Proposed P&Z Applicant Narrative on Energy Efficiency & Renewables

P&Z Commission Public Workshop
April 18, 2022
Energy Management Advisory Committee

- EMAC appointed March 2021
- Volunteers + BET, BOE, RTM, BOS
- Purpose to “save more, pollute less:” 20-40% Town savings, public role model
- September 2021 Report
- Subcommittees on EVs, Town solar, P&Z Energy & Renewables regulations
- P&Z subgroup responding to PA 21-29 and Executive Order 21-3
AGENDA

1) Who is P&Z subgroup of EMAC - research conducted
2) How Energy Efficiency (EE) saves money and pollutes less
3) What is the market appeal of EE to building buyers and tenants
4) Why is P&Z is starting with a narrative
5) What will the narrative accomplish
6) Questions and input from the public
ENERGY EFFICIENCY A P&Z ISSUE: USAGE DECIDED UP FRONT

“Energy efficiency starts at the earliest, concept stage of any building. Set a reasonable budget and energy efficiency targets – and let the design and construction community deliver.”

Chief Engineer, National Renewable Energy Laboratory, DOE

Source: NREL Elements of an Energy Efficient Home 2000
ENERGY EFFICIENCY A P&Z ISSUE: SAVINGS DECIDED UP FRONT

“Energy efficiency starts at the earliest, concept stage of any building. Set a reasonable budget and energy efficiency targets and let the design and construction community deliver.”

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<table>
<thead>
<tr>
<th>PRE-APPLICATION EE DRIVERS</th>
<th>POST APPROVAL DRIVERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Siting, orientation</td>
<td>• Systems selection</td>
</tr>
<tr>
<td>• Glazing, daylighting, lighting systems</td>
<td>• Appliances</td>
</tr>
<tr>
<td>• Envelope, mass to surface area (size)</td>
<td>• FF&amp;E</td>
</tr>
<tr>
<td>• Plug load</td>
<td></td>
</tr>
<tr>
<td>• Roof line, shading</td>
<td></td>
</tr>
<tr>
<td>• FINALLY...HVAC right-sized based on all above</td>
<td></td>
</tr>
<tr>
<td>Best practice 1 ton HVAC/1000sf saves 25-33% HVAC costs</td>
<td></td>
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Source: NREL Elements of an Energy Efficient Home 2000
CT Energy Prices mean efficiency pays off

Case study: Large SF Residential, Greenwich, CT
8,000 sf residence, 15-year ownership period
Sales price $750/sf or $6M
Cost to build $650/sf at 15% margin or $5.2M
Each 1% increase in cost to build = $52,000

$1.40/Ccf x 4900 Ccf/year = $6,860/year

~$100,000

~$250k energy costs = 4-5% cost to build

Source: EIA 2022, NAR
Energy Efficiency Retrofits Can Payback

Case Study: **Multifamily Housing**, Manchester, CT

- **Project:** Lighting, boilers, roof replacement, insulation
- **Upfront Cost:** $654k – incentives available from utilities, CT Green Bank
- **Annual savings:** $79k
- **Payback Period:** 8.3 years assuming constant energy prices, if rise, would payback faster

Source: CT Green Bank
Rocky Neck Village

- **Location:** East Lyme
- **10 Buildings:** 10
- **56 Units:** 44 Affordable, 12 Market rate
- **Average HERS Index:** 28

### Projected (Modeled) Energy Savings

<table>
<thead>
<tr>
<th></th>
<th>Annual kWh</th>
<th>Summer kW</th>
<th>Winter kW</th>
</tr>
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<tbody>
<tr>
<td><strong>Total kWh</strong></td>
<td>371,640</td>
<td>37.1</td>
<td></td>
</tr>
<tr>
<td><strong>Lifetime kWh</strong></td>
<td>9,291,000</td>
<td>194.0</td>
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</tbody>
</table>

### Projected (Modeled) Emission Savings

- **CO2 Reductions (Tons):** 2,416
- **SO2 Reductions (Lbs):** 2,810
- **NOX Reductions (Lbs):** 3,311

