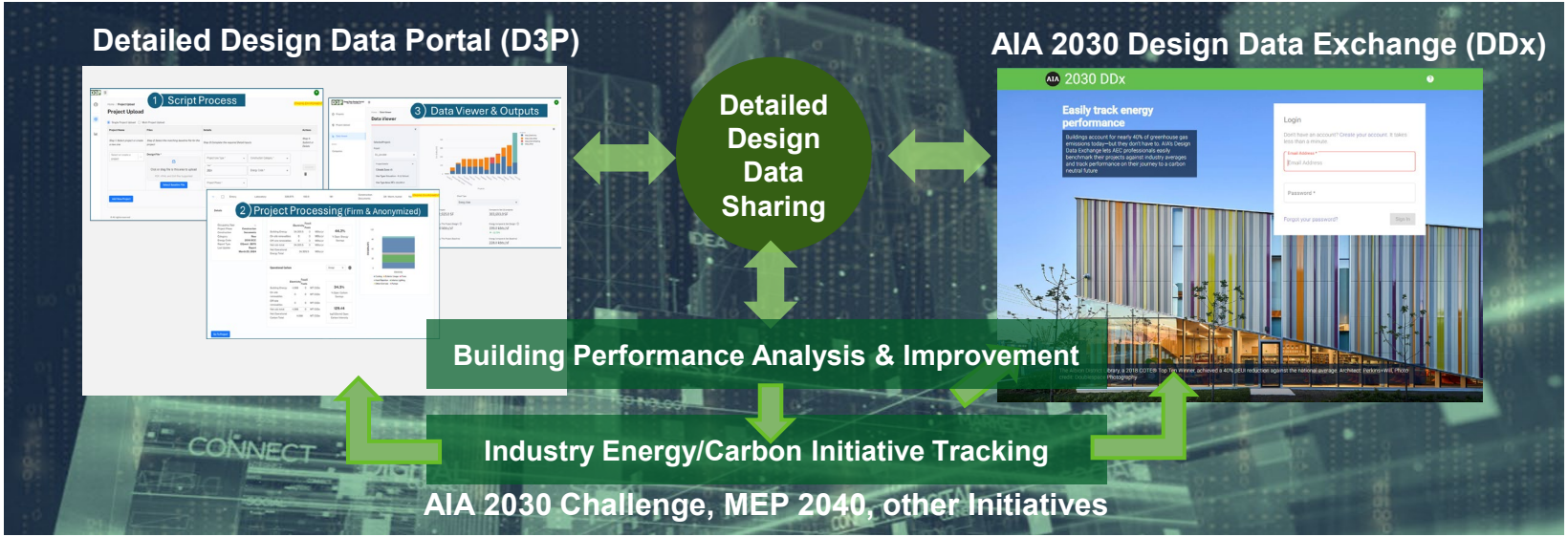
2024 PROJECT PEER REVIEW

U.S. DEPARTMENT OF ENERGY
BUILDING TECHNOLOGIES OFFICE

AIA 2030 DDx & Detailed Design Data Portal (D3P)

The role of energy modeling, design data and industry building design performance

AIA 2030 Design Data Exchange(DDx) & Detailed Design Data Portal (D3P)



Lawrence Berkeley National Lab
Cindy Regnier, P.E., Energy Technology Researcher V
CMRegnier@lbl.gov
WBS #3.5.5.56

Sustainable IQ, Inc.
Kevin Settlemyre, President
kfs@sustainable-iq.com

Project Summary: AIA 2030 DDx & D3P

OBJECTIVE, OUTCOME, & IMPACT

Objective: Building sector dataset to track design industry energy & carbon reductions compared to goals (AIA 2030 Commitment, MEP 2040) while providing feedback on design and BEM tool usage.

Outcome: DOE gains knowledge on design industry performance, incl. of energy modeling tools in application. Industry gains design feedback.

TEAM & PARTNERS

AIA 2030 DDx: LBNL, Sustainable IQ, AIA, AIA Working Group, A/E firms

Detailed Design Data Portal (D3P): LBNL, Sustainable IQ, Inc, A/E firms

DDx has 490 A/E Firms that report annually ~3.6B GSF (yr ~45% of total U.S. built/retrofit).

