Accelerating Existing Building Tune-Ups in Seattle

Webinar
Thursday, March 26, 2020
12:00 PM – 1:00 PM ET
Panelists

Nora Wang, Ph.D.
Pacific Northwest National Laboratory

Nicole Ballinger
Office of Sustainability & Environment / City of Seattle

Dina Belon-Sayre
Pineapple Hospitality

Rina Fa’amoce-Cross
Seattle Public Schools

Holly Carr
Department of Energy
Agenda

• Intro – Nora (5 min)
• Overview of TUA – Nicole (25 min)
• Asset Score Results – Nora (5 min)
• Hospitality Case Study – Dina (5 min)
• Education Case Study – Rina (5 min)
• Conclusion – Nicole (5 min)
• Q&A – Holly (10 min)
Accelerating Existing Building Tune-Ups in Seattle, Washington

Nicole Ballinger
Tune-Up Accelerator Program Manager
• Buildings make up over 1/3 of Seattle’s core emissions

• Goal: Carbon neutral city by 2050

• 2030 Target: Buildings must reduce emissions by 39% from a 2008 baseline
An energy efficiency mandate that helps building owners identify smart, responsible ways to reduce energy and water costs.

Like cars and bikes, all buildings need to be tuned regularly to keep them running as efficiently as possible.
Tune-Up Requirements

Operating Protocols
- HVAC systems
- Lighting
- Water heating
- Water usage

Maintenance & Repair
- HVAC systems
- Lighting
- Water heating
- Water usage
- Envelope

Examples of Operating elements
“Review HVAC equipment schedules.”
“Set schedules to optimize operations for actual building occupancy patterns.”

Examples of Maintenance, Cleaning, and Repair elements
“Verify HVAC equipment is clean and adequately maintained.”
“Clean where adversely impacting system performance.”
Elements of a Tune-Up

- **Conduct a Building Assessment**
  - of building systems to identify operational or maintenance issues
  - review benchmarking data and water bills
- **Identify Corrective Actions**
  - identify required operational and maintenance improvements
- **Implement Required Actions**
  - address all required corrective actions identified in the building assessment
- **Verify Changes & Report to City of Seattle**
  - confirm all corrected equipment and systems are functioning as intended
## TUNE-UP SCHEDULE

*Ongoing, every five years*

<table>
<thead>
<tr>
<th>BUILDING SIZE*</th>
<th>WAIVER AND EXTENSION DUE DATE</th>
<th>TUNE-UP SUMMARY REPORT DUE DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>200,000+ SF</td>
<td>September 4, 2018</td>
<td>March 1, 2019</td>
</tr>
<tr>
<td>100,000-199,999 SF</td>
<td>April 1, 2019</td>
<td>October 1, 2019</td>
</tr>
<tr>
<td>70,000-99,999 SF</td>
<td>April 1, 2020</td>
<td>October 1, 2020</td>
</tr>
<tr>
<td>50,000-69,999 SF</td>
<td>April 1, 2021</td>
<td>October 1, 2021</td>
</tr>
</tbody>
</table>

* Excluding parking
What is the Tune-Up Accelerator?

• Mid-Size buildings (approx. 100,000 SF or smaller) due 2020 or 2021
• Tune-up now to meet Seattle Building Tune-Ups requirements
• Financial incentives & enhanced technical support – offer sunset after 2018
• Goal of 20% average energy savings across at least 100 buildings or tenant spaces and 99.7 Million kBtu/year (~$1.5 million annual cost savings)
# Program Partners & Funding

<table>
<thead>
<tr>
<th>Partner</th>
<th>Primary Role</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="#">U.S. DEPARTMENT OF ENERGY</a></td>
<td>Federal funding ($1.2 million) and project oversight</td>
</tr>
<tr>
<td><a href="#">Seattle Office of Sustainability &amp; Environment</a></td>
<td>Program management, enrollment, coord. w/ Building Tune-Ups, evaluation, reporting to DOE</td>
</tr>
<tr>
<td><a href="#">SMART BUILDINGS CENTER</a></td>
<td>Provider training &amp; curricula, tool lending library, project tracking, help desk</td>
</tr>
<tr>
<td><a href="#">Pacific Northwest National Laboratory</a></td>
<td>Building Re-Tuning training, Asset Score support &amp; research on energy-savings from tune-ups</td>
</tr>
<tr>
<td><a href="#">Seattle City Light</a></td>
<td>Tune-up and energy conservation measure incentives</td>
</tr>
<tr>
<td><a href="#">INTEGRATED DESIGN LAB</a></td>
<td>Building Renewal strategic plan development and support, Spark Tool engagement</td>
</tr>
</tbody>
</table>
Program Approach

