policy principles for addressing climate change

our policy principles for addressing climate change guide our actions

global engagement | **balanced and measured approach** | **research and innovation** | **transparency**

global engagement

Reducing greenhouse gas emissions is a global issue that requires global engagement and action.

Greenhouse gases (GHGs) do not recognize sovereign borders. Climate change risks stem from the cumulative effect of GHG emissions from all nations. By 2040, about one-quarter of global energy-related GHG emissions are projected to come from OECD* nations and three-quarters from non-OECD nations, the single largest being China, alone accounting for nearly one-quarter of projected global energy-related GHG emissions. With emissions rising fastest in developing countries, climate change risks cannot be addressed by actions taken in the developed world alone. Global engagement is required. Unilateral action by any country or jurisdiction could result in unintended consequences that could distort markets, reduce competitiveness of trade-exposed industries and undermine intended environmental objectives – without reducing climate change risks to that country or jurisdiction.

*The Organisation for Economic Co-operation and Development

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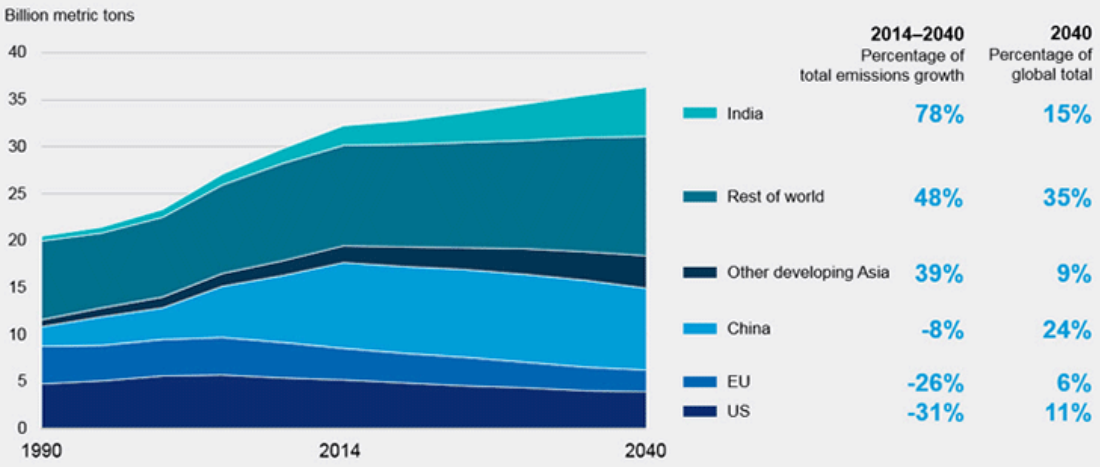
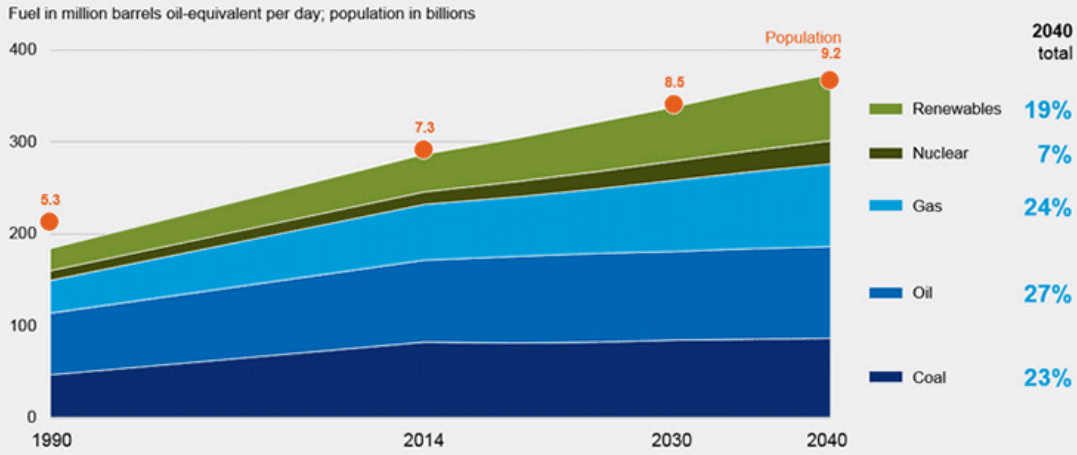
Energy-related CO_2 emissions by region



Source: Based on IEA data from *World Energy Outlook 2016*, New Policies Scenario © OECD/IEA 2016. License: www.iea.org/t&c; as modified by Chevron Corporation.

