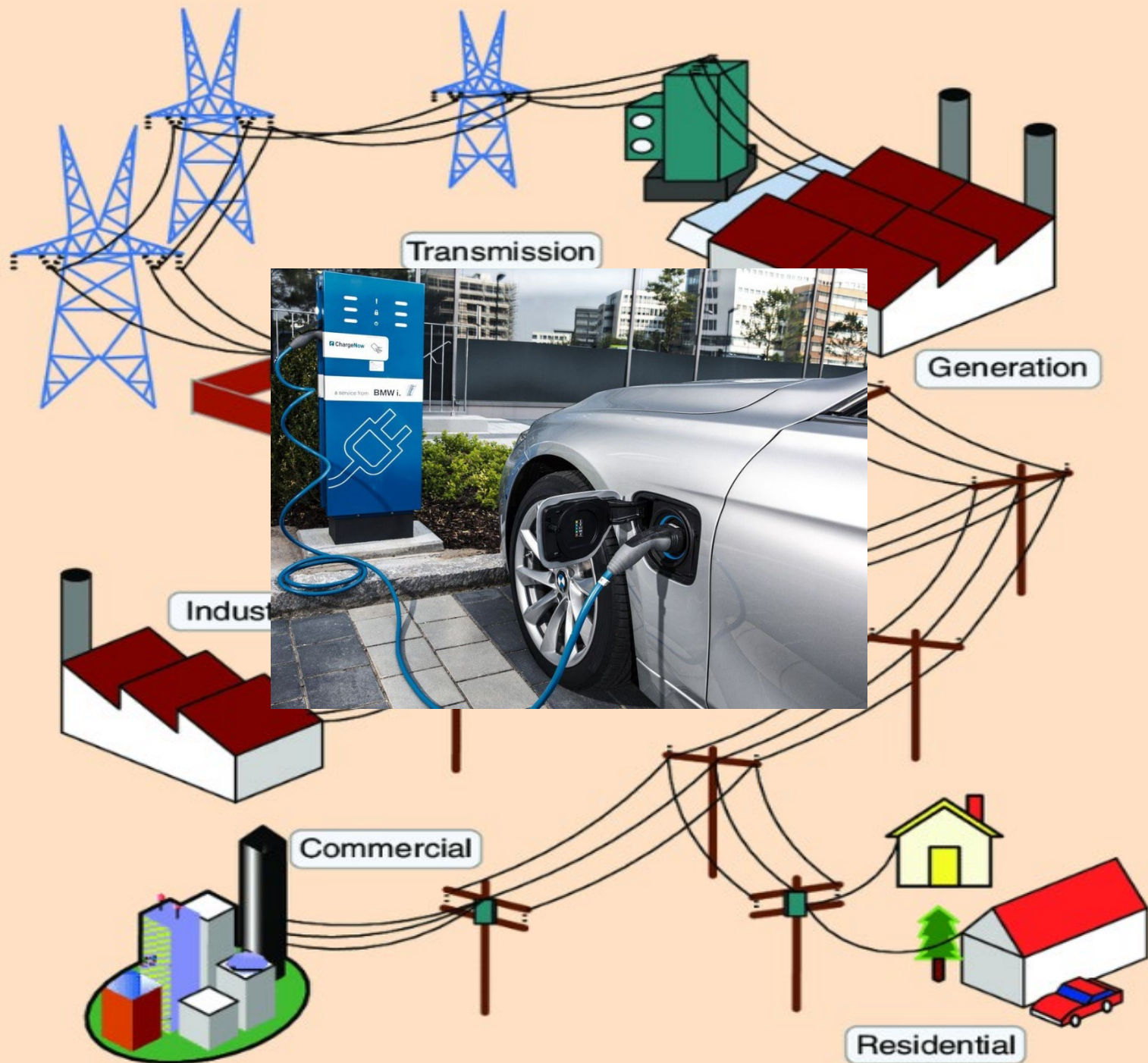


Electrification Without Penalties: Very High Efficiency HVAC



Healthy, high-performing buildings





***“Inefficient Building Electrification Will Require
Massive Buildout of Renewable Energy and
Seasonal Energy Storage”***

Harvard/Oregon State University/HEET article in Nature

Increasing emissions in the short term is acceptable because we have to jump start electrification.

