RE-ENERGIZING CANADA

Pathways to a Low-Carbon Future

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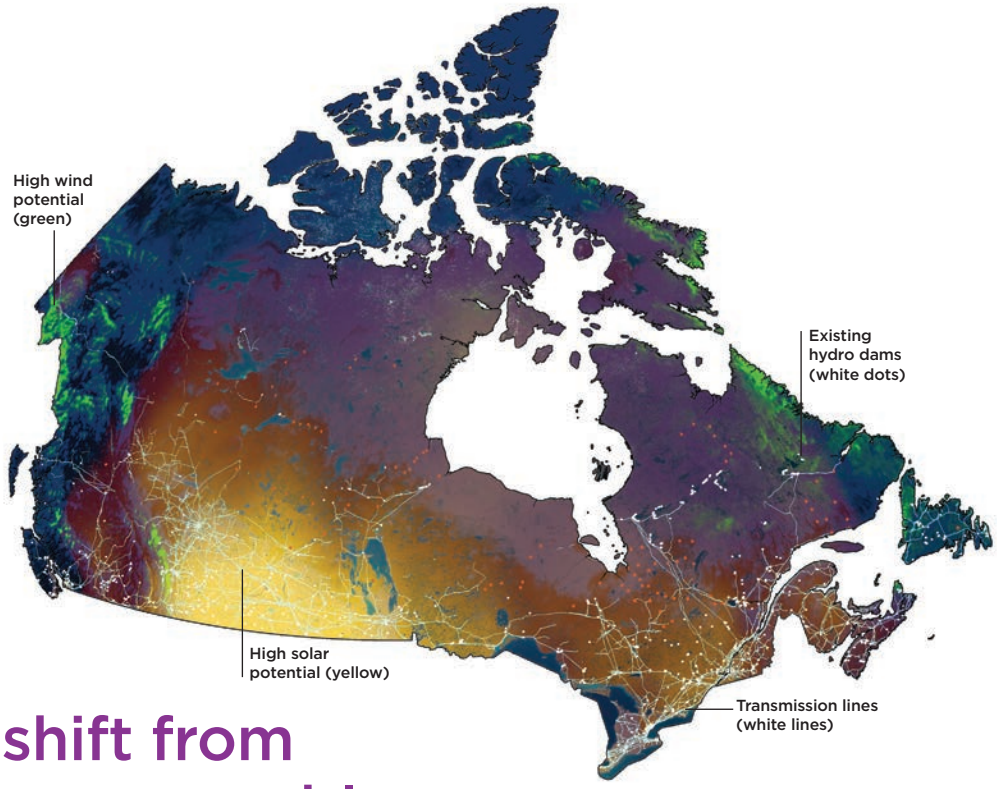
Re-Energizing Canada: Pathways to a Low-Carbon Future

This document is a brief overview of an 80-page report, *Re-Energizing Canada: Pathways to a Low-Carbon Future*, that examines how Canada can decarbonise its energy systems while remaining globally competitive.

The full report and this overview were produced by Sustainable Canada Dialogues, an independent volunteer network of more than 80 academics. The network includes researchers from multiple disciplines, such as engineering, sciences and social sciences, working in universities in all provinces.

Commissioned by Natural Resources Canada in Fall 2016, *Re-Energizing Canada: Pathways to a Low-Carbon Future* bridges decision-making and academic thought around energy and climate change. The findings of this overview and the full report, the opinions expressed and the actions proposed come from the authors and do not reflect positions of the Government of Canada.

At the onset, we identify governance issues as central to a successful transition. The technologies needed to begin the low-carbon energy transition are readily available. We believe that the key barriers to accelerating the low-carbon energy transition are social, political and organizational.



Canada needs to make the shift from an oil-producing country to a renewable energy leader.

THE CLIMATE IMPERATIVE

In its *Fifth Assessment Report*, the Intergovernmental Panel on Climate Change stated that 90% of 2010 energy sector emissions must be cut by mid-century to halt global temperature increase before it reaches the 2°C ceiling. This temperature increment would allow avoiding the most deleterious effects of climate change.

