

UNITED ARAB EMIRATES  
MINISTRY OF CLIMATE CHANGE  
& ENVIRONMENT



الإمارات العربية المتحدة  
وزارة التغير المناخي  
والبيئة

# تقرير حالة الاقتصاد الأخضر للدولة الإمارات العربية المتحدة

UNITED ARAB EMIRATES  
STATE OF  
**GREEN**  
ECONOMY REPORT

الإصدار الثاني  
SECOND EDITION 2016

[www.moccae.gov.ae](http://www.moccae.gov.ae)



“The UAE is working towards establishing a solid future for the coming generations away from the fluctuation of the energy prices and markets.”

“Creating sustainable wealth for the coming generation will depend on science, knowledge, technology and innovation.”

“The UAE has set its course for a post-oil world through investing in the development of our people.”



**His Highness  
Sheikh Khalifa bin Zayed Al Nahyan**

**President of the United Arab Emirates**

At the announcement of the Emirates Science, Technology and Innovation  
Higher Policy during the UAE Innovation Week, 21 November 2015



“Today, 70% of our GDP is independent from oil. Our goal is to have a new equation for our economy where we neither depend on oil nor market fluctuations. We will add new economic sectors, and leverage efficiency and productivity in current sectors. We want to prepare generations capable to lead a sustainable and balanced national economy.”



## **His Highness Sheikh Mohammed bin Rashid Al Maktoum**

**Vice President and Prime Minister of the  
United Arab Emirates and Ruler of Dubai**

At the announcement of a ministerial retreat to discuss  
the UAE's economy beyond oil, 16 January 2016





UNITED ARAB EMIRATES  
MINISTRY OF CLIMATE CHANGE  
& ENVIRONMENT



الإمارات العربية المتحدة  
وزارة التغير المناخي  
والبيئة

## His Excellency Dr. Thani Ahmed Al Zeyoudi

Minister of Climate Change and Environment  
United Arab Emirates

The year 2015 marked the first significant milestone in the UAE's long-term journey towards a Green Economy since the Green Economy for Sustainable Development initiative was launched in 2012 by His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai.

In January 2015, the UAE Cabinet issued a decision to approve and to implement the *UAE Green Agenda 2015-2030* as an overarching framework of actions for this initiative. In line with the *UAE Vision 2021* and each emirate's long-term development plan, five strategic objectives and twelve main programs were set under the new agenda. Also in January, the *UAE State of Green Economy Report* was unveiled as the first report in the world to publicly detail the latest status of a country's transformation towards a Green Economy.

In June, the Emirates Green Development Council (EGDC) was established under the chairmanship of our ministry to coordinate and oversee the implementation of the Green Agenda and to ensure effective collaboration between federal and local

authorities as well as stakeholders. By September, five committees were established under EGDC in line with the five strategic objectives of the UAE Green Agenda, each of which was mandated to formulate and implement two or three main programs. In December, these committees presented and agreed on a total of 96 initiatives for the short-term implementation of the Green Agenda. To monitor and review the progress, 41 UAE Green Key Performance Indicators (Green KPIs) were also determined covering environmental, economic and social sustainability.

This second edition of the *UAE State of Green Economy Report* presents the progress made at the national and local levels during 2015 in detail and benchmarks the UAE's current standing in realizing a Green Economy and its advancement against global commitments to sustainable development. As 2015 was celebrated as "the Year of Innovation" in the UAE, the report also features the country's ten innovation initiatives that would support the Green Economy transformation. Furthermore, and in advance of hosting the Global Roundtable of the

United Nations Environment Programme Finance Initiative (UNEP FI) in Dubai in October 2016, the country's state of green finance was reviewed. I hope that this report not only provides you with a comprehensive overview of the government's plan and diverse public and private-sector efforts, but also opens up new opportunities for the readers of this report to take part in our initiatives.

Following the restructuring of the federal government in February 2016, our ministry was renamed the Ministry of Climate Change and Environment (MOCCA), and mandated to manage all aspects related to international and domestic environmental and climate change affairs while continuing to chair EGDC. This major change indicates a clear commitment from the country's leadership to address climate change and environmental imperatives and accelerate preparation for the post-oil future. I look forward to making our best efforts to realize the Green Economy transformation and to continuously reporting to you about our progression in this journey.



## Achim Steiner

United Nations Under-Secretary-General  
Executive Director, United Nations Environment Programme (UNEP)\*

Over the past decade, the concept of the Green Economy has emerged as a strategic priority for many governments and intergovernmental organizations. All told, 65 countries have embarked on a path towards an Inclusive Green Economy and related strategies. By transforming their economies into drivers of sustainability, they will be primed to take on the major challenges of the twenty-first century – from urbanization and resource scarcity to climate change and economic volatility.

For its part, the United Arab Emirates seeks to become a global hub and a successful model for the Green Economy through innovative solutions that protect and sustain the environment for future generations. This report shows the country's solid advance towards a Green Economy through the implementation of the *UAE Green Agenda*

2015-2030. Announced in January 2015, the Agenda is an overarching framework of action for the Green Economy for Sustainable Development initiative across all sectors.

At the international level, the UAE has been playing an important role in promoting the Green Economy concept and practices, particularly through the launch in 2010 of the *UAE Vision 2021*, which strives for a sustainable future; the first Global Conference of the Partnership for Action on Green Economy (PAGE) which was hosted by the UAE in March 2014; and the World Green Economy Summit being organized annually in Dubai since 2014. The country also took an active role in the negotiations that resulted in the Paris Agreement on climate change. Furthermore, the fourth PAGE conference, to be held simultaneously with Dubai Expo 2020, will

allow the UAE to show the world advances in its knowledge, innovation and creativity towards a promising, sustainable future.

As the Green Economy concept takes root around the world, the UAE is diversifying its economy through innovative solutions. In so doing, it is attracting foreign investment and forging public-private partnerships to deploy renewable energy projects in developing nations, all of which contribute to the reduction of carbon emissions.

I applaud the leadership, vision and creativity that is evident at every turn in the UAE, and invite the reader to examine closely the country's experiences presented in this report. These experiences demonstrate that a greener economy is both a viable and highly intelligent approach to creating and stewarding natural wealth and enhancing social well-being.

\* June 2006 - June 2016



## About This Report

The *UAE State of Green Economy Report* aims to help the country make a solid advancement towards a Green Economy, which is defined by the United Nations Environment Programme (UNEP) as “one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities”. This report will do this by providing the public with a clear overview of the government’s plan and diverse public and private efforts, as well as a benchmarking of the country’s current standing. The reporting period of this second edition is **from 1 January 2015 until 31 December 2015**.

### CHAPTER 1

**Global Perspectives on an Inclusive Green Economy** is kindly contributed by the United Nations Environment Programme (UNEP). It introduces the global context for the need for the Green Economy transition based on the work of the UN Partnership for Action on Green Economy (PAGE).

### CHAPTER 2

**The UAE Green Agenda and 2015 Progress** outlines the rationale, structure and programs of the *UAE Green Agenda 2015-2030*, introduces the governance for guiding and overseeing its implementation, and reviews the development of tools and activities supporting and monitoring the implementation.

### CHAPTER 3

**UAE’s Ten Innovations for Enabling a Green Economy** showcases the leading innovation initiatives being conducted in the country that would support the realization of a Green Economy, while celebrating the Year of Innovation.

### CHAPTER 4

**Activities Defined by Green Agenda Committees** introduces a total of 96 activities that the five committees of the Emirates Green Development Council (EGDC) identified and committed to implement in the next few years, with a highlight of major ongoing activities.

### CHAPTER 5

**Green Economy Initiatives from the Seven Emirates** lists the initiatives of the country’s seven emirates in the process of being or soon to be implemented as part of the Green Agenda, and highlights the most prominent projects conducted mainly during 2015.

### CHAPTER 6

**State of Green Finance in the UAE** provides an overview of the UAE financial sector’s readiness, current practices and challenges in green finance, based on the analysis and extracts of a questionnaire survey conducted during the summer of 2015.

### CHAPTER 7

**UAE’s Performance towards a Green Economy** compiles the country’s latest results of the 41 Green Key Performance Indicators (Green KPIs) that are being monitored by the EGDC to review the country’s overall progress towards a Green Economy as well as the advancement of Green Agenda programs.

# Table of Contents



## 2015 Highlights – At A Glance 14

### 1. Global Perspectives on an Inclusive Green Economy 24

- Towards an Inclusive Green Economy 24
- Global Development Agenda Update 28
- Partnership for Action on Green Economy (PAGE) 33
- Inquiry into the Design of a Sustainable Financial System 37
- Green Economy in the UAE 38
- The View Forward 41

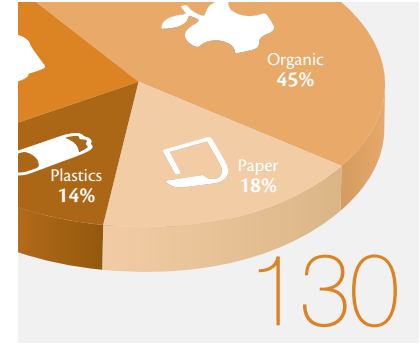
### 2. The UAE Green Agenda and 2015 Progress 44

- UAE Vision 2021 and Greening the Economy 44
- Structure of the UAE Green Agenda 45
- Green Agenda Programs 46
- Governance for the Green Agenda Implementation 55

- Planning for the Green Agenda Implementation 57
- Development of Green KPIs 58
- Capacity Building for the Green Agenda Implementation 62

### 3. UAE's Ten Innovations for Enabling a Green Economy 66

1. Public Buildings Powered by Sunshine 67
2. Turning Air into Water 69
3. Desalination Without Fossil Fuels 71
4. Flying by Fuels from Salt-tolerant Plants 72
5. New Business Models for Clean Energy 73
6. Tagging Tires for Safety 74
7. Sustainable Fishing by Remote Monitoring 75
8. Price Reforms for Rational Consumption 76
9. Building the Infrastructure for Electric Vehicles 77
10. Spatial Planning by Satellite Images 78



<b>4. Activities Defined by Green Agenda Committees</b>	<b>82</b>
Committee on Knowledge-Based Economic Diversification	82
Committee on Development and Quality of Life	86
Committee on Sustainable Environment	89
Committee on Clean Energy and Climate Change Adaptation	92
Committee on Green Life and Sustainable Use of Resources	96
<b>5. Green Economy Initiatives from the Seven Emirates</b>	<b>102</b>
Abu Dhabi	102
Dubai	105
Sharjah	107
Ajman	109
Umm Al Quwain	110
Ras Al Khaimah	111
Fujairah	112

<b>6. State of Green Finance in the UAE</b>	<b>116</b>
Outline of the Survey	116
Current Practices of Green Finance	119
Driving Force behind Greening the Financial Sector	121
Challenges and Enabling Policies for Green Finance	124
Way Forward to Mainstream Green Finance in the UAE	126
First Step in Engaging Local Financial Institutions	128
<b>7. UAE's Performance towards a Green Economy</b>	<b>130</b>
Environmental Performance	130
Economic Performance	147
Social Performance	162
<b>Annex: Latest Results of UAE Green KPIs</b>	<b>173</b>



UNITED ARAB EMIRATES  
STATE OF  
**GREEN  
ECONOMY  
REPORT**

SECOND EDITION  
2016



## 2015 Highlights – At A Glance

### Green Economy around the world

In 2015,  
the world agreed on

**17**

**Sustainable Development  
Goals for 2030 and limiting  
global warming**

**below 2°C**

To end poverty and  
pursue a sustainable  
future,

**over 65**

nations have already  
embarked on

**Green Economy**

**48**

countries are  
developing  
**Green Economy plans**

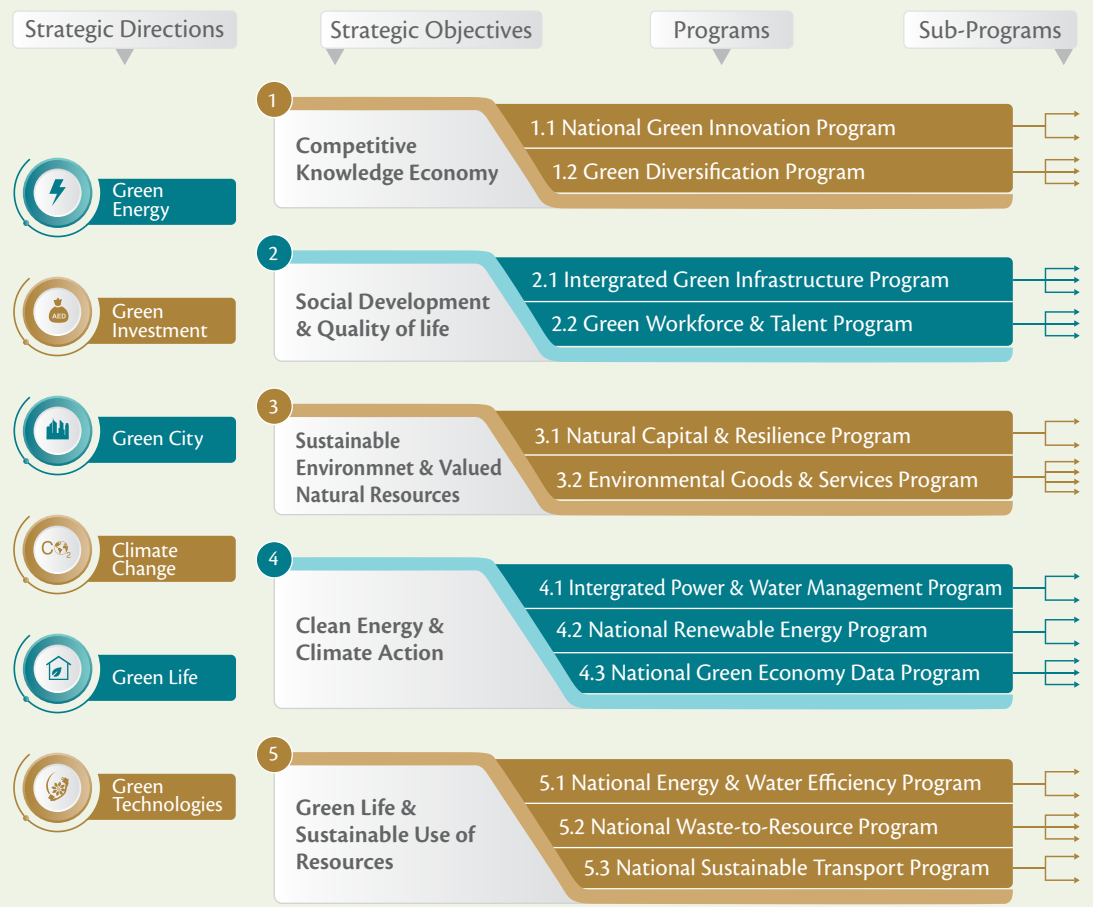
To help mobilize  
financing for attaining  
SDGs, the UAE hosts the

**UNEP FI Global  
Roundtable**

in **October 2016**



# The UAE Green Agenda



In January 2015, the UAE Cabinet approved the **UAE Green Agenda 2015-2030** as an overarching framework of Green Economy actions

The Green Agenda consists of **5** strategic objectives, **12** main programs, and **31** sub-programs

In June 2015, the Emirates Green Development Council was formed with representatives from **6** federal ministries and **7** emirates

EGDC coordinates and monitors the implementation of the Green Agenda.

# UAE's 10 green innovations



1

Public buildings powered by sunshine



2

Turning air into water

Desalination without fossil fuels



3



4

Flight fueled by salt-tolerant plants

New business models for clean energy



5





6  
Tagging tires for safety

8  
Price reforms for rational consumption



7  
Sustainable fishing by remote monitoring



9  
Preparing infrastructure for electric vehicles

10  
Spatial planning by satellite images



## Activities of Green Agenda committees

Committee on Knowledge-based Economic Diversification  
(Coordinator: Ministry of Economy)



Student scholarships for environmental studies

Financing schemes for green industries

EGDC established **5** committees according to the UAE Green Agenda's strategic objectives.

The committees identified a total of **96** initiatives to implement in the next few years.

Committee on Development and Quality of Life (Coordinator: Ministry of Infrastructure Development)



Program on sustainable buildings and construction

Vocational training for green jobs

Committee on Sustainable Environment  
(Coordinator: Ministry of Climate Change and Environment)



National and Abu Dhabi Blue Carbon projects

National eco-labels for products and services



Integrated energy and water management strategy

Energy data management and automation project



Committee on Clean Energy and Climate Change Adaptation  
(Coordinator: Ministry of Energy)



Supporting establishment of waste-to-energy plants

Vehicle fuel efficiency standards



Committee on Green Life & Sustainable Use of Resources  
(Coordinator: Ministry of Energy)



# Green Economy initiatives in the 7 emirates

**Abu Dhabi** Sustainable street lighting project

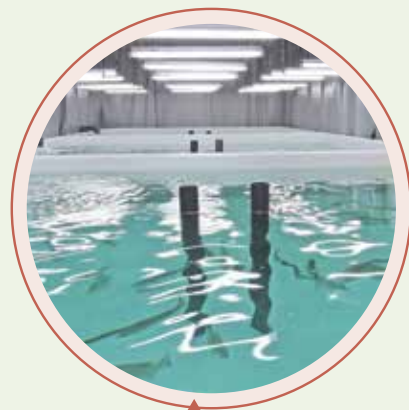


**Ajman** New parks for a healthy life



**Sharjah** Zero-waste-to-landfill goal

**Dubai** Mandatory use of sustainable concrete



**Fujairah** Initiative for environmental sustainability



**Umm Al Quwain** Fish hatchery for marine resources

**Ras Al Khaimah** The most efficient desalination plant

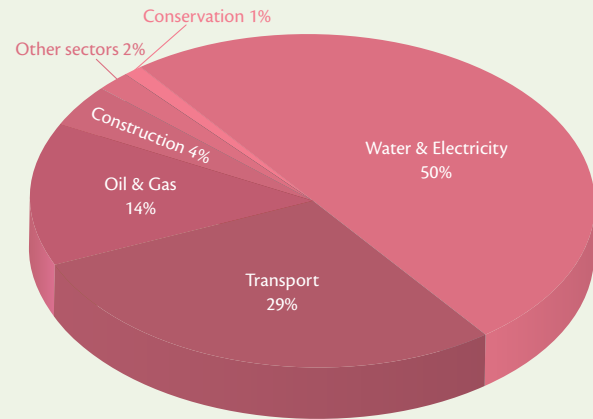
## State of Green Finance in the UAE

According to a survey of 79 UAE financial institutions, **48%** already provide a **green finance** product or service.

At least **0.27%** of the GDP has been invested in domestic green investment.

The institutions that implement green finance practices are motivated by **CSR, cost savings, reputation and competitive advantage.**

**50%** of domestic investment went to the **water and electricity** sector; **29%** to the transport and logistics sector.



Respondent institutions' green investment by sector

In preparation for the UNEP FI Global Roundtable, the Ministry of Climate Change and Environment (MOCCA) organized **2** high-level national meetings and is convening a **steering group** together with Central Bank of the UAE.

## UAE's performance towards a Green Economy

### 41 Green KPIs

were selected to monitor and review the UAE's overall progress towards a Green Economy.

Highlights of key performance according to the Green Agenda's 5 strategic objectives are:

#### Competitive Knowledge Economy

Global Competitiveness Index: **17<sup>th</sup>** in the world

Share of non-oil GDP: **68.6%**

#### Social Development & Quality of Life

Domestic material consumption per GDP: **478 g/\$**

Human Development Index: **41<sup>st</sup>** in the world

#### Sustainable Environment & Valued Natural Resources

Ecological Footprint: **7.75 global ha** per capita

Environmental Performance Index: **25<sup>th</sup>** in the world

#### Clean Energy & Climate Action

Carbon intensity of electricity production: **600gCO<sub>2</sub>/kWh**  
(including water desalination)

GHG emissions per GDP: **340 gCO<sub>2</sub>e/\$**

#### Green Life & Sustainable Use of Resources

Municipal water consumption per GDP: **2.98 l/\$**

Electricity consumption per GDP: **0.18 kWh/\$**



CHAPTER 1

GLOBAL PERSPECTIVES  
ON AN INCLUSIVE  
GREEN ECONOMY

## Global Perspectives on an Inclusive Green Economy



**Steven Stone**  
Chief, Economics and Trade Branch  
United Nations Environment Programme (UNEP)

In what may well become a landmark year in our ability to forge collective agreements on a scale commensurate with collective challenges, 2015 brought a wide array of successes at the state, regional and global level. From the adoption of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs) to the Paris Agreement that brought countries to a common goal of maintaining a 2 degree Celsius (°C) ceiling on climate change, the year saw a wave of advances in both technological innovation and institutional capacity to channel and harness innovation for enhanced sustainability.

Yet, it was also by far the warmest year in modern history, dotted with extreme weather



events stemming from El Niño to hurricanes and tropical storms, reminding us that the time remaining for transformational change is limited.

As we embark on a new year full of challenges and promise, there is much to survey and learn from 2015. This chapter takes a quick look around the globe and touches on the main landmarks and milestones on the sustainability landscape, starting with a closer look at how our understanding of an inclusive Green Economy itself evolved over this time.

### Towards an Inclusive Green Economy

Approaches to sustainable development and well-being have evolved dramatically over the last quarter century, reflecting different national contexts and priorities, sectoral concerns, and transitional strategies pursued

by a large and growing number of countries. Today, over 65 nations have embarked on Green Economy and related strategies, with 48 of them developing Green Economy plans as the centerpiece of these strategies.

The UNEP, along with its partners and programs – such as the Partnership for Action on Green Economy (PAGE), the Poverty-Environment Initiative (PEI), the Green Growth Knowledge Platform (GGKP), the UNEP Finance Initiative



(UNEP FI), and the Global Green Growth Institute (GGGI) – is guided by the mission of providing top-notch advisory services to countries wishing to address one of the most pressing challenges of the 21st century: transforming their economies into drivers of sustainability.

In this, UNEP has expanded and deepened its view of an Inclusive Green Economy (IGE), going beyond traditional concerns with efficiency to include sharing, circularity, collaboration,

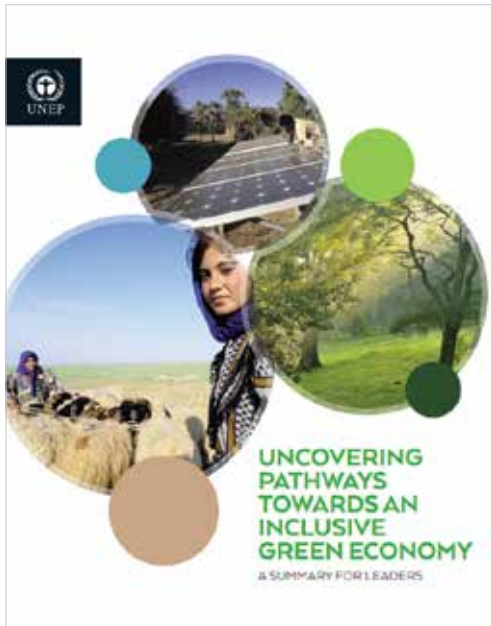
solidarity, resilience, opportunity, and interdependence. The design principles for an IGE speak to these elements of a socio-ecological and economy-wide transition and call for economic and fiscal policy reforms, legislative changes, new technologies, changes in financing, and strong institutions that are specifically geared to safeguarding social and ecological bases.

To build an economy that is truly equitable and sustainable will require carefully designed

policies and targeted investments that enable low and middle-income countries and the poor to contribute to, and benefit from, the transition. Of particular importance is the need for governance and policy reforms that extend to poor people to assist them in securing their rights to the environmental assets that underpin their livelihoods and well-being, and which ensure a louder voice in decisions affecting how these assets are managed. Put simply, policies and measures to support sustainability must contemplate and safeguard the quality of life and access to resources and public goods of all people, including those living in poverty. An IGE must provide not only for jobs and income, but for our health, our environment and our future. This is our common challenge: creating the conditions for enhanced prosperity and growing social equity, within the contours of a finite and fragile planet.

Of course, experience has shown that there are multiple approaches to reaching environmental sustainability, ranging from concepts such as Ecological Civilization, Circular Economy, and Harmony with Nature. This diversity of experience and approaches form the backdrop for expanding and widening the concept of an IGE to include institutions, governance and the norms and rules that guide societal decisions and market behavior.





### *Uncovering Pathways Towards an Inclusive Green Economy: A Summary for Leaders*

UNEP published this report in 2015 to bring together an overview that global leaders can use to better understand an IGE:

Multiple benefits can stem from an integrated approach such as economic, health, security, social and environmental by maximizing, prioritizing and sequencing them to produce a healthy environment.

Design principles for an IGE are based on sharing, circularity, collaboration, solidarity, resilience, opportunity and interdependence. To create an IGE, these elements must relate to socio-ecological and economy-wide transitions.

Embrace a circular and sharing economy that leads to the recovery, reuse, remanufacture and recycling of materials to promote sustainable production and consumption patterns.

Collaboration and championship are essential drivers of change in order to replicate successes and scale up an IGE. It is necessary to unite citizens, communities, businesses, finance and government organizations to work together in these efforts.

Challenges to be addressed for IGE transformations and transitions are numerous: the pressure of time to make these transitions, the required knowledge, skills and technology, and the availability of information, finance and capacity to set the necessary changes in place. The social implications of transitions can be considerable and difficult to manage, especially

if they entail disruption of prevailing patterns of employment. In carbon-based economies, issues will arise around stranded assets, lost revenues and even stranded skillsets, as the economy reduces its dependency on fossil fuels.

However, these very challenges define the work that lies ahead for heads of state,

ministers and leaders of businesses and civil society in a world increasingly challenged by environmental sustainability. And a cursory look at developments from around the world indicates that countries are not sitting still – they are actively engaging on these issues, as they affect the health and well-being of every individual.

## Advancing a Green Economy – Progress from around the World

In 2015, **China's 13th Five-Year Development Plan** (2016-2020) announced the development of a Green Economy that has become a major strategic policy theme highlighting it as a “pillar industry” in the previous plan. It focused more on greener growth and new steps to be taken to reduce the pollution that is affecting large amounts of the population. As part of its presidency of G20, China also included green finance as a stream of work, which will advance the topic among 20 largest world economies.

In the Central and Latin Americas, **Peru** exercised leadership on the international stage by hosting the International Monetary Fund (IMF)/World Bank Annual Meetings and domestically by leading on in its green growth strategy. **Uruguay** launched its own Green Economy Scoping Study in 2015, and **Colombia** defined green growth as an integral part of its new sustainable development strategy. **Saint Lucia** published a report on Social Protection Policy (SLSP) to enhance human capital, real income, capabilities and assets, while avoiding damage to the existing natural capital in order to facilitate the transition towards a Green Economy.

The **European Union** (EU28) introduced its new policy on the circular economy, stressing the key role of resource efficiency in making the economy greener and more competitive. It also lowered its greenhouse gas emissions by 21% since 1990, despite a 45% increase in gross domestic product.

**Morocco** is strongly developing its renewable energy capacity to achieve its objective of 42% renewables in 2020. Africa's largest windfarm in Southwestern Morocco, which has a capacity of 300 megawatts (MW), became operational in 2014. In 2015, the first 160 MW of its Noor concentrated

solar power (CSP) plant was connected to the grid. The plant is going to be the world's largest once it is finished.

In the Pacific region, **Samoa** hosted the 3rd International Conference on Small Island Developing States (SIDS) in 2014, which developed the SIDS action platform and highlighted the need to support and invest in the region so its members can achieve sustainable development. Tonga is developing its solar power capacity to reduce its dependency on oil with its Outer Island Renewable Energy Project, which will have a total installed capacity of 1.3 MW.



Noor CSP plant, Morocco

## Global Development Agenda Update

As mentioned, 2015 has been a pivotal year for sustainable development.

According to Bloomberg New Energy Finance, 2015 saw the highest renewable power capacity installation, with 64 GW of wind and 57 GW of

solar photovoltaics (PV) commissioned during the year, an increase of nearly 30% over 2014.

Looking at the figures in detail, the biggest piece of the USD 328.9 billion invested in clean energy in 2015 was asset finance of utility-

scale projects such as wind farms, solar parks, biomass and waste-to-energy plants and small hydro-electric schemes. This totaled USD 199 billion in 2015, up 6% on the previous year.

The biggest projects financed in 2015 included a string of large offshore wind arrays in the North Sea and off the coast of China – the UK's 580 MW Race Bank and 336 MW Galloper, at estimated costs of USD 2.9 billion and USD 2.3 billion respectively, Germany's 402 MW Veja Mate at USD 2.1 billion, and China's Longyuan Haian Jiangjiasha and Datang & Jiangsu Binhai, each with a 300 MW capacity and USD 850 million cost.

The past twelve months have defined a new global framework that succeeds the Millennium Development Goals. With three critical conferences – Addis Ababa Financing for Development Summit, the UN Summit on Sustainable Development, and the Paris Climate Conference – 2015 has created a platform to support and shape the global development agenda and aspirations for the next 15 years.

Taken in turn, these are:



Himadri Palikhe

### 3rd International Conference on Financing for Development (FfD3)

The 3rd International Conference on Financing for Development (FfD3) in Addis Ababa in July was a milestone in the global effort to shift financing for sustainable development and provided an opportunity to re-examine the policies needed to undergird the 2030 Agenda for Sustainable Development.

