ASHRAE

2023 Building Performance Analysis Conference

September 11-13, 2023 | Austin, Texas

SMNR 18 - Modeling Existing Buildings II

BETTER Together

Alex Chapin, PE Software Engineer, NREL

Learning Objectives

1. **Identify the benefits of BETTER and SEED platforms**
2. Identify problems connected to adaptive reuse of an old distillery in terms of energy efficiency, moisture, and thermal comfort
3. Explain the importance of accurately estimating energy use and highlight potential consequence of over or underestimation of energy use
4. Explain how machine learning could be used for energy model calibration

Acknowledgements

- SEED Team
  - Nicholas Long - National Renewable Energy Laboratory (NREL)
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  - Alex Swindler - NREL
  - Ross Perry - Department of Energy
  - Robin Mitchell - Lawrence Berkeley National Laboratory (LBNL)
- BETTER Team
  - Han Li - LBNL
  - Carolyn Szum - LBNL

- Note that Alex Chapin is funded by the Department of Energy to develop the SEED Platform

Outline/Agenda

- Describe BETTER and SEED
- Explain benefits of BETTER integration in SEED
- Discuss DC case study

BETTER Analysis

- Building Efficiency Targeting Tool for Energy Retrofits (BETTER)
  - Replaces ASHRAE level 1 audits
  - Streamlines ASHRAE level 2 audits
  - Uses change-point model

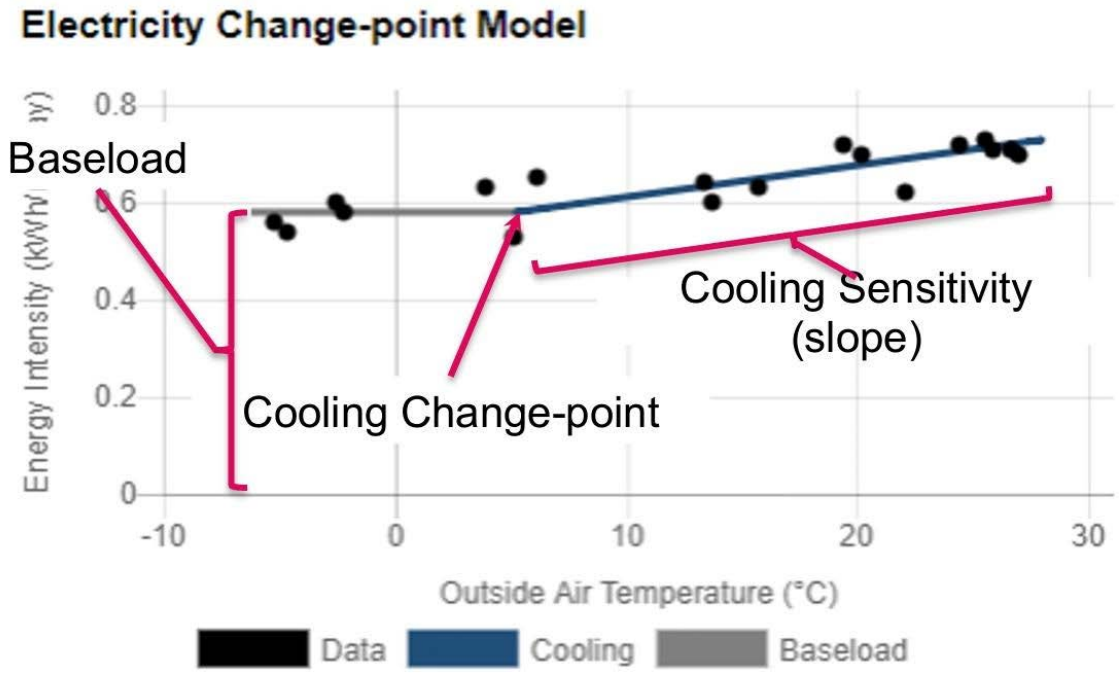


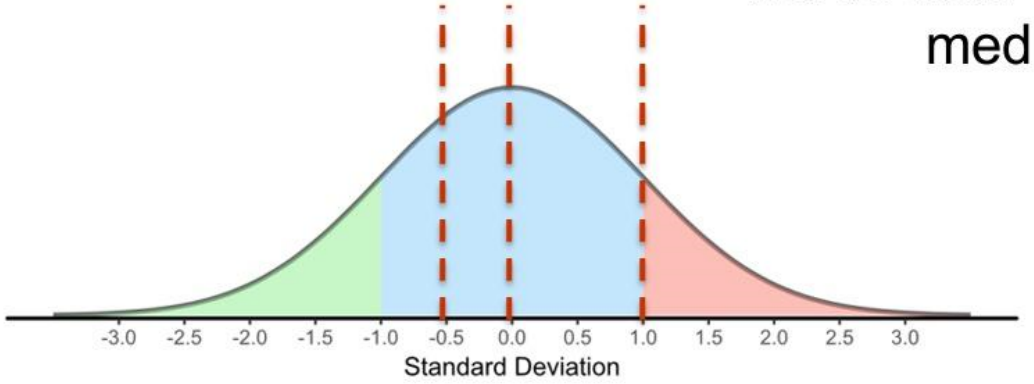
Image Credit: BETTER Training

BETTER Analysis

- Energy efficiency target

Aggressive (½ a standard deviation better than the dataset median)