STATS

Performance Period: FY17 - FY24

DOE Budget: $250k, Cost Share: $250k/yr

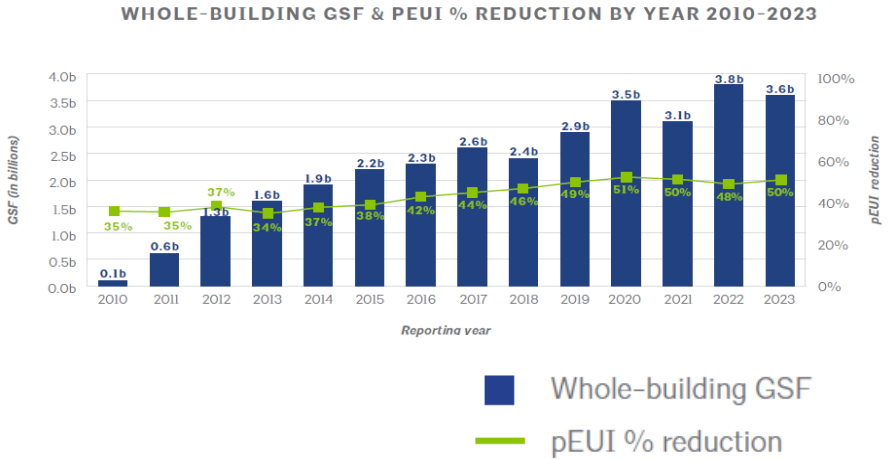
Milestone 1: Tech stack update (D3P)

Milestone 2: Enhancements (DDx)

Milestone 3: Operational Carbon Framework (D3P), Reporting year dataset summary (DDx)

Problem: A/E Industry Lags AIA 2030 Goals

- Industry tracks performance via the AIA Design Data eXchange (DDx)
- **Firms currently achieving 50% energy reduction - not meeting goals**
  - **80% reduction goal** in 2024 (projects & portfolios), 90% in 2025; 100% in 2030 (compared to CBECS 2003)
- **Firms report minimum required data**, no operational carbon, low QA/QC
- Firms are **not able to do** whole bldg. **benchmark comparisons,** or improve performance through **design feedback**

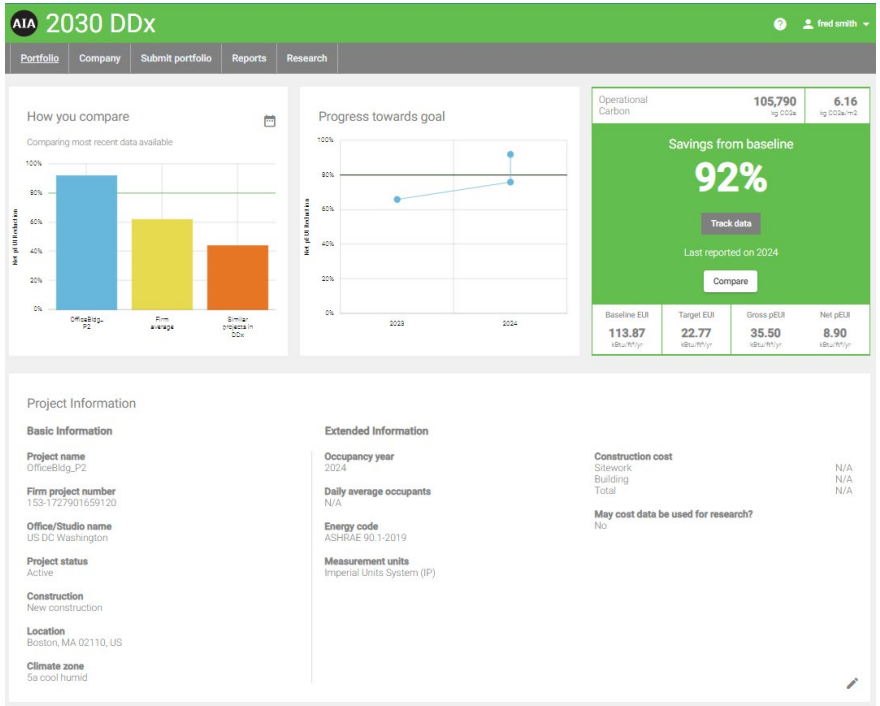


DDx progress (source: AIA by the numbers)