Heads of state and government and ministers of finance, foreign affairs and development cooperation, as well as all relevant institutional stakeholders, non-governmental organizations and business sector entities, reached a groundbreaking agreement – the Addis Ababa Action Agenda (AAAA). This included a series of measures to overhaul global finance practices and generate investments to address a range of economic, social, and environmental challenges.

The AAAA reaffirms existing commitments on the provision of official development assistance. It also emphasizes the critical importance of aligning private investment and financial flows with the objectives of sustainable development, and highlights seven major areas for priority attention. These priority areas are:

1. The mobilization of domestic resources;
2. Private business and finance;
3. International development cooperation;
4. International trade;
5. Debt and debt sustainability;
6. Systemic issues in the international financial system; and
7. Science, technology, innovation and capacity building for sustainable development.



The AAAA also signaled the need to utilize and unlock significant resources for development, i.e. global financial system, worth over USD 300 trillion, can support sustainable development investment. But to achieve this, trillions of dollars from multiple sources, including private finance, needs to be channeled annually into more sustainable and equity-oriented investment and away from resource-depleting and carbon-intensive investment.

“With an estimated annual financing gap of up to USD 7 trillion a year in infrastructure investments alone, our financial systems could transform the international economic landscape to better serve the needs of humanity and the sustainable development future we want,” said Achim Steiner, UN Under-Secretary-General and Executive Director of UNEP.

### UN Sustainable Development Summit

In September, the 193 member states of the United Nations unanimously adopted a bold new global agenda to end poverty by 2030 and to pursue a sustainable future at the UN Special Summit for Sustainable Development in New York.

Titled “Transforming Our World: The 2030 Agenda for Sustainable Development”, the agreement on a set of 17 goals and 169 targets came into effect on 1 January 2016, replacing the Millennium Development Goals (MDGs), which were adopted in 2000 and have since helped to improve the lives of millions of people around the world. The new 17 SDGs aim to transform the world over the next 15 years, building on the success of the MDGs.

The SDGs address poverty, hunger, gender inequality, preventable deaths and

## SUSTAINABLE DEVELOPMENT GOALS



environmental degradation. But these new goals are much broader in scope, comprising 169 targets, which together intend to usher in an era of development for all people, everywhere. The historic adoption of the new Sustainable Development Agenda was met with a standing ovation from delegations, including many of the more than 150 world leaders who addressed the summit. From the speeches at the summit, it was clear that implementation of the SDGs has already begun. Some speakers highlighted sustainable development initiatives already

in place or announced significant funding commitments, further demonstrating their commitment to implementation. Panama's president gave a commitment to restore 50% of his country's deforested areas over the next 20 years. The King of Spain noted that his country established the first SDG fund, with UNDP, which is financing projects in over 17 countries. China's president laid out an impressive list of financial commitments, including the establishment of a USD 2 billion assistance fund for South-South cooperation to implement the SDGs,

and increase investment in least developed countries (LDCs) to USD 12 billion by 2030. The Russian Federation said the country had written off USD 20 billion in debt and is instituting debt-for-aid swaps for the poorest countries.

SDGs provide a historical opportunity to shift from development in silos to a more integrated approach. The three dimensions of sustainable development are clearly interdependent. Environmental, social, and economic opportunities, when combined, can have mutually reinforcing outcomes for sustainable development. Poverty eradication can be achieved if sustainable economic growth, social protection, and environmental health and stewardship are considered together. Giving a proper value to natural capital and ecosystem services, protecting, restoring and enhancing natural assets, ensuring equitable access to natural resources and sustainably-derived basic services, promoting green and innovative fiscal policies and investments, and tracking progress through new indicators all should be part of the drive towards eradicating poverty irreversibly through smart, sustainable and inclusive growth.

In an SDG-achieving economy, economic policies and practices are framed around sustainability, which is inseparable from issues of equity and

social justice. In such economies, outdated subsidies and fiscal policies, including for energy, fisheries and agriculture, and public sector allocation, are rationalized and resources are refocused on achieving sustainable development for all, while rules of financial systems and associated markets are aligned with SDGs.

SDG-achieving economies invest in building new green skills, diversifying themselves away from polluting sources of energy and providing sustainable energy to all, resulting in creation of new green jobs, especially as an alternative sources of livelihoods for forestry and agriculture dependent populations, which will increase their income and reduce pressure on natural resources. According to the International Renewable Energy Agency (IRENA), the renewable energy sector alone employed 7.7 million people in 2014. Imagine the impact of scaling up that kind of job growth in other sectors of the economy.

On 25 September 2015, over 150 participants, including environment ministers and representatives from governments, country assistance agencies, finance and investment, civil society and international organizations, took part in a high-level event in New York focusing on the central theme of sustainable and inclusive growth and its role in helping to achieve the SDGs.

The event included a panel discussion titled “Powered by Inclusive Sustainable Growth: Why and How We Decided to Alter Course”, which was organized by UNEP, the Government of Germany and UNDP, with the support of the secretariat of PAGE and PEI. The event saw an interactive discussion on the key policies and investment decisions needed for countries to move towards more sustainable economic growth that respects planetary boundaries and ensures equitable outcomes. Ministers noted that achieving the SDGs will require strengthening bilateral and multilateral advisory mechanisms, networks, and partnerships to support countries, such as PAGE and PEI. Countries need support to transform institutions and economies through innovative integrated approaches to policy making that promote macroeconomic reform and comprehensive inter-sectoral collaboration.

### Paris COP21 Climate Conference

On 12 December 2015 in Paris, the 21st Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC) adopted the first-ever universal global climate deal.

The Paris Agreement is one of the most important international agreements in history, as through it, the nations of the world underlined

that climate change is a threat to the security and prosperity of all societies, and can only be addressed through unity of common purpose.

The first universal climate agreement was unanimously approved by the 196 delegations (195 member states plus the European Union). Never before had an issue brought together so many heads of state and government or



involved so many national contributions. The Paris Agreement is historic and should help limit the increase in temperatures to 2°C overall and 1.5°C by the end of the century, with a clause introduced to review these commitments.

The new agreement:

- Recognizes the concept of climate justice.
- Takes into account the differentiated responsibilities of the countries



Paris Climate Agreement at COP21 (December 2015)

concerned in every respect, along with their respective capacities in the light of national circumstances.

- Confirms the core aim of limiting the increase in the average temperature to well below 2°C and endeavoring to limit the increase to 1.5°C, which would help significantly reduce the risks and impacts associated with climate change.
- Holds all parties responsible for reducing greenhouse gas emissions, and requires them to submit their national

contributions; these may be revised every five years, but can only be made more ambitious.

- In the context of greater transparency, a collective statement of the latest progress will be produced every five years to encourage a collective reaction if insufficient effort is made to achieve the set objectives.
- Plans for the USD 100 billion a year set aside by 2020 to serve as a lower limit for the years to follow and for a new quantified objective to be set by 2025 at the latest. It

therefore provides the most vulnerable of countries and developing countries with the resources they have been promised.

The agreement is a testament to the ability of our societies to set aside differences and confront collective challenges for the global good. Importantly, the agreement has provisions to protect the most vulnerable. Fairness and equity are at the heart of this accord.

“Governments have sent a signal to the private sector that the momentum toward sustainability cannot be stopped. This is what the world needed to see. Above all, we have given future generations hope instead of doom and gloom. Now that negotiations have concluded, our work continues. We must focus on implementing the solutions that drive an inclusive green economy, including renewable energy, green finance initiatives, and sustainability in transport, construction and other sectors. However, in the days after Paris, we can reflect on the incredible progress we’ve made in only 23 short years. This is progress through compromise that the entire world can celebrate. Climate change creates enormous problems for our planet but by bringing the world together it has driven cooperation and collective action on a scale few would have imagined possible a year ago,” said UNEP Executive Director Achim Steiner.



## Partnership for Action on Green Economy (PAGE)

To support countries in their transformative agendas and bring the SDGs and related agreements within reach, UNEP and its partners continue to innovate and deliver on policy analysis, capacity development, and knowledge and experience sharing on the economics of sustainability. PAGE remains central to that effort. This section looks at the contributions and advances that PAGE has made in 2015.

There is growing realization among public- and private-sector decision makers that we need to transition towards a new economic model, capable of progressing and achieving the goals of sustainable development. This new economic model should be one that matches the ambition of countries as they embark on implementing the 2030 Agenda for Sustainable Development.

The PAGE seeks to put sustainability at the heart of economic policy-making. It supports nations and regions in reframing economic policies and practices around sustainability to foster economic growth, create income and jobs, reduce poverty and inequality, and strengthen the ecological foundations of their economies.



The first PAGE Conference, Dubai (March 2014)

Bringing together the expertise and broad convening power of five UN agencies — UNEP, International Labour Organization (ILO), United Nations Industrial Development Organization (UNIDO), UNDP, and United Nations Institute for Training and Research (UNITAR) — and working closely with national governments, private sector and civil society, PAGE offers a comprehensive, coordinated and cost-effective package of analytical support, technical assistance and capacity-building services to countries and regions to transform their economies into drivers of sustainability and social equity.

Currently, eight countries are officially included in the partnership as PAGE countries and receive direct support from PAGE to advance their green economy policies and projects. These are Burkina Faso, China, Ghana, Mauritius, Mongolia, Peru, Senegal and South Africa.

In March 2014, the UAE hosted the inaugural conference on PAGE in Dubai. More than 450 participants from 66 countries — including 27 ministers, representing governments, and members of the private sector, civil society and development agencies — attended the meeting. The conference was an opportunity

### Catalyzing Change: PAGE Progress So Far



#### Mongolia

The Government of Mongolia adopted its national Green Development Policy soon after joining PAGE. To support implementation of the Policy and to contribute to achieving its targets, PAGE is assisting in developing green development indicators, sustainable public procurement policy, green building codes, national waste management strategy, scenarios through system dynamics modelling, IGE learning strategy, and mobilizing domestic private finance.



#### Peru

After assisting the development of the Roadmap to a Green Growth Strategy, PAGE is supporting Peru in developing its national green growth strategy, options for green policy reforms in three key economic sectors, green industrial policy instruments, and operationalization of green jobs policy as well as its biotrade strategy, which refers to the sustainable collection, production, transformation and commercialization of goods and services derived from native biodiversity.



#### China

China (Jiangsu province) joined PAGE in 2015. Work is underway to support the provincial government in the identification of priority areas and sectors to further its progress toward an inclusive Green Economy.



### Ghana

To support the operationalization of Ghana's Shared Growth and Development Agenda (2014-2017), PAGE is assisting in the development of an IGE action plan and learning strategy, identification of opportunities for green industrial development and sustainable trade, and IGE training for media and policy-makers.



### Mauritius

The new government is developing a mid-term strategy *Achieving Meaningful Change* (2016-2020). PAGE informs the strategy based on IGE assessment of six economic sectors, and assists in developing solid waste and industrial waste strategies, preparing the Marshall Plan against poverty and social exclusion, advancing green skills and entrepreneurial development, and catalyzing domestic finance.



### Senegal

PAGE assists in achieving SDG-aligned targets of *Plan Senegal Emergent*, the national development framework. It does this by helping the Senegalese parliamentarians in drafting a strategic orientation document on IGE, mainstreaming IGE goals and targets in three key national strategies and policies, creating integrated industrial platforms, and formulating the Senegalese National Green Jobs Strategy and National Program for Green Jobs.

to review international experience and progress related to the Green Economy in the context of sustainable development and poverty eradication. It also considered how greener economies can contribute to the emerging post-2015 development agenda.

It was agreed to hold the fourth biennial PAGE conference again in Dubai, simultaneously with Expo 2020. This will provide a great opportunity to bring innovative ideas and promising solutions together to truly realize a global collaboration for sustainable living.

The 2016-2020 period will be a phase in which PAGE scales up to the challenge of delivering IGEs and the 2030 Agenda for Sustainable Development in an increasing number of countries. Based on current planning, PAGE expects to assist an additional twelve countries, bringing the total to 20 by 2020. Building on initial achievements, lessons learned and early experiences, an increasing number of partner countries will begin to shape and form the future they want. They will do this by focusing on the macro, fiscal, industrial and trade policies they need to stimulate growth and employment into the coming decades, while reducing environmental risks and ecological scarcities.

Economic and transformative change is urgently needed and possible. The IGE community can uproot the multiple causes of unsustainable development if we are all on the same PAGE: it is about making sustainability happen.

The ideas of a partnership for achieving the IGE transformation and a set of global sustainable development goals were conceived at Rio+20. PAGE has become even more relevant after the approval of the 2030 Agenda for Sustainable Development, including the SDGs, which are ambitious, complex and cut across sectors as well as divides of low- and high-income countries. The 2030 Agenda for Sustainable Development offers an historic opportunity to overcome disconnection and misalignment and develop integrated approaches to sustainable development. PAGE aspires to be the most fit for the purpose by bringing five UN agencies together whose mandates, expertise and networks, when put together, can offer integrated and holistic support to countries in their efforts to become an IGE, ensuring coherence and avoiding duplication.

PAGE is aligned with the 2030 Agenda for Sustainable Development, particularly with the



### South Africa

An in-depth stocktaking exercise on IGE for development of a robust results-based framework for the PAGE program document for 2016-2018 is underway. PAGE support will focus on implementing the existing national green economy policies through capacity building of learning institutions, national and local government staff, the development of Green Economy indicators, and mobilizing domestic private finance.



### Burkina Faso

PAGE is providing support to integrate IGE goals and targets into the country's next development plan, provisionally titled *Stratégie de croissance accélérée et de développement durable (SCADD 2)* (2016-2020), by contributing recommendations for green fiscal policy reforms, green industrial policies, and revision of the National Investment Plan on the Environment and Sustainable Development, and establishment of a green economy platform.

SDGs related to economy, jobs, environment and climate change, and partnerships in many ways. First, the IGE transformation is a tool for achieving sustainable development and poverty reduction. In a Green Economy, growth in income and employment are driven by policies and investments that reduce carbon emissions and pollution, enhance energy and

resource efficiency, and prevent the loss of biodiversity and ecosystem services.

Within the SDGs these objectives are distributed across the goals. Second, achieving most, if not all, of the SDGs requires investment in social capital, natural capital, and sustainably produced financial capital. PAGE helps deliver the SDGs by catalyzing

additional investment as well as shifting existing investment towards these forms of capital through the reform of macroeconomic policies.

An initial review of the SDGs and their targets shows that most of them include the concept and message of IGE. PAGE is particularly well placed to deliver on SDG 8 (which is to ‘Promote inclusive and sustainable economic growth, employment and decent work for all’) given its clear focus on generating

sustainable growth, employment, income and wealth in an inclusive manner while reducing environmental risks. PAGE has evolved as one of the means of implementing the 2030 Agenda for Sustainable Development, which is called upon in SDG 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development. Target 17.16 of the SDGs, which is to: “Enhance the global partnership for sustainable development, complemented by multi-stakeholder partnerships that

mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the sustainable development goals in all countries, in particular developing countries”, is particularly relevant for PAGE. By responding to the need for finance, technology, capacity building, trade promotion, and addressing systemic issues, including promotion of policy and institutional coherence under SDG 17, PAGE is already serving as a means of implementation in several countries.

## Inquiry into the Design of a Sustainable Financial System

In the wake of the global financial crisis, it has become more widely recognized that the financial system must be not only sound and stable, but also sustainable in the way it enables the transition to a low-carbon, green economy. With this in mind, UNEP established the Inquiry into the Design of a Sustainable Financial System in early 2014 to explore how to align the financial system with sustainable development, with a focus on environmental aspects. In 2015, the Inquiry launched its global report titled *The Financial System We Need*, at the IMF/World Bank Annual Meetings.

The key findings of the report are that:

- A ‘quiet revolution’ is underway as financial policy-makers and regulators take steps to integrate sustainable development considerations into financial systems to make them fit for the 21st century.
- Momentum is building and is largely driven by developing and emerging nations including Bangladesh, Brazil, China, Kenya, and Peru, with developed country champions including France and the UK.



- Amplifying these experiences through national and international action could channel private capital to finance the transition to an inclusive, green economy and support the realization of the SDGs.

UNEP’s Inquiry into the Design of a Sustainable Financial System has, for the first time, compiled and analyzed inspiring initiatives from across the world that seek to better align the financial

system with sustainable development, showing that there is much to be learned from the developing world. Additionally, a body of global research has been undertaken, including country-specific papers where national consultations have taken place.\*

The Inquiry has considered aspects of financial and monetary policies and financial regulations, and standards, including disclosure requirements, credit ratings, listing requirements and indices. It has focused on the roles of financial system rule-makers including central banks, financial regulators, finance ministries, other government departments, standards institutions, and market-based standard setters such as stock exchanges, and key international

organizations and platforms. The Inquiry has explored innovative experiences in advancing sustainable development through the actions of the financial system's governing institutions, notably central banks and financial regulators, government bodies and standard setters. Such experiences have been examined in some depth in Bangladesh, Brazil, China, Colombia, the European Union, France, Kenya, India, Indonesia, the Netherlands, South Africa, Switzerland, the United Kingdom and the United States.

Furthermore, the Inquiry has also drawn on extensive international engagement and research on topics as diverse as green bonds, value-based banking, fiduciary responsibilities, human rights and electronic trading. A high-

level advisory council has guided the Inquiry, which has also drawn on UNEP's Green Economy activities and UNEP FI. The Inquiry has contributed to a growing number of real-time initiatives seeking to integrate sustainable development with the evolution of financial and capital markets, from convening China's Green Finance Task Force with the People's Bank of China, to catalyzing and supporting the Swiss Government in launching a national consultation with the Swiss Sustainable Finance Initiative. Other activities include supporting a national inquiry into the green economy and the financial system by Brazil's banking association, *Federação Brasileira das Associações de Bancos*.

## Green Economy in the UAE



The UAE has been a front runner in the transition to a Green Economy by making highly significant commitments in its own national strategy and taking leadership in the international arena. The country's efforts to become a global hub and a successful model for a low-carbon Green Economy demonstrate that pursuing a diversified

\* Over 54 pieces of research can be found at [www.unepinquiry.org](http://www.unepinquiry.org)

and environmentally friendly economy can enhance competitiveness and sustainability at the core of its development pathway.

In 2009, the UAE made a bold move to embrace renewable energy by hosting the International Renewable Energy Agency (IRENA). This captured the attention of countries throughout the Middle East and the world. IRENA moved to its new permanent headquarters, located in Masdar City, in March 2015. Renewable energy began to make economic sense for the region decades earlier than expected because of rapidly declining renewable energy technology prices, and now the UAE stands ready to benefit from its early prioritization and adoption.

In 2012, the UAE launched the Green Economy for Sustainable Development initiative as a pathway to jointly enhance the country's economic growth ambitions, social development priorities and vital environmental goals. Earlier in 2015, the initiative's action plan was unveiled as the *UAE Green Agenda 2015-2030*. By transforming the UAE into a Green Economy, it is expected to create 160,000 new jobs and to bring a total boost to the country's GDP of up to 5.5% by 2030. The UAE was the first Arab country to introduce such



Achim Steiner, UNEP Executive Director and UN Under-Secretary-General, and His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai

an initiative, making it a pioneer both globally and regionally.

Financing is a major contributor to fulfilling the UAE Green Agenda, and is referred to as a key means to support and facilitate sustainable development; whether it is of financing of projects, businesses, industry, organizations and/or general events and campaigns. As part of the UAE's commitment to the Green

Economy, the Ministry of Climate Change and Environment (MOCCAEE) will host the 14th UNEP Finance Initiative Global Roundtable in Dubai in October 2016. This event will be the key global agenda-setting event in sustainable finance.

In May 2015, in preparation for hosting the UNEP FI Global Roundtable, the first national event on green financing was organized in



Dubai by the then Ministry of Environment and Water under the auspices of the 6th Green Economy Annual Conference, in cooperation with UNEP FI. Financial institutions, financial regulators and policy makers were invited to participate in a dialogue on “Financing and Investing in Green Economy” to discuss the role of the financial sector in the UAE’s Green Economy. International and national experiences and knowledge were shared on financing low-carbon opportunities and driving green industries from the finance sector.

As a direct outcome of the meeting, an online questionnaire survey was developed jointly by UNEP FI, the Ministry of Environment and Water and the Central Bank of the UAE with the aim of providing an overview of the UAE financial sector’s readiness, current

practices and challenges in green finance. The survey was circulated among 455 financial institutions operating in the country during the summer of 2015, in cooperation with the Central Bank, the Insurance Authority, the Securities and Commodities Authority (SCA) and the Dubai Financial Services Authority (DFSA). The results of the survey were reflected in a report *State of Green Finance in the UAE*, launched during the second high-level national roundtable in November 2015 in Dubai. According to the results of the survey, there is clear evidence not only that many of the UAE’s financial institutions are already investing in green products, but that investment is on the rise (see Chapter 6).

The UAE Vision 2021 clearly sets out its goal to reduce the nation’s dependence

on fossil fuels while increasing the use and development of renewable energy. In this vision, growth is stimulated by innovation, which is in turn stimulated by investments in research.

Solar power has been the primary focus of the UAE’s efforts to date. Abu Dhabi saw the completion of the 100 MW Shams 1 CSP plant, the largest-ever renewable energy project in the Middle East, and Dubai inaugurated 13 MW of solar PV as the first phase of what will eventually become the 5,000 MW Mohammed bin Rashid Al Maktoum Solar Park. The 200 MW Phase II of the Mohammed bin Rashid Solar Park is touted to become the biggest solar power plant in the Middle East (see Chapter 4).

In order to hit international climate change targets, the UAE has developed several initiatives aimed at diversifying and strengthening its low-carbon economy.

Furthermore, the fourth PAGE conference, to be held simultaneously with Dubai Expo 2020, will enable the country to show the world the advancement of its knowledge, innovation and creativity towards a promising and sustainable future.



## The View Forward

2016 will be dominated by a challenging macroeconomic environment and growing environmental pressures, which will form a backdrop for beginning the process of delivering on the ambitious agreements reached during 2015.

The 2030 Agenda for Sustainable Development will provide the official international framework for national and international efforts to achieve sustainable development and reduce poverty. Its delivery will depend heavily on cross-government mechanisms and dynamic country-wide partnerships for sustainable development. It will involve strengthening public policies, regulatory frameworks and finance at all levels, unlocking the transformative potential of people and the private sector, and promoting changes in financing as well as consumption and production patterns to support sustainable development.

The second session of the United Nations Environment Assembly (UNEA-2) in May 2016 aimed to create the strategic framework for decisions and policy guidance on issues central to our common well-being, such as the

environment and human health; and will help define policy responses and pragmatics steps to advance the SDGs.

Investment has an essential role in the transition to an IGE, in part because the systems that meet basic social needs such as water, energy and mobility, rely on costly and long-lasting infrastructure. Investment choices can therefore have long-term implications for the functioning of these systems and their impacts, as well as for the viability of alternative technologies. Transitions depend in part on avoiding investments that lock-in existing technologies, limit options, or hinder the development of substitutes.

Enormous amounts of capital are needed to finance infrastructure projects such as smart electrical grids, renewable energy, electrification of transport, and resource-efficient buildings. In addition to fiscal reforms, innovative financing mechanisms, such as the project bond initiative of the European Commission and the European Investment Bank, socially responsible investments (SRI), green bonds and sovereign wealth funds (SWF), are potential tools for supplying the needed funds.



In this regard, the upcoming bi-annual UNEP FI Global Roundtable will be hosted by MOCCA on 25-26 October 2016. The Global Roundtable on Sustainable Finance will bring together high-level representatives from financial institutions, governments, regulators, civil society, inter-



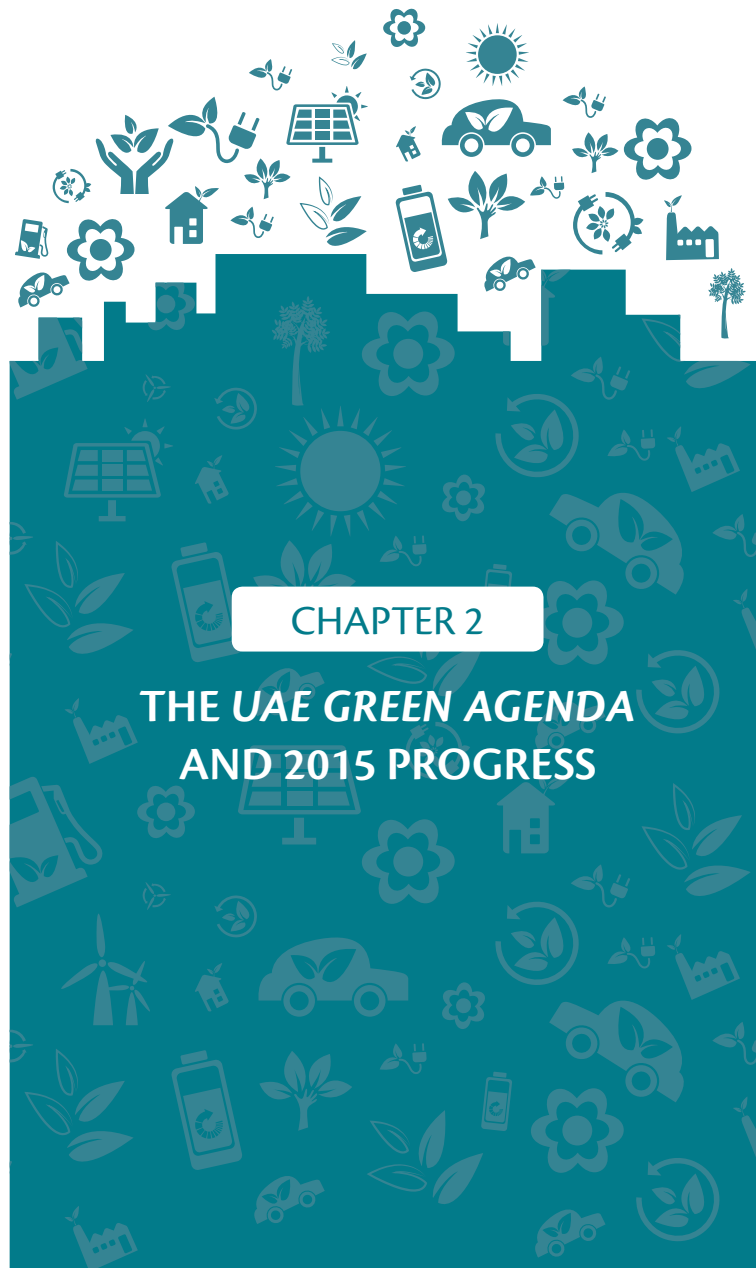
Ray Witlin / World Bank

governmental and multilateral agencies, academia, and the scientific community to address some of the most pressing questions facing the finance sector, including how to unlock the needed capital flows to underwrite the emerging green economy.

In parallel, the UNEP Inquiry into the Design of a Sustainable Financial System will support a G20 Green Finance Study Group led by China and the United Kingdom that is looking at options for green finance and align capital

flows and markets with sustainability goals at a systemic level.

Until now, significant effort has been focused on what not to do. What we are starting to see, from the law-making community and the financial community, is a much-needed movement towards more conscious and proactive decisions that will drive technology, funding and cooperation to deliver for the real economy – one in which growth is both sustained, inclusive and sustainable.



CHAPTER 2

**THE UAE GREEN AGENDA  
AND 2015 PROGRESS**

## The UAE Green Agenda and 2015 Progress

### UAE Vision 2021 and Greening the Economy

To chart the nation's new development path and present its united ambition and determination, the *UAE Vision 2021* was launched by His Highness Sheikh Khalifa bin Zayed Al Nahyan, President of the UAE, in February 2010. The primary and ambitious objective of this comprehensive national strategy is to become among the best countries in the world by the time of the nation's golden jubilee celebration in 2021. The UAE Vision 2021 addresses six major challenges for the UAE that require a compass to enable the nation to steer a course. This includes challenges to the family ties that hold together the strong fabric of a cohesive society; challenges to economic competitiveness; challenges to national identity; and challenges to health, education, the environment and well-being.

Given the prospective growth in population and demand for energy and resources in the country, it is evident that the UAE's ambition for further economic growth

and high-quality lifestyles will not be met by simply replicating the conventional development model. An alternative pathway to manage both its economic aspirations and natural heritage needed to be sought where sustainable development would be placed at the heart of the UAE's development. The UAE is highly resourceful and capable of shifting capital investment towards the perpetual assets such as human capital, innovative capacity and technological leadership that would enable it to realize such a radical transformation in the coming decades. An accelerated effort to decouple environmental impact from economic growth was also expected to bring significant new competitive advantages and job opportunities to the country.

Building upon the Vision 2021, and influenced by international initiatives for the Green Economy proceeding the Rio+20 Summit of the United Nations, His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice



President and Prime Minister of the UAE and Ruler of Dubai, launched the Green Economy for Sustainable Development initiative in January 2012. Through this resolution, the UAE stated its determination to enhance the competitiveness and sustainability of its development and preserve its environment for future generations, with an ambition to become a global hub and a successful model of sustainable development. Under the initiative, six strategic directions were outlined as focus areas along with a list of general actions to begin with, namely Green Energy; Green Investment; Green City; Climate Change; Green Life; and Green Technologies.

## Structure of the UAE Green Agenda

To strengthen the actions of the above six focus areas and ensure mainstreaming the Green Economy into the strategic plans of federal and local governments as well as the industry and the civil society, the then Ministry of Environment and Water, the Prime Minister's Office (PMO) and the then Ministry of Foreign Affairs, (now known as the Ministry of Foreign Affairs and International Cooperation) jointly led a stakeholder engagement and consultation process that extended for over a year from January 2013. This process was supported by the Abu Dhabi office of the Global Green Growth Initiative (GGGI), an inter-governmental organization headquartered in Seoul, Republic of Korea.

