Ivey Energy Policy and Management Centre
Ivey Business School at Western University
1255 Western Rd.
London, Ontario N6G 0N1
e: bschaufele@ivey.ca

June 29, 2023

RE: Submission to the Electrification and Energy Transition Panel

The Electrification and Energy Transition Panel (EETP) was asked to identify opportunities to improve Ontario's long-term energy planning framework. Long-term planning is essential for Ontario's energy sector. Energy assets have long lives, technologies are rapidly changing, and environmental and social pressures are increasingly salient. The Panel's work is thus critical to enhancing Ontario's energy sector planning and regulatory processes.

We offer a single technical recommendation to support the EETP's mandate. Our recommendation directly responds to two specific questions in the Open Call for Written Submissions. Even though our recommendation is technical, we believe that it has the potential to meaningfully support long-term energy planning in Ontario. Moreover, given its technical nature, we feel that this and similar specialized recommendations are likely to be overlooked in other submissions.

Our point is this: long-term energy planning involves risk. This risk is borne by Ontario's rate- and taxpayers. As such, planning agencies and/or planning regulations should explicitly acknowledge and adjust for this risk and future uncertainties in decision-making. Adjusting for risk is best done by applying an appropriate *risk-adjusted social discount rate* when generation or transmission assets are evaluated in the planning process – or when other energy-related policies are assessed.

ENERGY PLANNING: IMPROVING LONG-TERM PLANNING PROCESS AND OUTCOMES

RESPONSE TO QUESTIONS #3(E) AND #8

Question 3(e) asks: "How might government and/or OEB and IESO better respond to … unavoidable uncertainties?

Question 8 asks: "How might energy planning need to evolve to ensure short-, medium-, and long-term decisions are made at the right time and increment?"

Recommendation: Short-, medium-, and long-term planning should apply project-specific, risk-adjusted discount rates to ensure energy planning makes economically appropriate decisions at the right time and increment, accounting for unavoidable uncertainties.

As the Call for Written Submissions[1] highlights, Ontario's long-term energy planning framework should consider cost-effectiveness, reliability and measures related to the conservation and management of energy. However, evaluating energy projects involves incorporating uncertainties, disparate asset lifespans and future unknowns into decision-making. Our recommendation directly influences how a long-term planning agency can adjust decision-making rules to support key themes within the scope of the EETP's mandate, in particular:

- Opportunities to improve the long-term energy planning framework, and
- Opportunities and challenges to balance system costs and climate objectives

BACKGROUND AND MOTIVATION FOR RECOMMENDATION

Energy sector investments have economic, social and environmental costs and benefits that are spread over time.[2] The theory of discounting is a methodology that translates aggregate, risk-adjusted costs and benefits that accrue at different points in the future such that they can be evaluated by decision-makers today. As Polasky and Dampha (2021)[3] state: "Although discounting may sound like a technical and arcane topic, it has potentially profound implications … with long-run consequences" (p. 692).

Given this inter-temporal – or over time – quality, it is necessary to compare benefits and costs that take place at different times, and this is where a consideration of the discount rate enters. Discount rates make it possible to bring back to the same date (i.e., the present), dollars spent or earned in different years. Discounting also applies to non-market costs and benefits (e.g., environmental externalities) that materialize over project's lifetimes as these costs and benefits should be included in societal decision-making. The discount rate has a central role, insofar as it arbitrates between the present and the future: a high rate gives a low weight to the future, and a low rate means that we are willing to contribute more today to support future generations. Likewise, adjusting for risk means that some projects should be pursued earlier, while others delayed.

The theory of discounting as it is applied to regulatory analyses and public project evaluation has evolved over the past 15 years. We recommend that Ontario adopt best practices with respect to social discount rates. Notably, other jurisdictions, such as France, have revisited their approach to discounting over the past two decades.[4] They claim that adopting an appropriate risk-adjusted discounting methodology can be a

---

[1] Electrification and Energy Transition Panel, Open Call for Written Submission 2023, https://files.ontario.ca/energy-open-call-for-written-submissions-en-2023-06-06.pdf.

