Net Zero: Thinking, Paradigms and Money

Bill Maclay, FAIA, LEED AP
Wellesley, MA 1/21/19

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Maclay Architects' Path to Net Zero

1971

2014

1970's	1980's	1990's	2000's	2010's
Solar experimentation	Energy Conservation	Building Science	Healthy Buildings	NZ Buildings and Communities

Renewable NRG systems Phases 1 and 2

Putney School Field House

photo by Jim Westphalen

Aiken Center at UVM

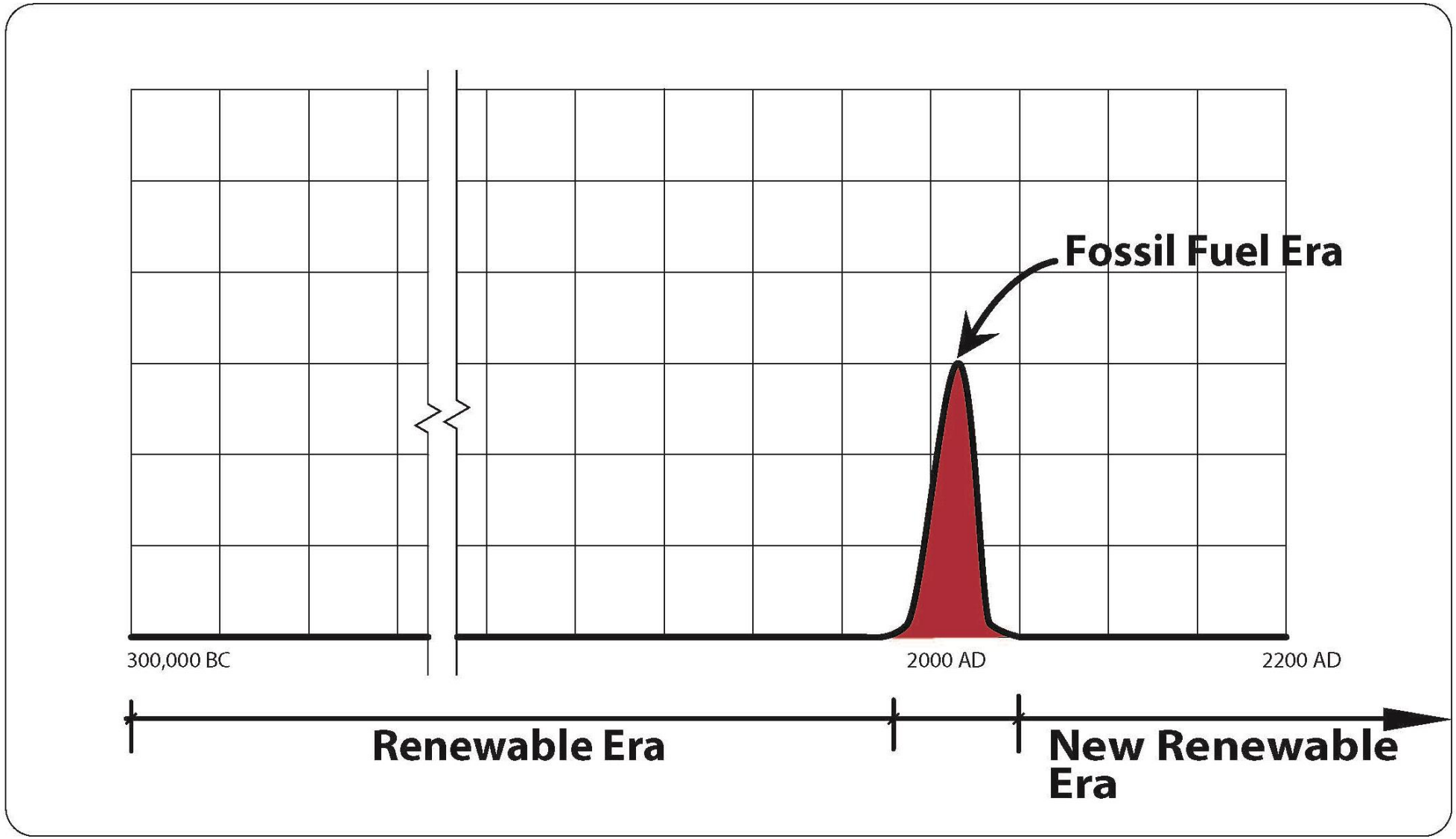
photo by Jim Westphalen

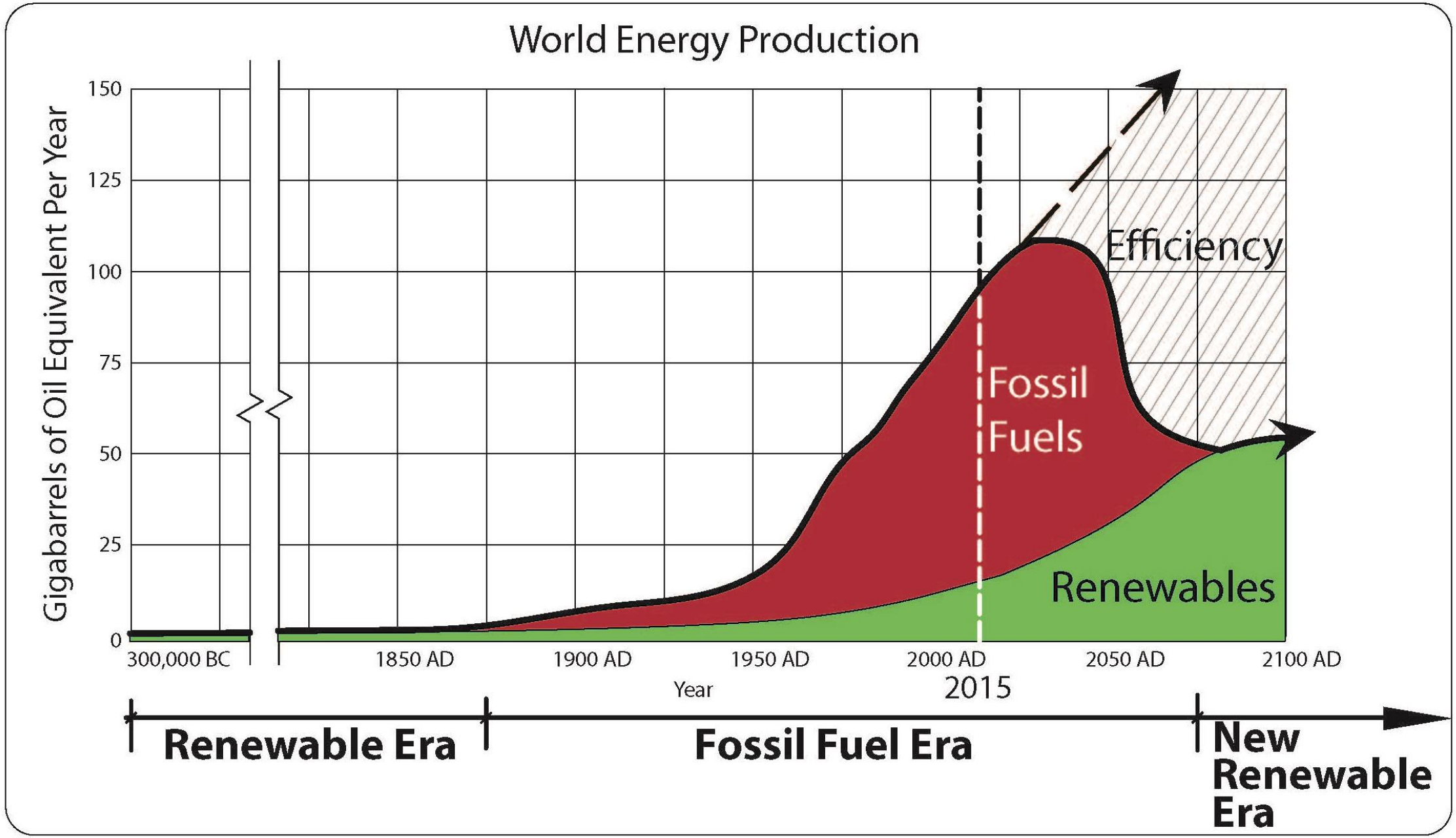