The “short term” here is 10 to 20 years.

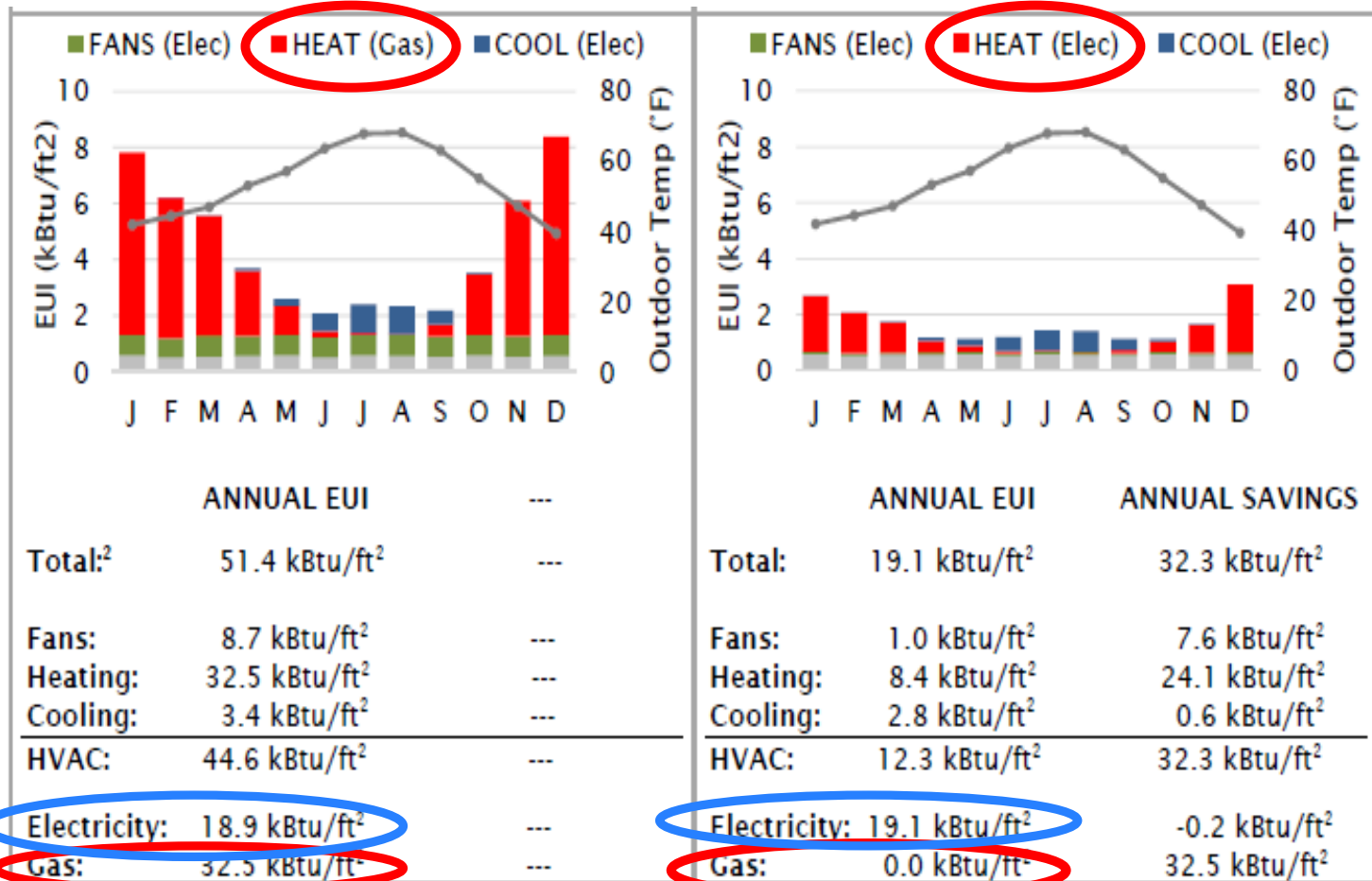
Increasing electrical demand provides ammunition to organizations whose goal is to extend the lives of coal and gas power plants.

