The Energy Transition in Perspective

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October 27, 2021

Presentation to the NASA Carbon Monitoring System
Energy and climate at Columbia University

The energy transition

Policies to address the climate crisis
Columbia University
- Center on Global Energy Policy
- Climate School
The Center on Global Energy Policy at Columbia University SIPA advances smart, actionable and evidence-based energy and climate solutions through research, education and dialogue.

EDUCATION – CGEP provides career and mentorship opportunities to early-career professionals, and CGEP scholars teach courses at the Columbia School of International and Public Affairs.

ANALYSIS – CGEP provides data-driven policy solutions to day’s most pressing energy issues. Its best-in-class research is accessible both within and outside of academia.

CONVENING – CGEP’s events, both public and private, bring together key experts and decisionmakers to facilitate cross-sectoral problem solving.
Initiatives designed to deliver energy solutions

ENERGIZING AMERICA

Energizing America offers policymakers a strategic framework to triple federal funding for clean energy innovation in 5 years—to $25 billion by 2025—and a detailed plan for achieving this goal.

ENERGY JOURNALISM INITIATIVE

Each summer, CGEP invites energy and environment journalists from around the world to participate in a seminar to learn about energy and environmental issues from experts in government, industry, and academia.

CARBON MANAGEMENT RESEARCH INITIATIVE

CaMRI provides independent insight and data-driven analysis for private and public sector leaders on how to accelerate decarbonization through carbon management.

ENERGY POLICY TRACKER

The Energy Policy Tracker tracks energy commitments at multiple levels, from individual policies to countries and the G20 community overall. The tracker is updated weekly.
A historic commitment: The nation’s first climate school

The school is designed as a resourceful and widely networked hub for research, learning and action. It builds on Columbia’s unparalleled strengths to inspire solutions to climate change in the context of a closing window of opportunity.

PURSUING KNOWLEDGE – The Climate School will draw on Columbia University’s cross-disciplinary expertise to produce cutting-edge research on decarbonization, coastal health, resilience, and food.

PREPARING FUTURE LEADERS – The Climate School will deliver degree programs, K-12 education, executive training, and capacity building with the goal of creating the leaders and workforce with the skills necessary to tackle the climate crisis.

LINKING KNOWLEDGE WITH ACTION – The Climate School is designed to turn research into action. The Climate School will design, nurture, and inspire solutions-based outcomes by engaging and partnering with leaders from government, civil society, and business.
**Programs suited to the urgency of the climate crisis**

<table>
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<tr>
<th>Program</th>
<th>Description</th>
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<tr>
<td><strong>Policy Impact Lab</strong></td>
<td>The Policy Impact Lab will improve prospects for smart, actionable climate policy. It will put evidence-based policy recommendations in policymakers’ hands at the right time.</td>
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<td><strong>Sustainable Finance Center</strong></td>
<td>The Sustainable Finance Center will support the alignment of the global financial system with deep decarbonization pathways and help markets understand and mitigate climate risks.</td>
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<td><strong>Climate Litigation Project</strong></td>
<td>The Climate Litigation Project will be a “law firm” that pursues climate action in courtrooms, agencies, and legislatures, both domestically and internationally.</td>
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<td><strong>Climate Communications Hub</strong></td>
<td>The Climate Communications Hub will advance effective communication strategies through training, research, and outreach.</td>
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The energy transition
Energy transitions take time

Uptake of energy technologies

- **Coal**: 50 years to provide 40% of global supply
- **Crude Oil**: 50 years to provide 30% of global supply
- **Natural Gas**: 50 years to provide 20% of global supply
- **Modern Renewables**: Still supplies only 5% of global demand

Source: Vaclav Smil
Energy history is about additions, not transitions

Share of global fuel mix

Global fuel mix

Source: Vaclav Smil
Meeting climate goals requires a VERY rapid transition

Global annual net CO$_2$ emissions

CO$_2$ emissions cuts of 1 to 2 billion tonnes are needed each year between 2020 and 2030 to limit climate change in line with the Paris Agreement goals.

Source: Global Carbon Project
124 countries have net-zero targets

Source: Energy and Climate Intelligence Unit
Net-zero and 1.5°C is now the goalpost

Key milestones on the pathway to net-zero

Source: IEA
The ambition-reality gap is enormous

Global CO₂ emissions (Gt)  Global oil demand (mb/d)  Global gas demand (bcm)

Source: IEA
More policy is needed to reach net-zero

National mid-century net-zero pledges cover 70% of the world’s emissions

Legally-binding mid-century net-zero pledges cover only 20% of the world’s emissions

Source: IEA
Ambition-reality gap is not sustainable

“If something cannot go on forever, it will stop.”

- Herbert Stein, noted American economist

Sources: New York Times, BBC, CBS, AP
Policies to address the climate crisis
We know where emissions come from, and we have a menu of policy options to address them.

Global annual emissions by sector

- Electric Power: 25%
- Transportation: 29%
- Agriculture: 10%
- Industry: 23%
- Commercial: 7.0%
- Residential: 5.8%

Performance standards
- Renewable portfolio standard
- Fuel economy standard
- Building efficiency standard

Economic signals
- Carbon tax
- Clean energy subsidies
- Energy efficiency subsidies

Support for R&D
- National laboratory funding
- Educational programs
- Intellectual property protections

Enabling policies
- Urban design
- Public awareness programs
- Infrastructure investment

Sources: CSIS, Hal Harvey
There are policies on the table that could close the ambition-reality gap

**Annual CO₂ Emissions (million tonnes)**

- **Existing Policy**
- **BIF**
- **BBB – no CEPP**
- **BBB**
- **BBB and BIF**
- **Net-Zero**

Source: REPEAT Project
But policies don’t always have their intended outcome

EV share of new car sales and oil consumption, Norway (2010-2020)

EV sales in Norway have increased 100-fold over the past decade and in 2020 accounted for 54.7% of new car sales. Oil consumption has remained stable over the same period, declining only 5%.

Sources: OFV, bp
The future of climate policy in the U.S. is uncertain

Pelosi delays a vote on the bipartisan infrastructure bill amid a stalemate among Democrats. 

Sources: NY Times, E&E News, AP

'More than one way': Dems mull options for climate program

By Mark Schleifstein, Renee Doherty | 1/21/2021 08:10 AM EST

Lawmakers are in a new phase of negotiations on the climate provisions of the reconciliation bill, as they attempt to come up with ideas to replace the flailing Clean Electricity Performance Program.

The crucial question for Democrats now is how to slash greenhouse gas emissions enough to meet President Biden’s climate targets in a world where the CEPP, as currently conceived, is all

Biden focuses on climate, families in trimmed $2T plan

By LISA MASCARO, ALAN FRAM and MATTHEW DALY | yesterday

WASHINGTON (AP) — Scaling down his “build back better” plans, President Joe Biden on Tuesday described a more limited vision to Democratic lawmakers of a $3 trillion government-overhaul package with at least $500 billion to tackle climate change and money for middle-class priorities — child tax credits, paid family leave, health care and free pre-kindergarten.

And he expects negotiations to wrap up as soon as this week.
Emissions Pathways Under Current Pledges (by region)

Carbon emissions data inform policymakers about progress towards their climate targets. They allow policymakers to “learn by doing” as to whether certain policies have the desired effect on emissions.

Source: Climate Analytics
Thank You

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Center on Global Energy Policy