2018 Seattle Energy Code: Alterations

BOMA Seattle

Seattle Department of Construction & Inspections

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The question is *how* we'll reach these targets

Washington state:
70% less building energy use by 2030

- Zero-carbon buildings
- Gov says move faster

Washington state:
45% reduction in GHG emissions by 2030

- 95% reduction by 2050

Seattle:
Carbon-neutral buildings & transportation by 2050

- …or sooner with Green New Deal

Seattle amendments: Guiding Principles

1. Build great envelope
   - Dependable energy savings for decades
2. Eliminate combustion
   - Carbon neutral today, won't need change later
3. Use electricity wisely
   - Don't waste on electric resistance heat
4. Generate power
   - Plus "solar readiness" for bigger future system

Build so no "major surgery" or system type changes needed for 2050

Existing Buildings: Basic Rules

- **Legally-built existing can remain forever**
- **Repairs can be like-for-like**
- **Historic fabric of Landmarks protected**
- **All new work usually has to meet code**

Chapter 5 – Existing Buildings

- 501 General
- 502 Additions ➡
- 503 Alterations
- 504 Repairs ➡
- 505 Change of Occupancy
- 506 Metering

<u>Additions</u>: compliance allowed for:

- New addition alone, *OR*
- Addition + existing building together
- C406 add'l efficiency credits required

<u>Repairs:</u>

- OK to fix something that's broken
- No need to upgrade
- Not the same as an "alteration"

Almost* like new construction:

- Substantial alterations
  - "Substantially extend the physical or economic life of the building"
  - Reoccupy building (or portion) after vacant more than 24 months
- Change of occupancy or use
  - Change from Factory, Storage, or Utility to something else
- Change of space conditioning
  - From unheated to fully conditioned, or heated only to heated and cooled
  - New exception for heat pump?

*"Almost" means:

1. Comply with entire code as for new construction, OR
2. Energy modeling: OK to have 10% higher energy use, OR
3. Building Envelope: complies as for new construction, except:
   1. Sub Alt: Envelope 15% worse heat loss than code
   2. Change of Occupancy or Conditioning: Envelope 10% worse heat loss than code

Exceptions to envelope alteration rules:

<u>These *don't* have to meet code:</u>

- Storm windows
- Replacement glass
- Cavities not exposed
- Cavities exposed
  - if filled with insulation
- Roof *recover* (not *replacement*)
- Simple door replacement doesn't require vestibule
- Air leakage testing not required unless substantial alteration

Cooling system alterations C503.4.1

- When adding cooling to an “uncool” space, must provide either DOAS or economizer, both at the individual equipment level and the total system level
- Alteration or replacement of cooling system: Table C503.4 - Economizers

TABLE C503.4

ECONOMIZER COMPLIANCE OPTIONS FOR MECHANICAL *ALTERATIONS*

	Option A	Option B (alternate to A)	Option C (alternate to A)	Option D (alternate to A)
Unit Type	**Any *alteration* with new or replacement equipment**	**Replacement unit of the same type with the same or smaller output capacity**	**Replacement unit of the same type with a larger output capacity**	**New equipment added to existing system or replacement unit of a different type**
1. Packaged Units	Efficiency: min.[a] Economizer: C403.5[b]	Efficiency: min.[a] Economizer: C403.5[b]	Efficiency: min.[a] Economizer: CC403.5[b]	Efficiency: min.[a] Economizer: C403.5[b]
2. Split Systems	Efficiency: min.[a] Economizer: C403.5[b]	For units ≤ 60,000 Btuh, comply with two of two measures: 1. Efficiency: + 10%[e] 2. Economizer: shall	For units ≤ 60,000 Btuh replacing unit installed prior to 1991, comply with at least one of two measures:	Efficiency: min.[a] Economizer: C403.5[b]

(Note some corrections to footnotes in Seattle code)

New & replacement heating systems Seattle

C503.4.6 New and replacement HVAC heating system equipment. For substantial alterations as defined in Section C503.8.1, or where a building's central HVAC heating system equipment is augmented or replaced, the building shall comply with Section C403.1.4.

Exception. Where only one heating appliance is failing and is replaced by another having the same or lesser heating capacity and the same or higher efficiency, no other alterations are made to the central HVAC system, and this exception has not been used within the same building in the previous 24-month period, this provision does not apply.