AIA 2030 minimum inputs: EUI, project type/location

Problem: DDx Lacks Functionality to Improve Design

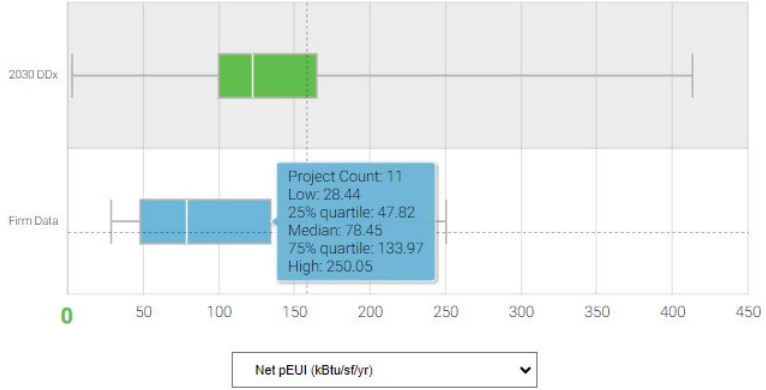
- Reporting tool has **QA/QC issues** (e.g. unrealistic baseline and EUI values), **and missing** enough **data to support better design decisions**
- **Detailed benchmarking** and design feedback is **possible if detailed data captured**, but currently not
- **BEM tool use** can help inform **better design outcomes**, but **limited data** on high performance efficiency measures **doesn't allow** for deeper insights



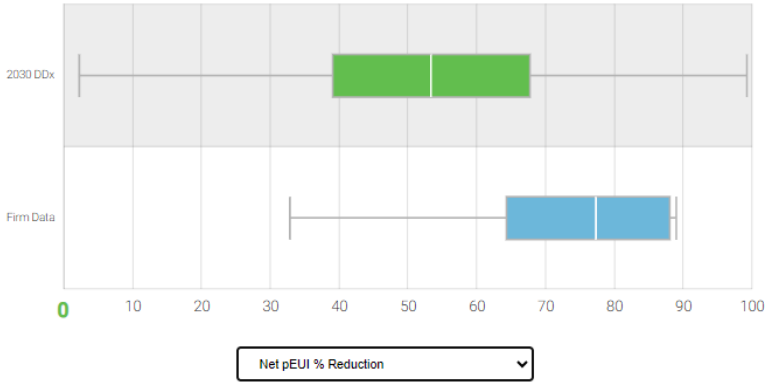
DDx: Project summary after EUI data entered

Approach and Progress: AIA 2030 DDx Improvements

- DDx **data quality (QA/QC) improvements**
  - Energy modeling tool “other” definition required
  - Project sharing across firms to limit project duplication
  - Project outlier rules
- **Operational Carbon** Calculations for all projects
  - Energy Star methodology / eGrid
- **High-Level Benchmarking** (Whole Bldg.)
  - Project and portfolio comparisons
  - Firm & All firms with filters



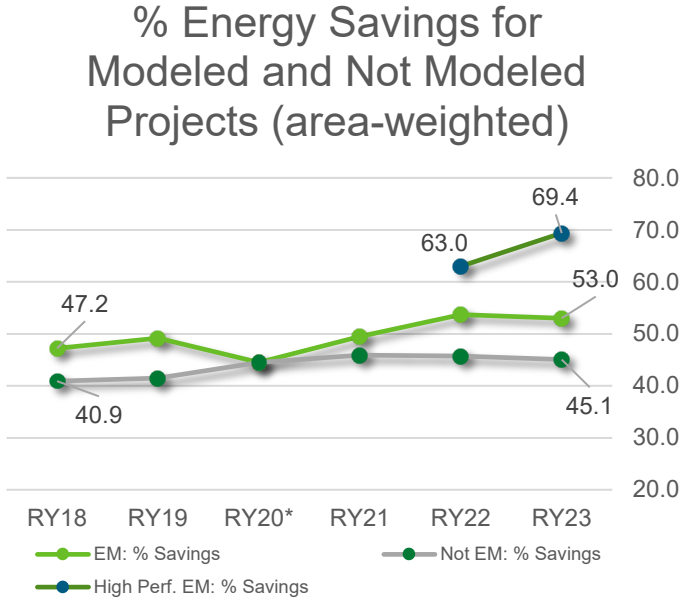
DDx High-level benchmarking: Laboratories, climate zone 4a,4b; energy modeled; >100,000 GSF



