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NewClimate Institute, Verra

# Buildings Efficiency Guidance

*Guidance for assessing the greenhouse gas impacts of buildings policies*

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Glossary, abbreviations and acronyms, references and contributors

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## GLOSSARY

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| **Activities** | The administrative activities involved in implementing the policy (undertaken by the authority or entity that implements the policy), such as permitting, licensing, procurement, or compliance and enforcement |
| **Assessment period** | The time period over which GHG impacts resulting from a policy are assessed |
| **Assessment report** | A report, completed by the user, that documents the assessment process and the GHG, sustainable development and/or transformational impacts of the policy |
| **Baseline scenario** | A reference case that represents the events or conditions most likely to occur in the absence of a policy (or package of policies) being assessed |
| **Building code** | Sets of standards for buildings or building systems determining minimum requirements of energy performance |
| **Causal chain** | A conceptual diagram tracing the process by which the policy leads to impacts through a series of interlinked logical and sequential stages of cause-and-effect relationships |
| **Deep retrofit** | Whole building analysis and construction process that uses “integrative design” to achieve much larger energy savings than conventional energy retrofits. Used interchangeably with “deep green retrofit” and “deep retrofit” |
| **Electricity grid (grid)** | A network consisting of wires, switches and transformers to transmit electricity from power sources to power users. A large network is layered from low-voltage (110-240 V) distribution, over intermediate voltage (1-50 kV) to high-voltage (above 50 kV to MV) transport subsystems. Interconnected grids cover large |

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| | areas up to continents. The grid is a power exchange platform enhancing supply reliability and economies of scale. |
| **Emission factor** | A factor that converts activity data into GHG emissions data |
| **Energy Carrier** | A transmitter of energy, including electricity and heat as well as solid, liquid and gaseous fuels which occupy intermediate steps in the energy-supply chain between primary sources and end-use applications |
| **Energy savings company (ESCO)** | A commercial or non-profit business providing a broad range of energy solutions including designs and implementation of energy savings projects, retrofitting, energy conservation, energy infrastructure outsourcing, power generation and energy supply, and risk management. ESCOs guarantee that energy savings are able to repay the efficiency investment, which helps overcome financial constraint to energy efficiency investments. |
| **Ex-ante assessment** | The process of estimating expected future GHG impacts of a policy (i.e., a forward-looking assessment) |
| **Ex-post assessment** | The process of estimating historical GHG impacts of a policy (i.e., a backward-looking assessment) |
| **Expert judgment** | A carefully considered, well-documented qualitative or quantitative judgment made in the absence of unequivocal observational evidence by a person or persons who have a demonstrable expertise in the given field (IPCC 2006). |
| **GHG assessment boundary** | The scope of the assessment in terms of the range of GHG impacts that is included in the assessment |
| **GHG impacts** | Changes in GHG emissions by sources that result from a policy |
| **Impact assessment** | The estimation of changes in GHG emissions or removals resulting from a policy, either ex-ante or ex-post |
| **In-jurisdiction impacts** | Impacts that occur inside the geopolitical boundary over which the implementing entity has authority, such as a city boundary or national boundary |
| **Independent policies** | Policies that do not interact with each other, such that the combined effect of implementing the policies together is equal to the sum of the individual effects of implementing them separately. |
| **Inputs** | Resources that go into implementing the policy, such as financing |
| **Intended impacts** | Impacts that are intentional based on the original objectives of the policy. In some contexts, these are referred to as primary impacts. |