Conservative (1 standard deviation worse than the dataset median)



Nominal (equal to the dataset median)

Image Credit: BETTER Training

Standard Energy Efficiency Data (SEED) Platform

Property Data:
Tax records, spreadsheets

Performance Data:
ESPM, Utility Data

Excel

Energy Star Portfolio Manager

hpxml

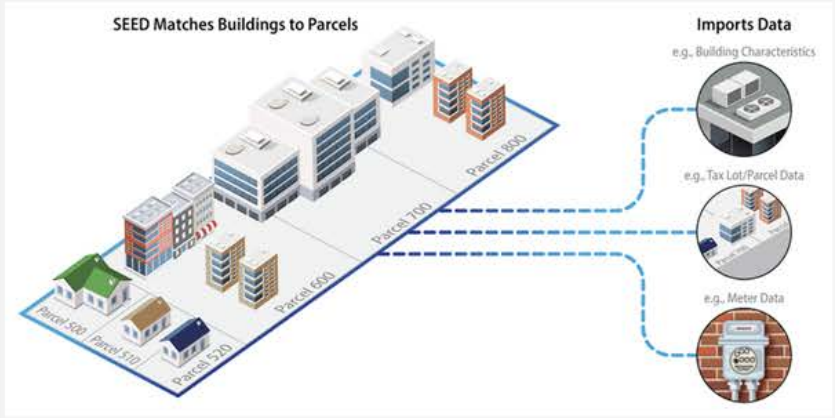
BUILDING SYNC

Audit Template

U.S. DEPARTMENT OF ENERGY

Other Audit Companies

SEED (Standard Energy Efficiency Data) **Platform**



BPS Program Admins

Benchmarking Admins