The consultation with key stakeholders was conducted on a sectoral basis through seven task forces in which over 160 representatives participated from federal and local government agencies, the private sector and civil society. This process identified the gaps in efforts to realize a Green Economy by comparing the current sectoral initiatives to the recommendations of the multi-



Structure of the UAE Green Agenda 2015-2030

stakeholder participants for achieving a sustainable society. Those gaps were compiled into a proposal for nationwide actions for a unified Green Economy transformation effort.

In January 2015, the UAE Cabinet issued a decision to approve and implement the *UAE Green Agenda 2015-2030* as an overarching framework of actions for the Green Economy for Sustainable Development initiative. In line

with the Vision 2021 and each emirate’s long-term development plan, five strategic objectives and twelve main programs were set under the Agenda. The twelve programs are further broken down into 31 specified sub-programs.\*

## Green Agenda Programs

The five strategic objectives and twelve programs of the *UAE Green Agenda 2015-2030* are designed to cover all key aspects of a Green Economy transition – from technology, human capital, regulatory environment, green finance, international trade, local content, intellectual property, consumer awareness, and integrated national planning and cooperation across the emirates. The 31 sub-programs intend to further concretize the actions that were proposed and generally agreed upon by stakeholders during the consultation process. Explained below are the background and objectives of each Green Agenda program, along with brief introductions of sub-programs:

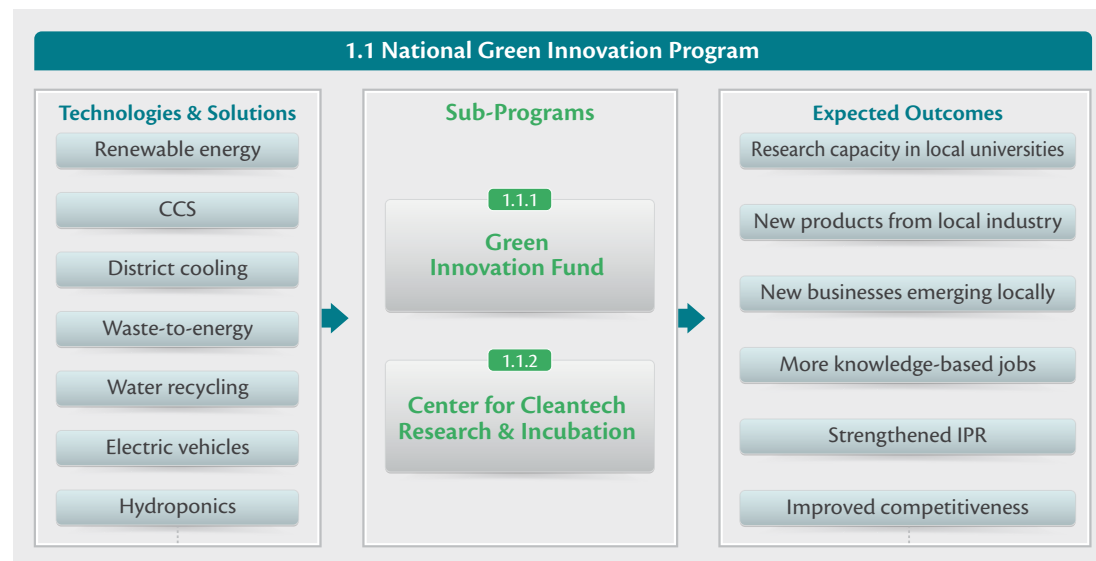
### 1. Competitive Knowledge Economy

#### 1.1 National Green Innovation Program

An advanced industrial structure and diversified economic activities require long-

term strategic investment in the advancement of promising technologies and solutions. According to the United Nations Educational, Scientific and Cultural Organization

(UNESCO), the UAE’s total expenditures for research and development (R&D) during 2011 were estimated as 0.49% of the nation’s total GDP, which is far behind the average spending



\* In the last edition of this report, the Green Agenda was presented in a different categorization (3 pillars and 8 programs) but the overall contents and proposed actions are intact.

of OECD countries (2.47%). The UAE set a target of raising this rate to 1.5% by 2021 under the UAE Vision 2021 (see Chapter 7).

The goal of this program is to strategically nurture R&D in clean technologies attractive to the UAE, while simultaneously strengthening the behavioral and institutional foundation for effective adoption and absorption of green technologies and business models.

This program consists of two sub-programs:

**1.1.1 Green Innovation Fund**

Nationally coordinate green R&D with tailored support for technologies identified as future growth engines;

**1.1.2 Center for Cleantech Research and Incubation**

Create a knowledge and innovation platform to foster closer collaborations between academic research and industry and close the gaps in the innovation value chain.

**1.2 Green Diversification Program**

This program aims to provide a comprehensive solution for promoting the economic activities of green industries to help advance the UAE economy beyond dependence on hydrocarbon resources. Whereas technological content and new business models will be advanced under

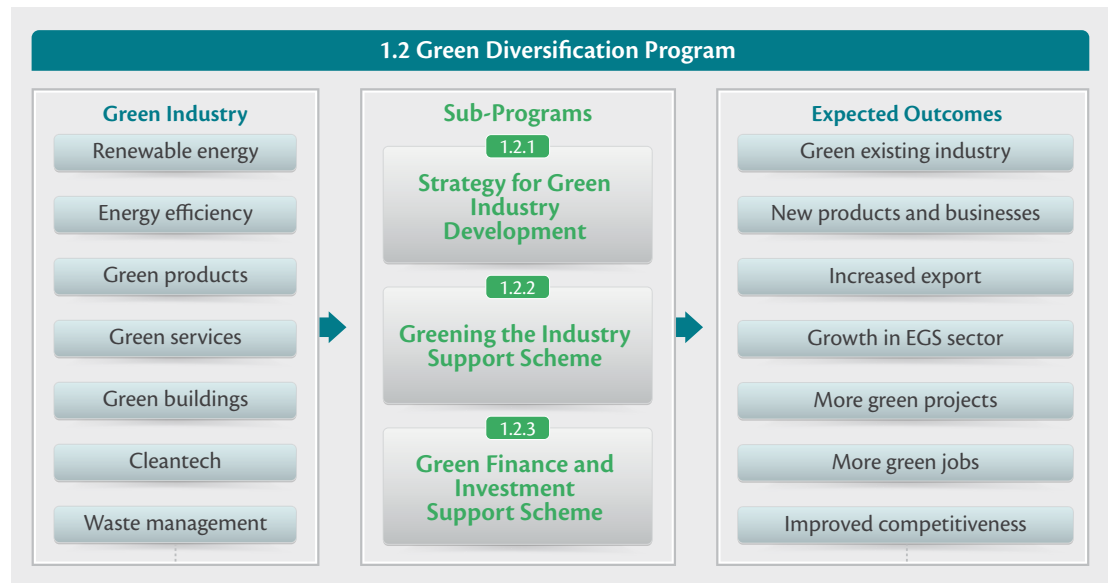
the National Green Innovation Program (1.1), the Green Diversification Program instead focuses on market creation for the emerging environmental goods and services (EGS) sector and increasing the green credentials of existing sectors by enhancing resource and energy efficiency.

promising clean technologies and the nascent EGS sector;

**1.2.2 Greening the Industry Support Scheme:**

**Scheme:**

Provide practical support to enable businesses and entrepreneurs to take greening actions;



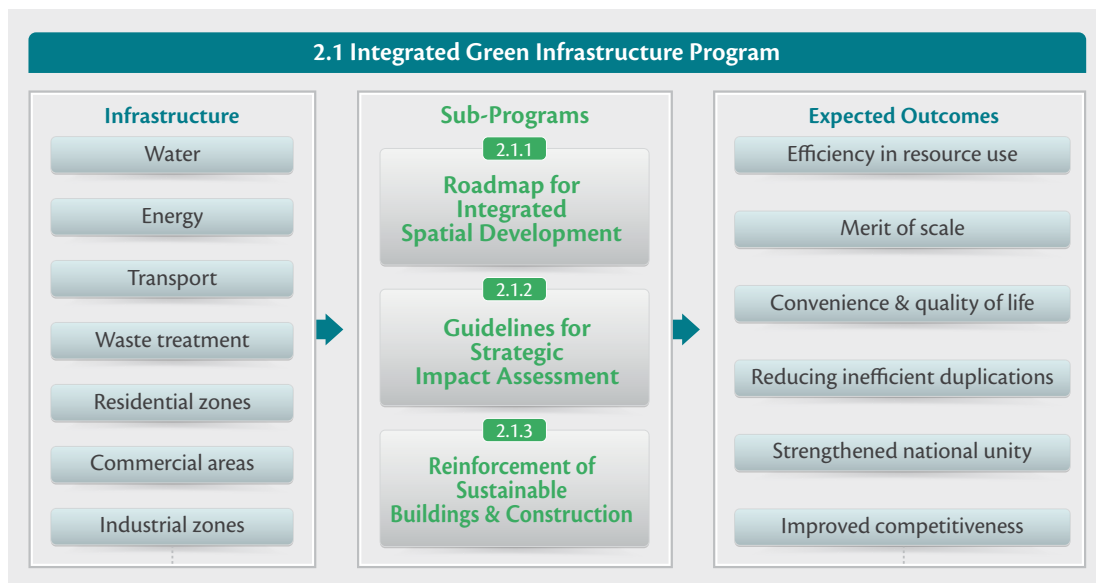
The program consists of three sub-programs:

**1.2.1 Strategy for Green Industry Development:**

Draw a strategic roadmap and set targets for greening the existing industries and nurturing

**1.2.3 Green Finance and Investment Support Scheme:**

Stimulate the financial sector to invest in green projects and businesses.



## 2. Social Development and Quality of Life

### 2.1 Integrated Green Infrastructure Program

Addressing economic and infrastructure disparities across the country is an important pre-requisite for enabling a Green Economy. The comparative advantages of each emirate need to be leveraged while identifying and filling important gaps in support of a balanced, prosperous and sustainable UAE economy. Development of public infrastructure supporting greener development needs to be clearly prioritized and accelerated. Smart integration of infrastructure development

such as power, water, transport, residential and commercial areas, industrial zones, and waste and sewage treatment facilities would radically improve efficiency while providing convenience and higher quality of life to residents.

This program consists of three sub-programs:

#### 2.1.1 Roadmap for Integrated Spatial Development:

Ensure emirate-level development policies to be aligned with the UAE Vision 2021 and the UAE Green Agenda;

#### 2.1.2 Guidelines for Strategic Impact

##### Assessment:

Establish coherent and harmonious codes and standards for integrated spatial development;

#### 2.1.3 Reinforcement of Sustainable Buildings and Construction:

Pursue inter-emirate collaboration opportunities in green infrastructural development.

### 2.2 Green Workforce and Talent Program

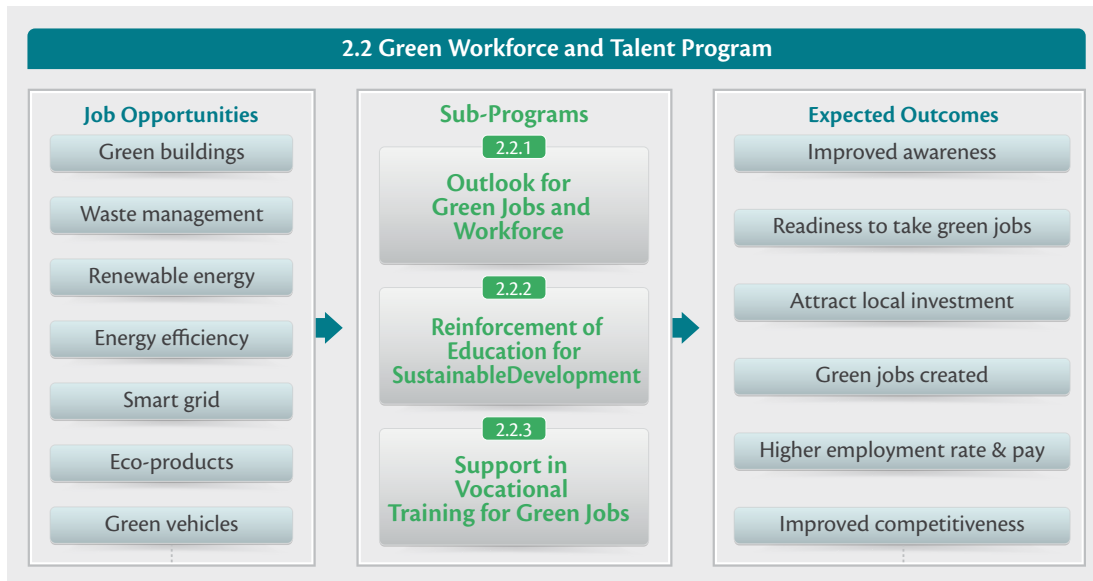
The successful transition to a Green Economy rests on the skills and expertise of the country's workforce and its ability to leverage local talent. Maximizing local workforce and talent is also a key federal priority for a competitive knowledge-based economy and quality social development targeted under the UAE Vision 2021. This program is designed to explicitly address the skill gaps between the current labor market and the requirements for a Green Economy and to ensure provision of education and workforce training to contribute to the overall efforts for moving towards sustainable development.

This program consists of three sub-programs:

#### 2.2.1 Outlook for Green Jobs and Workforce:

Identify education and skill gaps to fill to enable a Green Economy;





**2.2.2 Reinforcement of Education for Sustainable Development:**

Reinforce federally coordinated and guided education for sustainable development;

**2.2.3 Support in Vocational Training for Green Jobs:**

Develop and provide vocational training initiatives to equip the workforce for prospective green jobs.

**3. Sustainable Development and Valued Natural Resources**

**3.1 Natural Capital and Resilience Program**

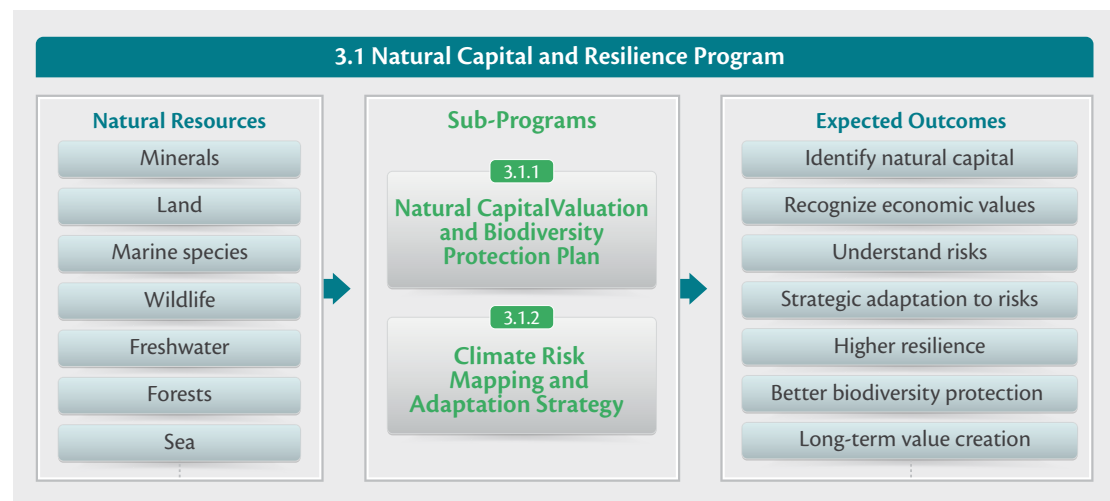
This program aims to respond to the twin challenges of minimizing the impact of UAE’s

rapid spatial and infrastructural development on the environment and ensuring that development is resilient to future risks such as climate change. The potential environmental and social externalities need to be factored into the investment decision-making processes to prevent long-term consequences of damaging the natural capital of the country.

The program consists of two sub-programs:

**3.1.1 Natural Capital Valuation and Biodiversity Protection Plan:**

Estimate the country’s natural capital and ecological services and plan the appropriate protection and use of biodiversity and natural resources;



### 3.1.2 Climate Risk Mapping and Adaptation Strategy:

Assess the potential financial and economic risks from climate change and develop and implement a strategy for adaptation through improved resilience.

### 3.2 Environmental Goods and Services Program

This program aims to support the development and market penetration of eco-friendly, sustainable goods and services produced or provided based on the principles of sustainable use of natural resources and respect for local heritage and workers. Such products and services would have significant potential to directly benefit the economy and generate growth and jobs from the existing and enhanced ecosystems.

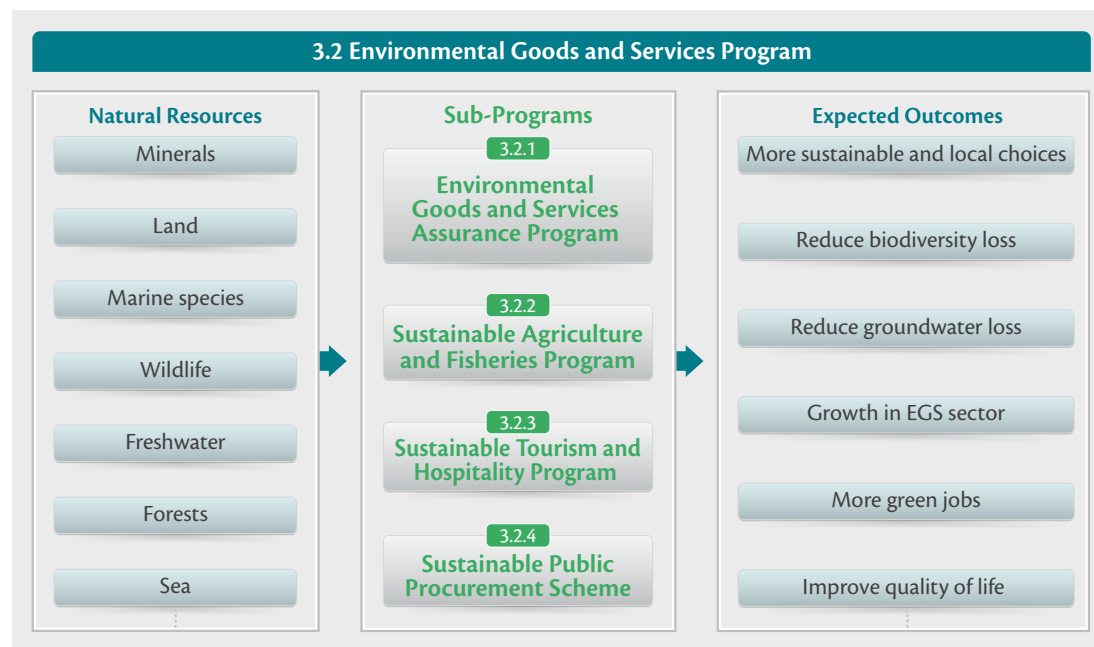
The program consists of four sub-programs:

#### 3.2.1 Environmental Goods and Services Assurance Program:

Support the market and consumer uptake of environmental goods and services (EGS) by providing quality assurance and easy-to-understand information;

#### 3.2.2 Sustainable Agriculture and Fisheries Program:

Support the development of the primary sector by disseminating sustainable, resource-efficient practices among farmers and fishermen;



#### 3.2.3 Sustainable Tourism and Hospitality Program:

Improve the environmental management of existing tourist attractions and ensure the new development to prevent potential damage, where a significant sectoral growth is expected towards Expo 2020;

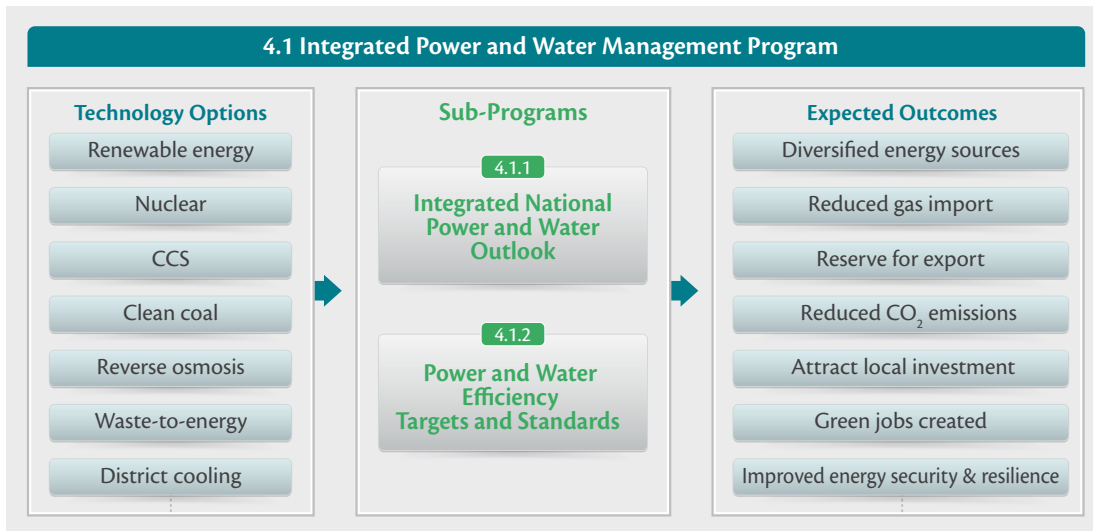
#### 3.2.4 Sustainable Public Procurement Scheme:

Leverage the public sector's purchasing power for nurturing the EGS market.

## 4. Clean Energy and Climate Action

### 4.1 Integrated Power and Water Management Program

Diversification of water and power supply technologies, including solar, wind, nuclear, clean coal, waste-to-energy and district cooling, would provide one of the most powerful foundations for a Green Economy with the significant potential to reduce carbon emissions and generate economic growth. A holistic, integrated energy and water



building on best practices and encouraging private-sector investment in the sector.

#### 4.2 National Renewable Energy Program

The presence of solar power as a free, abundant and unlimited resource is a clear driver of renewable energy for the UAE. With the recent rapid price decline in photovoltaic (PV) technologies, its commercial viability is rapidly being established. This program aims to provide policy and institutional support to accelerate the uptake of diverse renewable energy technologies with proven applicability.

The program consists of two sub-programs:

desalination plan would help ensure the long-term sustainable supply across the country.

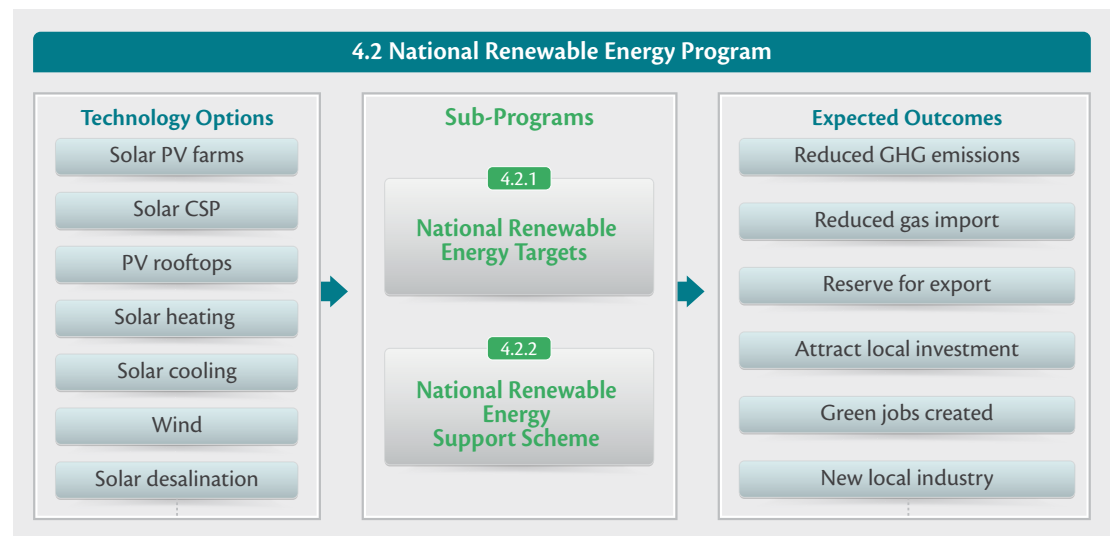
This program consists of two sub-programs:

##### 4.1.1 Integrated National Power and Water Outlook:

Coordinate the planning of future plants among emirates based on a strategic consideration of clean technology options;

##### 4.1.2 Power and Water Efficiency Targets and Standards:

Provide policy and institutional support to introduce clean energy technologies and increase energy and water efficiency in each emirate,



#### 4.2.1 National Renewable Energy Targets:

Establish an internationally recognized nationwide commitment to renewable energy deployment as well as a strategy and roadmaps to achieve the targets;

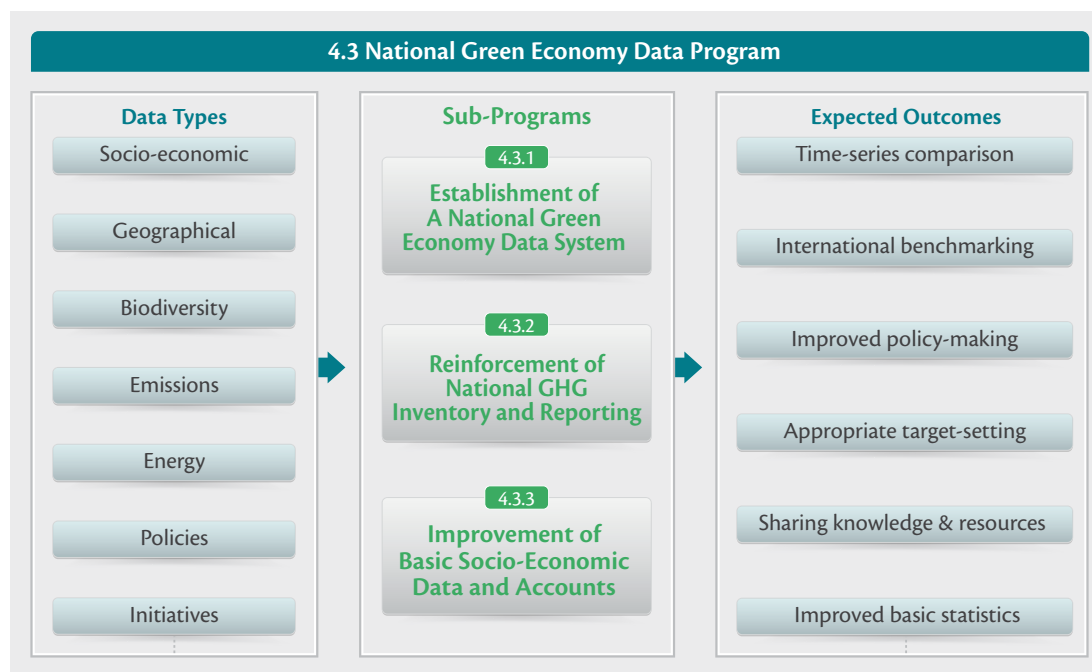
#### 4.2.2 National Renewable Energy Support Scheme:

Develop and deploy a range of public support schemes that enable renewable energy to associate with a positive impact on the economy, including job creation and the emergence of competitive technologies and services sectors.

#### 4.3 National Green Economy Data Program

To quickly improve the coverage and reliability of the Green KPIs (see below) for enabling evidence-based policy-making, a consistent nationwide data collection and management system based on globally recognized, standardized methods will be required. Since the UAE has only a short history of statistical work, general improvement in collecting basic socio-economic data and its consistency with authoritative international data sources is yet to be the first priority.

This program consists of three sub-programs:



#### 4.3.1 Establishment of a National Green Economy Data System:

Establish and manage a central repository of Green Economy data and ensure collection and reporting of relevant data from federal and local authorities;

#### 4.3.2 Reinforcement of National Greenhouse Gas (GHG) Inventory and Reporting:

Systematically upgrade the GHG inventories, which are currently developed at the federal,

local and private-sector levels, and allow them to consolidate for improved, consistent disclosure.

#### 4.3.3 Improvement of Basic Socio-Economic Data and Accounts:

Support improving the availability of basic socio-economic data necessary for Green Economy analyses and in coordination between national and local statistical bureaus to improve data quality and consistency.

## 5. Green Life and Sustainable Use of Resources

### 5.1 National Energy and Water Efficiency Program

More efficient use of energy and water and avoiding wastefulness is the most rational approach in a Green Economy, as saving energy and water is generally far cheaper than even the most efficient methods of production. Resource conservation and efficiency improvement can be encouraged in all

residential, commercial and industrial uses of energy and water. The emerging trend towards green buildings plays a key role in maximizing this efficiency gain.

This program consists of two sub-programs:

#### 5.1.1 Reinforcement of Efficiency Standards and Labeling:

Encourage sustainable consumption of energy- and water-using products by inducing better purchasing decision-making;

#### 5.1.2 Energy and Water Demand-Side Management:

Promote a holistic, comprehensive approach to reducing energy and water demand to help complement the actions to advance sustainable supply technologies.