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| **Interacting policies** | Policies that produce total effects, when implemented together, that differ from the sum of the individual effects had they been implemented separately. |
| **Intermediate effects** | Changes in behaviour, technology, processes, or practices that result from the policy, which lead to GHG impacts |
| **Jurisdiction** | The geographic area within which an entity's (such as a government's) authority is exercised. |
| **Key performance indicator (indicator)** | A metric that indicates the performance of a policy |
| **Long-term impacts** | Impacts that are more distant in time, based on the amount of time between implementation of the policy and the impact. |
| **Minimum energy performance standards** | Rules or guidelines for a particular product class that set a minimum efficiency level, and usually prohibit the sale of underperforming products |
| **Monitoring period** | The time over which the policy is monitored, which may include pre-policy monitoring and post-policy monitoring in addition to the policy implementation period |
| **Negative impacts** | Impacts that are perceived as unfavourable from the perspectives of decision makers and stakeholders. |
| **Non-policy drivers** | Conditions other than policies, such as socioeconomic factors and market forces, that are expected to affect the emissions sources included in the GHG assessment boundary |
| **Out-of-jurisdiction impacts** | Impacts that occur outside the geopolitical boundary over which the implementing entity has authority, such as a city boundary or national boundary |
| **Overlapping policies** | Policies that interact with each other and that, when implemented together, have a combined effect less than the sum of their individual effects when implemented separately. This includes both policies that have the same or complementary goals (such as national and subnational energy efficiency standards for appliances), as well as counteracting or countervailing policies that have different or opposing goals (such as a fuel tax and a fuel subsidy). |
| **Parameter** | A variable such as activity data or emission factors that are needed to estimate GHG impacts |
| **Policy or action** | An intervention taken or mandated by a government, institution, or other entity, which may include laws, regulations, and standards; taxes, charges, subsidies, and incentives; information instruments; voluntary agreements; implementation of new technologies, processes, or practices; and public or private sector financing and investment, among others |

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| **Policy implementation period** | The time period during which the policy is in effect |
| **Policy scenario** | A scenario that represents the events or conditions most likely to occur in the presence of the policy (or package of policies) being assessed. The policy scenario is the same as the baseline scenario except that it includes the policy (or package of policies) being assessed. |
| **Positive impacts** | Impacts that are perceived as favourable from the perspectives of decision makers and stakeholders |
| **Rebound effect** | A reduction in expected gains from new energy-efficient technologies because of behavioural or other systemic responses |
| **Reinforcing policies** | Policies that interact with each other and that, when implemented together, have a combined effect greater than the sum of their individual effects when implemented separately. |
| **Retrofit** | Involves modifications to existing buildings that improve energy efficiency or decrease energy demand.. |
| **Short-term impacts** | Impacts that are nearer in time, based on the amount of time between implementation of the policy and the impact. |
| **Stakeholders** | People, organisations, communities or individuals who are affected by and/or who have influence or power over the policy |
| **Sustainable development impacts** | Changes in environmental, social, or economic conditions that result from a policy, such as changes in economic activity, employment, public health, air quality, and energy security. |
| **Uncertainty** | 1. Quantitative definition: Measurement that characterises the dispersion of values that could reasonably be attributed to a parameter. 2. Qualitative definition: A general term that refers to the lack of certainty in data and methodological choices, such as the application of non-representative factors or methods, incomplete data, or lack of transparency. |
| **Unintended impacts** | Impacts that are unintentional based on the original objectives of the policy. In some contexts, these are referred to as secondary impacts. |

# ABBREVIATIONS AND ACRONYMS

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| **CDD** | Cooling degree days |
| **CDM** | Clean Development Mechanism |
| **EIA** | US Energy Information Administration |
| **GHG** | greenhouse gas |
| **GIZ** | Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH |
| **HDD** | Heating degree days |
| **ICAT** | Initiative for Climate Action Transparency |
| **NDC** | nationally determined contribution |
| **IPCC** | Intergovernmental Panel on Climate Change |
| **MRV** | Monitoring, Reporting and Verification |
| **NAMA** | Nationally Appropriate Mitigation Action |
| **UNFCCC** | United Nations Framework Convention on Climate Change |
| **WRI** | World Resources Institute |

# REFERENCES

Atanasiu, B., J. Maio, D. Staniaszek, and I. Kouloumpi. 2014. *Overview of the EU-27 Building policies and programs*. Available at: http://www.oeko.de/oekodoc/1854/2014-002-en.pdf.