Portfolio Owners

Building Analysts

BETTER

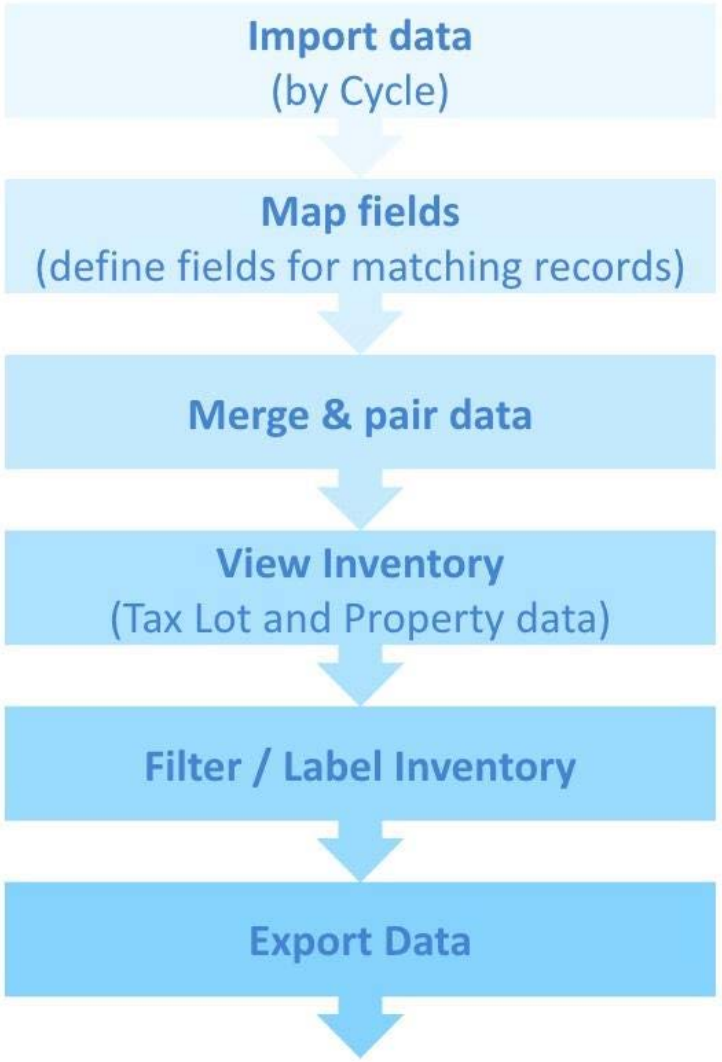
Salesforce

BUILDING SYNC

OpenStudio®

EnergyPlus®

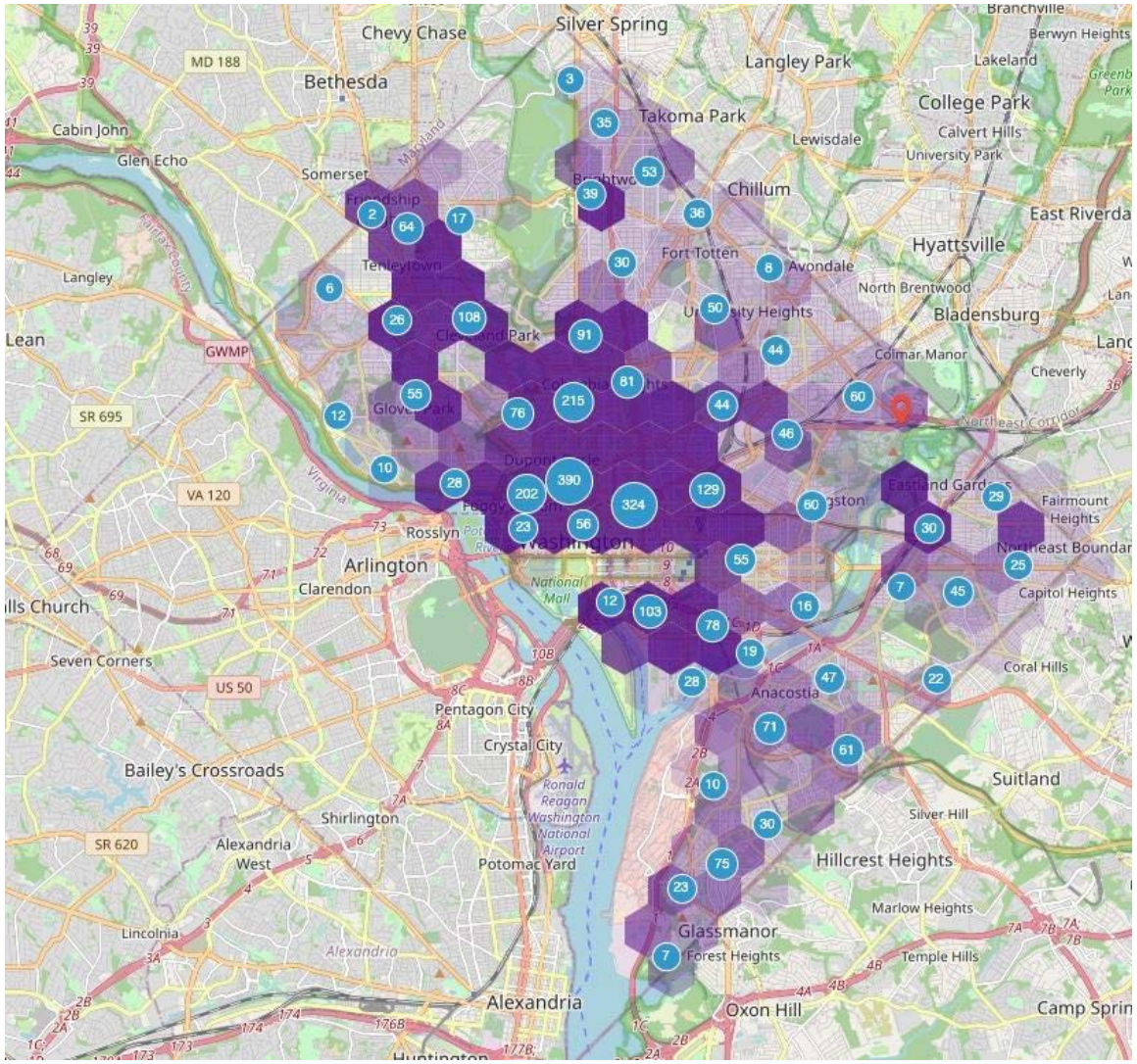
SEED Workflow



SEED & BETTER

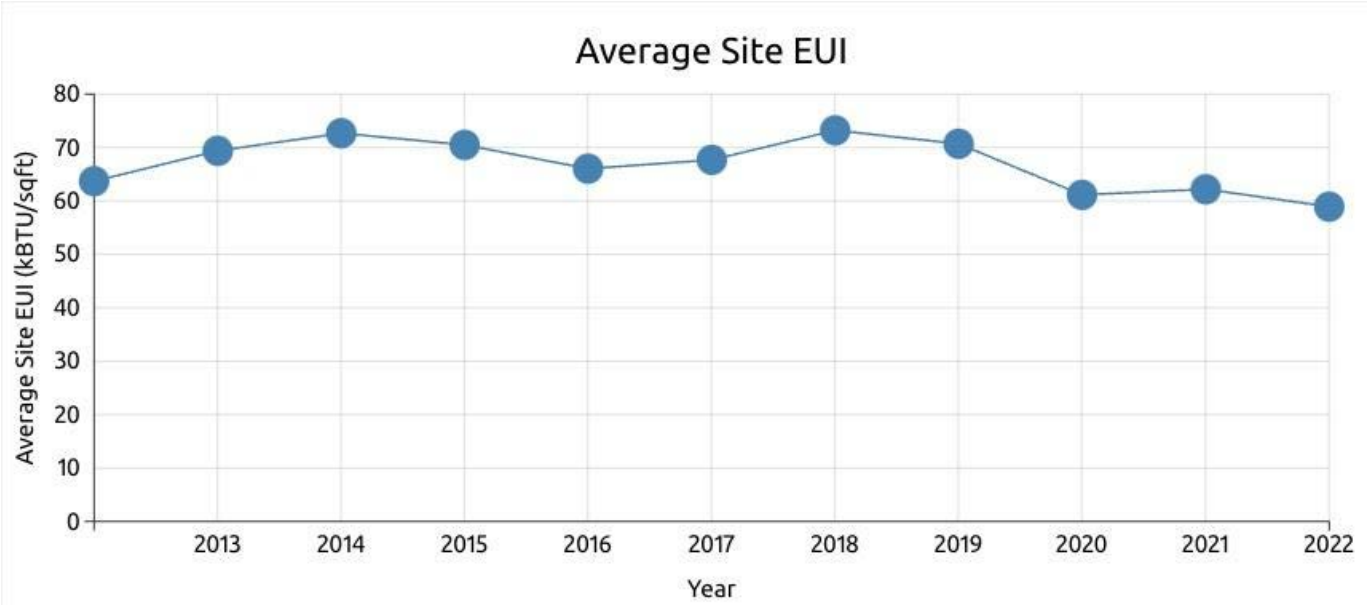
- Batch BETTER analysis of whole portfolio
- Required data for BETTER can be stored in SEED
  - Building type
  - ≥12 months of utility data
  - Location
- Can view BETTER reports/data in SEED
- SEED users can create data quality rules and labels to filter data