SDCI Informative Note: The term "central HVAC heating system" for the purposes of this section means a heating system that provides heating to multiple spaces or multiple dwelling or sleeping units (as opposed to a distributed heating system such as a baseboard heater or PTHP that provides heating to only a single space). A central heating system may include multiple pieces of heating equipment.
The exception permits like-for-like replacement of a single boiler, furnace or heat pump, where no other HVAC work is planned, so that a failed heating appliance can be expediently replaced.

Replacement of hot water system

C503.5 Service hot water systems. New service hot water systems that are part of the *alteration* shall comply with Section C404.

Exception. Where only one service hot water appliance is failing and is replaced by another having the same or lesser heating capacity and the same or higher efficiency, no other alterations are made to the central service hot water system, and this exception has not been used within the same building in the previous 24-month period, this provision does not apply.

Lighting Alterations C503.6

- Bring buildings closer to current code, one project at a time.
- Proportionate to scale of work

Stage 1: Fixture Replacement only

- If you replace 20% of the light fixtures* in any space or on the building exterior, meet the LPA or exterior lighting allowance
  - *or just the lamps and ballasts in existing fixtures

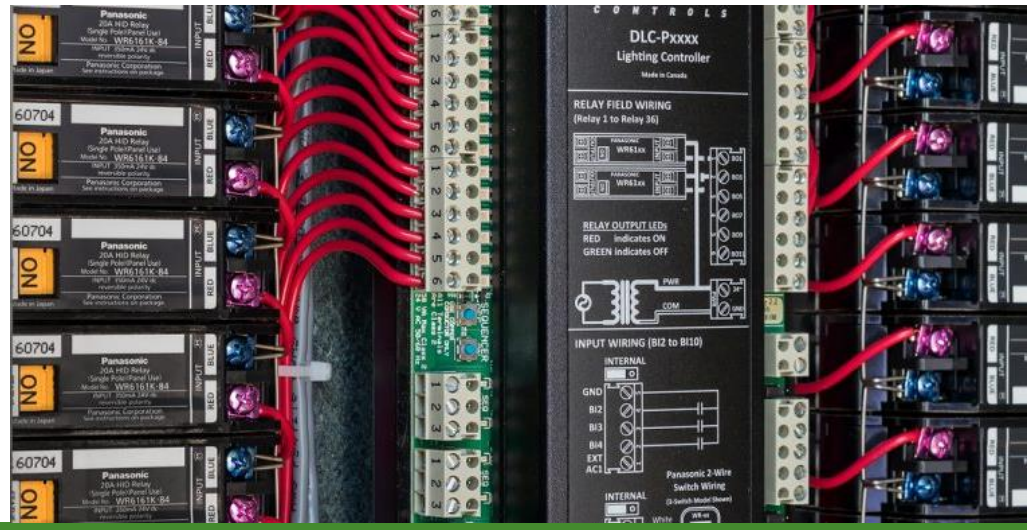
Stage 2: New Fixtures or Re-Circuiting Existing

- If new fixtures are wired or existing fixtures are being re-circuited, controls must have:
  - Manual controls (usually switches)
  - Light reduction controls (50% switching)
  - Automatic daylight zone controls
  - Specific application controls (display lights, under-counter lights, stairwell lights, etc.)
  - Occupancy sensors wherever required by C405.2.2.2

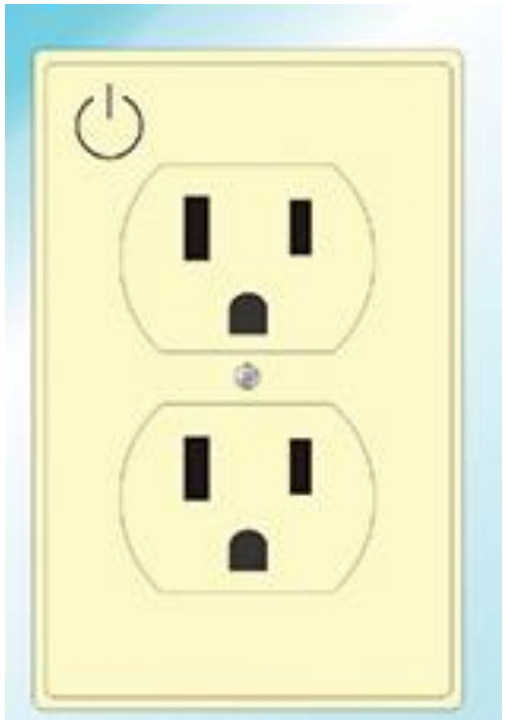
(so, consider LLLC fixtures)