DDx Dependent variable change, same project sets

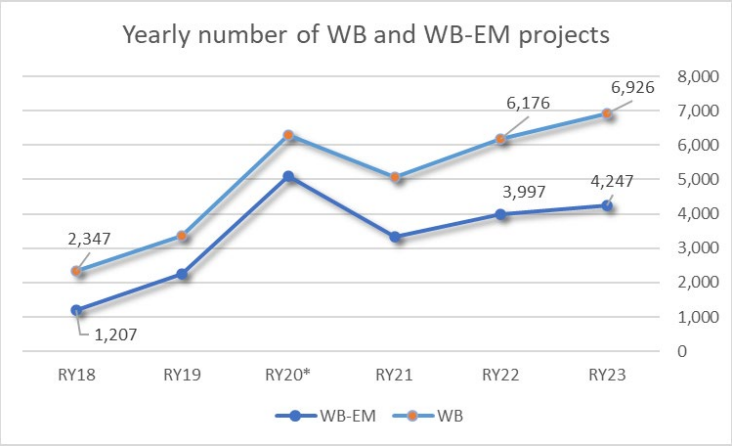
Impact: 2030 Reporting Highlights – 2023

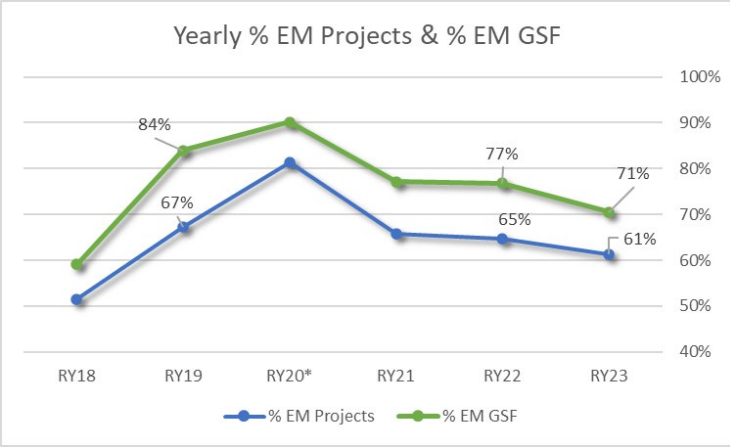
- **~16,400 projects, 3.6B GSF**
  - Energy savings 340 M Mbtu/yr
  - Carbon savings 38.5 M MTCO2e
- **Gradual improvements on energy/carbon savings, and energy modeling savings** over time
- Insights into **deeper energy/carbon savings**, and how they evolve **based on whether energy modeling is used**.
  - 24.3% energy savings for high-perf EM projects
- New **features** and high-level **benchmarking** capability **increase firm interest in** reporting and quantity of data input into **DDx**
  - 490 firms reported (15% increase)



Impact: 2030 Reporting Highlights – 2023

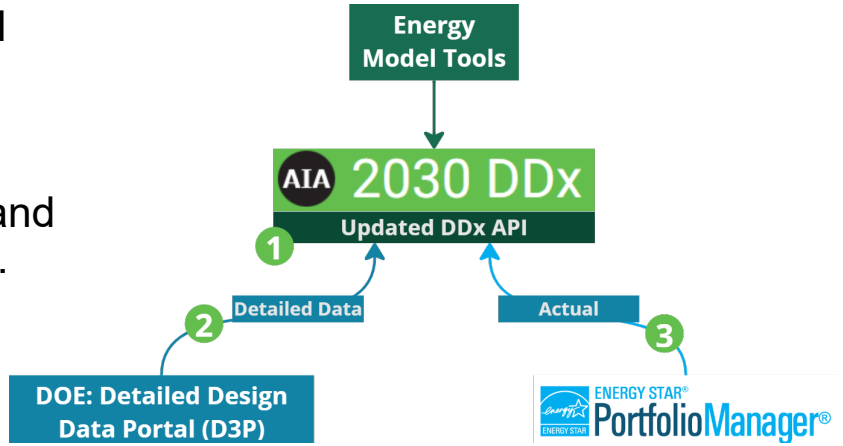
- **Number of participating firms and projects reported increasing**
- **% of energy modeled projects is decreasing**
  - More recently joining firms are less performance oriented and model less
  - DDx/D3P improvements can illustrate value of BEM on design and improve reporting
- **Gap between modeled and non-modeled projects is narrowing**
  - Codes becoming more stringent while designs not becoming more aggressive
  - DDx QA/QC issues





Future Work: AIA 2030 DDx

- **DDx API update** (expanded field set) – technical assistance
- [Potential] **Energy Star Portfolio Manager (ESPM) integration** providing ability for design and post-occupancy data for projects in one platform.
- DDx RY24 dataset analysis w/**BEM impacts**
- Additional **QA/QC improvements**

