



COLUMBIA LAW SCHOOL

SABIN CENTER FOR CLIMATE CHANGE LAW

Legal Pathways to Deep Decarbonization

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Ley de Cambio Climatico Camino a la COP25

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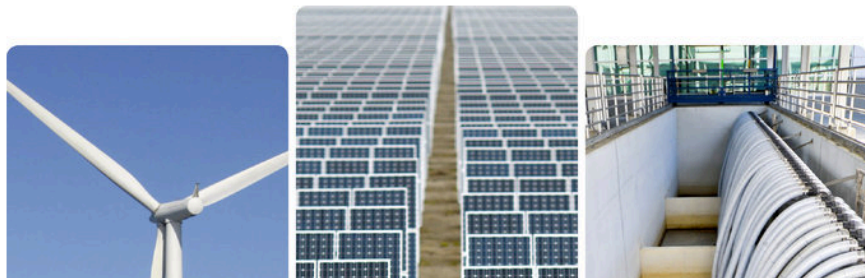
- Deep Decarbonization Pathways Project
 - National blueprints for limiting warming to 2°C
 - Moving from incrementalism to transformation
 - Independent research teams from 16 countries
 - 3/4 of current CO₂ emissions
 - OECD, China, India, Brazil, South Africa, Mexico



SCIENCE

A Path for Climate Change, Beyond Paris

By JUSTIN GILLIS DEC. 1, 2015

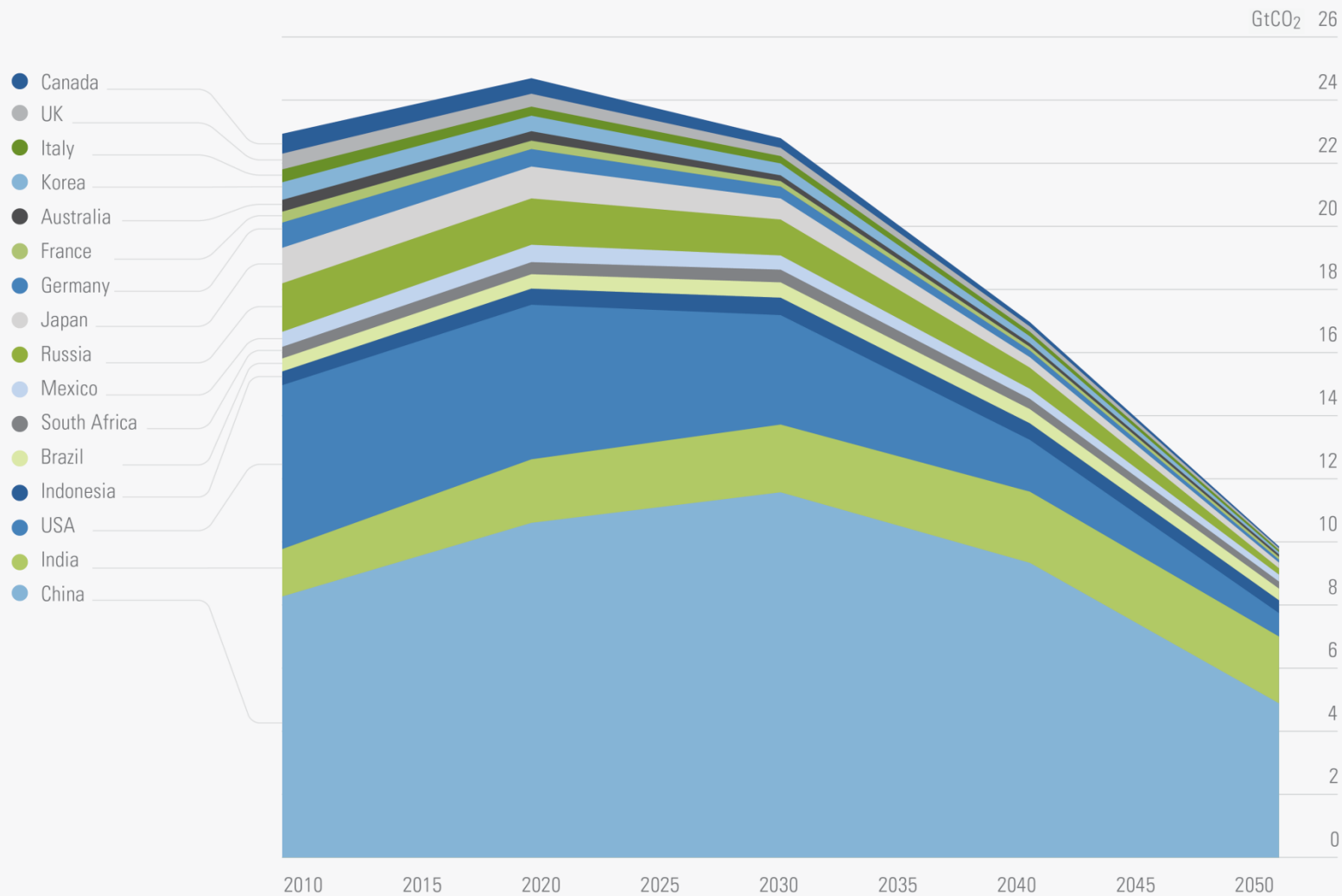


UN issued with roadmap on how to avoid climate catastrophe

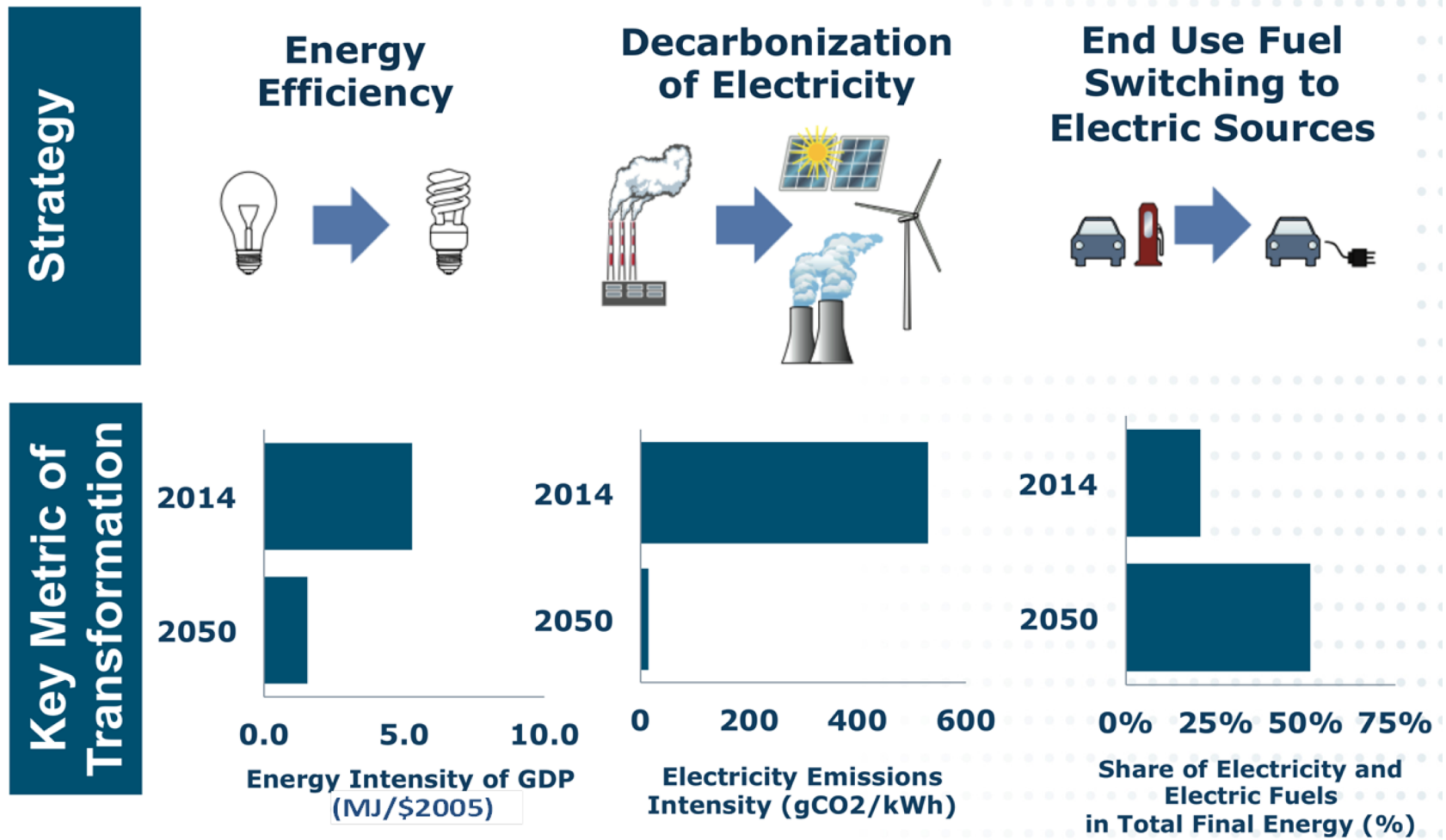
Report is the first of its kind to prescribe concrete actions that the biggest 15 economies must take to keep warming below 2C

DDPP Aggregate Emissions

Figure 1. Emissions trajectories for energy CO₂, 2010-2050, showing most ambitious reduction scenarios for all DDPP countries. 2050 aggregate emissions are 57% below 2010 levels.



