The best way to

improve the energy efficiency

of a building is by

taking a holistic approach to energy projects,
and financial measures to achieve an optimal result.

Five steps to success

Identify Opportunities

Evaluate Concepts

Create Packages

Implement Projects

Measure Success

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Create a replicable model

Demonstrate how to cost-effectively retrofit a large multi-tenant office building to inspire others to embark on integrated energy efficiency retrofits.

1. Identify opportunities

- 60+ energy efficiency ideas were narrowed to 17 implementable projects
- Team estimated theoretical minimum energy use
- Developed eQUEST energy model

2. Evaluate measures

- Net present value
- Greenhouse gas savings
- Dollar to metric ton of carbon reduced
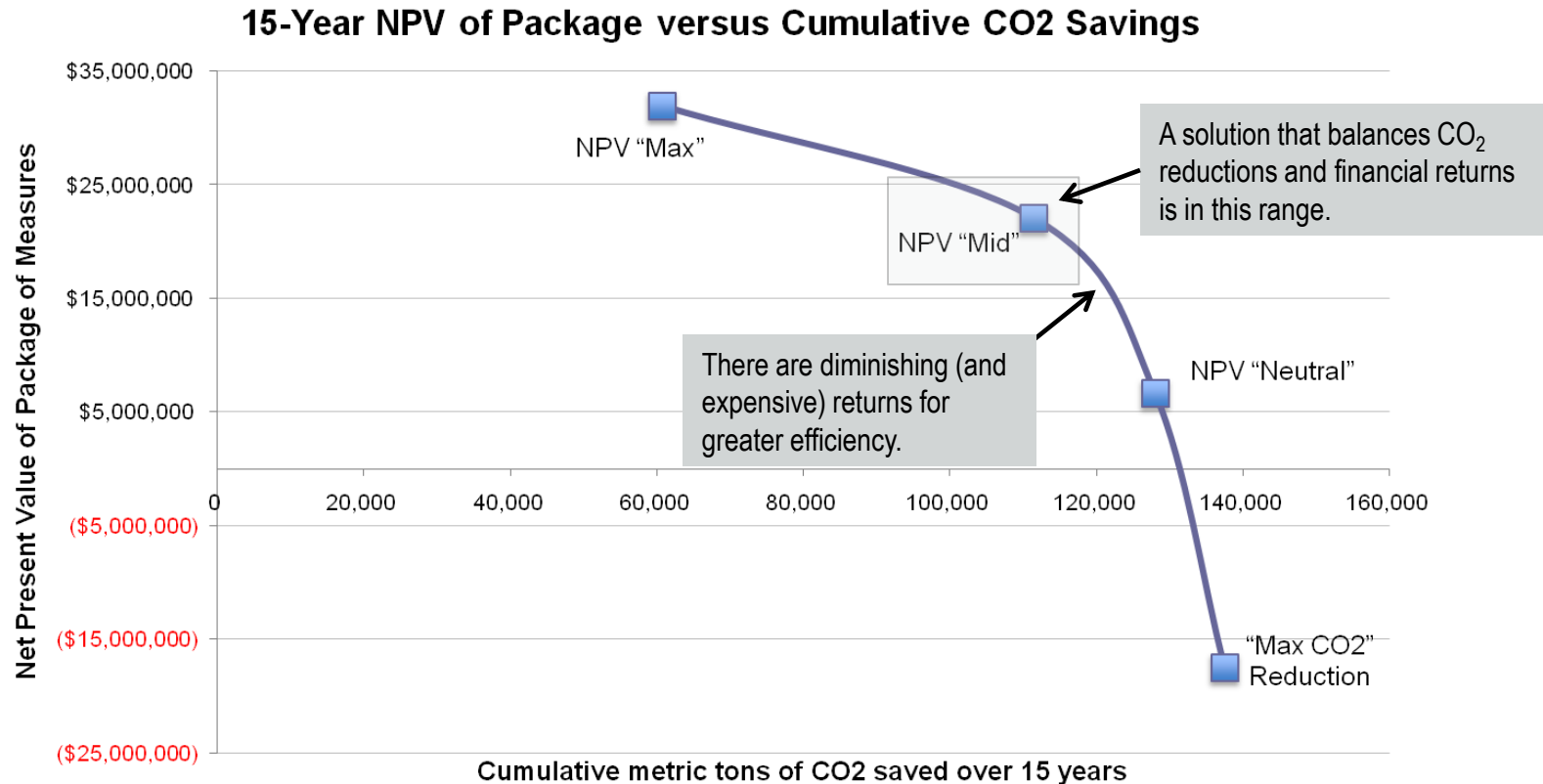- Calculated for each measure