Though the scale of the global challenge is enormous, more and more individuals, communities, industries and governments are stepping up to the task of meeting that goal. At the 2015 Paris Climate Conference, Canada joined the High Ambition Coalition, which is an alliance of 100 developing and developed countries that pledged to enhance decarbonisation efforts.

Domestically, one of the focus areas of the *2015 Canadian Energy Strategy* is the transition to a lower carbon economy, and the *Pan-Canadian Framework on Clean Growth and Climate Change*, supported by the federal government, eight provinces and the three territories, is "a commitment to the world that Canada will do its part on climate change, and a plan to meet the needs of Canadians." The transition to low-carbon emission energy systems is now a real objective.

Historically, Canada has successfully undertaken other journeys of great magnitude—including adopting universal healthcare and launching social security. These were complex endeavours considered challenging at the time. We know now that they made a significant and lasting contribution to the social-economic wellbeing of Canada, and proved that the country can take bold action. The decarbonisation journey is of equal importance.

We believe that embracing the low-carbon energy transition could provide a sense of 'mission' —an essential element to mobilize society around tackling climate change.

The full report draws on peer-reviewed research, data and other relevant documents to explore the challenges to, and opportunities within, achieving a low-carbon energy transition that will form the foundation of a sustainable future.

Working through the evidence, we have identified four cornerstones that can provide the foundation of a sustainable future.

1 THE TRANSITION CONTEXT

In 2015, the production and use of fossil fuels accounted for 80% of Canada's greenhouse gases. Transforming the way we produce and consume energy is possible, though not easy. For two centuries, coal, oil and gas have powered the rise of industrial civilization. Our technological systems and contemporary lifestyles are highly dependent on low-cost fossil energy.

Previous energy transitions were driven by immediate benefits—in cost and convenience—of moving to new fuels or energy carriers (e.g., gas or electricity). The current shift will be driven by the long-term risk of climate change, public health concerns and the volatility of energy markets motivating the development of low-carbon energy alternatives.

2 ENERGIES FOR THE FUTURE

When we analysed Canadian scenarios concerning future energy systems, a clear direction towards decarbonisation emerged. Experts anticipate future energy systems will be shaped around:

- Reducing overall energy demand through energy efficiency and conservation;
- Increasing electrification by switching to low-carbon-emitting sources of electricity;
- Progressively eliminating high-carbon petroleum-based fuels, replacing them with low-carbon fuels.

In the long-term, global demand for low-carbon energy is expected to climb while global demand for fossil fuels peters out.

3 OPPORTUNITIES AND OBSTACLES

With its uniquely vast endowment of renewable energy resources, Canada can seize the global energy transition as an opportunity to build a major new economic engine for the country. The future competitiveness and success of companies will be influenced by their readiness to engage in the low-carbon energy transition.

While some businesses are already embracing the transition to increase their competitiveness, others remain hesitant. Financial investment will help seed the ground for low-carbon energy innovation in the private sector, but parallel public investment and a clear sense of direction are needed.

Participation and education will play a vital role in changing our social and cultural practices and values around energy. There is evidence that innovative participatory energy planning and visioning processes can achieve citizen learning and promote changes in attitudes.

4 ACCELERATING THE TRANSITION

Our calculations in the full report are clear: The current ambition of low-carbon policies and measures will not allow us to reach our destination—a world that will have avoided a global temperature increment greater than 2°C.

Re-Energizing Canada: Pathways to a Low-Carbon Future illustrates how governments, citizens, communities and businesses can work together around four broad fields of action: transportation, cities, Indigenous communities and industry. We stress the importance of simultaneously focusing on energy supply and demand.

Offering citizens and companies a range of attractive low-carbon options that improve quality of life can accelerate the energy transition.

THE LOW-CARBON ENERGY JOURNEY

1 PREPARATION
2017–2020

Decarbonisation is the grand challenge of our time.

Co-Creating a Vision

We think that creating a common vision of a low-carbon society will offer Canadians opportunities to plan ahead, act and then refine or adjust as our transition unfolds. The federal government has a role to play in helping co-create this vision.

Because the pace of change matters, we propose that national discussions around the low-carbon energy transition consider that countries like Canada—with high emissions per capita and large contributions to atmospheric CO_2—should act more rapidly than countries with lower per capita emissions.

