The Un-Tapped Potential of Existing Buildings in the Quest for Carbon Neutrality

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OHIO HISTORY CONNECTION

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Trenches

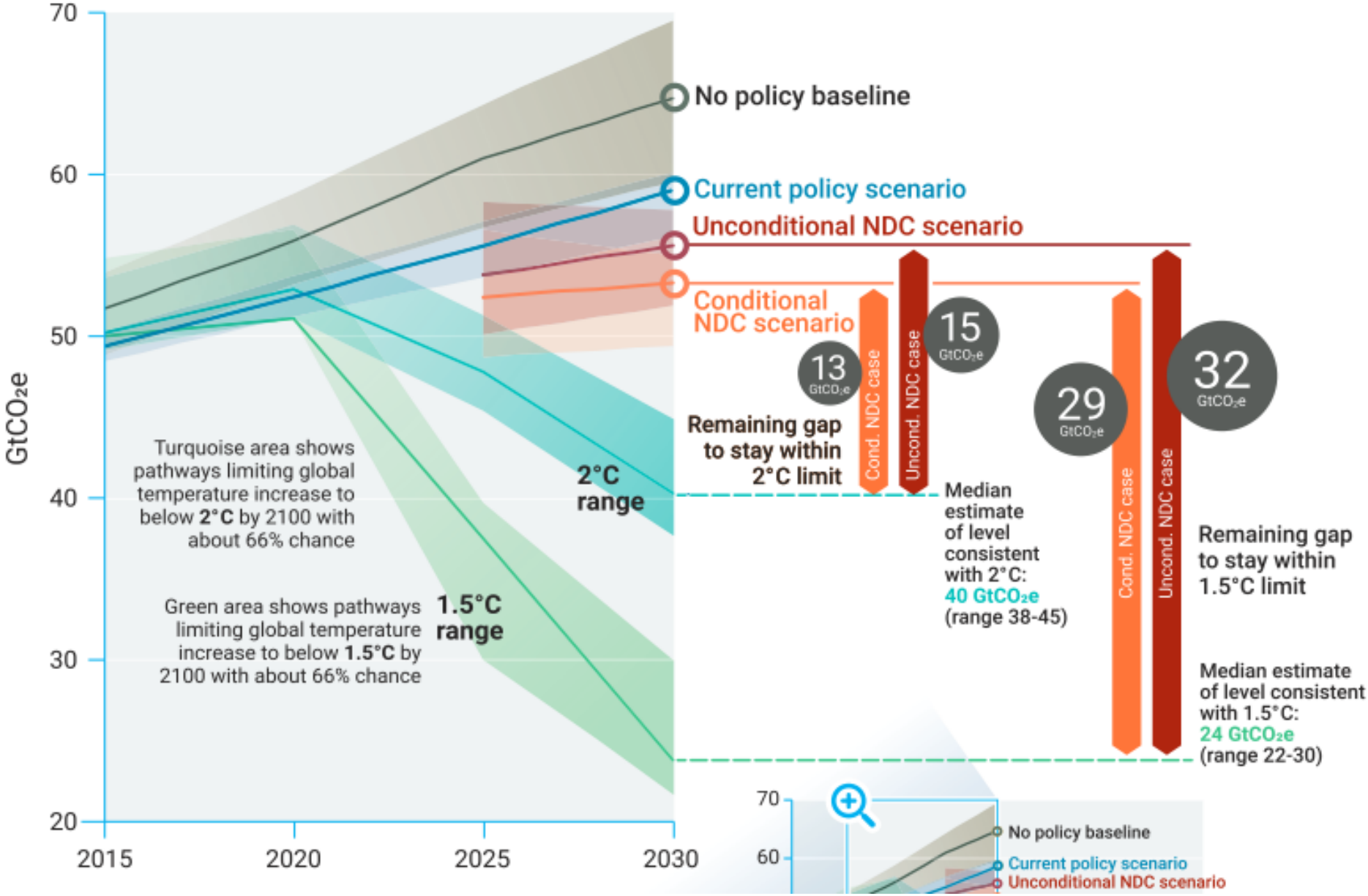
UN Emissions Gap Report 11/2018

"The opportunity to bridge the 1.5°C gap is dwindling… the kind of unprecedented action we urgently need is not happening yet…global CO_2 emissions did increase in 2017 after a few years of stagnation.