### Residential New Construction Incentives

<table>
<thead>
<tr>
<th>Measure</th>
<th>Incentive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total HERS Incentive</td>
<td>$194,560</td>
</tr>
<tr>
<td>All-Electric Incentive</td>
<td>$50,000 (Project Cap)</td>
</tr>
<tr>
<td>Passive House Incentive</td>
<td>$60,000 (Project Cap)</td>
</tr>
<tr>
<td>ENERGY STAR™ Incentive</td>
<td>$16,750</td>
</tr>
<tr>
<td>Affordable Housing Incentive</td>
<td>$65,720</td>
</tr>
</tbody>
</table>

**Total Incentives:** $387,030

### Projected (Modeled) Emission Savings

- **CO2 Reductions (Tons):** 2,416
- **SO2 Reductions (Lbs):** 2,810
- **NOX Reductions (Lbs):** 3,311
• The national standard in public use for ~30 years
• Maintained by EPA & DOE
• Widespread expert industry support
• Greenwich tracks municipal building energy use with ESPM
• Scoring relative to all EXISTING BUILDINGS of same type and climate zone
• 1-100 scale, higher score better, “75” is a good score and means the building is more efficient than 75% of existing buildings of same type and climate
• Greenhouse gas emissions estimates part of ESPM
Energy use presents Future Financial Risk from price volatility, rising prices, and pollution charges.

Source: SPG global
Commercial Buildings face EE Disclosure & Market Risk

Building Energy Efficiency Rating

- Sub-Current year Energy Efficiency Grade
- Energy Efficiency Grade Scale
- Building Address, Borough, Block & Lot (BBL)
- NYC average ENERGY STAR® Score
- ENERGY STAR® score (1-100) for current year
- Building Energy Efficiency Rating for previous two years
- Where the building falls on the scale
- Description of ENERGY STAR® score (1-100)
Residential buildings typically use Home Energy Ratings (HERS).

HERS Ratings and the Ratings or Rating Range for Homes
The Lower the HERS Rating is the Better

- Older Homes (100 and up)
- Conventional New Home Built to Code (100 is the standard)
- ENERGY STAR Home (85 or Lower | Highest HERS rating that qualifies as a green home)
- Zero Energy Ready Home (varies from 45 to 1)
- LEED for Homes (varies from 45 to 1)
- National Green Building Standard Homes (varies from 80 to 1)
- Passive House (35 or lower)
- All the above homes can become Net Zero Energy Homes
- Net Zero Energy Home (varies from 0 or less)
- Positive Energy Home (varies from -1 or lower)

Alternative pathways ~35-45
Residential buildings face EE Disclosure Risk and Opportunity
PLUS!
Green SF homes sell for ~4-5% more /sf

<table>
<thead>
<tr>
<th>Study Description</th>
<th>Location</th>
<th>Premium Percentage /sf</th>
</tr>
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<tbody>
<tr>
<td>9% /sf premium for green certified label</td>
<td>2007-2012 CA</td>
<td>9%</td>
</tr>
<tr>
<td>5.9% /sf premium for LEED certification in TX</td>
<td>2016 TX</td>
<td>5.9%</td>
</tr>
<tr>
<td>3.6% /sf premium in NC Building Performance Assoc.</td>
<td>2017 NC</td>
<td>3.6%</td>
</tr>
<tr>
<td>3.5% /sf premium in Washington, DC</td>
<td>2015 DC</td>
<td>3.5%</td>
</tr>
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</table>
Energy Efficiency Attractive to Local Buyers

“Local buyers like energy efficiency/Green homes and many new homes promote it in their listings.”

“I do believe anyone renovating tries to make the home the most energy efficient due to all the rising costs of maintaining a home.”

Bryan Tunney, Pres, Greenwich Assoc. of Realtors
Multi-family Green Premiums

3.1% Higher Rents

9.4% Sales price / unit

Source: Cushman & Wakefield 2020-2022 Green is Good 3-part study
EE Benefits

• Homeowners: ask for a home energy audit and get your HERS score! Know where you stand and save!

