Connecticut Department of
ENERGY &
ENVIRONMENTAL
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Energy and Technology Policy

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POLICY MEMO

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Rationale for Discount Rate to be Applied in Connecticut's Conservation and Load Management Plans
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Policy
A nominal discount rate of 3.0 percent should be applied in the benefit-cost analyses used in the Conservation and Load Management Plans. This updated policy is based upon DEEP's research and analyses of the applicability of discount rates to environmental and energy efficiency programs, described below, and aligns with the discount rate used in the U.S. Department of Energy Weatherization Assistance Program that DEEP implements.

Need for Policy Update and Background on Previous Policy Directives
On December 31, 2013, the Connecticut Department of Energy and Environmental Protection (DEEP) approved with conditions the 2013-2015 Electric and Natural Gas Conservation and Load Management Plan, dated October 1, 2012 (the Plan). The Plan was submitted by Eversource Energy (Eversource), The United Illuminating Company (UI), Connecticut Natural Gas Corporation (CNG) and The Southern Connecticut Gas Company (SCG), together referred to as "the Companies," pursuant to Connecticut General Statutes Section 16-245m, in consultation with the Connecticut Energy Efficiency Board (the Board). On March 24, 2014, the Connecticut Department of Energy and Environmental Protection (DEEP) approved the 2014 Annual Update of the 2013-2015 Plan with five conditions.[1] Condition 3 required the Companies to further articulate their basis for the discount rate used in the Plan's cost-effectiveness screening process.   In the 2014 Annual Update CL&P used a discount rate of 7.52 percent and Yankee Gas used a discount rate of 7 percent, based upon the Companies' weighted after-tax average cost of capital, and no less than a minimum rate of 7 percent as stated in Docket 09-10-03, DPUC Review of The Connecticut Energy Efficiency Fund's 2010 Conservation and Load Management

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[1] *Approval with Conditions of 2014 Update of 2013-2015 C&LM Plan*, Letter from DEEP to Companies, March 26, 2014, available at:
http://www.dpuc.state.ct.us/DEEPEnergy.nsf/c6c6d525f7cdd1168525797d0047c5bf/ff10423fc695a17885257cbb0047bbb1/$FILE/Approval
percent20with percent20Conditions percent20of percent20CLM percent20PLan percent202014 percent20Update.pdf

Plan for 2010.[2] In the 2014 Annual Update UIL chose to use a long-term nominal discount rate informed by the New England regional Avoided Energy Supply Cost study (3.39 percent). [3,4]

On August 12, 2014 the Companies submitted information regarding their perspective of the discount rate and subsequently reviewed this with DEEP staff.[5] The September 26, 2014 DEEP Resolution of Conditions directed the discount rate to be used in the Benefit-Cost Screening of 5.5 percent, a compromise between the CL&P and Yankee Gas companies' respective weighted average costs of capital (7.52 percent and 7 percent) and a discount rate informed by the New England region's *2013 Avoided Energy Supply Costs* report which was recommended for use by UIL [UI, CNG, SCG]. DEEP further noted that it believed consideration should be given to further review and rationalizing of the discount rate to be used in future C&LM Plans.[6] A concern with using the private cost of capital approach of discount rate selection is that the funds used in investing in efficiency measures does not actually come from private capital but rather public ratepayer funds collected through an upfront conservation charge.

Summary of DEEP's Research and Analyses of Practices for the Application of Discount Rates to the Benefit-Cost Ratio Analysis of Energy Efficiency Programs
Discount rates convert program costs and benefits from future time periods into their present value equivalents; the net sum of which is called the Net Present Value (NPV) and is used as a component in benefit-cost ratio analysis.[7] The selection of a discount rate plays an important role in accurately reflecting whether an investment is cost-effective.

Generally, discount rates used in assessments of investments that have long-term intergenerational benefits should use lower discount rates.[8] This means that the selection of the discount rate used in the benefit-cost calculations for energy efficiency programs funded with conservation charges should reflect the long-term benefits of these public investments.

