



# Built Environment Cost Analysis Protocol

**BUILT ENVIRONMENT  
EFFICIENCY WORKING  
GROUP**

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# EO 17-20 Item 6: Cost Analysis Protocol

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## I. INTRODUCTION

On November 6, 2017, Governor Kate Brown issued **Executive Order 17-20: Accelerating Efficiency in Oregon’s Built Environment to Reduce Greenhouse Gas Emissions and Address Climate Change**.<sup>1</sup> This Executive Order established directives for energy efficiency leadership in state buildings, increasing energy and water efficiency in new construction, and increasing energy efficiency through retrofits of existing buildings. The Executive Order also directed state agencies to adopt a cost-analysis tool to determine if any directive in the Executive Order should be deferred due to significant costs.

This document serves as a protocol to guide agencies through the process of using the Cost Analysis Tool.

### ***Excerpt from EO 17-20***

**6. Analysis of Cost:** *State agencies are expected to implement this Executive Order using the least cost methods available. ODOE and BCD, in consultation with DAS, PUC, and OHCS, are directed to adopt a cost-analysis tool through a process that involves meaningful public input by December 1, 2019. State agencies shall use this cost analysis tool to determine whether any directive in this Executive Order should be deferred for one year or, if specific to a building code related directive, to the next building code cycle, due to significant cost at the time of implementation of that directive. All state agency processes for determining deferral of a directive in this Executive Order must include at least one public meeting that allows interested stakeholders to provide input.*

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<sup>1</sup> [https://www.oregon.gov/gov/Documents/executive\\_orders/eo\\_17-20.pdf](https://www.oregon.gov/gov/Documents/executive_orders/eo_17-20.pdf)

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## II. WHEN TO USE THIS PROTOCOL AND THE COST ANALYSIS TOOL

If there is a need for deferral of a directive in Executive Order 17-20, a state agency should use this protocol and the Cost Analysis Tool to determine whether any directive in Executive Order 17-20 should be deferred for one year or, if specific to a building code related directive, to the next building code cycle, due to significant cost at the time of implementation of that directive.

**The Cost Analysis Tool is available on ODOE's website:**

[www.oregon.gov/energy/Get-Involved/Pages/BEEWG.aspx](http://www.oregon.gov/energy/Get-Involved/Pages/BEEWG.aspx)

Specific directives in Executive Order 17-20 that will be met by the responsible agencies by the dates specified in the Executive Order are not required to use the cost analysis tool to perform a cost analysis, but are expected to implement each Executive Order directive using the least cost methods available.

Questions by an agency regarding the applicability of the cost analysis tool should be presented to the Built Environment Efficiency Working Group (BEEWG).

## III. DETERMINATION OF INPUT VARIABLES AND ASSUMPTIONS

### A. Application-specific inputs

These inputs are specific and unique to an individual project, measure, scenario, etc. They are marked by yellow shaded cells in the Cost Analysis Tool. These include key inputs such as cost, equipment life, and energy savings. These inputs themselves may require a separate complex and detailed analysis, such as an energy model for energy savings or market analysis for equipment cost, to determine appropriate values. It is not the purpose or function of the Cost Analysis Tool to provide direction on how to determine these project-specific values. It is the responsibility of the agency using the Cost Analysis Tool to perform sufficient analysis to determine the appropriate inputs. This analysis should include clear documentation of how the values were determined. Project calculations may be included in an associated tab of the Cost Analysis Tool spreadsheet, or may be presented as an accompanying attachment, particularly if the analysis is too large to be reasonably included within the spreadsheet itself.

Agency personnel that are presenting the Cost Analysis Tool for BEEWG or public review are expected to have prepared the necessary supporting documentation for all inputs.

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## B. Rates and assumptions

These inputs, indicated with an orange cell in the Cost Analysis Tool, may also be specific to an individual project but are generally based on some external criteria or rate from a published source such as discount factor, emissions factor, electricity escalation rate, or similar. These should also be defined and supported on a project-by-project basis, though the user may be able to find external references for some of these rates that may be used, if applicable, for a given project.

## C. Reference sources

It is not the purpose of this document to define the sources that an agency must use for determining the appropriate values to input into the Cost Analysis Tool. However, there are several external sources for rates and variables that may be useful for an agency to review and reference to determine if they may be appropriate to use for a specific case. These are listed below, although listing here does not constitute an endorsement of any of these references.