Coastal Maine Botanical Gardens

Photo by Robert Benson

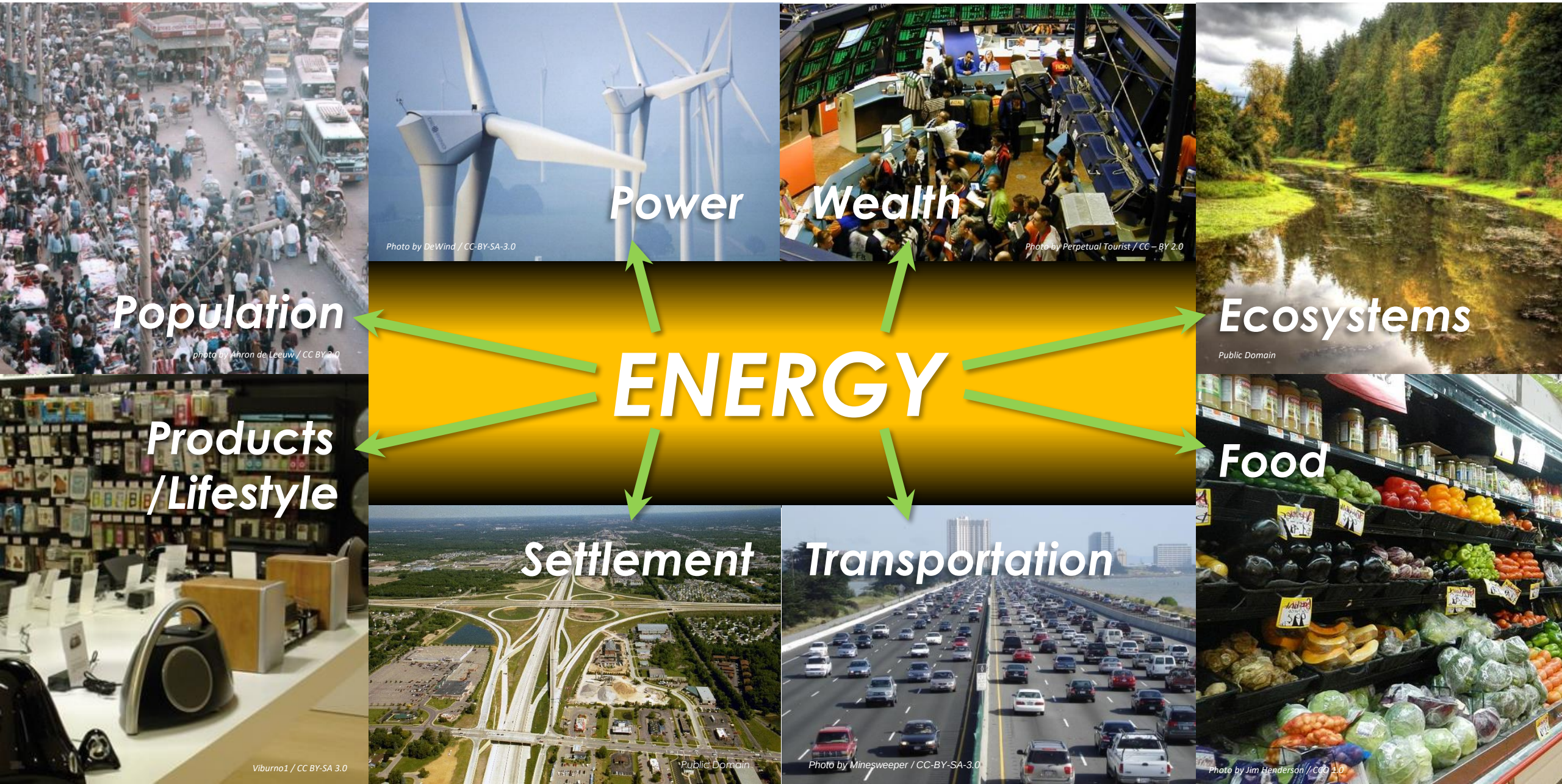
North Country School Performing Arts Center

Fossil Fuel Aberration




World Energy Production
Gigabarrels of Oil Equivalent Per Year
150
125
100
75
50
25
0
300,000 BC
1850 AD
1900 AD
1950 AD
2000 AD
2050 AD
2100 AD
Year
2015
Efficiency
Fossil Fuels
Renewables
Renewable Era
Fossil Fuel Era
New Renewable Era

Energy at the center



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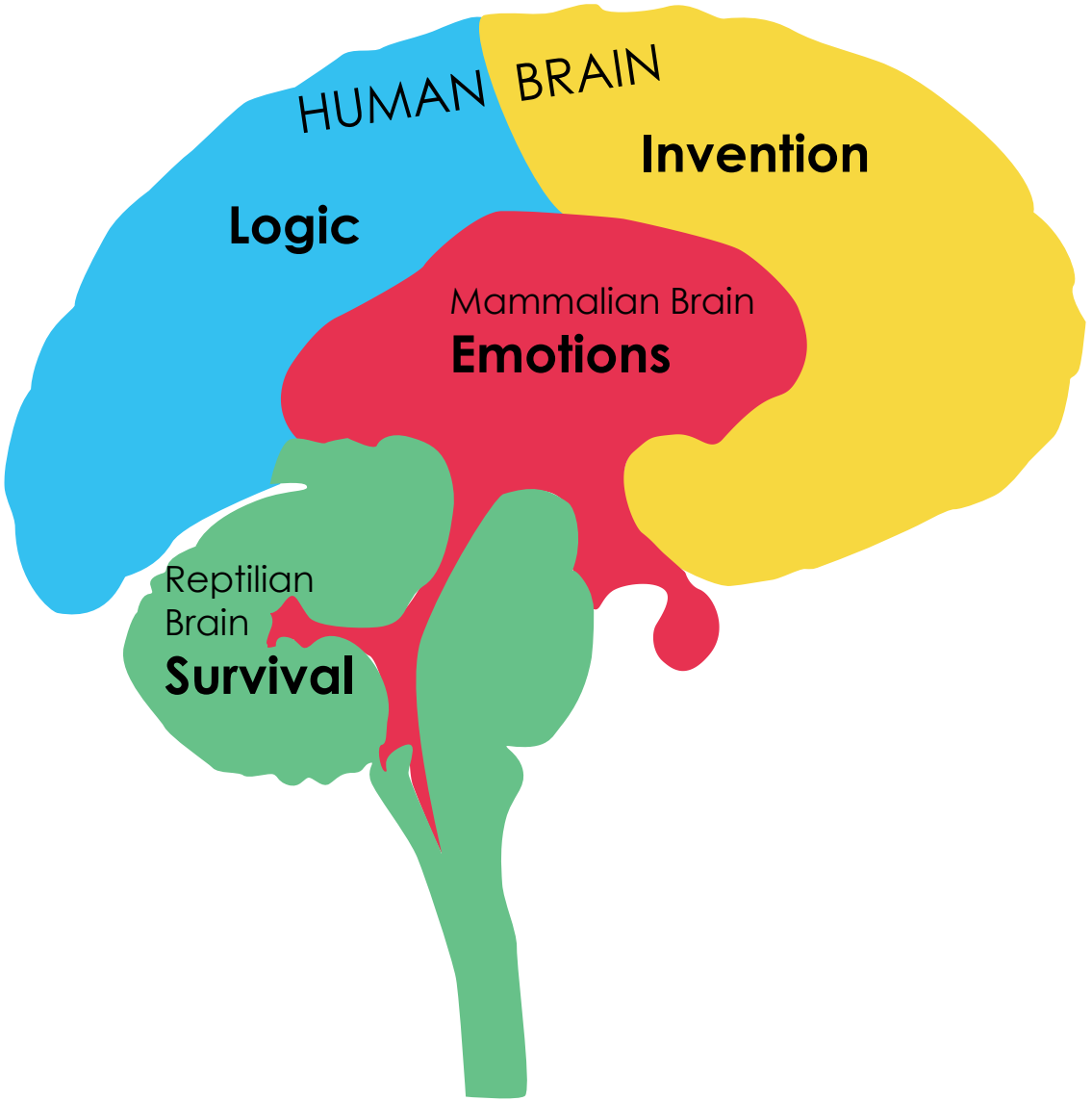
Do We Think In Multiple Ways?



