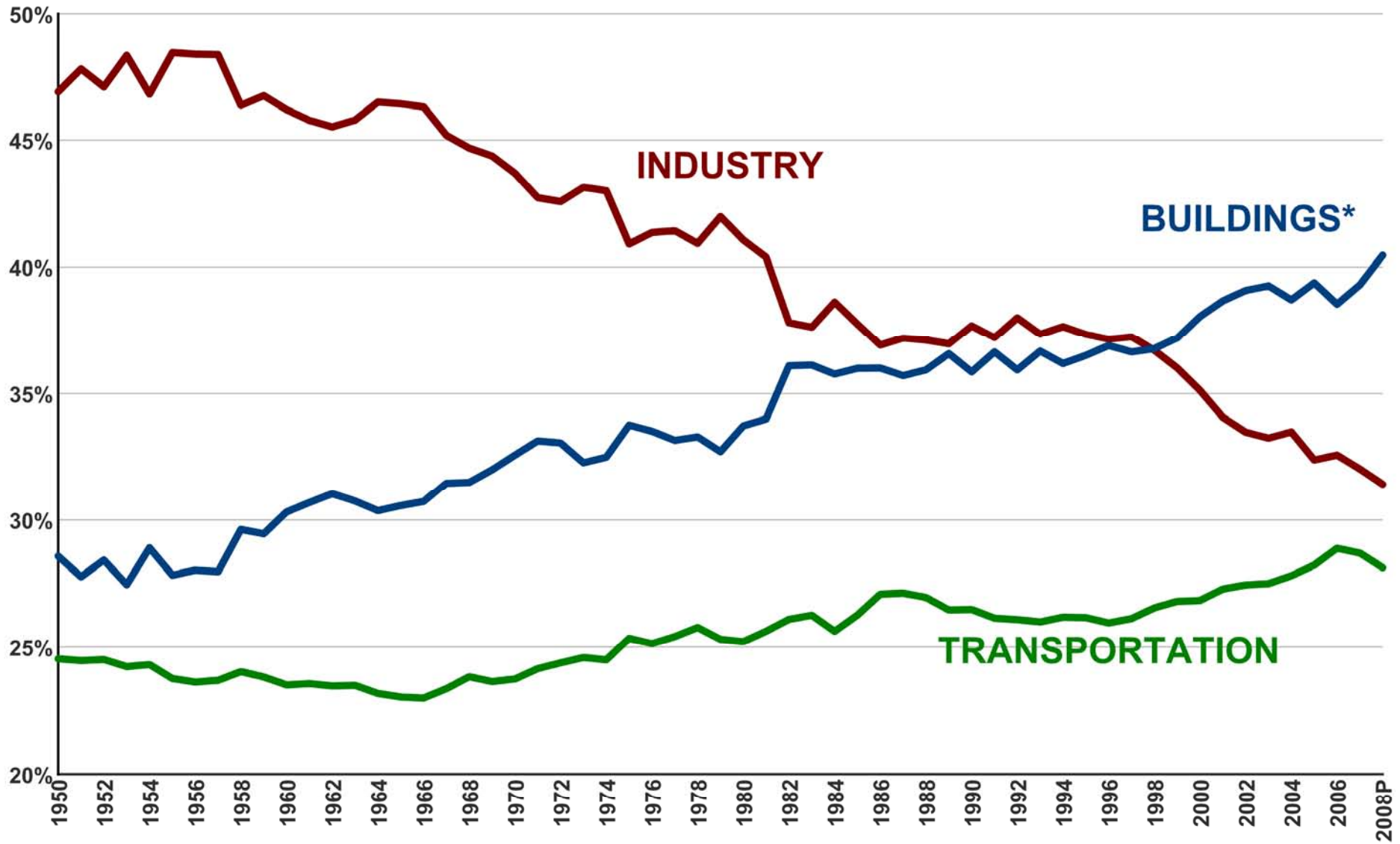

The Economics of Energy Efficiency in Buildings

Trevor Houser | September 23, 2009

US Energy Demand by Sector

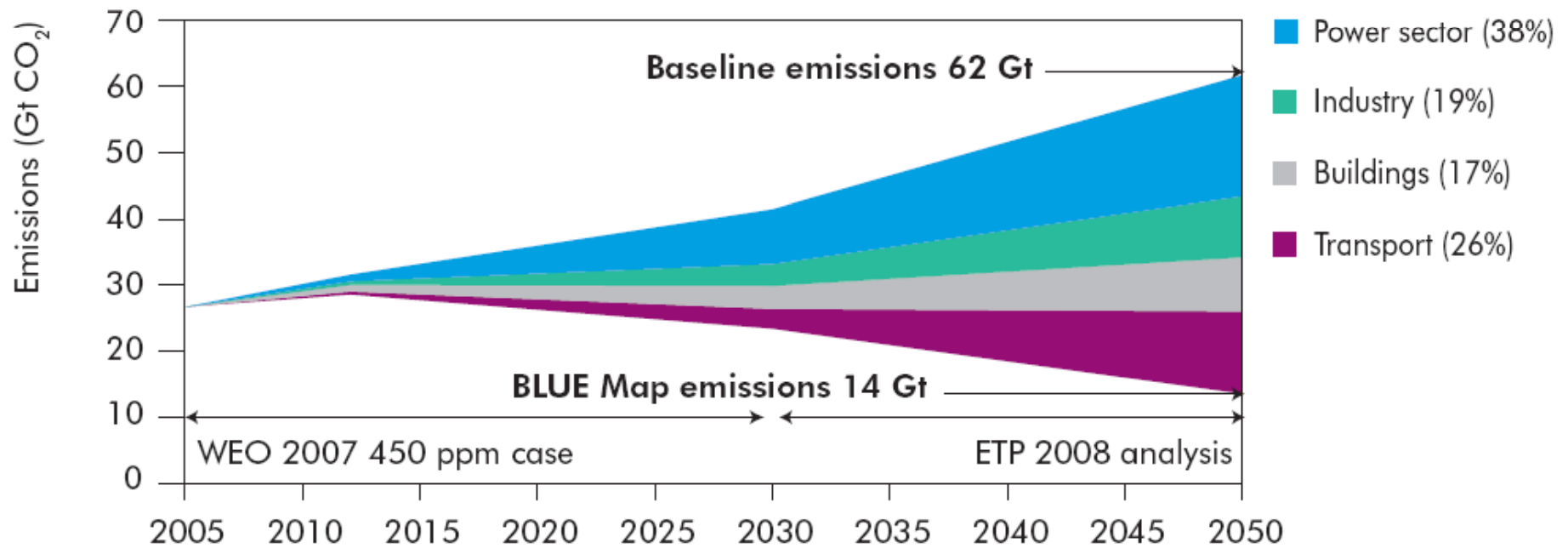
1950-2008



Source: EIA's Annual Energy Review 2009. * Buildings includes all residential and commercial energy demand but excludes energy demand from industrial buildings.