Three Pillars of Deep Decarbonization



Pathways to Deep Decarbonization in the United States, Mixed case results

Same Three Pillars Apply to Deep Decarbonization in Chile

Table ES2. Chile's NGHGI: GHG emissions and removals (Gg CO₂ eq) by sector, 1990-2013

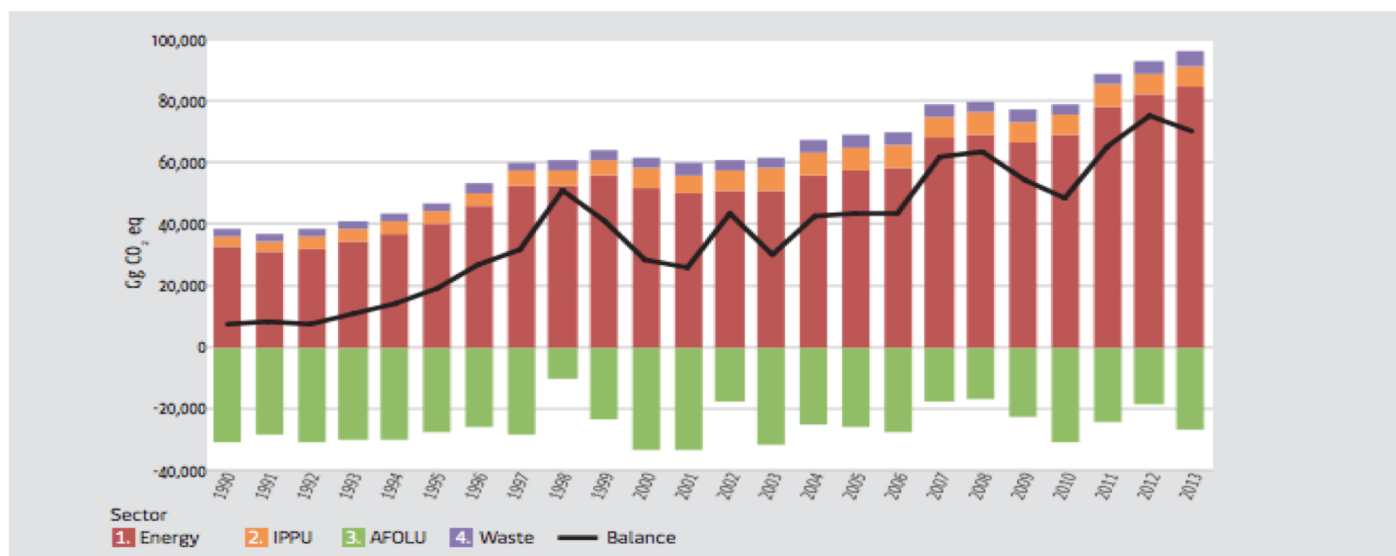
Sector	1990	2000	2010	2011	2012	2013
1. Energy	33,219.5	52,122.9	69,423.7	78,527.0	82,076.6	85,075.4
2. IPPU	3,127.5	6,449.6	6,008.1	6,868.3	7,214.9	6,619.4
3. AFOLU	-30,866.3	-32,819.2	-30,514.4	-24,339.9	-18,410.7	-26,119.2
Agriculture	12,633.5	13,580.7	12,879.8	12,741.7	13,285.0	13,735.2
FOLU	-43,499.8	-46,399.9	-43,394.2	-37,081.6	-31,695.8	-39,854.4
4. Waste	2,526.1	3,348.3	3,802.6	3,939.8	4,019.2	4,478.8
Balance (with FOLU)	8,006.8	29,101.5	48,719.9	64,995.1	74,899.9	70,054.4
Total (without FOLU)	51,506.6	75,501.4	92,114.2	102,076.7	106,595.6	109,908.8

Source: MMA's Coordinating Technical Team.

