

Federal Building Decarbonization Task Group: Phase III

Electrification Focus

October 30, 2023

Scope of Task Group

- The charter of the GSA Green Building Advisory Committee (GBAC) Federal Building Decarbonization Task Group in its third phase, was to explore opportunities and challenges for electrification of the federal building portfolio, while aligning with national climate goals, action plans, and legislation.

Task Group Approach

- Reviewed current federal policies and executive orders regarding electrification, as a subtopic area set of focus on building decarbonization.
- Reviewed a wide range of resources from national research labs, non-profit organizations, academic research institutions, and the private sector.
- Reviewed GSA's P-100-2021 with 2022 Addendum, *Facilities Standards for the Public Building Service*.
- Hosted guest presentations on electrification work by a range of federal, private sector, and non-profit organizations. These included project case studies, electrification frameworks, and related GSA initiatives.
- Reviewed previous Green Building Advisory Committee (GBAC) task group activities and Advice Letters.

Key Presentations

- U.S. Department of Energy: Energy Justice
- City of Denver Building Electrification Program
- Building Electrification at Google
- U.S. Department of Energy Better Climate Challenge Program
- U.S. Department of Energy Building Technologies Office
- GSA Denver Federal Building 48 Case Study
- Institute for Market Transformation - High-Efficiency HVAC
- GSA P-100 Federal Facilities Standards
- Buro Happold Engineering All-Electric Buildings
- GSA Blanket Purchase Agreements
- GSA Green Proving Ground (GPG)
- NYSERDA Empire Building Challenge

Presentation Themes (Barriers -> Lessons -> GSA Gaps -> 2030 Success)

■ Technology

- IMT, DOE Heat Pump
- Green Proving Ground
- *Utilities – grid harmonization (addressed through past advice letter work)*

■ Policy and Tools

- Denver, Google
- P-100-2022, BPA, ESPC

Presentation Themes (Barriers -> Lessons -> GSA Gaps -> 2030 Success)

■ Frameworks / Case Studies

- GSA Case Study
- BH Case Study
- LBNL/DOE Better Building Program
- NYSERDA

■ Benefits

- DOE Energy Justice
- *Health and Wellness (addressed through team research)*
- *Social Cost of Carbon (addressed through team research)*

Advice Letter Detailed Discussion

- Background
- Financing GSA Building Decarbonization
- Decarbonization Task Group
 - Phase 1: Decarbonization Playbook
 - Phase 2: Portfolio Decarbonization
- Assessing the Portfolio
- Electrification Scope Development (Project Phasing, Evolving Technology, Hybrid Solutions, GEB)
- Strategic Decarbonization

Strategic Decarbonization

- Align Agencies and Policies
- Strategic Electrification Approach
 - Review
 - Reduce
 - Reconfigure
 - Recover
 - Replace (Initial and Final)
- Support Data Tracking and Progress Tracking

Advice Letter Review

■ Review

- Develop a portfolio approach to conducting electrification audits (reference: Appendix C from 2022 advice letter, DOE Better Climate Emissions Reduction Framework).
- Develop a database of building characteristics.
- Document current and future projected grid emissions factors, linked with GSA CFE.
- Develop streamlined guidance for utilization of tax deductions and credits.

■ Reduce

- P100: emphasize demand reduction measures
- GPG: technologies rapidly deployable in existing/historic buildings

Advice Letter Review

■ Reconfigure and Recover

- P100: emphasize use of lower temperature systems linked to heat pump systems. Acknowledge evolving technology market.
- Develop targeted electrification phasing guidance by project type (size, climate, emissions, use).
- Develop a strategy for replacement of fossil fuel equipment (emergency replacement).
- Utilize 50,000 square feet as threshold for streamlined pathway.
- Work with OMB to study the bundling of funding for a group of buildings.

Advice Letter Review

■ **Store**

- GPG: study the impact of small scale battery/thermal storage on emissions reductions

■ **Replace**

- P100: develop outcome-based metrics based on greenhouse gas emissions intensity.
- P100: pre-develop factors for teams to use in LCCA for electrified systems (O&M focus).
- Utilize blanket purchase agreements to address electrification of smaller buildings.