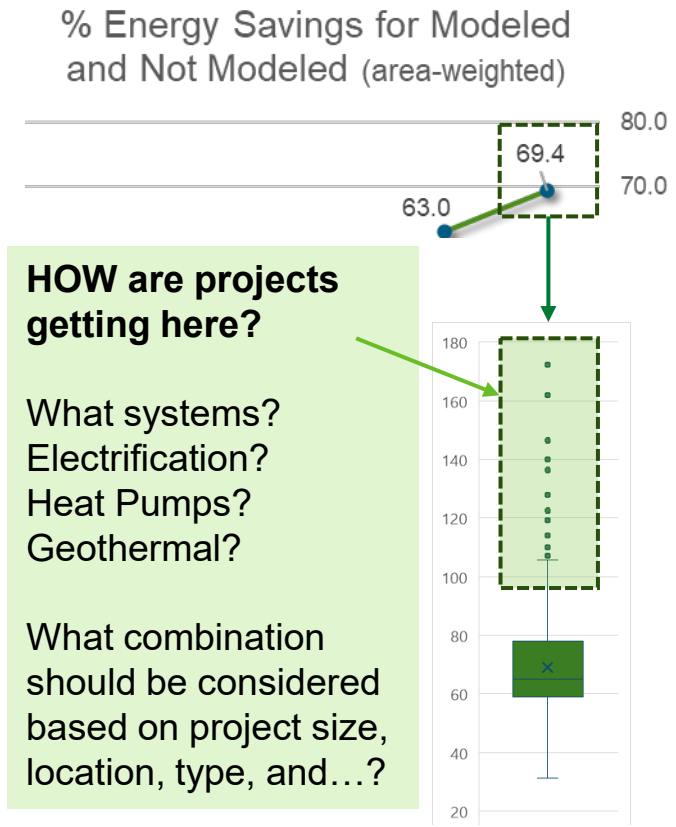


DDx API Update & Integration Opportunities

- *DDx API update funded by others*

Problem: Initiatives Raising Bar, Reporting Needs to Keep Pace

- Multiple initiatives pushing higher levels of performance (**AIA 2030**, **MEP 2040**, SE 2050, carbon free/Net Zero Emissions programs, LEED v5) and collect more detailed data per project
- Firms already spend **significant time collecting data**
- Firms have detailed data available in models, **but lack processes to extract and utilize**
- Current reporting (**DDx) provides high level metrics** for comparison, **but additional details needed to** inform design outcomes



HOW are projects getting here?

What systems?
Electrification?
Heat Pumps?
Geothermal?

What combination should be considered based on project size, location, type, and…?

Detailed Design Data & D3P

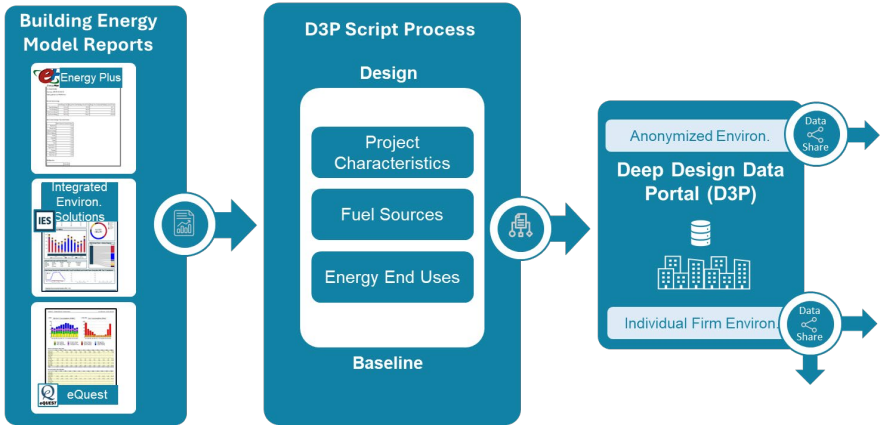
- **“Detailed Design Data”:** going beyond whole building EUI and EUI savings. Features and metrics that express design elements and their performance
  - Fuel source and energy end uses
  - HVAC system types and metrics
  - Load breakdowns
  - Energy conservation measures.