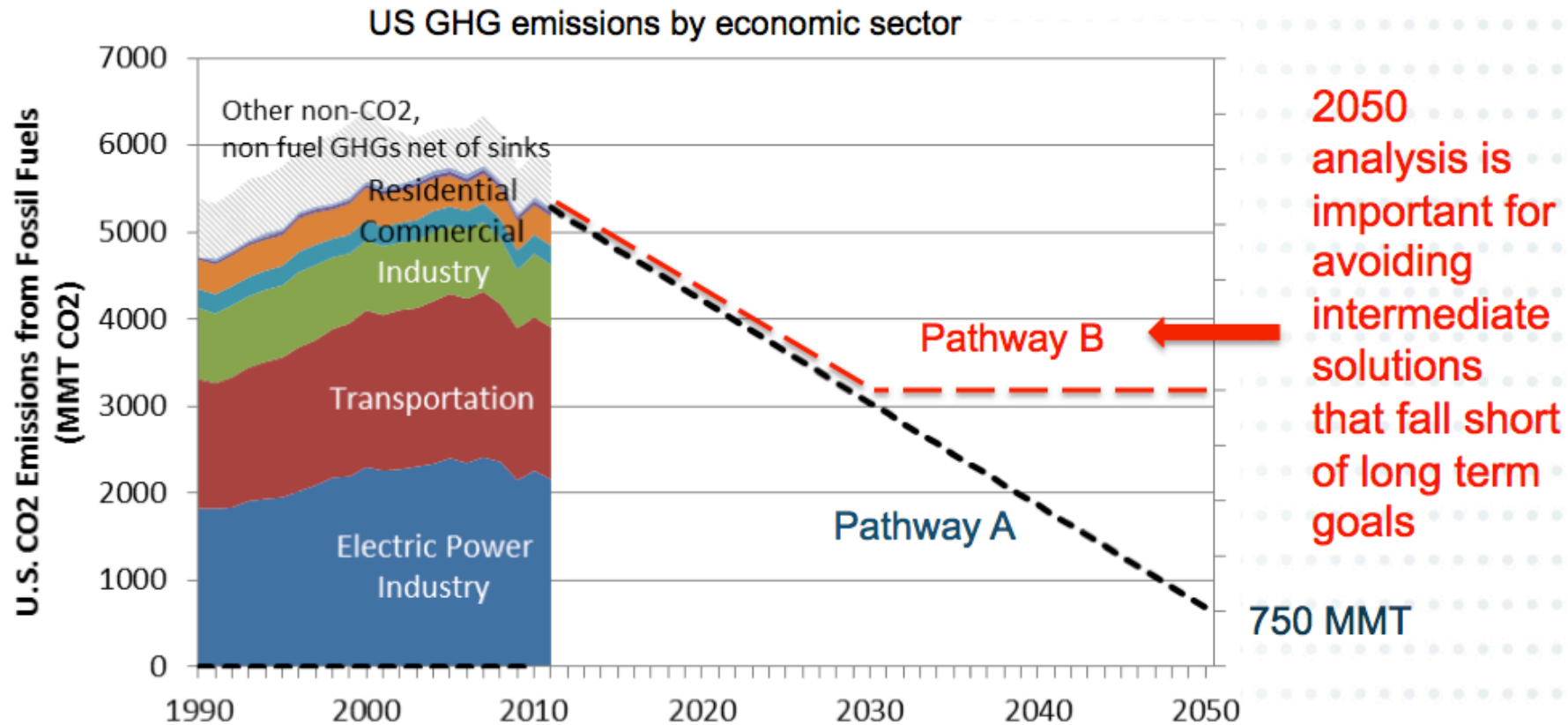
IPPU= Industrial processes and product use; AFOLU= Agriculture, forestry and other land use; FOLU= Forestry and other land use

In 2013, the total GHG emissions were dominated by CO₂, accounting for 78.4%, followed by CH₄ (10.7%) and N₂O (10.0%). Fluorinated gases collectively accounted for 0.9% of total GHG emissions in the country.

Figure ES1. Chile's NGHGI: GHG emissions and removals (Gg CO₂ eq) by sector, 1990-2013