■ **Resources**

- Invest in high quality education, with focus on building operators, design managers, and budget developers.
- Engage with consortium working on harmonizing decarbonization initiatives.

Advice Letter Review

- **Next Steps**

- Alignment with Federal net zero emissions definition
- P100 – detailed input
- Alignment with industry groups focused on operational decarbonization work – “ECHO” model

Appendix

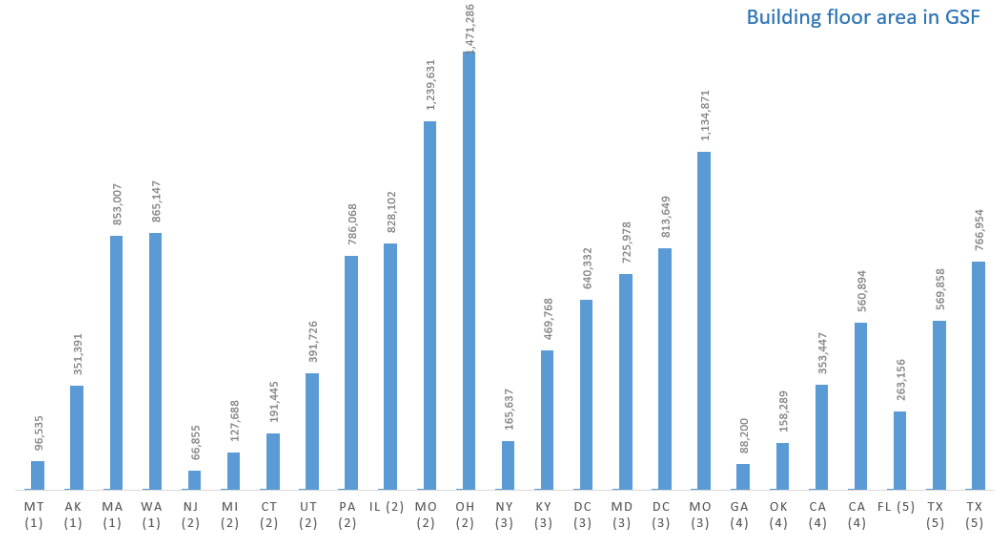
- Electrification audits
- Prioritization factors for electrification
- Portfolio budgeting
- High level summaries of presentations
- Resource links

Reference Content

Portfolio Approach

- Bundling of projects – not common for prospectus work
- OMB respectful of P100 mandates
- Idea: regional task group approach – share common experiences based on climate zone and local technology/construction market

Building Size and Climate Zone



P100

- Team Background
 - Read key sections – sustainability and mechanical engineering
 - Feedback from GSA on current performance tiers
- Opportunities to infuse additional content?
 - Life cycle cost analysis

1.9.2.9 DECARBONIZATION

Decarbonization is the process of reducing the amount of GHG emissions from design, construction and building operations. This includes being aware of the embodied carbon of materials and exploring opportunities to sequester carbon. Project teams should evaluate ways to decarbonize their project. Careful consideration must be given to the use of high embodied carbon items like concrete and steel and alternate materials should be considered that have lower embodied carbon such as wood and other biobased materials. See the [Carbon Smart Materials Palette](#).

New construction and major modernization projects must also:

- Target a 20% reduction in the project's whole-building embodied carbon from materials, compared to a conventional standard baseline building of the same project type (e.g. modernization or new construction)
- Calculate and compare carbon footprints for at least the structure and enclosure of a standard baseline building and the proposed design using a GSA-approved embodied carbon estimation tool. Earn at least one Building Life-Cycle Impact Reduction LEED BD+C: New Construction point, using LEED credit Option 2 "Whole-Building Life-Cycle Assessment" (WBLCA) to conduct a cradle-to-grave life-cycle assessment of the project's structure and enclosure and
- Meet ASTM E2921's Standard Practice for Comparing WBLCA's

All GSA projects that use at least 10 cubic yards of a concrete or asphalt mix must use GSA's Low Embodied Carbon Concrete and Environmentally Preferable Asphalt standards listed in Chapter 4, Prescriptive Civil Requirements.



