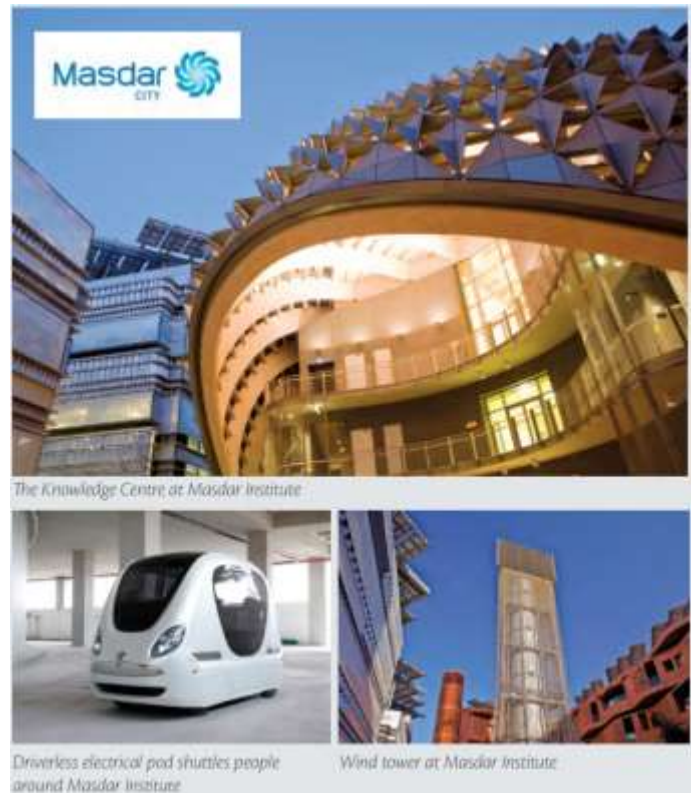
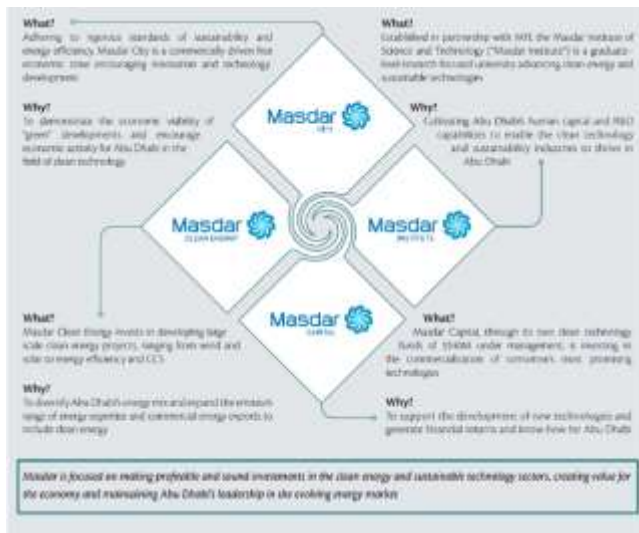


The UAE's best practices in government-related activities in the green economy

Abstract

The rising global challenge of energy supply and security, and climate impact has created a complex and uncertain energy environment. In this context, the United Arab Emirates (UAE) government has adopted a position as leader and pioneer in the new energy landscape, with significant projects and public policy focused on pursuing sustainable development. This can be seen in the country's *Green Economy Strategy* launched in 2012 by the federal government. Likewise, government-led initiatives (GLIs) or government-supported entities (GSEs) are making inroads across all sectors of the green economy, simultaneously improving the nation's competitiveness and reducing its ecological footprint.¹ For example, Masdar City,² is a multi-billion dollar, unique, clean energy cluster that advances renewable energy and sustainable technologies through education, research & development (R&D), investment, commercialisation and adaptation. There are several other solar energy initiatives, with additional solar energy projects being used to desalinate seawater, as well as to bring fresh water to desert flora and fauna. Recognising that the environment has no borders, the UAE's green ambitions also extend beyond its borders; for instance, Masdar is developing significant solar and wind energy projects internationally in conjunction with leaders in the field of clean energy. These, and other, initiatives are part of a sector-based approach and plan to make the UAE a leading green country of the 21st century.