Avoiding emissions dead ends



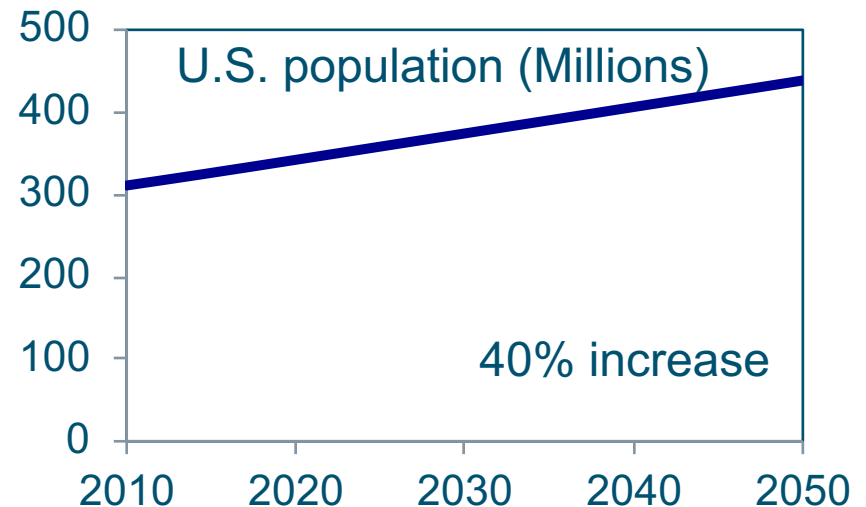
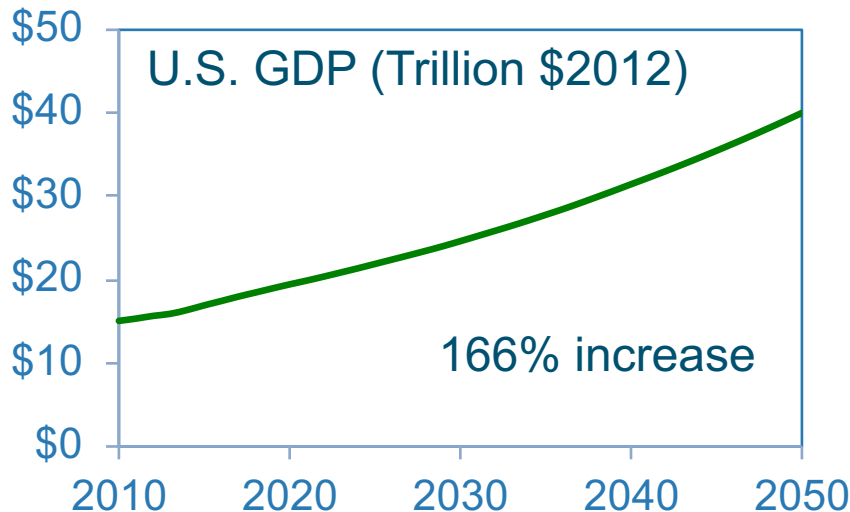
Todd Stern: "It's all about the transformation."

80% Reduction Goal by 2050 is Technically Feasible and Would Cost Only 1% of US GDP

- Almost complete decarbonization of electricity by 2050
- Double electricity generation through massive program of renewables construction
- More than double the efficiency with which energy is used
- Switching most end uses that require liquid fuels to electricity, especially passenger cars and space heating and cooling
- Requires deployment of roughly 300 million alternative fuel vehicles by 2050

Scenario Design Constraints

- Infrastructure inertia
- Electric reliability
- Same energy services as EIA forecast
- Technology is commercial or near-commercial
- Environmental limits (biomass, hydro)