**Northwest Power and Conservation Council 7th Power Plan:** This plan contains significant economic and energy analysis including electricity and fuel price forecasts, economic forecasts, discount factor analysis, and financial assumptions. The various appendices of the plan contain most of the potentially useful reference material.

Source: Northwest Power and Conservation Council

<https://www.nwcouncil.org/reports/seventh-power-plan>

**Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis – Annual Supplement to NIST Handbook 135:** This document provides energy price indices, escalation rates, carbon price indices, and discount factors for lifecycle cost analysis for energy conservation, water conservation, and renewable energy projects at federal facilities.

Source: National Institute of Standards and Technology

<https://www.nist.gov/publications/energy-price-indices-and-discount-factors-life-cycle-cost-analysis-150-2019-annual> (2019 Supplement)

**Life-Cycle Cost Analysis Tool Development for Oregon:** This report studied and defined many of the variables to use when performing a lifecycle analysis for multi-family affordable housing

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projects in Oregon. It was developed by Earth Advantage and the Housing Development Center for the Edwards Mother Earth Foundation.

Source: Earth Advantage, Housing Development Center

*Link Pending*

**Methodology for Evaluating Cost-Effectiveness of Residential Energy Code Changes:** This document details the methodology and assumptions used for lifecycle analysis to determine the cost effectiveness of energy code changes. It contains discussions and references for variables such as mortgage interest rates, discount rate, period of analysis, inflation rate, and energy price escalation rates.

Source: Pacific Northwest National Laboratory

[https://www.energycodes.gov/sites/default/files/documents/residential\\_methodology\\_2015.pdf](https://www.energycodes.gov/sites/default/files/documents/residential_methodology_2015.pdf)

**Methodology for Evaluating Cost-Effectiveness of Commercial Energy Code Changes:** This document is similar to the residential energy code change methodology report, but it applies to commercial energy code changes.

Source: Pacific Northwest National Laboratory

[https://www.pnnl.gov/main/publications/external/technical\\_reports/PNNL-23923.pdf](https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-23923.pdf)

## IV. USING THE COST ANALYSIS TOOL

The Cost Analysis Tool spreadsheet is generally self-explanatory in terms of the values that should be entered in the respective cells. The agency using the tool should fill out the project header information at the top of the sheet (Project Number, Project Title, etc.).

When using the spreadsheet, agencies should enter in project-specific values into the yellow and orange cells of the grey shaded area in the middle of the spreadsheet. The “Results” section near the top of the spreadsheet and the annual cash flow table at the bottom of the spreadsheet are automatically calculated and should not be edited. Any green cells in the spreadsheet should also not be edited.

If you notice an opportunity for additional functionality that can be incorporated into the spreadsheet, or notice any errors or omissions in the spreadsheet, please email

[AskEnergy@oregon.gov](mailto:AskEnergy@oregon.gov).

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## V. BEEWG AGENCY REVIEW PROCESS

It is the responsibility of the agency(ies) that wish to use the Cost Analysis Tool to defer a directive of EO 17-20 to complete the Cost Analysis Tool spreadsheet and assemble full supporting documentation. Upon completing this, the agency(ies) should communicate with the other members of the BEEWG to schedule a date for which the responsible agency(ies) will present their analysis, assumptions, and supporting documentation to the BEEWG. This may be done at either a pre-scheduled BEEWG meeting or at a specially scheduled meeting.

Any relevant materials, including the Cost Analysis Tool spreadsheet and supporting calculations, should be delivered to BEEWG members at least two weeks in advance of the scheduled meeting so that they may be reviewed.

BEEWG members should carefully review the materials and be prepared to make applicable comments on the cost analysis. However, it is not required that all BEEWG members agree and support the analysis input and its conclusions. BEEWG members may make notes or comments for the record to the presenting agency(ies), though it is recognized that the BEEWG itself does not have the authority to approve or reject the responsible agency's analysis. It is the intent that thoughtful consideration would be given to incorporate BEEWG comments and resolve potential issues to achieve unanimous agreement among state agencies in the BEEWG.

## VI. PUBLIC REVIEW PROCESS

After completing internal agency review through the BEEWG, the responsible agencies should hold at least one public meeting that includes opportunity for public review and comment of the Cost Analysis Tool and its assumptions and inputs. It is expected that this public meeting would be integrated with the agency's typical processes for receiving public input. It is not the intent of this protocol to require a process that is separate from or duplicative of typical agency proceedings.

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**FOR MORE INFORMATION**

## **Built Environment Efficiency Working Group**

<https://www.oregon.gov/energy/Get-Involved/Pages/BEEWG.aspx>