World population and primary energy demand by fuel



Sources: Based on IEA data from *World Energy Outlook 2016*, New Policies Scenario © OECD/IEA 2016. License: www.iea.org/t&c; as modified by Chevron Corporation.
United Nations Population Division, *World Population Prospects: The 2015 Revision*, © 2015 United Nations.

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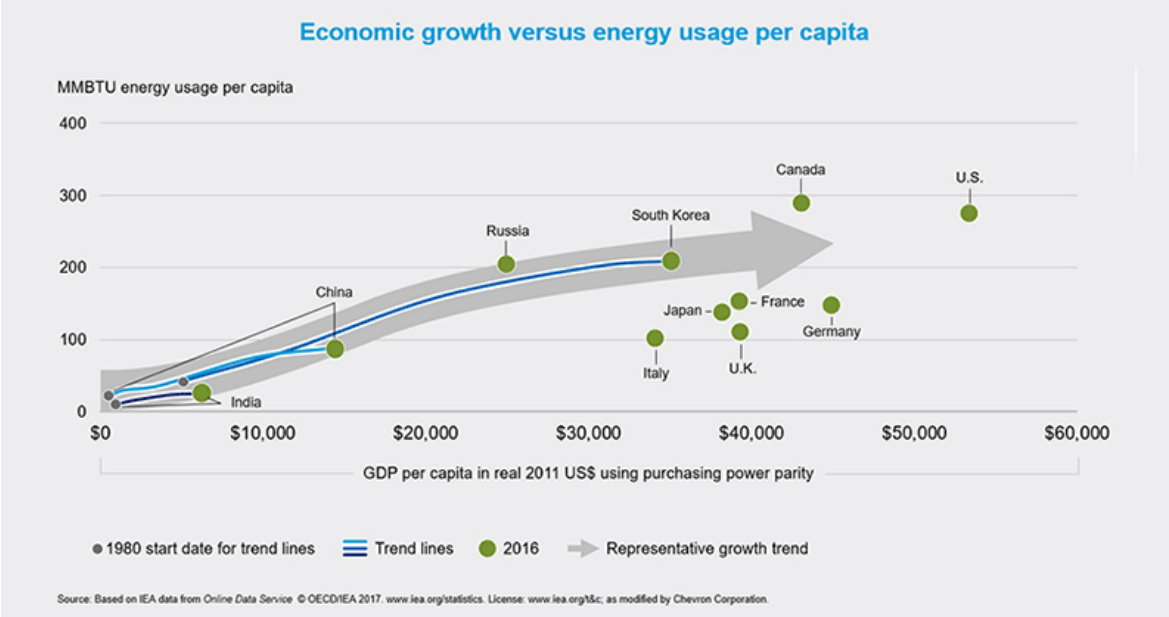
balanced and measured approach

Policies should be balanced and measured to ensure long-term economic, environmental and energy security needs are all met, costs are allocated in an equitable, gradual and predictable way and actions consider both GHG mitigation and climate change adaptation.

Access to affordable, reliable energy is essential to the growth of strong economies, sustained improvements in the quality of life, and the eradication of poverty. To ensure these benefits for today's and future generations alike, GHG reduction and climate change adaptation objectives must balance the need for economic growth, environmental stewardship and energy security.



How the costs of these actions are shared is equally important. GHGs are a function of many activities, from manufacturing, agriculture and transport, to supply the world with essential food, goods and services, to how much energy we use to power our homes, drive our cars and otherwise travel for work and leisure.

To reduce GHG emissions while avoiding disruptive economic and social impacts, policies must be developed that allow for multiple solutions, reasonable timeframes for the turnover of infrastructure, equitable sharing of costs across carbon-emitting sectors of the economy and efficient allocation of capital. Markets allocate limited capital in the most efficient and effective way when there are no large-scale subsidies for energy consumption or energy production.