Stage 3: New or Relocated Panel

- A new or moved lighting panel, with new raceway and wiring to the fixtures, must conform to the rest of C405.2.2. Therefore:
  - Automatic time switch for rooms that don't have occupancy sensors, with manual override



Controlled Receptacles C503.6.6



- Office, classroom, break room, etc:
- Control 50% of <u>new</u> outlets with time clock or occupancy sensor, <u>except</u>:
  - Alterations smaller than **5000 sf**
  - Systems furniture or office cubicle partitions reconfigured or relocated within the same area
  - Existing outlets in existing walls
  - Outlets for safety, security, maint, 24-hour

Metering for major HVAC alterations

- For <u>full HVAC replacement</u> (or more than half of heating & cooling capacity):
  - Meter incoming gas & electric
  - Sub-meter HVAC
  - Data acquisition & display

Metering for HVAC equip replacement

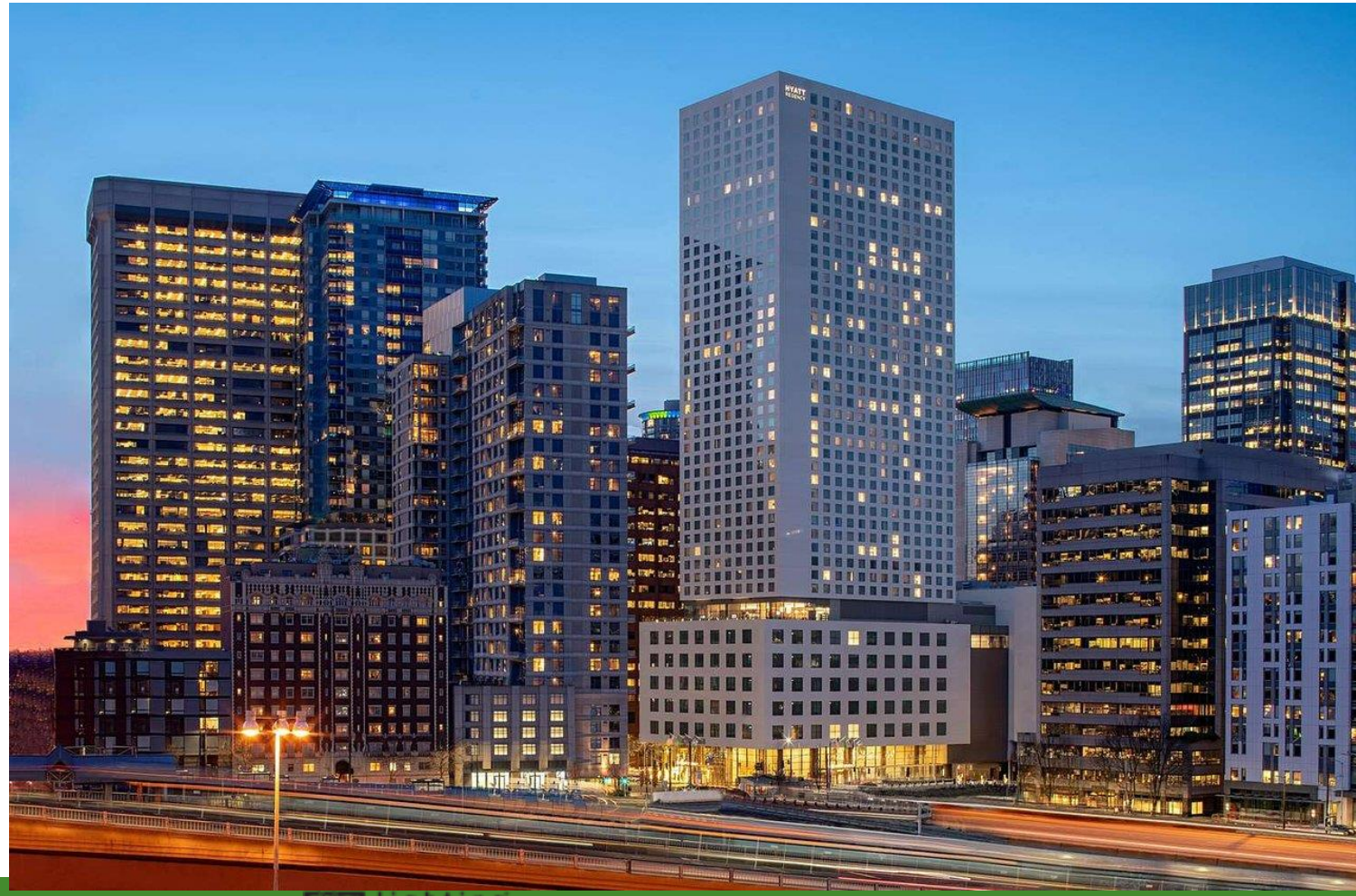
- "Local" meter required for:
  - Branch circuit over 50 kVA serving new HVAC equipment
  - New HVAC equipment on variable speed drive
- Gas metering required for new gas connection over 1,000 kBTU