How Buildings Fit into the Big Picture

IEA Estimates of Emissions Abatement by Source/Sector

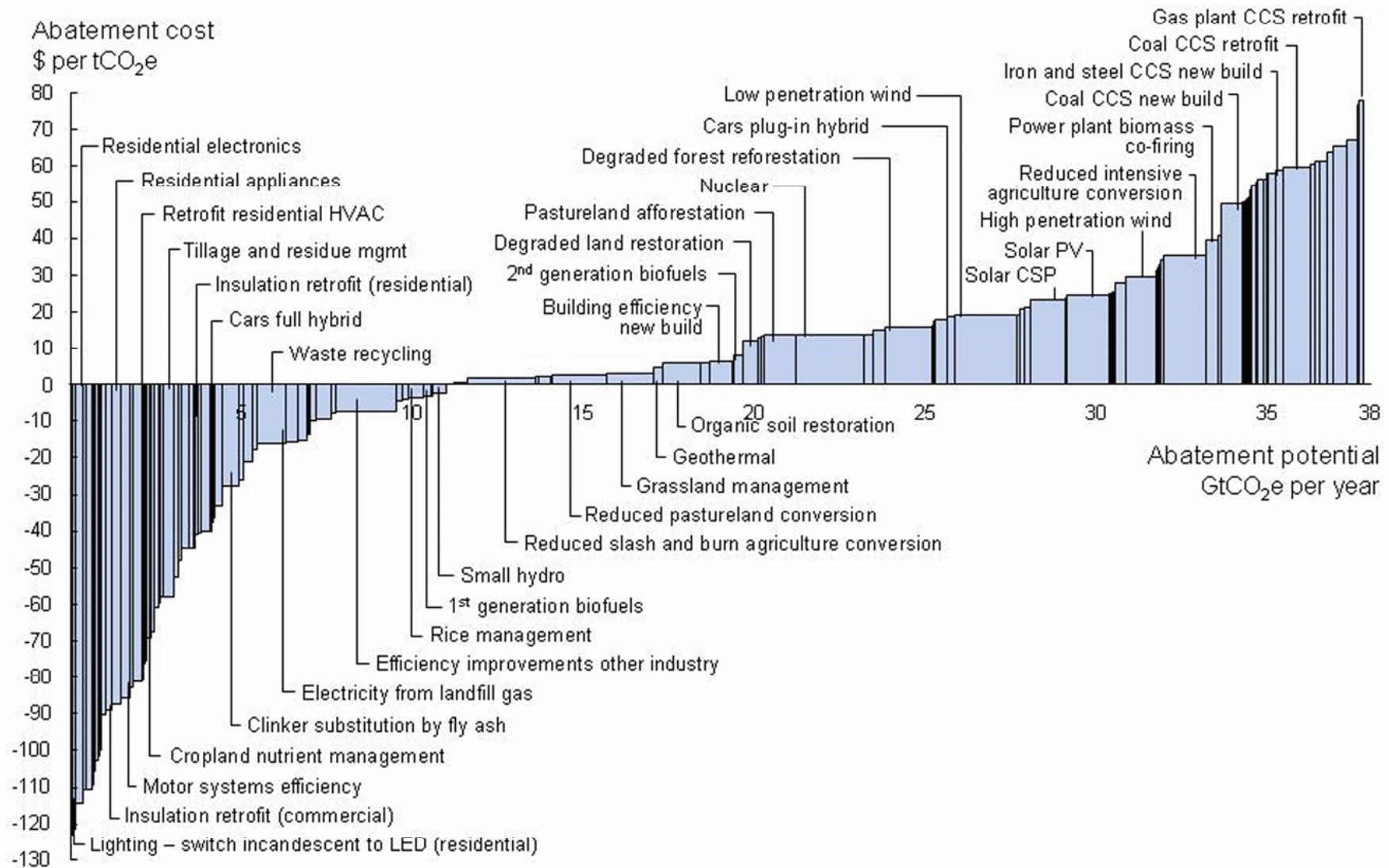


Sector	2050 BAU	2050 Blue MAP	Reduction
Power generation	--	--	18.2
Industry	23.2	5.2	9.1
Buildings	20.1	3.1	8.2
Transport	18	5.5	12.5
Total	62	14	48

Source: IEA Energy Technology Perspective 2008

Buildings – The Low-Hanging Fruit?

