establishment of the SSM incentive expressed a range of views on how it should be calculated and implemented.²⁰⁹

In its final decision, the OEB concluded it would continue to use the TRC-based SSM model adopted in its December 2004 Decision, i.e., LDCs would be rewarded with 5% of the net savings estimated by the TRC test. The OEB acknowledged that, although more complex mechanisms could be used to encourage superior performance in delivering CDM programs, the electricity LDCs were at the very beginning of the CDM journey and the existing TRC-based SSM incentive would suffice at this stage.

The LRAM, for its part, is determined by calculating the energy savings by customer type and valuing those energy savings using the distributor's board-approved variable distribution charge appropriate to each type of customer. Hence the LRAM is calculated based on the kW or kWh impacts of each program and for each type of customer both gross and net of free riders and not on the TRC test results.²¹⁰

The Role of the OPA in CDM Initiatives

While the OEB was developing its regulatory framework for the funding of utility CDM initiatives, a new actor in the form of the OPA was emerging on the Ontario CDM policy scene. In January 2004 the Ontario Energy Minister released the final report of the Electricity Conservation and Supply Task Force entitled *Tough Choices: Addressing Ontario's Power Needs*.²¹¹ The report highlighted key energy-related challenges and the need for CDM initiatives in Ontario and called for “the creation of a conservation culture in Ontario.” The framework report set out an action plan that led to a range of important legislative and regulatory changes that affected CDM initiatives in Ontario. The *Electricity Restructuring Act*, which came into force on December 9, 2004 in response to the task force's report, established a new agency — the OPA — with a mandate to provide a long-term plan for Ontario's electricity system. Specifically with respect to energy conservation, the legislation established a conservation bureau within the OPA with the primary goal of providing leadership in the planning and coordination of electricity CDM.²¹²

On July 13, 2006, the Minister of Energy issued a directive that required the OPA to take responsibility for organizing the delivery and funding of CDM activities through LDCs.²¹³ Under the directive, funding of up to \$400 million was made available for three years to support LDCs in delivering CDM initiatives. The directive also stated that as soon as this ‘Distributor CDM Fund’ was established, the OPA would become responsible for funding and overseeing the delivery of the majority of LDC-initiated CDM activities. According to the directive, the OPA would assume responsibility for the design of standard programs, including consumer awareness and

education, market capacity building, and market transformation programs. Further, LDCs were given the authority to design custom programs and to apply to the OPA for funding of these programs. As a result of the directive, two streams of funding became available to LDCs for the delivery of CDM programs: funding from the OPA and funding through distribution rates.

The Current OEB “Guidelines for Electricity Distributor Conservation and Demand Management”

In view of the policy change, the OEB decided to undertake a comprehensive study to explore the regulatory framework with respect to LDC-initiated CDM programs beyond September 2007. The study examined such issues as the regulatory treatment of OPA-funded and distribution rate-funded CDM programs, revenue protection and incentive mechanisms, and reporting requirements. In January 2007 the OEB released for comment a staff discussion paper of its findings. On March 2, 2007, after reviewing comments received on the staff paper, the OEB issued its *Report of the Board on the Regulatory Framework for Conservation and Demand Management by Ontario Electricity Distributors in 2007 and Beyond*. The report reaffirmed the OEB’s continuing role in LDC-designed and delivered CDM activities, including reporting guidelines, program evaluation, and the review and approval of proposed CDM programs and applications for the LRAM and SSM.²¹⁴ Further, the report emphasised that although distributors may apply to the OEB for funding through distribution rates if funding is not available from the OPA, the OEB expected that the majority of CDM activities by LDCs would be OPA funded.²¹⁵

Despite the emphasis on OPA-led funding, given the OEB’s ongoing role in CDM programs, it initiated the development of a comprehensive document that would include all major policies and guidelines on CDM for LDCs within the OEB’s scope of responsibility. On February 8, 2008, the OEB issued for comment its draft *Guidelines for Electricity Distributor Conservation and Demand Management*. These guidelines were meant to comprehensively address all policies and regulatory requirements developed with respect to electricity distributor CDM activities since 2004, including the cost–benefit analysis framework. In addition to combining existing documents and policies, the guidelines included some new developments, including multi-year funding for CDM programs, distribution and transmission losses in savings estimates, and enhanced evaluation planning and reporting.