Whole Brain Thinking

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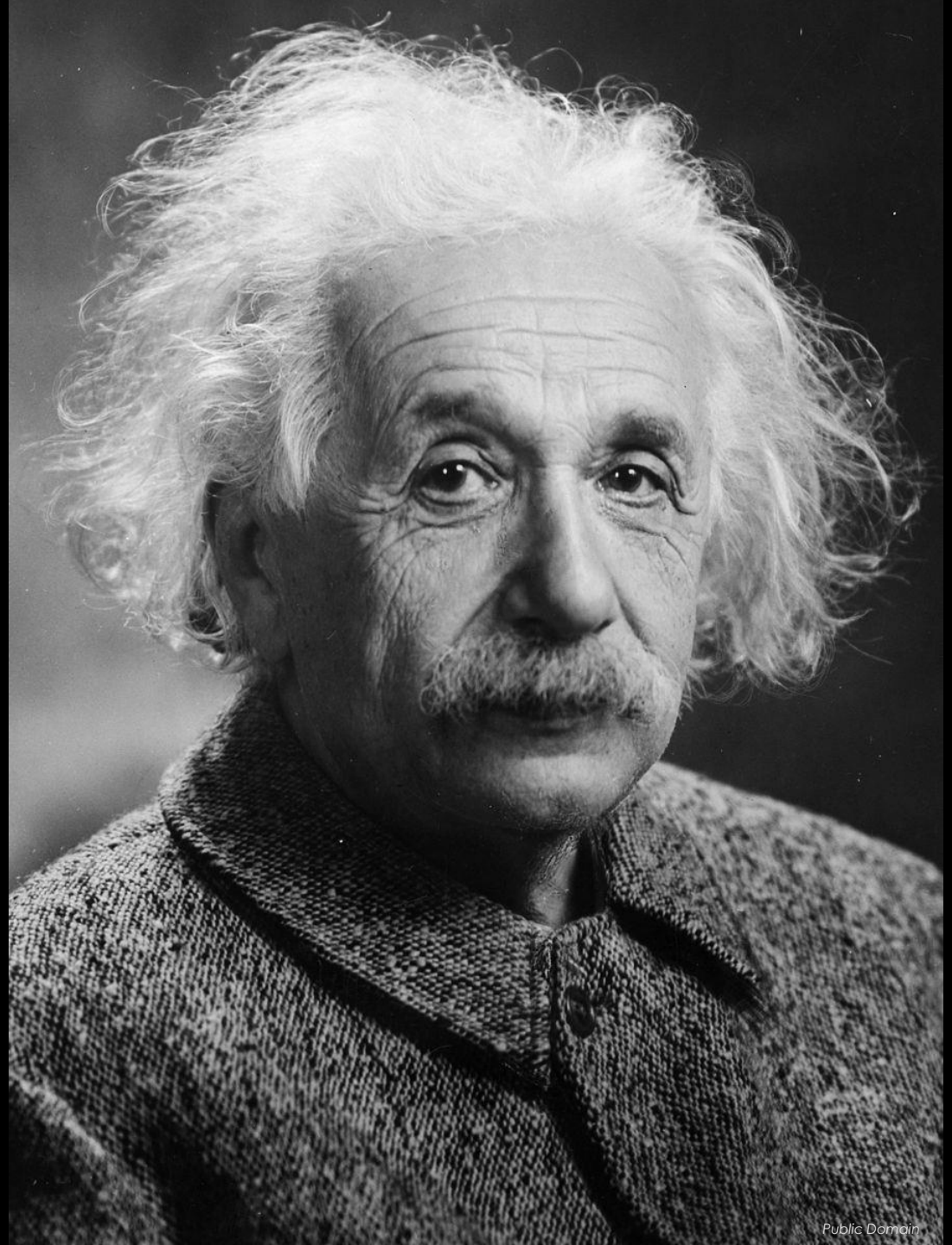
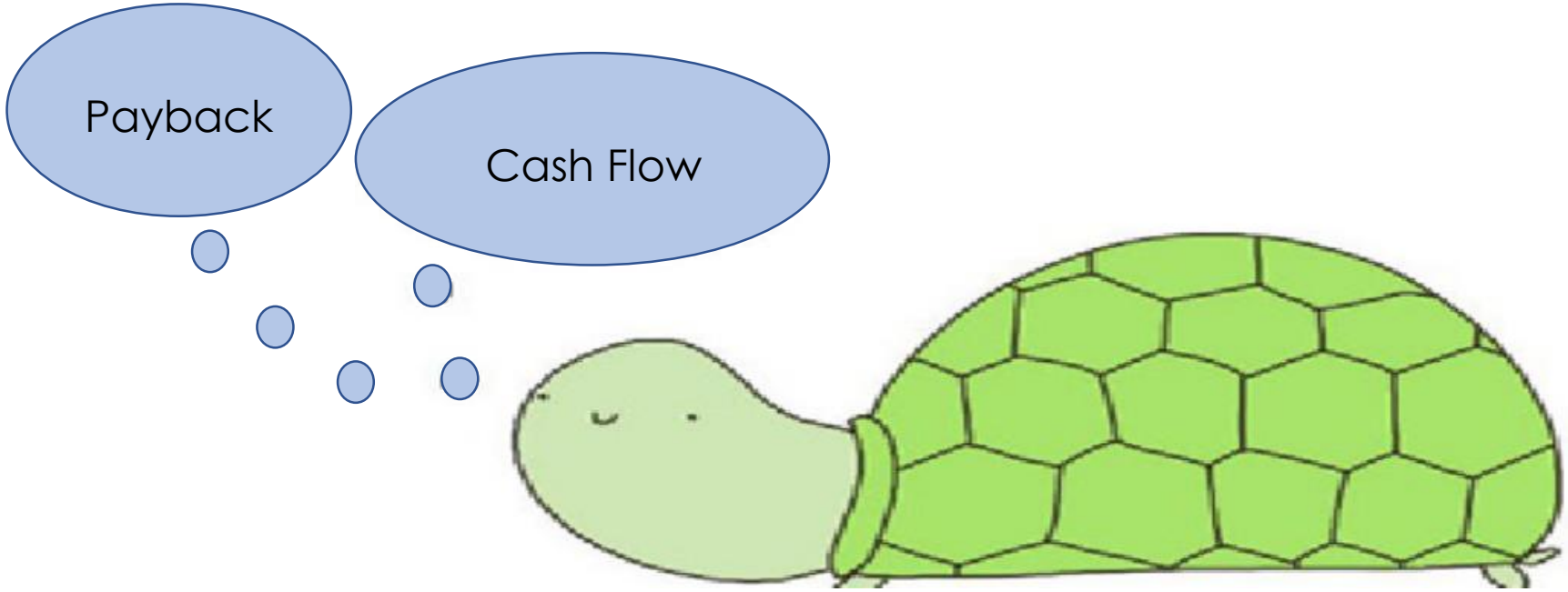
MONEY = SURVIVAL



"We can't solve problems by using the same kind of thinking we used when we created them."