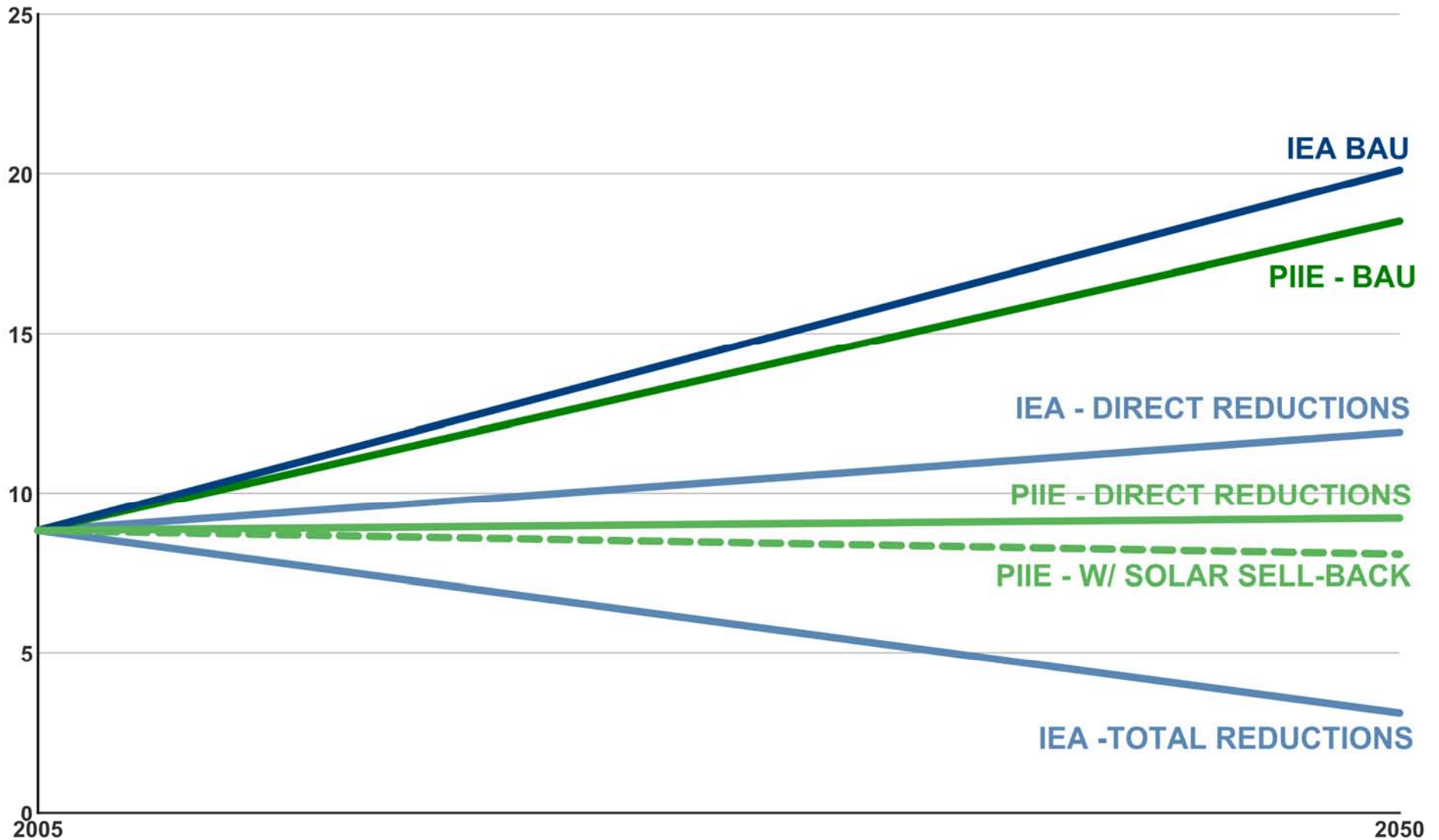
McKinsey GHG Abatement Cost Curve v2



Source: McKinsey & Company, Version 2 of the GHG Abatement Cost Curve

Building Sector CO2 Emissions

Gigatons



Source: IEA estimates from Energy Technology Perspective 2008. PIIE estimates from "The Economics of Energy Efficiency in Buildings".

Building Transformation Cost Estimates

Based on WBCSD EEB Model

Country/Region	Additional investment	Net-present value*	Emission reduction	Average abatement cost
	Billion USD per year 2005–2050	Billion USD per year 2005–2050	Million tons in 2050 relative to BAU	USD per metric ton, 2005–2050
OECD North America	244	–46	1,699	30
United States	209	–40	1,555	28
OECD Europe	170	–26	915	30
EU 27	158	–25	861	30
OECD Pacific	67	–17	353	48
Japan	37	–9	168	52
Transition Economies	78	–12	548	24
Russia	51	–10	345	33
Developing Asia	188	–26	2,343	14
China	114	–15	1,427	14
India	19	–2	221	12
Latin America	31	–5	148	39
Brazil	10	–2	28	61
Middle East	80	–17	663	32
Africa	29	–3	298	10
World	1,042	–180	8,200	25