Even if the nations of the world live up to their current commitments, that will likely result in global warming of around 3°C by the end of the century. That's a number that would be catastrophic – and fatal for many small island states and coastal areas."

http://www.unenvironment.org/emissionsgap - Foreword by Joyce Msuya

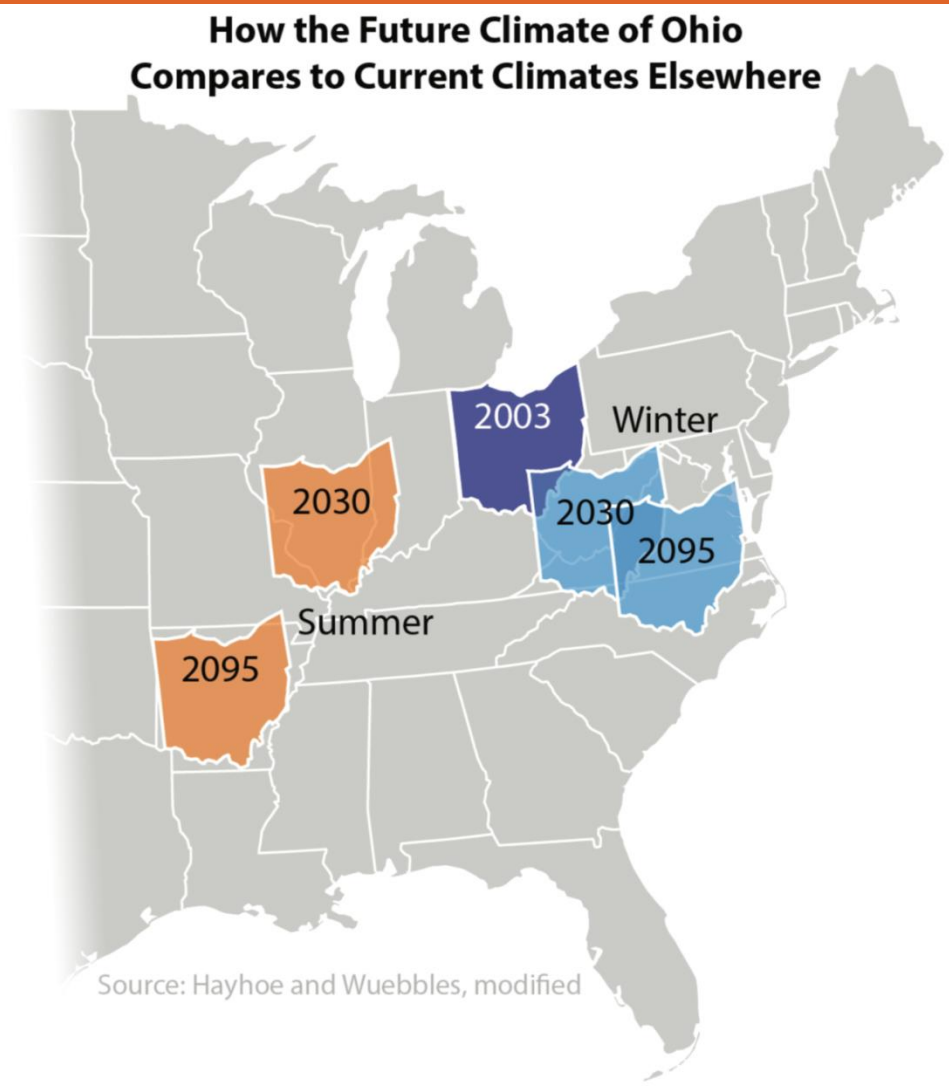
Figure ES.3: Global greenhouse gas emissions under different scenarios and the emissions gap in 2030 (median estimate and 10th to 90th percentile range).



http://www.unenvironment.org/emissionsgap - Figure ES.3 from Executive Summary

Why (Else) Ohio Cares?

- Polar Bears – just the zoo
- Sea level – we don't have beaches
- Hurricanes – those give us nice warm rain



Zero Energy Buildings

- "Closing the Emissions Gap means upping our ambition. Net zero must become the new mantra, and we must pursue this goal with confidence."

http://www.unenvironment.org/emissionsgap - Foreword by Joyce Msuya

Net-Zero Definitions

- Site Energy
- Source Energy
- Energy Cost
- Emissions
- California

Source: National Renewable Energy Laboratory (NREL)
http://www.nrel.gov/sustainable_nrel/pdfs/44586.pdf

Torpedo the Definitions

- What are they all trying to achieve?
  - ↓ CO_2, energy consumed, fossil fuel reliance
  - ↑ Renewable generation, efficiency

- So what if you only get 90% of the way there?
  - Did you fail?
  - Are you afraid of 0
  - Please remember this theme as we continue

ZEB Resources for New Construction

- DOE, NREL, ILFI, NBI, ACEEE
- Barriers overcome
  - Technology (Can we & how?)
  - Case Studies
  - Cost
    - NREL RSF
    - Cash flow / financing
- Remaining barriers:
  - Perception (what?)
  - Market (who wants?)