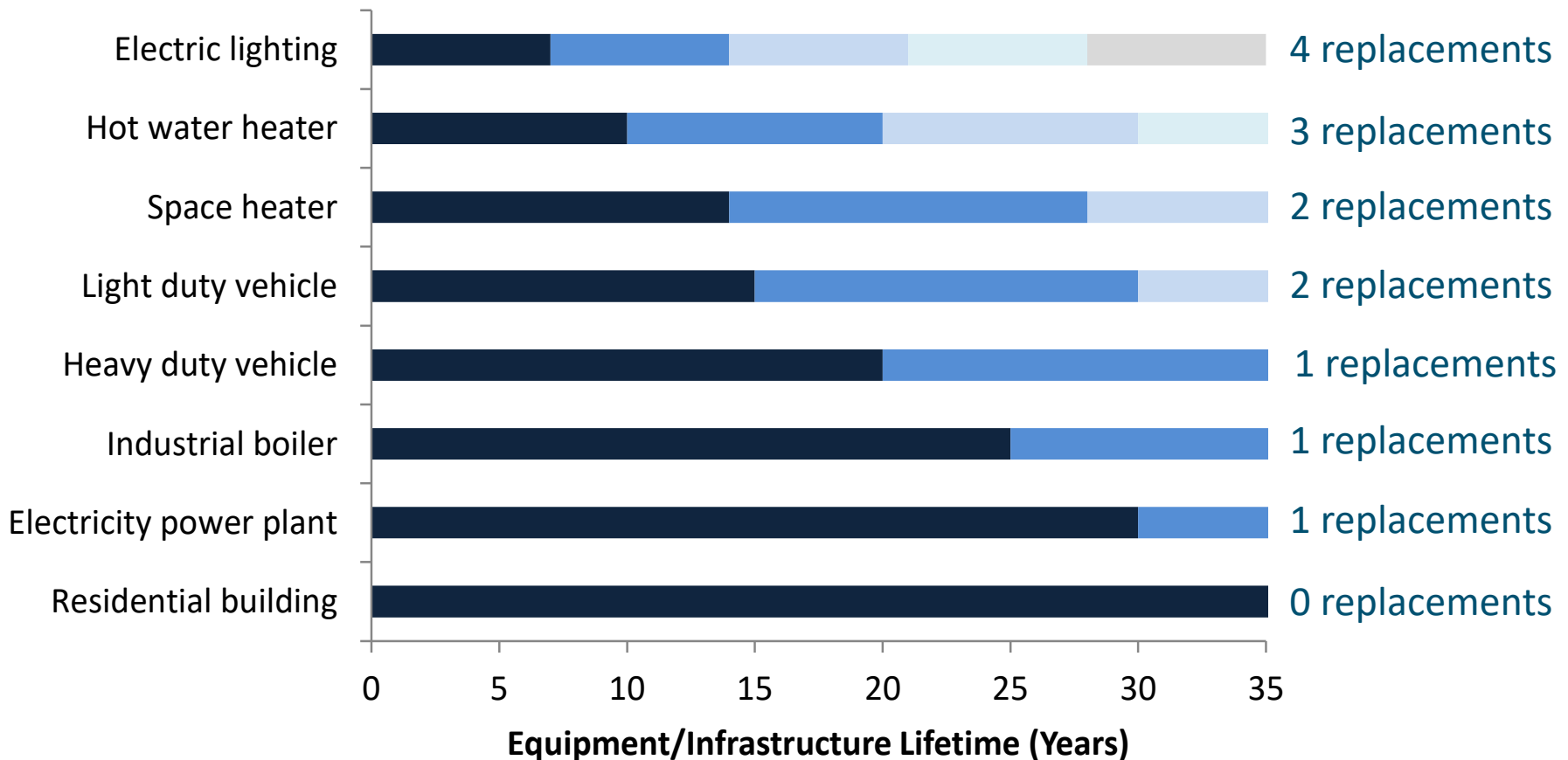


U.S. National Energy Modeling System and 2013 Annual Energy Outlook reference case

