

Building Energy Efficiency in North America – Summary & Vision

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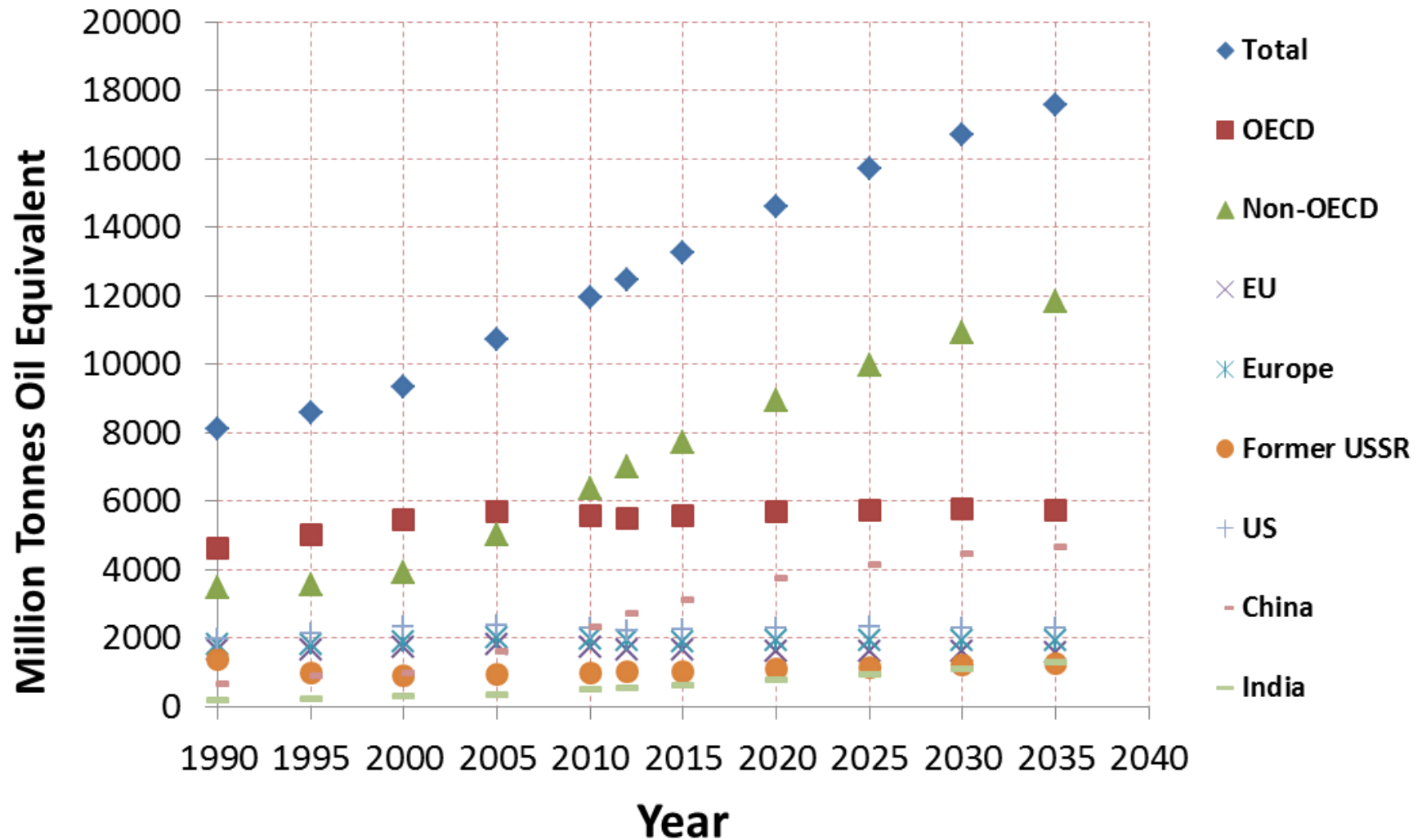