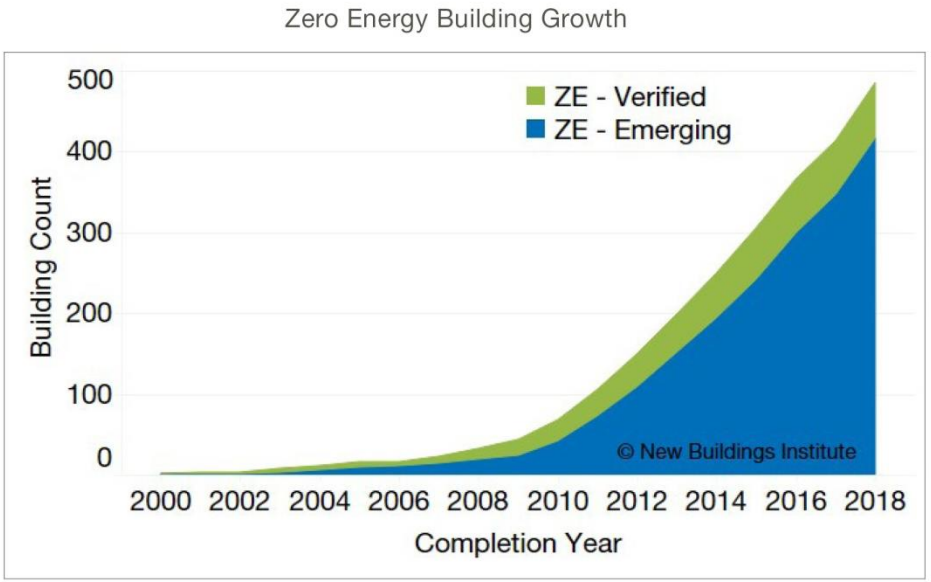


Fig 1. The Buildings List includes nearly 500 projects and is on a steep curve upward, having increased over 700% since 2012.

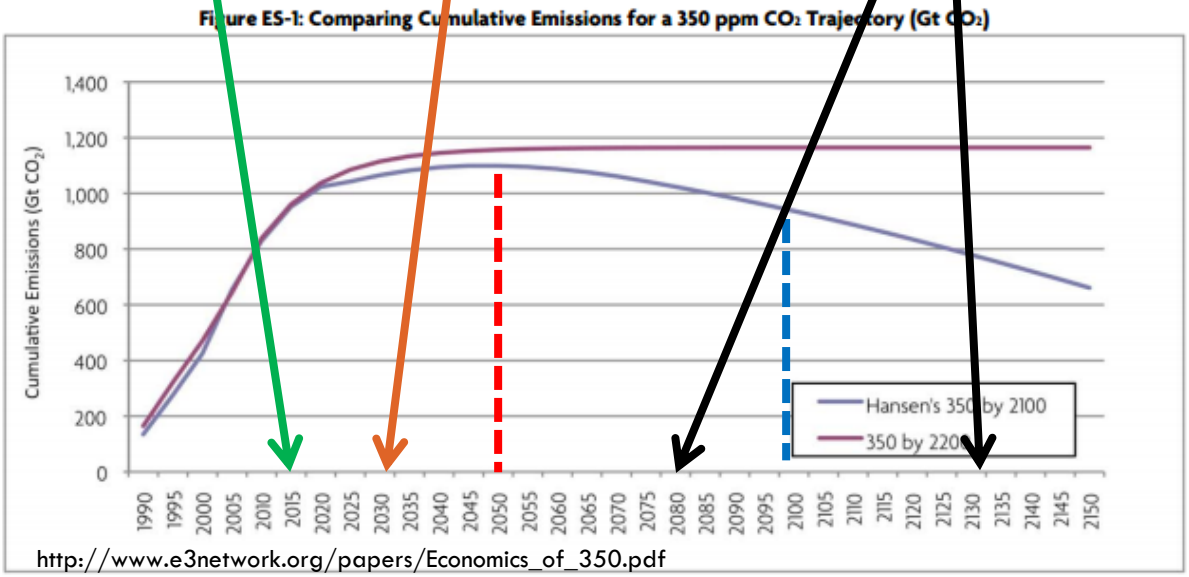
https://newbuildings.org/wp-content/uploads/2018/01/Fig1_2018GtZList.jpg

Back-Casting from the Goal

2018 – You are STILL Here

2030 – AIA achieved

30-80 years late for CO_2 neutral.