Introduction

As a founding member nation of the Global Federation of Competitiveness Councils (GFCC), competitiveness is clearly an important topic for the UAE. The Emirates Competitiveness Council (ECC)

¹ The ecological footprint is a measure of a human's impact on the Earth's ecosystem. It is calculated by Global Footprint Network. The most recent figures were released in 2014.

² Masdar, a.k.a. the "Abu Dhabi Future Energy Company", is a renewable energy company based in Abu Dhabi, UAE. Masdar City – part of Masdar – is designed to be an environmentally sustainable city powered completely by renewable energy.

is the entity in the country responsible for coordinating the efforts of the individuals and groups (private, public – both domestic and international) working – either directly or indirectly – in achieving the nation’s competitiveness goals. From this vantage point, the ECC is well positioned to assess the actions, policies and initiatives in the UAE that work towards the nation’s competitiveness strategy.

This paper outlines the UAE’s strategic policies for sustainable development – i.e. the simultaneous achievement of economic, environmental and social development – against the backdrop of global energy and environmental challenges. In particular, this piece examines how GLIs or GSEs are impacting or operating in the green economy space. It is shown here that the actions taken to capitalise on the green economy (and as corollary reduce the UAE’s ecological footprint) are not only socially responsible, but also improve the competitiveness of the country and have positive spillover both at home and abroad effects (Dechezlepretre et al., 2013; Scharwzer, 2013; UNEP, 2011). These efforts have set the stage for the UAE to lead in the clean energy sector as part of its goal to become a sustainable, diversified economy.

What is competitiveness?

The challenge faced by all nations is how to ensure that they are able to provide the material and social goods and services that will improve the physical and mental wellbeing of their constituents. National competitiveness thus relates to how efficiently and *sustainably* countries are able to procure these to its people. The International Institute for Management Development (IMD) – author of the *World Competitiveness Yearbook* (WCY) and a pioneer of the subject – defines competitiveness as the analysis of “how nations and enterprises manage the totality of their competencies to achieve prosperity or profit” (IMD, 2014). Likewise, the World Economic Forum (WEF) – author of the *Global Competitiveness Report* (GCR) – defines it as “the set of institutions, policies and factors that determine the level of productivity of a country” (WEF, 2014).

Nevertheless, competitiveness is not a static concept, and no entity has a monopoly on its definition. Indeed, academics and policymakers are increasingly becoming aware of the limitations of traditional measures of productivity and prosperity (e.g. GDP) as a means of measuring human development and the catch-all term “competitiveness”. For this and other reasons the notion of competitiveness has expanded from the more narrow view of economic productivity (aligned with GDP) to include more holistic factors such as happiness, sustainability, human capital, quality of life, etc. Indeed, the WEF also includes in its GCR a sustainability-adjusted ranking of competitiveness. At the same time, reports such as *the World Happiness Report* (WHR) and the *Living Planet Report* (LPR) have increasingly been attracting the attention of the public and decision makers. The United Nations (UN) has its own measure of human development (aptly named the *Human Development Report*) that looks at the totality of the human experience based on the dimensions of income (GNI per capita), education (mean years of schooling and expected years of schooling) and health (life expectancy at birth). More recently, the Organisation for Economic Cooperation and Development (OECD) has rolled out its *Better Life Index* trying to capture the totality of life satisfaction. The London-based Legatum Institute tries to balance both economic prosperity and social wellbeing in its *Prosperity index*. All these measures of competitiveness convert a set of factors/indicators into a real-number output (or set of outputs), enabling cross-country comparisons on the effectiveness of nations in delivery the material and social goods that contribute to the welfare of its members. And increasingly these measures are incorporating more facets of sustainability.

Benchmarking is an essential tool in understanding one’s relative strengths and weaknesses – however, competitiveness is not a zero-sum game with one country’s strong performance diminishing another’s less-strong standing. Indeed, national competitiveness has positive spillover effects inasmuch that efficient technologies, processes and goods in one country are diffused to the world. And competitiveness also means different things to different nations (at different stages of development and with different endowments). A competitive economy is not necessarily one that excels in the production of every good or service. Rather, as economist David Ricardo captured in his seminal work on comparative advantage, individuals and countries benefit from specialisation and trade. So countries can be simultaneously and

complementary competitive. Case in point, the United States is a highly competitive economy with a focus on culture and media, while German competitiveness derives from manufacturing. Neither's prosperity in their dominant sphere diminishes the other's wellbeing.