~ Albert Einstein

Paradigm Shift Payback v. Cash Flow



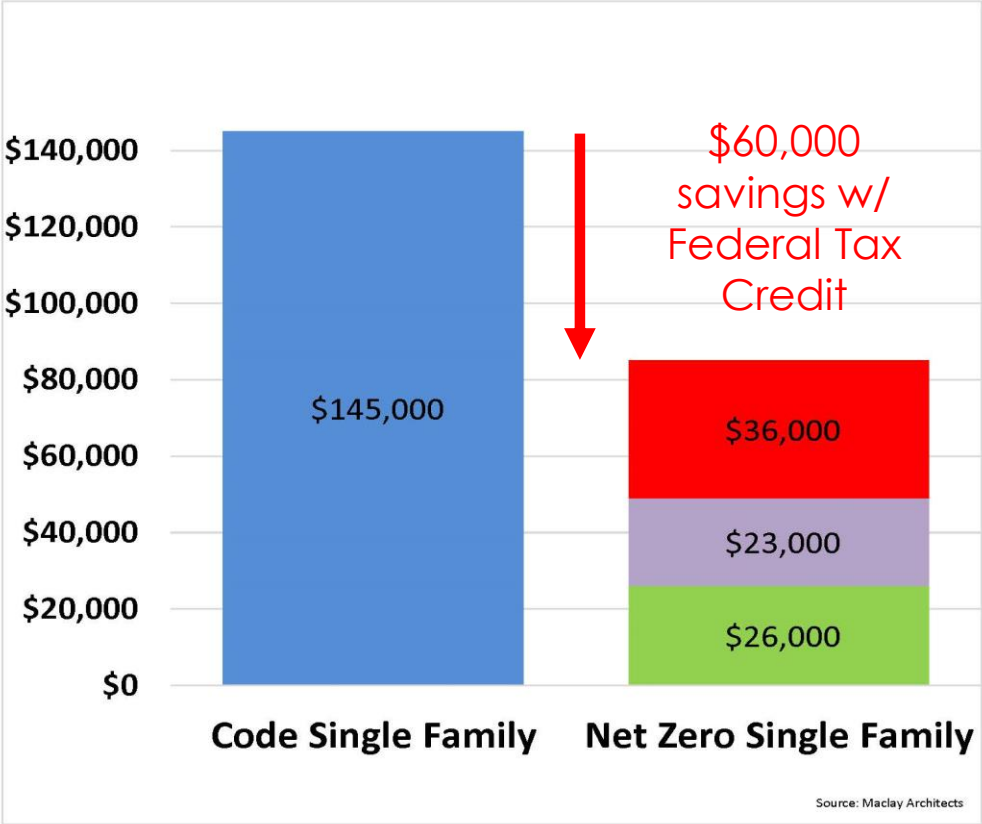
FirstCovers.com

Single Family Home

- 1,600 sf
- $16/sf Additional Construction Costs
- $14/sf Additional Solar Costs