[2] For example, projects in the energy sector frequently have large upfront construction costs, with benefits that pay off throughout the project's lifetime. Discounting applies to the decisions of investors, but it is also relevant for societal decisions, especially those where decision-makers must account for long-lasting and non-market implications such as environmental and health effects.

[3] Polasky, Stephen and Nfamara K. Dampha, 2021. "Discounting and Global Environmental Change," Annual Review of Environment and Resources, 46: 691-717.

[4] Lebeque, Daniel, 2005. Revision du taux d'actualization des investissements publics. Quinet, Émile, 2013. L'évaluation socioéconomique des investissements publics, rapport de la mission présidée, Commissariat général à la stratégie et à la prospective. Both summarized in https://www.strategie.gouv.fr/sites/strategie.gouv.fr/files/atoms/files/fs-guide-evaluation-i-taux_dactualisation-23novembre-final.pdf

"means of combating the optimism bias that affects many projects."[5] This is especially the case when the benefits of a project depend on future economic growth. Specifically, the "Quinet report (2013) linked risk and discount rate."[6] In this context, adjusting for risk means applying a discount rate that captures how the risks of a specific project is related to the Ontario economy; for example, evaluating how a new high-voltage transmission line or nuclear facility correlates with the overall macroeconomic risks driving economic growth. Discount rates – and, as a result, decision-making – must adjust the valuations of projects by adding or subtracting a societal risk premium. Intuitively, projects that reduce risk-exposure should be advantaged while those that increase risk should be penalized. Adding a risk premium does not mean disallowing a project. Rather, it raises (or lowers) the bar for those projects whose risks depend on the state of Ontario's economy.

Both the OEB and IESO use discount rates throughout their existing planning and rate review processes. For example, section 6.5.2(e) of the Ontario Energy Board's Transmission System Code[7] requires project proponents to "use a discount rate that is based on the transmitter's current deemed debt-to-equity ratio, debt and preference share costs and Board-approved rate of return on equity."[8] An OEB staff discussion paper on demand side management for natural gas utilities recommends[9] "using a social discount rate" (p. 27). Further, in 2011 OEB "staff ask[ed] participants for additional comments on a preferred approach to determine the social discount rate" (p. 27).[10] This staff report is notable for two reasons. First, it acknowledges that applying a social discount rate in energy planning is appropriate. Second, it adopts outdated methodologies. Six potential options for the social discount rate are presented in the report, none of which reflect the existing state of the academic literature on the subject. Indeed, the approaches advocated by the participants in this proceeding all fell prey to the "WACC fallacy". Kruger, Landier and Thesmar (2015)[11] state "The weighted average cost of capital (WACC) fallacy is a failure to account for project-specific risk … The value of riskier projects will be overestimated, while that of safer ones will be underestimated" (p. 1253). It is this WACC fallacy that our recommendation seeks to avoid by proposing that the EETP recommend a new approach to discounting.

---

[5] Ibid. Quinet (2013).
[6] Ibid.
[7] https://www.oeb.ca/regulatory-rules-and-documents/rules-codes-and-requirements/transmission-system-code-tsc
[8] The details on the appropriate discount rate are provided in the Transmission System Code, Appendix 5, Methodology and Assumptions for Economics Evaluations, which states: "The discount rate to be used in the DCF calculation shall be based on the transmitter's current deemed debt-to-equity ratio, debt and preference share costs and Board-approved rate of return on equity. Up-front capital expenditures will be discounted at the beginning of the project year and capital expended throughout the year will be mid-year discounted. The same approach to discounting will be used for revenues and OM&A expenditures."
[9] EB-2008-0346, Staff Discussion Paper, On Revised Draft Demand Side Management Guidelines for Natural Gas Utilities, January 21, 2011. https://www.oeb.ca/oeb/_Documents/EB-2008-0346/BrdStaff_DiscPaperRevDraft_DSM_Guidelines_20110121.pdf
[10] Of note, these recommendations were not incorporated into the final guidelines which state "the total avoided costs resulting over the life of the [demand side management] measures need to be discounted to a present value. The natural gas utilities should continue using a discount rate that is equal to their Board approved weighted average cost of capital ("WACC")" (p. 21). Demand Side Management Guidelines for Natural Gas Utilities, EB-2008-0346, June 30, 2011. https://www.oeb.ca/oeb/_Documents/Regulatory/DSM_Guidelines_for_Natural_Gas_Utilities.pdf
[11] Kruger, Philipp, Augustin Landier and David Thesmar, 2015. The WACC Fallacy: The Real Effects of Using a Unique Discount Rate." Journal of Finance, LXX(3): 1253-1285.