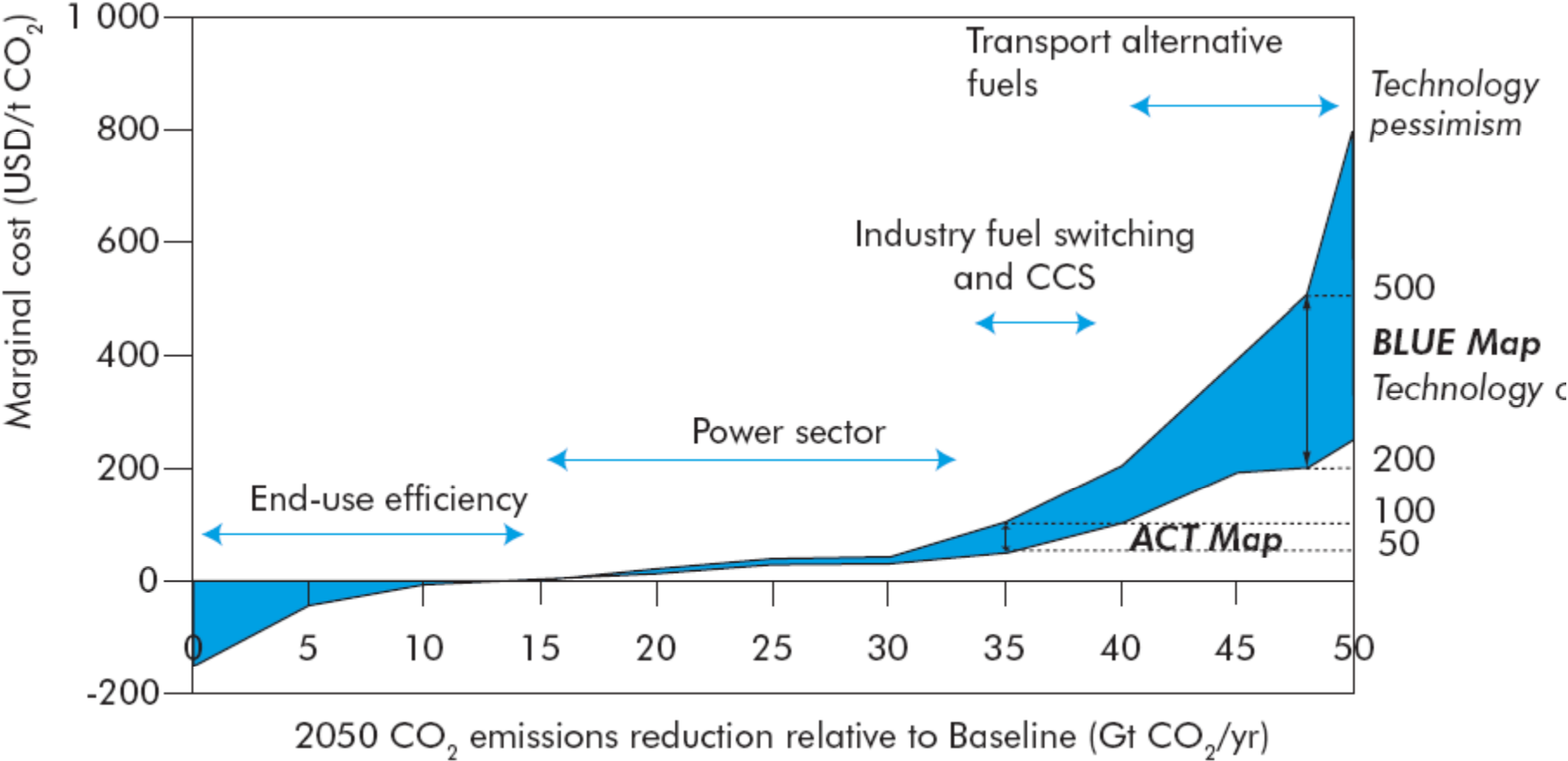
BAU = Business as usual

* Net-Present Value is calculated over 20 years using constant energy prices and a 6 percent discount rate.

Source: WBCSD Energy Efficiency in Buildings Model, International Energy Agency, United Nations Development Program, Economist Intelligence Unit.