1. **Advance market expertise** to support building tune-ups
   >> **Tune-Up Trainings**

2. **Accelerate tune-ups** in mid-size buildings
   >> **Incentives & Owner Engagement**

3. **Generate voluntary** market action towards greater savings
   >> **Building Assessments & Implementation – 20% Savings Goal**

4. **Ensure the mandate** is effective for this market sector
   >> **Evaluation & Refinement**

2017 – Q4 2019
Program Development

- Create Incentive Program with Seattle City Light
- Incentive Agreements
- Reporting Forms
- Define Program Paths & Brand
- Plan, Prioritize & Recruit Buildings
- Program & Customer Tracking

Tune-Up to Accelerate Your Building's Energy Savings!

And get help doing it! We're recruiting owners or managers of up to 100 mid-size nonresidential buildings (100,000 SF or less) to jump-start their building's Tune-up. Don't miss out on technical support and financial incentives for a tune-up that meets the new Seattle Building Tune-ups requirement – funding that will sunset after 2018. Complete a building assessment and implement corrective operations and maintenance actions or do more for deeper energy savings and a more valuable building asset.

TUNE-UP ACCELERATOR DATABASE
Tune-Up Specialist Trainings

- 85 service providers attended trainings
- 30 firms on the “TUA” provider list
- 16 firms participated in projects
- Seattle Public Schools RCx /RCM staff
- King County RCM staff
Incentives & Program Paths

A. BASIC TUNE-UP
City Light incentive of up to $0.12 per SF for a tune-up that meets requirements

B. TUNE-UP PLUS
Plus incentives for energy-saving improvements like lighting, HVAC

C. BUILDING RENEWAL
Support for deeper investments like renovations or tenant improvements with 3 different levels of technical support
Enrolled: 102
Asset Scores: 90
Assessments: 102
TUA Summary Rec'd: 102
TUA Summary Approved: 102
TUA Participant Buildings By Size

- > 100 - 110K SF (5 Buildings)
- 70 - 99K SF (37 Buildings)
- 50 - 69K SF (49 Buildings)
- < 50K SF (11 Buildings)

6.9 Million SF Total!
Average = 67,700 SF
TUA Participant Buildings By Type

- 27.5% Office
- 22.5% K-12 School
- 13.7% Other
- 10.8% College/University
- 6.9% Hotel
- 5.9% Medical Office
- 4.9% Non-Refrigerated Warehouse
- 3.9% Mixed Use Property
- 1% Worship Facility
- 1% Supermarket/Grocery Store
- 1% Retail Store
- 1% Distribution Center
Goal & Actual Project Types

- **Building Renewal (35%)**
- **Tune-Up Plus Unk (??%)**
- **Tune-Up Plus SCL (20%)**
- **Basic Tune-Up (10%)**

### Goal Project Type
- Building Renewal: 20
- Tune-Up Plus Unk: 40
- Tune-Up Plus SCL: 40
- Basic Tune-Up: 60

### TUA Participant Project Type
- Building Renewal: 5
- Tune-Up Plus Unk: 19
- Tune-Up Plus SCL: 30
- Basic Tune-Up: 48
## Top Required Tune-Up Measures

<table>
<thead>
<tr>
<th>Required Implementation</th>
<th>Found &amp; Corrected</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tune-Up Measure</strong></td>
<td></td>
</tr>
<tr>
<td>G1 – Review <strong>HVAC equipment schedules</strong></td>
<td>58%</td>
</tr>
<tr>
<td>G2 – Review <strong>HVAC set points</strong></td>
<td>49%</td>
</tr>
<tr>
<td>G6 - Verify <strong>HVAC controls</strong> are functioning as intended</td>
<td>41%</td>
</tr>
<tr>
<td>G5 - Verify that <strong>HVAC sensors</strong> are functioning, calibrated, and in appropriate locations</td>
<td>40%</td>
</tr>
<tr>
<td>G17 – Check <strong>valves and dampers</strong> and adjust</td>
<td>36%</td>
</tr>
<tr>
<td>G11 – Verify <strong>HVAC equipment maintenance</strong></td>
<td>34%</td>
</tr>
</tbody>
</table>