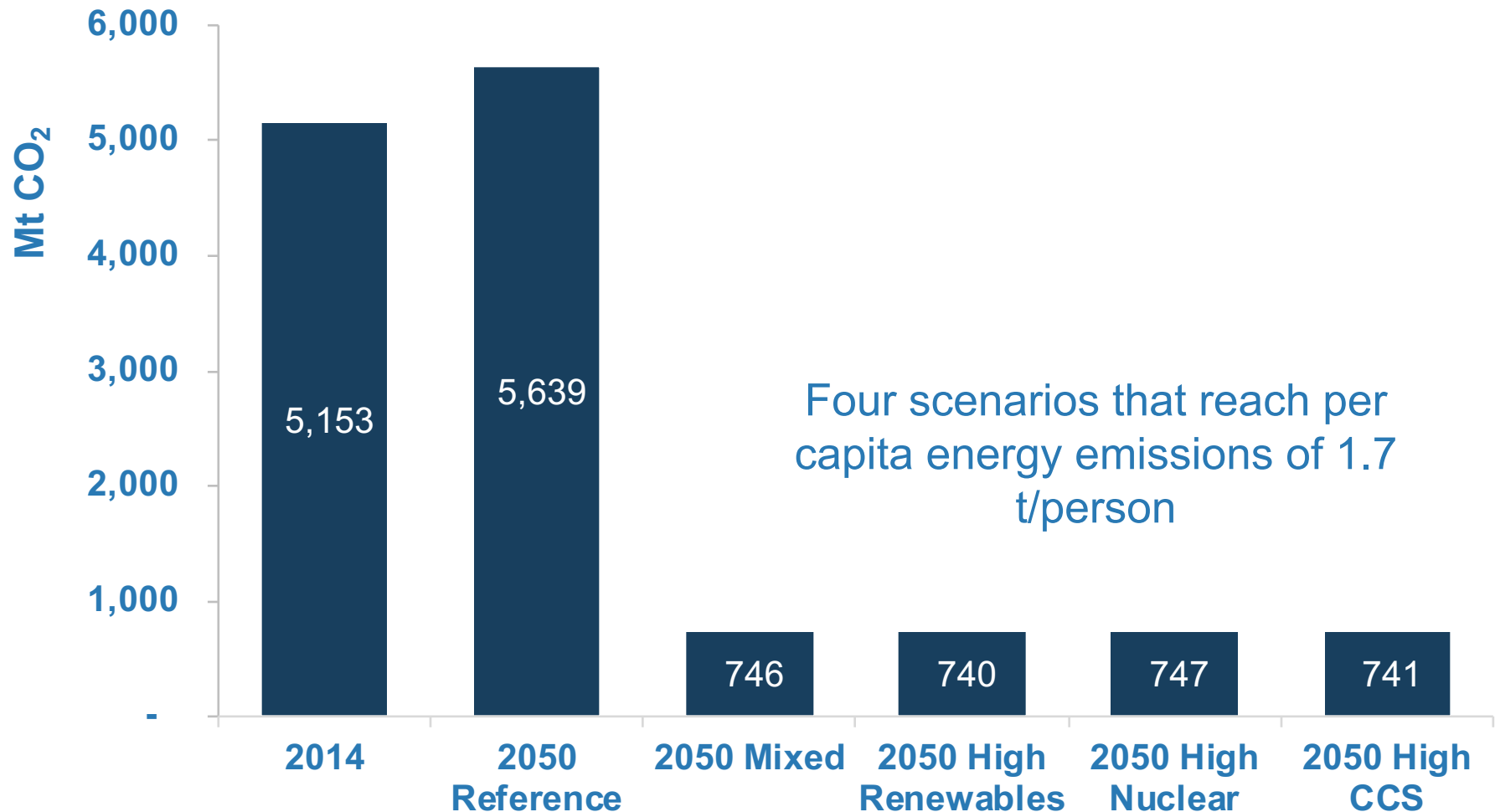
Early Retirement Not Required... But Timely Replacement Is