Energy and environmental challenges

Global climate change and the degradation of Earth's natural environment are a reality (e.g. UN, 2013). Scientists have already documented a dramatic increase in the level of greenhouse gas (GHG) in the past century leading to a rise in the global average temperature (average across all surface) by about 1 degree Celsius, and which is expected to continue climbing (UNEP, 2014). Climate change has already resulted in large economic losses as the result of greater incidence and stronger intensity of extreme climatic events (e.g. hurricanes, floods, etc.). Likewise, the technologies for extracting natural resources and converting them to goods have negatively impacted the natural environment causing the loss of natural habitats and reduced biodiversity (e.g. UN, 2013).

Calculations by the Global Footprint Network (GFN) show that the global ecological footprint exceeds the global bio-capacity (WWF, 2014). In other words, the amount resources used to provide the goods and services used by the world exceed the ability of the planet to replenish itself. This is not sustainable. Indeed, the planet has been running a deficit for many years, with rich nations consuming much more resources than their long-term carrying capacity (WWF, 2014). Indeed, the economic paradigm of development is surely doomed if there are no fundamental changes made to human behaviour. If China and India – which account for over 1/3 of the world's population – were to reach a level of prosperity in consonance with the “developed” world and consume resources and produce waste at similar levels, the planet will become environmentally bankrupt in a matter of decades.

The world *must* come up with a solution to the global environmental challenge. And herein lies the opportunity for those that are willing to be bold and take a leadership role in finding those sets of policies and actions that will ameliorate and repair the environmental damage that is currently underway because of our “development”. And this is where the UAE has been astute in positioning itself within this niche as a leader (with the commensurate advantage of being a pioneer) in the green economy, with a particular focus on the renewable energies sector.

The UAE history as a hydrocarbon nation

The UAE was formed in 1971 as the union of seven emirates. Although the country is often referred to as an “oil-rich nation”, the reality is that hydrocarbons have been only a recent discovery in the region and its presence is primarily limited to the emirate of Abu Dhabi. By most measures the UAE is a diversified economy, with oil and gas accounting for less than a third of the UAE's GDP and less than half of its exports.³ Indeed, oil and gas account for only 2 percent of the gross product of Dubai and virtually zero in the remaining emirates.⁴

The UAE's Vision 2021

At the heart of the UAE's strategic plans is a diversification of the economy. *Vision 2021* – the country's national strategic development blueprint – calls for the nation to be among the best countries in the world by 2021 (the UAE's golden jubilee year). This vision is underpinned by 4 tenets: (1) responsibility, (2) destiny, (3) knowledge, and (4) prosperity.

Within the tenet of knowledge are a set of national goals, two of which are: (i) To transform the country into a “sustainable and diversified economy”; and (ii) To become “a knowledge-based and highly productive economy”. With regards to (i), *Vision 2021* calls for “balanced growth [that will]... be fuelled by a sustainable range of energy sources... within which the UAE will ensure an important role for alternative and renewable [energies].” The aim is to create “lasting competitiveness” by looking “beyond

³ Sources: *International Trade Competitiveness, National Bureau of Statistics, Observatory of Economic Complexity.*

⁴ Source: *Dubai Statistics Centre*

traditional economic models and take a more flexible perspective [for development]... where growth is driven by knowledge and innovation.”⁵

The green economy

The green economy is defined by the United Nations Environmental Programme (UNEP) as “one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities (i.e. it is low carbon, resource efficient and socially inclusive)” (UNEP, 2011). There are six components of the green economy:⁶

1. Renewable energies
2. Green building
3. Sustainable transport
4. Water management
5. Waste management
6. Land management

The UAE, both directly in terms of GLIs and indirectly by the actions of its GSEs, is targeting all six of the green economy principles (as well as biodiversity management). For example, the UAE is home to the International Renewable Energy Agency (IRENA) an intergovernmental organisation that supports countries in their transition to a sustainable energy future. More tangibly, Dubai Solar Park is expected to generate 1,000 MW of power by 2030. Most recently, the Dubai Government issued its *Green Building Regulations & Specifications* in September 2014 outlining the green specifications for all new buildings in that emirate. Dubai also created the *Dubai Awards for Sustainable Transport* (DART) several years back to encourage green solutions to its transportation system, which in recent years has rolled out two metro lines and a tram, alleviating some of the emirate’s vehicular traffic (a big contributor of GHGs). The UAE is also home to the International Centre for Bio-saline Agriculture (ICBA), with its focus on water management. With regards to waste management, recycling programmes are gaining traction with, for example, the launch in Dubai of *My City My Environment* in 2012. Finally, with respect to land management, much of the desert – a highly diverse and fragile landscape – has in recent times come under protection (e.g. Jebel Ali Sanctuary, Arabian Oryx Protected Area, Dubai Desert Conservation Reserve, etc.) as a result of growing awareness of the importance of land conservation.