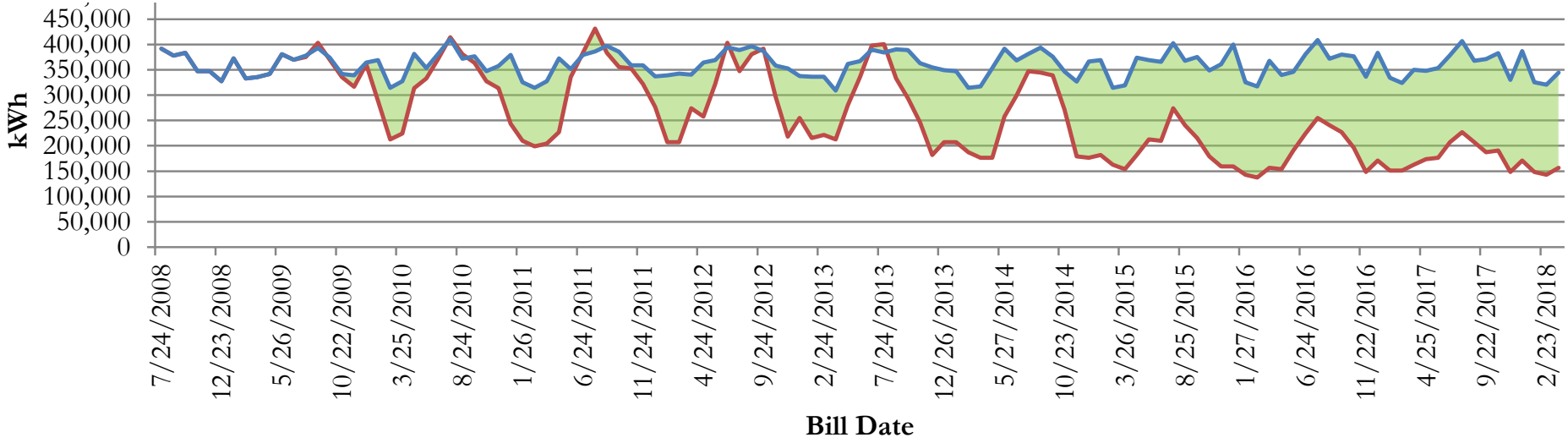
http://www.e3network.org/papers/Economics_of_350.pdf

2050 – CO_2 Neutral Economy – What?!

2100 – 350 ppm! We did it! Catastrophic Climate Change Avoided

The Ohio History Center

M&V Results


kWh
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350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
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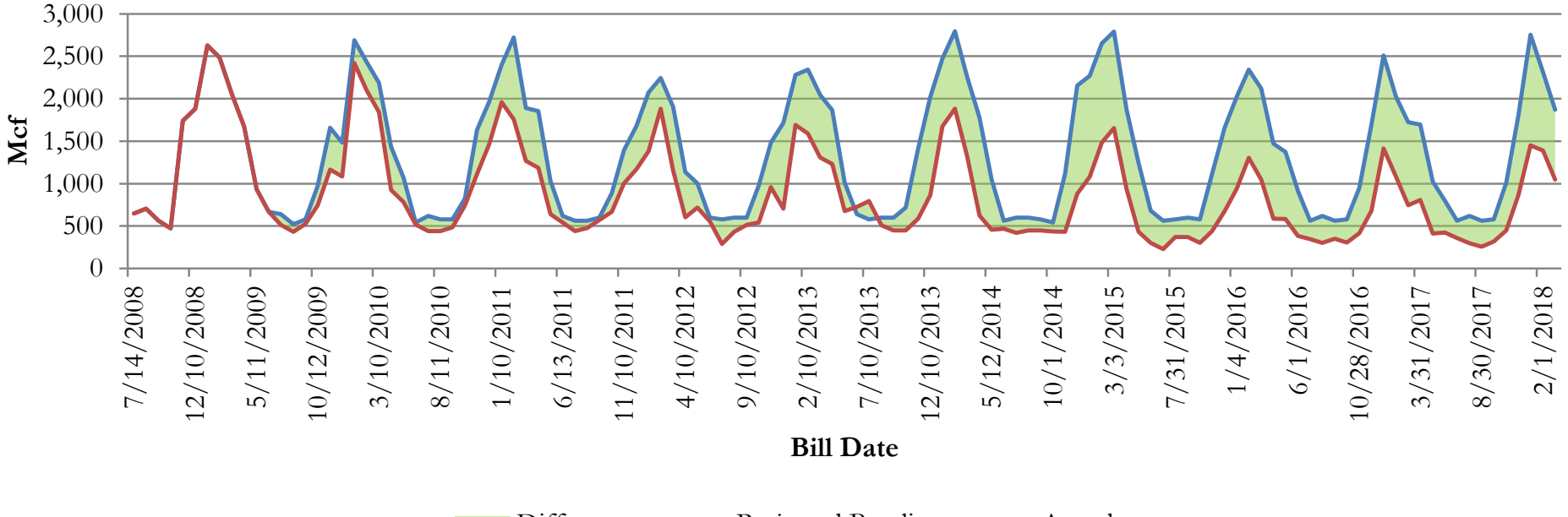
5/26/2009
10/22/2009
3/25/2010
8/24/2010
1/26/2011
6/24/2011
11/24/2011
4/24/2012
9/24/2012
2/24/2013
7/24/2013
12/26/2013
5/27/2014
10/23/2014
3/26/2015
8/25/2015
1/27/2016
6/24/2016
11/22/2016
4/25/2017
9/22/2017
2/23/2018
Bill Date
Difference
Actual
Projected Baseline