- **Detailed Design Data Platform (D3P):** prototype “detailed DDx”
  - Includes scripts for automatically extracting from BEM reports → Easy reporting to multiple programs
  - Comparisons and visualizations

- **Enhanced Benchmarking:** Provide informative design performance comparisons
  - Compare fuel sources and end uses for similar projects
  - “Click in” to see HVAC system types selections and loads for high-performance projects

Approach: D3P

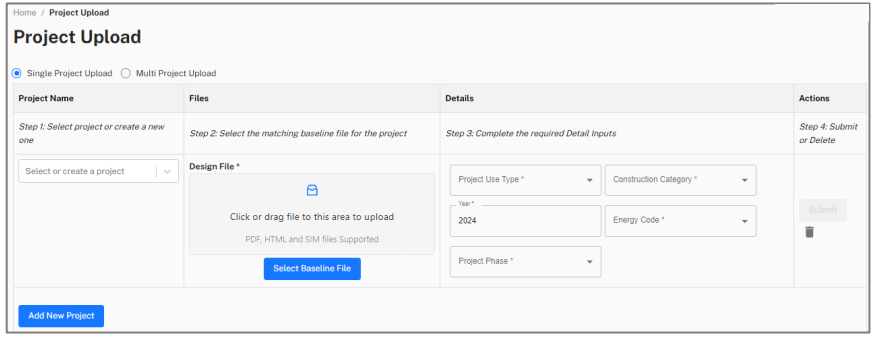
- **BEM report data extraction scripts**
  - EnergyPlus, eQuest, IES-VE
  - 90+% of all projects use one of these
  - Proposed design & baseline
  - Fuel sources, energy end uses, and project basics (detailed data to be added)
- **Prototype platform**
  - **BEM data collection** (via scripts)
  - **QA/QC and derived metrics** (operational CO2)
  - Warehousing and **visualization**
  - Exports for program **reporting**
  - Process for integrating external data



D3P script process to extract data from BEM reports

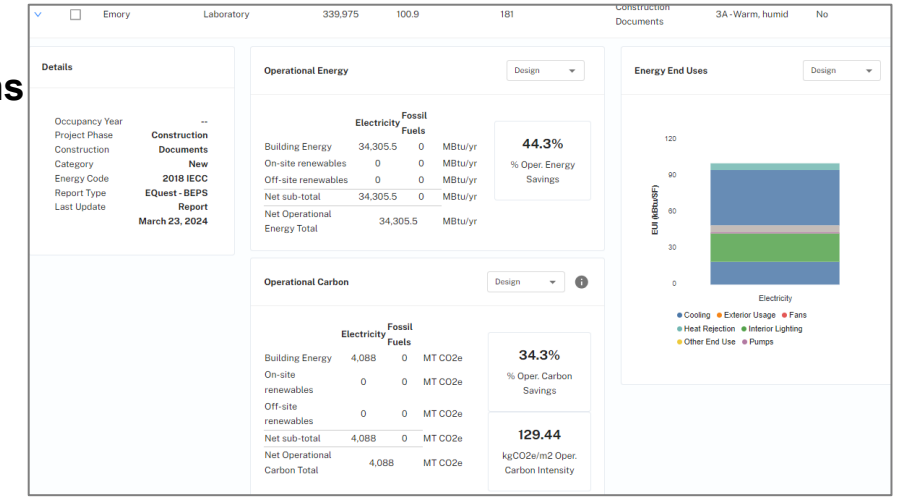
Progress: D3P

- **Data scripts completed and piloted**
  - **Research with firms** on **types of detailed data** to include (HVAC systems, loads)
  - Operational carbon calculations
  - **Upgraded platform tech stack** based on pilot feedback for process phases (upload, data processing, visualization)
  - Prototype tool **piloted** by group of **large A/E firms**
- **Socialized** the platform **with program leaderships** with initial interest provided. In discussions **to identify pathways** for **integration**



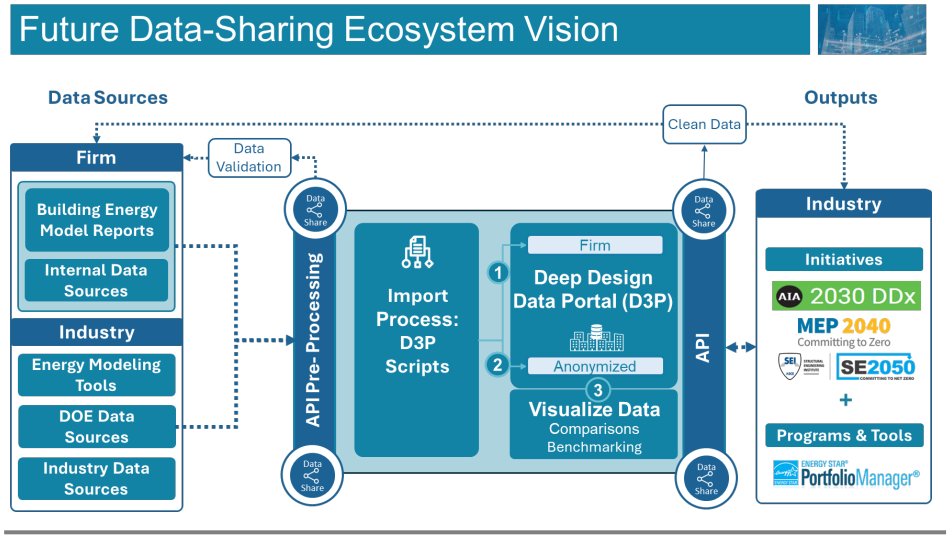
Project Upload (initiates script process)