Performance Tiers in P100

Energy

Energy Net-Zero

Baseline	New construction and major modernization project designs must be Energy Net-Zero ready to the maximum extent technically feasible on a source energy basis with onsite renewables that are designated on the plan for future installation including pathways, conduits, or other means of getting the power in the building.
Tier 1	New construction and major modernization project designs must be Energy Net-Zero ready with 25% onsite renewables installed and the remainder designated on the plan for future installation. At a minimum, comply with IgCC-2018 Section 701.4.1.1 (7.4.1.1) On-Site Renewable Energy Systems, however Exception 2 shall not apply.
Tier 2	Tier 1 + 50% onsite renewables installed.
Tier 3	Tier 1 + 100% renewables installed.
M & V	Report the projects ongoing energy performance in a sustainability benchmarking platform
Plans & Specs	Y
Calculations & Analysis	Provide 90.1 Appendix G energy model and calculations for proposed and installed renewable energy.
References	
Basis of Design	Show project is energy net-zero ready, on a source energy basis, and achieves actual annual delivered energy less than or equal to the on-site and/or proposed renewable exported energy.
Construction Verification	CX agent to confirm installed renewables supply the required power to meet the high-performance tiers.

Themes of Interest

- **Total Cost of Ownership: Navigating Barriers and Maximizing Opportunities**
- Demand Reduction: Electrical Service and Grid Considerations
- **Equipment Replacement**
- Integrated Benefits: Social Cost of Carbon, Comfort, Health, Equity
- Prioritization Matrix: Deeper Dive into Future Grid Emissions and Utility Costs
- Technology Barriers: High Temperature Thermal Energy Systems, High-GWP Refrigerants
- Emerging Technologies
- Streamlined Audits: Virtual Building Electrification/Decarbonization Audits
- **Phased Retrofits**
- ***Workforce Development***

Prioritized Theme Exploration

- Outcomes
 - P-100 guidance
 - Project prioritization matrix – additional development
 - Research priorities
 - Project delivery guidance

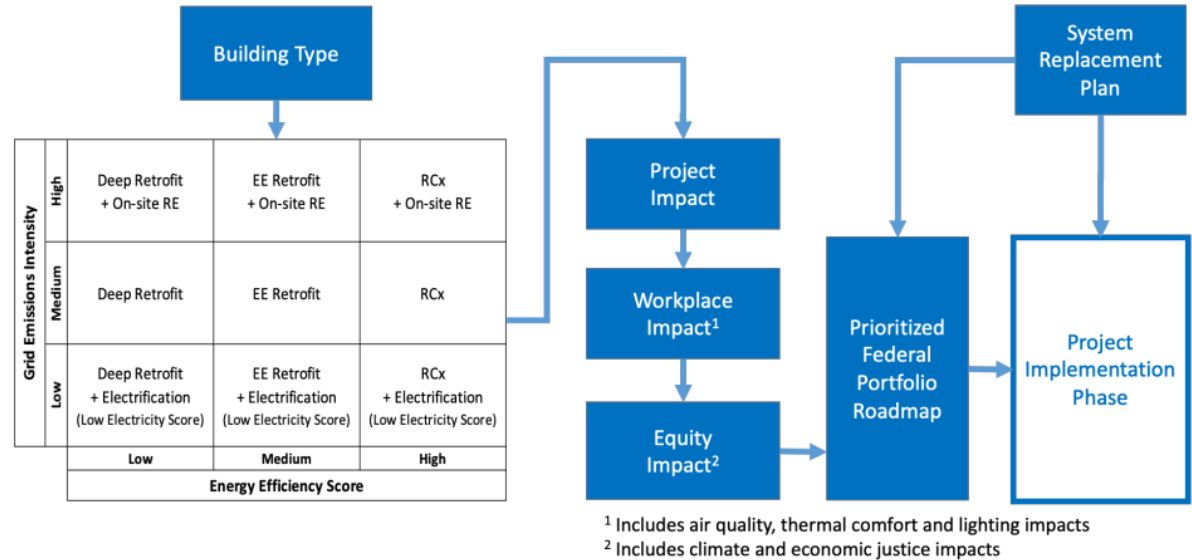


Figure 1 – Building Decarbonization Prioritization Methodology