Since instructing the utilities to use a 5.5 percent nominal discount rate in 2014, DEEP has conferred with economic experts, conducted a thorough review of resource economics literature, researched the federal regulations and guidance related to the cost-effectiveness testing of federal energy conservation programs, and assessed best practices across several states. Upon completion of this research and analyses, DEEP has concluded there is common agreement from resource economists that energy efficiency investments resulting from public programs should be discounted using public discounting, which is discounting from the broad society-as-a whole point of view, rather than private discounting,

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[2] DPUC Final Decision*, DPUC Review of The Connecticut Energy Efficiency Fund's Conservation and Load Management Plan for 2010*, March 17, 2010, available at:
http://www.dpuc.state.ct.us/dockhistpost2000.nsf/8e6fc37a54110e3e852576190052b64d/13218f54fe32200c852582c90052dfce?OpenDocument
[3] *2014 Update of the 2013-2015 C&LM Plan*, available at:
http://www.dpuc.state.ct.us/DEEPEnergy.nsf/c6c6d525f7cdd1168525797d0047c5bf/d489c8b5c74f521185257c92006e0abe/$FILE/2014-2015 percent20Plan percent20Update percent20FINAL.pdf
[4] *Avoided Energy Supply Costs in New England: 2013 Report*, available at: http://www.synapse-energy.com/sites/default/files/SynapseReport.2013-07.AESC_.AESC-2013.13-029-Report.pdf
[5] *Correspondence regarding DEEP Approval with Conditions of the 2014 Annual Update of the 2013-2015 Conservation and Load Management Plan,* August 12, 2014, available at:
http://www.dpuc.state.ct.us/DEEPEnergy.nsf/c6c6d525f7cdd1168525797d0047c5bf/8525797c00471adb85257d32005dde48?OpenDocument
[6] DEEP's letter to utility Companies dated September 26, 2014, available at:
http://www.dpuc.state.ct.us/DEEPEnergy.nsf/c6c6d525f7cdd1168525797d0047c5bf/8c7ecfb93dec758c85257d620061b63b/$FILE/Resolution percent20of percent20CONDITIONS percent201345 percent20for percent202014 percent20Annual percent20Update percent20of percent20CLM percent20Plan percent20 percent20approval percent20of percent20extension.pdf
[7] OMB Circular A-94, 1992 https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A94/a094.pdf
[8] OMB Circular A-4, 2003 https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A4/a-4.pdf

which is discounting from the specific limited perspective of private individuals or firms. The following information is a summary highlighting key points on this topic:

The federal Office of Management and Budget (OMB) identifies the general use of both a 7 percent and 3 percent real discount rate in regulatory benefit-cost analyses.[9] The distinction between the two rates is that the 7 percent rate is an average before-tax rate of return to private capital in the U.S. economy that approximates the opportunity cost of capital, while the 3 percent is based both on the rate that the average saver would use to discount future consumption and the real rate of return of long-term government debt.[10] OMB Circular A-4, issued on September 17, 2003[11], notes that for policies and practices that have intergenerational benefits or costs, lower rates should be considered to reflect a different rate of time preference than the 7 percent average before-tax rate of return to private capital.

The US EPA "Guidelines for Preparing Economic Analyses" (December 2010), Chapter 6, *Discounting Future Benefits and Costs,* notes that long time horizon policies should use a broad society-based perspective when discounting investments in public policy because private discounting can bias results in benefit-cost analyses of public programs.[12] Typically, long-term government policy does not distribute the benefits or costs equally over time; in other words, policy effects do not always exclusively or primarily fall on the allocation of capital. Thus, simple comparison of these gross costs and gross benefits would disregard the time value of money. Therefore policy must use a discount rate that reflects the time value of the stream of costs and benefits for the aggregate population affected by the policy.[13] According to OMB Circular A-4, this rate is simply how a society discounts future consumption flows to their present value, which is often fairly represented by using the real rate of return on long-term government debt, which is typically low. This is sometimes called the social rate of time preference.[14]

This logic supports DEEP's periodic review of the discount rate, and it should be noted that this rate is regularly revisited by the OMB to accurately reflect current economic assumptions. The OMB annually revises the forecasted real and nominal interest rates on treasury notes and bonds in the section on *Discount Rates for Cost-Effectiveness Analysis of Federal Programs,* published in the Federal Register; this year in Volume 83, page 5646, February 8, 2018.[15] The 2018 rates were lowered to a range of -0.8 percent to 0.6 percent real, and 1.0 percent to 2.6 percent nominal for 2018 depending on the maturity of Treasury notes and bonds. DEEP has identified the 30-year Treasury bond as the yield to refer to, with a nominal rate of 2.6 percent, rounded to 3 percent.