The OEB received written comments on the draft guidelines from 12 organisations.²¹⁶ The comments pertaining to the cost effectiveness framework in general and the TRC test calculation and implementation in particular are summarised below.

- **The consistency of the frameworks and assumptions**

A number of organisations, including several LDCs, voiced their concerns about both an overlap in responsibilities between the OPA and OEB for CDM funding and the inconsistency of assumptions between the OEB and the OPA for the purposes of TRC analyses. The Coalition of Large Distributors (CLD) stated that there should be a single ‘TRC Guide and Measures List’ that would apply both to OPA-funded programs and to programs funded through distribution rates. Further, the CLD indicated that the guide and measures list would need to be updated as often as possible. The Consumers Council of Canada (CCC) also stressed the need for using reasonable and up-to-date assumptions in both the screening and evaluation of CDM programs, since these assumptions play a critical role in determining the amount of SSM rewards. The OPA, while raising its own concerns regarding the consistency of the TRC input measures, noted that it invested considerable effort in collecting and updating the input assumptions and suggested that the OPA’s approach should be used by both the OEB and the OPA to avoid any duplication. Both GEC and Pollution Probe, however, criticised the OPA’s proposed assumptions to be used for TRC purposes. GEC stated that OPA’s TRC avoided costs estimates are based on unrealistic assumptions for the costs and performance of nuclear generation and suggested the OEB values be used instead. Pollution Probe voiced similar concerns and suggested the OEB use avoided cost estimates that would reflect current market data and Ontario’s historical experience.

- **The inclusion of avoided environmental externalities**

The question of whether environmental externalities should be included in a cost–benefit analysis for screening and evaluating CDM programs was raised by Hydro One. It suggested that, given the importance of climate change and the need to reduce GHG emissions in Ontario, the OEB consider including environmental costs in the TRC calculations that would encourage LDCs to undertake more CDM initiatives.

- **The free ridership rate**

Pollution Probe reiterated its concerns²¹⁷ regarding the OEB's continuing practice of relying on technology-specific free ridership rates, suggesting that free ridership rates were a function of the program design rather than the technology. Pollution Probe recommended that the OEB require large LDCs to provide evidence to support their free ridership rate estimates.

- **Distribution and transmission losses**

One of the changes to the TRC process introduced by OEB in the guidelines was the inclusion of distribution and transmission losses in calculating TRC benefits. System losses were previously excluded from the TRC calculations. The draft guidelines suggested that distributors include a fixed percentage of system losses (4% for distribution and 2.5% for transmission losses) when undertaking a benefit–cost analysis of CDM programs. When calculating the SSM associated with a program these assumptions regarding distribution and transmission losses should result in higher TRC benefits than if the avoidance of these losses was not considered.²¹⁸

The OEB sought comments and suggestions regarding whether all distributors should use the same distribution loss values or whether each distributor should use distributor-specific factors in the evaluation of CDM programs. While many stakeholders agreed with the proposal to use a unified value for transmission losses, more criticised the idea of assigning a unified value for distribution losses. The EDA noticed that, although for many LDCs this policy development would represent a positive change, some LDCs could be unfairly penalized because of their system design. Both the EDA and the CLD suggested that using an average rate of 4% would be acceptable, but using a higher distribution rate should be permitted if the LDC could prove that it would be valid to do so. Hydro One suggested that using a standard distribution loss factor was inappropriate for rural-based LDCs, where the average distribution losses were higher than for urban LDCs because of longer distribution distances and lower customer density. It recommended that the OEB be allowed to use LDC-specific distribution loss factors because of significant differences in the characteristics of Ontario LDCs as compared to the standard assumptions employed in the TRC guide. A number of other organisations, including Energy Cost Management Inc., GEC, Pollution Probe and VECC, also supported the idea of using a utility-specific distribution loss. In view of such overwhelming support, the OEB revised the guidelines to read, “distribution system losses should be those specific to the distributor, and be the most recent annual loss values reported to the Board.”²¹⁹

