



May 7, 2020

GSA Public Buildings Service

MEMORANDUM FOR PBS REGIONAL DESIGN AND CONSTRUCTION DIRECTORS

FROM: Natalie Huber ^{NJH}
Chief Engineer
Office of the Chief Architect
Public Buildings Service

SUBJECT: GSA Energy Use Target Guidance

The purpose of this memorandum is to provide project teams guidance on how to determine an energy use intensity design target. This guidance applies to new construction and work on existing buildings. This guidance takes into consideration legislated statutes, executive direction and GSA requirements. This guidance does not change, add or delete any current requirements.

The attached guidance provides an executive summary, flow charts for project types, and an in depth review of the background legislation and requirements from which the guidance is developed. GSA project teams should utilize this information in the development of projects, contracting for design services, and the conceptual development of a design. It should be noted that design energy use intensity may not be the same as the operational energy use intensity.

If you have any questions on this guidance, please contact Lance Davis at lance.davis@gsa.gov or Mark Kutchi at mark.kutchi@gsa.gov.

Attachment (1): GSA Energy Use Targets Explained APR20

U.S. General Services Administration
1800 F Street, NW
Washington, DC 20405-0002

www.gsa.gov

GSA Energy Use Intensity Explained

April 2020

Purpose:

Starting in FY 2020, new energy use intensity requirements came into effect for federal projects, so additional scrutiny must be applied to all our designs that started in October 2019 or later. This memorandum clarifies the following requirements as they relate to how the design team will set the design energy use intensity (EUI):

- The use of ASHRAE 90.1 for the Energy Policy Act 2005 (EPACT)
- 2016 Guiding Principles for Sustainable Federal Buildings, principle #2
- EISA 2007 fossil fuel reductions
- The use of the 2030 Challenge as a means to achieve fossil fuel reductions
- Determining life cycle cost-effectiveness

Summary:

Congress passed legislation mandating that the Federal Government reduce its buildings' energy and fossil fuel usage. These requirements are for the portfolio as well as for individual buildings. The Department of Energy (DOE) is required to develop rules for how agencies should calculate compliance, and which standards to apply, but have not yet established such rules. GSA has therefore developed requirements for how project teams must achieve the individual building energy and fossil fuel reductions.

New construction projects will utilize the 2013 version of ASHRAE Standard 90.1 and will set an energy target reduction at least 30% below the energy model baseline.

Modernizations¹ will utilize the 2016 Guiding Principle #2 to set an energy target.

GSA requires that all project types above prospectus use Architecture 2030's 2030 Challenge to set an energy target per specific fossil fuel reductions compared to the 2003 CBECS data.

GSA requires the use of Life Cycle Cost Analysis in accordance with: [10 CFR 436, Subpart A](#), Methodology and Procedures for Life Cycle Cost Analyses; and GSA's P120, PBS Cost and Schedule Management Policy. Life cycle costs are the sum of the present values of;

- Investment costs, less salvage values at the end of the study period
- Non-fuel operation and maintenance costs
- Replacement costs less salvage costs of replaced building systems
- Energy and/or water costs

determined on the basis of a systematic evaluation and comparison of alternative building systems. The most stringent energy target will be analyzed for use as the design project's energy use intensity.

¹ A modernization is defined as the "comprehensive replacement or restoration of virtually all major systems, tenant-related interior work (such as ceilings, partitions, doors, and floor finishes), and building elements and features." (2016 Guiding Principles § II "Applicability", and P100 Appendix A.3 "New Construction and Modernization".).

Project Type

New Construction

Required Energy and Fossil Fuel Reduction

EPAct 2005 § 109, 10 CFR 433:
 Energy target must be at least 30% better than ASHRAE 90.1-2013 energy model baseline. (P100 § 1.8.2)

EUI = _____

EISA 2007 § 433:
 Utilize the 2030 Challenge's Zero Tool to determine an energy target per the yearly reduction on a site energy basis. (P100 § 1.8)

EUI = _____

Compare EUI Targets

Comparison
 Compare EUI targets, standardized to site energy. Also compare to any regional EUI targets.