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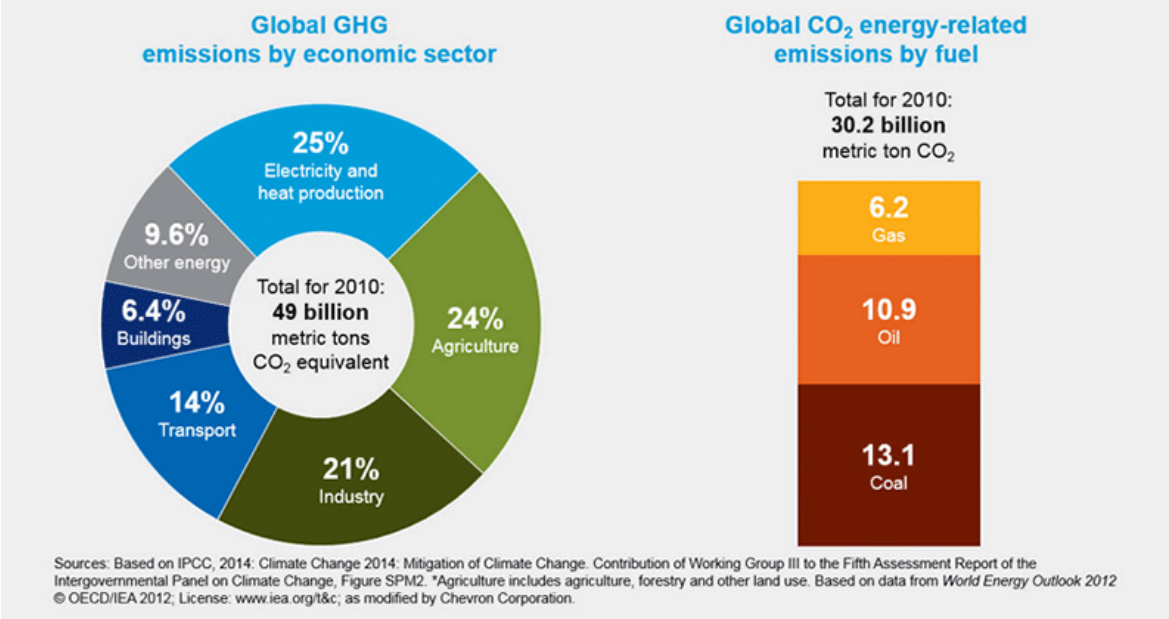
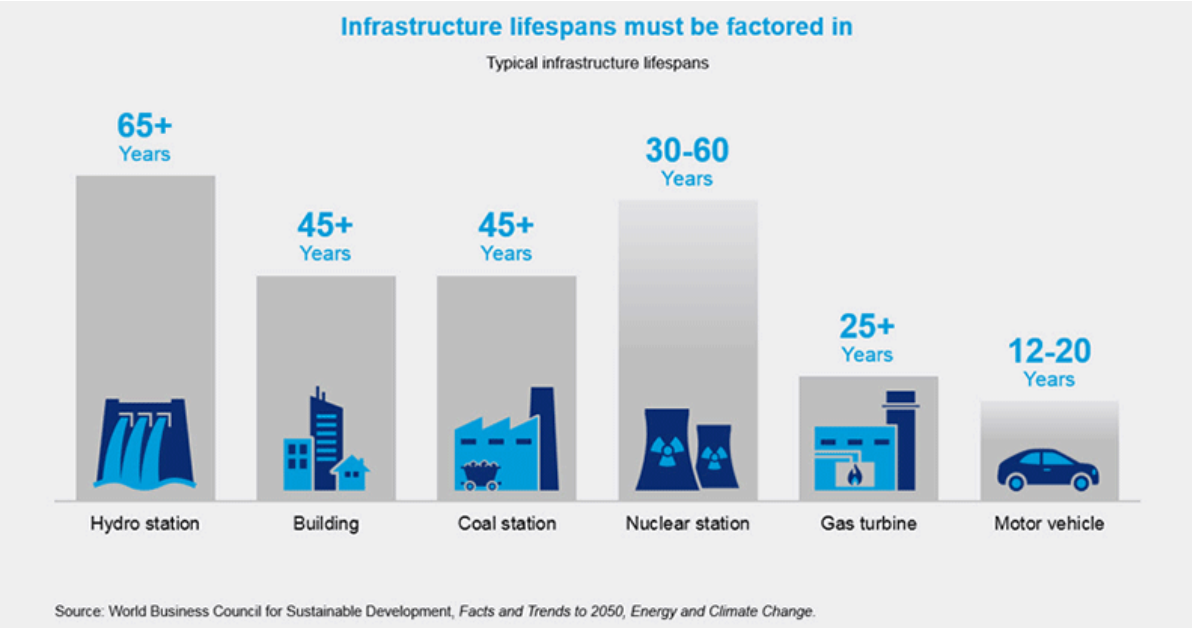