Beautiful Electrification



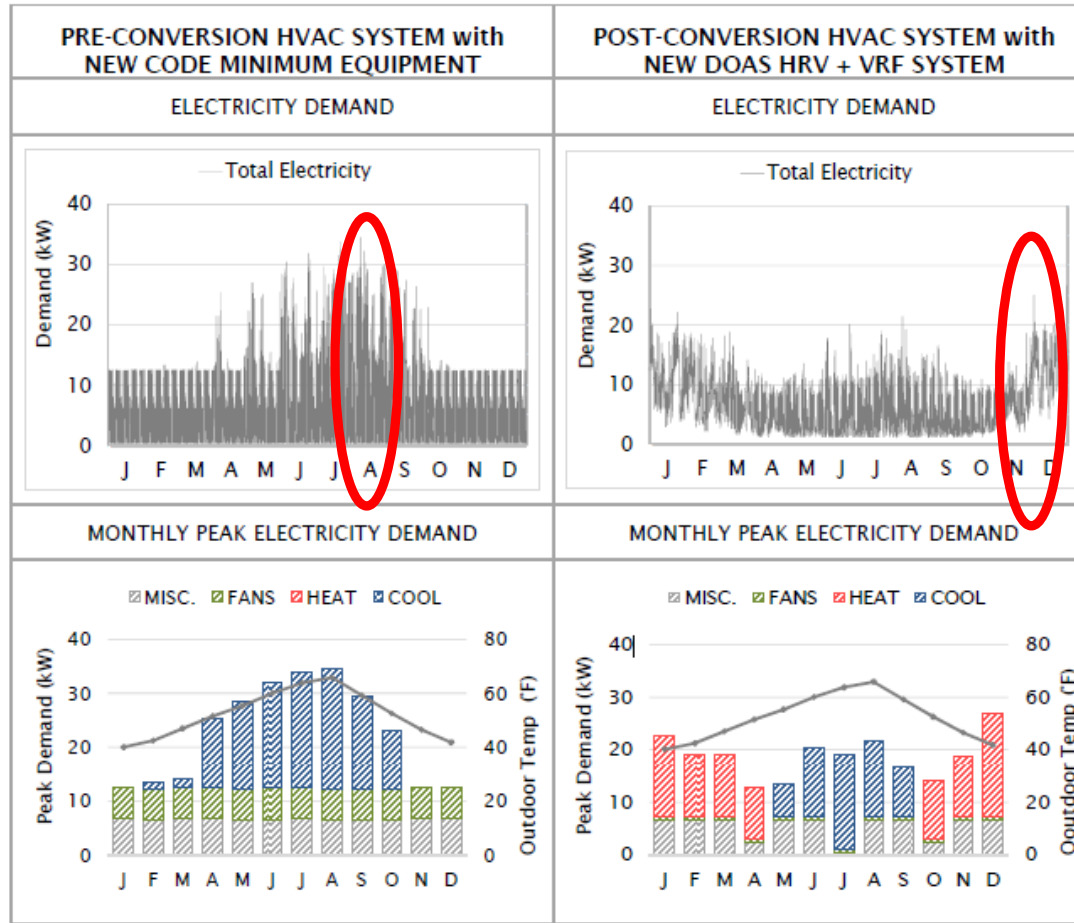
Law Office, Portland, OR

Energy Use Results

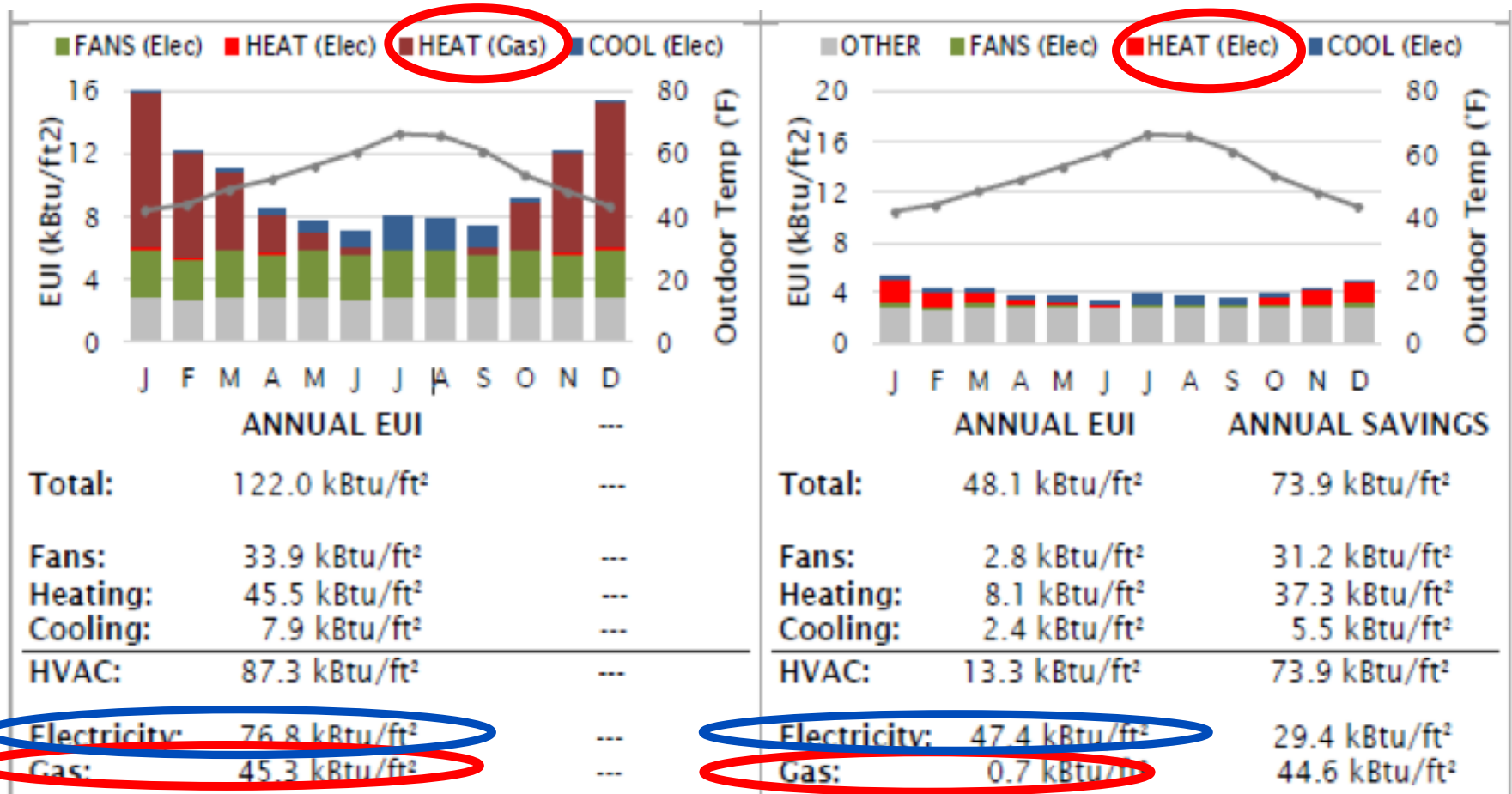


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Peak Demand Results

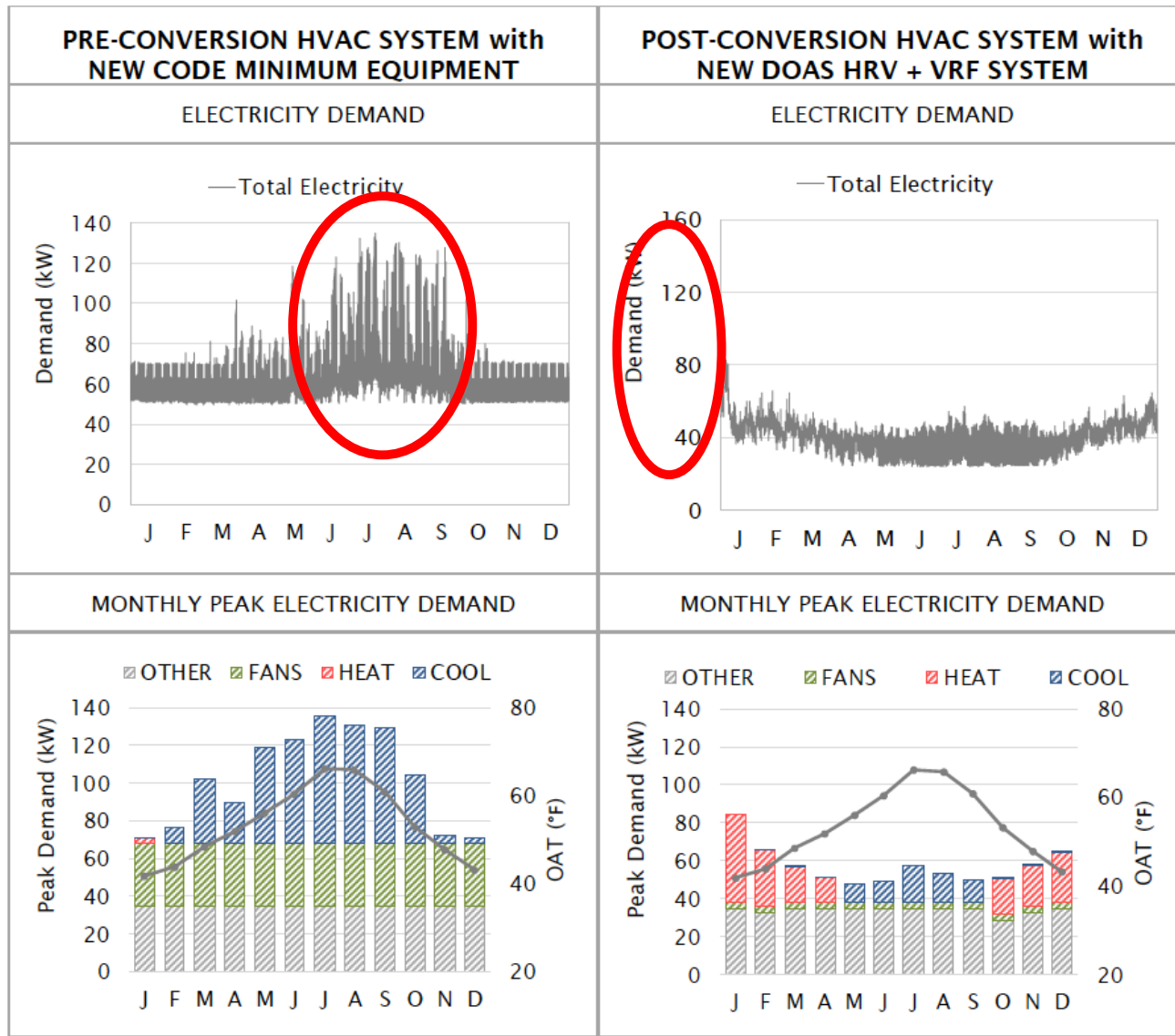


Airport Administrative Building, Seattle, WA Energy Use Results



1 Minor additive discrepancies are due to rounding.

Airport Administrative Building, Seattle, WA Peak Demand Results



Northwest Energy Efficiency Alliance Demonstration Results

Building Type	HVAC Savings