Boza-Kiss, B., S. Moles-Grueso, and D. Urge-Vorsatz. 2013. *Evaluating policy instruments to foster energy efficiency for the sustainable transformation of buildings*. Current Opinion in Environmental Sustainability, (5), pp. 163–176. Available at: https://www.researchgate.net/profile/Diana_Uerge-Vorsatz/publication/257722048_Evaluating_policy_instruments_to_foster_energy_efficiency_for_the_sustainable_transformation_of_buildings/links/00463532c2f23df64f000000.pdf.

Buildings Performance Institute Europe (BPIE). 2010. *Energy Performance Certificates across Europe: From design to implementation*. Available at: http://bpie.eu/wp-content/uploads/2015/10/BPIE_EPC_report_2010.pdf.

Deringer, J. J., M. Iyer, and Y. J. Huang. 2004. *Transferred Just on Paper ? Why Doesn't the Reality of Transferring / Adapting Energy Efficiency Codes and Standards Come Close to the Potential?* Available at: http://aceee.org/files/proceedings/2004/data/papers/SS04_Panel8_Paper07.pdf.

Dungen, S. Van Den and G. Carrington. 2011. *Minimum Energy Performance Standards: How does New Zealand compare with other countries?* Available at: http://www.otago.ac.nz/csafe/research/otago055640.pdf.

Global Buildings Performance Network (GBPN). 2014. *Designing and Implementing Best Practice Builidng Codes: Insights from Policy Makers*. Available at: http://www.gbpn.org/sites/default/files/05_Design and implementation of best practice building codes_1.pdf.

Hayes, S., S. Nadel, C. Granda, and K. Hottel. 2011. *What have we learned from energy efficiency financing programs?* Available at: http://www.mnenergysmart.com/wp-content/uploads/2011/09/ACEEE-What-We-Have-Learned-From-Energy-Financing-Programs.pdf.

Heiskanen, E., K. Matschoss, and H. Kuusi. 2012. *Intelligent Energy Europe: Report on specific features of public and social acceptance and perception of nearly zero - energy buildings and renewable heating and cooling in Europe with a specific focus on the target countries*. Available at: http://www.entranze.eu/files/downloads/ENTRANZE_D2_6_Final_version.pdf.

International Energy Agency. 2010. *Energy Performance Certification of Buildings - A Policy Tool to Improve Energy Efficiency*, p. 64. Available at: https://www.iea.org/publications/freepublications/publication/buildings_certification.pdf.

International Energy Agency. 2011. *25 Energy Efficiency Policy Recommendations*. Available at: https://www.iea.org/publications/freepublications/publication/25recom_2011.pdf.

International Energy Agency. 2013a. *Modernising Building Energy Codes to secure our Global Energy Future: Policy Pathways*. Available at: https://www.iea.org/publications/freepublications/publication/PolicyPathwaysModernisingBuildingEnergyCodes.pdf.

International Energy Agency. 2013b. *Transition to Sustainable Buildings*. Available at: https://www.iea.org/publications/freepublications/publication/Building2013_free.pdf.

International Energy Agency. 2017. *World Energy Statistics and Balances*. Available at: https://www.iea.org/statistics/relateddatabases/worldenergystatisticsandbalances/

Koeppel, S. and D. Ürge-Vorsatz. 2007. *Assessment of policy instruments for reducing greenhouse gas emissions from buildings*. Available at: http://www.greeningtheblue.org/sites/default/files/AssessmentofPolicyInstruments_0.pdf.

Laustsen, J. 2008. *Energy Efficiency Requirements in Building Codes, Energy Efficiency Policies for New Buildings*. International Energy Agency. doi: 10.1.1.378.1012. Available at: https://www.iea.org/publications/freepublications/publication/Building_Codes.pdf.