The link between the green economy and competitiveness

Although there is a perception of an antagonism between the environment and the economy, nothing could be further from the truth. This distorted view derives from having an improper perspective on the economy/competitiveness. Competitiveness is not a one-off game; rather, it is an infinitely-repeated set of interactions, where each period countries try to achieve the best for their constituents under the limitations of the economy and the planet. It is this long-term view that needs to be taken to see why the green economy and competitiveness are synonymous.

Green solutions help competitiveness when governments put the right framework in place for agents in the market to take more long-term and holistic views on their motivations. That is, policy makers should create an economic framework that makes firms include social and environmental goals in their objective function, or conversely incorporate the environment into the constraint under which firms optimise. Strong environmental laws are not “anti-business”; rather they are “pro-market” and in fact spur innovation and help connect the current and future prosperity (e.g. CIEL, 2013).

The UAE’s green economy initiative

In January 2012 Sheikh Mohammed bin Rashid Al Maktoum, Vice-President and Prime Minister of the UAE and Ruler of Dubai, announced the launch of the nation’s *Green Economy Initiative* under the

⁵ UAE Vision 2021: <http://www.vision2021.ae/en>

⁶ Another aspect of the green economy (but not included in UNEP definition) is biodiversity management; i.e. ensuring that the diversity of flora and fauna is maintained and not compromised by human activity.

slogan of “a green economy for sustainable development”. The government has embraced the green economy not only as a means to ameliorate the country’s environmental impact, but also to become a leader in the technologies that will underpin the green economy.⁷ There is much work that needs to be done in the UAE, where currently the region has one of the highest per capita ecological footprints. The country’s extreme environs pose natural challenges (e.g. the weather necessitates air conditioning for much of the year). Likewise, the arid landscape makes desalination a necessity to produce fresh water. But GSEs in the UAE are turning these obstacles around and making them assets. For example, the abundance of desert sunshine has in turn spawned investments in solar technology. This includes using solar energy to desalinate seawater, as well as to draw brackish or brown water from the water table and purify them for desert flora and fauna. ICBA is also working on R&D to develop plants more amenable to desert conditions and that can use brackish/saline water to reverse human-induced desertification. Likewise, Etihad Airways⁸ (in conjunction with Masdar) is working on developing algae that thrive in the desert conditions and saline water as biofuels for its planes.

The government’s role in the green economy

The UAE government has taken a decisive role in spearheading the development of the green economy. This is not by some accident of chance – or a strategy that only has merits in the UAE. Indeed, the environment knows no boundaries. Air pollution passes from one country to another unhindered by artificial political borders. Thus while there remains wrangling on the international stage on getting countries to sign up to a green agenda, the UAE is unilaterally making strides in developing its green economy strategy.

The “green economy” and the “economy”, often treated as two dichotomous subjects, are in reality highly interlinked and one and the same as all our activities in one way or another impact the environment – the goods and services we produce and consume are not done so in a vacuum in isolation of the planet. The ultimate goal is to ensure that the totality of our activities do not overburden the capacity of the environment to sustain us. It thus behooves governments to set up the correct framework to ensure that human actions are working within the boundaries of long-term prosperity.

Why government?

While some governments elsewhere are still debating the causes or the effects of climate change (or in some cases even its veracity), the UAE government has taken a forward-leaning approach. Under the current economic paradigm – where goods and services do not reflect their total social costs and benefits – markets do not produce enough positive externality goods (e.g. clean air) and conversely too many negative externality goods (i.e. “bads”, such as pollution). From basic economics we know that since we have poorly distributed/enforced property rights, especially with respect to common goods (e.g. the oceans) we as humanity suffer a “tragedy of the commons” (e.g. overfishing) on shared/public resources. Simply put, neither purely self-interested governments nor private entities will produce the optimal amount of green goods. This is a market failure that needs to be addressed by government. In the absence of a World government, global public goods – e.g. the global clean environment – will not be provided outside of unilateral (or altruistic) actions.