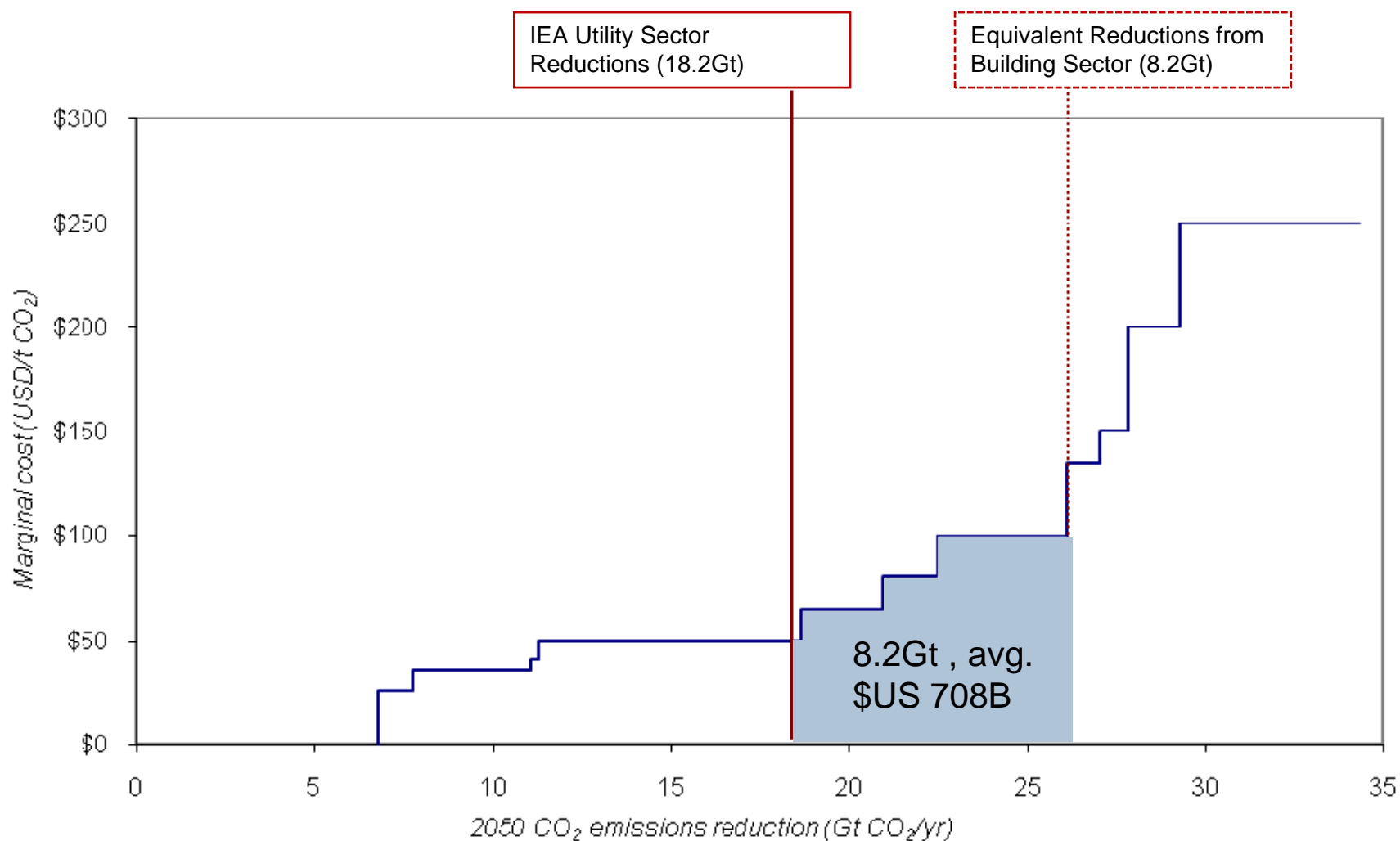
Relative Abatement Costs

IEA Abatement Cost Curve



The Cost of Failing on Buildings

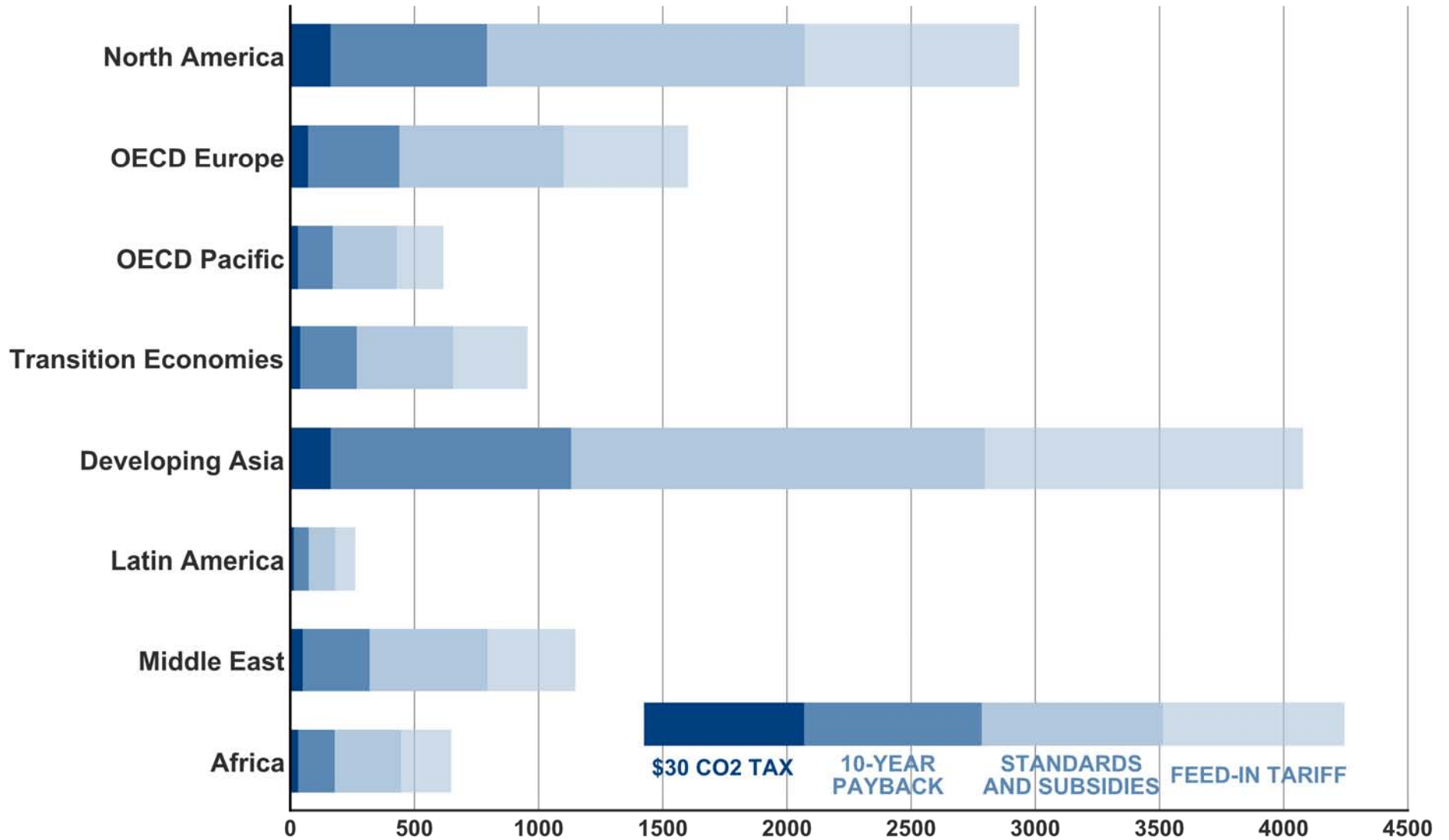
And making up those reductions in the power sector



Source: International Energy Agency and Peterson Institute for International Economics