Endnotes

- ¹ The IPSP is intended to outline a plan, including electricity supply and conservation and demand management options to meet Ontario's electricity needs over the 2006-2026 period.
- ² Minister of Energy, *IPSP Supply Mix Directive*, June 13, 2006, http://64.34.71.254/Storage/23/1870_IPSP-June13%2C2006.pdf (accessed May 26, 2009).
- ³ See Government of Ontario, *Go Green: Ontario's Action Plan on Climate Change* (Toronto: Government of Ontario, 2007), <http://www.ene.gov.on.ca/publications/6445e.pdf>.
- ⁴ *The Green Energy and Green Economy Act, 2009*, Schedule D, section 1.
- ⁵ *The Green Energy and Green Economy Act, 2009*, Schedule F, section 1.
- ⁶ See, for example, Parker, S., *Optimizing CDM Resources in Ontario*. Report prepared for the Green Energy Coalition, Ontario Sustainable Energy Association and the Pembina Institute. Filed with the Ontario Energy Board August 1, 2008, <http://ontario.pembina.org/pub/1686> (accessed May 22, 2009).
- ⁷ See, for example, Hall, R., Peters, R. and Winfield, M., *A Quick Start Energy Efficiency Strategy for Ontario* (Toronto: Pembina Institute, 2006), 3, <http://ontario.pembina.org/pub/218> (accessed May 19, 2009).
- ⁸ *The Green Energy and Green Economy Act, 2009*, Schedule D, section 6.
- ⁹ *The Green Energy and Green Economy Act, 2009*, Schedule D, section 7.
- ¹⁰ Ontario Energy Board, *Guidelines for Electricity Distributor Conservation and Demand Management EB-2008-0037* (2008), http://www.oeb.gov.on.ca/documents/cases/EB-2008-0037/Board_Guidelines_for_CDM_20080328.pdf (accessed May 4, 2009).
- ¹¹ Amann, J.T., *Valuation of Non-Energy Benefits to Determine Cost Effectiveness of Whole-House Retrofits Programs: A Literature Review* (Washington, DC: American Council for an Energy-Efficient Economy, 2006).
- ¹² *California Standard Practice Manual: Economic Analysis of Demand-side Programs and Projects* (2001), http://www.raponline.org/Pubs/CPUC_CA_STANDARD_PRACTICE_MANUAL_2001.pdf (accessed May 7, 2009).
- ¹³ Winfield, M., Gibson, R.B., Markvart, T., Gaudreau K., and Taylor, J., *An Analysis of the Ontario Power Authority's Consideration of Environmental Sustainability in Electricity System Planning*. Report prepared for the Green Energy Coalition (Toronto and Waterloo: Faculties of Environmental Studies, York University and University of Waterloo, 2008), <http://www.fes.uwaterloo.ca/research/sustasmt/GEC-Pembina-OSEA%20IPSP%20sust%20asmt.pdf>
- ¹⁴ See Vegh, G., *Regulatory Change and the GEA*. Presentation to Osgoode Hall Law School Professional Development Program *Bill 150: Green Energy and Green Economy Act: The Legal and Practical Implications*, June 15, 2009.
- ¹⁵ See, for example, Gibson, R.B., "Sustainability Assessment: Basic Components of a Practical Approach," *Impact Assessment and Project Appraisal*, Vol. 24, No. 3, September 2006, 170–182.
- ¹⁶ See Ontario Energy Board, *Conservation and Demand Management*, [http://www.oeb.gov.on.ca/OEB/Industry+Relations/OEB+Key+Initiatives/Conservation+and+Demand+Management+\(CDM\)](http://www.oeb.gov.on.ca/OEB/Industry+Relations/OEB+Key+Initiatives/Conservation+and+Demand+Management+(CDM)) (accessed April 4, 2009).
- ¹⁷ For a discussion of the benefits of CDM activities from a sustainability perspective see Winfield, M., Gibson, R.B., Markvart, T., Gaudreau K., and Taylor, J., *An Analysis of the Ontario Power Authority's Consideration of Environmental Sustainability in Electricity System Planning*. Report prepared for the Green Energy Coalition (Toronto and Waterloo: Faculties of Environmental Studies, York University and University of Waterloo, 2008), 130–135, <http://www.fes.uwaterloo.ca/research/sustasmt/GEC-Pembina-OSEA%20IPSP%20sust%20asmt.pdf>.
- ¹⁸ See Cowart, R.H., *Efficient Reliability: The Critical Role of Demand-Side Resources in Power Systems and Markets* (Montpelier, VT: The Regulatory Assistance Project, 2001).