Airport terminal office	89%
Government dorms	77%
Restaurant	77%
Law office	75%
Government district office	73%
Seattle office	69%
Pizza restaurant	51%
Utility district office	48%

All results independently verified by RDH Engineering.

NEEA Demonstration Air Quality Feedback

“...the marked upgrade to indoor comfort still takes you by surprise. The difference is huge and we couldn’t be happier.”

Energy Services Supervisor,
Flathead Electric

“There was definitely a noticeable difference—this was a much more comfortable environment.”

Chief Engineer, Oregon Department of
Fish & Wildlife

VHE HVAC

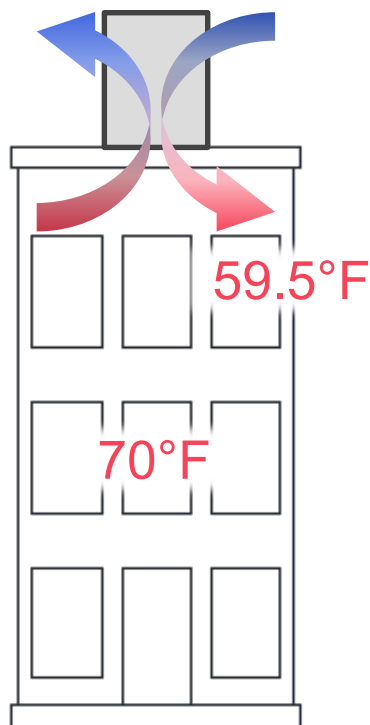
- A systems approach to commercial HVAC
- A performance specification, not a single technology
- Optimizes all elements of the HVAC system
- Uses equipment familiar to industry
- Heating/cooling systems typically downsized 30%-50%

VHE HVAC

- 1) Ventilation fully decoupled from heating/cooling function
- 2) Very high efficiency energy/heat recovery equipment
- 3) High performance electric heat pump
- 4) Right-sized heating and cooling equipment