Building Sector Abatement by Policy

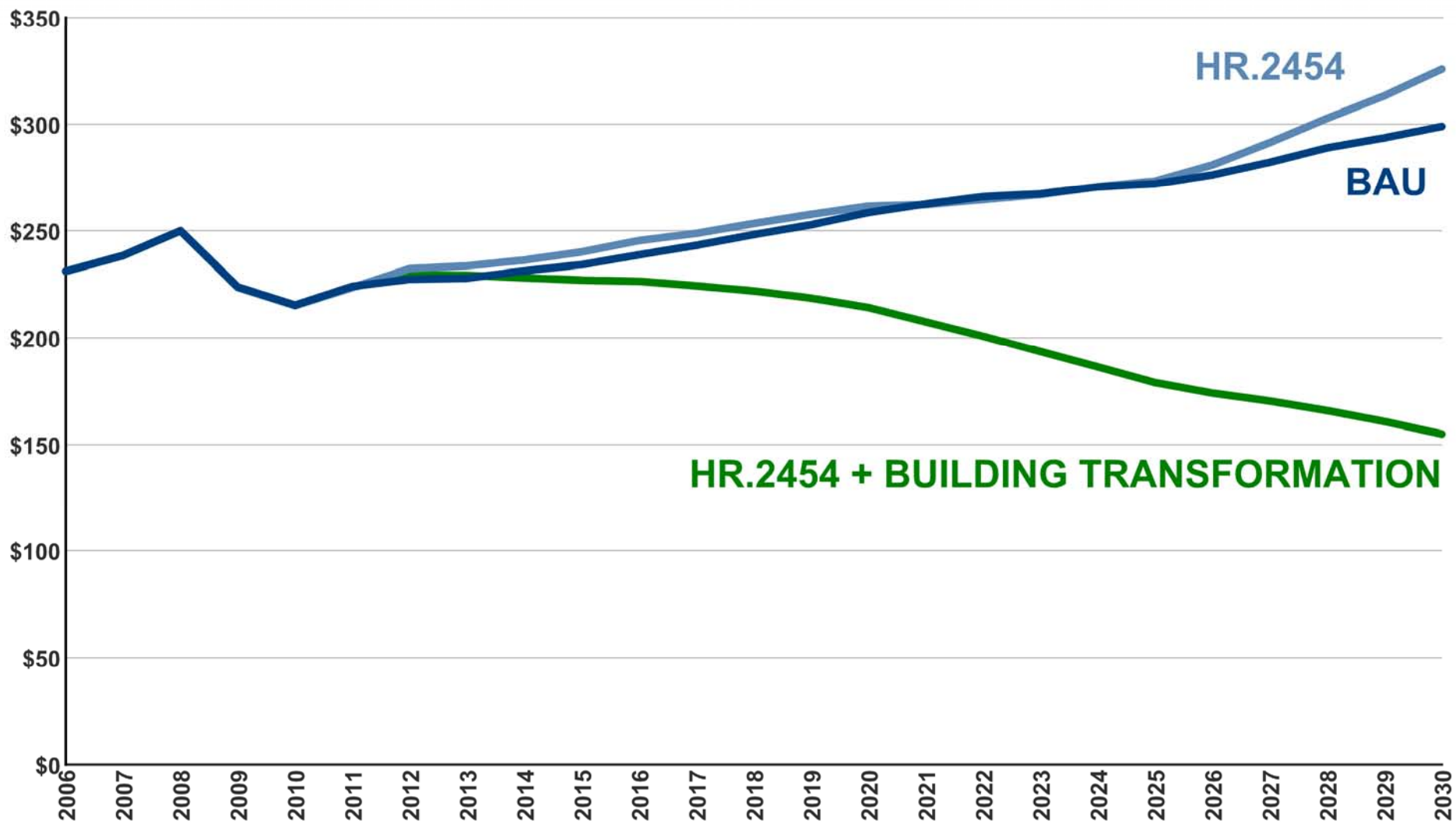
Million metric tons of CO₂, by region



Source: Peterson Institute for International Economics

US Residential Energy Expenditures

Billions of dollars (2007 real)



Source: Business-as-usual projections are EIA Annual Energy Outlook 2009. The climate policy scenario is EIA's assessment of the impact of the Waxman-Markey bill (HR.2454). The building transformation scenarios is Waxman-Markey plus per-square foot efficiency improvement achieved in the WBCSD model (WBCSD 2009).

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