Addressing climate change risks in a meaningful way is a complex, long-term proposition. Along the way and as knowledge evolves, climate change policies require periodic assessment to determine if the intended results are being achieved, if costs and actions are being shared equitably, if global development and economic growth continue, and if energy remains affordable to global consumers.



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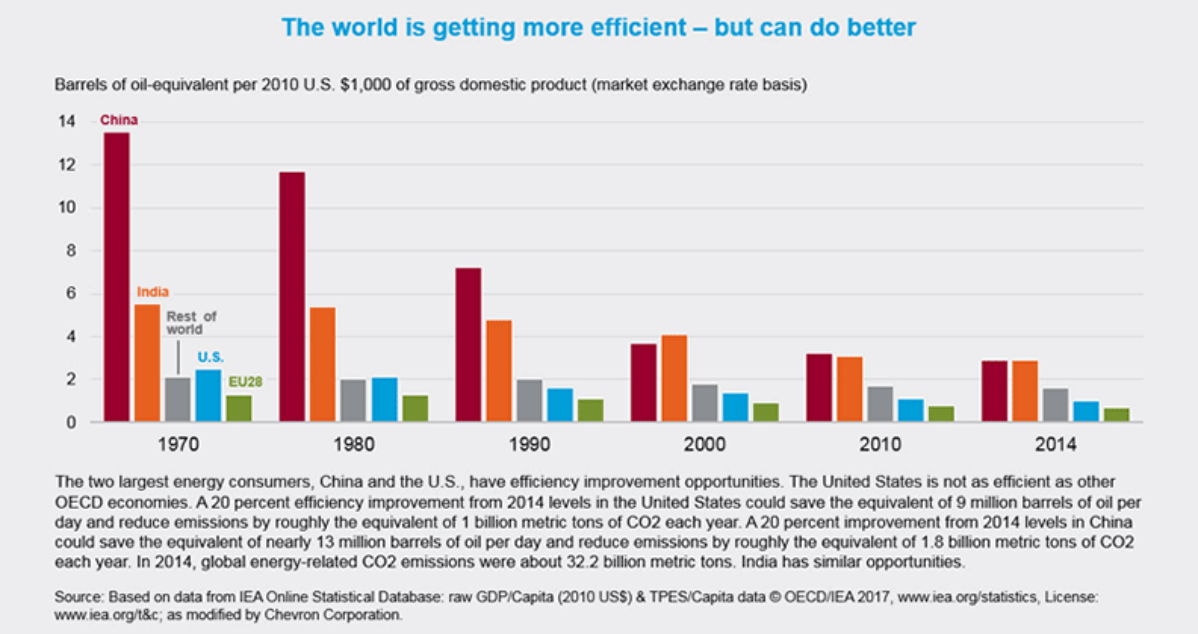
research, innovation and application of technology

Continued research, innovation and application of technology are essential to enable significant and cost-effective mitigations to climate change risks over the long term.

There are large-scale, proven and affordable technologies available today that can be applied to lower or reduce the growth of global GHGs. Natural gas, energy efficiency, and nuclear technologies can be implemented immediately to help reduce GHG emissions while innovative research continues. This also may include unsubsidized wind energy in jurisdictions where large-scale development can be achieved. Government must enable the development and application of these energy technologies by removing barriers to access, streamlining permitting and ensuring responsible and cost-effective regulation.