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- ¹⁹ See Pollin, R. and Garrett-Peltier, H., *Building the Green Economy: Employment Effects of Green Energy Investments for Ontario* (Amherst, MA: Political Economy Research Institute, 2009), http://www.greenenergyact.ca/Storage/25/1722_PERI_ON_Green_Jobs_Report.pdf. See also, Campbell, B., Dufay, L. and Macintosh, R., *Comparative Analysis Employment from Air Emission Reduction Measures* (Drayton Valley: The Pembina Institute, 1997).
- ²⁰ See Freeman, N., *The Politics of Power* (Toronto: University of Toronto Press, 1995), 171–179. See also Winfield, M. and Jenish, G., *Ontario's Environment and the 'Common Sense Revolution': A Four Year Report* (Toronto: Canadian Institute for Environmental Law and Policy, 1999), 3–47.
- ²¹ See Government of Ontario, "Eves Government Takes Action to Promote Green Energy, Alternative Fuels and Conservation," news release, November 13, 2002.
- ²² Electricity Conservation & Supply Task Force, *Tough Choices: Addressing Ontario's Power Needs*, Final Report to the Minister (2004), <http://www.mei.gov.on.ca.wsd6.korax.net/english/pdf/electricity/TaskForceReport.pdf> (accessed June 2, 2009).
- ²³ Ontario Energy Board, *History of the OEB*, <http://www.oeb.gov.on.ca/OEB/About+the+OEB/History+of+the+OEB> (accessed May 6, 2009).
- ²⁵ For an explanation of OPA funding and the global adjustment mechanism, see Ontario Power Authority, *OPA Cash Flows from the Global Adjustment Mechanism*, <http://www.powerauthority.on.ca/Page.asp?PageID=122&ContentID=6680&SiteNodeID=454> (accessed May 27, 2009).
- ²⁵ Chief Energy Conservation Officer, *Our Conservation Challenge: 2005 Annual Report*, 10, http://www.conservationbureau.on.ca/Storage/10/977_CECO_2005_Annual_Report.pdf (accessed March 13, 2009). The directive mechanism was intended as an interim measure to facilitate rate-based funding of electricity related supply and CDM initiatives pending approval of the IPSP to be developed by the OPA.
- ²⁶ Ontario Energy Board, *Guidelines for Electricity Distributor Conservation and Demand Management EB-2008-0037* (2008), http://www.oeb.gov.on.ca/documents/cases/EB-2008-0037/Board_Guidelines_for_CDM_20080328.pdf (accessed May 4, 2009).
- ²⁷ Conservation Bureau, *Ontario's Chief Energy Conservation Officer: Annual Report 2008* (Toronto: Conservation Bureau, 2008), <http://www.conservationbureau.on.ca/>
- ²⁸ Ibid.
- ²⁹ Marbek Resource Consultants Ltd., *Summary of Electricity Conservation Programs & Initiatives in Ontario from 2005–2007, Excluding OPA Funded Programs and Ontario Government Buildings*, Final Report submitted to Ontario Power Authority in association with Seeline Group Inc. (2008), http://www.powerauthority.on.ca/Storage/74/6931_Summary_of_Non-OPA_Funded_Conservation_Programs_2005_-_2007.
- ³⁰ Conservation Bureau, *Supplement to the Chief Energy Conservation Officer's Annual Report 2007: Conservation Results 2005–2007* (Toronto: Conservation Bureau, 2008), http://www.powerauthority.on.ca/Storage/77/7242_CECO_Report_June_2008_Final_reference_corrected_June_26.pdf (accessed May 7, 2009).
- ³¹ Does not include OPA-funded programs.
- ³² Ibid.
- ³³ Electricity Distributors Association, *Electricity Distributors: Creating a Culture of Conservation in Communities Across Ontario*, <http://www.eda-on.ca/eda/edaweb.nsf/0/DC7CF4CF7F9AF22D85257448006A27A8> (accessed May 6, 2009).
- ³⁴ Ontario Energy Board, *Report of the Board on the Regulatory Framework for Conservation and Demand Management by Ontario Electricity Distributors in 2007 and Beyond EB-2006-0266* (2007).
- ³⁵ Ontario Energy Board, *Guidelines for Electricity Distributor Conservation and Demand Management EB-2008-0037* (2008), 7, http://www.oeb.gov.on.ca/documents/cases/EB-2008-0037/Board_Guidelines_for_CDM_20080328.pdf (accessed May 4, 2009).
- ³⁶ *Terms of Reference for the Program Operations Advisory Group of the LDC CDM Fund* (2006), http://www.powerauthority.on.ca/Storage/32/2757_OPA_Delivery_Group_terms_of_reference.pdf (accessed May 7, 2009).
- ³⁷ Minister of Energy, *Directive Re: Coordination of Funding for LDC activities to deliver Conservation and Demand-Side Management Programs*, (2006), [http://64.34.71.254/Storage/53/4819_July_13%2C_2006_\\$400_million_LDC_Funding_over_three_years.pdf](http://64.34.71.254/Storage/53/4819_July_13%2C_2006_$400_million_LDC_Funding_over_three_years.pdf) (accessed May 23, 2009).

