Strategic Decarbonization Assessment (SDA)

Capital planning is a critical tool for any real estate asset manager looking to project his or her long-term investment plan. As such, capital planning should be an important step in the decarbonization roadmap process. Performing a Strategic Decarbonization Assessment (SDA) that compares decarbonization-focused capital plans to business-as-usual scenarios is a key step in quantifying and sharing decarbonization plans with decision makers. The goal of the SDA for decarbonization planning is to shift financial analysis from payback-oriented and individual measure justification, toward identifying the lowest "net-present-cost" or highest "net-present-value" decarbonization pathway inclusive of a variety of uncertainties and broader real estate considerations.

The SDA Tool

The Strategic Decarbonization Assessment (SDA) calculator is a valuable tool that allows building owners and retrofit teams to align their asset decarbonization strategies with their capital investment strategies. The SDA is designed to integrate assessment of multiple requirements including optimizing net present value, replacing equipment close to end of life, avoiding compliance fees, and coordinating electrification of fossil fuel equipment with future electric grid decarbonization. The SDA is a long-term financial planning tool for building owners to manage carbon emissions and energy use. During the EBC program, the tool guided the participants in refining their decarbonization scenarios and identifying the most cost effective decarbonization plans. Several teams were able to show positive net present value for their decarbonization plans compared to business as usual. This process can benefit many buildings and property owners in New York.

The SDA tool was built by Arup and Ember Strategies. It was previously developed for the San Francisco Department of the Environment and modified for NYSERDA use in the Empire Building Challenge.

Below are the principle directions to perform a strategic decarbonization Assessment:

- Develop your decarbonization term (years)
- Feed in your baseline starting point
- Define a business-as-usual path and analyze divergence from it
- Develop a discounted cash flow model of different investment scenarios with as much detail as possible
- Value non-energy benefits
- Near-term years require more accuracy and detail
- Long-term years are more directional
- Phase-in is critical

Finding the Right...essment (SDA).pdf

User Advisory for EBC Partners

The SDA tool was created as the one stop shop for development and modeling of the business case that supports your EBC submission. The current EBC version of the SDA tool was developed based on ASHRAE Standard 211 normative forms with a variety of users and use cases across the country in mind; as a result, the SDA tool contains functionality and modules that are not required for EBC submissions. This guidance provides EBC participants with an understanding of the minimum requirements for using the tool for EBC submission.

The EBC team can respond to business case/SDA questions up until the submission deadline.

The tables and charts on the **"Summary (Print Me)"** tab form the basis of NYSERDA's review of EBC proposals. This tab summarizes assumptions, costs, savings, decarbonization trajectory and alignment with LL97 requirements.* The bar charts and trajectories on this tab should be a graphical representation of the narrative explanation of your plan and business case from the **"Narrative & Measures"** and "**Alternatives**" tabs. The "*Carbon emissions per year, before offsets*" and the "*Relative NPV of Alternatives*" charts on the "**Summary (Print Me)**" tab should illustrate the sequencing and timing of equipment replacement, relationships between ECMs and savings/costs. Your alternatives, which are strongly encouraged but not required, should be made clear in your narrative submission. The landlord and tenant breakout charts will not be considered unless they are part of your narrative.
Building Info and Assumptions

On the "**Building info and assumptions**" tab, users input basic information about the building: floor areas, space types, fuel types and consumption (bill) data.

The "**Building info and assumptions**" tab enables users to communicate building information in a highly customized way at a very granular level. It is doubtful that most EBC users will need to take full advantage of all the functionality to develop a competitive EBC proposal. You do not need to change the default values unless your business case is materially impacted by these estimates (i.e., you are trying to reduce maintenance costs in addition to energy costs). Most of these assumptions are found in the "Real Estate Characteristics" drop down. Very few EBC users have needed these features, so we suggest you use the defaults, even though they were based on pre-pandemic New York data. Note that all red/orange cells are optional, but **not all blue cells are required** as many include default values.

This drop down is where you can change the default escalations rates for general costs and specific fuel costs over time. Sensitivity analyses that explore a variety of future rate scenarios are encouraged to show that you have considered the sensitivity/fragility/resilience of your plan in a variety of futures.