*Top 6 out of 20 required measures in 102 TUA buildings.*
## Top Voluntary Tune-Up Measures

<table>
<thead>
<tr>
<th>Voluntary Implementation Tune-Up Measure</th>
<th>Found</th>
<th>Corrected</th>
</tr>
</thead>
<tbody>
<tr>
<td>H4 – Identify <em>inefficient lighting</em></td>
<td>64%</td>
<td>20%</td>
</tr>
<tr>
<td>G18 - Identify <em>equipment approaching the end of its service life</em>, per ASHRAE</td>
<td>49%</td>
<td>10%</td>
</tr>
<tr>
<td>H2 – Verify <em>lighting sensors are working</em> and located appropriately</td>
<td>36%</td>
<td>17%</td>
</tr>
<tr>
<td>J12 – Check <em>water flow fixtures</em></td>
<td>34%</td>
<td>10%</td>
</tr>
<tr>
<td>G9 – Identify areas with indications that <em>ventilation rates</em> may vary significantly from ASHRAE 62.1</td>
<td>33%</td>
<td>11%</td>
</tr>
<tr>
<td>G15 – Verify that <em>(HVAC) equipment observed</em> is in good working condition (such as motors, fans, pumps)</td>
<td>25%</td>
<td>12%</td>
</tr>
</tbody>
</table>

Top 6 out 19 voluntary measures in 102 TUA buildings.
Based on 20 ECMs in 19 TUA enrolled buildings.
Level 1 Findings

• 38 “Spark” reports created using benchmarking, Asset Score and tune-up reports as inputs

• 11 reports with a positive net present value were sent to building owners

• If all measures completed, the average EUI could be reduced 47%!

Developed by NEEA BetterBricks
• Uses EnergyPlus seed models to simulate energy performance
• Incorporates business case
• Exports report and technical appendix
• https://buildingrenewal.org
Spark Report Example

**Existing Building**
- Energy Use Intensity (EUI): 71 kBtu/sf-yr
- Electricity: $127,800
  - 1,419,600 kWh
- Gas: $7,700
  - 6,546 Therm
- Total Expense: $135,500

**Renewed Building**
- Energy Use Intensity (EUI): 52 kBtu/sf-yr
- Electricity: $110,100
  - 1,223,355 kWh
- Gas: $0
  - 2 Therm
- Total Expense: $110,100

Energy Use: 27%
Energy Cost: 18%
Annual Energy Savings: $25,400

**Result: STRONG Candidate**
Your building is a strong candidate for a successful Building Renewal – a whole-building energy savings project that reduces the building’s energy use by over 30%.

- BR Index Score: 15/20
- Market Position: 3 Risky
- Tenant Conditions: 3 Fluid
- Financial Flexibility: 5 Unleveraged
- Systems + Structures: 4 Aging

The building is at risk of losing market appeal on tenants and investors, shows signs of decreasing asset value, and may need to incur additional costs to comply with codes. Risky buildings are good candidates for a BR project because the energy efficiency focus can anchor a repositioning strategy and deliver reduced operating costs and improved tenant comfort.

Significant opportunity exists to implement major construction projects within the building, either through current or future vacanies, the ability to relocate tenants, or tenant willingness and desire to improve environmental performance.