Energy efficiency is the most immediate and cost-effective source of “new” energy with no GHG emissions. In addition to government support of energy efficiency efforts, the private sector should increase its own efforts to enhance efficiency in everything from manufacturing and transportation to building management and construction.



Innovative technologies are created and developed through free markets, university rese arch, government investment, public-private partnership, entrepreneurial venture capital start-ups, and industrial and individual application of new technologies.
The development of multiple solutions and pathways will require sufficient time for government and industry to learn from and to apply the outcomes of the research.

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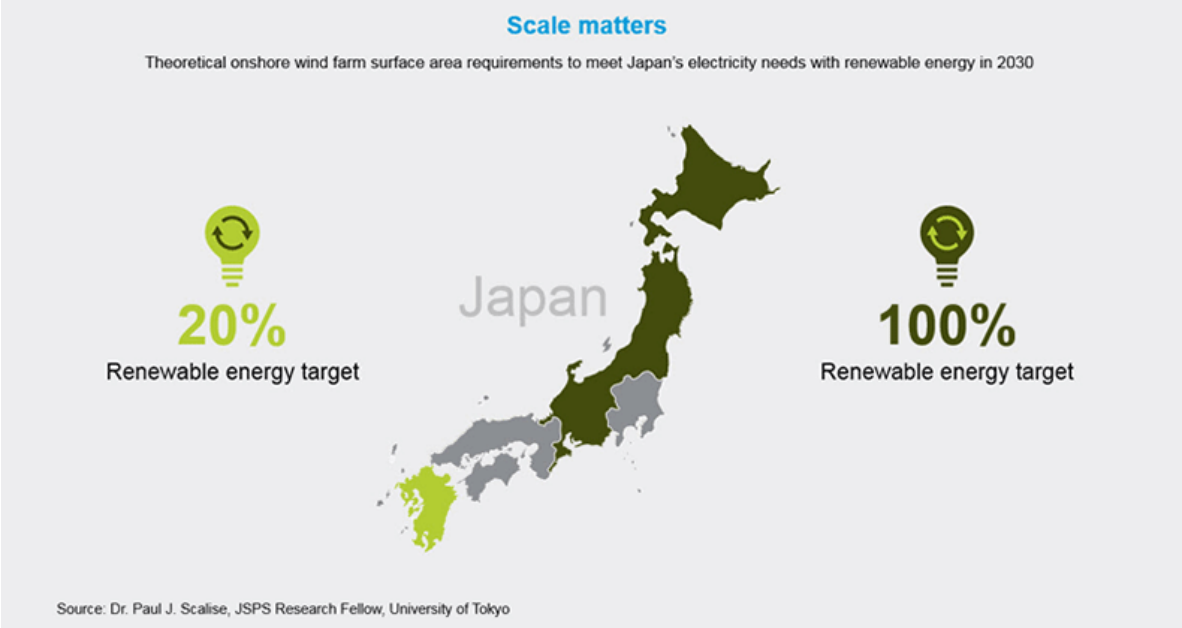
Research, development and deployment of technology should be focused on cost-effective climate change adaptation measures and breakthroughs needed to deliver affordable, lower carbon energy solutions that can be adopted globally, at scale and without subsidies. Associated government policies should be technology neutral and support early stage pre-commercial activity to advance needed technology and cost breakthroughs. Continued global research on climate science is also critically important to further our understanding of the complex relationship between GHG emissions and climate and narrow the uncertainty in predictive models.

Policies that enable these dynamic aspects of science, research, innovation and application of technology to address scale, cost and technological barriers will advance the most cost-effective solutions to climate change risks.



