

# Residential Windows Regulatory Impact Statement

## REGULATORY PROPOSAL

PREPARED BY:  
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B.C. MINISTRY OF ENERGY, MINES AND PETROLEUM RESOURCES  
JULY 2019

COMMENTS MUST BE RECEIVED BY [OCTOBER 4], 2019

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## SCOPE AND REQUIREMENTS

<b>TYPE OF DEVICE</b>	<p><b>Residential Windows and Sliding Glass Doors</b> means metal and non-metal framed manufactured windows and sliding glass doors for residential buildings with less than five stories, and non-residential buildings with a floor space of 600m<sup>2</sup> or less.</p> <p>Residential windows and sliding glass doors do not include hinged doors, bi-folding doors, sidelites, transoms, skylights, sloped glazing, roof windows, curtain walls, window walls or storefront windows.</p>
<b>TEST STANDARD</b>	<p>The procedure set out in one of the following:</p> <p>(a) CAN/CSA A440.2-14/A440.3-14;</p> <p>(b) CAN/CSA A440.2-18/A440.3-18;</p> <p>(c) NFRC 100-14; or</p> <p>(d) NFRC 100-17.</p>
<b>PROPOSED ENERGY PERFORMANCE STANDARD</b>	<p>U-value must be <math>\leq 1.61 \text{ W}/(\text{m}^2\text{-K})</math></p>
<b>EFFECTIVE DATE</b>	<p>Products manufactured and sold after January 1, 2022.</p>
<b>CERTIFICATION</b>	<p>Compliance with the regulation requires testing and verification by a Standards Council of Canada accredited Certification Body.</p> <p>The existing labelling requirements for manufactured fenestration products will not change. The existing labelling requirements include an energy efficiency verification label as well as an additional removable label requirement. The labelling requirement aligns with that of recognized North American fenestration certification programs.</p>
<b>CURRENT STANDARD</b>	<p>The B.C. Energy Efficiency Standards Regulation requires residential windows and sliding glass doors to have a U-Value equal to or less than 1.80 W/m<sup>2</sup>K. Products must be tested with CAN-CSA A440.2-14/A440.3-14 or NFRC 100-2014. Compliant products must have an energy efficiency verification label from a Standards Council of Canada accredited certification body or a National Fenestration Rating Council accredited independent certification and inspection agency.</p>
<b>HARMONIZATION</b>	<p>B.C.'s proposed regulation is aligned with the objectives of the Market Transformation Roadmap endorsed by the Energy and Mines Ministers in 2018. <sup>[1]</sup> The Roadmap includes a short-term goal that all windows installed in Canada meet a U-value <math>\leq 1.61</math> by 2022. The City of Vancouver (which represents ~17% of B.C.'s population) has had a residential window requirement of U-value <math>\leq 1.4</math> since January 1, 2015.</p>

<sup>[1]</sup> [https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/emmc/pdf/Market-Transformation-Strategies\\_en.pdf](https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/emmc/pdf/Market-Transformation-Strategies_en.pdf)

<b>NEED FOR REGULATION</b>	<p>This standard will:</p> <ul style="list-style-type: none"> <li>• Achieve CleanBC commitments to reduce greenhouse gas (GHG) emissions through new energy efficiency standards for space heaters, water heaters and residential windows (2.2 Improving Where We Live and Work);</li> <li>• Reduce net heating costs for B.C. residents; and</li> <li>• Drive the adoption of the latest window manufacturing technologies.</li> </ul>
<b>TRANSPARENT REGULATION DEVELOPMENT</b>	<p>Development of the proposed residential window standard proceeded as follows:</p> <ul style="list-style-type: none"> <li>• Review of provincial climate and energy plans;</li> <li>• Market, economic and technical analysis; and</li> <li>• Development of a regulatory proposal.</li> </ul> <p>Public review and stakeholder consultation will be open for [45-days] after the publication of this document. Stakeholder consultation will be followed by regulatory drafting and submission of the regulatory proposal to Cabinet for approval.</p>
<b>ACCEPTANCE</b>	<p>Compliant products (U-value <math>\leq 1.61</math>) use the same technologies as the current regulated minimum performance products (U-value <math>\leq 1.80</math>) which include:</p> <ul style="list-style-type: none"> <li>• Vinyl, wood or fibreglass frame; and</li> <li>• Dual pane insulating glass unit (IGU) with argon gas fill and one low emissivity (Low-E) coated surface.</li> </ul> <p>Most manufacturers will not need to change their fixed, picture and hinged window selections to meet the proposed standard. Some dual panel, single Low-E surface sliding windows meet the proposed regulation, but many do not. The standard will require manufacturers with non-compliant products to upgrade glass coatings, change from sliding to hinged designs, or upgrade frame design.</p> <p>Homeowners will not notice any change in the product’s appearance or function, except where hinged windows are selected in place of sliders.</p>
<b>MARKET TRANSFORMATION</b>	<p>The performance of residential windows continues to improve. The use of sealed IGUs, dual panes, low-E coatings, argon gas, and non-metal frames has increased the performance of windows by 30-40% over the last 30 years. Further improvements in low-E coatings, deeper multi-chambered frame design and warm-edge spacers allow products to meet the proposed performance criteria of U-value <math>\leq 1.61</math>.</p> <p>Market transformation has been facilitated by labelling programs and requirements, incentive programs, and the adoption of progressively more stringent codes and standards.</p> <p>Energy performance labelling has helped consumers identify and choose high-performance windows. Energy performance labelling is facilitated by the Energy Efficiency Standards Regulation (which requires labelling of all windows), the voluntary ENERGY STAR program, and the City of Vancouver’s Building Bylaw (which strictly enforces labelling requirements).</p> <p>Rebate programs have helped to drive market awareness and demand for high-efficiency products. Rebates for high-efficiency windows were provided by LiveSmart (2008-2014) and more recently by the CleanBC Better Homes program and Home Renovation Rebate program (2018-present).</p>