University
of Victoria

Presentation Outline

- Energy Efficiency & North America
- Regulatory Drivers
- Insulation & Energy Efficiency
- Vision 2025

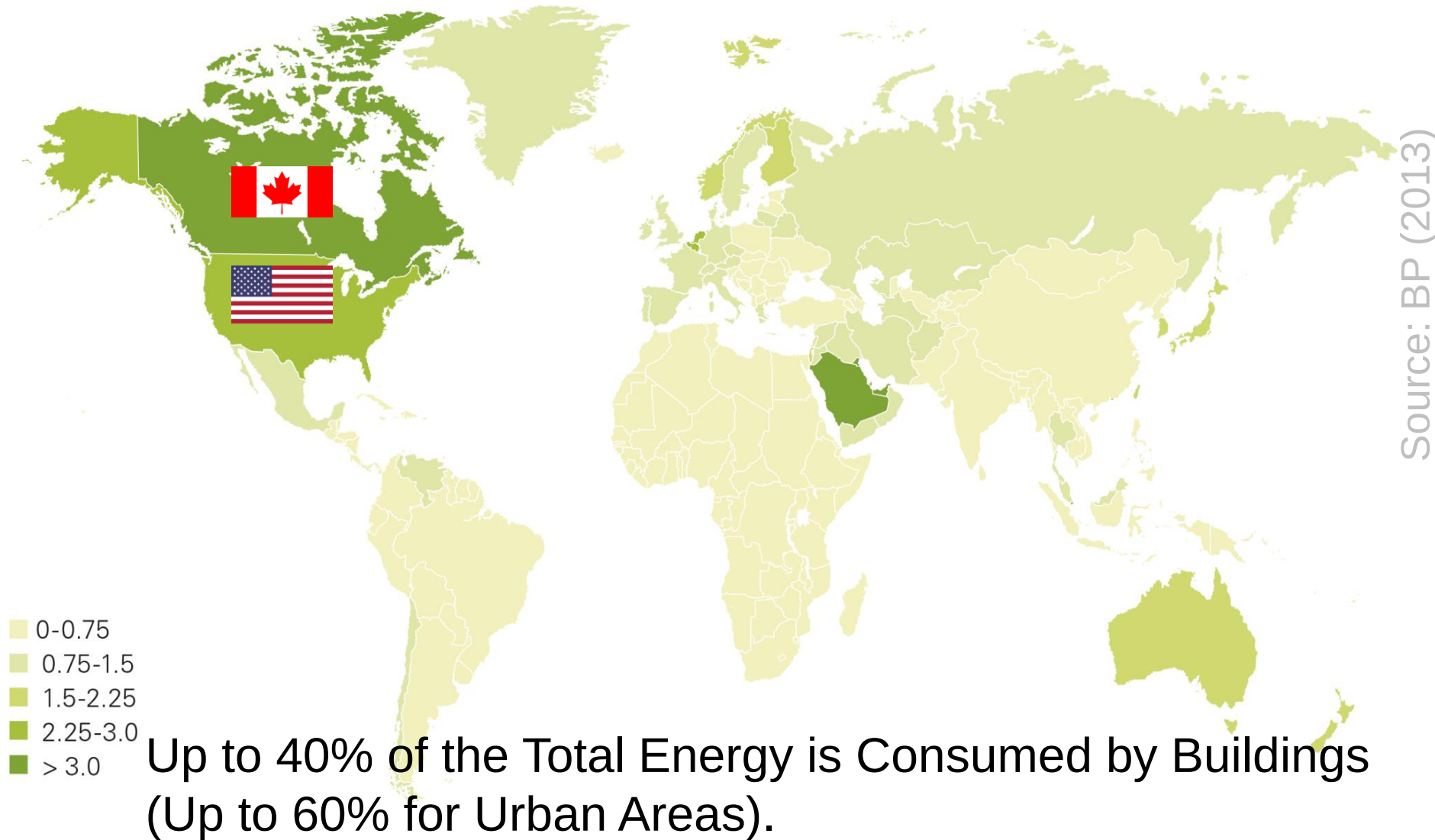
Global Energy Consumption Trend