Mcf
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2,500
2,000
1,500
1,000
500
0
7/14/2008
12/10/2008
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3/10/2010
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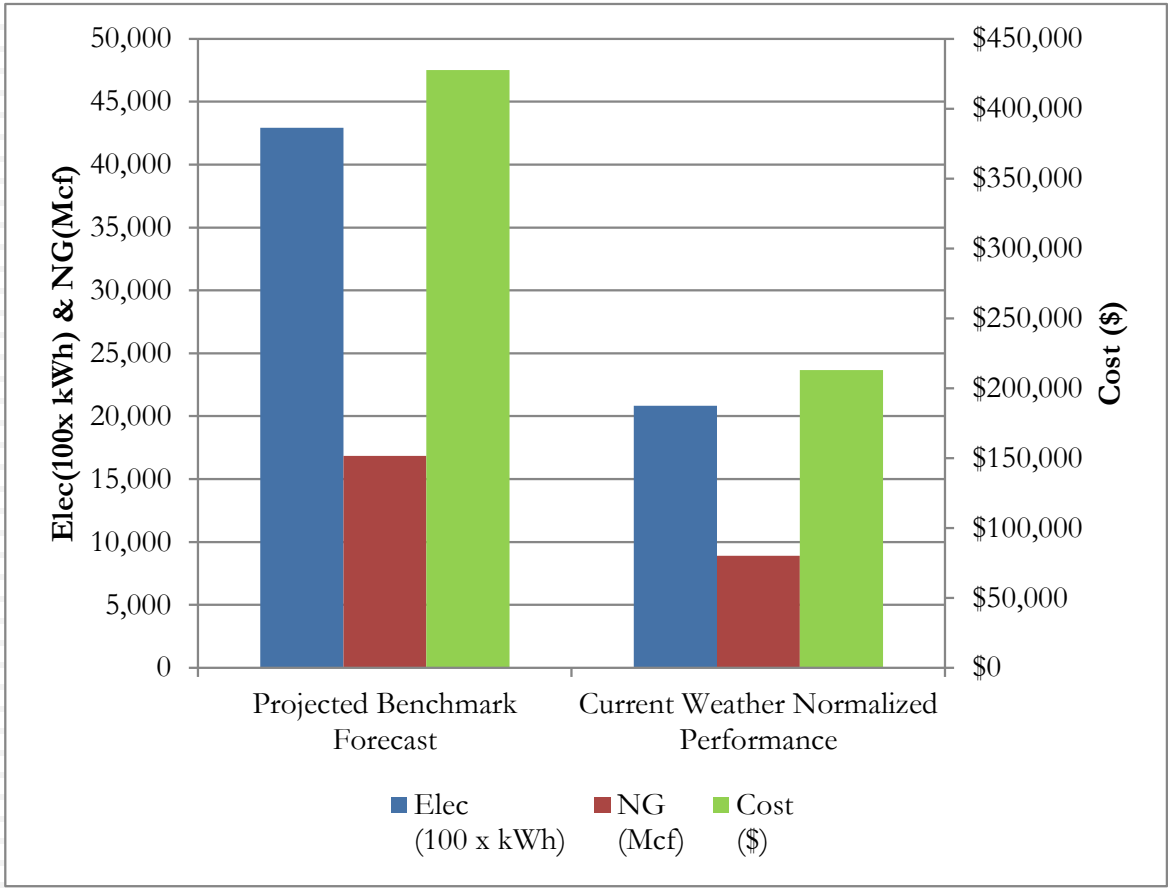