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- ³⁹ Those programs were Appliance Retirement, Business Incentive, Summer Savings and Residential and Small Commercial Demand Response; http://www.powerauthority.on.ca/Page.asp?PageID=122&ContentID=5330&SiteNodeID=311&BL_ExpandID= (accessed May 7, 2009).
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- ⁴² *The Green Energy and Green Economy Act, 2009*, Schedule B, section 2(2).
- ⁴³ *The Green Energy and Green Economy Act, 2009*, Schedule D, sections 6 and 7.
- ⁴⁴ *The Green Energy and Green Economy Act, 2009*, Schedule B.
- ⁴⁵ Ontario Energy Board, *Guidelines for Electricity Distributor Conservation and Demand Management EB-2008-0037* (2008), http://www.oeb.gov.on.ca/documents/cases/EB-2008-0037/Board_Guidelines_for_CDM_20080328.pdf (accessed May 4, 2009).
- ⁴⁶ The OPA will use a TRC test to screen CDM programs implemented beyond 2007 with the TRC test built on the current OEB TRC model.
- ⁴⁷ The test was significantly revised in 1987, and then updated in 1988 and again in 2001 (see Chapter 5 for more detail).
- ⁴⁸ Vine, E., Rhee, C.H. and Lee, K.D., "Measurement and evaluation of energy efficiency programs: California and South Korea," *Energy*, Vol. 31, Issues 6–7, May–June 2006: 1100–1113. See also *California Standard Practice Manual: Economic Analysis of Demand-side Programs and Projects* (2001), http://www.raonline.org/Pubs/CPUC_CA_STANDARD_PRACTICE_MANUAL_2001.pdf (accessed May 7, 2009).
- ⁴⁹ See Chapter 3 for a detailed description of these various cost effectiveness tests.
- ⁵⁰ Amann, J.T., *Valuation of Non-Energy Benefits to Determine Cost Effectiveness of Whole-House Retrofits Programs: A Literature Review* (Washington, DC: American Council for an Energy-Efficient Economy, 2006).
- ⁵¹ Enbridge Gas Distribution, *Principles and Frameworks for DSM in Ontario: A Policy Paper by Enbridge Gas Distribution* (2003).
- ⁵² Ontario Energy Board, *Guidelines for Electricity Distributor Conservation and Demand Management* (EB-2008-0037) (2008), http://www.oeb.gov.on.ca/documents/cases/EB-2008-0037/Board_Guidelines_for_CDM_20080328.pdf (accessed June 2, 2009).
- ⁵³ Ontario Energy Board, *Total Resource Cost Guide* (2005), <https://ospace.scholarsportal.info/bitstream/1873/3005/1/255871.pdf> (accessed June 2, 2009).
- ⁵⁴ Ontario Energy Board, *Total Resource Cost Guide* (Revised October 2, 2006), <https://ozone.scholarsportal.info/bitstream/1873/960/1/266896.pdf> (accessed June 2, 2009).
- ⁵⁵ Ontario Energy Board, *Report of the Board on the Regulatory Framework for Conservation and Demand Management by Ontario Electricity Distributors in 2007 and Beyond* (2007), <https://ozone.scholarsportal.info/bitstream/1873/500/1/271140.pdf> (accessed May 9, 2009).
- ⁵⁶ Ontario Energy Board, *Filing Requirements for Transmission and Distribution Applications* (2006), <https://ozone.scholarsportal.info/bitstream/1873/1135/1/268118.pdf> (accessed June 2, 2009).
- ⁵⁷ At the beginning of the natural gas CDM initiatives, the OEB issued its EBO 169-III Report of the Board, which established a regulatory framework for the promotion of CDM activities by Ontario's natural gas utilities. In this report, the OEB considered several cost effectiveness tests for screening/evaluating CDM programs, including the SCT, but eventually the TRC test was chosen as an evaluation tool for CDM initiatives in the natural gas sector.
- ⁵⁸ Pollution Probe, *Submissions with Respect to the January 23, 2004 OEB Staff Report on Demand-Side Management and Demand Response* (2004), <http://www.pollutionprobe.org/Reports/ppoeb.pdf> (accessed May 10, 2009). The bulk of the savings (\$729 million) were attributed to Enbridge Gas Distribution.