Case Study – Washington, D.C.



Case Study – Washington, D.C.

- Building Energy Performance DC
  - Now: buildings >25,000 SF
  - Calendar year 2024: buildings >10,000 SF
  - 3,208 buildings
  - ~298 million SF of total gross floor area covered



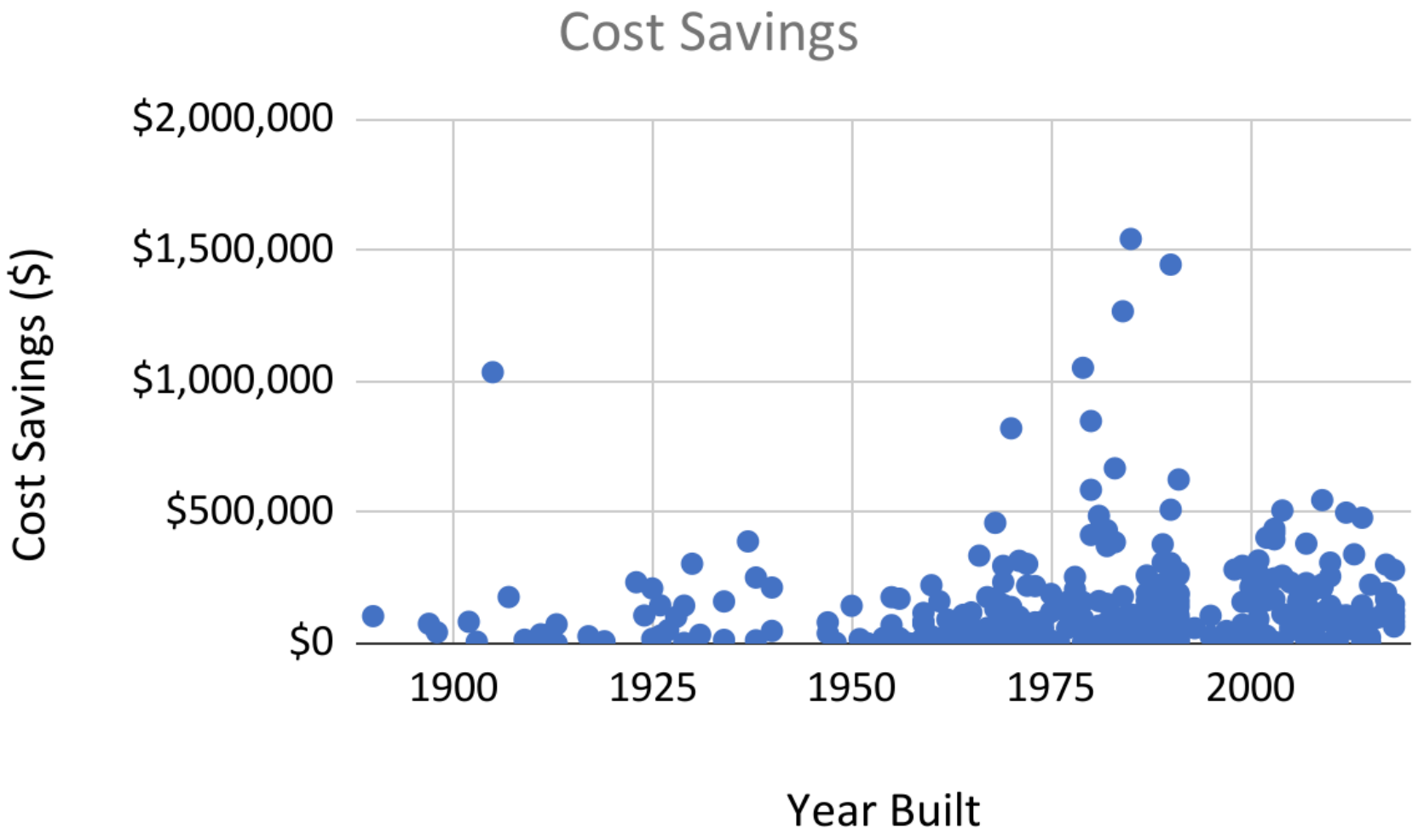
https://buildingperformancedc.org/

Case Study – Washington, D.C.