Expanded project view after upload process



Future Work: D3P

- Complete **DDx reporting link** and pilot
- With **industry consortium**, coordinate across reporting programs and **develop three-year roadmap**
- **Enhance benchmarking capabilities** with additional data (HVAC systems, loads, etc.)
- Leverage updated DDx API to integrate D3P and enable detailed benchmarking and design feedback



Data sharing ecosystem including AIA 2030 DDx (platform) and D3P (data extraction + sharing)

Alignment

Energy/Carbon reduction targets 80% currently, 90% by 2025, 100% by 2030

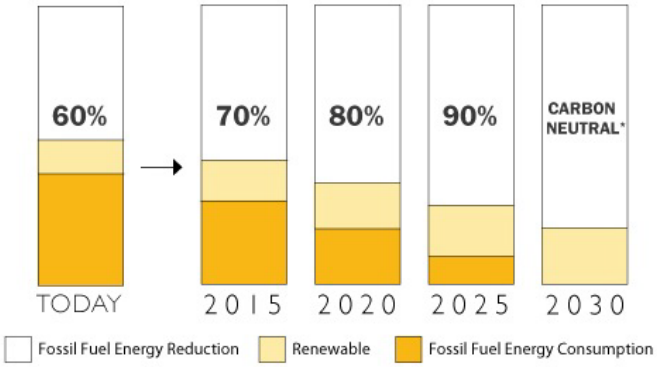
Reduce U.S. building emissions 60% by 2035, 90% by 2050

"Provide tools to help stakeholders identify and implement measures to improve efficiency, increase demand flexibility, accelerate electrification, and deploy on-site generation and storage in buildings."

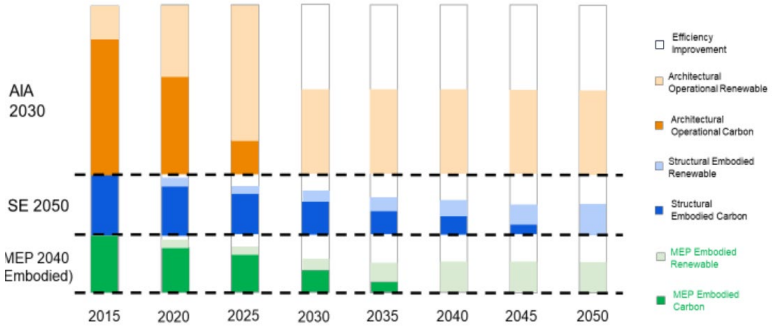
"Improve awareness of low-carbon solutions."

Energy efficiency, onsite emissions reductions, lifecycle emissions reductions. DDx and D3P help design firms track, benchmark, and understand the energy and carbon performance of their projects, and highlights the value of energy modeling in high-performance project delivery.

AIA 2030 Commitment goals



AIA 2030 + SE 2050 + MEP 2040



Thank you

Sustainable IQ, LBNL

Cindy Regnier, Energy Technology Researcher V
LBNL
CMRegnier@lbl.gov
WBS # 3.5.5.56

Kevin Settlemyre, President
Sustainable IQ, Inc.
kfs@sustainable-iq.com

2024 PROJECT PEER REVIEW
U.S. DEPARTMENT OF ENERGY
BUILDING TECHNOLOGIES OFFICE

Reference Slides

Project Execution

	FY2024				FY2025				FY2026			
Planned budget												
Spent budget												
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Past Work												
Q1 Milestone: D3P tech stack updates-P1 (FY24 approval)												
Q2 Milestone: DDx enhancements-P1 (partner delays)												
Q2 Milestone: D3P stakeholders (case study delay)												
Q3 Milestone: D3P prioritized improvements												
Q3 Milestone: D3P tech stack updates-P2												
Q4 Milestone: DDx enhancements-P2												
Q4 Milestone: DDx annual analysis												
Current/Future Work												
Q1 Milestone: DDx Update API technical assistance												
Q2 Milestone: D3P Industry Consortium												
Q2 Milestone: D3P High-performance HVAC												