Metering for complete new electrical system

- Provide complete metering

HB 1257: Building performance standard

- Either meet EUI target, or…
  - “Conditional compliance”
- Penalty: $5000 + $1/sf/year
- Reporting schedule:
  - 220,000+ sf June 1, 2026
  - 90,000+ sf June 1, 2027
  - 50,000+ sf June 1, 2028
- Technical assistance
- Positive ROI investments
- Equip end of life timing
- Cap on assistance $$



Alterations: Unresolved roadblocks

Gas boilers, furnaces, water heaters

- Often just get replaced at failure, no time to design new system

Electric resistance heating

- no existing pipes or ducts to move warmth from heat pump to rooms

Electrical service & panel size

- Service upgrade can double cost

New bldg + 1 Day = Existing bldg

<u>The Near Future: 2023 - 2024</u>

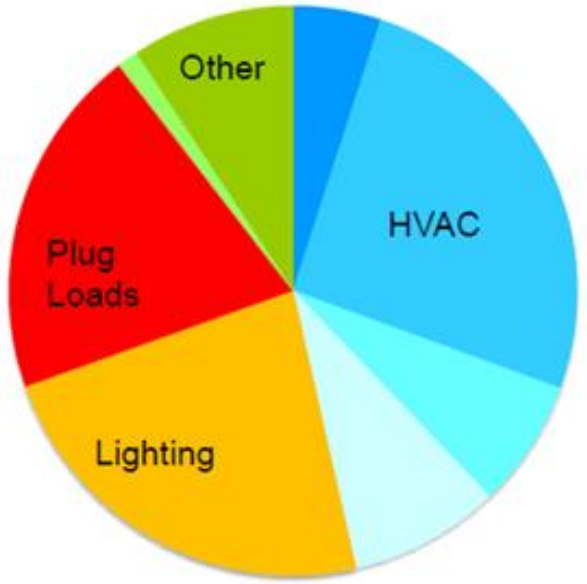
- Heat pump water heating for R-1 & R-2
  - + commercial?
- Heat pump space heating, with a few exceptions
- LLLC for open office
  - or networked lighting control
- Energy modeling requires high-performance envelope

The Future:

The following list is definitely inaccurate

- Lights & plugs *off* when not needed, esp off-hours
- Waste heat recovery (air & water) & storage
- Rooftop PV and battery storage
- Triple (or high-tech) glazing
- Solar control at glazing
- Refrigerant phase-out
- Embodied carbon: concrete, steel
- Diagnostics, with obligation to repair?

- Use ideas from world champs (Bullitt Center, etc.)
- Use “additional efficiency credits” as pathway



- Comfortable air
- Comfortable light
- Convenient electronics
- Effective appliances

Efficiency is not our only value

Health (sunlight, clean air)

Comfort (temp, humidity)

Environment (pollution, carbon)

Durability (long-lasting materials)

Quiet (machinery, traffic)

Beauty

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