Liu, F., A. S. Meyer and J. F. Hogan. 2010. *Mainstreaming Building Energy Efficiency Codes in Developing Countries*. Available at: http://www.esmap.org/sites/esmap.org/files/WP_204_GBL_Mainstreaming Building Energy Efficiency Codes in Developing Countries_Overview_1.pdf.

Lucon, O., D. Ürge-Vorsatz, A. Z. Ahmed, H, Akbari, P. Bertoldi, L. F. Cabeza, N. Eyre, A. Gadgil, L. D. D. Harvey, Y. Jiang, E. Liphoto, S. Mirasgedis, S. Murakami, J. Parikh, C. Pyke, and M. V. Vilariño. 2014. *Chapter 9 - Buildings. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Available at: https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_chapter9.pdf.

Michel, A., E. Bush, J. Nipkow, C. U. Brunner, and H. Bo. 2012. *Cold appliances: recommendations for policy design*. Available at: http://www.topten.eu/uploads/File/Recommendations_Cold_June_13.pdf

Nogueira, L. A. H. 2013. *Package of measures to promote efficient air conditioning*. Available at: https://www.wec-policies.enerdata.eu/Documents/cases-studies/Measures_to_promote_efficient_air_conditioning.pdf.

Novikova, A., H, Amecke, K. Neuhoff, K. Stelmakh, B. Kiss, C. Rohde, E. Dunkelberg, J. Weiss, K. Matschoss, and S. Darby. 2011. *Information tools for energy demand reduction in existing residential buildings CPI Report*. Available at: https://climatepolicyinitiative.org/wp-content/uploads/2011/12/Information-Tools-for-Energy-Demand-Reduction.pdf.

Rohde, C. 2017. 'Presentation on primary energy demand/balance of a building', pp. 1–8.

Sarkar, A. and J. Singh. 2010. *Financing energy efficiency in developing countries —lessons learned and remaining challenges*. Energy Policy, (38), pp. 5560–5571. Available at: http://scholar.google.de/scholar_url?url=http://regulationbodyofknowledge.org/wp-content/uploads/2013/04/Sarkar_Financing_Energy_Efficiency.pdf&hl=fr&sa=X&scisig=AAGBfm2tzcRVl2tpW4bDnhFVpV-MMWGKPw&nossl=1&oi=scholarr&ved=0ahUKEwiX7abl5YXSAhWF7hoKHX5sC4MQg.

Schüwer, D., J. Klostermann, C. Moore, and S. Thomas. 2012. *Strategic Approach - The Strategic Approach to improving energy efficiency in buildings*. Available at: http://www.bigee.net/media/filer_public/2013/11/29/bigee_txt_0043_bg_strategic_approach_overview_new_residential.pdf.

Schwarz, V. 2009. *Promoting Energy efficiency in buildings: Lessons Learned from International Experience*. Available at: https://www.google.de/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwiVmv7lr-_RAhXGOhQKHXcOBl0QFggkMAA&url=http%3A%2F%2Fwww.thegef.org%2Fsites%2Fdefault%2Ffiles

%2Fpublications%2FEEBuilding_WEB_2.pdf&usg=AFQjCNEZqMMKwRyOW6H5eCpy0FRpLkyG

SEAD. 2015. *Rebound Effects in the Context of Developing Country Efficiency*. Available at: http://superefficient.org/~/media/Files/Rebound%20effects%20and%20Developing%20Countries_DRAFT%20FINAL.ashx

US Energy Information Agency. 2018. *Energy Units and Calculators Explained*. Available at: https://www.eia.gov/energyexplained/index.cfm?page=about_degree_days

World Resources Institute (WRI). 2014. Greenhouse Gas Protocol *Policy and Action Standard*. Available at: http://www.ghgprotocol.org/policy-and-action-standard.

WRI. 2015. Greenhouse Gas Protocol *Policy and Action Standard - Commercial and Residential Buildings Sector Guidance*. Available at: http://www.ghgprotocol.org/sites/default/files/ghgp/standards_supporting/Buildings%20-%20Additional%20Guidance.pdf.

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