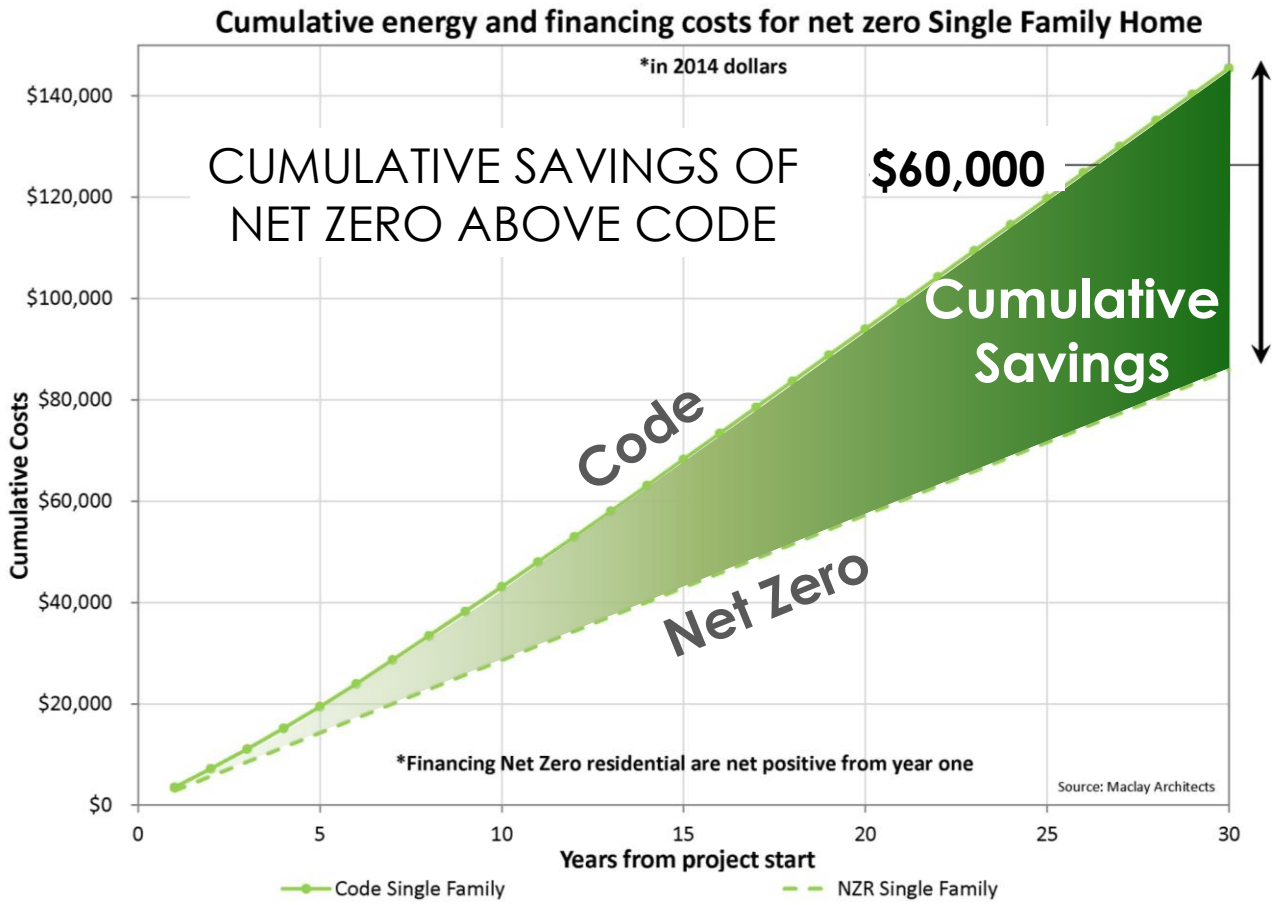
HUNTINGTON HOMES SINCE 1978

Single Family 30-year Costs

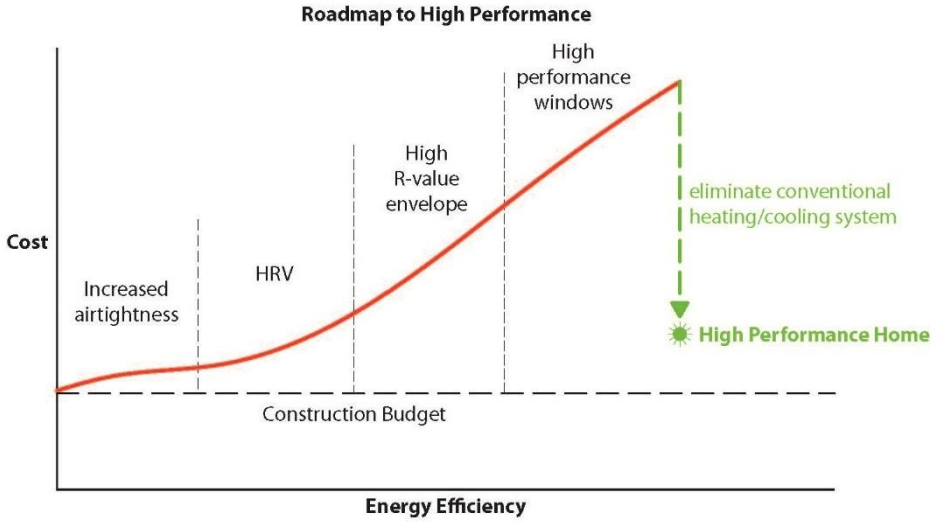


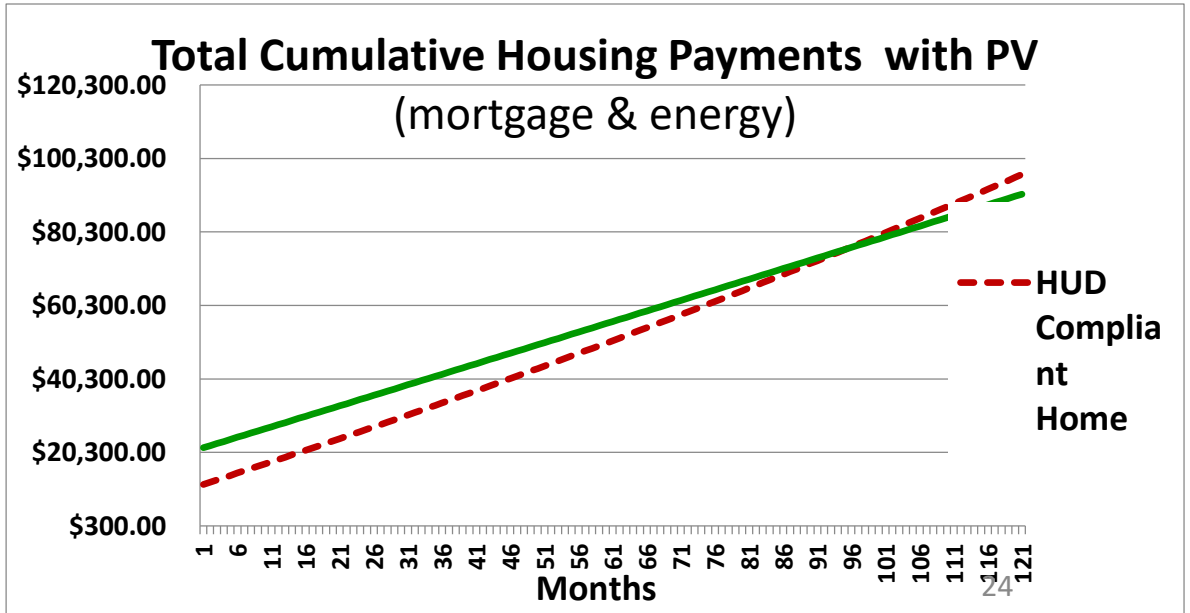
30-Year Cash Flow

- Savings after 30 years



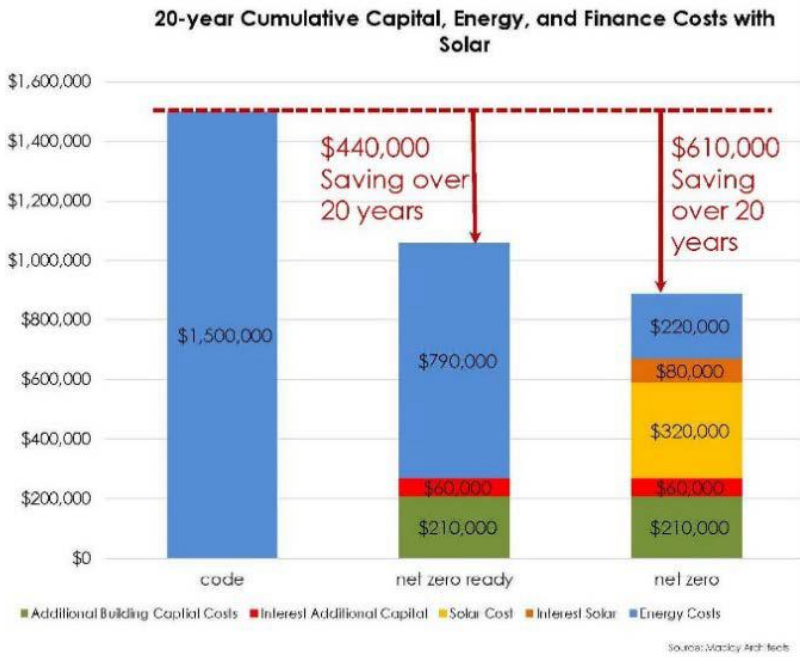
High Performance Mobile Home

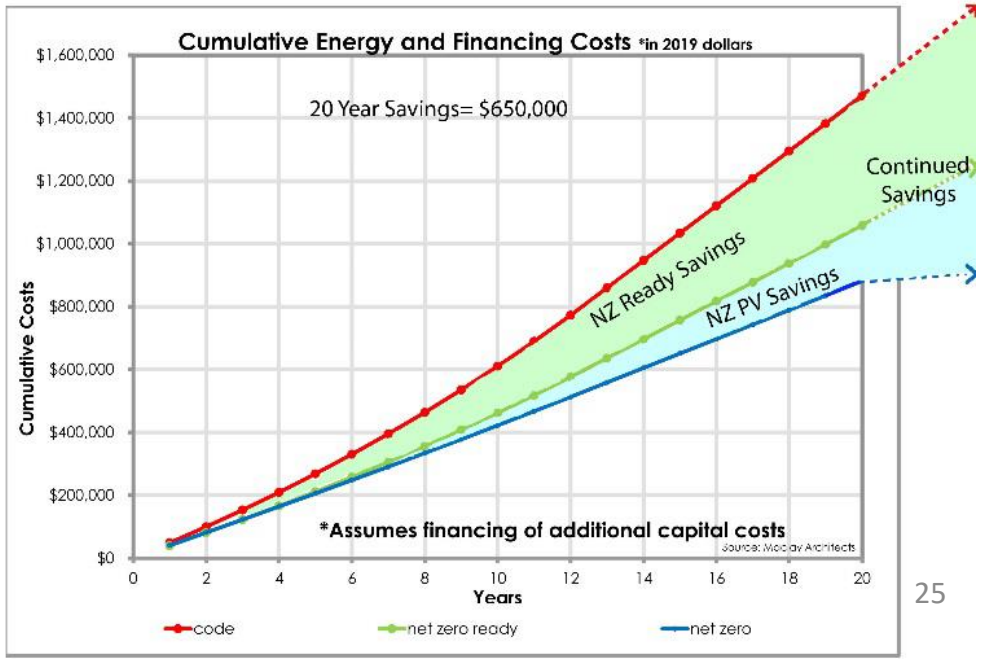




Charts produced by Peter Schneider, VEIC, 2013.