The IESO also uses discounting in its long-term planning. Examples can be found in its Cost Effectiveness Guide for Energy Efficiency[12] and Conservation and Demand Management Cost-Effectiveness Tool User Guide.[13] The Energy Efficiency guide states, "When performing a cost effectiveness assessment, the discount rate should be applied to real (inflation-adjusted) streams of benefits and costs" (p. 18). Unfortunately, Appendix A of this document simply assumes a 4% discount rate with no consideration of a risk-adjusted approach to evaluate "Avoided Electricity Supply-Side Resource Costs." More ambitiously, the Conservation and Demand Management Tool incorporates a societal discount rate. Here again, the examples set the social discount rate equal to the private discount rate, which are both equal to a constant 4%.[14]

The preceding examples are not meant to criticize the OEB or IESO's methods. Indeed, both should be commended for recognizing that time has a price. However, the difficulty with the IESO and OEB's current approaches to discount rates is that they fail to reflect advances in the literature or tailor rates to circumstances, that include disparate economic, health or environmental risks. Neither agency is required to use estimates that represent the true balancing of intergenerational costs and benefits, after accounting for risks. Planning tends to emphasize engineering-based approaches rather than focusing on how investments affect Ontarian rate- and taxpayers. The EETP has an opportunity to recommend updated practices and introduce new ideas. As the Ontario energy sector is forecast to grow rapidly, new theories and methods should be incorporated into the planning process. As such, we encourage planning and regulatory agencies to continue to use discounting in all aspects of project evaluation and that they adopt best practices that are on par with leading jurisdictions.[15]

WHAT DO RISK-ADJUSTED SOCIAL DISCOUNT RATES LOOK LIKE?

Social discount rates represent the economically appropriate method to evaluate costs and benefits accruing over time. Yet, discounting is frequently misunderstood.[16] Often, there are (or should be) different discount rates for different purposes. Social discount rates, those that are appropriate for public planning processes, for example, are not equivalent to market rates. Indeed, social discount rates represent a blend of descriptive (i.e., market rates) and prescriptive (i.e., social objectives) elements.

---

[12] https://www.ieso.ca/-/media/Files/IESO/Document-Library/EMV/IESO-CDM-CE-TestGuide-V9.ashx

[13] https://www.ieso.ca/-/media/Files/IESO/Document-Library/EMV/IESO_CDM_CE-Tool_UserGuide_V8.ashx

[14] Another example where the IESO correctly seeks to use social discount rates is when they evaluate unsolicited energy project proposals. In this context, proponents must construct a discounted cash flow model and apply the appropriate "social discount rate". (See https://www.ieso.ca/-/media/Files/IESO/Document-Library/sac/2021/sac-20210217-ieso-project-valuation-framework.ashx.) Again, it is not obvious that up-to-date methods are used to determine the appropriate social discount rate.

[15] One method to institutionalize best practices would be to create an expert committee (or committees, as needed) that support the agencies on technical matters such as the social discount rate.

[16] In fact, Baumol (1968) famously said "few topics … rival the social rate of discount as a subject exhibiting simultaneously a very considerable degree of knowledge and a very substantial level of ignorance." Baumol, William, 1968. On the social rate of discount. American Economic Review, 58: 788-802.

Theories on discounting for planning and regulatory objectives have evolved rapidly in the last decade.[17] For instance, it is now well-known that the term structure of the discount rate declines over time, a fact that can influence how we evaluate long-lived assets and policies aimed at mitigating the effects of climate change.[18] These details are part of the technical minutiae in regulatory and planning processes, but they are important to sector participants and often have surprising consequences for Ontario's long-term energy planning.