- A car purchased today, is likely to be replaced at most 2 times before 2050.
A residential building constructed today, is likely to still be standing in 2050.

2015 → 2030 → 2050

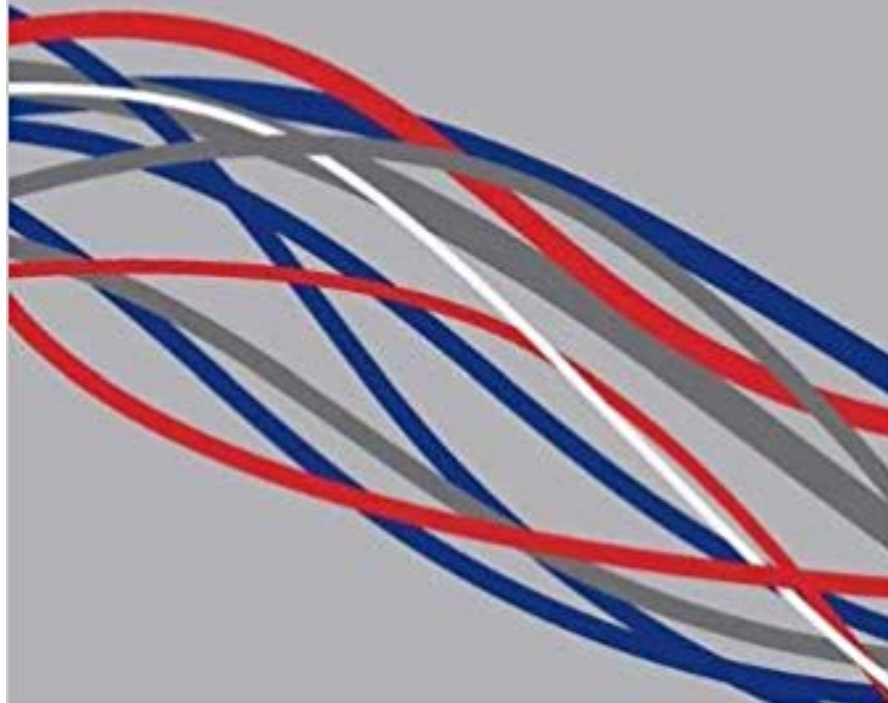


Multiple Feasible Technology Pathways Exist



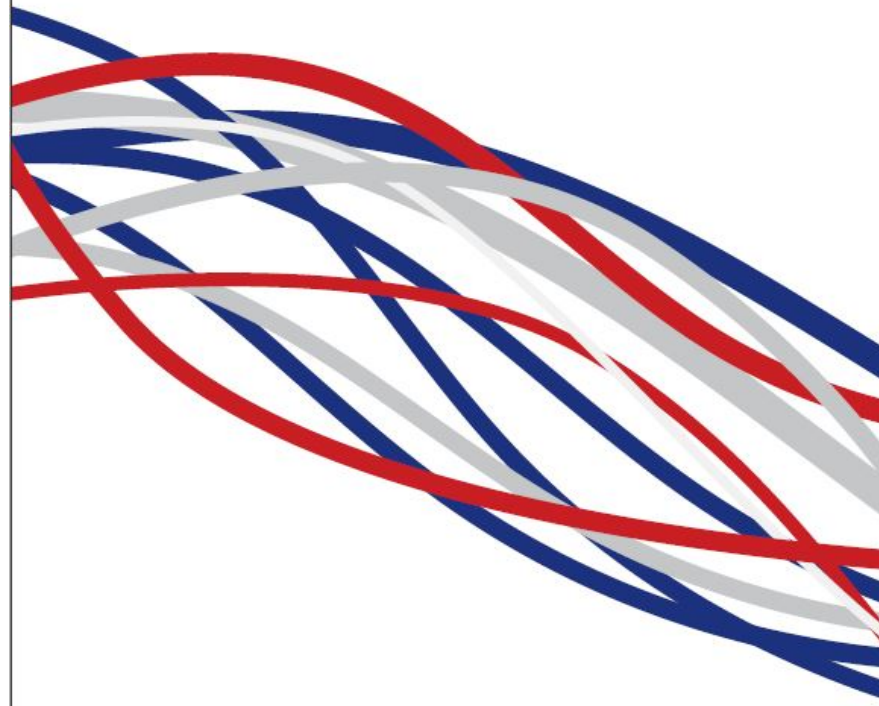
**LEGAL
PATHWAYS TO
DEEP DECARBONIZATION
IN THE UNITED STATES:
SUMMARY & KEY RECOMMENDATIONS**

MICHAEL B. GERRARD AND JOHN C. DERNBACH,
EDITORS



LEGAL PATHWAYS TO DEEP DECARBONIZATION IN THE UNITED STATES

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Key Findings on Legal Pathways

- Legal tools are available to decarbonize U.S.
- More than 1,500 specific recommendations for federal, state, local and private action
- Wide variety of types of tools; some are regulatory, but most are not
- These tools would create economic, social, environmental, and security benefits in addition to reducing GHG emissions

Twelve types of legal tools

- Additional regulation
- Reduction or removal of legal barriers
- Market-leveraging approaches
- Removal of incentives for fossil fuel use
- Tradable permits or allowances
- Information/persuasion
- Facilities and operations
- Infrastructure development
- Research and development
- Insurance
- Property rights
- Social equity

Legal Pathways

Energy efficiency, conservation, fuel switching

- Light duty vehicles
- Heavy duty vehicles and freight
- Transportation demand and mode shifting
- Aviation
- Shipping
- Lighting, appliances and other equipment
- Old buildings
- New buildings
- Industrial sector

Legal Pathways

Electricity decarbonization

- Utility-scale renewables
- Distributed renewables
- Transmission, distribution and storage
- Nuclear
- Hydropower
- Phasing out fossil fuels in electricity sector

Legal Pathways

Fuel decarbonization

- Bioenergy feedstock
- Production and delivery of low-carbon gaseous fuels
- Production and delivery of bioenergy fuels

Legal Pathways

Carbon capture and negative emissions

- Carbon capture, sequestration, utilization
- Direct air capture
- Agriculture
- Forestry

Legal Pathways

Non-CO2 climate pollutants

- Black carbon
- Methane
- Fluorinated gases
- Nitrous oxide

Legal Pathways

Cross-cutting approaches to reducing emissions

- Carbon pricing
- Behavior
- Technological innovation
- Financing large-scale projects
- Financing at the grid edge
- Materials consumption and solid waste
- International trade

Purposes of New Climate Legislation

- Allocate/Delegate Authority
 - Scale of Governance
 - Capacity
- Provide Intelligible Principles for Exercise of Delegated Authority
- Create Enforcement Mechanisms (eg, penalties) and Compliance Systems (eg, incentives)
- Provide for Information Disclosure
- Provide for Public Participation
- Assign Budgets/Create Funding Pools

CONTINUITY, COHERENCE, LEGITIMACY, EFFECTIVENESS

Legal Pathways on and off the Agenda at COP25

- Article 6 Negotiations
 - Article 6.4: Clean Development Mechanism 2.0
 - Accounting Guidelines for Trading Mitigation Outcomes
- Loss and Damage: Review of the Warsaw International Mechanism
- Enhanced Ambition in Nationally Determined Contributions in 2020



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Gracias!

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