Case study: Masdar⁹

Established in 2006 as a subsidiary of the Mubadala Development Company,¹⁰ Masdar (“source” in Arabic) is a highly innovative, multifaceted business model focused on the clean energy space. This case study explores a few of the projects that Masdar is undertaking in the renewable energies sector at home

⁷ *The Global Green Economy Index is one notable report that tries to quantify the effectiveness of countries in “creating strong economies that also reduce their degradation of the environment.”*

⁸ *Abu Dhabi’s domestic airline.*

⁹ *Mohamed, Shaheena (2013). “Masdar: Powering UAE’s competitiveness with clean energy.” Policy In Action Issue 05 Jul-13.*

¹⁰ *Mubadala is an investment vehicle of the Abu Dhabi government with a mandate to facilitate the diversification of the economy.*

and abroad. In the process of investing in clean technology companies and developing large-scale renewable energy projects, Masdar is helping to contribute to the UAE's goals of economic diversification, its *Green Economy Initiative*, as well as *Vision 2021* by building up the knowledge-based sectors of the economy that are a hallmark of green technologies.

Masdar is a major player in the global renewable energy market, which in 2013 saw \$214 billion in investments.¹¹ Masdar is not only important for its business imperative, but also for providing a valuable platform for international policy makers to address global challenges in the energy sector. Additionally, by creating fertile soil and planting the seeds for a new generation of green energy experts, it is ensuring a bright future for the UAE where growth and prosperity are derived from knowledge and innovation.

Structured as integrated business units, Masdar includes an investment arm (Masdar Capital), a renewable energy power generation and operation unit (Masdar Clean Energy), and an independent research-driven graduate university (Masdar Institute). Masdar's infrastructure also includes a cutting-edge urban complex (Masdar City), where innovative technologies can be tested and implemented in a real-life context of residences and workplaces. These integrated components allow Masdar to conduct a range of activities including innovation and R&D, investment, and utility-scale renewable energy projects. The coming together of different value chains including solar, wind and carbon capture, under a single umbrella creates a robust environment for knowledge sharing, collaboration, and commercialisation to address today's energy challenges.

Masdar is making significant national and international contributions by competitively positioning the UAE in critical areas of the clean energy value chains. This includes manufacturing, energy generation and storage, power distribution, as well as the reduction of carbon output by means of efficiency and carbon capture and storage. The below are a few examples of key areas in which Masdar occupies a pivotal position in leading-edge technologies:

Manufacture of photovoltaic panels

Solar photovoltaics (PV) is a growing area of the solar energy market. PV is a technology that converts sunlight directly into electric current using semiconductor material such as silicon. Thin-film cells are manufactured by applying thin layers of semiconductor material to manufacture solar panels. Masdar PV GmbH (Masdar PV), a wholly-owned subsidiary of Masdar is producing the next generation of PV films, with new kinds of materials and innovative cell structures. It currently manufactures cells that are eight times larger and more powerful than the industry standards. For instance, it produces modules with up to 10% efficiency – an industry benchmark that implies a higher energy yield and profitability for the same surface area than competing products. It has been able to achieve this industry leadership through a corporate strategy centred on R&D for product improvement and on industry-academia collaborations.

In a separate initiative, to promote greater uptake of PV solar technology in the Middle East, Masdar Institute is collaborating with Siemens Energy to develop PV coatings that counteract the effects of dust accumulation (a problem in the desert) that hamper the effectiveness of solar panels.

Utility-scale power generation

Another key area in which Masdar is a strategic player, is power generation using renewable sources of energy. Masdar Clean Energy invests in technologies for utility-scale renewable energy and is a developer of clean power generation projects. Its portfolio of utility-scale projects consists of direct investments in individual projects in all areas of renewable energy, with a focus on PV solar energy, concentrated solar power (CSP), and wind energy – areas which have relevance internationally and for the UAE. Some key projects include:

- ***Photovoltaic solar energy***

¹¹ Source: *Global Trends in Renewable Energy Investment 2014*.