We favour low-carbon energy pathways that contribute most to promoting sustainability, balancing the needs for economic growth, social wellbeing and environmental protection, in the spirit of Reconciliation with Indigenous peoples.

Adapting Institutional Arrangements

Implementation of a common low-carbon energy vision will require novel institutional arrangements. We recommend the following priorities:

Assign responsibility for advising on the energy transition at the federal level to a **joint task force** that reports directly to the Prime Minister and an associated, high-level cabinet committee. This **joint task force** would bring together senior civil servants from energy, environment, economy, technology, transportation, industry, innovation and more.

Create an **independent commission** that will evaluate progress with respect to milestones and long-term goals, assess the efficiency of both existing and proposed actions and programs, provide scenarios based on these and report to First Ministers.

Develop a **multi-level structure** to promote decarbonisation and facilitate exchanges among all government levels. The federal government could expand communication and help decrease the tensions that remain between regions with respect to energy supply.

Allocate resources to **experimentation** by providing research funding to trial practical innovations—technologies, social practices and so on—testing novel, challenging and risky ideas.

There are many possible, intertwining energy pathways, but only one destination.

2

EARLY IMPLEMENTATION 2020–2030

Navigating Low-Carbon Energy Pathways

Key components of energy systems link energy sources to the comforts and services that people need and want. Social acceptability and energy efficiency will have an increased role in determining the makeup of future Canadian energy systems.

Low-carbon energy options like hydroelectricity, mature variable renewables such as solar and wind, emergent renewables like wave, tidal, geothermal and biomass, low-carbon fuels, waste reuse, nuclear and carbon capture and storage will be the way forward. Different technological and social options can be combined, using these sources and others still to be developed, to create varied pathways to a low-carbon future. Each has trade-offs and patterns of social and environmental costs and benefits.

Such choices are not just technical decisions but involve values, priorities and attitudes towards risk. They may differ among provinces, territories and Indigenous peoples and will change over time.

As we move forward, we will accumulate experience and clarify the implications of different choices to accelerate our transition. We need an informed and continuing public debate about socially acceptable energy pathways that aims to build understanding and consensus to achieve this transition.

Low-carbon energy sources such as:

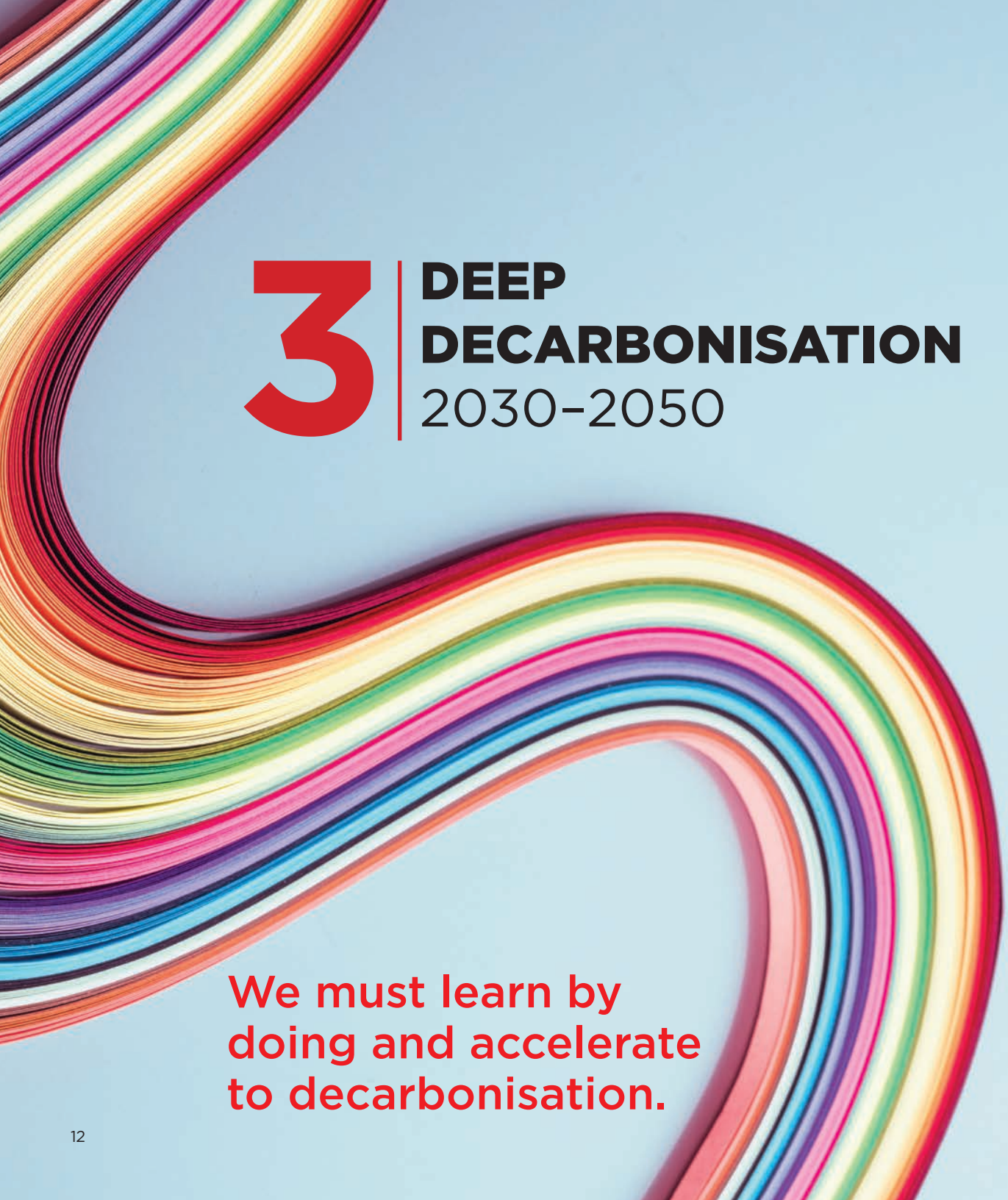
HYDRO SUN WIND GEOTHERMAL BIOMASS NUCLEAR WASTE

Implementing a Low-Carbon Development Strategy

To accelerate the low-carbon energy transition, we recommend integrating policy into a broader 'low-carbon development strategy' that would:

- Continuously strengthen policy frameworks (including carbon pricing, regulatory and other measures) to stimulate ambitious climate action;
- Focus on international markets for Canadian low-carbon technologies and services (e.g., finance, insurance and asset management maintenance);
- Support transitions in technology and jobs from high- to low-carbon energy sources, leveraging existing technical and institutional strengths by retooling manufacturing processes;
- Explore new resource combinations where Canada has natural advantages, including agro-fuels and -chemicals, the bio-economy and forest-based building materials and technologies;
- Stimulate innovation in technology development, practices and management. The transition can begin with existing technologies but innovations will be essential to complete it;
- Develop regional decarbonisation strategies that employ the particular resources, industrial and financial assets and skillsets of each region to stimulate place-based, low-carbon development. Here, leadership rests with Indigenous peoples, provinces, territories and municipalities, with the federal government providing support;
- Create retraining programs to help meet employment needs of oil and gas workers and labour needs of the renewable energy industry. We propose that information and education must also target the industry itself to allow companies to envision future options linked to shifting their production towards low-carbon energy.

3 DEEP DECARBONISATION 2030–2050



We must learn by doing and accelerate to decarbonisation.

Through international and national commitments, Canada has formalized its commitment to tackle the human causes of climate change. One thing we know for certain: A deliberate, strategic, orchestrated transition to low-carbon energy is paramount.