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- ⁵⁹ In the early days of the natural gas CDM initiatives, the OEB issued its EBO 169-III Report of the Board, which established a regulatory framework for the promotion of CDM activities by Ontario's natural gas utilities. In this report, the OEB considered several cost effectiveness tests for screening and evaluating CDM programs, including the societal cost test (SCT) that would take into account environmental and social externalities. Eventually the TRC test was chosen as the evaluation tool for CDM initiatives in the gas sector.
- ⁶⁰ See, for example, Ontario Energy Board, "Decision in the matter of an application by Greater Sudbury Hydro Inc. for approval of certain Conservation and Demand Management Programs," EB-2008-0147 (2008), 6, http://www.rds.oeb.gov.on.ca/web-drawer/webdrawer.dll/webdrawer/rec/88909/view/GreaterSudbury_CDM_dec_20081104.PDF (accessed May 11, 2009).
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- ⁶² Ontario Power Authority, *Evaluation, Measurement & Verification Framework for Ontario Power Authority Conservation Programs*, Final version 1.0 (2008), http://www.powerauthority.on.ca/Storage/68/6326_OPA_EM&V_Framework_1.0.pdf (accessed May 9, 2009).
- ⁶³ Ontario Power Authority, *OPA Evaluation Protocols* http://www.powerauthority.on.ca/Storage/68/6325_FINAL_Evaluation_Protocols_-Single_Document.pdf (accessed June 2, 2009).
- ⁶⁴ Ontario Power Authority, *OPA Measures and Assumptions List*. Published and revised annually by the OPA. The latest version — *2009 OPA Measures and Assumptions List* — is available at http://www.powerauthority.on.ca/Storage/87/8291_2009_Measures_and_Assumptions_List_-_MM_-_Nov_26,_2008_-_v1.01.pdf (accessed June 2, 2009).
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- ⁶⁷ Ontario Power Authority, *Evaluation, Measurement & Verification Framework for Ontario Power Authority Conservation Programs*, Final version 1.0 (2008), http://www.powerauthority.on.ca/Storage/68/6326_OPA_EM&V_Framework_1.0.pdf (accessed May 9, 2009).
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- ⁷¹ See Ministry of Energy and Infrastructure, *Community Conservation Initiatives*, <http://www.mei.gov.on.ca/english/energy/conservation/?page=cci> (accessed June 2, 2009).
- ⁷² As defined in the July 23, 1993, E.B.O. 169-III Report of the Board.
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- 80 According to section 2.1.3 of the *Guidelines for Electricity Distributor Conservation and Demand Management EB-2008-0037*, a distributor may deliver programs on non-cost effective technologies in the form of pilot programs.
- 81 A measure or technology refers to the specific actions or technologies, the adoption of which a program is intended to encourage. The adoption of more efficient lighting is one example.
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- ²⁰³ Pollution Probe, *Notice of Motion by Pollution Probe Re: Electric Utility LRAM and SSM for Fiscal 2005* (2004), <http://www.pollutionprobe.org/Reports/oebmotionrec.pdf> (accessed May 9, 2009).
- ²⁰⁴ Ontario Energy Board, *Guidelines for Electricity Distributors Wishing to Apply for SSM Incentive for 2005 Implementation of CDM Plans* (2005), http://www.oeb.gov.on.ca/documents/cases/RP-2004-0203/dcdm_ssm_guidelines_030505.pdf (accessed May 10, 2009).