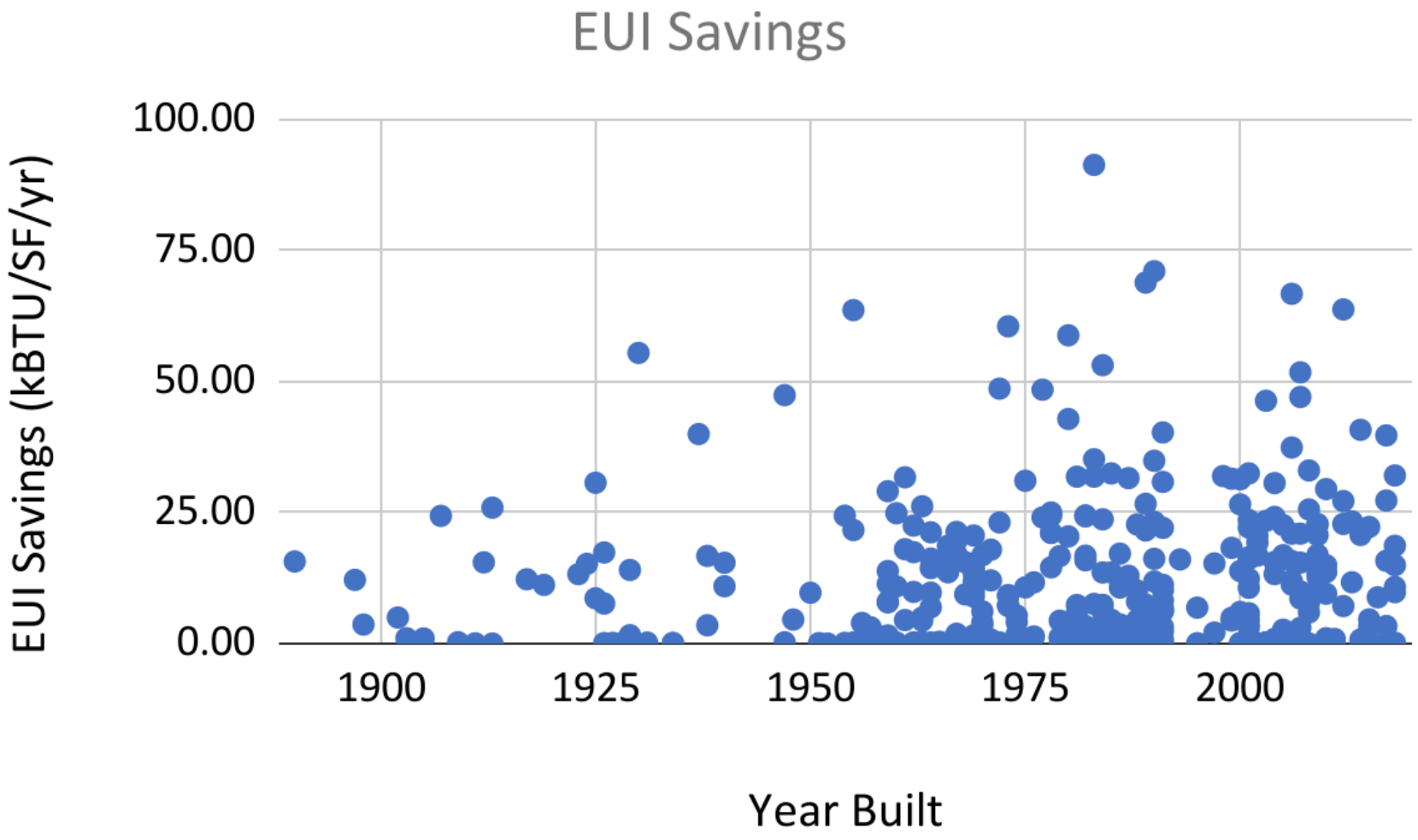
- BETTER Analysis of Office Buildings

Buildings	364
Gross Floor Area (SF)	101,792,937
Average Site EUI (kBTU/SF/yr)	49.48
Predicted Site EUI (kBTU/SF/yr)	37.27
Total Cost Savings ($)	$49,573,132