While this submission is not the place to fully review details of the social discount rate, offering a high-level overview of the elements that go into discounting gives a flavour for how it works and why it is important. Social discount rates, such as those that should be used in long-term energy planning and the application of regulatory practice, are an amalgam of four effects. Each of these four effects has implications for Ontario's energy sector and can be consistently combined to support decision-making. The effects are:

- A **wealth effect**,
- A **precautionary effect**,
- A **risk effect**, and
- An **impatience effect**, or a pure rate of time preference.

To start, the wealth and precautionary effects offer an intertemporal balancing act for planning agencies. The ***wealth effect*** recognizes that, due to economic growth, future generations will be wealthier than current ones. Therefore, future generations are better positioned to bear construction and development costs associated with energy transition. The wealth effect raises the bar for publicly sanctioned investments and operates to delay costly decisions. (Alternatively, the wealth effect says that if growth is higher, decision-makers should incorporate a higher opportunity cost into their planning.) The wealth effect is the product of a forecast of economic growth and a parameter that measures aversion to intertemporal income inequality. The ***precautionary effect*** works in the opposite direction. It recognizes that the future is uncertain; growth may not materialize as expected, so it is prudent to invest in energy infrastructure now. Numbers reflecting the state of Ontario's economy can be assigned to the wealth and precautionary effects to support decision-making.

Next, energy projects vary in how they affect the Ontario economy. Some support rural growth while others facilitate trade in energy and goods. Some investments have a positive effect on growth while others may act as a drag. The ***risk effect*** says that social discount rates should be adjusted to accommodate for the interaction of specific projects with Ontario's macroeconomy. At a very general level, this means that if Ontario's economy grows rapidly, more energy is needed. Slower growth, however, means that it is possible to over-build the energy sector and Ontarians will have to pay for excess capacity. Of course, the extent of economic

[17] See Gollier, Christian, 2013. Pricing the Planet's Future: The Economics of Discounting in an Uncertain World Princeton University Press: Princeton. Drupp, Moritz A., Mark C. Freeman, Ben Groom, and Frikk Nesje. 2018. "Discounting Disentangled." American Economic Journal: Economic Policy, 10 (4): 109-34. Newell, Richard, Billy Pizer and Brian Prest, 2022. "A Discounting Rule for the Social Cost of Carbon", with Richard Newell and Billy Pizer, Journal of the Association of Environmental and Resource Economists, 9(5): 1017-1046.

[18] In essence, discount rates far into the future should be smaller than discount rates for short-term projects.

growth is uncertain, so there is risk with any development. The risk adjustment in the social discount rate provides a method to quantitatively integrate this uncertainty into a decision-making rule.

Finally, there is the ***impatience effect*** or the pure rate of time preference. The pure rate of time preference represents Ontarians' strict preference for their own generation over that of future generations. Ethical arguments support setting the impatience effect to a very small number or even zero. Whereas the wealth, risk and precautionary effects attempt to adjust for different circumstances, uncertainties and levels of well-being levels for Ontarians, there are few compelling reasons to inherently treat people born at different times differently.

The practice and study of energy sector planning and regulatory processes are continually evolving. There are many elements of Ontario's energy regulation landscape that could be updated. However, comparing future costs and benefits is an area that has largely been ignored. It is also a domain where both academic research and emerging regulatory practice have rapidly evolved. Discounting in the planning process plays a subtle and outsized role in decision-making. As Cherbonnier and Gollier (2022) state "Most governments use a much simplified system in which a single discount rate is used independent of the investment's risk profile. … this is likely to severely distort public investment" (p.47). In an effort to enhance the energy planning process, we recommend that the EETP consider updated methods in energy planning including the application of a risk-adjusted social discount rate.

Sincerely,

Brandon Schaufele
Director, Ivey Energy Policy and Management Centre
Associate Professor, Business, Economic and Public Policy
Ivey Business School, Western University

Adam Fremeth
Associate Director, Ivey Energy Policy and Management Centre
Associate Professor, Business, Economic and Public Policy
Ivey Business School, Western University

Brian Rivard
Adjunct Professor, Ivey Energy Policy and Management Centre
Ivey Business School, Western University