	<p>Since 2017, the High Performance Window Certification Program has provided financial support to B.C. manufacturers to test and certify new Passive House and ENERGY STAR Most Efficient window products. Passive House and Energy Star Most Efficient products perform significantly better than the proposed regulation. The technology used in ultra-efficient Passive House and Energy Star Most Efficient products has informed the development of mid-efficiency product lines that meet the proposed standard.</p> <p>Incremental updates to the Energy Efficiency Standards Regulation, the B.C. Building Code and the City of Vancouver Building Bylaw have driven market adoption of high-efficiency windows over time. Most recently, the City of Vancouver’s U-value <math>\leq 1.4</math> requirement and the adoption of the B.C. Energy Step Code are driving technology advancement and market adoption of products meeting the proposed standard.</p>
<b>AVAILABILITY</b>	The market share of compliant products is estimated at 40%. Most window dealers in B.C. have access to multiple compliant products.

## ASSESSMENT FROM AN INDUSTRY PERSPECTIVE

<b>ACCESSIBILITY</b>	<p>Builders and window installers have access to compliant products across the Province. Compliant products are sold through all major distribution channels. Compliant products are compatible with new construction and renovation projects in all major residential building types.</p>
<b>MANUFACTURER PERSPECTIVE</b>	<p>The proposed standard will require some manufacturers to adjust their product offerings and/or design and certify new products. Manufacturers will have two years prior to the proposed effective date to make these changes.</p> <p>Common upgrades from a non-compliant window will be to introduce a second low-E coating or switch from a slider to a casement window. These options are included in most manufacturers’ existing product certifications and manufacturing capabilities.</p> <p>Some manufacturers will design and certify new product lines using more thermally efficient frame profiles. Engineering resources for designing new products can be supplied by window system suppliers (i.e. frame profile suppliers) or by experienced fenestration thermal modellers.</p>
<b>IMPACT ON BUILDERS</b>	<p>Residential home builders typically specify slider windows and purchase the lowest cost products meeting building code requirements.</p> <p>The proposed standard will require residential builders to adapt their specifications. Residential builders will need to re-evaluate window selection based on updated cost parameters. Slider windows will not always be the lowest cost option under the standard. This shift is already being prompted by the B.C. Step Code which, in jurisdictions that have adopted it, requires builders to carefully consider window design.</p>
<b>OTHER ISSUES</b>	Some manufacturers and builders are concerned about being undercut by non-compliant products. Industry associations advocate for consistent enforcement of standards to ensure a level playing field for compliant manufacturers.