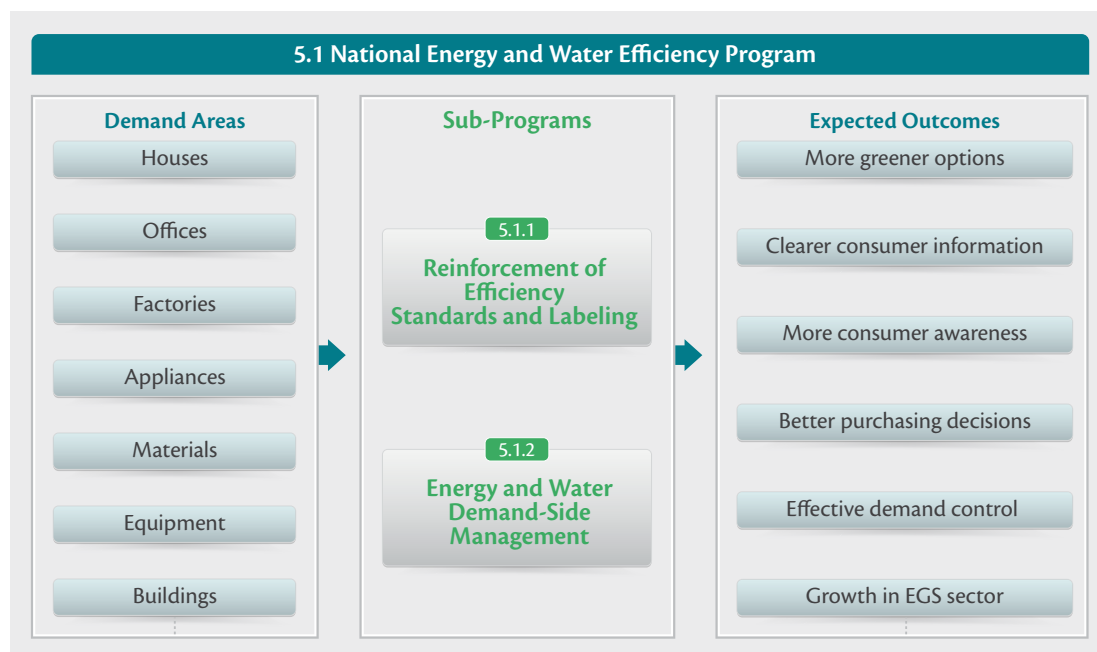
### 5.2 National Waste-to-Resource Program

Along with energy and water efficiency, improvement in material use efficiency is an urgent priority in the UAE, as the resource-intensive construction sector is a major economic driver and most non-oil resources need to be imported. The country also needs to tackle waste generation and landfilling, which keeps increasing as the population and the economy continue to rapidly expand. The initial target of this program would be overall waste reduction (through reduction, reuse, and recycling) but would also seek the lifecycle approach to take advantage of material-efficient technologies and practices across the value chain.

The program consists of three sub-programs:

#### 5.2.1 Integrated Waste Management Strategy and Standards:

Harmonize waste management strategies and standards across the emirates to reduce disparities and enable more efficient and better treatment for resource recovery;





and more efficient use of vehicles through better land use, awareness raising and incentives.

The program consists of two sub-programs:

### 5.3.1 Integrated Public Transport Plan and Promotion:

Improve the availability and convenience of public transport options across the country by enhancing cross-emirate coordination in planning and operations;

### 5.3.2 Green Vehicles Support Scheme:

Help reduce the fuel consumption and emissions of private and commercial vehicles through the promotion of greener models and technologies among consumers and operators.

### 5.2.2 3Rs Promotion Scheme:

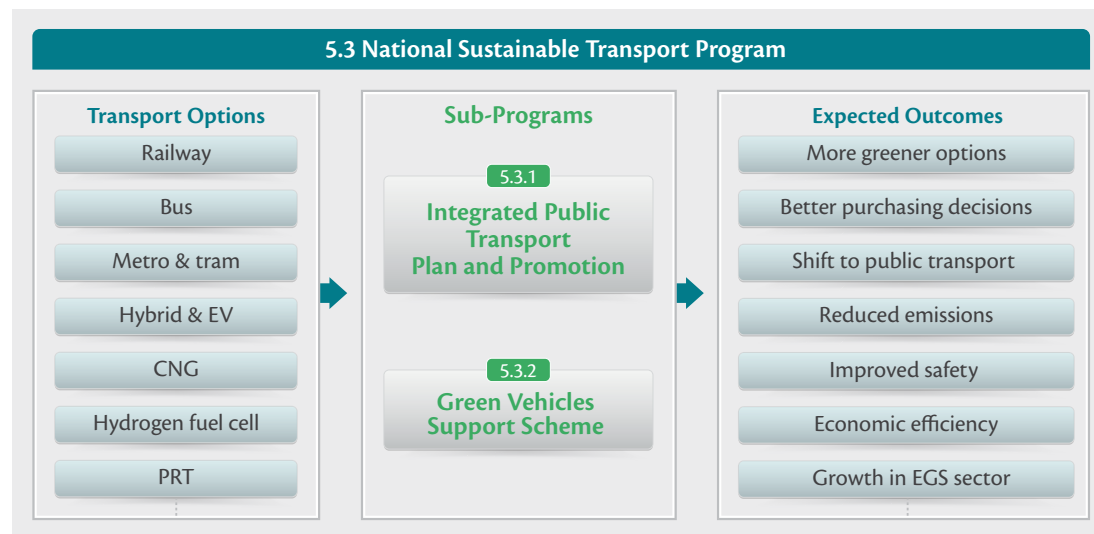
Promote the principle of “reduce, reuse, recycle” (also known as the 3Rs) and lifecycle considerations among households and businesses and provide support for sorting facilities and the recycling industry.

### 5.2.3 Waste-to-Energy Support Scheme:

Disseminate diverse waste-to-energy technologies as a resource-efficient option.

### 5.3 National Sustainable Transport Program

This program would aim to help build initiatives, policies and plans for sustainable transport, in a more coordinated, pan-emirate way, by providing a federal framework. It would also support the increased coverage and use of public transport



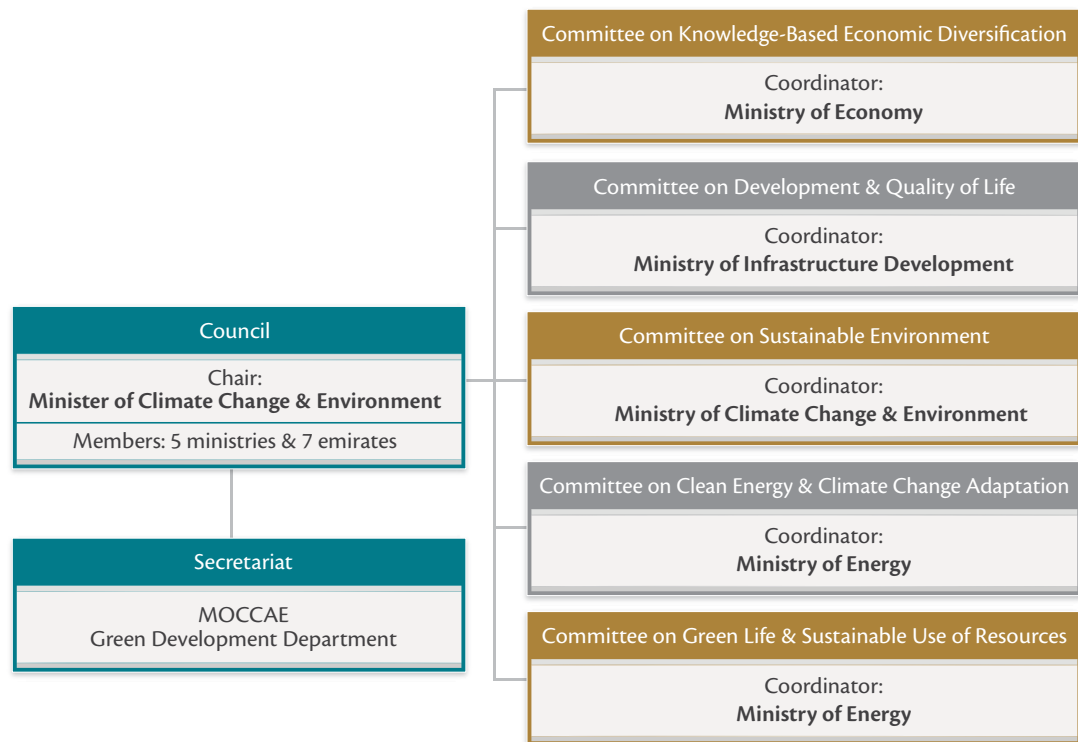
## Governance for the Green Agenda Implementation

In June 2015, the Emirates Green Development Council (EGDC) was formed to coordinate and oversee the implementation of the *UAE Green Agenda 2015-2030* and to ensure effective collaboration between federal and local authorities as well as stakeholders. As per the Cabinet decision on the Agenda in January 2015, the Council is chaired by the Minister of Climate Change and Environment, and its members consist of high-level representatives from five federal ministries (energy, infrastructure development, economy, finance, and foreign affairs and international cooperation) and all seven emirates of the UAE (Abu Dhabi, Dubai, Sharjah, Ajman, Umm Al Quwain, Ras Al Khaimah and Fujairah). MOCCA's Green Development Department serves as secretariat of EGDC.

By September 2015 five committees were established in line with the strategic objectives of the UAE Green Agenda. Each of them is mandated to formulate and implement 2-3 programs, of which each is broken down into 2-4 sub-programs (see above) designed under the Agenda. Each committee is coordinated by a federal

ministry and engages relevant ministries, local authorities and stakeholders. The EGDC members meet every quarter of the year to update and discuss each committee's

progress and performance according to the pre-defined parameters and indicators (see below).



Governance of the Emirates Green Development Council

## Membership of the Emirates Green Development Council (updated April 2016)

### Chair

**H.E. Dr. Thani Ahmed Al Zeyoudi**  
Minister of Climate Change and Environment

### Members - Representatives from the federal government

**H.E. Dr. Matar Al Neyadi**  
Undersecretary, Ministry of Energy

**H.E. Eng. Zahra Salman Al Aboodi**  
Undersecretary, Ministry of Infrastructure Development

**H.E. Abdullah Sultan Al Fan Al Shamsi**  
Assistant Undersecretary for Industrial Affairs, Ministry of Economy

**H.E. Saeed Rashid Al Yateem**  
Assistant Undersecretary of Resources and Budget Sector, Ministry of Finance

**Hamad Obaid Ibrahim bin Yaaqob Al Zaabi**  
Deputy Director, International Organizations,  
Ministry of Foreign Affairs and International Cooperation

### Members - Representatives from the emirates

**H.E. Razan Khalifa Al Mubarak**  
Secretary-General, Environment Agency - Abu Dhabi

**H.E. Ahmad Buti Al Muhairbi**  
Secretary General, Dubai Supreme Council of Energy

**H.E. Hana Saif Al Suwaidi**  
Director General, Sharjah Environment and Protected Areas Authority

**H.E. Saeed Saif Al Matrooshi**  
Secretary General, Ajman Executive Council

**H.E. Humaid Rashid bin Humaid Al Shamsi**  
Secretary-General, Umm Al Quwain Executive Council

**H.E. Dr. Saif Mohammed Al Ghais**  
Executive Director,  
Ras Al Khaimah Environment Protection and Development Authority

**H.E. Eng. Mohammed Saif Al Afkham**  
Director General, Fujairah Municipality



## Planning for the Green Agenda Implementation

The general meetings of the EGDC were held three times during 2015. The first meeting in June marked the official formation of the council, as its members were nominated from the ministries designated by the Cabinet and the executive council of each emirate, all of which were confirmed unanimously. The newly-appointed members reviewed and adopted the implementation mechanism of the UAE Green Agenda, including the appointment of coordinating authorities for the five committees (see above), and the set of Green Key Performance Indicators (Green KPIs) to monitor the progress of the Agenda implementation (see below). Following the first meeting, the secretariat conducted bilateral meetings with each committee and supported the recruitment and nomination of initial committee members from federal and local authorities.

In the second meeting of the council, held in September, the development of each committee's work plan was discussed. The secretariat proposed that each committee would formalize the designated Green Agenda programs and sub-programs in a few months



Second meeting of the Emirates Green Development Council (Dubai, September 2015)

based on identification and harmonization of existing initiatives and analysis of gaps in those initiatives. It was shared that in the short-term, during the current budget cycle of the federal government lasting until the end of 2016, the Green Agenda implementation would proceed only within the framework of the available budgets and existing projects. However, the council will guide each committee to systematically integrate Green Agenda

programs in the next budget cycle of 2017-2021 based on the developed action plan.

Furthermore, the secretariat presented each committee with a list of potential strategic partnerships that were aimed at helping implement specific Green Agenda programs and building the capacity and knowledge of policy-makers, while encouraging reactivation of existing memorandums of understanding between authorities and knowledge



A meeting of the Committee on Knowledge-Based Economic Diversification (Ministry of Economy, September 2015)

institutions. A draft “smart dashboard” was also presented, which would allow the council members to monitor the progress of the Green Agenda implementation and

Green KPIs via tablet computers (see below). Alignment of Green KPIs with the National KPIs defined under the UAE Vision 2021 and their integration into the performance

## Development of Green KPIs

In order to guide the formulation of policies as well as voluntary activities of the private sector and the civil society towards the Green Economy transformation, it is critical to establish a set of indicators as an effective compass to allow for monitoring and assessment of the underlying developments, progress and potential opportunities and

risks. The refined indicators should be able to serve to provide solid evidence based on which policy makers can set clear goals, formulate policies, review progress and evaluate impacts.

Aimed at primarily helping the EGDC to monitor and review the progress of Green

management system operated by the Prime Minister’s Office, were advised.

In the third meeting, held in December, each committee presented and agreed on their list of initiatives that would support the actual implementation of Green Agenda programs and sub-programs. A total of 96 initiatives have been identified (see Chapter 4), and the council directed the committees to develop detailed action plans for implementation and integration of initiatives into the next budget cycle. As one of the concrete steps in this direction, the introduction of a green public procurement policy in federal entities has been confirmed. The need to promote the Green Agenda and the council work among stakeholders through awareness raising, education and media communications was also highlighted.

Agenda programs and sub-programs in its quarterly meetings, 41 UAE Green KPIs have been selected according to the three dimensions (environment, economic and social) of sustainable development. As measuring the complex and multi-dimensional nature of the Green Economy is a challenging task, this framework and selection of indicators was

built upon the ongoing international efforts by the Organisation for Economic Development and Co-operation (OECD), UNEP, the World

Bank, GGGI, etc. At the same time, several relevant National KPIs were also adopted in the Green KPIs framework, so as to reflect the

local context and ensure alignment with the country’s overall development strategy (see table below).\*

### List of UAE Green Key Performance Indicators

Environmental	Economic	Social
ENV1: Rate of groundwater abstraction	ECO1: Real GDP growth (per emirate)	SOC1: Labor participation rate
ENV2: Water consumption per capita	ECO2: Share of non-oil GDP	SOC2: Employment rate
ENV3: Waste generation per capita	ECO3: Share of non-oil export	SOC3: <i>Emiratization rate</i>
ENV4: <i>Rate of waste recovery</i>	ECO4: GDP from environmental goods and services	SOC4: Number of green jobs
ENV5: Energy consumption per capita	ECO5: <i>R&amp;D expenditure in GDP</i>	SOC5: Number of UAE patents
ENV6: <i>Rate of non-fossil energy</i>	ECO6: <i>Foreign direct investment net inflows</i>	SOC6: <b>Global Innovation Index</b>
ENV7: <b>Carbon intensity of energy</b>	ECO7: <i>Doing Business Index</i>	SOC7: <i>Global Entrepreneurship Index</i>
ENV8: Total GHG emissions	ECO8: <b>Global Competitiveness Index</b>	SOC8: Environmental awareness rate
ENV9: <b>Ecological Footprint</b>	ECO9: <b>Water consumption per GDP</b>	SOC9: Environmental behavior rate
ENV10: Number of environmental regulations	ECO10: Waste generation per GDP	SOC10: <b>Human Development Index</b>
ENV11: Number of environmental standards	ECO11: <b>Energy consumption per GDP</b>	SOC11: <i>World Happiness Index</i>
ENV12: Ratio of protected areas	ECO12: <b>Material consumption per GDP</b>	
ENV13: Environmental expenditure	ECO13: GHG emissions per GDP	
ENV14: <b>Environmental Performance Index</b>	ECO14: <b>Efficiency of water and electricity production</b>	
ENV15: Ratio of green vehicles	ECO15: Average fuel efficiency of vehicles	

Note : Indicators in *Italic* : Corresponding to National KPIs  
 Indicators in **bold** : Headline Indicators for the 5 strategic objectives (see explanation below)

\* In the last edition of this report, a framework of the “UAE Green Economy Indicators” was introduced and the UAE performance was reported according to it. The set of Green KPIs is a revision of this framework, which was redesigned in a way to allow the EGDC to assign each committee clear ownership and responsibilities by allocating accountable indicators, as well as to monitor the country’s overall progress towards a Green Economy.

To help monitor and improve the outcomes of the Green KPIs by placing clear ownership and accountability, each indicator is allocated under one of the five strategic objectives of the Green Agenda, and each committee is designated as a “custodian” of 5-10 Green KPIs (see table below). The committees are expected to have the methodology, data gathering and processing procedures of the assigned Green KPIs in place and regularly monitor and report the outcomes to the secretariat.

Furthermore, two headline indicators are selected for each strategic objective so that each committee’s progress can be easily monitored and understood by the EGDC members. A total of ten headline indicators make up a “smart dashboard”, which will highlight the overall achievement of the UAE Green Agenda and the contributions to and consistency with the UAE Vision 2021.

It should also be noted that the outcome of each Green KPI is inevitably influenced

by the activities of different Green Agenda programs and other factors that may not be controlled by government and national stakeholders, and that the performances cannot be attributed only to a single committee. Chapter 7 presents and analyzes the latest data of Green KPIs.

#### Allocation of Green KPIs to EGDC Committees

Strategic Objective (Committee)	Headline Indicators	Other designated Green KPIs	Other relevant Green KPIs
1. Competitive Knowledge Economy	<i>ECO8: Global Competitiveness Index</i> <i>SOC6: Global Innovation Index</i>	ECO1: Real GDP growth (per emirates)	ENV8, 13 ECO4, 9, 10, 11, 12, 13 SOC1, 2, 3, 4, 8, 10, 11
		ECO2: Share of non-oil GDP	
		ECO3: Share of non-oil export	
		ECO5: R&D expenditure in GDP	
		ECO6: Foreign direct investment net inflows	
		ECO7: Ease of Doing Business Index	
		SOC5: Number of UAE patents	
2. Social Development & Quality of Life	<i>SOC10: Human Development Index</i>	SOC7: <i>Global Entrepreneurship &amp; Development Index</i>	ENV2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15 ECO1, 2, 3, 4, 9, 10, 11, 12, 13, 15 SOC7
		SOC1: Labor participation rate	
		ECO12: Material consumption per GDP	
		SOC2: Employment rate	
		SOC3: Emiratization rate	
SOC4: Number of green jobs			
SOC11: <i>World Happiness Index</i>			

Strategic Objective (Committee)	Headline Indicators	Other designated Green KPIs	Other relevant Green KPIs
3. Sustainable Environment & Valued Natural Resources	ENV9: Ecological Footprint ENV14: Environmental Performance Index	ENV1: Rate of groundwater abstraction	ENV2, 3, 4, 5, 8 ECO2, 3, 9, 10, 11, 13 SOC4, 7, 11
		ENV10: Number of environmental regulations	
		ENV11: Number of environmental standards	
		ENV12: Ratio of protected areas	
		ENV13: Environmental expenditure	
		ECO4: GDP from environmental goods and services	
		SOC8: Environmental awareness rate	
SOC9: Environmental behavior rate			
4. Clean Energy & Climate Change Adaptation	ENV7: Carbon intensity of electricity ECO14: Efficiency of water and electricity production	<i>ENV6: Rate of non-fossil energy</i>	ENV2, 4, 9, 13, 14
		ENV8: Total GHG emissions	ECO2, 4, 9, 11
		ECO13: GHG emissions per GDP	SOC4
5. Green Life & Sustainable Use of Resources	ECO9: Water consumption per GDP ECO11: Energy consumption per GDP	ENV2: Water consumption per capita	ENV8, 9, 10, 11, 13, 14 ECO4, 12, 13, 15 SOC4, 8, 9, 11
		ENV3: Waste generation per capita	
		<i>ENV4: Rate of waste recovery</i>	
		ENV5: Energy consumption per capita	
		ENV15: Ratio of green vehicles	
		ECO10: Waste generation per GDP	
ECO15: Average fuel efficiency of vehicles			

Note : Indicators in *Italic*: Corresponding to National KPIs

## Capacity Building for the Green Agenda Implementation



It is one of the most critical factors determining the success in Green Economy transformation (as well as in fulfilling many other policy objectives) whether the policy-makers, industry and citizens in a country are well equipped with knowledge and capability to elaborate effective measures, deliver programs and projects and take better

decisions and actions. The EGDC secretariat therefore regularly organizes opportunities for relevant policy officers and stakeholders to learn international best practices from prominent experts and share knowledge and experiences among practitioners. During 2015, such capacity-building activities were focused on two themes: eco-labeling and

sustainable public procurement (related to Program 3.2); and sustainable finance and investment (Program 1.2).

The Capacity Workshop on Eco-labeling and Green Public Procurement was organized in September by the EGDC secretariat and the then Ministry of Foreign Affairs in association with GGGI. Key policy-makers from authorities relevant to these policies were invited and the session was led by experts from the European Office of ICLEI – Local Governments for Sustainability, the Center on Sustainable Consumption and Production (Germany) and Agrofuturo (Italy). Based on the learning of global best practices, participants discussed how best those policies can be applied and the existing practices can be advanced in the UAE context, and identified each authority's role and collaboration opportunities.

In addition, MOCCAE joined two international networks – the Sustainable Public Procurement Programme and the Consumer Information Programme – set up under the United Nation's 10-Year Framework Programme on Sustainable Consumption and



Capacity Building Workshop on Eco-Labeling and Green Public Procurement (Abu Dhabi, September 2015)

Production (10YFP), which was adopted at the Rio+20 summit on sustainable development in 2012. This move aims to gather and share vital knowledge for introducing sustainable public procurement and eco-labeling policies as well as to share with the international community the UAE's own experiences.

In November, during the High-level National Meeting on Sustainable Finance

co-organized by MOCCA, EGDC and UNEP FI, banking managers were given an opportunity to experience interactive learning with two international experts on environmental and social risk assessment for integrated decision-making. Chapter 6 details the practices of green finance in the UAE.



UNITED ARAB EMIRATES  
MINISTRY OF ENERGY



الإمارات العربية المتحدة  
وزارة الطاقة

## His Excellency Dr. Matar Al Neyadi Undersecretary, Ministry of Energy

According to the United Nations, 65 countries around the world have embraced the development of Green Economy strategies. Out of these 65 countries, 45 countries have taken proactive steps to transform their economies and to develop national Green Economy plans.

The UAE is at the forefront of this transformation. Our nation has applied a series of fundamental policies and guiding principles to instill sustainable development at the core of its vision for growth, as captured in the *UAE Vision 2021*.

Transitioning into a green economy requires visionary and determined leadership. To achieve this, the leadership of the UAE has formed a government that emphasizes flexibility, responsiveness and dynamism; a government that empowers its ministries to embrace sustainable development and put forward ambitious policies, as well as tools and initiatives, to transform each sector and become enablers of the green economy.

The UAE Ministry of Energy has been working with great determination to deliver sustainable

development across the energy sector, as energy plays a fundamental role in the transformation of the UAE into a Green Economy. Long-term sustainability stands at the core of the vision of the Ministry of Energy. Over the years, the Ministry has enacted key policies to increase the production of clean energy, as well as the promotion of efficient use of energy, water and mineral resources. The Ministry of Energy has also worked with key energy stakeholders across the UAE to understand the synergies and opportunities that lie ahead for energy entities to contribute to the vision of a green economy.

2015 has been a particularly fruitful year for the UAE energy sector: we witnessed key milestones on the road towards a sustainable energy sector. The UAE continued to develop its significant investments in clean energy production to preserve natural resources and make a better use of oil and natural gas.

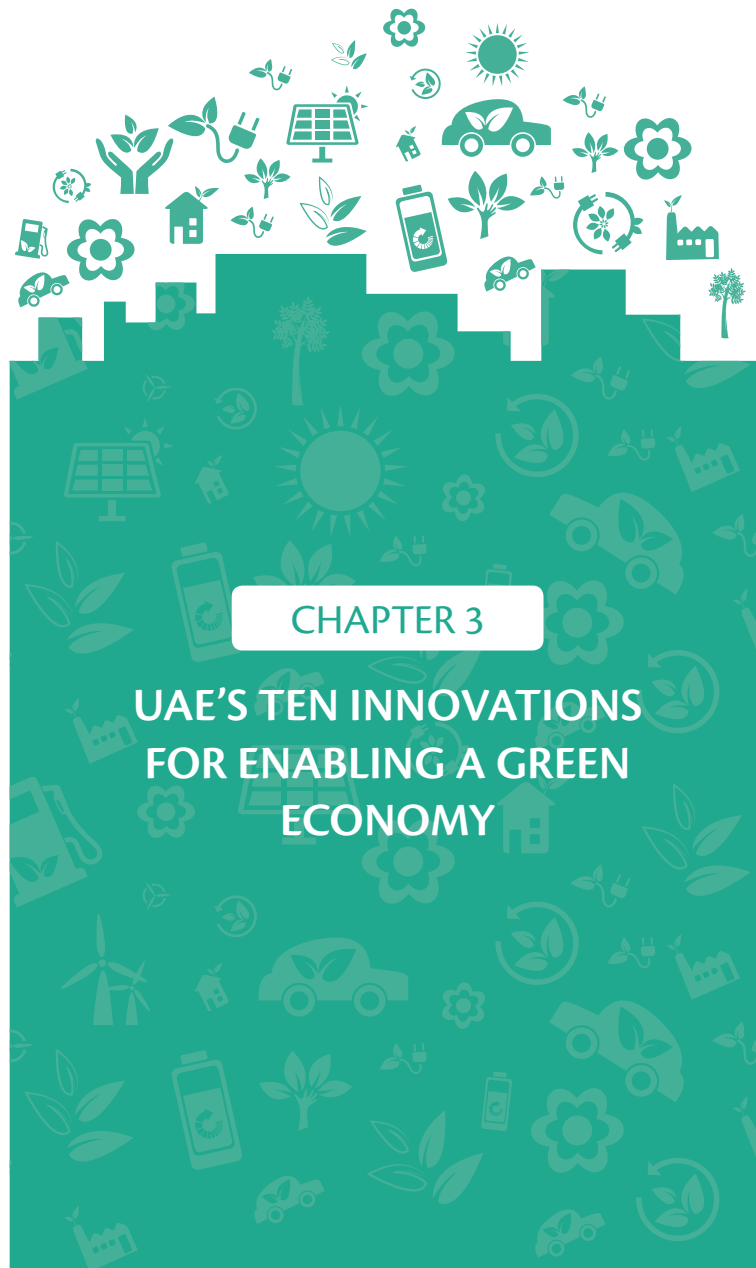
The nation also set the record last year for the world's cheapest and unsubsidized solar energy,

with 5.84 US cents per kilowatt-hour for the third phase of the Mohamed bin Rashid Solar Park. Last year also witnessed the introduction of sustainable energy policy when the Ministry of Energy launched the end of fuel subsidies in the form of new pricing structures for diesel and gasoline.

The Emirates Green Development Council (EGDC) is a key government platform to bring together the economic sectors of the UAE and to measure the transformation towards a Green Economy. Since its inception, the Council has taken decisive steps towards engaging public and private entities in the coordination of policies and proactive measures to accelerate the transformation.

This work has only begun and I share the enthusiasm of my distinguished peers who sit with me as members of the EGDC. We are determined to continue to work together and, under the guidance of the leadership of the UAE, to deliver a sustainable development and a prosperous green economy for our future generations.





## CHAPTER 3

# UAE'S TEN INNOVATIONS FOR ENABLING A GREEN ECONOMY

## UAE's Ten Innovations for Enabling a Green Economy



His Highness Sheikh Mohammed bin Rashid greets ASIMO, a Japanese humanoid robot

The UAE launched its National Innovation Strategy and designated 2015 as “the Year of Innovation” while laying out a comprehensive strategy to position the UAE among the world’s most innovative nations by 2021. The Cabinet directed all federal government bodies to boost cooperation

and to revise their policies to develop a nurturing environment for innovation. His Highness Sheikh Khalifa bin Zayed Al Nahyan, President of the UAE, said: “We must prepare and equip our generations in such a manner that they fit in the world in which we live, ensure their position among nations,

and make a prosperous future for us similar to our present.” The National Innovation Strategy focuses on fostering innovation mainly in seven sectors – renewable energy, transport, education, health, technology, water, and space – with the aim of enabling innovation to play an essential and integral role in achieving each sector’s key strategic objectives.

As part of the Year of Innovation, UAE Innovation Week was held on 22-28 November 2015, where the education, health, energy, environment, space, economy and service sectors showcased their innovations through more than 850 events across the country. At this occasion, the President announced the adoption of the Emirates Science, Technology and Innovation Higher Policy, which plans new national policies in legislation, investment, technology, education and finance to build a vibrant knowledge economy in the UAE, supported by future investment of over AED 300 billion (USD 82 billion). At the same time, a new AED 2 billion (USD 545 million) Sheikh Mohammed bin Rashid Al Maktoum Fund to

Finance Innovation was launched to support the transformation of innovative ideas into projects. This fund will guarantee commercial loans required to finance projects through the Ministry of Finance, also drawing in the support

of commercial banks, investment funds, family businesses and other funding entities.