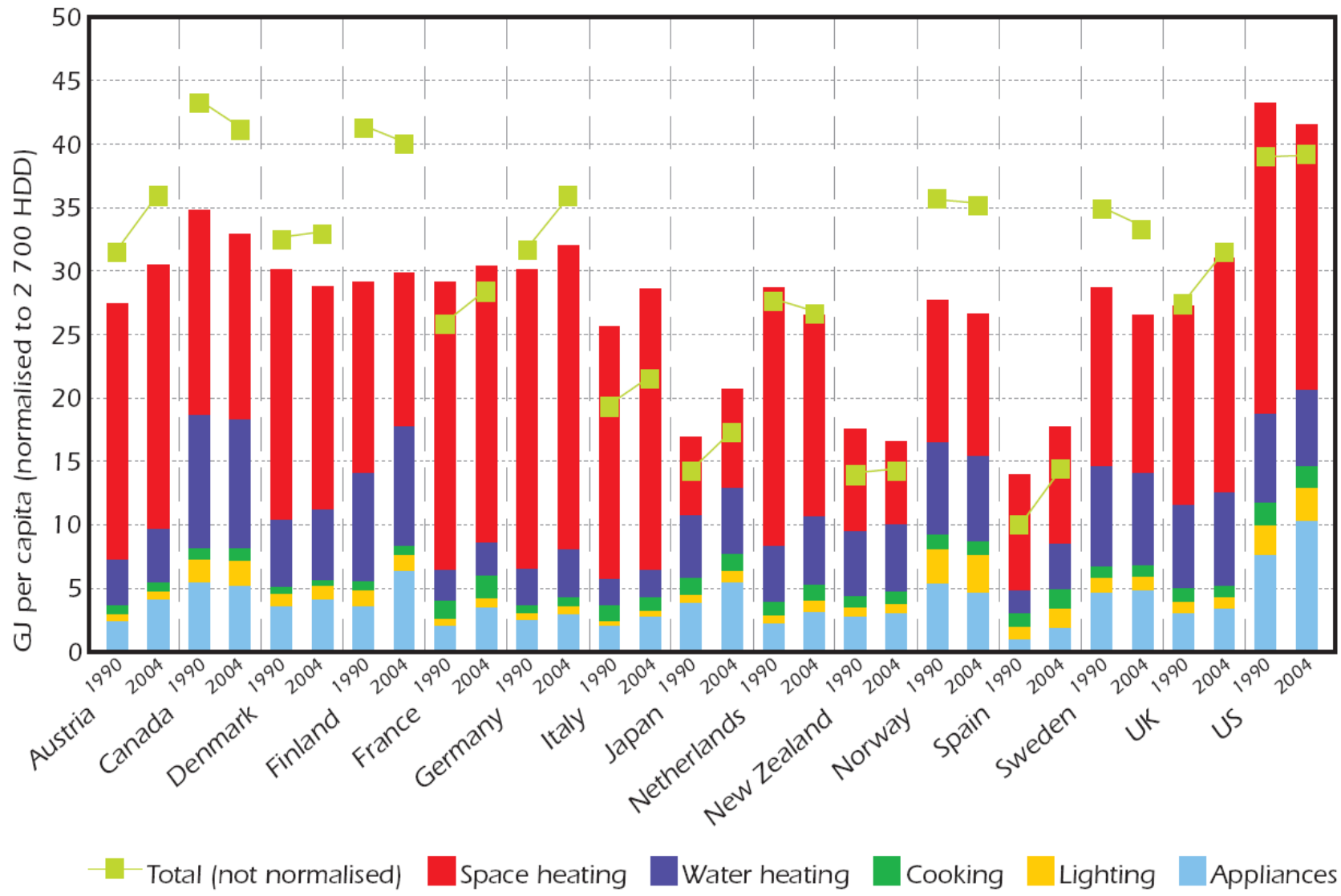
BP Energy Outlook 2035: January 2014

Energy Efficiency & North America

Oil Consumption Per Capita 2012
Tonnes



Energy Efficiency & North America



(Energy Use in the New Millennium -Trends in IEA Countries)