3. Create packages

- Maximize net present value
- Balance net present value and CO_2 savings
- Maximize CO_2 savings for a zero net present value
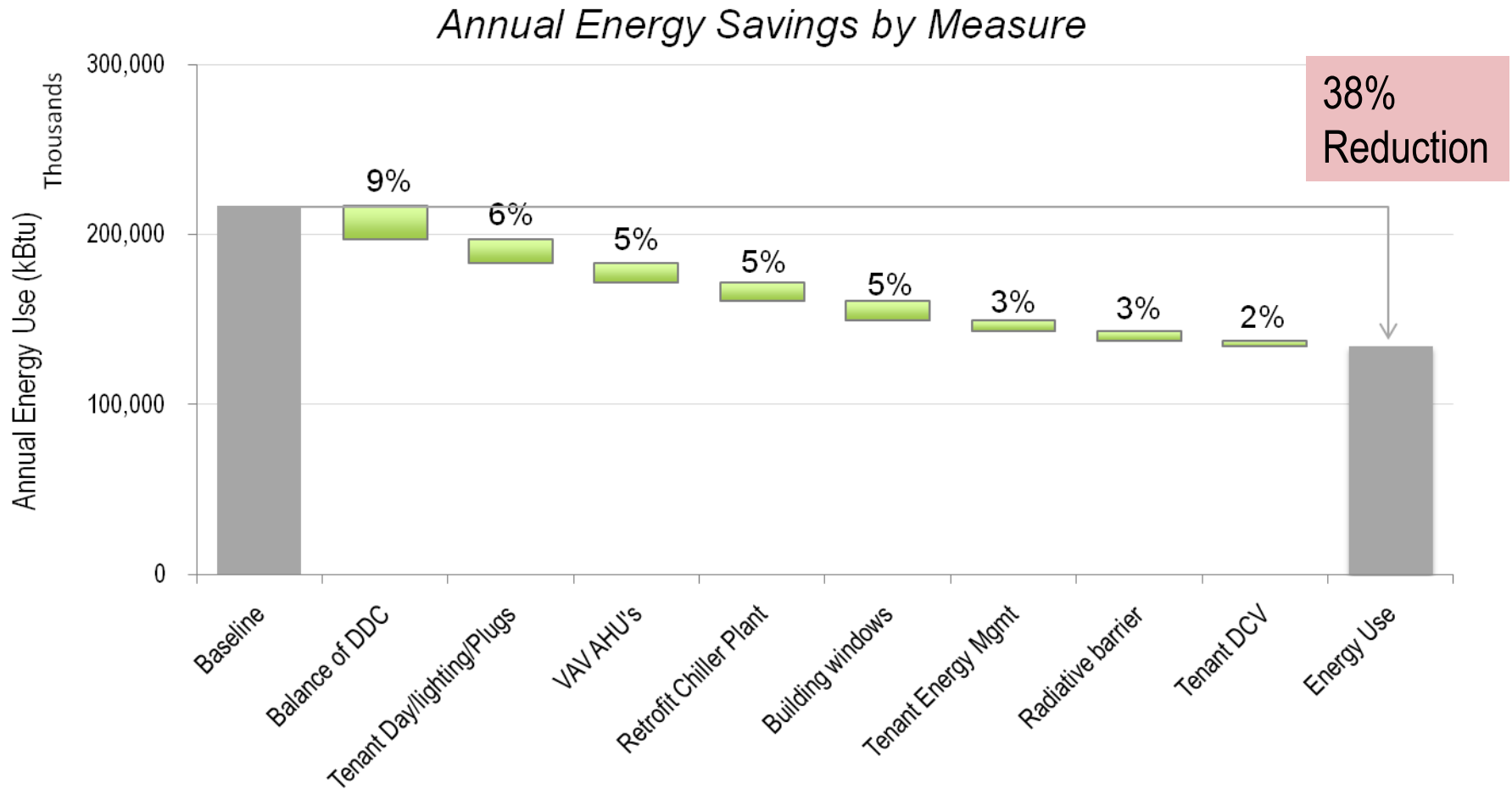- Maximize CO_2 savings

4. Model iteratively

- Iterative energy and financial modeling process to identify final eighht recommendations

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Balance financial return & carbon reduction
Achieve a high level of CO$_2$ and energy reduction cost-effectively

15-Year NPV of Package versus Cumulative CO2 Savings

NPV "Max"

A solution that balances CO$_2$ reductions and financial returns is in this range.

NPV "Mid"

There are diminishing (and expensive) returns for greater efficiency.

NPV "Neutral"

"Max CO2" Reduction

Net Present Value of Package of Measures (y-axis): $35,000,000 / $25,000,000 / $15,000,000 / $5,000,000 / ($5,000,000) / ($15,000,000) / ($25,000,000)

x-axis: 0 / 20,000 / 40,000 / 60,000 / 80,000 / 100,000 / 120,000 / 140,000 / 160,000

Cumulative metric tons of CO2 saved over 15 years

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Putting the pieces together

Annual Energy Savings by Measure

Model for Energy Retrofits

- Replicating this process in over 30 buildings nationally
- Summary of buildings where this process has been implemented

	Capital cost	Energy reduction	Annual savings	Payback period
Bldg. A	$4,000,024	50%	$2,501,756	1.6 years
Bldg. B	$1,763,280	23%	$321,805	5.5 years
Bldg. C	$1,625,469	20%	$463,055	3.5 years
Bldg. D	$1,509,064	42%	$398,169	3.9 years
Bldg. E	$1,269,885	29%	$314,460	4.0 years
Bldg. F	$700,225	26%	$242,426	2.9 years