Reflecting this latest development during the Year of Innovation, this chapter highlights

the ten original innovation initiatives being conducted in the country that aim to support the realization of a Green Economy, many of which were showcased during UAE Innovation Week.

## 1. Public Buildings Powered by Sunshine



PV modules installed on the rooftop of Rashid Abdullah bin Omran Hospital

In November 2015, the Rashid Abdullah bin Omran Hospital in Ras Al Khaimah became the first hospital in the UAE to be powered by renewable energy. As part of this project, solar photovoltaic (PV) modules were

installed across the rooftop of the 82-bed maternity and children's hospital and the car park shading while smart solar streetlights were installed to provide light for the hospital grounds. This installation, with a total capacity

of 554 kilowatts (kW), can now provide 16% of the hospital's total energy demand, yielding estimated annual savings of AED 267,000 (USD 72,700) from reduced energy bills and a carbon emissions reduction of 600 tons annually.

The project was initiated at the 2012 World Future Energy Summit by eight Young Future Energy Leaders (YFEL) members. YFEL, an outreach program of the Masdar Institute of Science and Technology, offers selected students and young professionals a year-long training and mentorship experience, working closely with government, industry and other organizations active in the area of alternative energy and sustainability. The eight YFEL 2012 members took on the project's planning and execution, and received support from the Institute and the Special Projects Unit of Masdar (Abu Dhabi Future Energy Company). They were involved in identifying potentially suitable sites, conducting viability studies, obtaining approvals, assisting in timely completion and



The YFEL members and VIPs celebrating the completion of Abdullah bin Omran Hospital solar energy project

tendering for a contractor, before testing and handing over the completed project. The Rashid Abdullah bin Omran Hospital solar energy installation was commissioned by the then Ministry of Public Works.

An additional innovative aspect of this project is that the polycrystalline PV modules used to provide the solar energy for the hospital were manufactured in Fujairah, supporting the UAE's efforts to develop its renewable energy sector while creating economic opportunities and jobs in high-tech industries.

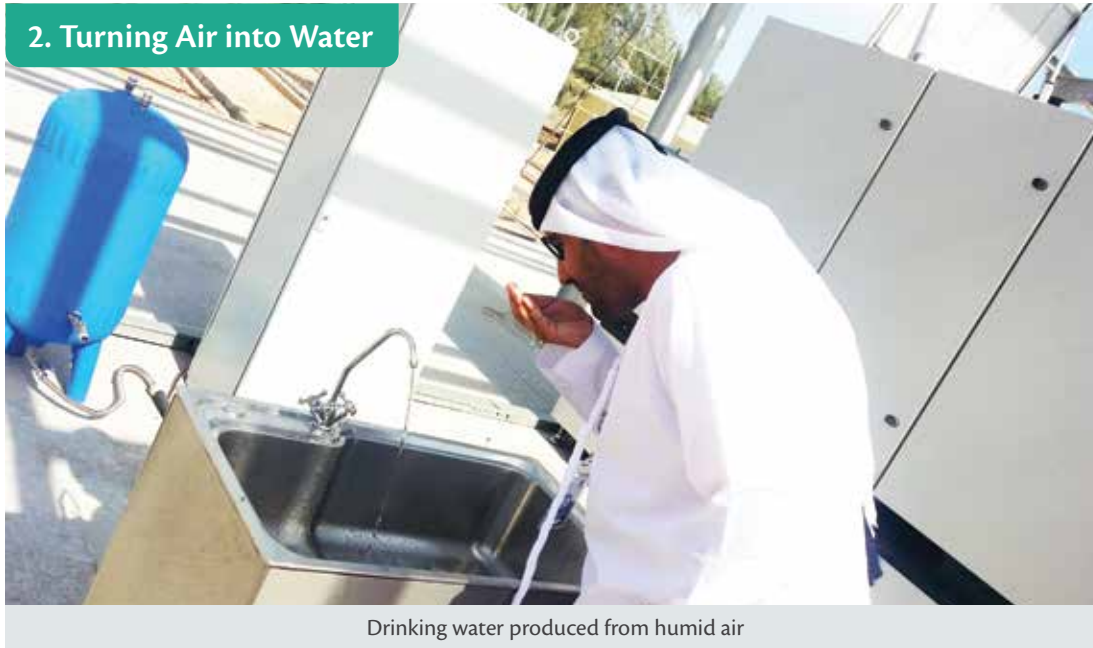
The Sheikh Zayed Housing Programme (SZHP) was established to provide suitable housing for UAE national families in order to contribute to achieving the aspirations of the UAE government in the provision of a high standard of living for UAE nationals. UAE nationals who do not own a suitable house for their families and have not received housing aid from any government authority for 15 years are eligible for housing assistance provided by the program in the form of a new house, loan or grant.

SZHP is planning to provide this public housing with an option to install solar PV panels on rooftops and feed back the excess electricity collected by them, into the grid. This idea was proposed by a local firm, New Step Solar Energy. According to a feasibility study made by SZHP, if a 10 kW PV system is installed on the rooftop of a typical public house, AED 9,500 (USD 2,600) would be saved in electricity bills annually. As the initial instalment of the system cost AED 120,000 (USD 32,700), the investment could be recovered within 13 years. SZHP is looking into the best financing model for enabling PV installation in collaboration with the International Renewable Energy Agency (IRENA).



A villa built by Sheikh Zayed Housing Programme in Dibba, Fujairah

## 2. Turning Air into Water



Drinking water produced from humid air

The hot climate of the UAE, which is both warm and highly humid throughout the year, provides the opportunity to produce a reliable source of water through the use of an atmospheric water generation mechanism.

The Ministry of Climate Change and Water (MOCCA) has thus identified an idea and a suitable partner for piloting and deploying atmospheric water generation technologies. There are multiple uses for the generated water, such as agricultural purposes, aqua-

farming, potable water generation and district cooling. In February 2015, the ministry signed joint agreements with Taipei-based technology firms for the implementation of the Drop of Life Project, which aims to demonstrate and promote the extraction of freshwater from air humidity.

The ministry team visited Taipei in August 2015 to see the first display of this technology. Prototypes were displayed during UAE Innovation Week in November 2015. This

atmospheric water generation system is planned in the UAE to integrate the following components:

- Solar panels used to power the system – both for cooling of greenhouses and operation of the water generation machine.
- The generated water is used for aqua farming. The water is enriched with nutrition from this process.
- The enriched water can be used for agricultural purposes.

At the demonstration, the prototype systems, which utilize nanotechnology,



Machine converting humidity into drinking water



From the Drop of Life Project

successfully produced around 200 liters of freshwater per day by collecting the moisture in the air and condensing it into water efficiently. One of the systems was fully powered by solar PV panels set on the site, together with battery storage. The ministry's aim is to build a solar-powered system for producing 1,500 liters of water per day that fits into a single container, to make it mobile for placing in remote areas.

In 2012, French company Eole Water conducted trials of its unique patented wind turbine in Abu Dhabi. This turbine can convert humidity in the air into water and at the same time is able to generate electricity. The tests were successful and showed that the device can withstand harsh desert conditions and sandstorms, and the quality of extracted water was within the regional standards for drinking water.

It works by drawing ambient air onto a heat exchanger aimed at cooling down the air to its dew point, causing condensation. The liquid water is led to the ground through the main stem of the turbine, and then filtered, eventually becoming drinking water.

The full-scale installation of the wind turbine was dropped for logistical reasons but the French design office has resumed its investigations of solar-driven machines, which are easier to install and incorporate into the UAE environment. The company says that the upcoming model will be able to produce several hundred liters of drinking water each day, just from the air and the sun.



Wind turbines that convert air humidity into drinking water

### 3. Desalination Without Fossil Fuels



Sampling water produced from the pilot desalination plants in Ghantoot, Abu Dhabi

(left to right: H.E. Dr. Sultan Al Jaber, Minister of State, Director General of Abu Dhabi National Oil Company and Chairman of Masdar; H.E. Dr. Ahmad Belhoul, Minister of State for Higher Education and former CEO of Masdar, and H.E. Suhail Al Mazroui, Minister of Energy)

It is critical for the UAE to identify a sustainable desalination solution to meet long-term water needs as most potable water relies on desalination due to the lack of natural freshwater sources. In the UAE, seawater desalination requires ten times more energy than surface freshwater production, and demand for freshwater is projected to grow by 30% by 2030. Connecting desalination technologies to renewable energy is one solution to drastically reduce the reliance on fossil fuels and carbon emissions.

Masdar thus launched its Advanced Energy-Efficient Desalination Pilot Project in 2013 aimed at developing and demonstrating seawater desalination technologies that are efficient enough to be powered by renewable energy. In 2014, four companies – Abengoa, Suez, Sidem (Veolia) and Trevi Systems – were awarded contracts to build and operate their own test plants in Ghantoot, Abu Dhabi. During UAE Innovation Week in November 2015, the operational stage of the pilot project was officially launched. Over the next fifteen months

four plants will demonstrate innovations in different advanced membrane technologies, which are more energy-efficient than the thermal processes currently in use at most desalination plants. The test plants will also provide 1,500 cubic meters (m<sup>3</sup>) of potable water daily, enough to meet the requirements of around 500 homes.

The target of this project is to dramatically reduce the energy intensity of desalination by up to 40%, achieving less than 3.6 kilowatt-hours (kWh) per m<sup>3</sup> of produced water at a salinity of 42,000 milligrams per liter (mg/l). In the subsequent implementation and development phase of the project, the technologies that meet predefined criteria will be scaled up and will be entirely powered by renewable energy. The ultimate goal is to have a commercial-scale facility operating by 2020.

This project goes beyond traditional research and development (R&D), and is considered research and development transformation (RDT), allowing new technologies to be developed faster, leading to accelerated adoption and implementation by utility service providers. The partnership between Masdar and the project participants is also expected to stimulate knowledge transfer as the Masdar Institute coordinates hands-on engagement of its students with the international partners for research and studies in membrane



Desolenator solar desalination unit

distillation, capacitive deionization and cutting-edge forward osmosis.

When an Abu Dhabi-based Dutch entrepreneur William Janssen first saw solar water heaters on rooftops in Thailand, he came up with the idea of adding a PV solar panel that could be used to boil water for desalination. He also realized that he could use a heat exchanger to make the desalination process more efficient as while the hot water vapor is condensing, it can be channeled within the unit to help warm up the next batch of cold water. Mr. Janssen started working on a prototype of solar power-based desalination device from his Abu Dhabi home in his spare time and eventually set up a UK-registered company in 2013, which is now part of Imperial College London's incubator program.

Desolenator, the invented free-standing solar desalination unit, can produce around 15 liters of clean water a day from seawater or other dirty water, requiring no power other than the sun and has no moving parts or filters, which ensures easy maintenance. The user feeds water in a pipe and the solar panel provides enough heat and electric energy to boil and cleanse the water. Each unit would cost only about USD 590 (AED 2,170) if mass

produced, and Mr. Janssen's long-term focus is to provide water to the one billion people around the world who do not have access to clean water through non-governmental organizations or microfinance. He launched a crowdfunding campaign and raised over USD 150,000 (AED 551,000). The next step is to produce about 1,000 units for testing in a village in Tamil Nadu, India based on this funding.

#### 4. Flying by Fuels from Salt-tolerant Plants



Etihad aircraft making a test flight with locally produced biofuel

In June 2015, Etihad Airways, together with Boeing, Total, Takreer (the refinery subsidiary of Abu Dhabi National Oil Company) and the Masdar Institute, launched the BIOjet Abu Dhabi Roadmap for the sustainable production of aviation biofuels in the UAE. This was the

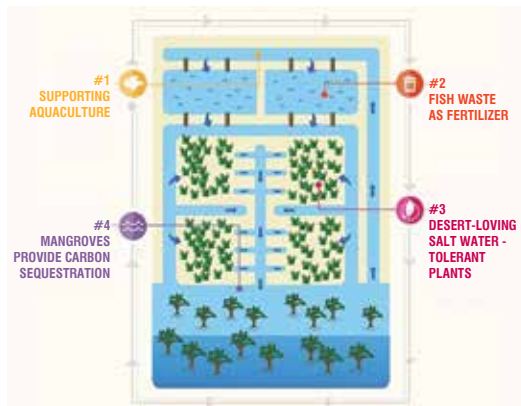
culmination of a year-long dialogue between the five partners of the BIOjet Abu Dhabi initiative, and local and global stakeholders. The roadmap details Abu Dhabi's potential to produce aviation biofuel locally and sustainably, taking into account all elements of



the supply chain, from feedstock supplies to bio-refining and distribution.

James Hogan, President and CEO of Etihad Airways, explains the idea behind this initiative: "The industry's license to grow can only be granted if we find and implement ways to lower the carbon footprint of commercial aviation."

The roadmap explores how a supply chain can be established in the UAE through the exploration of sustainable feedstocks, new infrastructure requirements and necessary policy frameworks. This is built on local research undertaken by the Sustainable Bioenergy Research Consortium, led by the Masdar Institute, whose flagship project is the



The concept of the integrated Seawater Energy and Agriculture System (SEAS)

integrated Seawater Energy and Agriculture System (SEAS). SEAS is an initiative to develop a unique form of agriculture, producing food and energy products from salt-tolerant halophyte plants grown on traditionally non-arable desert land irrigated with seawater. The roadmap

concludes that Abu Dhabi holds significant potential to supply domestic feedstocks from halophyte plants, as well as inland planted forest areas and municipal and agricultural waste.

The pilot SEAS facility is currently under construction in Masdar City, Abu Dhabi.

## 5. New Business Models for Clean Energy



Enerwhere's solar-diesel hybrid plant at the Saadiyat Accommodation Village, Abu Dhabi

Daniel Zywiets arrived in the UAE in 2008, where he worked as a consultant at Masdar and other renewable energy projects in the region. He quickly found that implementation of the ambitious plans for renewable energy was going slowly, hampered by the low electricity prices at the time. Looking for economically viable applications for renewables, he found that many remote facilities like workers' villages, construction sites and islands in the UAE were running on diesel generators, at a

cost up to ten times higher than the subsidized grid electricity prices. While many of these sites were small, the total installed diesel generator capacity in the UAE reaches around 1,000 megawatts (MW), a potential market size nearly as large as the renewable energy target announced by the Abu Dhabi government for 2020.

Seeing the opportunity, he co-founded Enerwhere in Dubai in 2012 to bring solar commercial-scale solutions to clients without a stable grid

connection. The first problem to solve was that of transportability, as most clients did not own the land around their site or were not likely to stay in the same location for 15-20 years. The company therefore developed a new ballasted mounting structure design, allowing it to offer solar power on a rental basis. This unique rental model allows clients to benefit from cheaper solar power for short-term projects without incurring heavy upfront capital investments themselves.

After an initial demonstration plant performed well on the World Islands in Dubai, the company soon took over the complete power supply for the Saadiyat Accommodation Village (SAV), the home of the 8,000-man workforce building the Louvre Abu Dhabi and other attractions on Saadiyat Island. The 5 mega-volt ampere (MVA) solar-diesel hybrid plant utilizes solar PV for daytime power, while the diesel generators guarantee power availability at night and during periods of bad weather. As much of the electricity demand is during daytime, this enables the share of solar energy to take 30-80% of peak demand, depending on the season and the shape of the load curve. The innovative design won the company the Middle East Solar Industry Association's "Project of the Year" award in 2014.

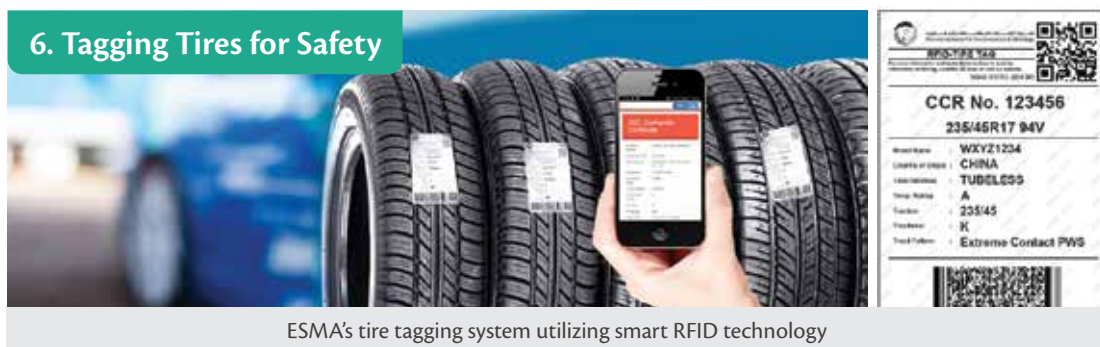
Today the company has expanded its footprint beyond the UAE to several African countries, including Nigeria and Zimbabwe, with plans

for further expansion. Apart from the original off-grid service offering for workers' villages and construction sites, the company now also builds solar power plants for factories and warehouses under the Shams Dubai solar initiative (see Chapter 5).

Yellow Door Energy was established in 2015 as a subsidiary of Dubai-based Adenium Energy Capital, an investment firm specializing in solar energy financing and operations with utility-scale projects in the Middle East, Europe and Japan. Yellow Door focuses on investing in solar net metering projects in the UAE and Jordan, through a customized leasing business model that is designed according to the needs of businesses and institutions. While the company invests in the capital

expenditure and arranges the construction, permitting, operation and maintenance of the solar PV systems, the building owners only need to take care of monthly bills for the energy generated by the systems. The systems can be part of the Shams Dubai initiative as the unused surplus electricity can be exported to the grid.

For example, if a solar PV system with capacity ranging from 100 kW to 10 MW is installed under a 20-25 year lease term, Yellow Door can provide the building owner with an initial savings of 5-15% on their electricity bill from the first day of the system operation, subject to roof assessment and climate data review. So far, eight leasing contracts (two in Dubai and six in Jordan) have been concluded.



ESMA's tire tagging system utilizing smart RFID technology

Tires in the UAE must be able to withstand high temperatures due to the country's harsh climate. Tires meant for colder regions are

liable to wear out faster or burst, endangering lives. Sub-standard or inappropriate tire use has caused a number of fatal road crashes in

the country, despite repeated warnings from authorities, the reason being that consumers may not be aware of the appropriate specifications or understand the coded inscriptions on tires. Some motorists even willingly buy unregulated varieties to save money.

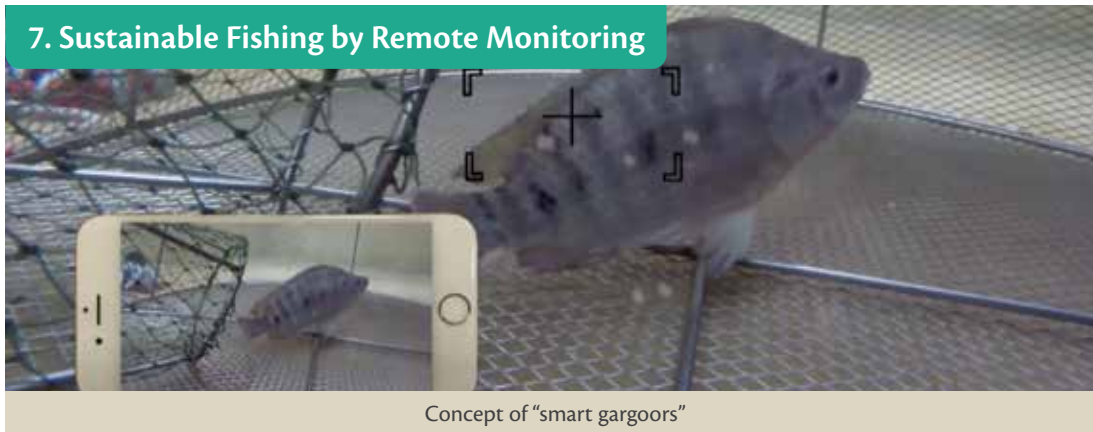
The Emirates Authority for Standardization and Metrology (ESMA) came up with the idea that an ID number be given to tires to monitor them from manufacturing to installation, to make sure the tire matches the requirements

of the regional standards and is appropriate to use in the UAE climate. A mandatory tagging system thus has been rolled out in 2015, which is considered to be the first of its kind in the world.

The system aims to solve two issues together: protection of the consumer from parallel imports not designed for the region and protection of traders from damage to their reputation caused by incorrect use of their products. The tags are readable by smart

phones and confirm if the tire is compliant with the UAE specifications and registered with ESMA, besides carrying basic information such as its manufacturer, vehicle type, country of origin, date of production, weight, pressure and speed range. Using QR code readers on mobile phones, consumers can instantly know if the tire meets the standards and the vehicle type for which it is meant. There is also an RFID chip that can be read by inspectors using handheld devices.

## 7. Sustainable Fishing by Remote Monitoring



Concept of "smart gargoor"

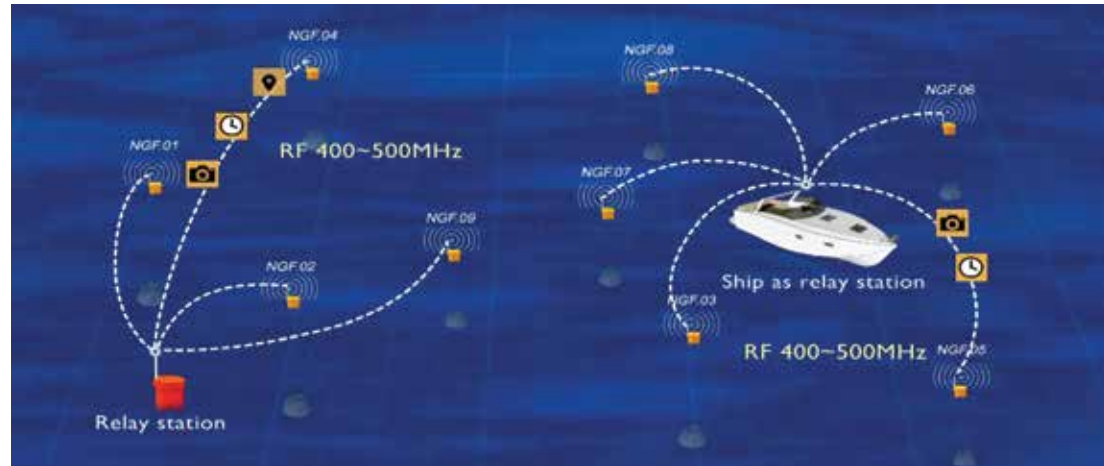
Commercial fishing in the UAE has been carried out using a variety of traditional fishing equipment and technologies. Multi-gear artisanal fisheries catch over 100 species of fish. The recent development of the fishing

fleet has led to excess pressure on a variety of commercial species. The numbers of boats and traps have multiplied over the years and the estimated fish stocks have radically dropped in the UAE's territorial waters (53-70% decline

between 2002 and 2011), highlighting the need for improved management plans and regulations.

The gargoor, a dome-shaped wire trap, is by far the most important type of traditional fishing gear in the UAE. Conventional gargoor are normally connected to floating buoys to determine their location but do not provide any information on what is inside the traps. The fishermen can only find out what the gargoor has trapped when they draw them out from the bottom of the sea. This not only requires much time and effort of fishermen but also the loss gargoor can lead to "ghost fishing", whereby forgotten or abandoned gargoor continue to trap fish, resulting in destroying valuable habitats and lowering the fish stock.

As part of innovation efforts, MOCCA came up with an idea of “smart gargoor”, which adds a wireless sensor that sends real-time information to the user, such as the GPS coordinates of the trap, biomass details (amount and number of fish) in the trap, and images of fish inside the trap to identify species. Every smart gargoor consists of four modules: communication, power supply and device management, floating and suspension, and image and motion sensing. The information and images within a particular zone are transmitted to a relay station, which then forwards the information to the operation center, which processes the images and create reports compiling the status of all traps.



How “smart gargoors” capture and send images

The concept was successfully presented during UAE Innovation Week in November 2015. The next steps are to conduct cost analysis and

pilot testing to design and test the system’s software and sensors.

## 8. Price Reforms for Rational Consumption

	Actual Cost at 10.55 AED/Unit	Subsidy
	40.84	-16.30
<b>Subsidy (2016)</b>		19.78
	-8.62	35.70
	0.00	0.00
	0.00	0.00
<b>Total to Pay</b>		

Abu Dhabi’s water bill indicating the amount of subsidies given to the consumer

Fuel prices in the UAE have been kept low for many years through price controls on gasoline and diesel. The International Energy Agency (IEA) estimates that the UAE’s total energy subsidies in 2013 amounted to USD 22.2 billion, which is equivalent to 5.6% of GDP; 65% of the total cost of energy supply was subsidized. Energy subsidies have been considered a drag on financial resources that could be used more productively elsewhere, such as education and infrastructure. Furthermore, low prices

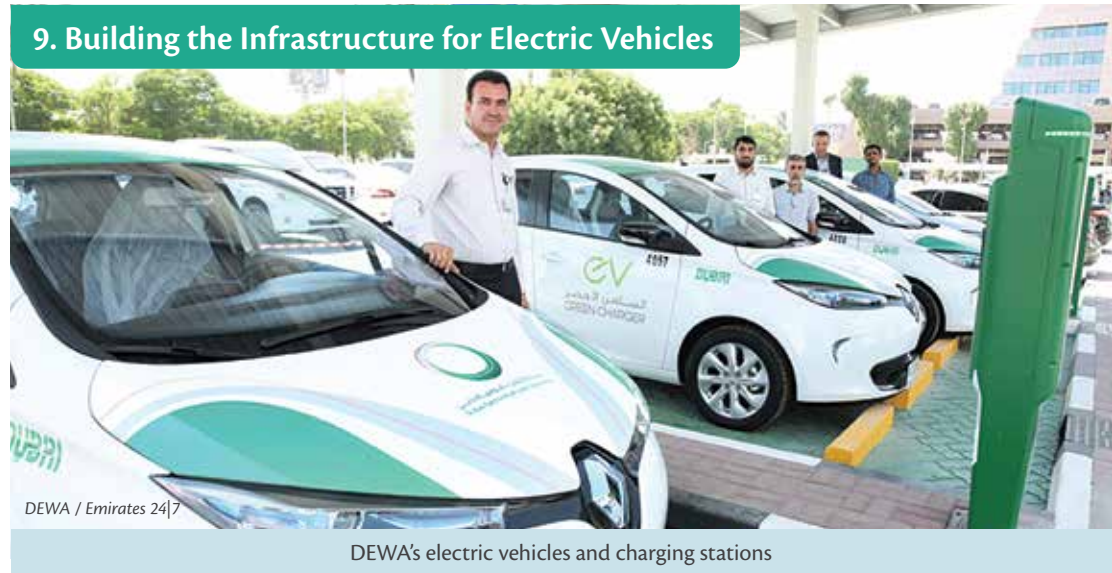
facilitate higher consumption, and as a result they are not environmentally sustainable.

In August 2015, fuel prices were deregulated by the Ministry of Energy, with a new pricing policy linked to global prices. The reforms are widely seen as a progressive step in fiscal reforms in the context of falling oil prices and resultant decline in government revenues. His Excellency Suhail Al Mazroui, Minister of Energy, said: "The resolution is in line with the strategic vision of the UAE government in diversifying sources of income, strengthening the economy and increasing its competitiveness in addition to building a strong economy that is not dependent on government subsidies." With regard to other benefits of the decision, the minister added that deregulating fuel prices would help decrease fuel consumption and preserve natural resources for future generations. It will also encourage individuals to adopt fuel-efficient vehicles and the use of public transport. This will have a positive impact in lowering carbon emissions from the transport sector, where is currently responsible for 22% of the total greenhouse gas emissions in the country. The Petrol and Diesel Prices Committee was set up to review fuel prices against average international levels. On the 28th of each month, the committee announces the prices for the following month.

Additionally, a slab tariff system has been applied in some parts of the UAE by federal and local authorities for water and electricity consumption of residential, industrial, commercial and governmental users. This system assures that as consumers use more water or power, the cost per unit becomes higher, so that it encourages more rational, efficient use of resources while reducing government

subsidies. Abu Dhabi, which had high subsidies, was the latest of the emirates to introduce this progressive tariff system in 2015. The reformed tariff rates increased by up to 170% for water and up to 40% for electricity for expatriates, whereas tariff rates for UAE nationals also increased. A further increase in tariff rates was announced in 2016 for consumers exceeding a certain level of consumption.

### 9. Building the Infrastructure for Electric Vehicles



DEWA / Emirates 24/7

DEWA's electric vehicles and charging stations

In 2015, the Dubai Electricity and Water Authority (DEWA) started introducing electric vehicle (EV) charging stations in the emirate. The move is part of the Smart Dubai Initiative

launched by His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and the Ruler of Dubai, to transform Dubai into the happiest

place on Earth with the lowest carbon footprint and to help the city provide efficient and quick services to its residents and visitors.

As part of the first phase of the project, DEWA installed 100 charging stations in various locations of Dubai, such as malls, airports, commercial buildings, residential complexes, and petrol stations. Three types of technologies have been introduced: fast-charging stations which take 20-40 minutes installed at petrol stations, while regular charging stations for 2-4 hours were installed in shopping malls, parks and office areas. The charging stations located at DEWA headquarters and its Sustainable Building in Al Quoz are powered by solar panels.

Motorists can obtain DEWA EV cards to use the public charging stations, and the cost can be added to their monthly DEWA bills. Customers without a DEWA account can obtain an EV-ID card and pay per consumption.

This initiative is built around the idea that the introduction of a charging infrastructure throughout a city encourages the public and the commercial sector to start using hybrid and electric vehicles. DEWA also added the first eight electric vehicles to its fleet in October 2015, becoming the first government organization in Dubai to use these new silent, pollution-free vehicles.