Regulatory Drivers

Regulations to Green Solutions

2013



ANSI/ASHRAE/IES Standard 90.1-2013
Supersedes ANSI/ASHRAE/IES Standard 90.1-2010
Includes ANSI/ASHRAE/IES Addenda listed in Appendix F

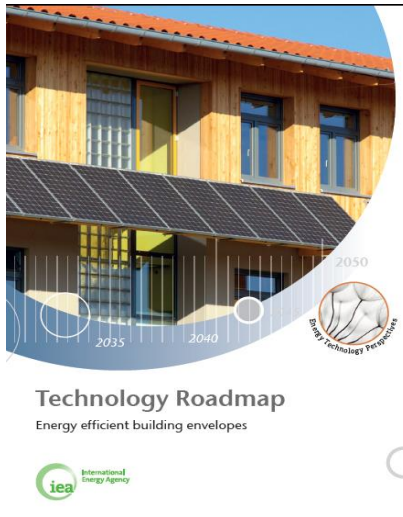
Energy Standard for Buildings Except Low-Rise Residential Buildings (I-P Edition)

See Appendix F for approval data by the ASHRAE Standards Committee, the ASHRAE Board of Directors, the IES Board of Directors, and the American National Standards Institute.

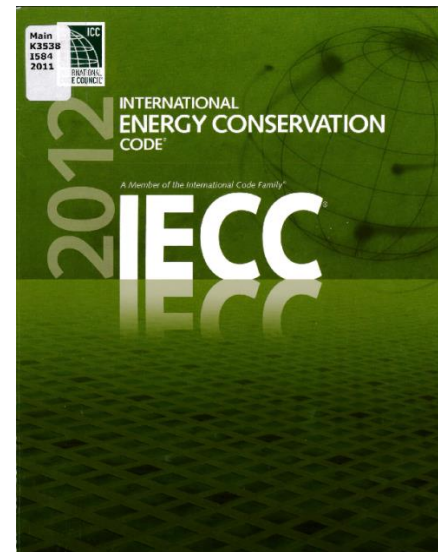
This standard is under continuous maintenance by a Standing Standard Project Committee (SSPC), for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely document, consensus action on requests for change to any part of the standard. The change addenda form, instructions, and guidelines may be obtained in electronic form from the ASHRAE website (www.ashrae.org) or in paper form from the Manager of Standards. The latest edition of an ASHRAE Standard may be purchased from the ASHRAE website (www.ashrae.org), or from ASHRAE Customer Service, 1791 Taylor Circle, Suite 400, Atlanta, GA 30329-2305. E-mail: orders@ashrae.org; Fax: 404-521-5470; Telephone: 404-521-5400 (toll-free); or toll-free 1-800-527-4753 (for orders in US and Canada). For reprint permission, go to www.ashrae.org/reprint.