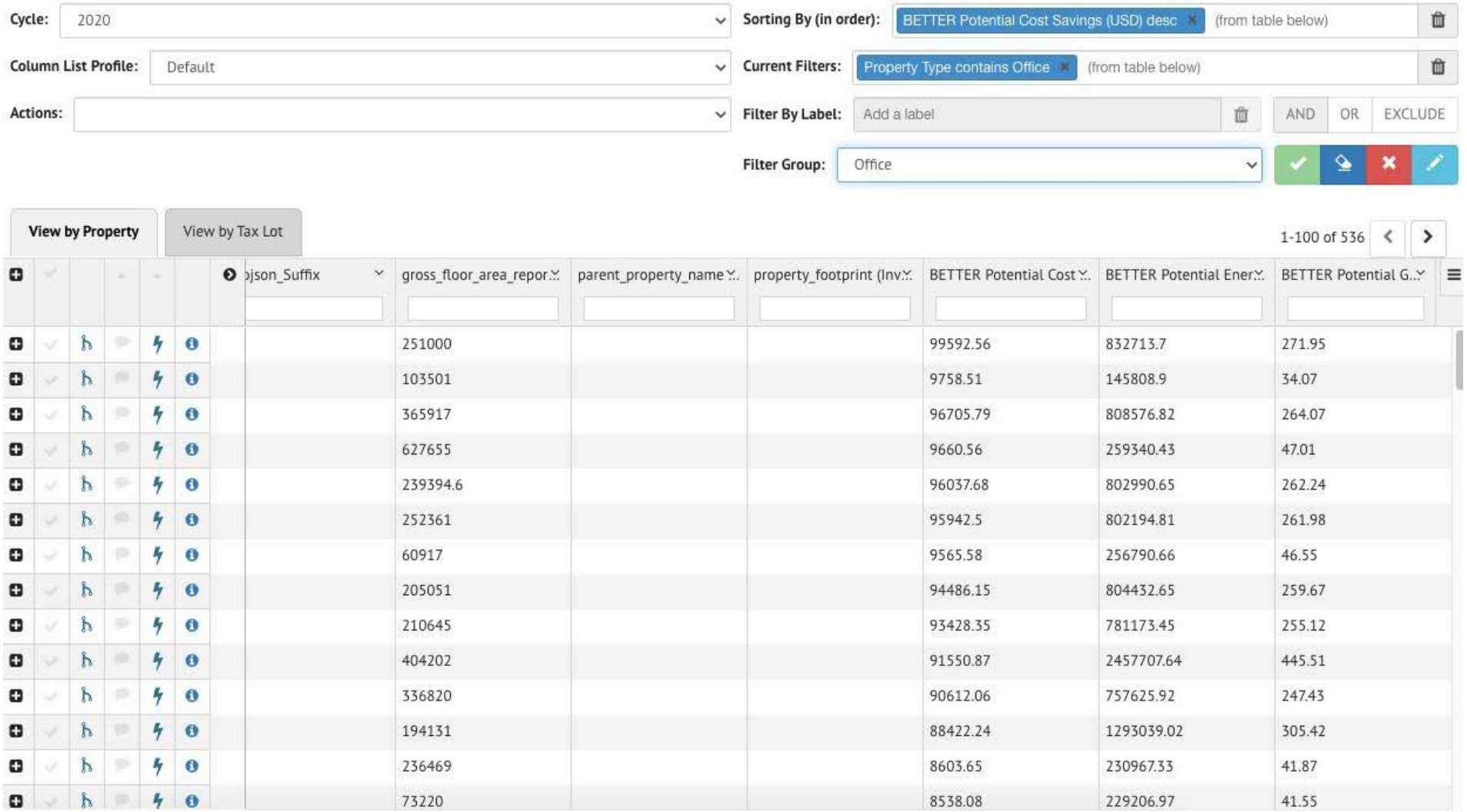
Case Study – Washington, D.C.



Case Study – Washington, D.C.

