Maclay Architects' Path to Net Zero

- 1970: Baer Zomeworks
- 1971: Solar experimentation
- 1980: Energy Conservation
- 1990: IAQ Healthy Bldg
- 2000: Microload
- 2010: NZ Bldg
- 2014: NZ Communities + Planet
Four Approaches to Selling NZ, LBC, . . .

• Environmental Zealotry
• Pleasing Clients
• Collaborate with Clients
• Innovative, Aspirational Collaboration
How do Clients Think?

Client: What do I want anyway?
How do Clients Think?

Client: Concerns + Purpose
How do We Think?

Focus on Results + Analysis Procedures

Care for Planet Environment People

Right Brain

Left Brain
Do We Think in Multiple Ways?

Based on "Whole Brain Thinking"," Courtesy of: Graceworks Inc. 2009-2016
How do **CLIENTS** Think About Building Projects?

- **Results**
  - What will this cost?
  - Will this meet the program?
  - What is the schedule?
  - How will this get done?

- **Create**
  - Will this be beautiful?
  - Will we innovate?
  - Will this support health?
  - Will this connect to nature?

- **Control**

- **Happiness**
Who is the Client?

Stakeholders

- Directors
- Advisors
- Employees
- Public
- Project Manager
A Disconnect

Client: Will this cost too much?

Architect: This will save the world
Design for Reconnect

Architect: Maybe I should think about the entire client..

Based on “Whole Brain Thinking”, Courtesy of: Graceworks Inc. 2009-2016
Single Family Home

- 1,600 sf
- $16/sf Additional construction costs
- $14/sf additional solar costs
## Financial Analysis – Energy Consumption

**INPUTS: Energy Model**

<table>
<thead>
<tr>
<th>CODE</th>
<th>NET ZERO READY</th>
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<tbody>
<tr>
<td>Heat</td>
<td>2,406</td>
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<tr>
<td>Hot Water</td>
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<tr>
<td>Cooling</td>
<td>--</td>
</tr>
<tr>
<td>Lighting</td>
<td>585</td>
</tr>
<tr>
<td>Other Elec</td>
<td>3,953</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>9,611</strong></td>
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**% ENERGY SAVINGS ABOVE CODE** 67%

Energy Usage, kWh/yr
Financial Analysis – Financial Assumptions

**INPUTS**

- Interest Rate
- Loan Duration
- Fuel Escalation Rate
Single Family 30-year Costs

- Solar Costs
- Additional Building Costs

Source: Massey Architects
Single Family 30-year Costs

Interest Costs

CODE

NET ZERO

$0

$20,000

$40,000

$60,000

$80,000

$100,000

$120,000

$140,000

$36,000

$23,000

$26,000

Source: Merley Architects
Single Family 30-year Costs

Energy Costs

CODE

$145,000

NET ZERO

$36,000

$23,000

$26,000

Source: Medley Architects
Single Family 30-year Costs

- **CODE**
  - Total Cost: $145,000
- **NET ZERO**
  - Cumulative Savings: $60,000
  - Savings: $36,000, $23,000, $26,000

Source: Macley Architects
Single Family 30-year Costs

$72,000 savings w/ Federal Tax Credit
30-Year Cash Flow

- 30-Year savings

Cumulative energy and financing costs for net zero Single Family Home

*in 2014 dollars

Cumulative Savings of Net Zero Above Code $60,000

Cumulative Savings

CUMULATIVE SAVINGS OF NET ZERO ABOVE CODE

Years from project start

Years 0-30

Cumulative Costs

$0

$20,000

$40,000

$60,000

$80,000

$100,000

$120,000

$140,000

Financing Net Zero residential are net positive from year one

Code

Net Zero

Source: Maclay Architects
Cumulative Savings

CUMULATIVE SAVINGS OF NET ZERO ABOVE CODE

PLUS FREE SOLAR $60,000

30-Year Cash Flow

- Savings after 30 years

Cumulative energy and financing costs for net zero Single Family Home

*in 2014 dollars

Cumulative Costs

$140,000
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$0

Years from project start

0 5 10 15 20 25 30

Cumulative Savings

Code

Net Zero

*Financing Net Zero residential are net positive from year one

Source: Maclay Architects

Code Single Family

NZR Single Family
Cumulative Savings of Net Zero Ready vs Code

ROI = 13%

Savings = $750,000

[Graph showing cumulative costs and savings comparison between Net Zero Ready and Code.]
Paradigm Shift Payback v. Cash Flow
New Option Surface Area Reduction: 31% on 5 sides
45% on 6 sides

Cost: No increased cost

Massing Savings: Infinite Return on Investment
Thermal diagrams

Existing Building Envelope

New Building Envelope
The Renewable NRG Systems Net-Zero Master Plan includes:

- Mixed use workplace and residential neighborhood
- 300,000 sf of buildings
Lessons

• Speak to Client’s “Whole Brain”

• Look for Levers