Key Component: High-Efficiency Heat Recovery

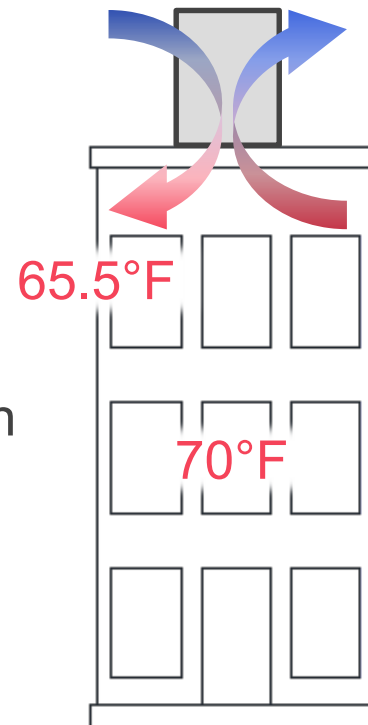
70% Recovery



4,860 Btu/h
at 500 cfm

VS

85% Recovery



2,430 Btu/h
at 500 cfm

40°F outdoor
temperature

A 15% difference in recovery efficiency reduces the energy needed to maintain a 70°F indoor temperature by 50%!

Applicable Buildings

- **Applicable in half of US commercial floor space**
- **Total system replacement**
- **Excellent applications: retail, offices, schools, assembly. Others possible.**

Contact

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