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[9] "*Empirical evidence suggests that real interest rates around the world have come down since the last evaluation of the rates, and new theoretical advances considering future uncertainty likely suggest lower long term rates, as well. In general the evidence supports lowering these discount rates, with a plausible best guess based on the available information being that the lower discount rate should be at most 2 percent while the upper discount rate should also likely be reduced."*- Council of Economic Advisors Issue Brief. *Discounting for Public Policy: Theory and Recent Evidence on the Merits of Updating the Discount Rate*. January 2017.
https://obamawhitehouse.archives.gov/sites/default/files/page/files/201701_cea_discounting_issue_brief.pdf

[10] Council of Economic Advisors Issue Brief. *Discounting for Public Policy: Theory and Recent Evidence on the Merits of Updating the Discount Rate*. January 2017. https://obamawhitehouse.archives.gov/sites/default/files/page/files/201701_cea_discounting_issue_brief.pdf

[11] OMB Circular A-4, 2003 https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A4/a-4.pdf

[12] *Guidelines for Preparing Economic Analyses*, US EPA, 2010 https://www.epa.gov/sites/production/files/2017-09/documents/ee-0568-06.pdf

[13] Farber, Daniel A. *The Shadow of the Future: Discount Rates, Later Generations, and the Environment.* January 1, 1993. Berkley Law. https://scholarship.law.berkeley.edu/facpubs/1052/

[14] OMB Circular A-4, 2003 https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A4/a-4.pdf

[15] *Discount Rates for Cost-Effectiveness Analysis of Federal Programs,* Federal Register, Volume 83, page 5646, February 8, 2018 https://www.gpo.gov/fdsys/pkg/FR-2018-02-08/pdf/2018-02520.pdf

Additionally, OMB Circular A-94 *Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs* recommends that "a nominal discount rate that reflects expected inflation should be used to discount nominal benefits and costs," which is currently how the C&LM plan measures its costs and benefits.[16] Consistent with this, the U.S. Department of Energy Weatherization Assistance Program that DEEP implements for the State of Connecticut uses a federally prescribed rate, currently 3.0 percent, for use in the savings to investment ratio cost-effectiveness testing required prior to implementing weatherization measures.

This is also consistent with the Code of Federal Regulations at 10 CFR 436.14 which outlines the methodological assumptions for discounting the present value of future cash flows for energy conservation investments in the Federal Energy Management and Planning Programs. It specifies that the nominal discount rate be confined to a ceiling of 10 percent, and a floor of 3 percent but should be equal to a 12 month average of the composite yields of all outstanding U.S. Treasury bonds, which currently is about 3 percent. [17, 18]

It should be noted that this method is different than considering the weighted average cost of private capital for use as the discount rate of the present value of costs and benefits of energy efficiency investment. As the Minnesota Department of Commerce, Division of Energy Resources recently stated, the weighted average cost of capital "represents the time preference of utility investors, but this is different from the time preference of customers and the time preference of regulators. The goal of the cost-effectiveness analysis is not to maximize investor value; instead the goal is to maximize the net benefits to customers. The discount rate must be consistent with the regulatory time preference in order to achieve this goal."[19]

The National Energy Efficiency Screening Project's 2017 *National Standard Practice Manual* recommends, as a best practice for applying the public policy perspective to energy efficiency programs, that states adopt a prescriptive approach to discount rates— not linked rigidly to market indicators (e.g., Treasury rate and consumption rate) but instead reflecting the state's policy focus on long-term environmental impacts, the long-term value of energy efficiency, the generally low risk of energy efficiency, and the interests of both current and future utility ratepayers.