Select the most stringent EUI target.

Life Cycle Cost Analysis

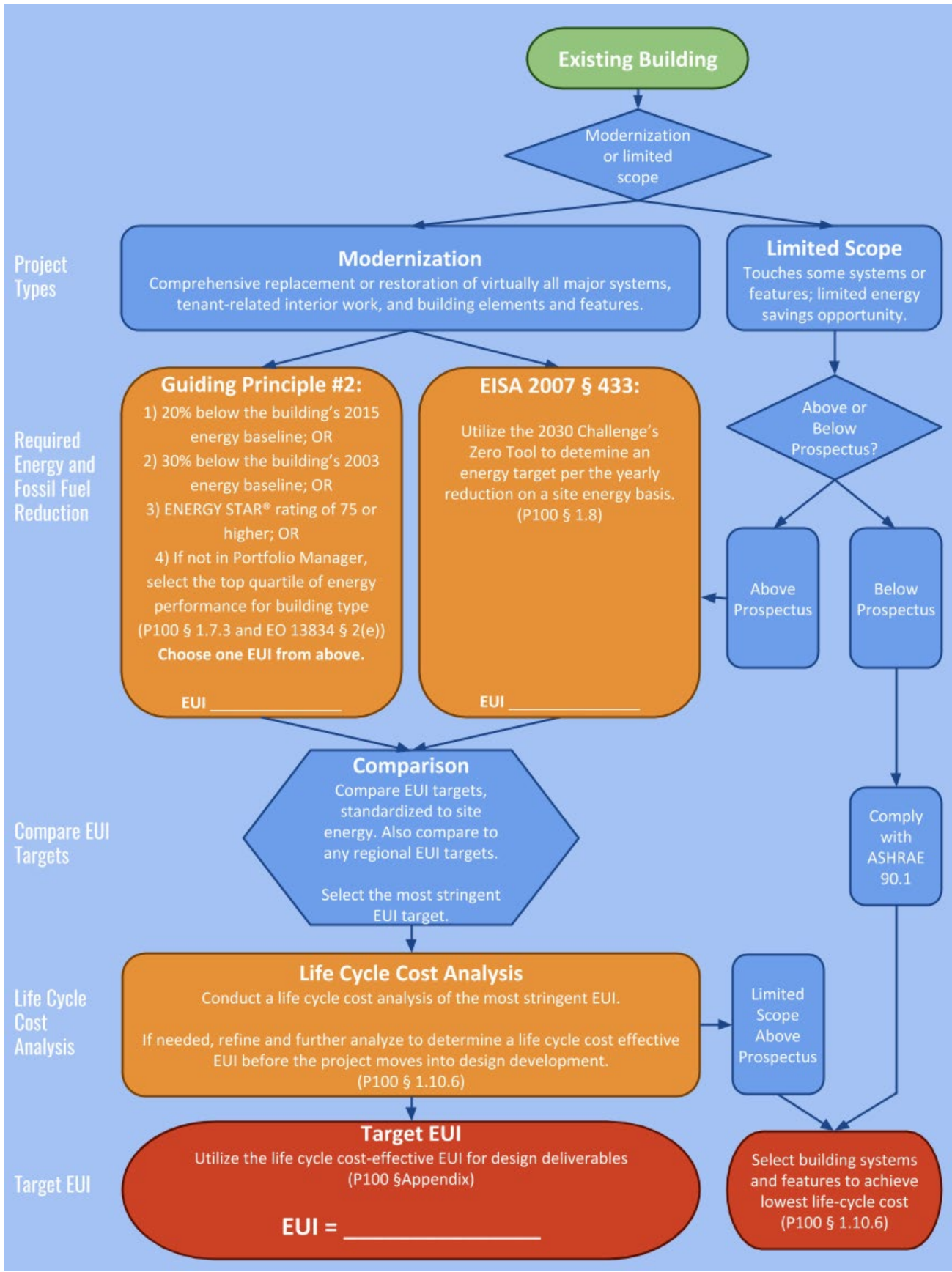
Life Cycle Cost Analysis
 Conduct a life cycle cost analysis of the most stringent EUI.