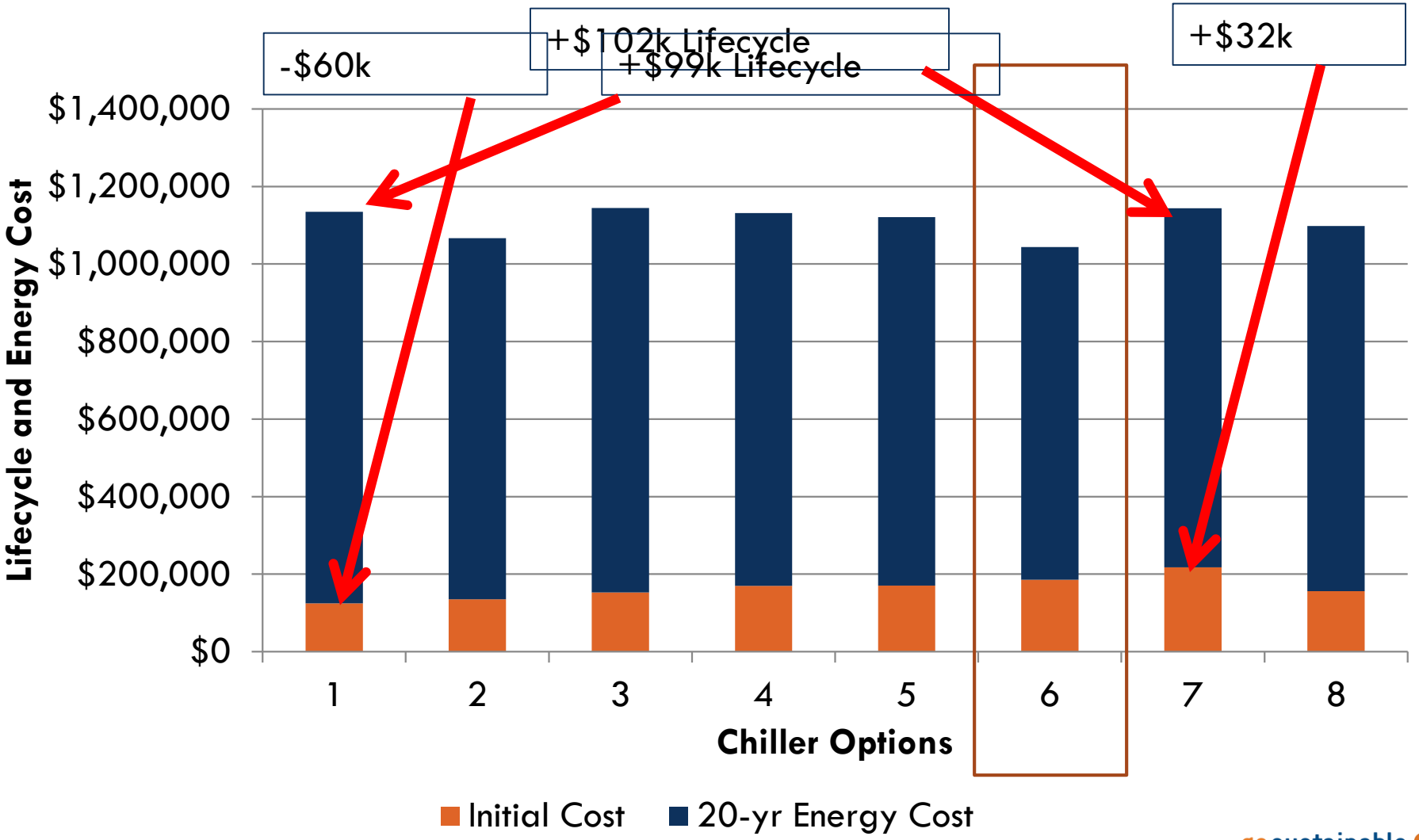
6/13/2011
11/10/2011
4/10/2012
9/10/2012
2/10/2013
7/10/2013
12/10/2013
5/12/2014
10/1/2014
3/3/2015
7/31/2015
1/4/2016
6/1/2016
10/28/2016
3/31/2017
8/30/2017
2/1/2018
Bill Date
Difference
Projected Baseline
Actual