The building’s financial situation is such that a variety of options are available to fund the BR project, including a willingness to explore additional debt, energy services agreements, equity infusions, or other unique financial resources. Furthermore, planned capital projects offer an ideal window of to facilitate an BR project, integrating systems and envelope upgrades with other building enhancements.
Level 3 Findings
## Level 3 Building Renewal Potential

<table>
<thead>
<tr>
<th>Measure Package</th>
<th>Description</th>
<th>Range of Savings in 5 Buildings</th>
<th>Average Savings</th>
<th>Average EUI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>O &amp; M</strong> - measures and a DDC expansion or complete DDC retrofit where needed</td>
<td>6% - 28%</td>
<td>16%</td>
<td>71</td>
</tr>
<tr>
<td>2</td>
<td><strong>Retrofit</strong> - lighting, envelope, and plug load management</td>
<td>21% - 37%</td>
<td>30%</td>
<td>59</td>
</tr>
<tr>
<td>3</td>
<td><strong>Mechanicals</strong> - improve the performance of selected or out of date HVAC systems.</td>
<td>30% - 49%</td>
<td>38%</td>
<td>55</td>
</tr>
<tr>
<td>4</td>
<td><strong>Electrification</strong> - replace gas (space heating and/or DHW) and or process steam equipment with heat-pump-based systems</td>
<td>49% - 65%</td>
<td>56%</td>
<td>41</td>
</tr>
</tbody>
</table>

Total direct emissions savings of up to 900 MT CO2e
Evaluation: M & V Sample

- Evaluated 10 buildings
  - Mixed Use (1)
  - Hotel (1)
  - K-12 School (2)
  - Office (3)
  - Medical Office (1)
  - College/University (1)
  - Non-Refrigerated Warehouse (1)

- Site Visits

- Pre-Post Energy Data Analysis
M & V: Site Visits

• Interviews with building owner/facility manager

• Visual verification of corrective actions reported to City

• Data loggers used to verify corrective actions requiring controls changes

Strong measure persistence!

SBC staff and building facility manager retrieve a HOBO UX90 motor runtime logger used to verify reduced parking garage exhaust fan schedule. It was confirmed.
M & V: Energy Data Analysis

- 2017 baseline compared to 2019 using same pre and post months
- Emissions using Seattle GHG factors (carbon neutral utility)

Challenges:
- Unexplained data gaps & dips
- Range of implementation timeline
- Enough “post tune-up” data (range of 4 – 10 months available). Plan to update.
- Not enough for weather normalization
### Building Energy Consumption & Emissions Savings Post-Tune-Up in M & V Sample Buildings 2017 vs. 2019 Non-Normalized. (##) = increase in energy or emissions.

<table>
<thead>
<tr>
<th>Building</th>
<th>Electric %</th>
<th>Natural Gas %</th>
<th>Total Energy %</th>
<th>GHG Emissions %</th>
<th>Total Energy (kBtu)</th>
<th>Total Emissions (MT CO2e)</th>
<th>Months of Post Tune-Up Energy Data*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(3.81%)</td>
<td>0.51%</td>
<td>(1.84%)</td>
<td>0.14%</td>
<td>(65,924.91)</td>
<td>.13</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>12.69%</td>
<td>7.45%</td>
<td>12.32%</td>
<td>10.08%</td>
<td>344,344.47</td>
<td>2.13</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>4.92%</td>
<td>see note</td>
<td>4.92%</td>
<td>4.87%</td>
<td>102,520.81</td>
<td>.42</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>(7.13%)</td>
<td>see note</td>
<td>(7.13%)</td>
<td>(7.09%)</td>
<td>(97,216.68)</td>
<td>(0.4)</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>(3.16%)</td>
<td>17.57%</td>
<td>11.65%</td>
<td>16.95%</td>
<td>274,581.69</td>
<td>15.63</td>
<td>10</td>
</tr>
<tr>
<td>6</td>
<td>(1.18%)</td>
<td>see note</td>
<td>(1.18%)</td>
<td>(1.24%)</td>
<td>(23,041.24)</td>
<td>.01</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>20.38%</td>
<td>31.67%</td>
<td>27.17%</td>
<td>31.11%</td>
<td>749,318.72</td>
<td>28.84</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>16.73%</td>
<td>0.47%</td>
<td>14.42%</td>
<td>5.65%</td>
<td>597,868.71</td>
<td>2.6</td>
<td>10</td>
</tr>
<tr>
<td>9</td>
<td>5.65%</td>
<td>12.55%</td>
<td>8.59%</td>
<td>11.89%</td>
<td>282,930.94</td>
<td>9.8</td>
<td>7</td>
</tr>
<tr>
<td>10</td>
<td>11.31%</td>
<td>see note</td>
<td>11.31%</td>
<td>11.33%</td>
<td>371,639.58</td>
<td>1.54</td>
<td>7</td>
</tr>
</tbody>
</table>