If needed, refine and further analyze to determine a life cycle cost effective EUI before the project moves into design development. (P100 § 1.10.6)

Target EUI

Target EUI
 Utilize the life cycle cost-effective EUI for design deliverables (P100 §Appendix)

EUI = _____



New Construction Energy Use Target

Requirement:

- Legislation: Energy Policy Act of 2005 (EPACT) Sec. 109 Federal Building Performance Standards: “(i) if life-cycle cost-effective for new Federal buildings— “(1) the buildings be designed to achieve energy consumption levels that are at least 30 percent below the levels established in the version of the ASHRAE Standard or the International Energy Conservation Code, as appropriate, that is in effect as of the date of enactment of this paragraph;
- US Code: 42 USC 6834: Federal Buildings Energy Efficiency Standards: (a)(3)(B) Not later than 1 year after the date of approval of each subsequent revision of the ASHRAE Standard or the International Energy Conservation Code, as appropriate, the Secretary shall determine, based on the cost-effectiveness of the requirements under the amendment, whether the revised standards established under this paragraph should be updated to reflect the amendment.
- GSA P100 Performance Requirement: Per P100, the [P100 Performance Matrix](#) is utilized to set the minimum performance requirements for a project in section 5.4 Whole Building Energy Performance Requirements.

How to Achieve:

As DOE has not made a determination on the 2016 version of ASHRAE Standard 90.1, GSA will continue to utilize the 2013 version per 10 CFR 433. New buildings will develop a model² per ASHRAE 90.1 appendix G. Once a model is set, a target of at least 30% reduction or better can be developed.

Determine 30% below ASHRAE 90.1 target and Site EUI as indicated below (submit all calculations):

1) *Site 30% Reduction Target*

*=Site model building consumption – (0.3 * (Site model building consumption – Receptacle and process loads))*

2) *30% Reduction Site EUI = $\frac{\text{Site 30\% Reduction Target}}{\text{GSF}}$*

Modernization Energy Use Target

Requirement:

Per the 2016 Guiding Principles for Sustainable Federal Buildings principle #2, achieve one of the following:

- Energy use target at least 20% below the FY 2015 energy baseline; OR
- Energy use target at least 30% below the FY 2003 energy baseline; OR
- An ENERGY STAR® rating of 75 or higher; -OR
- If the building type is not in ENERGY STAR Portfolio Manager, the building is in the top quartile of energy performance for its building type, compared to adequate benchmarking data.

How to Achieve:

² Receptacle and process loads are not included in the model and proposed building energy reduction calculations in accordance with 10 CFR 433 paragraph 433.101 “Performance level determination”.

Determine one of the four 2016 Guiding Principle #2 target choices Site EUIs as indicated below (submit all calculations):

- 20% below FY 2015 Site EUI = $.8 \times$ Energy Usage Analysis System (EUAS) FY 2015 EUI
- 30% below FY 2003 Site EUI = $.7 \times$ Energy Usage Analysis System (EUAS) FY 2003 EUI
- ENERGY STAR rating of 75 or higher Target
 - Obtain the Site energy consumption for ENERGY STAR rating of 75 or higher from Energy Star Portfolio Manager utilizing the existing meter data.
- Top quartile energy performance for its building type, compared to adequate benchmarking data
 - If project type is not listed in Portfolio Manager, search for an adequate benchmark and submit this benchmark to the project manager for approval
 - Top Quartile Energy Performance Site EUI = total site baseline energy consumption / GSF.