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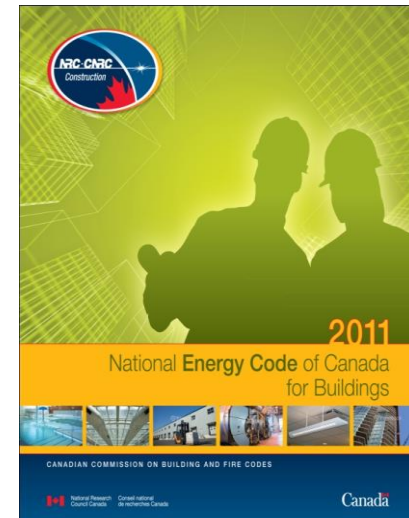
ISBN 1041-231X



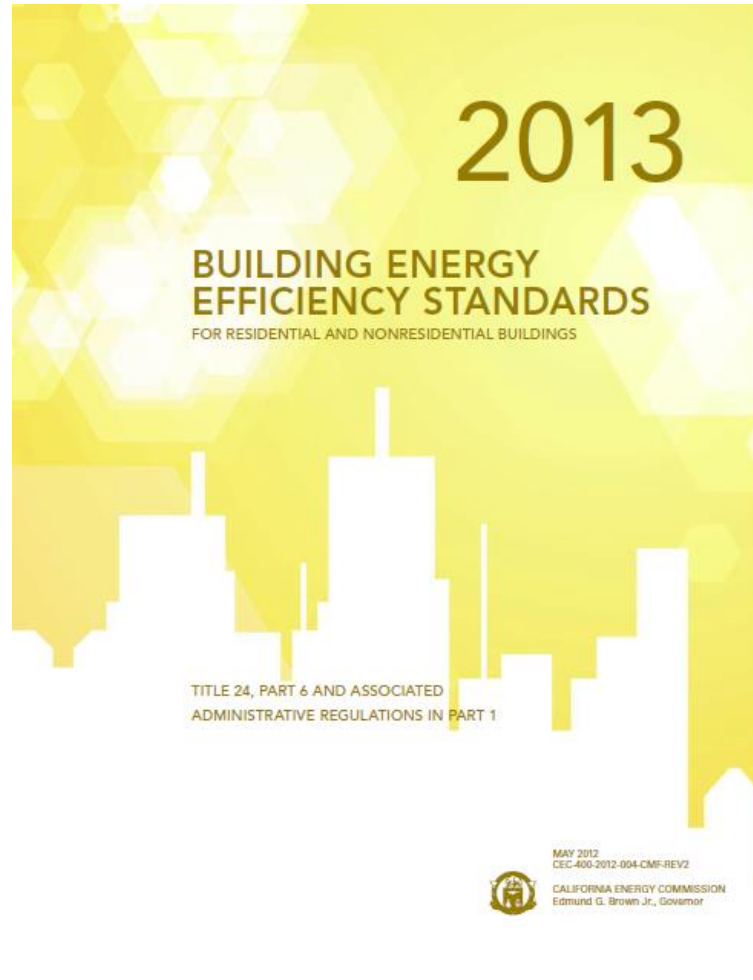
2012



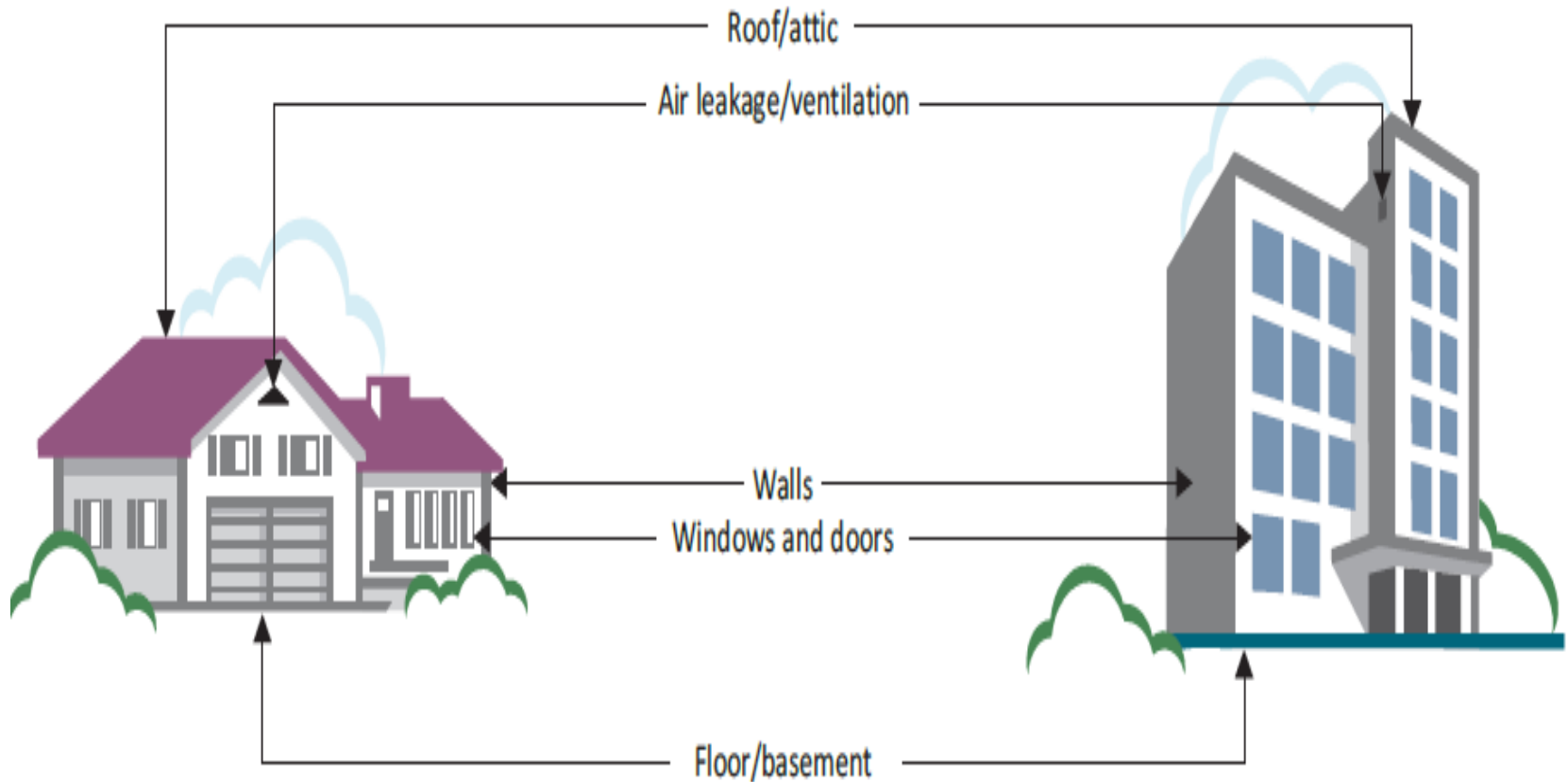