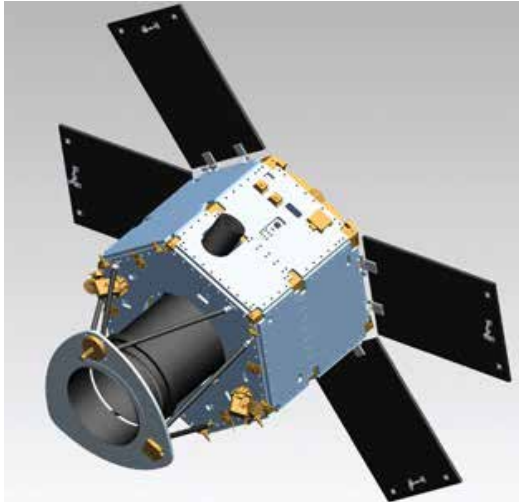
## 10. Spatial Planning by Satellite Images



A satellite photograph captured by DubaiSat-2. Vegetation is marked in red

In July 2014, His Highness Sheikh Mohammed bin Rashid Al Maktoum, the Vice President and Prime Minister of the UAE and Ruler of Dubai, announced the Emirates Mars Mission to send an unmanned probe to the red planet in 2020, making the UAE the first in the Arab world to do so. The probe is planned to reach Mars several months later, in time to celebrate the UAE's 50th anniversary in December 2021. The UAE Space Agency has since been established to direct national space programs that will have direct benefits to the country's economy and human capital.

The Dubai Government also established the Mohammed bin Rashid Space Center (MBRSC) in April 2015, to which the Emirates Institution for Advanced Science and Technology (EIAST) will be affiliated, to develop research, projects and studies on space in a way that will support the UAE's drive to advance this sector and build national capabilities. MBRSC has already accomplished a number of significant achievements, most notably the launches of Earth observation satellites DubaiSat-1 and DubaiSat-2, both of which continue to orbit the planet, capturing



Earth observation satellite, DubaiSat-2

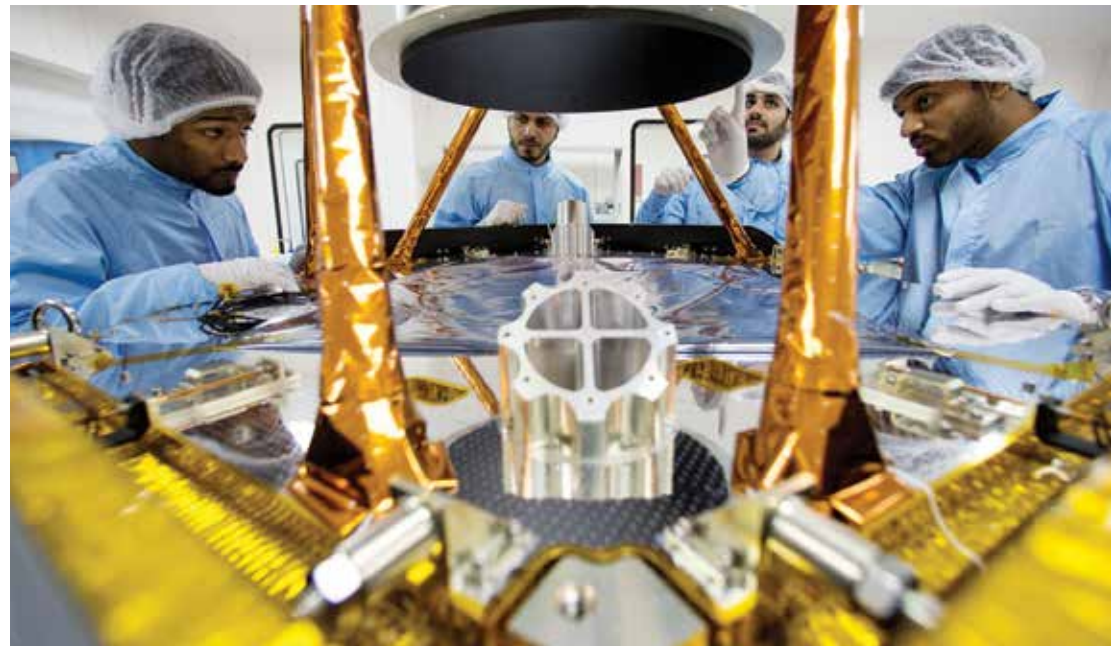
high-resolution imagery beamed back to its headquarters.

During UAE Innovation Week, MBRSC announced ten new innovative space technologies and satellite applications. Among them, Saeed Al Mansouri, Acting Head of MBRSC's Applications Development and Analysis Centre, has developed an image processing application for space images captured by DubaiSat-2 entitled "Semi-Supervised Classification Tool for DubaiSat-2 Multi-Spectral Images". Although there are several commercial applications with similar features, the innovative technique of this

tool lies in its parameters that are designed to be compatible with DubaiSat-2 images. This increases its accuracy and makes it easier to use, providing precise figures on the categories entered by users.

This tool is aimed at giving decision-makers accurate analytical results of urban developments in the country, whether buildings on land or removed facilities, as well as highlighting the changes taking place in both

the vegetative and aquatic areas. It constitutes a qualitative leap in terms of the development of technical software used in the image processing sector and space analysis in the country, as it will serve a large segment of public and private service institutions, such as municipalities, the Dubai Roads and Transport Authority (RTA) and MOCCA, and will also be useful in studies and research carried out by universities and educational institutions in the UAE.



Emirati scientists and engineers working for the Mars Mission at MBRSC



UNITED ARAB EMIRATES  
MINISTRY OF INFRASTRUCTURE  
DEVELOPMENT



الإمارات العربية المتحدة  
وزارة تطوير البنية التحتية

## Her Excellency Eng. Zahra Salman Al Aboodi

Undersecretary, Ministry of Infrastructure Development

The Green Economy comes in line with the *UAE Vision 2021*, a part of the national agenda to ensure sustainable development, environmental protection and harmonizing economic and social growth under the visionary guidance of the UAE's wise leadership.

His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, launched the *UAE Green Growth Strategy in 2012* where six tracks were introduced to enhance the Green Economy in the UAE, including sustainable transportation and clean air initiatives. Our GDP has grown 27 times since 1975 and in parallel with this rapid growth, our demand on infrastructure has increased. It is important to understand the UAE's national context and to be encouraged to take part in the ongoing and forthcoming initiatives.

The UAE's *Green Building Guidebook* came out in 2009 as a partnership between our ministry and the Executive Office in Dubai to set standards for designing and executing green buildings. Our ministry launched its *Sustainable Urban Development Strategy in 2015*, highlighting our role in maintaining sustainability in economy, society and environment through a set of initiatives catering to urban, transport and building projects along with internal activities within the ministry, in order to establish a benchmark.

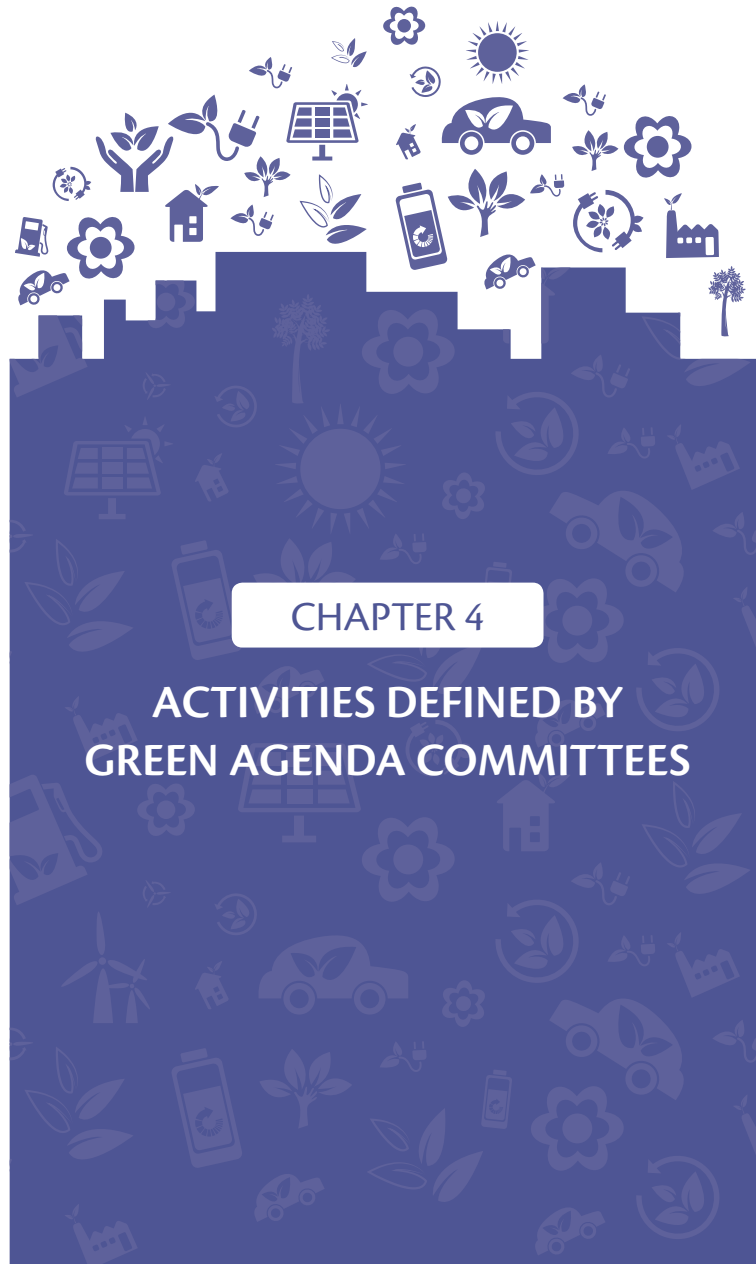
The challenges faced today stem from climatic change. The opportunities, on the other hand, are rather promising, with new strategies and initiatives being developed to enhance green lifestyles and reduce carbon emissions and footprint. We know that our efforts have been achieved as the UAE has earned first place in the

Road Quality sector in the *Global Competitiveness Report*.

On the federal level, the ministry completed a study on the sustainability rating system *The Palm*, where projects will be measured to meet the required standards. The implementation phase is yet to take place. The Palm rating system will act as a benchmark for sustainable living in the region to enable the development of public infrastructure to be greener and more sustainable.

The promulgation of such a benchmark will need skilled workforce to enhance the productivity and sufficiency of infrastructure projects. We will continue working to raise the bar and achieve our goals to promote innovation for a greener economy, where our knowledge and creativity will act as a guide for a promising sustainable future.





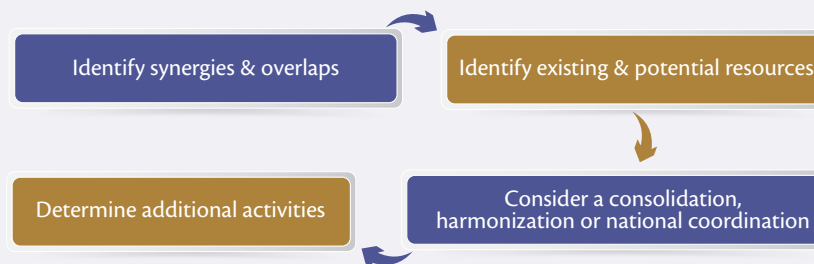
## CHAPTER 4

# ACTIVITIES DEFINED BY GREEN AGENDA COMMITTEES

## Activities Defined by Green Agenda Committees

As outlined in Chapter 2, the *UAE Green Agenda 2015-2030* defines twelve programs and 31 sub-programs as concrete action itineraries, which are structured under its five strategic objectives. The five inter-ministerial committees were established according to the strategic objectives, each of which developed a list of forthcoming activities to be conducted in the short term, based on identification and harmonization of existing initiatives and analysis of gaps in those initiatives (see figure right).

This chapter introduces a total of 96 activities that the five committees identified and committed to implement in the next few years, with a highlight of key ongoing activities. Also presented are the current membership of each committee and the gaps to be filled by further actions through the systematic integration of Green Agenda programs into the next budget cycle of 2017-2021.



Process by which the action plan of each Green Agenda Program was developed

## Committee on Knowledge-Based Economic Diversification

### Members

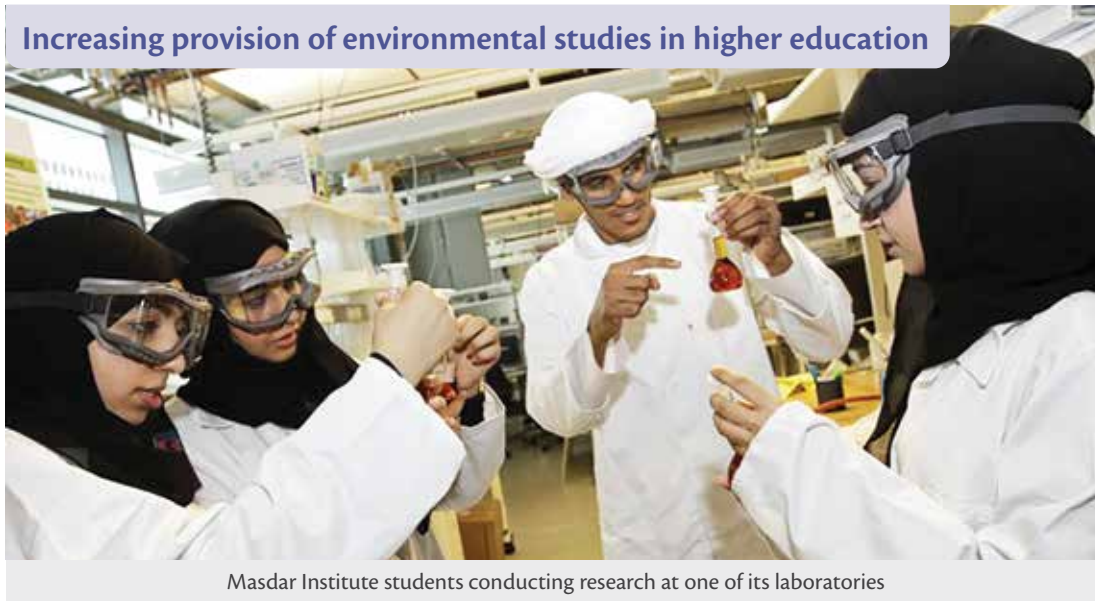
Coordinator	Ministry of Economy
<b>Federal entities</b>	Ministry of Climate Change and Environment Ministry of Education Emirates Development Bank
<b>Local entities</b>	Abu Dhabi Department of Economic Development Dubai Department of Economic Development Sharjah Department of Economic Development Ajman Department of Economic Development Umm Al Quwain Department of Economic Development Ras Al Khaimah Department of Economic Development Fujairah Department of Economic Development Abu Dhabi Education Council Dubai Knowledge and Human Development Authority

### Identified Green Agenda activities

Program	Identified Activities
1.1 National Green Innovation Program	<ul style="list-style-type: none"> <li>• Licensing and accrediting professional training programs in green fields</li> <li>• Student scholarship for environmental courses in higher education</li> <li>• Financing studies and research on green specialties</li> <li>• Research initiatives that support the emergence of a knowledge-based green economy</li> </ul>
1.2 Green Diversification Program	<ul style="list-style-type: none"> <li>• Study incentive packages for supporting green manufacturing</li> <li>• National program on awareness raising and education of green manufacturing</li> <li>• Include focus on green industries in the Emirates Industrial Development Strategy</li> <li>• Develop rules and national indicators on green manufacturing</li> <li>• Financing program for green industries</li> <li>• Policy on integrated management of industrial waste</li> </ul>

#### Identified gaps

- Development of policies and more initiatives for stimulating green innovation and industries
- Define and roll out support mechanisms for green diversification



Increasing provision of environmental studies in higher education

Masdar Institute students conducting research at one of its laboratories

To advance green innovation, one of the fundamental actions to be taken is to foster educational programs for sustainable development, particularly in higher education, so as to equip future generations to accelerate research and development of enabling technologies and systems. The establishment of more undergraduate and graduate degree programs in related fields, and upgrading existing university courses, is believed will strengthen the country's reputation as a knowledge hub in the region. It will also help the UAE's universities achieve global status. For the last few years, the Ministry of Education has been actively working to accredit academic programs on environmental and energy

studies in public and private higher education institutions. To date, twelve UAE institutions provide nearly twenty environment-related courses (see table right), with most relating to scientific fields.

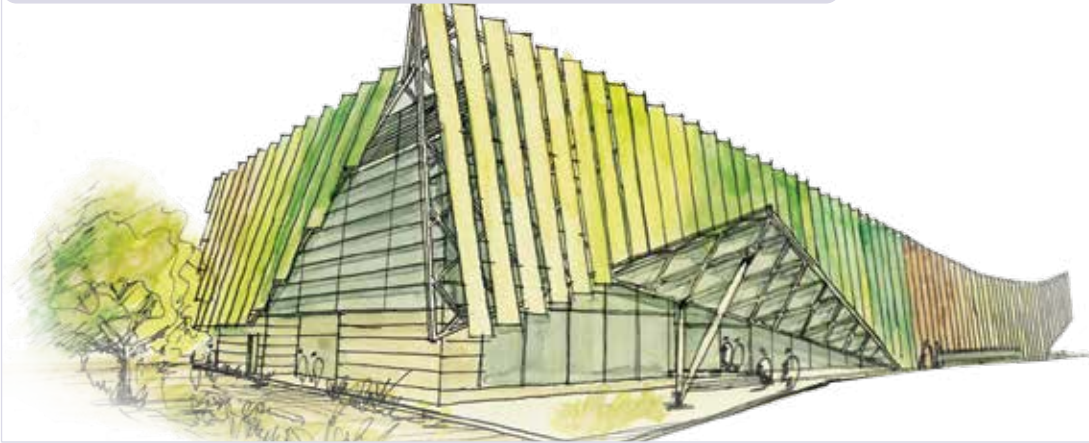
Among them, the Masdar Institute of Science and Technology acts as a research-driven, graduate-level university exclusively focused on advanced energy and sustainable technologies. With the ongoing support and cooperation of the Massachusetts Institute of Technology (MIT), the Masdar Institute offers Master's and PhD degree programs based on the US graduate education system to students from more than 40 countries, aiming to integrate theory and practice to incubate a culture of innovation and entrepreneurship. The Institute was ranked first for research citation impact in the 2015 US News and World Report's inaugural Best Arab Region Universities ranking, which listed more than 90 institutions across 16 countries. Three UAE universities also made it into the first Times Higher Education rankings for the MENA region announced in February 2015 – the UAE University being ranked 11th, American University of Sharjah 17th, and the Petroleum Institute in Abu Dhabi in 20th position.

#### Degree courses in environmental fields offered by UAE higher education institutions

Institution	Degree program
Abu Dhabi University	BSc in Environmental Health and Safety
	BSc in Environmental Science
	MSc in Sustainable Architecture
Abu Dhabi Vocational Education and Training Institute	Diploma of Environment, Health and Safety
American University of Sharjah	BSc in Environmental Sciences
British University in Dubai	PhD in Architecture and Sustainable Built Environment
	MSc in Sustainable Design of the Built Environment
	Postgraduate Certificate in Sustainable Design of the Built Environment
	Postgraduate Diploma in Sustainable Design of the Built Environment
Canadian University of Dubai	BSc in Environmental Health Management
Dubai Police Academy	Master of Law and Environment
Hamdan bin Mohammed Smart University	MSc in Excellence in Environmental Management
Jumeira University	BSc in Environmental Health
Masdar Institute of Science and Technology	MSc in Sustainable Critical Infrastructure
	MSc in Water and Environmental Engineering
Paris-Sorbonne University Abu Dhabi	MA in Geography, Planning and Environment
Petroleum Institute	MEng in Health, Safety and Environment Engineering
University of Sharjah	BSc in Sustainable and Renewable Energy Engineering
	Diploma in Environmental Health and Safety

Source: Ministry of Education, Commission for Academic Accreditation

## R&D centers for advancing energy and water technologies



An image of the R&D Centre to be built in the Mohammed bin Rashid Solar Park

In 2014, the Dubai Electricity and Water Authority (DEWA) announced the development of a Research and Development (R&D) Centre in the Mohammed bin Rashid Al Maktoum Solar Park to diversify the energy mix, promote energy efficiency, and enable an environment for innovation to contribute to creating a knowledge-based economy in Dubai. The Centre is focusing its work on technologies and research to support future innovative solutions aimed at improving DEWA services and operations by developing a network of partners and local stakeholders, and guiding and sponsoring Emiratis by providing

training programs. It conducts research in four key areas: water; energy efficiency; smart grid integration; and solar generation, with a planned budget of AED 150 million (USD 41 million) for its implementation phase.

The R&D Centre facilities, research laboratories and offices will be completed by the end of 2017. The Centre currently has an outdoor test facility running, where solar technologies are being tested and a reliability program is being implemented. It is collaborating with national and international academic and research institutions to implement the programs. Some innovative projects are already underway,

including dust impact analysis on generation technologies, drone and 3D printing outlook for utility applications, solar-powered desalination, big data analytics, etc. As part of DEWA's focus on innovation, its plan also includes supporting the development of new technology companies through special incubation programs.

In 2014, the Masdar Institute of Science and Technology launched five Institute Research Centers (iCenters) to consolidate its research activities in support of the UAE's knowledge economy transformation goals. Its Center for Innovation and Entrepreneurship (iInnovation), Center for Energy (iEnergy), Center for Water and Environment (iWater), Center for Microsystems (iMicro), and Center for Smart and Sustainable Systems (iSmart) work to produce the intellectual and human capital required to fuel the innovative high-tech sectors that will be at the heart of the UAE's future diversified economy. The five centers focus on early-stage research and serve as a bridge between industry and academia, and continue to attract new research collaborations and funding. The Masdar Institute has also taken the additional step of mapping its iCenters and research objectives to the seven sectors identified in the UAE National Innovation Strategy.

## Committee on Development and Quality of Life

### Members

<b>Coordinator</b>	Ministry of Infrastructure Development
<b>Federal entities</b>	Ministry of Energy Emirates Authority for Standardization and Metrology Sheikh Zayed Housing Programme
<b>Local entities</b>	Abu Dhabi Urban Planning Council Sharjah Environment and Protected Areas Authority Umm Al Quwain government Ras Al Khaimah Environmental Protection and Development Authority Fujairah Municipality

### Identified gaps

- Engage more authorities in the Committee and identify appropriate actions related to green infrastructure and workforce

### Identified Green Agenda activities

Program	Identified Activities
<b>2.1 Integrated Green Infrastructure Program</b>	<ul style="list-style-type: none"> <li>• Development of an action plan on urban development</li> <li>• Continued development of the Integrated Urban Development Plan</li> <li>• Study on environmentally sensitive areas and heat island effect</li> <li>• National program on sustainable buildings and construction</li> <li>• Guidelines and specifications on green buildings for federal estate</li> <li>• Implementation of sustainable infrastructure projects according to international best practices</li> <li>• Legislation on sustainability and environmental considerations in road infrastructure</li> <li>• Guidelines on environmental strategic impact assessment for major projects</li> <li>• Legislation on use of sustainable materials in infrastructure projects</li> <li>• Application of international standards and sustainable energy for public housing projects</li> <li>• Policy support for procuring and developing green building materials</li> <li>• Guidance on sustainable design of buildings</li> <li>• Legislation for rationalization of energy and water consumption in existing buildings</li> <li>• Projects on autonomous houses</li> <li>• Application of sustainability standards in residential complexes</li> <li>• Global partnerships for energy conservation</li> </ul>

Program	Identified Activities
<p><b>2.2 Green Workforce &amp; Talent Program</b></p>	<ul style="list-style-type: none"> <li>• Integration of green economy and sustainable development in school curriculum</li> <li>• Establish a structure that supports higher education in sustainability fields</li> <li>• Classification of green jobs under the existing job categorization</li> <li>• Introduction of new vocational training courses at the national and local levels</li> </ul> <ul style="list-style-type: none"> <li>• Integration of training for green jobs in federal and local vocational institutions</li> <li>• Incentives and promotion of green jobs for new graduates</li> <li>• Promote continued education to help the shift the careers of workers to green professions</li> <li>• Promote partnerships between academia and industry</li> </ul>

### Guidelines for sustainable buildings and construction



IRENA headquarters building in Masdar City, which was the first building to obtain a four-pearl rating under the Estidama scheme

The growth in the buildings sector generates potential for increasing environmental impacts from material and land use at the construction stage as well as energy and water consumption by occupants. The federal and local authorities have therefore emphasized policy measures to increase sustainability in the sector. In 2010, the then Ministry of Public Works (now Ministry of Infrastructure Development), together with the Dubai Government’s Executive Council, developed the *UAE Green Building Guidelines* for new projects to be carried out by the ministry, addressing six focal areas: envelope efficiency; cooling systems; energy efficiency; water use and efficiency; indoor environmental quality; and site heat island.

In 2001, the Dubai Municipality introduced energy efficiency standards for new buildings, including the provision of insulation standards for building envelopes. Subsequently, green building regulations and specifications were

introduced in 2010 as one of eight initiatives launched by the municipality towards the goal of Dubai becoming one of the top ten sustainable cities in the world by 2020. While they were initially mandated to all government buildings, since March 2014 they have also become mandatory for all private developments, which are now required to meet 79 specifications.

*Estidama* (the Arabic word for sustainability) is a sustainable building framework introduced in April 2010 by the Abu Dhabi Urban Planning Council (UPC) as a key component of the Abu Dhabi Vision 2030. At the heart of this framework is the Estidama Pearl Rating System for the design, construction and operation of buildings, villas and communities. The five-level pearl rating provides guidelines covering the use of natural systems, an integrated development process, conservation of water, energy and materials, the incorporation of innovative practices and the creation of livable communities. The assessment criteria comprehensively cover the building's lifecycle (design, construction and operation). In the emirate, all new buildings are required to obtain at least a one-pearl rating, whereas all government buildings and villas must obtain at least a two-pearl rating.

The Leadership in Energy and Environmental Design (LEED) rating system administered by the US Green Building Council has also been widely adopted in the UAE. The UAE increased

its total amount of LEED-certified space by 72% over the last year to 3.13 million of gross square meters, and climbed from the ninth place in 2014 to eighth in 2015 (outside the US).

### Certifying the personnel for environmental services



Training for HVAC mechanic qualifications

The Abu Dhabi Quality and Conformity Council (QCC), a local government entity established in 2009 to raise the quality of infrastructure and products traded locally or exported, has set conformity schemes for products and systems. Since 2012, QCC has extended the scheme to include the conformity assessment and certification

of personnel in specific professions where their quality, safety and skills are highly required. By the end of 2015, 54 standards in 24 occupations have been developed in the construction and agriculture sectors. Also, other conformity schemes were launched including school bus drivers and supervisors, and pool and beach lifeguards.



Applicants for those professions undertake courses provided by public and private training centers with the curriculum in accordance with the occupational standards. Subsequently, the applicant goes through an examination that is approved by the QCC's technical evaluation committee, and QCC issues the Certificate of Conformity with an AD Trustmark based on the test report provided by the assessment center (training is not compulsory for some professions in which the applicant's capabilities can be already demonstrated through an exam). Where these personnel conformity schemes exist, regulatory authorities can issue trade licenses on the basis of certification, allowing them for effective judgment of personal skills and future legislation.

A study of the Abu Dhabi Executive Council on demand-side management found that energy efficiency of air conditioning units would be improved by no less than 27% simply through the proper maintenance of chillers. Given this finding, QCC embarked on the development of personnel conformity schemes for electricians and heating, ventilation and air conditioning (HVAC) mechanics. It has also extended the scheme to the agricultural sector for farmers applying pesticides in the way to keep their health and safety as well as

to minimize the environmental impacts. Over 600 certificates have been issued to date for different professions. QCC aims to extend the scheme further into environmental

professions such as hazardous and non-hazardous waste management personnel, and solar water heater and photovoltaic (PV) panel installers, among others.

## Committee on Sustainable Environment

### Members

<b>Coordinator</b>	Ministry of Climate Change and Environment
<b>Federal entities</b>	Ministry of Economy Ministry of Energy Ministry of Infrastructure Development Emirates Authority for Standardization and Metrology
<b>Local entities</b>	Environment Agency – Abu Dhabi

### Identified Green Agenda activities

Program	Identified Activities
<b>3.1 Natural Capital &amp; Resilience Program</b>	<ul style="list-style-type: none"> <li>Monitoring and controlling groundwater level and quality</li> <li>Regulate groundwater exploitation through drilling permits</li> <li>Environmental impact assessment of development projects</li> <li>Implementation of the Climate Change Adaptation Strategy</li> <li>Monitoring and management of terrestrial and marine habitats</li> <li>National Blue Carbon Project</li> <li>Abu Dhabi Blue Carbon Project</li> <li>Fisheries sector's change management</li> <li>Management and monitoring of coastal and marine environment</li> <li>Regulation and monitoring of sewage discharge</li> <li>Air quality monitoring and controlling</li> </ul>

Program	Identified Activities
3.2 Environmental Goods & Services Program	<ul style="list-style-type: none"> <li>• National guidelines on green manufacturing</li> <li>• Development of national eco-labels for products and services (Emirates Environmental Label)</li> <li>• Emirates Environmental Excellence Program</li> <li>• Program improving added value in the global value chain of environmental goods and services (EGS)</li> <li>• Safeguard policies for the emerging EGS sector</li> <li>• Promotion of EGS exports and capacity development</li> <li>• Development of environmental standards that support the growth of the EGS sector</li> <li>• Program for career matchmaking between graduates and demands in green industries</li> <li>• Green public procurement policy for the federal government</li> </ul>

### Identified gaps

- Identify and integrate relevant local-level initiatives into the programs
- Develop a national-level initiative on sustainable tourism and hospitality

### Identifying the potential of Blue Carbon for mitigating climate change



Jamal Al Alawi

Preserving and improving mangrove swamps in the UAE would help mitigate global climate change

Conserving and nurturing ecosystems is increasingly being considered as one of the most promising ways to reduce atmospheric carbon dioxide and limit global climate change. Recent studies have shown that coastal vegetation can sequester carbon far more effectively than terrestrial forests. These “blue carbon” ecosystems in the UAE are made up of mangrove forests, seagrass meadows, saltwater marshlands, algal mats, etc. The blue carbon ecosystems hold the largest carbon stocks found across the Arabian Peninsula. In addition to storing carbon, coastal wetlands provide a source of carbon and other nutrients that support avian and near-shore food chains.