Fossil Fuel Reduction

Requirement:

Energy Independence and Security Act of 2001 (EISA) Sec. 433 Federal Building Energy Efficiency Performance Standards

(a) STANDARDS.—Section 305(a)(3) of the Energy Conservation and Production Act (42 U.S.C. 6834(a)(3)) is amended by adding at the end the following new subparagraph:

“(D) Not later than 1 year after the date of enactment of the Energy Independence and Security Act of 2007, the Secretary shall establish, by rule, revised Federal building energy efficiency performance standards that require that:

“(i) For new Federal buildings and Federal buildings undergoing major renovations, with respect to which the Administrator of General Services is required to transmit a prospectus to Congress under section 3307 of title 40, United States Code, in the case of public buildings (as defined in section 3301 of title 40, United States Code), or of at least \$2,500,000 in costs adjusted annually for inflation for other buildings:

“(I) The buildings shall be designed so that the fossil fuel-generated energy consumption of the buildings is reduced, as compared with such energy consumption by a similar building in fiscal year 2003 (as measured by Commercial Buildings Energy Consumption Survey or Residential Energy Consumption Survey data from the Energy Information Agency), by the percentage specified in the following fossil fuel reduction table:

Fiscal Year	Percentage Reduction
2020	80
2025	90
2030	100

P100 Sec. 1.8 Energy Use Targets, 2030 Challenge for Carbon Neutral Buildings

2030 Challenge aligns with EISA and requires buildings to be designed so that the fossil fuel generated energy use is reduced by the [above] percentages over the latest version of the Energy Information Administration’s Commercial Buildings Energy Consumption Survey (CBECS) in designs for prospectus-level new construction and major renovations³.

³ For the purposes of this guide, the terms modernizations and major renovations are used synonymously.

How to Achieve:

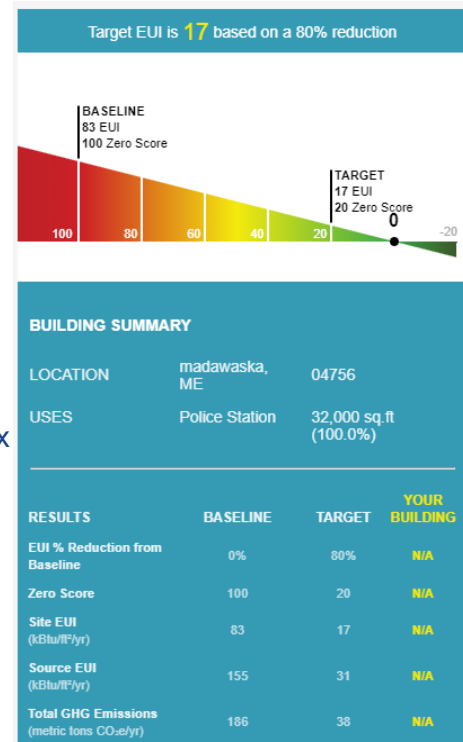
As DOE has not made a final rule on fossil fuel reduction, GSA has implemented the use of the 2030 Challenge⁴ as a means to reduce fossil fuel use for new construction and major renovations. The 2030 Challenge utilizes data from CBECS 2003 and has the same 2020, 2025, and 2030 reductions as listed above for EISA 2007 sec 433.

⁴ Receptacle and process loads must be included in the 2030 Challenge baseline and proposed building energy reduction calculations.

2030 Challenge for Fossil Fuel Energy Reduction

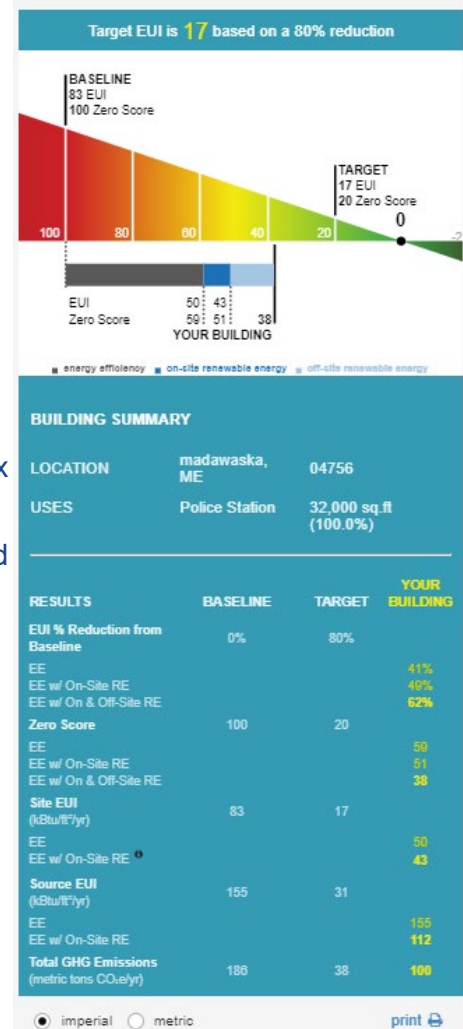
The 2030 Challenge for new construction:

1. Open the [Zero Tool](#)
2. Enter information for location
3. Select New Construction
4. Select the primary building use (office, courthouse, LPOE (comparable building type determined during design concept based on building use))
5. Input the GSF
6. Set the percent reduction to 80 or higher and check the box to meet 2030 Challenge Targets
7. Establish a Site EUI baseline and target



The 2030 Challenge for existing buildings:

1. Open the [Zero Tool](#)
2. Enter information for location
3. Select Existing Building
4. Select the primary building use (office, courthouse, LPOE (comparable building type determined during design concept based on building use))
5. Input the GSF
6. Set the percent reduction to 80 or higher and check the box to meet 2030 Challenge Targets
7. Input energy purchased, energy generated and energy sold to the grid.
8. Establish a Site EUI baseline and target
9. Adjust energy purchased, energy generated and energy sold to develop alternative scenarios



Comparison of Energy Use Intensity Targets

For new construction, The A/E must design all new buildings to the most stringent of:

- (a) have an energy performance below the EISA 2007 energy target [Zero Tool output, Site EUI] (receptacle and process loads included), OR
- (b) EPACT at least 30% below ASHRAE 90.1-2013 [30% Reduction Site EUI] (receptacle and process loads not included), whichever is lower (P100 § 1.8.2); AND is
- (c) life-cycle cost-effective.
 - As per 10 CFR 433, §433.100 (c), If a 30 percent reduction is not life-cycle cost-effective, the design of the proposed building shall be modified so as to achieve an energy consumption level at or better than the maximum level of energy efficiency that is life-cycle cost-effective, but at a minimum complies with ASHRAE 90.1-2013.

For modernizations, The A/E must design to the most stringent of:

- (a) have an energy performance below the EISA 2007 energy target [Zero Tool output, Site EUI] (receptacle and process loads included), OR
- (b) the target Site EUI established under Guiding Principle #2 per the options below;
20% below FY 2015 Site EUI, OR
30% below FY 2003 Site EUI, OR
ENERGY STAR rating of 75 or higher Site EUI, OR
Top Quartile Energy Performance Site EUI, AND is
- (c) life-cycle cost-effective.

As detailed in this section above, design teams must calculate and compare the target EUIs to ensure compliance with EPACT, EISA, and the Guiding Principles, and must design for the most stringent option that is life cycle cost-effective. It is important to note that P100 requires three concepts during the early stages of concept development, including three engineered systems.⁵

Life Cycle Cost Effective

Life-cycle costing (LCC) is the method used to ascertain and demonstrate the life cycle cost performance of a facility. LCC is the development of all significant costs of acquiring, owning, and using an item, system, or service over a specified length of time. Per 10 CFR 436, the time period used is the expected life of the retrofit, building or 40 years from the beginning of beneficial use, whichever is shorter. Mutually exclusive alternates will all use the longest life of the alternates. LCC is used to compare and evaluate the total cost of competing solutions based on the anticipated life of the facility or product to be acquired.

P120 specifies how life cycle cost analysis and modeling is to be developed. 10 CFR 436 sets the methodology and procedures for life cycle cost analysis. For Limited Scope projects, “building systems and features must be analyzed and selected to achieve lowest life-cycle cost”, within scope, budget, performance, and approved prospectus constraints. (P100 § 1.10.6, 42 USC § 8253 (g), 10 CFR 436)

⁵ See P100 Appendix A (Submission Requirements) for “Energy Analysis Input and Output, Conceptual Design”.