Team

Cindy Regnier, LBNL

Energy Technology Researcher V

Lead, Project Management

Kevin Settlemyre, Sustainable IQ

President

Lead, Project Implementation

Kathleen Lane

Managing Director, Climate Action and Design Excellence

Praveen Patel

Senior VP, Technology

Eana Bacchiocchi

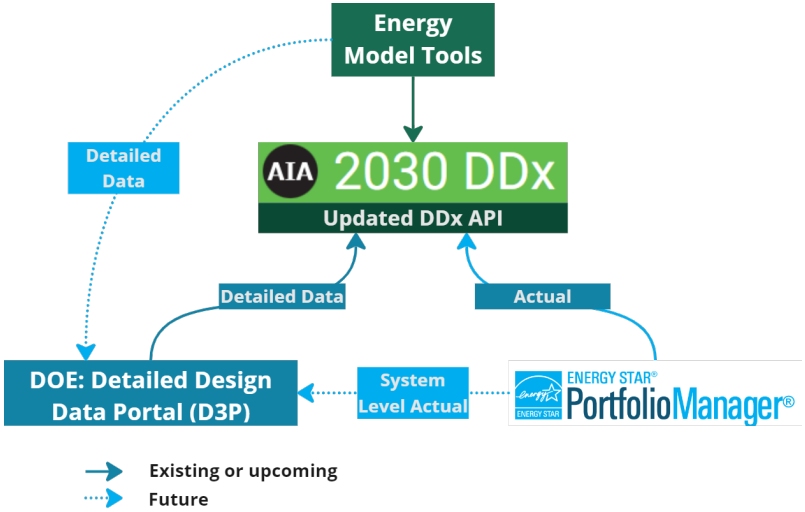
Climate Action Pledge Programs Manager

TAG + AIA 2030 Working Group

A sample of the firms included

Approach: D3P Process

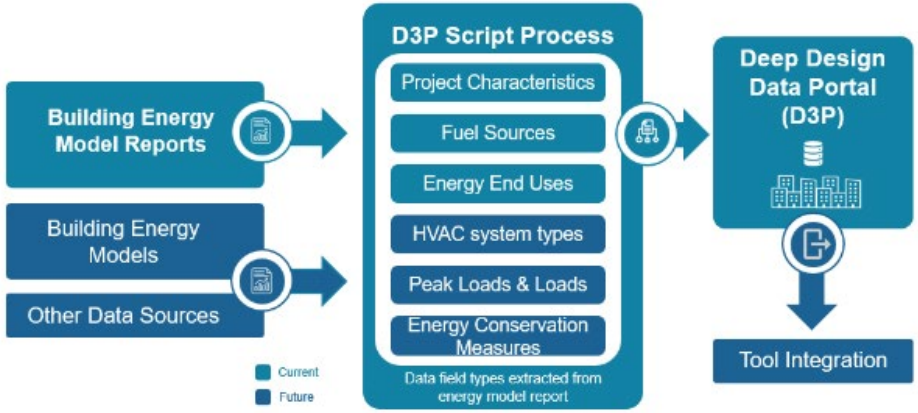
- Process for **report into program** frameworks (AIA 2030 DDx, MEP 2040)
- Develop process to bring **additional data sources into D3P** to provide easier detailed design data access.
- **For full impact,** the platform **will need to coordinate** and be incorporated through **multiple initiative platforms,** and need to **identify foundational industry partner organization(s)** to spearhead ownership



Impact: D3P

- Provides firms an approach to **access detailed design data from BEM reports in minutes**, versus the hour(s) of manual data collection.

- Increasing the types of **high-performance comparisons** that firms can do on with additional data (end uses, baselines, etc.)
  - **End use and fuel source data** enables **benchmarking** with similar buildings that can **identify reduction opportunities**
- **Provides data** beneficial for more **insightful tracking** of AIA 2030 DDx and DOE Blueprint **carbon reduction goals**
  - Can **significantly increase** the **% DDx projects with fuel source data** (minimum)



D3P Current and Future: Additional data sources, detailed data types, and Tool Integration