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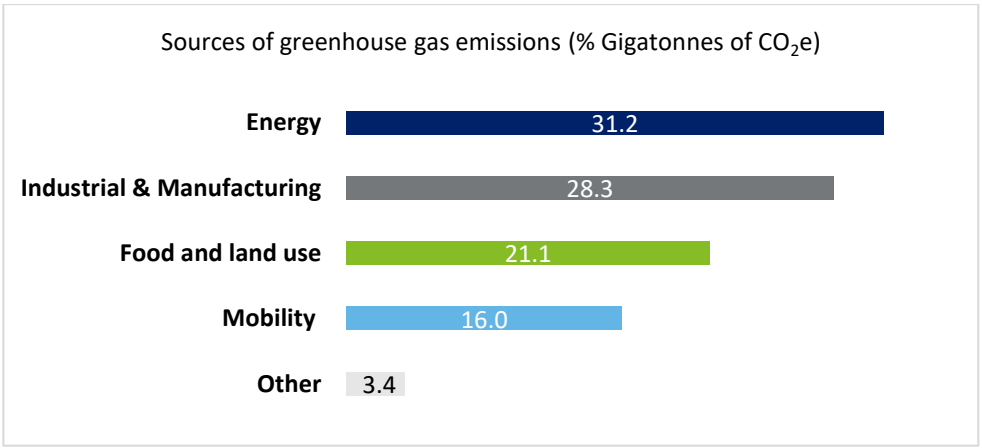
Policy considerations for a low-carbon energy system

Introduction

Energy production, primarily electricity generation and heating, accounts for ~31% (~15 gigatons CO2e)i of global greenhouse gas emissions. Coal and natural gas combined make up 60% ii of the total power produced. (These figures exclude tail-pipe transport emissions which are considered in our Low-carbon mobility system paper) The world produces approximately 100 million barrels of oil a day.[iii]



A low-emission energy system will likely require that nearly all electricity is supplied without the use of fossil fuels, with a mix of utility-scale and distributed solar and wind dominating the electricity mix. Energy storage provided by batteries, hydrogen, physical systems, and other technologies can address challenges with the intermittency of renewable power generation. A variety of other low-carbon power generation technologies–including bioenergy with carbon capture and sequestration, geothermal, small modular nuclear, and natural gas with carbon capture–all are likely to have roles to play. Significant transmission capacity and a more robust, resilient, and intelligent grid will be needed to support increasing demand from the widespread electrification of sectors such as home heating and electric vehicles and the dynamic load balancing and management of distributed energy resources such as rooftop solar.

The transition to a net-zero economy will require transforming a series of complex, interconnected systems, and in many cases, change can only happen by working at the intersections of those systems. Government, businesses, consumers, as well finance, and technology all have key roles to play in accelerating the emergence of low-carbon systems.

The transition should also occur in a way that addresses the disproportionate negative impacts the current energy system has on vulnerable communities. For example, some studies show that low-income households spend a larger proportion of their income on energy [iv], are less able to adapt to price shocks, and are exposed to more air pollution and other environmental hazards [v].

The energy transition will also have a significant impact on workers in a range of industries. Those who have specific training related to fossil fuel extraction or power generation, such as those in the mining industry, will be at risk of losing their jobs. The energy system transition should provide the support mechanisms necessary to upskill and retrain the workforce.

Policies and policy levers–five considerations to be addressed

Policy makers are faced with a vast and varied array of choices about how to move their countries to a low-carbon energy system. While most agree that this is the future and have committed to the Paris Agreement, how best to get there is a matter of continuing debate.