The Abu Dhabi Global Environmental Data Initiative (AGEDI) started in 2011 with a demonstration project to illustrate the potential of coastal ecosystems for carbon storage and other benefits in the emirate. The second phase of the project involved quantification of carbon stocks of 18 mangrove swamps across the country – four in the Sea of Oman, six in the Arabian Gulf of the Northern and Eastern Emirates, and eight in the Emirate of Abu Dhabi – with support from an international team of coastal carbon experts.

The National Blue Carbon Project outcome report launched by the then Ministry of Environment and Water in October 2015

demonstrated significant differences in level of sequestration and storage between areas. The mean ecosystem carbon stock of the mangroves are 389 tons carbon per hectare (tC/ha) in the Sea of Oman, 229 tC/ha in the Northern and Eastern Emirates, and 140 tC/ha. Globally, mangrove carbon stocks have been reported to be around 1,000 tC/ha. The carbon stocks of hyper-arid, hyper-saline mangroves of the UAE are thus at the lower end of carbon stocks. Nevertheless, given that around 3,000 ha of mangrove swamps exist in the UAE, the effect of preserving and improving the precious coastal environment to help mitigate climate change is highly significant.

During the governmental innovation lab organized by the ministry in October 2014, the UAE Smart Map of Natural Capital initiative was identified and adopted to further bridge the gaps in knowledge and data on environmental and economic services of the country's natural resources. During 2015, a national analysis workshop was conducted with a range of stakeholders to identify the next steps to implement this initiative. It was agreed that the initiative should aim to incorporate the value of natural capital into national accounting and to support the implementation and long-term integration of the natural capital approach into the decision-making of all governmental departments.

### Labeling schemes to support sustainable choices



Sustainability labels developed in the UAE

Standards and labeling is one of the most effective demand-side policy tools for improving quality and efficiency of products and services by driving consumers towards better, more responsible choices. The Emirates Authority for Standardization and Metrology (ESMA) has set authoritative national product standards adapted to local conditions. A mandatory water and energy efficiency rating and labeling system has been introduced on domestic appliances such as air conditioning units, washing machines and dryers, refrigerators, storage water heaters, and

water fixtures. At point of sale those products have a label showing how much water and/ or electricity they consume in a year, together with a star rating to show how efficient they are. ESMA estimates this initiative is expected to save the government's electricity subsidies of AED 400 million (USD 109 million) a year from energy savings on air conditioners alone.

ESMA also introduced an organic food certification scheme in 2012 that is applied to both domestic and imported foodstuff. The certification comes with a logo by which consumers can easily distinguish organic products from conventional ones. The Emirates Wildlife Society (EWS), a local conservation group in association with WWF International, launched a fish labeling scheme under its Choose Wisely awareness campaign in 2009. The labels carry red, orange or green tags depending on whether they are over-fished, rare or sustainably available in the country. Several supermarket chains participate in this scheme, and some local restaurants indicate the sustainability of fish on their menu. Furthermore, ESMA is currently planning to introduce the Emirates Environmental Label scheme, which would be applied for a wide variety of products and

services in a similar manner as the European Union (EU) Flower Label and German Blue Angel.

At the local level, Abu Dhabi's QCC developed a Trustmark for Environmental Performance which certifies products for compliance with the UPC's *Estidama* requirements in energy and water efficiency, toxicity, recycled contents, etc. The Dubai Chamber of Commerce and Industry developed a Corporate Social

Responsibility (CSR) Label, which is a voluntary standard that supports CSR implementation among UAE companies by providing a valuable framework to help participating entities review and benchmark their CSR policy and practices themselves. In 2015, 63 companies, including four small and medium-sized enterprises (SMEs), were awarded with the label. A total of 201 labels have been awarded since its launch in 2010.

## Committee on Clean Energy and Climate Change Adaptation

### Members

Coordinator	Ministry of Energy
<b>Federal entities</b>	Ministry of Economy Ministry of Foreign Affairs Ministry of Climate Change and Environment Federal Electricity and Water Authority Emirates Nuclear Energy Corporation Emirates Authority for Standardization and Metrology Federal Competitiveness and Statistics Authority
<b>Local entities</b>	Abu Dhabi Water and Electricity Authority Dubai Electricity and Water Authority Sharjah Electricity and Water Authority Masdar

### Identified Green Agenda activities

Program	Identified Activities	
<b>4.1 Integrated Power &amp; Water Management Program</b>	<ul style="list-style-type: none"> <li>• Integrated energy management strategy</li> <li>• Integrated water management strategy</li> <li>• Promoting optimal design in power stations</li> </ul>	<ul style="list-style-type: none"> <li>• Upgrading gas turbines in water desalination units</li> <li>• Reducing transmission loss in electricity networks</li> </ul>
<b>4.2 National Renewable Energy Program</b>	<ul style="list-style-type: none"> <li>• Shams 1 project (Abu Dhabi)</li> <li>• Mohammed bin Rashid Al Maktoum Solar Park (Dubai)</li> <li>• Water and electricity tariff review</li> </ul>	<ul style="list-style-type: none"> <li>• Building energy efficiency standards</li> <li>• Programs promoting rooftop solar energy</li> <li>• Further dissemination of district cooling systems</li> </ul>
<b>4.3 National Green Economy Data Program</b>	<ul style="list-style-type: none"> <li>• Energy Data Management and Automation project</li> <li>• Monitoring, reporting and verification (MRV) system on GHG emissions</li> <li>• National Communications on GHG emissions to UNFCCC</li> <li>• Periodic public reports on GHG emissions and other data</li> <li>• Identification and collection of environmental data</li> </ul>	<ul style="list-style-type: none"> <li>• Identification and collection of economic and social data</li> <li>• Development of integrated electronic database on economic, social and environmental data</li> <li>• Further refinement and regular monitoring of Green KPIs</li> <li>• Green KPIs Dashboard</li> <li>• Regular compilation of UAE State of Green Economy Report</li> </ul>

### Identified gaps

- A nationally agreed target and roadmap for renewable energy deployment is needed
- Strengthen coordination and institutional capacity to collect and provide information for building a national green economy database

### Mega solar projects lead the world



Aiming to position itself as a global hub for renewable energy and as part of its commitment to diversifying the energy mix and reducing the

nation’s carbon footprint, the UAE has been rapidly expanding through its high-profile solar power projects which are among the largest in the world.



Shams 1 concentrated solar power plant, Abu Dhabi (100 MW)

DEWA began developing the Mohammed bin Rashid Al Maktoum Solar Park in 2012 in Seih Al Dahal, around 50 km south of the city, with the first phase of a 13 megawatt (MW) PV plant. In January 2015, the second phase project was won by Riyadh-based ACWA Power and TSK of Spain. Since their bid recorded the world's lowest price at 5.6 US cents per kilowatt-hour (kWh), DEWA awarded the consortium the 200 MW project as part of the 25-year power purchase agreement (PPA). This phase is expected to be completed by 2017 and will

produce enough electricity to power 30,000 homes. Over 20 consortia are running for the third phase of the 800 MW installation and the winner is expected to be announced in mid-2016.

The Mohammed bin Rashid Solar Park was originally planned for 1,000 MW solar energy in 2030, but in November 2015 Dubai expanded its target to 5,000 MW for 2030 (making it the largest solar park on a single plot in the world), which will require about AED 50 billion (USD 13.6 billion) in investment.

In 2013, Masdar commenced operation of Shams 1, a 100 MW concentrated solar power (CSP) plant in the Western Region of Abu Dhabi. CSP generates electricity from the heat of the sun rather than sunlight as in PV technology. Working together with Total and Abengoa Solar for a total project cost of USD 600 million, this is one of the largest CSP plants in the world. Spread over an area of 2.5 square kilometers (km<sup>2</sup>), 768 parabolic troughs featuring 258,000 mirrors concentrate the heat from the sun into oil-filled central tubes. The collected heat in turn is used to produce steam, which powers a turbine and generates electricity.

In December 2015, the Abu Dhabi Water and Electricity Authority (ADWEA) announced a tender for a 350 MW PV project to be built in Sweihan, about 120 km east of the capital. The project will be structured as an independent power project with a PPA, and the successful developer will own up to 40% of a special-purpose vehicle (SPV), with ADWEA taking the remaining equity. This will be the authority's first foray into renewable energy beyond its eleven gas-fired, independent water and power projects. ADWEA is aiming to select a developer in 2016.

## Setting ambitious energy targets for tackling climate change



Presentation of the UAE's INDC at COP21 in Paris

At the 21st session of the Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Paris in December 2015, 195 countries adopted the first-ever universal, legally-binding global climate deal. The agreement sets out a global action plan to put the world on track to avoid climate change by limiting global warming to well below 2°C. In preparation for COP21, countries have agreed to submit their Intended Nationally Determined Contribution (INDC), which publicly outlines what post-2020 climate actions they intend to take under a new international agreement.

In October 2015, the UAE government formally submitted its INDC to UNFCCC, which consists of a range of action plans. In this document, the government set its national target for significantly increasing the proportion of electricity generation from clean energy sources to 24% by 2021 in line with the UAE Vision 2021 (see Chapter 7). The proposed action plans reflected the country's economic diversification strategy, as well as its commitment to the transformation towards a Green Economy under the UAE Green Agenda, reinforcing its contributions to mitigating and adapting to climate change. Although the country has depended heavily on hydrocarbons to drive economic development over the past 40 years,

the UAE's INDC states that the future depends on investing in clean energy, and the transformation of the country's energy mix is already well underway (see examples above). Under the Paris Agreement, the contributions from countries are to be registered by the UNFCCC Secretariat and should be reported every five years.

In November 2015, prior to COP21, His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, launched the *Dubai Clean Energy Strategy 2050*, which consists of five main pillars: infrastructure; legislation; funding; building capacities and skills; and having an environment-friendly energy mix. The strategy ultimately aims to provide 75% of the emirate's power through clean energy sources by 2050, and set a medium-term goal of energy mix at 25% from solar, 7% from nuclear, 7% from clean coal and 61% from natural gas by 2030. Sheikh Mohammed declared: "Our goal is to become the city with the smallest carbon footprint in the world by 2050."

Abu Dhabi also set a target of energy mix where at least 7% of power generation capacity should be from renewable energy by 2020. Reflecting these developments, a further refinement of the national-level strategy and targets for clean energy deployment is required, where this committee is tasked to coordinate with federal and local stakeholders.

## Committee on Green Life and Sustainable Use of Resources

### Members

Coordinator	Ministry of Energy	
Federal entities	Ministry of Climate Change and Environment Ministry of Infrastructure Development Federal Electricity and Water Authority	Emirates Authority for Standardization and Metrology Federal Transport Authority – Land and Maritime
Local entities	Abu Dhabi Water and Electricity Authority Department of Transport – Abu Dhabi Center of Waste Management (Tadweer) – Abu Dhabi Dubai Municipality Dubai Roads and Transport Authority	Dubai Electricity and Water Authority Sharjah Environment and Protected Areas Authority Sharjah Electricity and Water Authority Sharjah Roads and Transport Authority

### Identified gaps

- No specific gap has been identified as ongoing initiatives can address most of the concerns in these subject areas.

### Identified Green Agenda activities

Program	Identified Activities	
5.1 National Energy & Water Efficiency Program	<ul style="list-style-type: none"> <li>• National program on efficiency of water and electricity consumption</li> <li>• Monitoring system of water control equipment</li> <li>• Efficiency standards and labeling on dishwashers, water pumps, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Demand-side water and energy management strategies and policies</li> <li>• Smart metering and smart grid projects</li> </ul>
5.2 National Waste-to-Resource Program	<ul style="list-style-type: none"> <li>• Development of federal law on integrated waste management</li> <li>• Special legislation on environmental requirements in landfills</li> <li>• Setting environmental requirements in waste-to-energy plants</li> </ul>	<ul style="list-style-type: none"> <li>• Legislation on safe disposal of used batteries</li> <li>• Legislation on proper disposal of obsolete pesticides</li> <li>• Integrated waste management projects in the Northern Emirates</li> </ul>
5.3 National Sustainable Transport Program	<ul style="list-style-type: none"> <li>• Integrated land transport plan for Abu Dhabi</li> <li>• Low-emission zones in Abu Dhabi</li> <li>• Consideration of alternative modes of transport in Dubai's urban development</li> <li>• Introducing Intelligent Traffic Management Systems</li> <li>• Specification of fuel efficiency of cars and phasing out inefficient vehicles</li> </ul>	<ul style="list-style-type: none"> <li>• Development of technical standards that support the introduction of green vehicles</li> <li>• Development of performance standards of vehicles</li> <li>• Promote responsible behavior and sustainability in road transport</li> <li>• Incentive schemes for the use of alternative fuels</li> <li>• Awareness campaigns on sustainable transport</li> </ul>



## There is no such thing as waste, only new resources



Landfill gas capture and power generation facility in the Al Qusais landfill site, Dubai

Waste is increasingly being seen as an important environmental and health issue for the UAE, as the majority currently ends up in landfill. Extracting energy from waste is now being viewed as one of the best ways to tackle this problem while diversifying energy sources.

The Sharjah Environment Company (Bee'ah) is scheduled to soon start building a waste-to-energy facility, in its Waste Management Centre in Al Saj'ah industrial area in Sharjah. The facility will have the capacity to convert

160,000 tons of waste into energy annually and help the emirate's ambitious target for diverting all waste from landfill (see Chapter 5). The facility uses a combination of gasification and pyrolysis systems, which produce gas as fuel, as well as steam to generate electricity through 35 MW capacity turbines.

In February 2015, a national team led by the then Ministry of Environment and Water was formed and tasked to study and implement a waste-to-energy initiative in the Northern Emirates. This is a leading

project of the Ministry of Presidential Affairs. The first phase addressed study and research on recommended criteria and standards of suitable technologies for this initiative, and looked into seven different waste-to-energy methods. Subsequently, the team considered the selection of suitable sites for the plants, taking into account spaces and logistics between the four emirates, as well as financing models.

Al Qusais Landfill Gas Flaring and Power Project was commissioned by Green Energy Solutions & Sustainability LLC in cooperation with the Dubai Municipality in 2012. The company designed and built a 22 km network of underground pipes through twelve collection stations for a flaring capacity of 6,000 normal meter cubed (Nm<sup>3</sup>) per hour landfill gas (60% methane). The project is registered with UNFCCC as a large-scale Clean Development Mechanism (CDM) project. The facility is using a portion of the gas to generate 1 MW electricity per hour to meet the landfill site's energy needs. The amount of gas currently captured by the project is enough to power a generator of 12 MW capacity, and future expansion plans will boost that to 20 MW by 2020.



Neutral Fuels LLC, a Dubai-based venture, works with Dubai’s restaurants and hotels, including the world’s largest fast-food chain McDonald’s, to convert the waste cooking oil used in these outlets into European quality standard biodiesel. The factory in Dubai produces fuel that now powers many generators, school buses, tourist buses, trucks and all the McDonald’s UAE fleet without extra cost. The Gulf Indian High School of

Dubai has run all of its school buses on 100% biodiesel from waste cooking oil since 2013, saving carbon emissions of 1,380 tons per year. In early 2015, the Dubai Municipality made a commitment to running its fleet on Neutral Fuels’ biodiesel. The company has recently taken steps to produce a liquid biofuel for furnaces and boilers while aiming to increase biodiesel production for mass market vehicle adoption in the country.



Having celebrated its tenth anniversary in November 2015, Dubai’s Roads and Transport Authority (RTA) is now leading the drive to serve a growing population with efficient, state-of-the-art public transport. Expecting over 25 million people visiting Expo 2020 Dubai, a 14.5 km extension of the Dubai Metro Red Line, a fully automated rail network that came into operation in 2009, will start in early 2016 to connect Nakheel Harbour & Tower station and the Expo site near Al Maktoum International Airport. Two more extensions have been approved on both Red and Green Lines, which are to be completed by 2020. The Green Line extension is planned to connect International City and Ras Al Khor.

Following the successful introduction of the Dubai Metro, the Dubai Tram started operating in Dubai Marina and Jumeirah Beach areas

in late 2014, and the world's first hydrogen-powered Dubai Trolley was introduced to spread the culture of sustainable transport for all. In its first phase, Dubai Trolley runs 1 km along Mohammed bin Rashid Boulevard, offering tourists and residents easy access to Dubai Mall, Souq Al Bahar and several iconic hotels. The carriages are elegantly designed to complement the surrounding Emirati architectural features. The Dubai Trolley will eventually span 7 km across the entire area of Downtown Dubai.

As part of Dubai Canal construction, RTA started the development of twelve marine transport stations at the Business Bay Canal and the Dubai Water Canal to improve mobility options between the shores of the Dubai Creek and the two canals.

A green modernization of existing transport modes is also ongoing. In May 2015, RTA tentatively started the operation of electric buses. Their batteries can be charged up to 80% in less than 30 minutes, and a fully charged battery enables the bus to run 200 km at a speed of 100 km per hour. The bus network will eventually expand with 700 state-of-the-art electric buses, with zero emissions targeted at the Expo site. A total of 200 hybrid taxis have been introduced in Dubai till date, as several operators recognize the value of their reduced

fuel cost of 30% and environmental benefits. Furthermore, RTA launched in July 2015 a smart application for its Sharekni carpooling scheme, while examining the implementation of a Smart Rental (car sharing) initiative whereby cars will be offered to ease the mobility of public transport users to their final destinations.

During 2015, 539.5 million journeys – a daily average of nearly 1.5 million journeys – were made in Dubai through mass transit (including taxis), a rise of more than 8 million from 2014. The use of the Dubai Metro has increased by 8.7% to 178.6 million journeys. Overall, the share of public transport in the mobility of people reached 15%, rising dramatically from less than 6% in 2006. RTA is now aiming to increase this share to 20% by 2020 and 30% by 2030.

The first stage of a 1,200 km national railway network was completed in late 2014 in the 264 km section linking the Shah and Habshan sour gas fields with the oil port of Ruwais in the Western Region of Abu Dhabi. More than two million tons of sulfur has been transported over the past year during trial operations, equivalent to more than 66,000 truck trips. The second stage is a 628 km section, which connects Mussafah, Khalifa and Jebel Ali ports and extends along the coast to the Saudi border at Ghweifat. When fully completed, the Etihad Rail network will

form part of the GCC Railway Network, linking the UAE with the other Gulf countries.

Abu Dhabi city also has plans for a metro and light rail network to connect areas such as the Central Business District and Saadiyat Island.



Dubai Trolley, which links tourist attractions, shopping malls and hotels in Downtown Dubai



## Her Excellency Razan Khalifa Al Mubarak Secretary-General, Environment Agency – Abu Dhabi (EAD)

There is a growing realization that we need to decouple economic growth from resource consumption, emissions of pollutants and generation of waste, and that low-carbon development is a necessity.

This realization is being acted on globally and locally. During 2015, we saw the ratification of the Sustainable Development Goals (SDGs) and a substantive climate change agreement resulting from the Paris Conference. As part of the United Nations-led climate negotiations, the UAE, through its Intended Nationally Determined Contribution (INDC), committed to expand its ambitious actions to limit emissions and improve resilience through economic diversification. Domestically we saw the endorsement of the *UAE Green Agenda 2015-2030* by the Cabinet and growing impetus to prepare the country for a post-oil and gas economy.

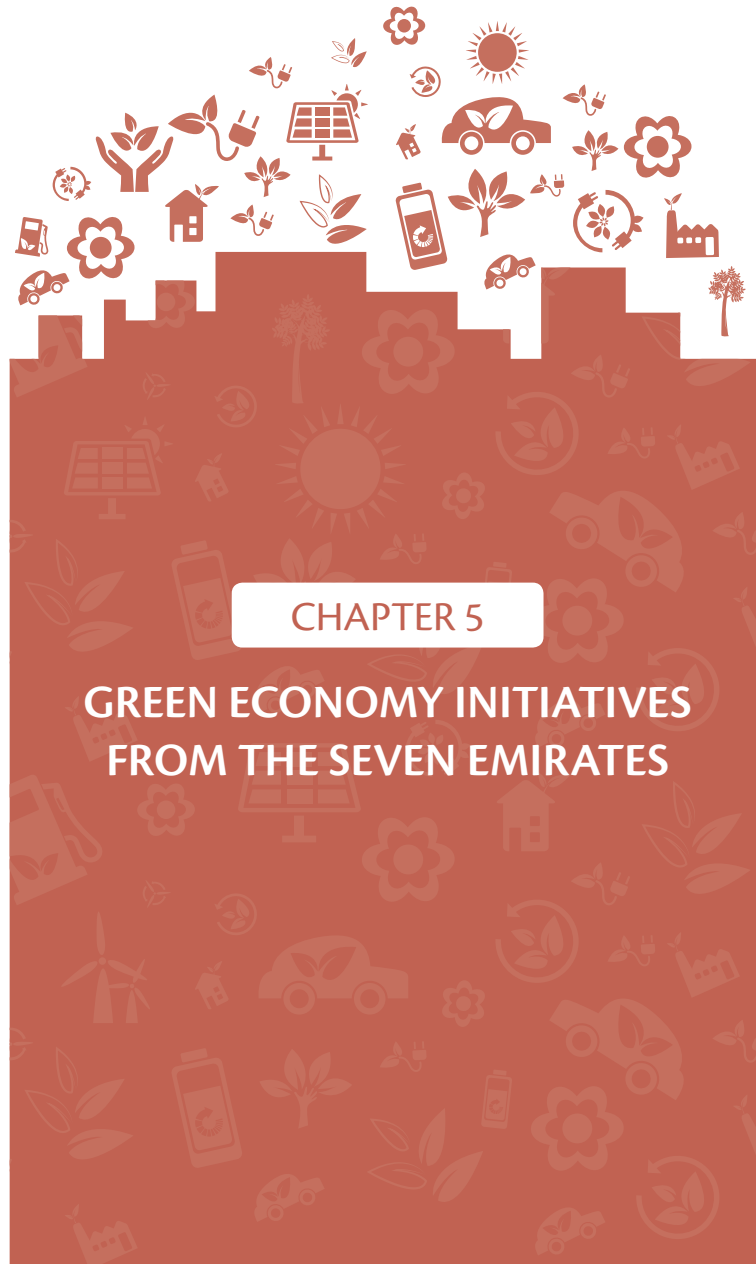
In the UAE, we have started the decoupling process by diversifying our energy mix into low-carbon, low-emissions sources such as nuclear and renewables, with the aim of generating 24% from these sources by 2021. In order to maximize the potential use of renewable energy, they should be accompanied by demand-side measures to significantly increase efficiency.

The *UAE Lighting Standard* approved in December 2013 is a great and pragmatic example of how this can be done. The standard for indoor lighting was developed as a result of effective collaboration between government, regional regulators, civil society and the private sector. We are now looking to build on this success by implementing a vehicle fuel economy policy targeting consumers and manufacturers, which will result in the UAE market

being supplied with more efficient vehicles. The proposed legislation and standards would result in around 400 million tons of carbon dioxide savings between 2017 and 2050.

To accelerate the shift to a water-efficient economy EAD has developed a water budget approach. Working with others we will define a volume of water that can be supplied sustainably – economically and environmentally – into the economy, in effect turning water into a limited resource. By doing so we create the enabling conditions to accelerate initiatives to drive efficiency, freeing up our existing resources to make space for “smart growth”.

We have made a good start towards green growth but it is now important that all sectors of the economy work in partnership to accelerate this change.



## CHAPTER 5

# GREEN ECONOMY INITIATIVES FROM THE SEVEN EMIRATES

## Green Economy Initiatives from the Seven Emirates

The UAE was formed as a constitutional federation of seven emirates: Abu Dhabi, Dubai, Sharjah, Ajman, Umm Al Quwain, Ras Al Khaimah, and Fujairah, which came together as one state on 2 December 1971 under the late former president, His Highness Sheikh Zayed bin Sultan Al Nahyan.\* Since the Federation was established, the seven emirates have forged a single identity, as the Constitution grants federal authorities explicit powers over

foreign affairs, security and defense, education, public health, communications services, etc. Meanwhile, each emirate has kept a large degree of control over its internal affairs, having its own separate institutions of government.

Therefore, the engagement of and contributions from each emirate towards the implementation of the *UAE Green Agenda 2015-2030* is highly critical to its success, and

the Emirates Green Development Council (EGDC) includes high-level representatives from the seven emirates to harmonize strategic directions, encourage collaboration, and share knowledge and resources wherever appropriate. This chapter lists the initiatives of each emirate's government that are or will be implemented as part of the UAE Green Agenda, and highlights the most prominent projects conducted mainly during 2015.

### Abu Dhabi

#### List of relevant initiatives

Ongoing initiatives		Planned initiatives	
<ul style="list-style-type: none"> <li>• Pavement recycling, and use of gravel recycled from demolition and plastic nets (Geogrid) for road maintenance and rehabilitation</li> <li>• Western No Waste campaign</li> <li>• Afforestation Week</li> <li>• Estidama green building projects and eco-efficiency standards for building materials</li> <li>• Use of LED lighting in infrastructure projects</li> </ul>	<ul style="list-style-type: none"> <li>• Rehabilitate and create reservoirs and pumping stations in Western Region</li> <li>• Irrigation lines projects for the use of treated wastewater in Liwa and Madinat Zayed</li> <li>• Installing irrigation systems, planting windbreaks and walkways in Al Ain</li> <li>• Energy efficiency project</li> <li>• External air quality monitoring project</li> </ul>	<ul style="list-style-type: none"> <li>• Research on carbon emissions from road projects</li> <li>• Build a system to measure sustainability of road projects</li> <li>• Green building for community centers in Madinat Zayed</li> <li>• Study and implement solutions to high water table affecting the construction sector in Al Ain</li> </ul>	<ul style="list-style-type: none"> <li>• Design and install 6 wastewater treatment plants for slaughterhouses in Al Ain</li> <li>• Paperless Day in Al Ain</li> <li>• Sustainable procurement policy in Al Ain Municipality</li> <li>• Promote tourism in the Ai Ain oases</li> </ul>

\* Ras Al Khaimah joined the Federation in February 1972.

### Strategic water reserve using aquifer storage and recovery



Strategic water reserve in Liwa, Abu Dhabi

Despite the production of huge volumes of drinking water by desalination plants, secure water supply is not guaranteed in the UAE, particularly if an emergency were to arise. A lack of storage facilities means that demand can only be met for short periods. Whereas Abu Dhabi relies on the continuous operation of desalination plants for its potable water, the city's freshwater storage has been sufficient to last only for three days. There was an urgent need to develop a very large and reliable storage and reserve, but there was a concern that building ground storage reservoirs would

require plenty of land and be easily polluted as water gets stagnant.

In 2016, the emirate's first aquifer storage and recovery facility will be completed at Liwa in the Western Region of Abu Dhabi after more than a decade since the project started at a pilot scale. Commissioned by the Abu Dhabi Water and Electricity Authority (ADWEA) and the Environment Agency – Abu Dhabi (EAD), with the support from the German Organization for International Cooperation (GIZ), the Liwa aquifer storage and recovery was built on one of the few remaining low-

salinity native groundwater reserves in the emirate and has a capacity of 22.7 million cubic meters (m<sup>3</sup>), which can be stored up to 100 years. The aquifer will be recharged with desalinated water and could supply 180 liters of water per capita for a period of 90 days in case of any emergency.

Non-renewable groundwater makes up 64% of water use in the emirate, which has shown a rapid decline in groundwater levels and increase in salinity. EAD is therefore aiming to conserve the emirate's groundwater resources through better planning, regulations and the promotion of responsible consumption. The most common cause of waterlogging, which occurs in more than 30 sites across the emirate, is the seepage of excess irrigation water from farms or forests on highly elevated areas. The agency is conducting temporary works for draining the accumulated water and establishing a permanent subsurface drainage system, which allows collecting and reusing this water for irrigation again. EAD is also working on the improvement of groundwater monitoring by establishing an expert team and integrating monitoring networks and databases with those of the National Drilling Company.