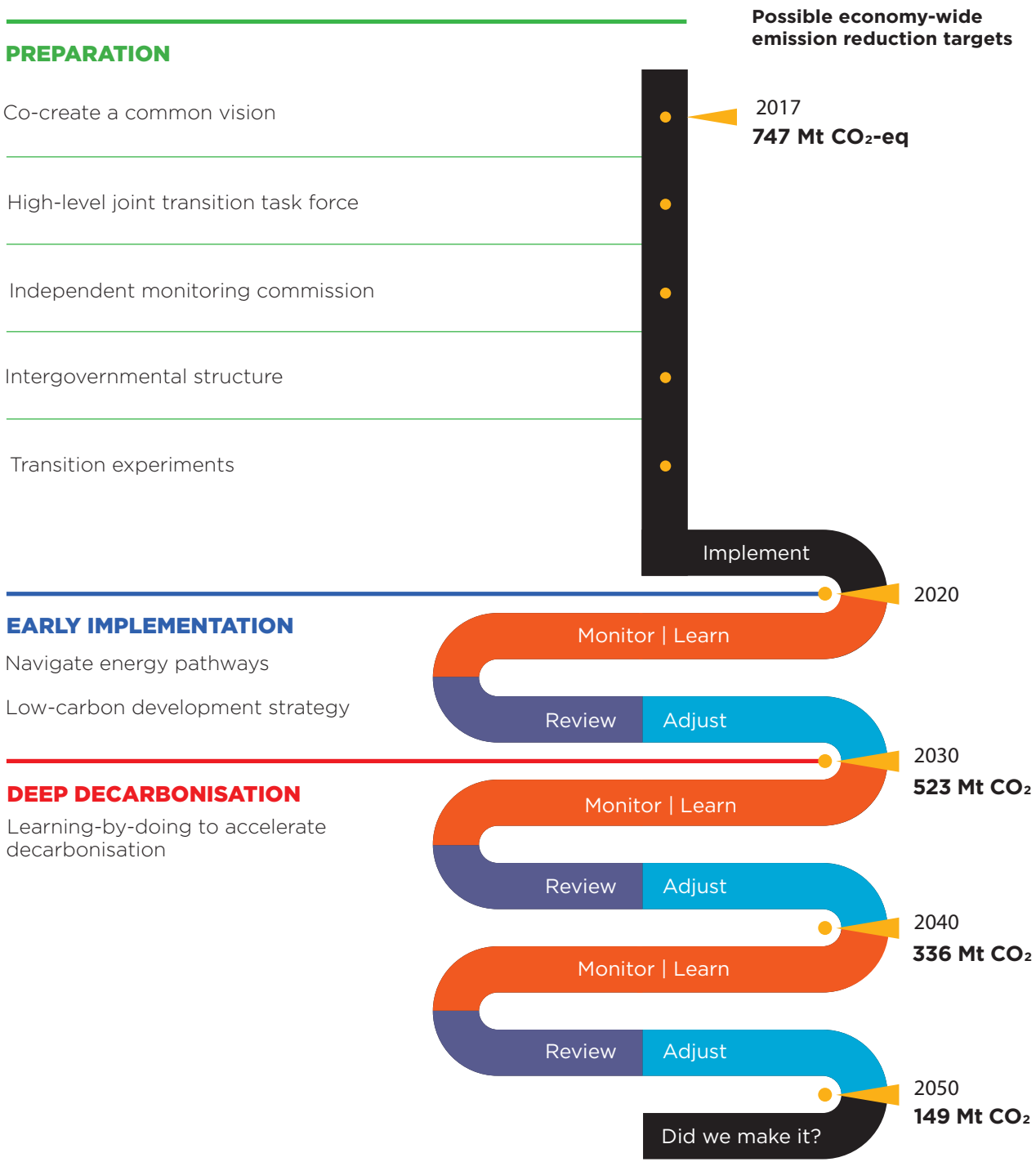
Since the pathways to a successful energy transition are not known, it is important to experiment with innovative social practices and technologies that will cover the spectrum of diversity found in Canada. Failures are likely—even unavoidable. Policies need to support testing, recognizing that some degree of failure is expected and that knowledge gained from successes and failures is put to good use.

Advancing towards decarbonisation thus entails learning-by-doing. This demands continuously:

- Identifying where and how emissions could be rapidly reduced;
- Shaping policy approaches based on this information;
- Developing a monitoring system to evaluate the effectiveness of policies and measures taken;
- Adjusting to novel conditions including climate, technology development and fluctuating energy prices.

Key to the success of the low-carbon energy transition is a simple fact: Emission reductions need to add up to the target pledged while ensuring a development that is *truly* sustainable.

STEPS PROPOSED



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