- ²⁰⁵ Ontario Energy Board, *Guidelines for Electricity Distributors Wishing to Apply for SSM Incentive for 2005 Implementation of CDM Plans* (2005), 2, http://www.oeb.gov.on.ca/documents/cases/RP-2004-0203/dcdm_ssm_guidelines_030505.pdf (accessed June 2, 2009).
- ²⁰⁶ Ontario Energy Board, *2006 Electricity Distribution Rate Handbook* (2005), http://www.oeb.gov.on.ca/documents/edr_final_ratehandbook_110505.pdf (accessed June 2, 2009).
- ²⁰⁷ The OEB had ordered Hydro One to produce avoided cost estimates by June 30, 2005. The board had also initiated an independent study to produce data on the energy savings and to measure lifetime estimates and free-ridership rates.
- ²⁰⁸ Ontario Energy Board, *Guidelines for Electricity Distributors Wishing to Apply for SSM Incentive for 2005 Implementation of CDM Plans* (2005), http://www.oeb.gov.on.ca/documents/cases/RP-2004-0203/dcdm_ssm_guidelines_030505.pdf (accessed June 2, 2009).
- ²⁰⁹ That is, whether it should be based on kWh savings or on TRC results, whether it should have a performance-based sliding scale or be uniform, and so on.
- ²¹⁰ Ontario Energy Board, *Guidelines for Electricity Distributor Conservation and Demand Management EB-2008 0037* (2008), 18, http://www.oeb.gov.on.ca/documents/cases/EB-2008-0037/Board_Guidelines_for_CDM_20080328.pdf
- ²¹¹ Electricity Conservation & Supply Task Force, *Tough Choices: Addressing Ontario's Power Needs*, Final Report to the Minister (2004), <http://www.mei.gov.on.ca.wsd6.korax.net/english/pdf/electricity/TaskForceReport.pdf> (accessed June 2, 2009).
- ²¹² Ontario Energy Board, *History of the OEB*, <http://www.oeb.gov.on.ca/OEB/About+the+OEB/History+of+the+OEB> (accessed May 10, 2009).
- ²¹³ Minister of Energy, *Directive Regarding the Coordination and Funding of LDC Activities to Deliver Conservation and Demand-Side Management Programs* (2006), [http://www.powerauthority.on.ca/Storage/53/4819_July_13%2C_2006_\\$400_million_LDC_Funding_over_three_years.pdf](http://www.powerauthority.on.ca/Storage/53/4819_July_13%2C_2006_$400_million_LDC_Funding_over_three_years.pdf) (accessed May 9, 2009).
- ²¹⁴ Ontario Energy Board, *Report of the Board on the Regulatory Framework for Conservation and Demand Management by Ontario Electricity Distributors in 2007 and Beyond* (2007), <https://ozone.scholarsportal.info/bitstream/1873/500/1/271140.pdf> (accessed May 9, 2009).
- ²¹⁵ Ibid.
- ²¹⁶ The written comments received on the draft *Guidelines for Electricity Distributor Conservation and Demand Management* can be found at [http://www.oeb.gov.on.ca/OEB/Industry+Relations/OEB+Key+Initiatives/Conservation+and+Demand+Management+\(CDM\)/Guidelines+for+Electricity+Distributor+CDM](http://www.oeb.gov.on.ca/OEB/Industry+Relations/OEB+Key+Initiatives/Conservation+and+Demand+Management+(CDM)/Guidelines+for+Electricity+Distributor+CDM)
- ²¹⁷ These concerns were previously voiced in its comments on the *Draft Guide to Total Resource Cost Analysis* in 2005.
- ²¹⁸ Ontario Energy Board, *Draft Guidelines for Electricity Distributor Conservation and Demand Management (EB-2008-0037)* (2008), http://www.oeb.gov.on.ca/documents/cases/EB-2008-0037/Guidelines_for_CDM_20080208.pdf
- ²¹⁹ Ontario Energy Board, *Guidelines for Electricity Distributor Conservation and Demand Management (EB-2008-0037)* (2008), 20.



**Faculty of Environmental Studies
York University**

**4700 Keele St.
Toronto, Ontario
M3J 1P3**