1. How these shifts can be made quickly without disrupting energy supplies.

Renewables are expanding rapidly and are already among the cheapest sources of electricity in most markets [vi]. However, current buildout trends are likely to be insufficient to meet Paris Agreement targets, and could leave a shortfall in capacity, risking disruption and price shocks. To accelerate and smooth the transition, governments will likely need to examine a range of potential policies. A recent International Monetary Fund study found that, in 2020, the coal, oil and gas industries received subsidies of $5.9 trillion USD [vii]. Clean energy standards could reverse this trend and put countries on a path to net-zero by setting aggressive and transparent renewable energy use requirements. A suite of policies aimed at reducing the extraction and use of fossil fuels are currently being enacted by several countries. In May 2021, the G7 pledged to stop international funding for coal projects [viii]. This was followed by a similar commitment by China in September, which committed to stop financing and building overseas coal power plants [ix] However, as highlighted in the United Nation's *Emissions Gap Report 2021* [x] more needs to be done to make the shift to low-carbon energy systems.

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3. How governments can work together across borders to accelerate a global green energy journey.
Connecting national electricity grids across borders allows for the balancing of energy use and production over a greater area. Already there are examples of governments coordinating to mutually benefit from cross-border energy programs. Shared systems in the UK/Norway [xvi] and Canada/US [xvii] are two examples of cross boundary energy agreements that model long-term energy partnerships models and serve national interests. Where feasible, border-sharing governments should seek to explore energy sharing best practices, such as technology standardization and shared infrastructure and systems, to improve efficiencies.

4. The role of the private sector, finance, and technology in the accelerated transition to low-carbon energy.
Innovation from business, flow of capital and smart technology combined with time-varied electricity rates can help balance supply and demand for electricity and accelerate the move to a low-carbon energy system that is smart and robust enough to manage the intermittency of renewable power generation. In parallel, incentives for investment in new renewables and clean tech is viewed as essential to reach net-zero. Getting to a net-zero emissions energy system will require large-scale changes throughout and across complex value-chains.

5. How governments, businesses, and civil society can work together to minimize social consequences.
The initial cost of energy transition can be a burden for low-income households if the cost is transferred directly to consumers. Incentives that consider vulnerable communities and encourage energy conservation and smoothed demand peaks have the dual benefit of making it easier to manage the energy grid without fossil fuels and reducing costs for low-income households. As this transition unfolds, governments should be mindful of workforce dislocation, providing retraining, reskilling, and new economic opportunities for those most heavily and directly impacted by a transition from long-standing predominant energy sources. Working together to transition to low-carbon energy, while maintaining a workforce employed in well paid jobs should be a goal of government. Engineering, science, technology, and project management skills will be transferable to new green energy jobs. Examples of this have been seen in the transition from offshore oil to offshore wind where there are transferable engineering skills.

6. The role of nuclear energy in the green transition.
Some argue that nuclear energy is necessary to establish a stable baseline of electricity production without resorting to fossil fuels. Others argue that, because of upfront costs and buildout time, proliferation concerns, and the risks of nuclear waste, it is not a viable option in the long-term. This is one example of many questions governments will face on the optimum policy to balance short- and long-term needs while facilitating the move to a low-carbon energy system.

At COP21, where the Paris Agreement was signed, policy makers set out their goals for limiting climate change. Now, at COP26, it is hoped that policy makers will set out the actions they will take to make the Paris Agreement a reality.

Find out more

- Deloitte's system of systems approach
- Deloitte's Climate Exchange

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[i] Hannah Ritchie, "Sector by sector: Where do global greenhouse gas emissions come from?", Our World in Data, September 18, 2020. This analysis includes residential and commercial energy use, unallocated fuel consumption, and fugitive emissions from oil, gas, and coal.
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[vii] Ian Parry, Simon Black, Nater Vernon, "Still Not Getting Energy Prices Right: A Global and Country Update of Fossil Fuel Subsidies," International Monetary Fund, September 24 2021.
[viii] Elizabeth Piper, Markus Wacket, "In climate push, G7 agrees to stop international funding for coal," Reuters, May21, 2021.
[ix] Valerie Volcovici, David Brunnstrom, Michelle Nichols, "In climate pledge, Xi says China will not build new coal-fired power projects abroad," Reuters, September 22, 2021.
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[xiii] Elizabeth Piper, Markus Wacket, "In climate push, G7 agrees to stop international funding for coal," Reuters, May21, 2021.
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[xvii] "North American Power Grid," Canadian Electricity Association

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