

# Energy Code

## DESCRIPTION

Revisions to Seattle's energy code would introduce far reaching energy standards within the City's building codes, directly influencing the amount of energy consumed by new and renovated buildings within the city.

## POLICY OBJECTIVE

The objective of an energy code is to require all new construction and large scale renovations to meet specific targets relating to the building's energy performance, thus directly influencing the energy saving potential of buildings in the City.

### SUMMARY RATINGS (★★★★★ = best/most feasible)

ENERGY EFFICIENCY POTENTIAL

★★★★★

COST EFFECTIVENESS

★★★

ECONOMIC BENEFIT

★★★★

ADMINISTRATIVE FEASIBILITY

★★★

COST OF IMPLEMENTATION

★★★

## ENERGY EFFICIENCY POTENTIAL

★★★★★

*Long-term energy savings potential is high as increased energy performance standards in an energy code will cover all new and major renovation projects in the City.*

- **Energy savings potential:** The energy savings potential of a new building code is high as energy code standards would cover all new construction and major renovations in the city. This is particularly true where a performance based compliance path is mandated, as specific reductions in a building's energy performance could be set.
- **Performance based code targets:** Setting performance based carbon targets (as opposed to energy improvement targets) would bring Seattle's energy policy in line with the requirements of the 2030 Challenge by explicitly reducing fossil fuel emissions for buildings. Setting carbon targets could also take into consideration source energy use, which would encourage the use of renewables or more sustainable fuel sources.
- **Cumulative Energy Savings:** This policy would generate energy savings of between 1,800,000 and 2,200,000 MWh through 2030, assuming a 20% improvement in energy efficiency for 80% of new development within the City (assuming residential construction is unaffected due to limits established by Washington State law).
- **Applicability to 2030 Challenge targets:** Mandating a performance based route to compliance would allow energy reduction targets to be mapped onto 2030 Challenge goals, as targeted improvements in energy performance could be set to meet the specific requirements outlined in the 2030 Challenge.
- **Construction performance:** By mandating specific commissioning requirements, such as air pressure testing at the completion of a project, the energy code would be able to exert influence over the quality of construction, directly influencing the amount of energy consumed by a building after construction.
- **Post construction performance:** Tying design energy performance to actual post construction energy performance represents a significant challenge. Of the case studies reviewed, England and Wales has the most comprehensive post construction energy requirements. However, these are not tied to pre construction energy performance predictions, primarily due to limitations in the accuracy of energy modeling compared to "real world" energy use.

## ECONOMIC IMPACTS

★★★★★

*Excellent potential for job creation as all new construction projects would fall under the requirements of the code, forcing a wholesale shift toward more energy efficient buildings*

- **Job creation potential:** By removing prescriptive compliance paths and mandating a performance based compliance strategy, job creation potential in the City is very high. Similar requirements in England and Wales helped the building industry take a leap in its practices and process, pushing sustainability to the forefront of building design and with it creating a new industry of building scientists, energy engineers and energy assessors. Although more stringent prescriptive requirements will also increase the need for green building specialists and green building product suppliers, they are unlikely to have the same level of job creation potential. By responding to stricter energy codes businesses in Seattle could establish market leadership in sustainable design, which could then be leveraged to develop work such as sustainable engineering or architectural consulting in other jurisdictions.
- **Property Values:** Energy code improvements could be tied to a requirement that buildings track actual performance

and display energy certificates based on metered energy, or on an energy performance rating such as ENERGY STAR. This option is currently being investigated by Cascadia Consulting as part of the City's Green Building Task Force's Existing Buildings Committee. The City could also require energy surveys to be carried out at the point of sale or lease, as required in England and Wales and currently voluntary under California State Law. Survey reports could include an energy performance rating which would highlight areas of energy deficiency. Since the building owner's payback for efficiency improvements has traditionally been limited to the recovery of capital expenditures through lower energy costs, there is often a reluctance to invest in measures with a payback period longer than a few years. The introduction of energy rating certificates would allow the benefits of energy efficiency to be recognized in increased property values, so that the owner need not rely solely on the benefit from reduced operating costs.