Tracy Street Affordable Housing





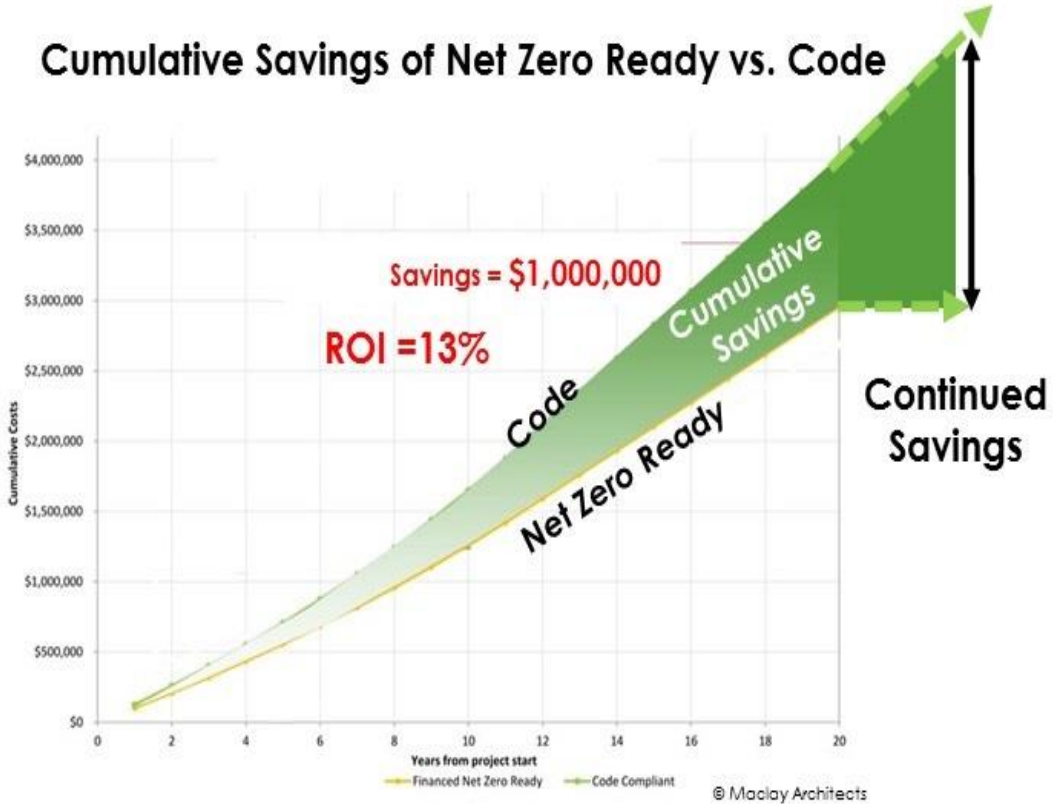
Bennington Courthouse and State Office Building

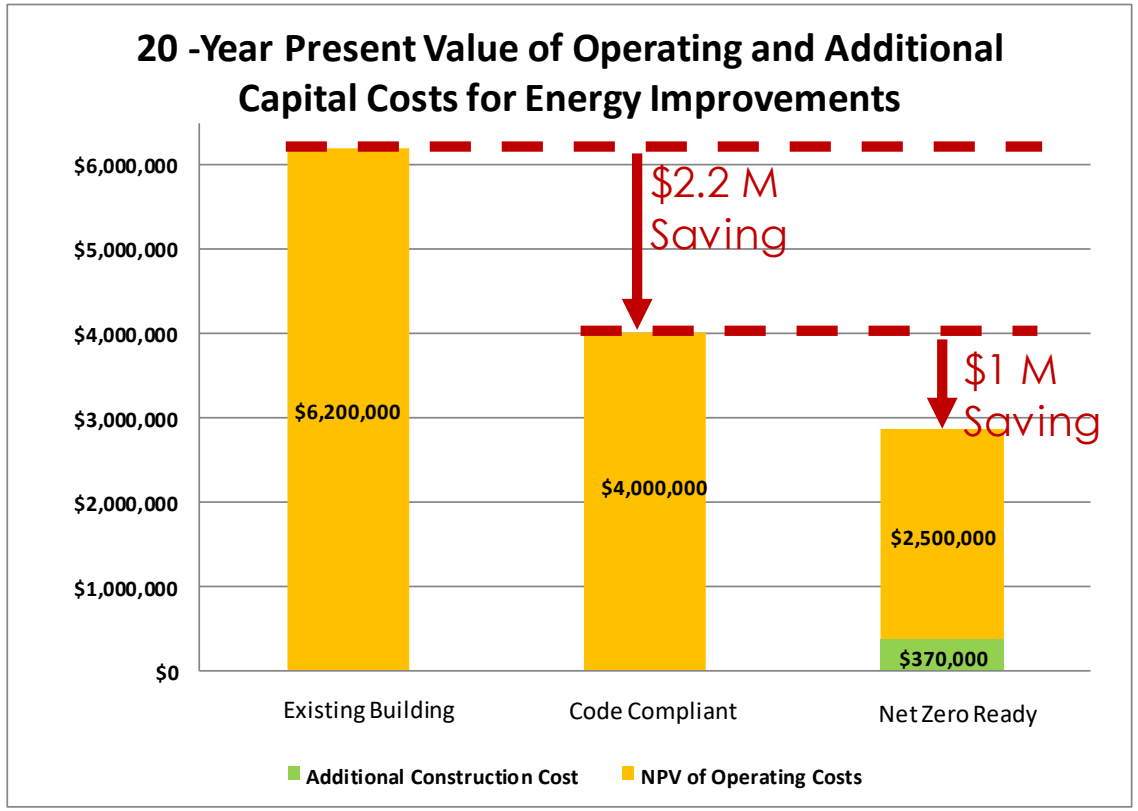
- LEED Gold
- 65,000 SF Renovation / Addition
- $6/SF Net Zero Cost
- 3% Net Zero Cost Increase

photo by Jim Westphalen

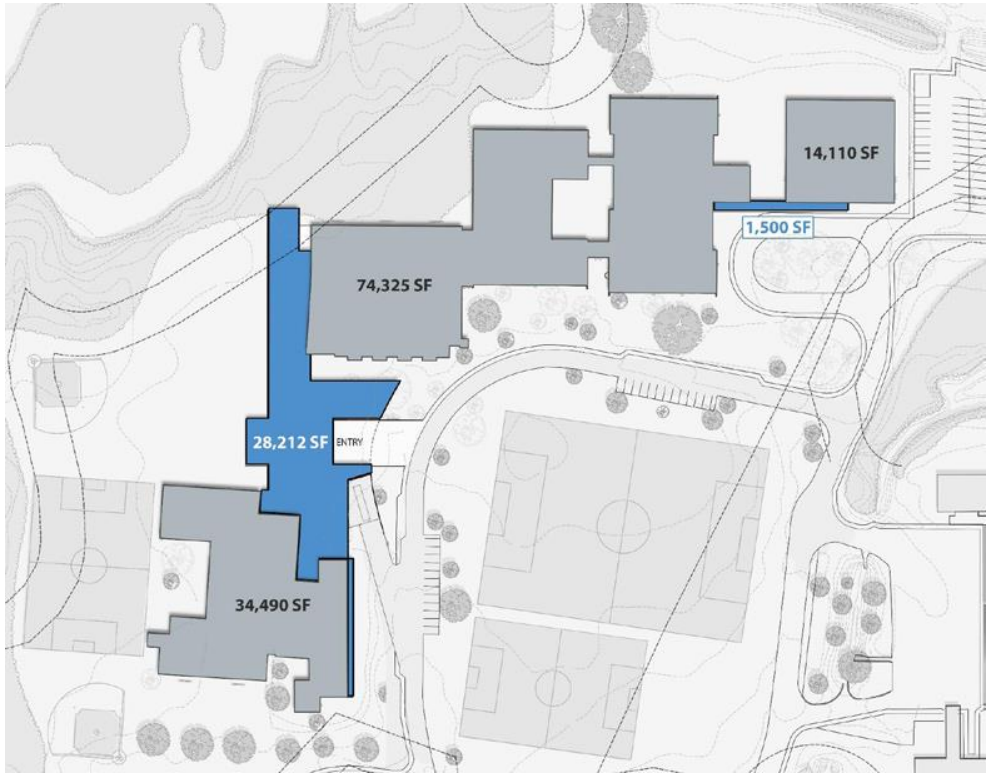
Bennington 20-year Present Value Financial Analysis

20-Year Present Value of Operating and Additional Capital Cost for Energy Improvements