**Average Savings**  
5.64%  
11.70%  
8.02%  
8.37%  
253,702.21  
6.07

**Building Notes:**  
3 - Gas wasn’t analyzed because the tenant using gas left and service stopped on 6/30/18.  
4 - Gas not analyzed because the meter was malfunctioning, and the management didn’t realize it until M&V visit.  
6 - Building is electric only with no natural gas use.  
10 - Gas analysis was excluded due to unexplained high variability in usage trends.  
*At the time of the evaluation, not all buildings had a full year of post tune-up data due to the implementation timing of the tune-up corrective actions, therefore these results should be considered preliminary.
PNNL Re-Tuning Estimates

METHOD
• “Crosswalk” between TUA measure prevalence & Re-tuning prototype energy model
• 71 buildings matched to DOE/PNNL’s 9 building types
• Eight *required* Seattle Tune-Up measures mapped to 18 different PNNL Re-tuning measures

FINDINGS
• Predicted savings ranged from 3.8% to 11.2% for building types.
• If extrapolated to all TUA buildings:
  • Electric 4.3%
  • Gas 3.1%
  • Steam .1% (1 bldg.)
  • Total 7.5%
Asset Score
Data Analysis

Nora Wang, Ph.D. AIA
Chief Engineer, Team Lead
Asset Score runs an energy simulation using EnergyPlus through OpenStudio. The simulation normalizes for building operations, occupancy and tenant behavior. Users enter building characteristics through a web interface. A standard Asset Score report is then generated.
In FY16, the City of Seattle identified over 2,600 small to medium size buildings (11,000-170,000 sq.ft.) from the energy benchmarking program. PNNL ran Preview Asset Score (AS) analysis based on their floor area, vintage, and use type. It was intended to help the City identify buildings with retuning or retrofit potentials with minimum inputs.

Example analysis of office buildings (total count 466)
- Actual EUI is measured from Portfolio Manager.
- Preview EUI is the medium EUI from the uncertainty analysis.
60 out of the 90 TUA buildings have an ESPM Score.

Score comparison is less biased than EUI comparison because score normalizes weather and use type.
Case Study A

Field Assessment Report:
• Schedule exterior and interior lighting with energy management system.
• 30 years old water source heat pump units will need to be replaced.
• Upgrade all interior and exterior lighting.

Asset Score Recommendations:
• Replace all existing lights with LEDs.
• Install occupancy sensors.
• Upgrade heating system to natural gas boiler.
• Add variable frequency drives to cooling tower fan and condenser pumps.
Case Study B

Field Assessment Result:
- Replace valves on hot water loop and allow boilers and pumps to turn off when there is no heat demand.
- Install timer or aqua-stat control on domestic hot water recirculation pump to reduce 24/7 operation.
- Install occupancy sensors in storage room and the “back of house” spaces.
- Restaurant AHU nearing end of useful life.

Asset Score Recommendations:
- Replace T8-32 to LED lighting
- Add airside economizer
- Implement demand control ventilation
EEM Comparison with Assessor’s Analysis

The Asset Score EEMs align with the assessor’s evaluations, except that the tune-up assessors do not generally recommend envelope retrofits.

<table>
<thead>
<tr>
<th>EEMs (for 56 buildings)</th>
<th>TUA</th>
<th>AS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lighting - Retrofit</td>
<td>32</td>
<td>47</td>
</tr>
<tr>
<td>HVAC - Implement Controls</td>
<td>28</td>
<td>36</td>
</tr>
<tr>
<td>Lighting - Install Controls/Sensors</td>
<td>25</td>
<td>46</td>
</tr>
<tr>
<td>HVAC - Add Equipment</td>
<td>11</td>
<td>33</td>
</tr>
<tr>
<td>HVAC - System Upgrade</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>Envelope - Add Insulation</td>
<td>5</td>
<td>41</td>
</tr>
<tr>
<td>DHW - Install low flow faucets</td>
<td>4</td>
<td>34</td>
</tr>
<tr>
<td>Envelope - Upgrade Windows</td>
<td>3</td>
<td>24</td>
</tr>
<tr>
<td>DHW - System Upgrade</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>279</td>
</tr>
</tbody>
</table>