- **Policy enforcement:** Enforcement of a comprehensive performance based energy code is likely to place additional burden on city plans reviewers for the assessment of performance calculations, a process which will be unfamiliar to most City staff. Currently the city reviews only a handful of performance based submittals a year. City staff have described the approach as difficult to assess and control, and more open to manipulation than the prescriptive approach; the process requires a detailed assessment of a computer model where tradeoffs may have been made in order to achieve compliance. By comparison, the prescriptive approach involves a more simplistic review of drawings and construction documents. Staff noted that reviewing a building under the performance approach can take up to five times longer than reviewing a comparable building using a prescriptive approach. Therefore, more comprehensive energy code requirements may require additional enforcement staff, particularly if a performance based compliance route or requirements for post occupancy energy evaluations are included. Where other jurisdictions have implemented performance based codes, administration of the code has been described as being "challenging" following the code introduction. With greater experience by enforcement staff, difficulties in enforcing performance codes have diminished, such that the process is now accepted as standard practice by enforcement officials.
- **Policy Stringency:** Increased costs to the developer would either be passed on to consumers or reduce profit margins, either of which could adversely impact the new construction real estate market. Conversely, where more demanding requirements are introduced the costs of the products associated with achieving these code requirements (for example more efficient windows) would ultimately reduce, due to increased demand.

## **COST OF POLICY IMPLEMENTATION**

★★★

*Costs to the City in implementing an improved energy codes are dependent on the compliance routes and requirements outlined in the code.*

- **Cost to the City:** Implementation costs to the city are largely dependent on the compliance paths available to developers and builders. Currently the Seattle Energy Code is required by City ordinance to include amendments providing a 20% improvement in energy savings over the current version of ASHRAE Standard 90.1 for non-residential construction. It should be noticed that comparing relative code stringency is difficult and particularly for prescriptive codes, relative increases from one code to another may not be achieved for all buildings. Since this periodic review and updating of the Seattle Energy Code is already standard business process, enhancing the prescriptive requirements of the energy code is being done as part of the existing code development cycle and imposes no additional costs. Mandating a performance based compliance methodology for all buildings would impose significantly greater requirements on City staff, with associated cost increases. The costs of implementing Part L (2006) for England and Wales were high compared to City level policy development budgets. However, the City already has an established voluntary performance based compliance methodology within its energy code, thus negating the need to develop a comprehensive new methodology from scratch.
- **Cost to the developer:** Any increase in energy code performance standards is likely to result in cost increases to developers, in order to construct buildings compliant with the more demanding requirements. Based on experiences in California, increases in prescriptive code requirements yielding energy performance gains of up to 20% are likely to increase building costs by approximately 1% to 2%. Mandating performance based compliance would incur additional costs to developers for computer modeling by third party consultants, likely in the region of \$40k for complex buildings. For smaller commercial and residential projects, full scale energy modeling may not be financially viable.
- **Post construction performance requirements:** Post construction requirements for demonstrating performance compliance are likely to increase costs to both the City and to developers. The City would be required to develop a methodology for producing energy ratings and certificates, though costs could be minimized if a 3<sup>rd</sup> party tool such as ENERGY STAR Portfolio Manager is used. Costs for producing certificates or energy ratings would be passed onto the developer or homeowner. Use of ENERGY STAR Portfolio Manager is free for all buildings; however, home energy inspections are likely to cost \$200 to \$300, depending on the scope and requirements of the survey.

## **COST EFFECTIVENESS**

★★★

*The cost-benefit analysis indicates that the program would be effective for the City, though developers will*

*experience some financial burden in complying with the standard at initiation.*

- **Direct City Benefit Cost ~16.4:** \$16.40 of energy savings per \$1.00 of program costs to the City. This ratio is quite high due to the comparatively low cost to the City of administration and policy development, compared to high energy savings anticipated over time.
- **Net Benefit Cost ~0.2:** \$0.20 of monetized energy savings and financial benefit to the developer for every \$1.00 of costs to the City and developer. This ratio is low due to the large financial investment required on the part of developers to comply with the standard, with little corresponding financial benefit to the developer in terms of additional rents or offset costs. However, the cost of code compliance will likely decrease with time and developer experience.
- **Cost per MWh saved low:** ~\$2.90 per MWh saved.