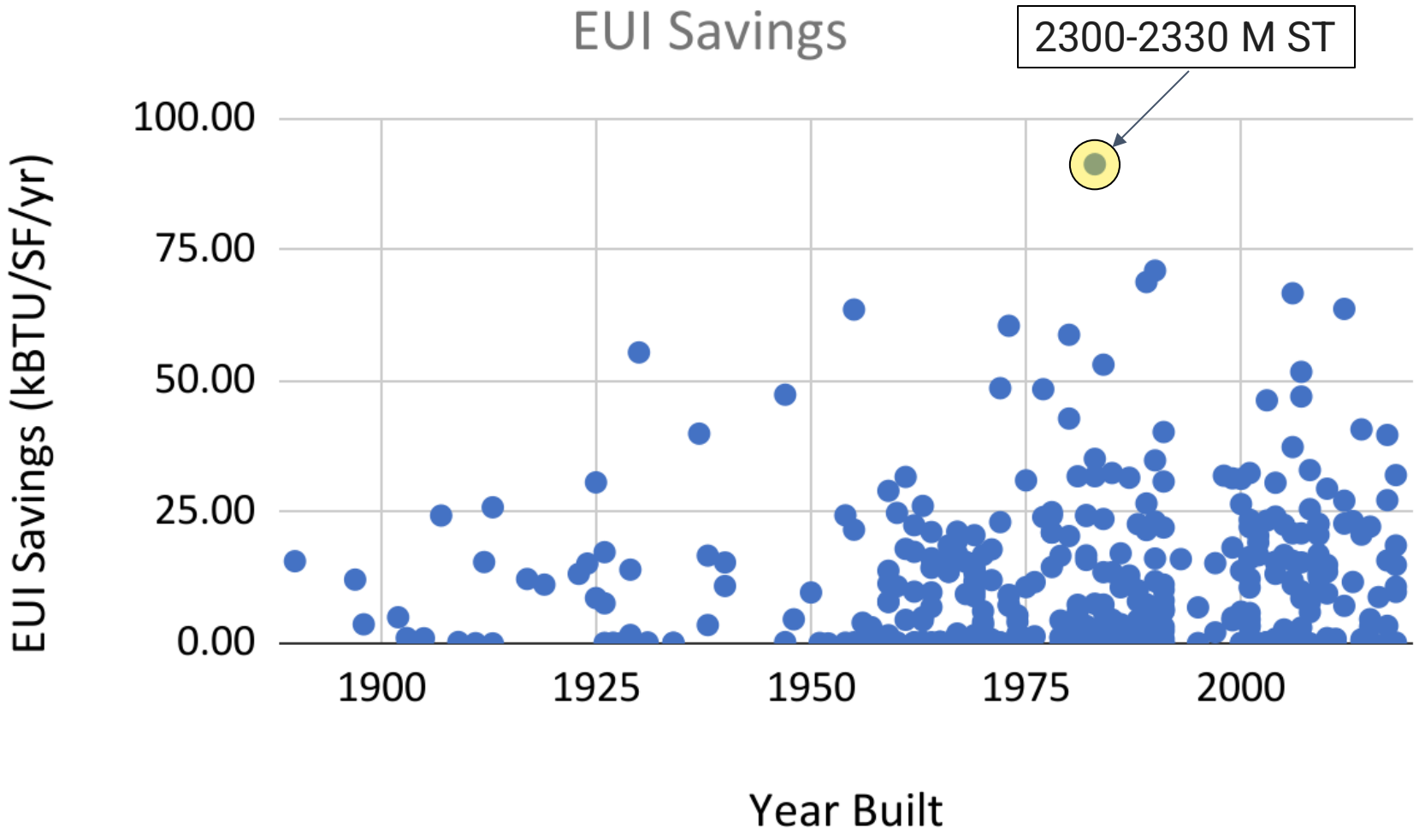


Case Study – Washington, D.C.



)json_Suffix	gross_floor_area_repor	parent_property_name	property_footprint (Inv	BETTER Potential Cost	BETTER Potential Ener	BETTER Potential G
	251000			99592.56	832713.7	271.95
	103501			9758.51	145808.9	34.07
	365917			96705.79	808576.82	264.07
	627655			9660.56	259340.43	47.01
	239394.6			96037.68	802990.65	262.24
	252361			95942.5	802194.81	261.98
	60917			9565.58	256790.66	46.55
	205051			94486.15	804432.65	259.67
	210645			93428.35	781173.45	255.12
	404202			91550.87	2457707.64	445.51
	336820			90612.06	757625.92	247.43
	194131			88422.24	1293039.02	305.42
	236469			8603.65	230967.33	41.87
	73220			8538.08	229206.97	41.55

Case Study – Washington, D.C.



Case Study – Washington, D.C.

Building Type:

Office

Gross Floor Area (ft^2):

120,871.8

Building Location:

WASHINGTON, DC

Closest Weather Station:

Station: 724050-13743 : Ronald Reagan Washington Natl Ap

Potential Cost Savings:

$387,027.08

71.1%

Potential Energy Savings:

11,041,732 kBTU

71.1%

Electricity Energy/Cost Savings:

71.1%

Fossil Fuel Energy/Cost Savings:

N.A.%

GHG Emissions Reduction (tCO_2e):