**ASSESSMENT FROM A CONSUMER PERSPECTIVE**

<b>COST-BENEFIT ASSUMPTIONS</b>	<p>A cost-benefit analysis was completed for single-family dwellings. The cost-benefit analysis weighs the incremental costs against the energy cost savings discounted over the equipment lifetime. The consumer cost-benefit analysis is a weighted average of natural gas furnace, electric resistance heating and oil furnace space heating types. Cost-benefit assumptions include:</p> <ul style="list-style-type: none"> <li>• A natural gas cost that includes all variable costs including delivery charges, commodity charges, carbon tax, sales tax and the clean energy levy. The total cost of gas supply was estimated at \$9.90/GJ in 2020, with moderate increases in subsequent years.</li> <li>• A BC Hydro electrical rate that includes 66% of bills charged at Tier 2, using forecasted rate increases between 2022 and 2040. Electrical rates include all applicable taxes and the rate rider.</li> <li>• The 2018 average spot price of heating oil was used for years between 2022 and 2040.</li> <li>• A consumer discount rate of 6%.</li> <li>• An incremental cost of \$500 per home package of windows that represents the average additional cost for a compliant package once the regulation takes effect.</li> <li>• A product lifetime of 20 years.</li> </ul> <p>Energy savings were modelled in HOT2000 v11.4 for the representative climates of Vancouver, Kamloops, and Prince George.</p>																									
<b>COST-BENEFIT ANALYSIS ENERGY SAVINGS FOR EACH CONSUMER</b>	<p>The following tables show the cost-benefit analysis for the purchase of a home package of windows compliant to the proposed regulation versus the current minimum energy performance standard.</p> <table border="1" data-bbox="467 1350 1464 1728"> <thead> <tr> <th colspan="5">Consumer Cost-Benefit Analysis per home</th> </tr> <tr> <th>Region</th> <th>Net Present Value</th> <th>Annual GHG Reductions (kg CO2e/yr)</th> <th>First-year cost savings</th> <th>Simple Payback</th> </tr> </thead> <tbody> <tr> <td>Lower Mainland &amp; Van. Isl.</td> <td>\$240</td> <td>60</td> <td>\$50</td> <td>13</td> </tr> <tr> <td>Southern Interior</td> <td>\$290</td> <td>80</td> <td>\$55</td> <td>12</td> </tr> <tr> <td>North</td> <td>\$560</td> <td>140</td> <td>\$75</td> <td>9</td> </tr> </tbody> </table>	Consumer Cost-Benefit Analysis per home					Region	Net Present Value	Annual GHG Reductions (kg CO2e/yr)	First-year cost savings	Simple Payback	Lower Mainland & Van. Isl.	\$240	60	\$50	13	Southern Interior	\$290	80	\$55	12	North	\$560	140	\$75	9
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<b>NON-ENERGY BENEFITS</b>	<p>Compliant window technology can also reduce drafts, condensation and outside noise levels.</p>																									

**ASSESSMENT FROM A PROVINCIAL GOVERNMENT PERSPECTIVE**

<p><b>ECONOMIC ASSESSMENT FROM A PROVINCIAL PERSPECTIVE</b></p> <p><i>(Aggregate energy, emission, and net cost savings)</i></p>	<p>A cost-benefit analysis was completed for the Province as a whole. The cost-benefit to the Province is represented by the net present value of window sales affected by the proposed regulation between 2022 and 2030. The Provincial cost-benefit assumptions include:</p> <ul style="list-style-type: none"> <li>• All assumptions made in the consumer cost-benefit analysis.</li> <li>• A window sales forecast developed based on historical housing starts, a replacement ratio of 3% per year and a typical house package consisting of 28 windows with an average size of 1.1m<sup>2</sup>.</li> </ul> <table border="1" data-bbox="427 646 1455 953"> <thead> <tr> <th colspan="2">Provincial Cost-Benefit Analysis<sup>1</sup></th> </tr> </thead> <tbody> <tr> <td>Aggregated Annual Gas and Oil Savings</td> <td>240,000 GJ in 2030</td> </tr> <tr> <td>Aggregate Annual GHG Reductions</td> <td>12,400 tonnes CO<sub>2</sub>e in 2030</td> </tr> <tr> <td>Aggregated Annual Electrical Savings</td> <td>50 GWh/yr in 2030</td> </tr> <tr> <td>Provincial NPV by 2030</td> <td>\$40 Million</td> </tr> </tbody> </table>	Provincial Cost-Benefit Analysis <sup>1</sup>		Aggregated Annual Gas and Oil Savings	240,000 GJ in 2030	Aggregate Annual GHG Reductions	12,400 tonnes CO <sub>2</sub> e in 2030	Aggregated Annual Electrical Savings	50 GWh/yr in 2030	Provincial NPV by 2030	\$40 Million
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<p><b>ADMINISTRATIVE FEASIBILITY FOR COMPLIANCE AND ENFORCEMENT</b></p>	<p>Compliance and enforcement approach under the <i>Energy Efficiency Act</i> is based on random inspections and response to compliance complaints. Enforcement will be based on provincially regulated labelling and the certified product directories of designated testers.</p>										

**NOTES**

<p><b>REGULATORY ASSESSMENT COMPLETED BY</b></p>	<p>Cameron Shook, P.Eng Energy Efficiency Standards Engineer, Energy Efficiency Branch Tel: (778) 698-8306 E-mail: cameron.shook@gov.bc.ca</p>
<p><b>DATE</b></p>	<p>July 25, 2019</p>

<sup>1</sup> Aggregated annual values account for the savings/reductions that occur in 2030 from all units installed since the implementation of the standard up to the year specified.