Masdar's earliest PV project in the UAE, the 10 megawatt (MW) PV plant at Masdar City, operational since 2009, reduces carbon emissions by 25,000 tonnes annually. The solar power plant meets the energy needs of the Masdar Institute, Masdar's site offices, and it powers the ongoing construction activities of Masdar City. The PV plant, consisting of 87,777 panels (50% thin film and 50% crystalline silicon), is one of the most cost-efficient PV installations in the world. Currently, Masdar Clean Energy is developing one of the world's largest solar PV plants (Noor 1, a 100 MW plant in Abu Dhabi).

• **Concentrated solar power**

In a joint venture with Abengoa Solar and Total, Masdar Clean Energy is developing Shams 1, a 100 MW concentrated solar power (CSP) plant in the western region of Abu Dhabi, set to be largest of its kind in the Middle East. At a cost of approximately \$600 million, Shams 1 will employ a state-of-the-art parabolic trough technology. It will reduce CO₂ emissions by 175,000 tonnes annually, equivalent to eliminating the use of 15,000 cars in a city like Abu Dhabi.¹² Masdar Clean Energy also holds significant ownership stakes in Torresol, a joint venture with SENER Grupo de Ingeniería of Spain, to build and operate CSP plants. Masdar has invested in three projects in partnership with Torresol and SENER (Valle 1, Valle 2, and Gemasolar), all operational in the Andalucía region of southern Spain. Valle 1 and Valle 2, both parabolic trough plants with 7.5 hour of stored capacity, are in commercial operation with a total installed power of over 100 MW. Gemasolar, a CSP plant near Seville, is provides electricity to over 27,000 residents.

• **Wind technology**

Often clustered in farms, wind turbines convert wind energy into electricity and are a growing source of energy globally. Large wind farms consist of hundreds of individual wind turbines connected to an electric power transmission network. Wind power is becoming a favoured source of renewable generation, with the global wind power market increasing 6% to 41 GW in 2011.¹³ Masdar Clean Energy is building wind energy sources in the UAE and internationally. In the UAE it is putting in place a wind farm on Sir Bani Yas Island, 250 km southwest of Abu Dhabi, with a targeted capacity of 28.8 MW for the first phase.

An iconic wind technology project of Masdar is the 1,000 MW London Array offshore wind farm in the Thames Estuary, a joint venture with DONG Energy and E.ON. Set to become the world's largest offshore wind farm, the project will consist of up to 278 wind turbines, producing enough energy to power 750,000 homes – displacing the emissions of 1.9 million tonnes of CO₂ per year as part of the UK government's goal of generating more than 15% of its electricity supply from renewable sources by 2015.

[Insert high resolution picture of solar panels/energy.]

What can other countries learn?

It may be argued that UAE's example as a hydrocarbon-rich nation choosing to channel those funds into the green economy has inspired similar initiatives in the region. Hopefully the country's bold vision and proactive government approach to the green economy will spur yet other countries to do likewise. Certainly, the UAE's actions through GLIs and GSEs are already helping the global green economy by funding and developing clean technologies that are otherwise underprovided by private markets.

The Stone Age came to an end not because humans exhausted the stock of stones. Just as much, the Fossil Fuel Age will end before fossil fuels are depleted from Earth. The UAE is not only planning for that transition, but leading the way in spite of its comparative advantage as a resource-rich nation. There is no

¹² Abengoa Solar website (accessed 12 December 2012).

¹³ Bloomberg News, Wind Power Market Rose to 41 Gigawatts in 2011, Led by China, Alex Morales, 07 February 2012

contradiction or inherent incongruousness in aiming to be a leading green economy while being rich in hydrocarbon resources. Indeed, steering funds derived from hydrocarbons and investing into renewable energies is a way of paying forward for our current dependence on fossil fuels.

A race to the top

By aggressively pursuing a green economy strategy, the UAE is helping to shine a spotlight on clean technologies. Governments can – and should – play an activist role in the green economy, especially as private markets acting alone are unable to achieve the socially optimal solution. This is because private markets do not price in externalities, leading to too many bads (e.g. pollution) and too few goods (clean air). As a corollary, public goods, such as the clean environment, are not best provided by free markets. Therein lies the impetus for strong policies by governments to ensure that environmental laws encourage long-term thinking of economic agents. Finding green solutions will help nations in transition avoid the path of pollution (i.e. a Kuznets curve between development and pollution) and leapfrog onto cleaner technologies.

When governments from around the world compete to deliver on good environmental outcomes this will become a race to the top, with society and the planet benefiting. In short, what is good for the environment is good for competitiveness.

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