2011



Regulatory Drivers

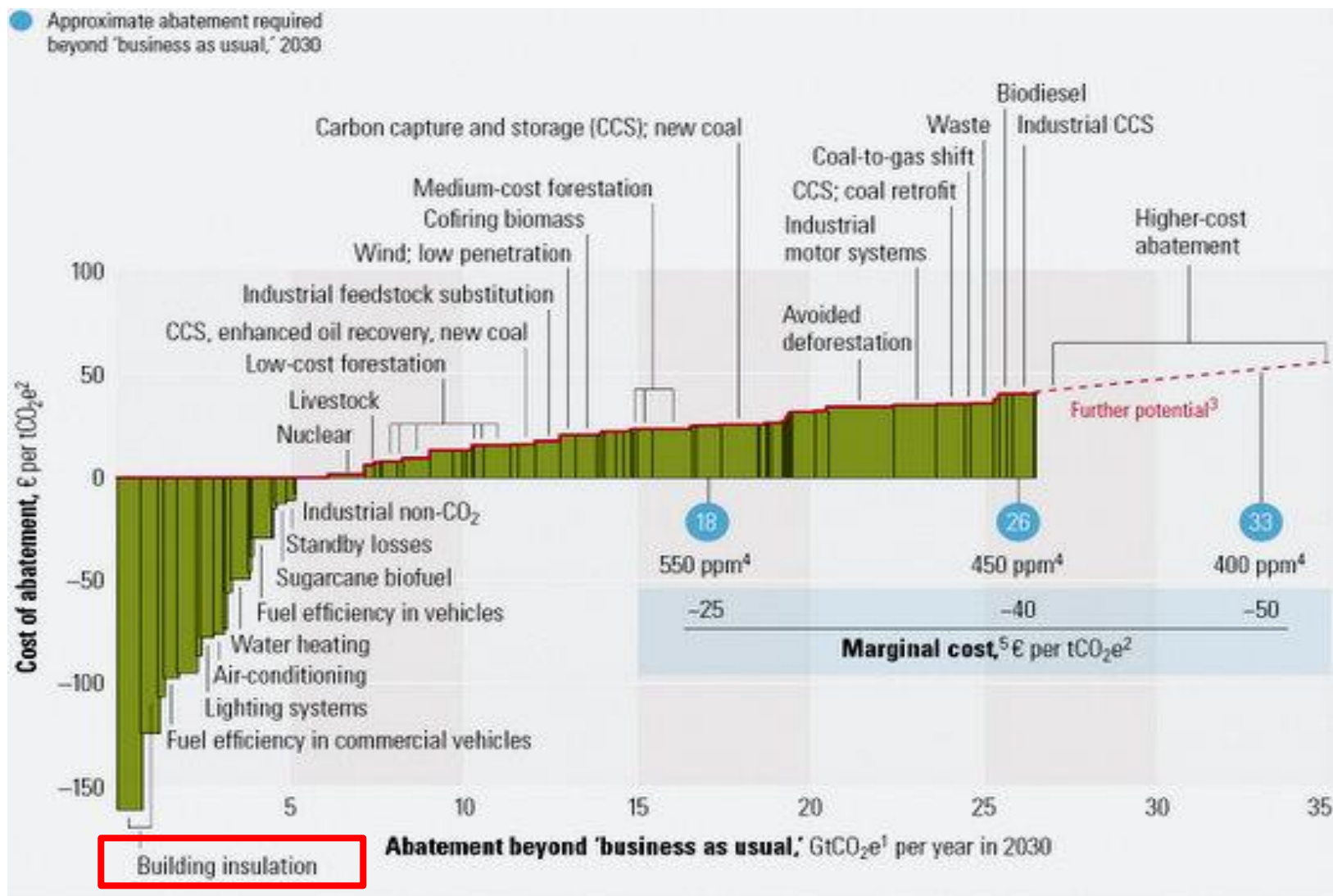


Energy Efficient Technologies



- **Highly Insulated Walls, Roofs, Floor etc.**
- **Energy efficient Windows & Doors**
- **Air Leakage**
- **Building-Integrated Photovoltaic**
- **Passive Solar Design**
- **Heat Recovery Ventilation**
- **Heat Pump**
- **LED lighting**

Why Thermal Insulation?