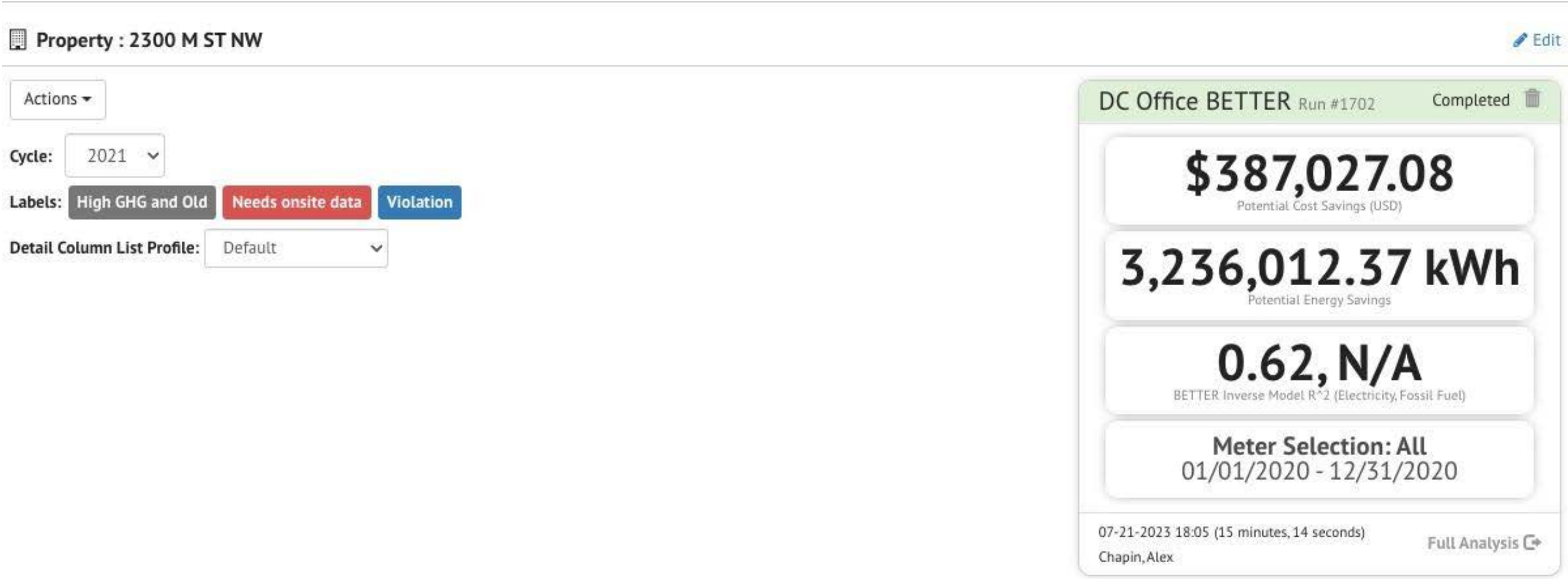
1,056.8

71.1%

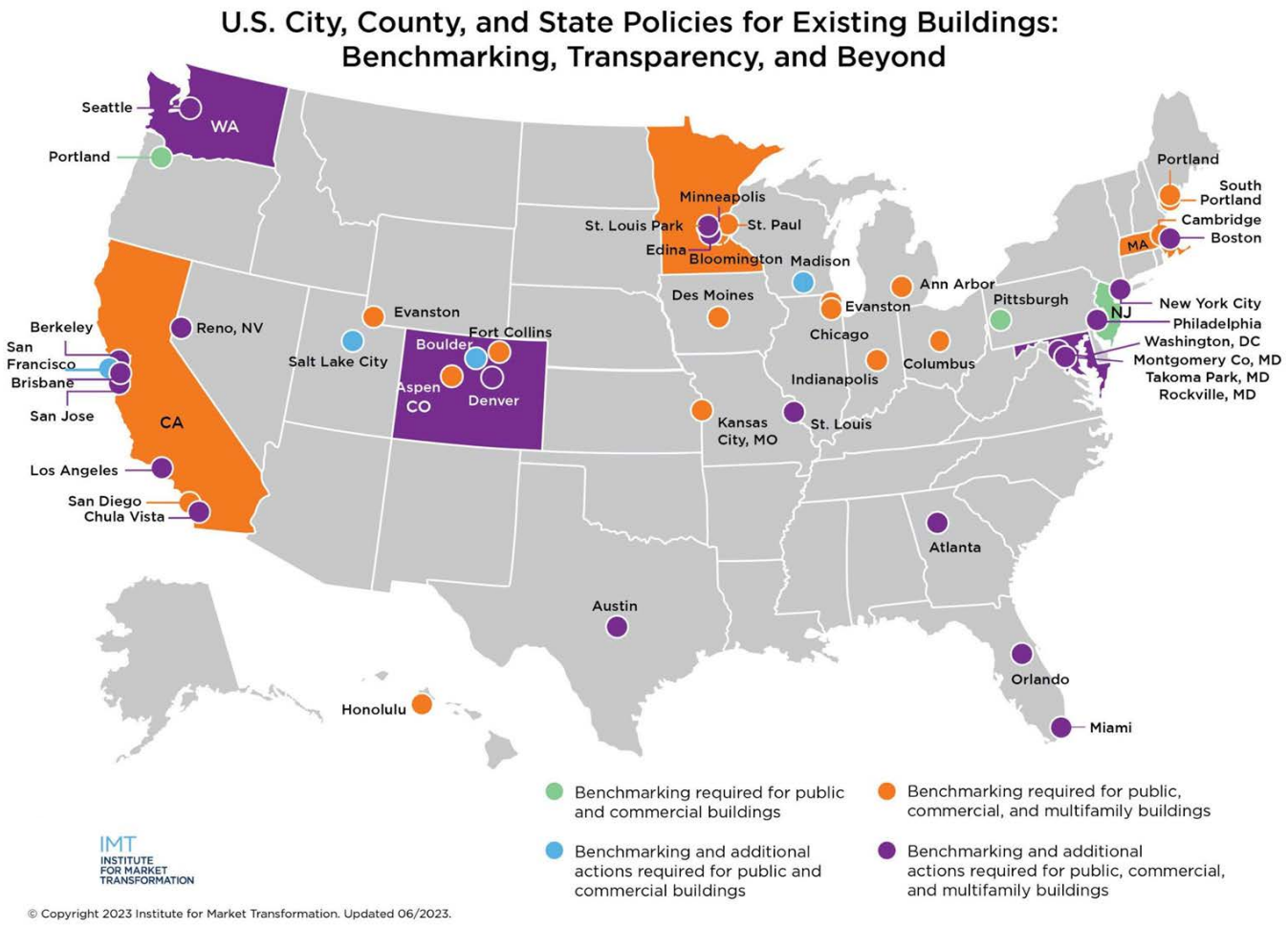
GHG Emissions Intensity Reduction ($kgCO_2e/ft^2$)

8.7

Case Study – Washington, D.C.



Case Study – Washington, D.C.



Conclusion

- BETTER provides insights for large building portfolios
- SEED connects with other tools to enable powerful insights and analyses
- Integrating SEED and BETTER connects real data with powerful insights for making energy-related decisions

Bibliography

Introduction and Basic Training for BETTER v 1.0.
https://better.lbl.gov/static/pdf/BETTER.Training.Slides_V.18.0_Analytical%20Methodology_08.10.2022.8a79b102eb73.pdf

DC Affordable Housing Retrofit Accelerator
https://www.dcseu.com/retrofitaccelerator

Questions?

Alex Chapin - alex.chapin@nrel.gov

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