The "Regulatory Assumptions" drop down on this tab includes NYSERDA default values for fuel specific emissions factors stipulated by LL97. This section also automatically calculates the building's LL97 emissions limits for the 2024-2029 and 2030-2034 time periods using building typology and GSF inputs on the same tab.*

*Note, we have not updated the tool to reflect the proposed changes to LL97 building classes and emissions factors. We do not expect this to impact most EBC proposals, but please let us know if your proposal is impacted in some way.

Equipment Inventory

On the "**Equipment Inventory**" tab, users will input major energy using equipment. *All* the fossil fuel equipment and at least 80% of total energy using equipment should be inventoried and reported on this tab. Very similar or identical equipment can be grouped into one row (e.g. multiple AHUs of generally the same size and age). The date of installation is required as it determines the equipment life and is used to define the Business As Usual (BAU) trajectory - existing equipment is projected to continue functioning until it reaches End of Useful Life and is replaced, like for like, at that time. User-input costs for the like for like replacement are also required inputs to complete the BAU trajectory. **Pl ease note, the estimated replacement cost and year installed are required inputs for the SDA graphics.** Replacement costs for decarbonization measures and BAU equipment replacement need not be overly precise - these cost numbers should be realistic to ensure ROI and NPV calculations are sufficient for comparative purposes.

NPV and savings calculations in the SDA are significantly influenced by major energy using equipment. To streamline SDA development and simplify analysis, project teams should focus on major equipment and group minor equipment together by age, if feasible. If you are not using the landlord/tenant cost/benefit breakout, keep all equipment in column I (Tenants Own/Operate) marked "No". This tab also enables a simple summer/winter peak/off peak calculator for demand ECMs, but using this feature is optional and is not a replacement for a full 8760 hour model.

The "*Percent energy/carbon by equipment RUL*" graphics to the right (cell AY) should populate as expected if everything is input correctly. This visual is often used in business case narratives, but does not appear on the Summary tab.

Narrative & Measures

On the "**Narrative & Measures**" tab, users narratively define their alternatives and input all the ECMs (costs and energy/carbon impacts) that will be assigned to years on the "**Alternatives**" tab. The SDA automatically generates two BAU cases: one in which LL97 compliance is not sought and fines are applied, and one in which LL97 compliance is achieved through carbon offsets alone.

Note the measure life column is a critical input as it determines how long the measure's savings will persist - if the measure ends without replacement you will see the corresponding uptick in energy /carbon on that year in the trajectory graphs.

Many EBC participants are using detailed energy models and bringing the outputs from those models into the SDA. These users may streamline ECMs to minimize data entry and rely on the narrative explanation of the measures. The simplest ECM list in this case may be "Year 1 ECMs", "Year 2 ECMs", etc with corresponding costs and benefits; but be advised that users must explain their measures very clearly where they have aggregated costs and benefits.

Alternatives

On the "**Alternatives**" tab, users schedule ECMs and review the bar charts and trajectories between those Alternatives. The charts on this tab should illustrate the EBC business case consistent with the narrative submission. As stated before, the landlord vs. tenant breakdown for ECMs is not required (column H of Alternatives) and the subsequent charts can be disregarded if not used.

Note the Holding period and Analysis periods can be varied independently, but most EBC users keep both set for 20 years for EBC submission.

The "*Total Relative NPV Compared to Baseline - Varying Time Horizons*" chart (cell AZ) is very commonly used in internal business cases to evaluate cost-effectiveness of the Alternatives over different time horizons, but it is not included on the Summary tab.
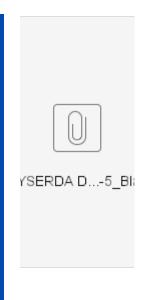
Operating Statements

Most of the calculations happen on the "**Operating Statements**" tab, where an annual operating statement is created for each alternative/baseline for the 20 year analysis period. Users can review these statements as needed; however, it is not recommended to edit this portion of the tool directly. This is typically done when troubleshooting a trajectory chart that does not match user expectations.

Download

The updated SDA tool is available for download below, including a Blank SDA Tool version and a completed Sample Building SDA Tool version with data from a sample building.

Blank SDA Tool

YSERDA D...-5_Bl:

Sample Building SDA Tool

211215 NYSER

Instructional Videos

Four instructional videos (one for each step in the process and tab in the tool) are available here.