Additionally, a report for the National Home Performance Council, prepared by Synapse-Energy, provided best practices on selecting a discount rate for energy efficiency programs. The report stated that some states assume the utility's weighted average cost of capital for energy efficiency investment and compare it to a supply-side investment; however, this is an incorrect assumption because utilities value and recover costs differently from energy efficiency investments than supply-side investments. Supply-side investments require utilities to raise capital through debt and equity, but energy efficiency investments are recovered immediately through fully reconciling conservation charges. This makes

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[16] OMB Circular A-94 https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/circulars/A94/a094.pdf

[17] See U.S. Department of Energy Subpart A of Part 436 of Title 10 of the Code of Federal Regulations (10 CFR 436A), https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=&SID=1c7a500a57a905e8546514deeccf2c9f&mc=true&n=pt10.3.436&r=PART&ty=HTML which references *Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis – 2018 Annual Supplement to NIST Handbook 135,* National Institute of Standards and Technology, U.S. Dept. of Commerce https://nvlpubs.nist.gov/nistpubs/ir/2018/NIST.IR.85-3273-33.pdf

[18] https://www.treasury.gov/resource-center/data-chart-center/interest-rates/Pages/TextView.aspx?data=longtermrate

[19] *Updating the Energy Efficiency Cost-Effectiveness Framework in Minnesota*, August 2018

efficiency investments a much lower financial risk to utilities, which should be reflected in the choice of lower discount rate.[20]

Similarly, the U.S. Department of Energy's Regional Energy Efficiency Organization for the northeast, the Northeast Energy Efficiency Partnerships, published a report in 2013 that recommended that states should use a rate "reflecting the relatively low financial risk of energy efficiency programs, by using a low-risk rate such as U.S. Treasury bonds." [21]

Further, in addition to reduced financial risk, energy efficiency investments typically have lower project risk and portfolio risk than supply-side investment. Examples of project risk associated with energy efficiency include customer adoption or technology performance, but these risks are relatively small and are typically mitigated through C&LM program evaluation and marketing efforts. On the supply side, project risks include construction costs, siting constraints, fuel price volatility, demand fluctuation, and more. Energy efficiency is low in portfolio risk by nature because it is achieved through a variety of diverse programs that collectively diversify the mix of resources in the utility system.[22]

Finally, a review of neighboring states with similar levels of energy efficiency investment show Vermont's rate is fixed at 3.0 percent, and Rhode Island's and Massachusetts' rates, based on the 10-year Treasury rate, are presently 2.9 percent.[23] The 2018 New England region's Avoided Energy Supply Components (AESC) study uses a discount rate of 3.37 percent.

Conclusion

A nominal discount rate of 3.0 percent should be applied in the benefit-cost analyses used in the Conservation and Load Management Plans. This updated policy is based upon DEEP's research and analyses of the applicability of discount rates to environmental and energy efficiency programs, described above, and aligns with the discount rate used in the U.S. Department of Energy Weatherization Assistance Program that DEEP implements.

Next Step to Implement Policy

DEEP can communicate this updated practice through a condition of approval of the Conservation and Load Management Plan, as proposed in DEEP's December 7, 2018 *Tentative Determination to Approve with Conditions the 2019-2021 Conservation and Load Management Plan*. The Plan and DEEP's draft decision were the subject of a public comment period that DEEP held open between November 30 and December 17, 2018 and was the subject of a public informational meeting December 13, 2018. This means DEEP will direct the Conservation and Load Management Plan program administrators to replace DEEP's previous directive to use 5.5 percent nominal discount rate pending further review and rationalization (as noted in DEEP's 2014 resolution of a condition of approval to the 2014 Update of the C&LM Plan), and to instead use a 3.0 percent nominal discount rate for Connecticut's utility-implemented Conservation and Load Management Plan.

[19] *Best Practices in Energy Efficiency Program Screening: How to Ensure that the Value of Energy Efficiency is Properly Accounted For*. Prepared for the National Home Performance Council by Synapse Energy Economics, Inc. July 23, 2012. http://www.synapse-energy.com/sites/default/files/SynapseReport.2012-07.NHPC_.EE-Program-Screening.12-040.pdf

[21] *Energy Efficiency Cost-Effectiveness Screening in the Northeast and Mid-Atlantic States,* 2013

[22] Energy Efficiency Screening Coalition. Recommendations for Reforming Energy Efficiency Cost-Effectiveness Screening in the United States. November 18th, 2013. http://www.synapse-energy.com/sites/default/files/SynapseReport.2013-11.NHPC_.Efficiency-Screening.13-101-Report.pdf

[23] Commonwealth of Massachusetts Department of Public Utilities. Docket No. 08-50-A *Investigation by the Department of Public Utilities on its own Motion into Updating its Energy Efficiency Guidelines Consistent with An Act Relative to Green Communities.* March 16, 2009. http://ma-eeac.org/wordpress/wp-content/uploads/08-50-A-Order1.pdf