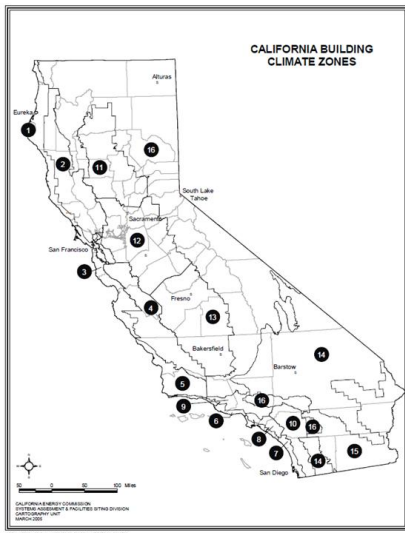


Increased Insulation Use

TABLE 150.1-A COMPONENT PACKAGE-A Standard Building Design

				Climate Zone															
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Building Envelope	Insulation¹	Roofs /Ceilings		U 0.025 R 38	U 0.031 R 30	U 0.031 R 30	U 0.031 R 30	U 0.031 R 30	U 0.031 R 30	U 0.031 R 30	U 0.031 R 30	U 0.031 R 30	U 0.031 R 30	U 0.025 R 38	U 0.025 R 38	U 0.025 R 38	U 0.025 R 38	U 0.025 R 38	U 0.025 R 38
		Walls	Above Grade	2x4 Framed² U 0.065 R 15+4 or R 13+5	U 0.065 R 15+4 or R 13+5	U 0.065 R 15+4 or R 13+5	U 0.065 R 15+4 or R 13+5	U 0.065 R 15+4 or R 13+5	U 0.065 R 15+4 or R 13+5	U 0.065 R 15+4 or R 13+5	U 0.065 R 15+4 or R 13+5	U 0.065 R 15+4 or R 13+5	U 0.065 R 15+4 or R 13+5	U 0.065 R 15+4 or R 13+5	U 0.065 R 15+4 or R 13+5	U 0.065 R 15+4 or R 13+5	U 0.065 R 15+4 or R 13+5	U 0.065 R 15+4 or R 13+5	U 0.065 R 15+4 or R 13+5
					U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.059 R 17
					U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.1025 R 8.0	U 0.125 R 8.0	U 0.070 R 13
			Below Grade	Below Grade Interior³ U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.070 R 13	U 0.066 R 15
					U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.100 R 5.0	U 0.100 R 5.0	U 0.053 R 5.0
		Floors	Slab Perimeter	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
			Raised	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19	U 0.037 R 19
			Concrete Raised	U 0.092 R 8.0	U 0.092 R 8.0	U 0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.269 R 0	U 0.092 R 8.0	U 0.138 R 4.0	U 0.092 R 8.0			

Insulation Requirement – California Building Energy Efficiency Standard

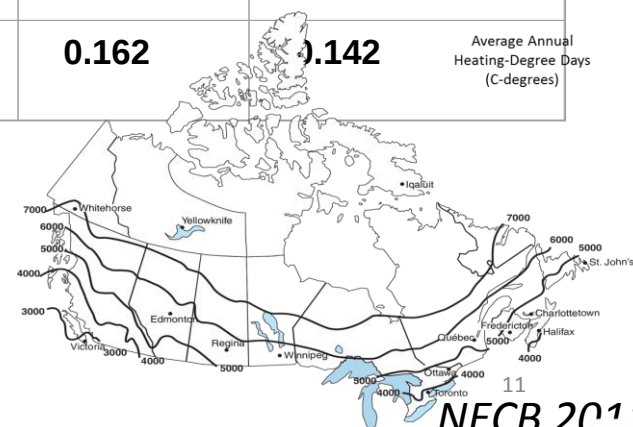


Increased Insulation Use

Prescriptive – above-ground opaque building assemblies

	Heating Degree-Days of Building Location, Celsius degree-days					
	Zone 4: Less than 3000	Zone 5: 3000 to 3999	Zone 6: 4000 to 4999	Zone 7A: 5000 to 5999	Zone 7B: 6000 to 6999	Zone 8: Greater than or equal to 7000
Maximum Overall Thermal Transmittance (U-value, W/m ² K)*						
Walls	0.315	0.278	0.247	0.210	0.210	0.183 R31
Roofs	0.227	0.183	0.183	0.162	0.162	0.142 R40
Floors	0.227	0.183	0.183	0.162	0.162	0.142

Average Annual
Heating-Degree Days
(C-degrees)



National Energy Codes for Buildings – Canada

Vision 2025

Regulations to Solutions



**Materials &
Components**

**System
Integration**

**Field
Demonstration**

**Introduction of New
Materials & Technologies**





Thank You !!

Questions ??

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