HVAC EEM examples:

Add Equipment:
- add air-side economizer
- add variable frequency drive to supply fans

System Upgrade:
- upgrade heating system with high efficiency natural gas furnace
- upgrade cooling plant pumping system to constant primary - variable secondary pumping system

Implement Controls:
- implement chilled water temperature reset
- lower VAV box minimum flow set points
“We participated in the Tune-Up Accelerator because it was a good business choice for us to get ahead of the game. The financial incentive helped; but more importantly, it allowed us to focus on energy efficiency and gave us a needed process, timeline and amazing support to get our necessary fixes done and create an informed plan for future capital upgrades.”

DINA BELON-SAYRE  
PINEAPPLE HOSPITALITY,  
VICE PRESIDENT OF REAL ESTATE ASSETS

“We were already doing a fair job managing the building, but we could only address the obvious things that were broken or not working right. The Tune-Up program gives us the opportunity to have our retro-commissioning staff dig in deep and find the source of a problem that isn’t as obvious. That’s the best thing about this program—finding the hidden opportunities is a big win.”

RINA FA’AMOE-CROSS
SEATTLE PUBLIC SCHOOLS
RESOURCE CONSERVATION SPECIALIST

Post-Participation Survey

✓ Positive Program Experience & Benefit to Building Operations
  • 80% agreed to: Overall, participating in the Tune-Up Accelerator Program was beneficial to my building or organization.

✓ Strong Satisfaction with the Tune-Up Specialist
  • 75% agreed to: Service providers that want to conduct Seattle Building Tune-Ups should be required to attend a City of Seattle program training.

✓ The Tune-Up Drives ECM Participation
  • 80% “Yes”: After your participation, did you implement, or have you planned/budgeted for any voluntary ECM(s) beyond the required actions of the tune-up?”

✓ Offering an Incentive & Technical Support for Early Compliance is Good Policy
  • 93% “Yes” - The City should use incentives and extra technical support to engage building owners with early compliance.
## Tune-Up Costs

<table>
<thead>
<tr>
<th>Primary Building Use</th>
<th>Number of Buildings</th>
<th>Avg. Tune-Up Cost/SF</th>
</tr>
</thead>
<tbody>
<tr>
<td>College/University</td>
<td>11</td>
<td>$0.13</td>
</tr>
<tr>
<td>Hotel</td>
<td>7</td>
<td>$0.19</td>
</tr>
<tr>
<td>Office</td>
<td>27</td>
<td>$0.19</td>
</tr>
<tr>
<td>Medical Office</td>
<td>5</td>
<td>$0.20</td>
</tr>
<tr>
<td>Other</td>
<td>15</td>
<td>$0.21</td>
</tr>
<tr>
<td>Retail/Grocery Store</td>
<td>2</td>
<td>$0.21</td>
</tr>
<tr>
<td>Mixed Use Property</td>
<td>6</td>
<td>$0.24</td>
</tr>
<tr>
<td>Non-Refrigerated Warehouse / Distribution Center</td>
<td>4</td>
<td>$0.25</td>
</tr>
<tr>
<td>K-12 School</td>
<td>23</td>
<td>$0.27</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>100</strong></td>
<td><strong>$0.21</strong></td>
</tr>
</tbody>
</table>
TUA Revised Savings Estimates

Basic Tune-Up: 10% → 7%
Tune-Up Plus: 20% → 15%
Building Renewal: 35% → 35%

Total Estimated: 20% → 12%
kBtu: 99 → 67.8 million
Seattle GHG: 13.3%
MT CO2e/Yr: 10,500
Beyond Tune-Ups... Next Steps

- WA State Building Performance Standards
- Future Seattle Building Performance Standards
- Green New Deal
- Increased Support: “Hubs”, Financing
- Pilot “Retrofit Accelerator”
Thank You!

Nicole Ballinger
nicole.ballinger@seattle.gov

www.seattle.gov/buildingtuneups
Questions