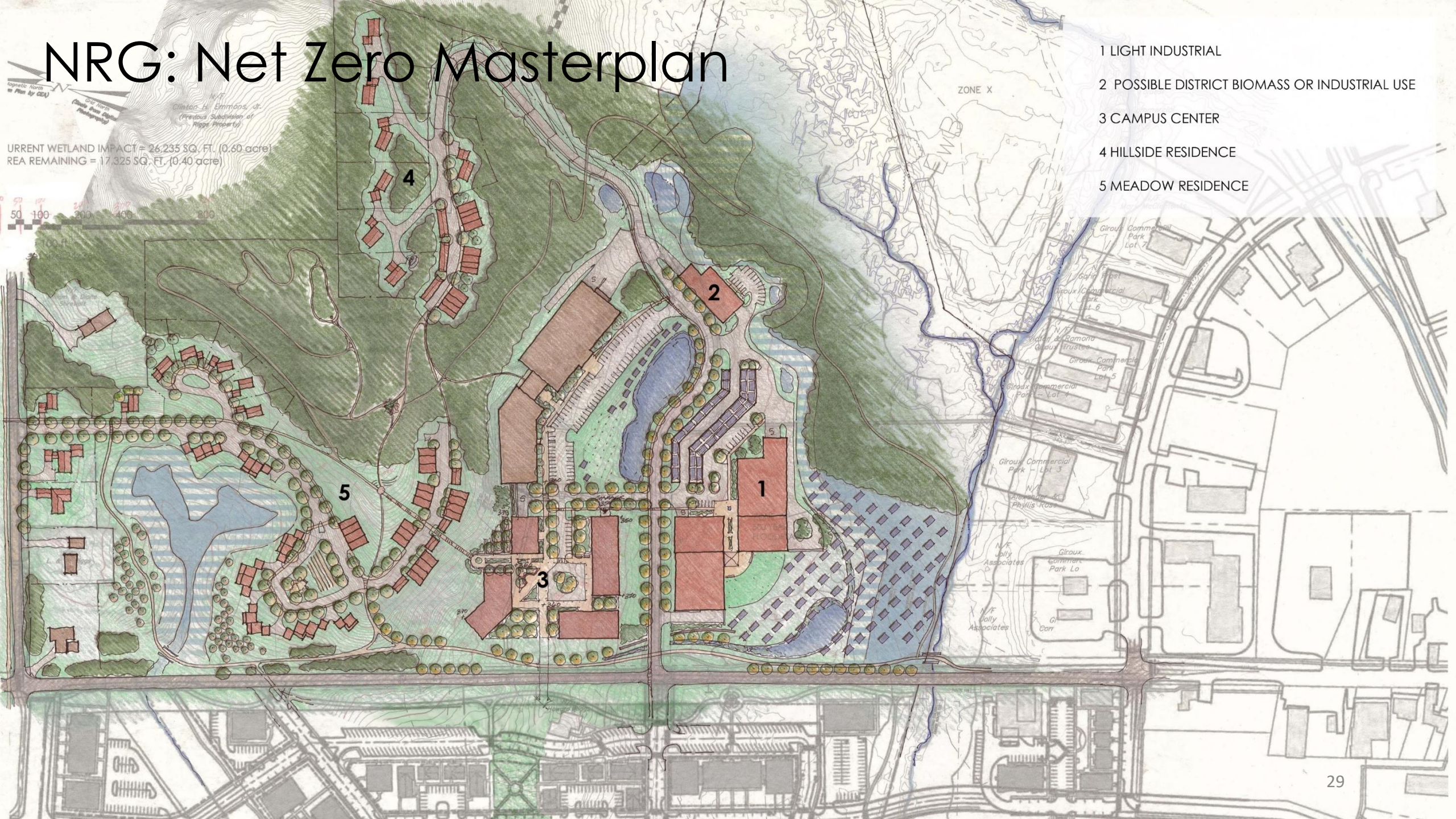




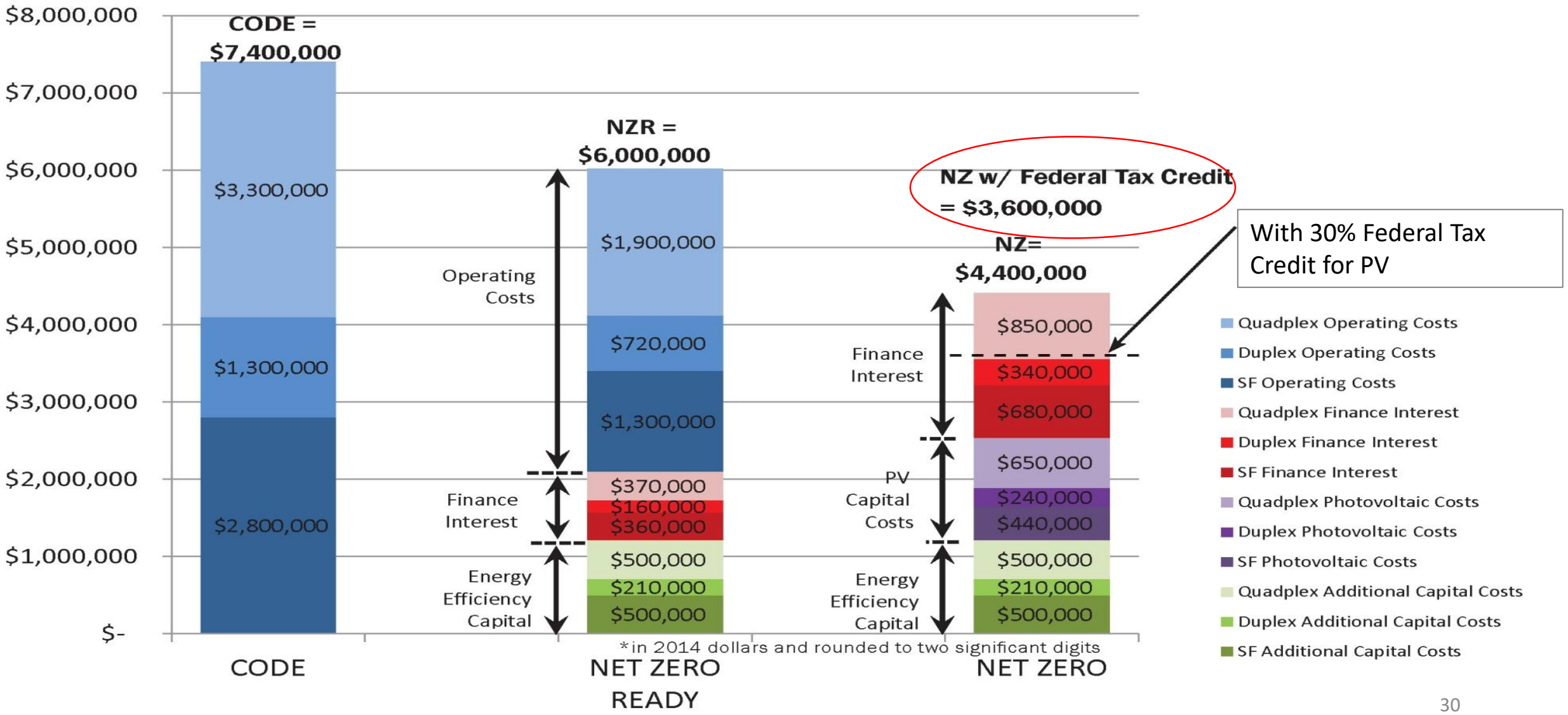
Lincoln School Financial Analysis



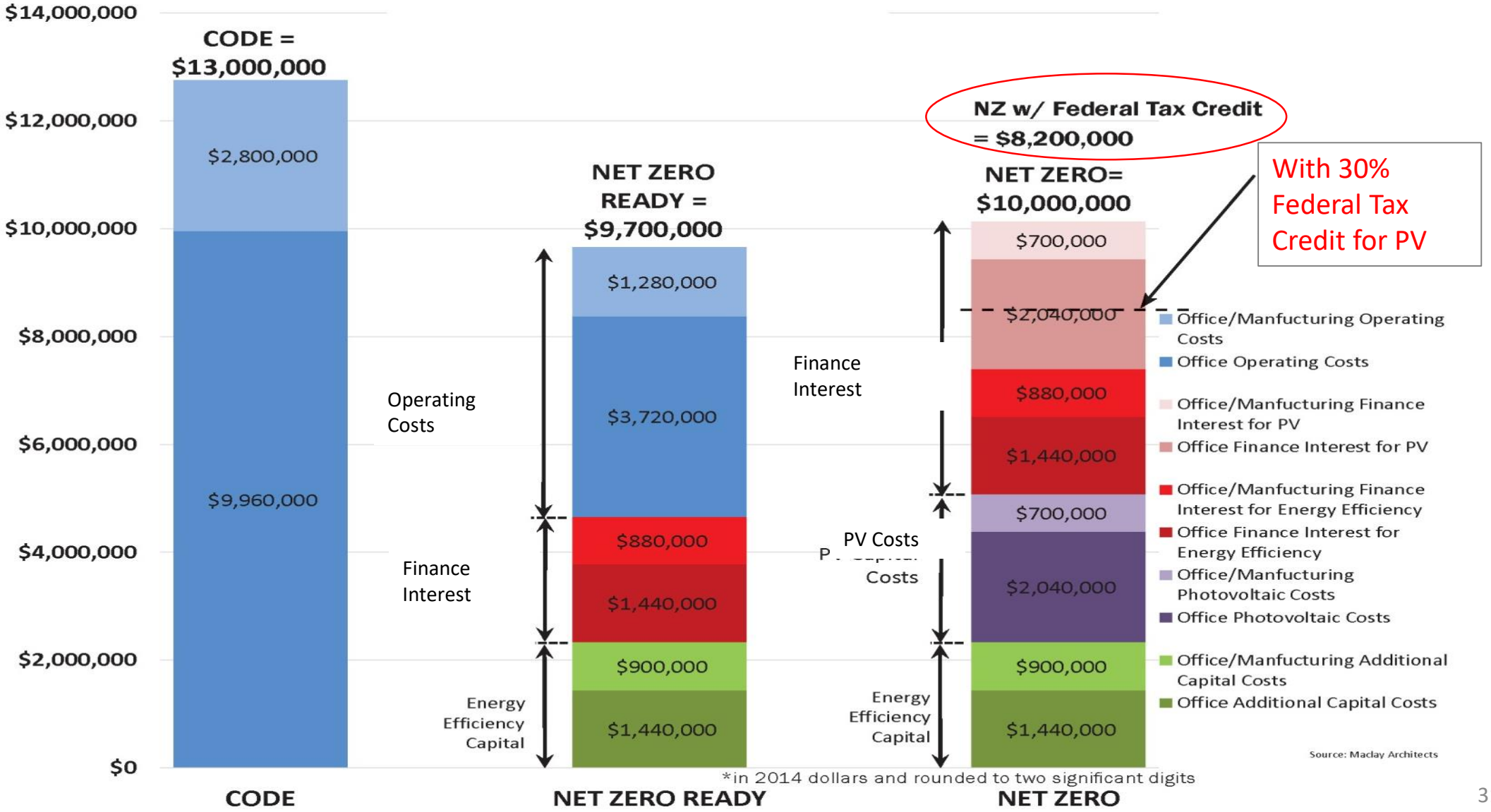
NRG: Net Zero Masterplan



NRG Community Residential 20-Year Costs



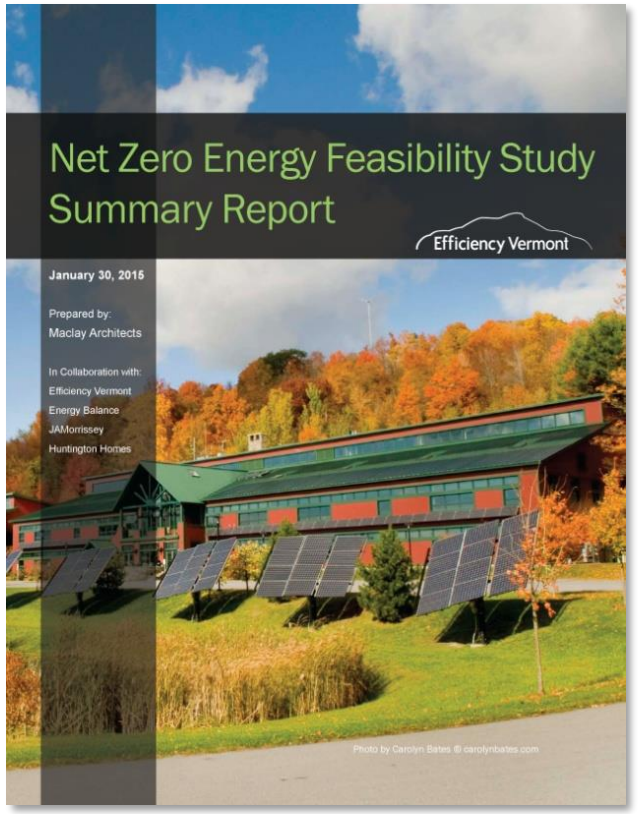
NRG Community Commercial 20-Year Costs



Best Investment Today

- $5-$20/sf Capital Cost
- 3-10% of Construction Cost
- Solar Financing

- Envelope + ROI
- Heat Pumps + ROI
- Renewables + ROI



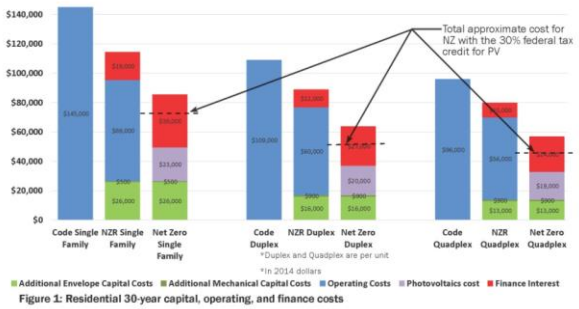
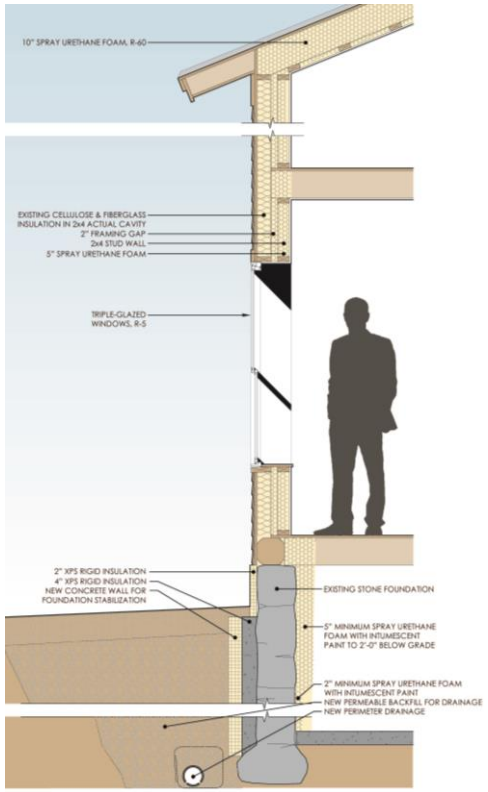


Figure 1: Residential 30-year capital, operating, and finance costs



Think Big!

Fossil Fuel Impact Costs:

- Pollution
- Health Costs
- Flooding
- Species Extinction
- Drought
- Hurricanes
- War
- Famine

Are Greater Than…

Net Zero Implementation Costs:

- NZ Buildings
- Transportation
- Infrastructure
- Agriculture
- Settlement

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Achievable
photo by Jim Westphalen

Affordable
photo by Carolyn Bates www.carolynbates.com

Healthy

Photo by Robert Benson

Beautiful

Photo by Robert Benson

The Renewable Future is NOW.

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