## ADMINISTRATIVE FEASIBILITY

★★★

*Enhanced prescriptive requirements could be integrated into the City's existing codes with comparative ease compared to a mandated performance based approach.*

- **Administrative feasibility depends on the route to compliance required through the code:** Although a performance based approach currently exists in the Seattle Energy Code for both residential and non residential buildings, mandating this approach would place a significant administrative burden on City officials, particularly in permit review and analysis of performance calculations supplied to the City to demonstrate code compliance. If mandating a performance based approach is seen as likely to place a significant burden on both developers (in terms of costs to demonstrate compliance) and City staff (to review documentation for compliance) an incentive based approach could be used to encourage the use of performance calculations when needed to demonstrate energy efficiency in excess of that which could be achieved through prescriptive compliance alone. Increasing mandatory standard would be a relatively easy process to implement provided improved standards do not contravene Washington State or federal requirements governing limiting values which may be set at a local level.
- **Acceptability of the performance based approach to Seattle:** Seattle City officials report that performance based compliance is generally only used on large and complex construction projects where the analysis can lead to quantifiable improvements in energy performance, with proportionally small modeling costs compared to total project costs. For smaller projects, it is often felt that developers would achieve better energy use reductions by investing computational modeling costs in tangible improvements such as increased wall insulation rather than investing in a performance based analysis. It is thought by City staff that mandating a performance based approach for all buildings may be perceived by developers as introducing unnecessary cost increases by requiring computer modeling, in particularly for small commercial developers and the majority of residential developers
- **Washington State and federal building standards may conflict with increased energy code requirements:** Increasing mandatory standards would be a relatively easy process to implement provided improved standards do not conflict with Washington State or federal regulations limiting values which may be set at a local level. Washington State regulations for residential buildings define "minimum/maximum" limits, governing the maximum performance which can be mandated by local jurisdictions. Some aspects of buildings, such as appliance efficiency standards, are also governed by federal law, where a waiver must be first be obtained in order for the local jurisdiction to exceed federal requirements. Current legal action against Albuquerque's proposed new energy code centers on the City mandating standards which exceed federal law, despite the City also requiring a performance based compliance approach to be followed and therefore not explicitly requiring the standards to be achieved.
- **Post construction performance requirements:** Post construction performance requirements are likely to place an additional administrative burden on City policy makers. Energy rating certificates and rating methodologies may need to be developed directly by the City if 3<sup>rd</sup> party alternatives are unsuitable or unavailable. Additional staff may also be required in order to meet the increased administration workload of reviewing and approving building energy rating scores and energy survey information provided by 3<sup>rd</sup> part reviewers.

## STAKEHOLDER IMPACT

- **Project costs would increase in order to achieve compliance with improved code standards:** If compliance costs are overly high the development community would be adversely impacted.
- **Opposition may be felt regarding the implementation of specific standards within the code** from some elements of the building industry in the City, such as the smaller developers and multi family residential developers who may feel burdened with the additional costs incurred through complying with improved energy codes. This is particularly likely to be the case with a mandatory performance based compliance route, where the cost and complexity requirements of energy modeling may be considered overly burdensome.
- **Post construction performance requirements:** Developers and homeowners may incur additional costs to meet energy certification or energy survey and energy rating requirements.

## LESSONS LEARNED

### PROS

- Will directly impact energy use of all new development within the City.
- Post construction energy efficiency policies will impact the City's existing building stock.

### CONS

- Existing Seattle building standards will need to be reviewed in conjunction with Washington State and federal code requirements.
- Mandating performance based compliance requirements or introducing policies covering post construction energy use would place an additional burden on City staff.

### CONSIDERATIONS IN POLICY DESIGN

- Stringency of building requirements and the associated level of financial burden to impose on the developer industry – would developers choose to build outside of Seattle?
- How should post construction and in occupancy energy performance be considered in policy design?
- Should a performance based compliance path be mandated for all buildings or should performance based compliance be incentivized by the City? The future requirements of the 2030 Challenge are unlikely to be able to be met with improvements in prescriptive requirements alone due to the inflexibility of this approach. Analysis using DMJM H&N's SSIM energy modeling software indicates that obtaining increased efficiencies in excess of 40% to 50% compared to current Seattle standards through prescriptive measures alone is both technically and economically difficult using current technologies.
- If a performance base approach is used, targets (be they energy or carbon) could be based upon percentage improvement targets in energy performance compared to an equivalent baseline building, based on modeled performance. Absolute targets could also be set (adjusted to reflect differences in size or building use) however this approach may discriminate against buildings with unusual and unavoidable loads, which may be unfairly advantaged or disadvantaged should absolute targets be set. This is avoided if the percentage improvement approach is used and receptacle or process loads are excluded from the calculation.
- How far can Seattle's policies be developed independently of state and federal code development?
- Suggestions for improvements to the Washington State Codes end on 31 March 2008 (for the next 3 year cycle). Therefore changes which may be affected by state policy should be submitted before this date.