Deep Energy Retrofit

- 50% Savings
- $1.2 Million Cumulative
- Weather Normalized



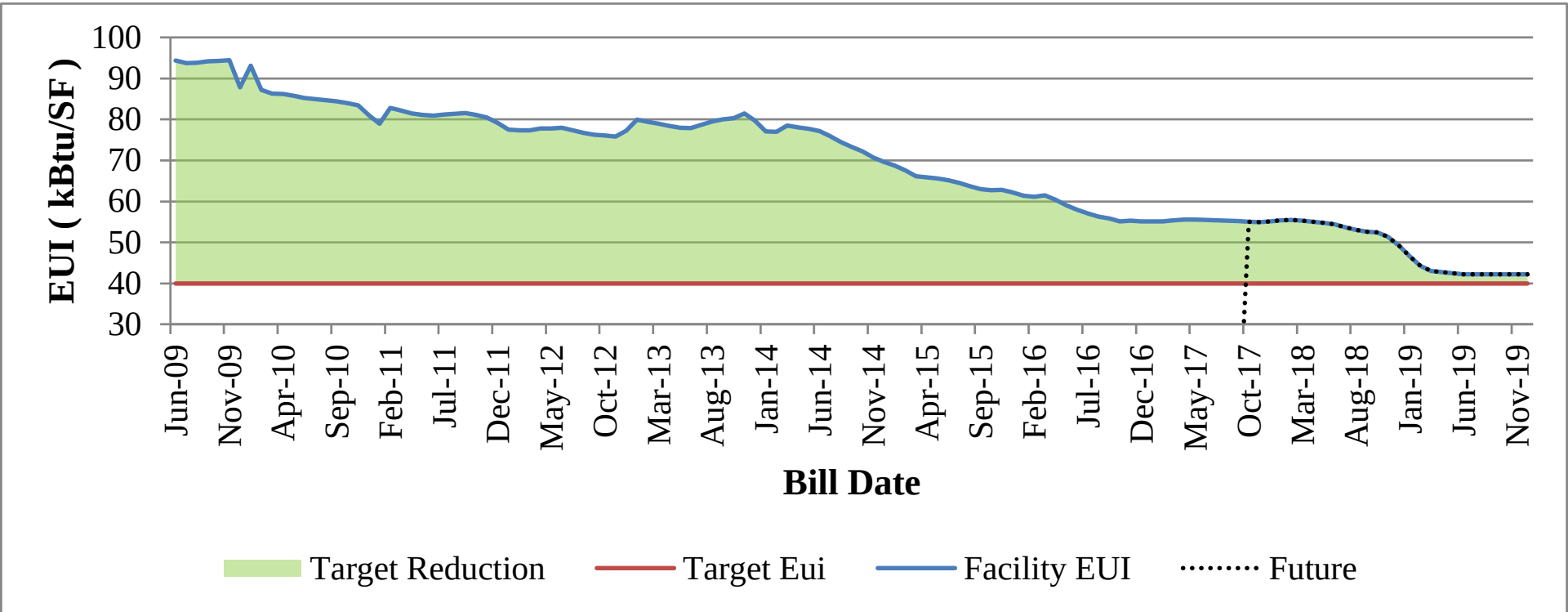
Incremental Investment



Where to?

EUI 95 to 55 in a decade!

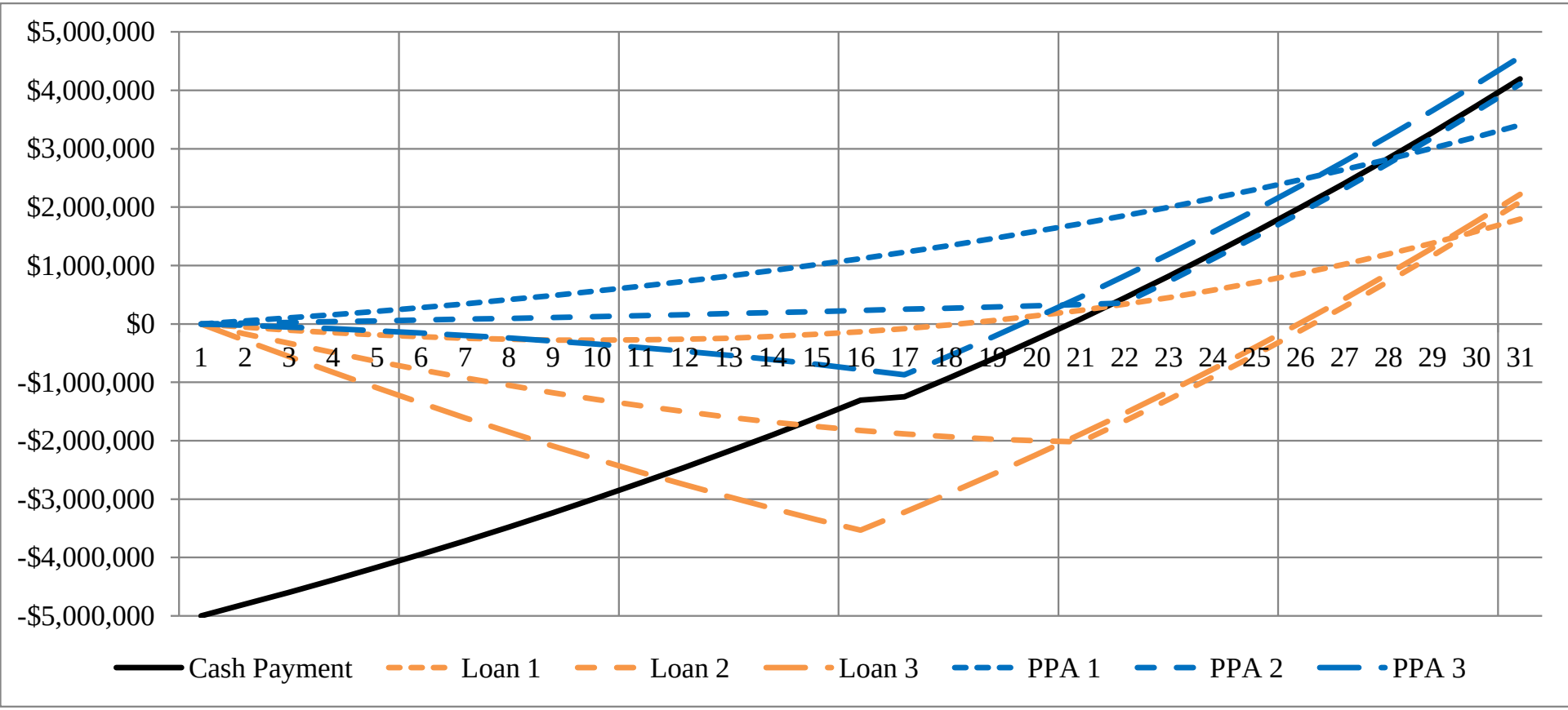
- ZEB-Ready at ~40 kBtu/ft^2
  - 80th percentile of ZEB (NBI)
  - Most projects already identified!