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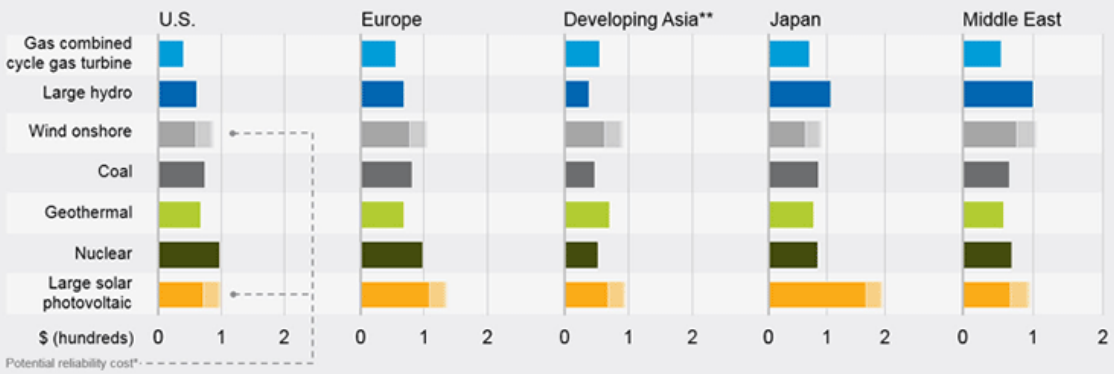
Cost matters

2017 levelized cost of energy for power generation, $ per megawatt hour



Levelized cost of energy (LCOE), including capital, operating, fuel and carbon costs over the lifetime of a project, calculated as a break-even price for electricity delivered to a high-voltage grid. The market prices used for gas are the Nymex Henry Hub front-month futures contract for the U.S. and *World Gas Intelligence's* Japan and All-Asia LNG spot assessments for developing Asia.

* Potential reliability cost: additional system integration, backup capacity, and transmission costs to offset intermittency of wind onshore and large solar photovoltaic; however, these costs are not known.

Source: © 2017 Energy Intelligence Group, *New Energy*, March 2017; as modified by Chevron Corporation. **Primarily China and India.

Breakthroughs required

Examples of technologies required to commercialize advanced fuels and vehicles in the United States

Light-duty engines and vehicles	Biofuels	Light-duty compressed natural gas	Light-duty electric	Light-duty hydrogen	Medium/heavy-duty engines and vehicles
• Low-cost lightweighting (up to 30% mass replacement)	• Hydrolysis • Fermentation of C5 and C6 sugars • Lignocellulose logistics/ densification • Production of higher-quality pyrolysis oil • Biotechnology to increase food and biomass	• Leverage liquid ICE fuel economy technology	• Lithium-ion battery energy density • Lithium-ion battery degradation and longevity	• Compression and storage for dispensing • Fuel cell degradation and durability	• Combustion optimization

Nonfood-based biofuel challenges include high cost, compatibility with refinery gasoline and scalability.

Economic hurdles include:
- Using chemical hydrolysis to break down cellulosic materials into sugars for fermenting into ethanol (hydrolysis)
- Developing microbes that can simultaneously ferment multiple types of sugars (fermentation of C5 and C6 sugars)
- Transporting and storing bulky and heavy cellulosic materials (lignocellulose logistics/densification)
- Removing impurities from bio-oil and improving its stability (production of higher-quality pyrolysis oil)

Source: © National Petroleum Council 2012, Advancing Technology for America's Transportation Future. "ICE" (Internal Combustion Engine)

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transparency

The costs, risks, trade-offs and uncertainties associated with GHG reduction and climate change adaptation efforts and policies must be transparent and openly communicated to global consumers.

Developing solutions of the scale required by the climate change challenge will be a complex endeavor. It is essential to understand and fully communicate the economic and social costs of various policies and the projected environmental benefits, both in the near term and the long term, so we can agree on solutions that are fair, balanced, effective and affordable to global consumers.

Cautionary Statement >

downloads

› 2018 Annual Report

› 2018 Corporate Responsibility Report

› The Chevron Way - English

links

- Chevron's climate change policy principles
- Learn more about our corporate responsibility activities and results
- Request a printed copy of our reports

resources

- Climate change resilience: a framework for decision making
- Managing climate change risks: a perspective for investors
- Independent review of Chevron's greenhouse gas emissions inventory
- Carbon Disclosure Project's 2017 response for Chevron Corporation
- Chevron's 2018 annual report on Form 10-K

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