• Builders: model what you’re building! Know your HERS, ESPM scores; be considered a ‘go to’ EE builder with skills, subs relationships, and experience

• Commercial owners: encourage MF housing with lower utility costs

• Be prepared! Energy prices and volatility; emissions disclosure and cost; competition for skilled subs – all rising
Renewables Offer Attractive Economics

Residential solar PV up-front purchase 9-11% ROI

<table>
<thead>
<tr>
<th>System Size</th>
<th>10 kW</th>
</tr>
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<tbody>
<tr>
<td>Total Price</td>
<td>$38,926</td>
</tr>
<tr>
<td>Rebate</td>
<td>$3,091</td>
</tr>
<tr>
<td>Tax Credit</td>
<td>$9,317</td>
</tr>
<tr>
<td>Net Cost</td>
<td>$26,517*</td>
</tr>
</tbody>
</table>

Solar PV lease net cost reduction - $102 cost, $218 produced, and predictable

Source: Sunwatts.com calculator. Go solar CT
Energy Efficient Heat Pumps an Option

- Swimming pool
- Hot Water
- Floor Heating
- Ground, Horizontal collector
- Ground, Vertical collector
- Air (Outside unit)
- Sea, Lake or Pond
What’s in P&Z’s proposed inquiry regulation?

A brief written statement

1) Describe the potential and use of renewable energy systems
   - Site characteristics and shading
   - Building orientation, scale, roofing, any solar system planned
   - HVAC approach (air or ground source heat pumps, gas, etc.)

2) Estimate overall energy efficiency performance
   1) Available energy efficiency modeling and metrics
   2) How building choices effect estimated efficiency levels
Draft Regs Create Transparency & Opportunity

Building community takes stock without requirements

Progress on EMAC mandate

P&Z learns-readiness and EE levels for future incentives, education, and regs
A brief written statement from the P&Z applicant addressing:

1) Energy efficiency including overall energy efficiency performance, as well as how a development project’s features and systems will contribute to minimizing greenhouse gas emissions.

2) The potential and use of renewable energy systems, as well as highly energy efficient equipment such as air and ground source heat pumps, hot water heat pumps and fuel cells. Renewable energy systems generate energy from wind, solar radiation, geothermal steam, and biogas. Such information shall include a description of the site’s relevant features (including but not limited to: site slope, ground composition, shading), as well as the proposed building’s potential for renewable energy generation (including but not limited to: orientation, scale, roofing, and systems.)

3) Any available energy efficiency modeling and metrics that outline a project’s energy profile. Examples of such information would include an Energy Use Index (EUI), and greenhouse gas emissions in terms of carbon equivalents, as well as the heating ventilation and air conditioning (HVAC) and hot water equipment’s efficiency, calculated as a Coefficient of Performance (COP). Residential projects (including multi family homes) of 10,000 sf or larger in size could highlight their energy efficiency by providing a Home Energy Rating System (HERS) index rating on an as designed basis. Commercial and Industrial projects of 10,000 sf or larger in size could highlight their energy efficiency and renewables use by providing a source ENERGY STAR Portfolio Manager (ESPM) score, also on an as designed basis.
Questions ?
DEVELOPERS, OWNERS AND TENANTS VALUE EFFICIENCY DIFFERENTLY

<table>
<thead>
<tr>
<th>Perspectives on...</th>
<th>SPECULATIVE DEVELOPER</th>
<th>OWNER DEVELOPER</th>
<th>TENANT</th>
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</thead>
<tbody>
<tr>
<td>Upfront capital</td>
<td>Short term ROI%</td>
<td>Holding period NPV</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>capital constraints</td>
<td>capital constraints</td>
<td></td>
</tr>
<tr>
<td>Labor uncertainty</td>
<td>Very valuable</td>
<td>Valuable</td>
<td>NA</td>
</tr>
<tr>
<td>Operating costs</td>
<td>NA</td>
<td>Valuable</td>
<td>Very valuable</td>
</tr>
<tr>
<td>Predictable operating costs</td>
<td>NA</td>
<td>C&amp;I passthrough</td>
<td>Residential valuable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Residential valuable</td>
<td></td>
</tr>
<tr>
<td>Future value: asset, rental</td>
<td>NA</td>
<td>Valuable</td>
<td>NA</td>
</tr>
<tr>
<td>income</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Market demand</td>
<td>Price drives return</td>
<td>Valuable</td>
<td>Lower utility costs</td>
</tr>
<tr>
<td></td>
<td>Reputation important</td>
<td></td>
<td>= rental premium</td>
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