Silver Bullet to Avoid Extinction?

Just need half the parking lot.

PPA – 30-year Cash-Flow Scenarios



- NPV would enhance the PPAs
- 2 MW, $2.5M, $0.08/kWh, Ohio, 3% utility cost escalation rate, RECS retained and retired

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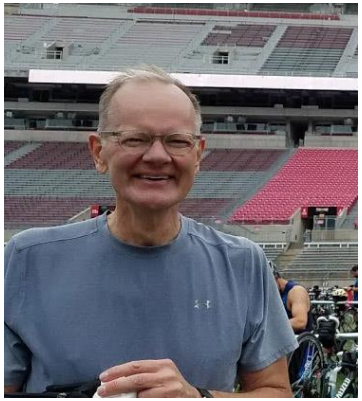
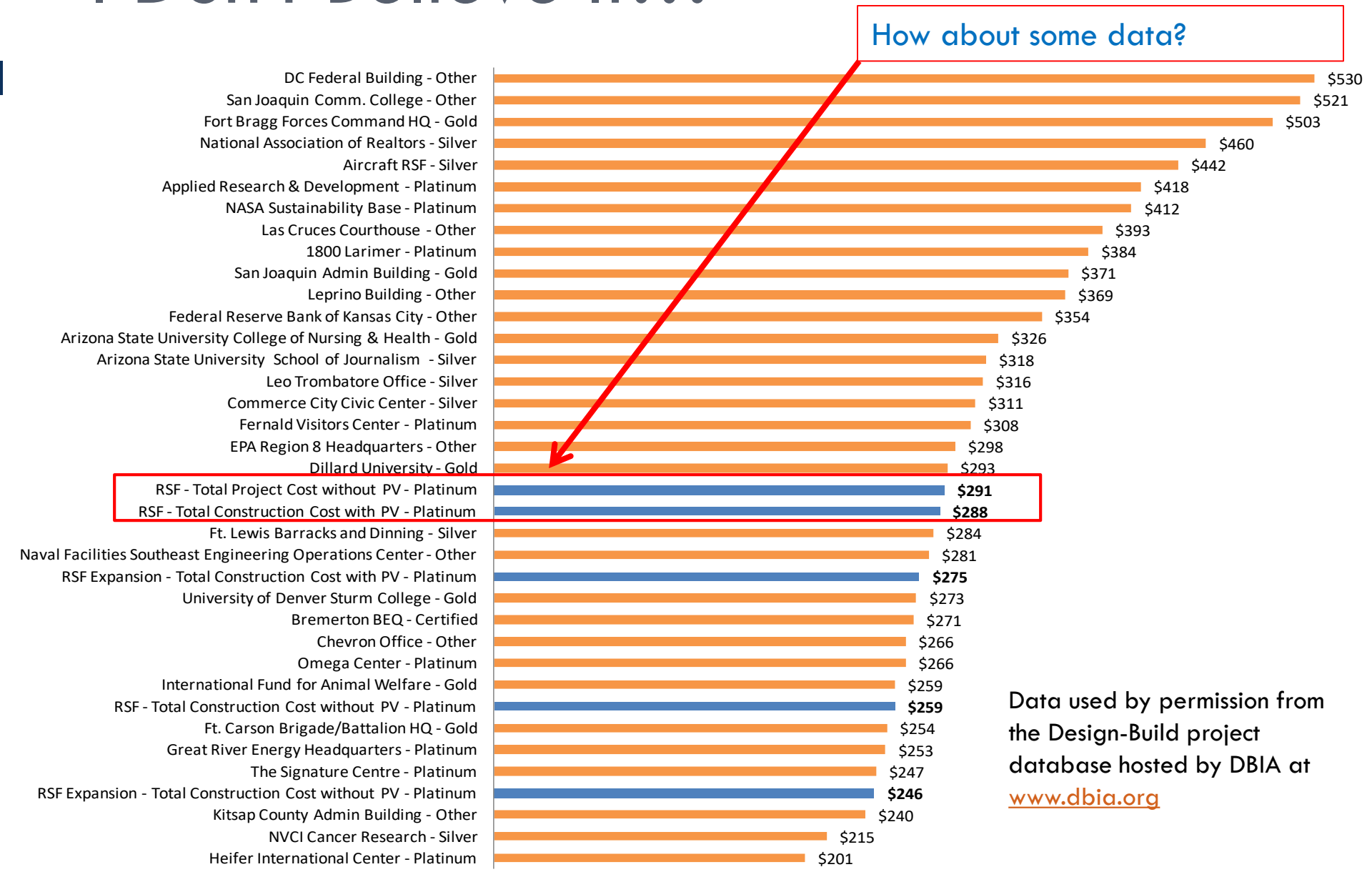


Amy Kaspar (akaspar@ohiohistory.org), Fred Smith

I Don't Believe It…



Data used by permission from the Design-Build project database hosted by DBIA at www.dbia.org