## Sustainable street lighting project



Application of LED lighting in Sheikh Zayed Tunnel, Abu Dhabi

With an objective of reducing the cost of public lighting by 60-75% and reducing light pollution rates by 60% over the next 20 years, the Abu Dhabi Municipality launched a new Sustainable Public Lighting Project in 2015. A benchmark study was firstly commissioned to evaluate and compare current marketplace light-emitting diode (LED) lighting solutions with traditional lighting systems and to update the work started under the Abu Dhabi Sustainable Lighting Strategy in 2010. The result showed

that a combination of modern LED lighting systems and a further improvement in street lighting design would now achieve annual saving of 88% in energy costs and cut down the number of lighting devices in the same street by a third, as compared to the previous system. It is also estimated that LED lights would decrease carbon emissions by about 75% and reduce the need for maintenance by 70-90%. The new *Abu Dhabi Lighting Manual – Issue 1* was compiled by the Department of Municipal Affairs and

encompasses all the revised and improved standards defined and approved under the Sustainable Public Lighting Project.

Previously, the Municipality carried out the installation of LEDs in the Sheikh Zayed Tunnel, East Sector 48 and West Zone 33. Electricity consumption in the tunnel was reduced by 86% from the original proposal and Zone W33 reduced energy use by 62%. It also completed the replacement of all conventional decorative features and street lighting with LED fixtures on the Sheikh Zayed Bridge, where the overall consumption then dropped by 81%. Other installations replaced with LED include pedestrian tunnels and bridges. The Municipality indicates that the total economic gains by energy saving from those installations would reach as much as AED 3.28 million (USD 893,000) for the whole emirate over 20 years.

Furthermore, the Municipality prepared a 500-page *Public Realm and Street Lighting Reference Handbook* to support energy-efficient lighting design in the city, comprising detailed information about the principles of lighting and technology and technical aspects for the application in streets, buildings, parks and public squares.



# Dubai

## List of relevant initiatives

Ongoing initiatives		Planned initiatives	
<ul style="list-style-type: none"> <li>Expansion of the Ambient Air Quality and Noise Monitoring Network</li> <li>Development of the Environmental Health Strategy</li> <li>Expansion of the Dubai Coastal Zone and Marine Water Quality Monitoring Network</li> <li>Development of the Dubai Wetland Centre at Ras Al Khor Sanctuary</li> <li>Groundwater permitting system</li> <li>Dubai Car Free Day</li> </ul>	<ul style="list-style-type: none"> <li>Environmental awareness summer campaigns</li> <li>Campaign for light bulb recycling and use of LEDs</li> <li>Promotion of solar panels and water heaters</li> <li>Certification of green materials and products</li> <li>Green buildings with green concrete</li> <li>Landfill gas recovery (methane gas capturing)</li> <li>Segregation at source and recycling center</li> </ul>	<ul style="list-style-type: none"> <li>Integrated Ambient Air Strategy 2015-2021</li> <li>Integrated management program for noise control</li> <li>Integrated management plan for wildlife and sanctuaries</li> <li>Dubai Fisheries Research and Development Centre</li> <li>Groundwater metering and quality monitoring network</li> <li>Groundwater injection projects</li> <li>Environmental awareness programs on groundwater conservation</li> </ul>	<ul style="list-style-type: none"> <li>Green industry manual and awards</li> <li>Introduction of waste tipping fees</li> <li>Treated sewage water policy</li> <li>Sewage treatment methane gas to energy project</li> <li>Landfill gas to energy project</li> <li>Municipal solid waste to energy project</li> <li>Municipal organic waste to energy project</li> </ul>



In March 2015, the Dubai Electricity and Water Authority (DEWA) started implementing the Shams Dubai initiative as one of its three Smart Dubai Initiatives. This initiative aims to encourage home and building owners to install solar photovoltaic (PV) panels to generate electricity by allowing them to connect with DEWA's electricity grid. The PV owners are allowed to feed excess power generated from solar panels into the grid and this will be offset against the amount of energy purchased from DEWA. In the same month, a 30 kW solar array at Al Maktoum International Airport became

the first installation to be connected to the grid under this scheme. The 100 PV panel system is expected to generate about 50 megawatt-hours (MWh) of electricity every year.

To ensure safety and quality of the installed PV systems, DEWA developed standards and regulations that set the requirements for equipment and tools, which include PV modules, inverters, and interface protection systems. DEWA also trains and approves consultants and contractors who can work under this scheme. Based on this legislation, DEWA provides interested owners with the necessary steps to install PV systems and connect them to the grid. They firstly contact one of the consultants or contractors accredited by DEWA to study the feasibility of installing the solar system and suggest the best solution. The consultant or contractor then obtains the necessary approvals from DEWA. These include a non-objection certificate (NOC) for installing a solar system and connecting it to the grid, and approvals for the system design that meets all the requirements. After obtaining the necessary approvals, the consultant or contractor undertakes on-site work. After completing installation, they will submit a notification to DEWA so that it conducts the technical inspection of the site and installs the meter to complete the connection process.

In the *Dubai Clean Energy Strategy 2050* announced in November 2015, Dubai set an ambitious target of having solar panels on the roofs of every building in the emirate by 2030. By the end of 2015, DEWA received more than 27 applications to install PV systems in commercial and residential buildings.

DEWA also recently inaugurated one of the largest single rooftop arrays in the Middle East and North Africa (MENA) region, a 1.5 megawatt direct current (MWdc) PV generation project at Jebel Ali Power Station, and successfully

connected it to the DEWA's grid. A total of 5,240 PV panels were installed on the 23,000 square meter roof of the water reservoir at M-Station, which is the newest and largest power production and desalination plant in the UAE.

The modules will generate 2,666 megawatt-hours (MWh) annually, which will meet the station's energy needs. The project aims to increase dependence on renewable energy and reduce the carbon emissions from different operations at the station, with an annual carbon dioxide emission reduction of about 1,600 tons.



In April 2015, the Dubai Municipality issued a circular to require all construction sector

stakeholders in the emirate, including consultancy offices, contracting companies,

concrete factories and suppliers, to apply eco-friendly, sustainable concrete materials in building construction. This circular is in line with the UAE Green Agenda and also in support of the strategic objectives of the Government of Dubai to transform the emirate into a green, low-carbon emirate, and the municipality's plan to improve the quality of buildings.

The production of each ton of Ordinary Portland Cement (OPC), one of the most common construction materials, is estimated to emit 1.1 tons of carbon dioxide and 164 kilograms of dust into the air, contributing to global climate

change as well as several diseases including cancer. In the UAE, twelve cement companies are producing a total of 19 million tons of cement annually. This decision also mandates concrete manufacturers to use eco-friendly cementitious materials in manufacturing concrete, which are defined as Portland Cement containing a minimum of 36% of ground granulated blast slag (GGBS) or fly ash.

Since GGBS and fly ash are by-products of other industrial processes, such as iron and steel making and coal combustion, their use reduces carbon and dust emissions normally generated

by new OPC production. Furthermore, the concrete to which GGBS or fly ash is added gives better properties than the OPC alone, and at the same time is less costly to make. The other benefits include the extension of building lifespan by up to 40%, higher strength and workability, and more resistance to the deterioration effects of water, salt and sulfate. Overall, the municipality estimates that "green concrete" can reduce the carbon footprint by up to 45% and save AED 192 billion (USD 52 billion) due to its extra durability, thus helping to create a more environmentally friendly urban environment.

## Sharjah

### List of relevant initiatives

Ongoing initiatives		Planned initiatives
<ul style="list-style-type: none"> <li>Processing, treatment and recycling of medical waste, construction and demolition waste, used tires, etc. at the Waste Management Center in Al Saja'a</li> <li>Around 100,000 tons of sewage sludge, grass clippings, tree trimmings, branches and leaves, horse stable waste and camel manure, and expired foods composted annually at the Organic Recycling Facility</li> </ul>	<ul style="list-style-type: none"> <li>Construction and operation of a new tanker discharge sewage treatment facility at Al Saja'a with a daily intake capacity of 30,000 m<sup>3</sup></li> <li>Green building code implementation at government construction projects</li> <li>Public-private partnership initiatives and incentives to encourage green investment</li> </ul>	<ul style="list-style-type: none"> <li>Installation of Integrated Air Monitoring Stations at various strategic locations</li> <li>Expansion of the Organic Waste Recycling Facility to 300,000 tons annual intake capacity</li> <li>Expansion of Al Saja'a Tanker Discharge Sewage Treatment Facility to 45,000 m<sup>3</sup> daily intake capacity</li> </ul>

Ongoing initiatives	Planned initiatives
<ul style="list-style-type: none"> <li>Plantation of around 25,000 palm trees and a variety of indigenous and non-native trees, shrubs and herbs</li> <li>Around 15 million m<sup>2</sup> of grass-carpeted area</li> <li>Afforestation at the entrance of Khorfakkan (31.5 km<sup>2</sup>)</li> <li>Establishment of Al Wasit Wetland Nature Reserve (4.5 km<sup>2</sup>), Sharjah Islamic Botanical Garden, Al Batayeh Nature Reserve (9.5 km<sup>2</sup>) and Al Dhaid Nature Reserve</li> <li>Use of 14,700 m<sup>3</sup> of treated wastewater for landscaping in and around Sharjah City</li> </ul>	<ul style="list-style-type: none"> <li>Construction of a state-of-the-art waste-to-energy plant</li> <li>Increasing the number of public and community parks, green belts and nature reserves</li> </ul>



Bee'ah's Material Recovery Facility, Sharjah

Sharjah set up a municipal waste management company Bee'ah (the Arabic word for environment) in 2007 in the form of a public-private partnership. In 2011, the emirate announced an ambitious plan for "Zero Waste to Landfill" in line with the vision of His Highness Dr. Sheikh Sultan bin Mohammed Al Qasimi, Member of the Federal Supreme Council and

Ruler of Sharjah, to be the leading environmental city in the Middle East. To attain this goal, Bee'ah developed a state-of-the-art Waste Management Centre, one of the world's largest waste management plants to process and recycle different materials including construction waste, medical waste, used vehicles, used tires, metal waste, e-waste and organic waste.

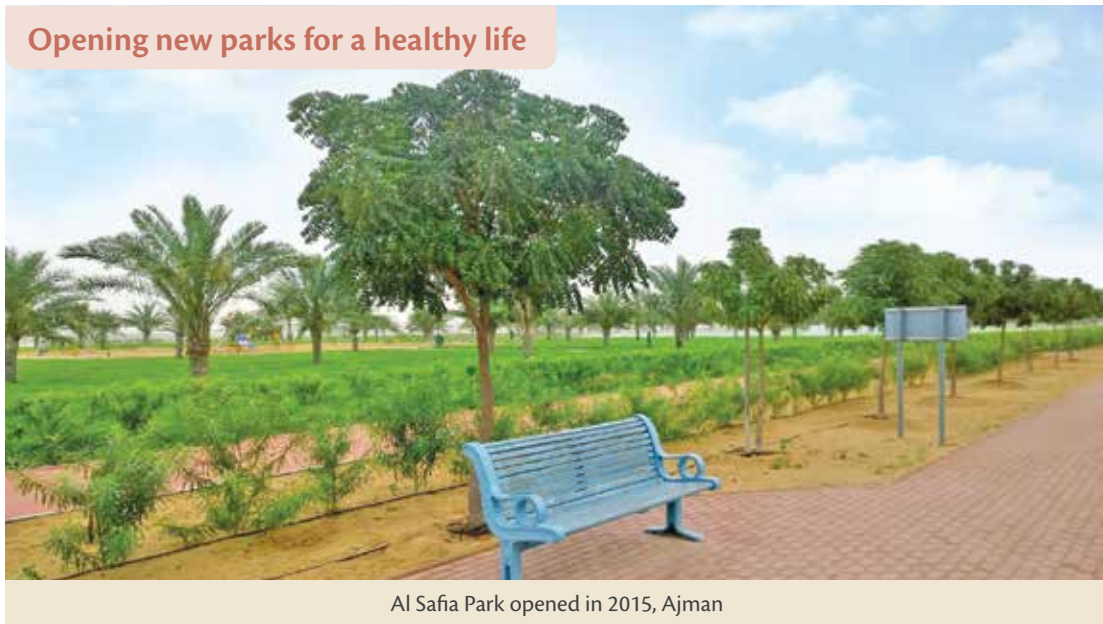
Since 2012, the company has been introducing recyclable waste collection systems, along with a new tipping fee structure set in cooperation with the Sharjah City Municipality to incentivize waste reduction and to closely regulate landfill contents. It has established more than 1,700 three-stream recycling bins for residents to encourage the community to separate between paper, plastics and cans, and general waste. Tandeef, a waste collection division of Bee'ah, has distributed blue recycling bins and totes among over 4,500 offices, and introduced a range of unique services. The "You Call, We Haul" free service comes to pick up bulky waste such as furniture and appliances. Bee'ah also provides services for safely destroying and recycling confidential data and documents.

The recovery rate or the diversion rate of waste in Sharjah has steadily risen from around 53% in 2012 to 70% in 2015, as waste has been recycled or recovered. The emirate is set to become the first Arab city to divert 100% of its waste from landfill within the next few years.

# Ajman

## List of relevant initiatives

Ongoing initiatives	Planned initiatives
<ul style="list-style-type: none"> <li>Using treated wastewater for landscaping, construction and cooling in industrial plants</li> <li>Solar restaurant and workers' camp projects</li> <li>Air quality self-monitoring system for industries with emissions detection stations (five stations were placed)</li> <li>Placed six seawater quality monitoring stations</li> <li>Establish Al Zawraa Protected Area</li> </ul>	<ul style="list-style-type: none"> <li>Modern medical waste incinerator project</li> <li>Development of a waste sorting facility with a capacity of 700 tons per day</li> </ul>



As the number of residents suffering from health problems such as diabetes is increasing, the Ajman Government places priority on providing environmental and recreational space and clean air as a strategy to achieve a healthy and sustainable environment. Four new parks were opened during 2015 or will be opened soon, adding much-needed green space to the UAE's smallest emirate and encouraging residents to lead a healthier life.

In the Al Jurf area of the emirate, the 2,100 m<sup>2</sup> Flag Park was opened in 2015, featuring a 122 m UAE national flag. The Al Safia Park in Mushairif overlooks the creek and is spread over 129,000 m<sup>2</sup>, with a play zone for children, barbecue area, a 1,800 m running track, 500

palm trees and bicycles for hire. Local palm trees were selected by His Highness Sheikh Humaid bin Rashid Al Nuaimi, Member of the Federal Supreme Council and Ruler of Ajman, to provide shade for visitors. A third park is being developed in the tiny enclave of Masfout. This is the area's first park and was

designed to resemble the rugged landscape of this inland area.

A 40,000 m<sup>2</sup> sports park will also open in early 2016, which will have stadiums for football, volleyball and basketball, a play area for children, a dedicated area for adults, cycling track, a rubber track for jogging, and an

outdoor gym. With a development budget of AED 5 million (USD 1.4 million), the Ajman Municipality aims to get residents fit and encourage more visitors to the city while making the emirate greener, as the park will also be dedicated to a number of trees and green spaces.

## Umm Al Quwain

### A fish hatchery opened to enhance marine resources



Sheikh Khalifa Marine Research Centre Hatchery, Umm Al Quwain

Over-exploitation of marine resources and deterioration of marine ecosystems are among the challenges the UAE is facing to ensure food and environmental security. A comparison between a study by the United Nations Food

and Agriculture Organization (FAO) in 1978 and a GCC survey from 2008 to 2011 showed that the demersal fish stocks in UAE territorial waters overlooking the Arabian Gulf and the Sea of Oman dropped by 88% and 94% respectively.

Aquaculture has long been considered in the country as a viable option to complement the decline in fish stocks, but lack of investment and lack of locally available raw materials such as fingerlings and feed, which had to be imported, have been significant barriers.

The Sheikh Khalifa Marine Research Centre Hatchery is being built in Umm Al Quwain as part of President Sheikh Khalifa's initiatives with a grant of AED 75 million (USD 20 million). It aims to enhance fish stock, conduct aquaculture research to develop the flagship species of the UAE, and provide the essentials required to develop a sustainable aquaculture industry in the country. The Centre will be composed of a number of state-of-the-art components including marine fish hatchery, 14 complex labs and a multi-purpose center. Early in 2015, the first phase of the hatchery was

completed and toured by His Highness Sheikh Mansour bin Zayed Al Nahyan, Deputy Prime Minister and Minister of Presidential Affairs.

The hatchery was built with the latest indoor recirculating aquaculture systems (RAS), the first of its kind in the region with a capacity

to produce 10 million fingerlings. It focuses on raising local commercial fish species such as hammour (grouper), subaiti, sheim and gabbit.

## Ras Al Khaimah

### List of relevant initiatives

Ongoing initiatives	Planned initiatives
<ul style="list-style-type: none"> <li>• Food waste separation in hotels and large food establishments</li> <li>• Upgrade the material recovery facility</li> <li>• Waste separation program at schools</li> <li>• Al Hamra Village Full Source Separation Program</li> <li>• Bulky waste collection program for donating to charities</li> </ul>	<ul style="list-style-type: none"> <li>• A landfill gas to electricity project</li> <li>• A construction and demolition waste recycling plant</li> <li>• Study anaerobic digesters for food waste and sludge</li> <li>• Source separation of wastes throughout Ras Al Khaimah city</li> <li>• Dump site rehabilitation</li> </ul>

### Building the most efficient desalination plant



Signing the deal to establish a joint venture for an efficient desalination plant in Ras Al Khaimah

In August 2015, Utico Middle East, the GCC's largest private utility provider and a subsidiary of Abu Dhabi-based Ghantoot Group, and Spanish energy firm Grupo Cobra, announced their joint venture partnership to construct an AED 719 million (USD 196 million) water desalination plant in Ras Al Khaimah. The joint venture, named Al Hamra Water Company, will oversee the development of the world's largest privately financed independent desalination plant. The facility will be located in the Al Hamra Jazeerah area of Ras Al Khaimah.

This will be a state-of-the-art facility that is technologically advanced and having one of the

lowest power consumption levels in the region. Water re-use through the facility will save at least 33,280 tons of carbon dioxide emissions per year. Furthermore, a tender has been issued to supply solar panels to the facility.

The plant is to start supplying water by June 2017 and to become fully operational in 2018. The Al Hamra Water Company will generate

100,000 m<sup>3</sup> of water per day, most of which will be directly supplied to the Federal Electricity and Water Authority (FEWA) that supplies electricity and water to Ras Al Khaimah, Ajman, Umm Al Quwain, Fujairah and some east coast cities.

This is also one of the largest foreign direct investments in the UAE in recent times and the largest in an infrastructure project of its kind.

It is the first desalination plant in the region to be independently financed, which will be 80% debt financed and 20% liquidity. The project is expected to create 300 jobs during the construction phase and 80 permanent positions once operational. About 20-25% of these jobs will be offered to Emirati nationals after training them for a year.

## Fujairah

### List of relevant initiatives

Ongoing initiatives		Planned initiatives
<ul style="list-style-type: none"> <li>• Construction and operation of a material recovery facility (MRF) for municipal solid waste with a capacity of 500 tons per day to cover Fujairah City and its suburbs</li> <li>• A similar MRF is being constructed in Dibba</li> <li>• Seven unregulated dumpsites have been closed.</li> <li>• Launching the Segregation at Source Initiative applied for local and federal entities, educational institutions and business centers</li> <li>• Supporting recycling of used oil, plastics, rubber, etc.</li> <li>• Medical waste incinerator</li> </ul>	<ul style="list-style-type: none"> <li>• Thermal treatment and co-processing of industrial and hazardous wastes in cement factories</li> <li>• Intensive awareness program on e-waste management and safe disposal</li> <li>• Operation of Al Hayel Sewage Treatment Plant to cover the areas not connected to the main sewage treatment plant</li> <li>• Building 35 eco-friendly residential units</li> <li>• LED street lighting</li> <li>• Promoting solar water heaters</li> <li>• Rehabilitation of Wadi Al Wurayah</li> <li>• Al Hilal Real State City Project</li> <li>• Sheikh Zayed Mosque</li> </ul>	<ul style="list-style-type: none"> <li>• Waste-to-energy plant to convert municipal solid waste into energy under the supervision of MOCCA</li> <li>• Rehabilitation of old landfills under the supervision of MOCCA</li> <li>• Construction and demolition waste treatment project</li> <li>• Construction and operation of sewage treatment plants for remote areas</li> <li>• Waste transfer stations for transporting from remote landfills to the main landfill in Al Hayel</li> <li>• Development of Mohammed bin Zayed City as per sustainability standards</li> </ul>



### Fujairah initiative for environmental sustainability



Rooted in its rich natural and cultural heritage, Fujairah is aiming to develop a highly livable, sustainable community of skilled and engaged citizens working hand in hand to build a responsible and thriving economy in a changing climate. The Fujairah Municipality launched the *Fujairah Environmental Sustainability Initiative* in 2014 to encourage all enterprises and institutions in the emirate to adopt the

principles of Green Economy and sustainable development through the application of good environmental work practices. It is a program to assess the participating entities on eight sustainability aspects including environmental management system, water, energy, waste, social responsibility, work environment, optimal utilization of resources, and use of smart information technology.

Targeting government agencies, factories and companies, schools, and hotels and resorts in the emirate, a comprehensive field assessment of environmental practices of the participating entities is conducted by the assigned team of the municipality. Those nominated for the best environmental practices are awarded with trophies and certificates. The initiative is expected to help raise awareness of good environmental practices and their applicability to business of companies and entities. It would also help develop green partnerships between all sectors of society and promote the role of social responsibility in protecting the environment and improving sustainability.

Seeking a better quality of life for residents, Fujairah is currently developing the *Fujairah Strategic Master Plan 2040* based on the principles of Green Economy and sustainable development. Given its strategic location facing the Indian Ocean, the emirate is also working to consolidate its position in key sectors such as trade, oil bunkering, and eco-tourism.



## His Excellency Ahmad Buti Al Muhairbi

Secretary General, Dubai Supreme Council of Energy (DSCE)

Within a very short time span, the Emirate of Dubai has leapfrogged towards a greener economy by pioneering several sustainability and clean energy initiatives in the region and the world. Based on the current achievements on the ground, coupled with the national and local plans such as the *UAE Vision 2021*, *Dubai Plan 2021* and *Dubai Integrated Energy Strategy 2030*, we envisage significant opportunities for greater investment across the UAE and Dubai, spanning the economic, environment and social aspects of the Green Economy spectrum.

A critical underpinning of our ability to achieve our targets and implement our long-term plans successfully has always been the solid support and commitment of our leadership. His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, has recently announced the *Dubai Clean Energy Strategy 2050*, which pledged significant investments in renewable and clean energy to diversity fuel sources and support the fast economic growth of Dubai.

Attracting the private sector is also a major component of our roadmap towards a Green Economy. We worked side-by-side with relevant stakeholders to develop and implement the enabling policy frameworks, as well as accountability and good governance to incentivize the private sector to invest in renewable energy solutions. We designed a robust regulatory framework and made sure

our terms are attractive and fair. This marked a turning point in the journey to diversify Dubai's energy mix and demonstrated the value proposition of strategic public-private partnerships for risk management, knowledge transfer and job creation. Last year, Dubai's name made global headlines when it achieved the cheapest solar PV generated electricity and added 200 MW of solar PV to its installed capacity mix.

Another aspect of our approach to Green Economy is to engage our citizens and residents to participate in this journey. In Dubai, people can now install solar panels on their buildings and generate electricity while being connected to the power grid of the Dubai Electricity and Water Authority (DEWA). We consider this a significant development that has transformed consumers into active producers and created a wealth of opportunities for SMEs and industry players.

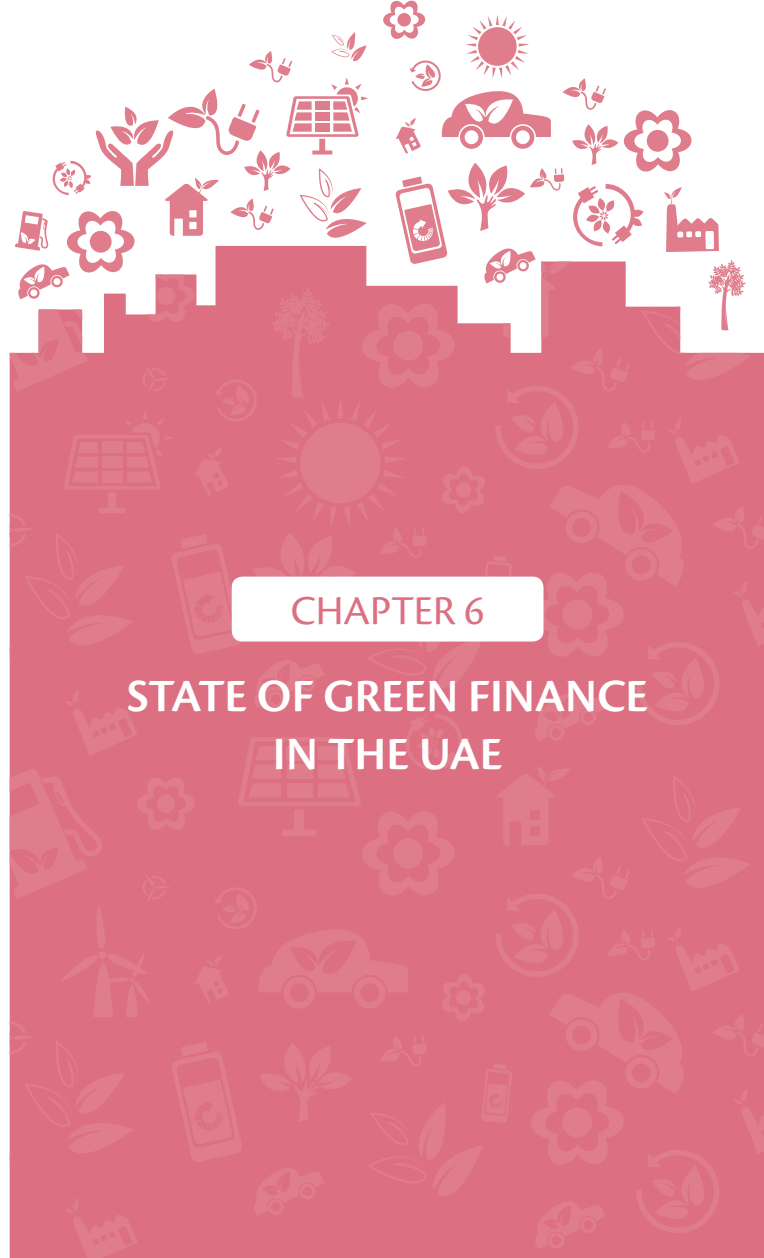
While we focus on energy supply, we also have brought innovation to the demand-side area. Dubai's *Demand Side Management (DSM) Strategy 2030* has achieved considerable savings exceeding the target in both electricity and water consumption (1.9 TWh and 3.5 billion imperial gallons or 15.9 million m<sup>3</sup> in 2014). The DSM Strategy spurred innovation on many levels, such as introducing new business models for energy contracting services to retrofit buildings through the creation of a Super ESCO, Etihad Energy Services.

We also see considerable potential for growth in the alternative transportation sector. Dubai has already taken bold steps towards introducing hybrid and electric vehicles in the emirate. DEWA has completed the first phase of installing 100 electric charging stations across Dubai. Meanwhile, DSCE has engaged with relevant members to roll out the first phase of the *Green Mobility Initiative* targeting government entities, thus leading by example. This first-of-its-kind initiative in the region will contribute to lower carbon emissions in Dubai from road transportation, and help achieve the objective of the *Dubai Carbon Abatement Strategy 2021*.

When considering the Green Economy, waste management becomes an integral part. In Dubai, we are working with the Dubai Municipality and other players to facilitate waste-to-energy projects that alleviate the amount of waste dumped in landfills.

The time is right: declining technology costs, the need to de-carbonize energy to address climate change, new benchmarks and examples of success on the ground, and available investment have created a momentum of opportunity that has been seized in our country.

In partnership with the Emirates Green Development Council and other stakeholders, we are actively demonstrating the "many partners, one goal" approach. We look forward to continuing this fruitful partnership for generations to come !



## CHAPTER 6

# STATE OF GREEN FINANCE IN THE UAE

## State of Green Finance in the UAE

The macroeconomic scenarios examined in the development of the *UAE Green Agenda 2015-2030* require the investment of 1-2% of gross domestic product (GDP) in greening the economy for the next 15 years.\* Attracting private sector finance and investment is ultimately a decisive factor for the success in the UAE's Green Economy transformation, as it allows the country to raise a massive level of investment. Despite the wide availability of green technology solutions and the willingness of both government and citizens for taking green action, most of the pioneering green projects in the UAE have been led and funded by the public sector. Limited private-sector participation in green finance and investment has been considered as the major challenge to materialize economic and employment opportunities from greening the UAE economy.

In October 2016, the Ministry of Climate Change and Environment (MOCCA) will host the Global Roundtable of the United Nations Environment Programme Finance Initiative (UNEP FI), under the patronage of His Highness Sheikh Hamdan bin Mohammed bin Rashid Al Maktoum, Crown Prince of Dubai and Chairman of the Dubai Executive Council, as part of the country's contributions to global efforts to realize a Green Economy. At this high-profile global gathering, the UAE aims to showcase best practices in green finance while stimulating the country's financial sector towards investment in green projects and innovating green finance products and services.

Working with UNEP FI for the preparation of this event, the need for a comprehensive overview of green finance practices in the



UNITED ARAB EMIRATES  
MINISTRY OF CLIMATE CHANGE  
& ENVIRONMENT



مصرف الإمارات العربية المتحدة المركزي  
CENTRAL BANK OF THE U.A.E.



FINANCE  
UNEP INITIATIVE

country was strongly recognized as the first step to global engagement. Such an overview was also deemed necessary as a baseline for attracting the attention of the financial sector to the UAE Green Agenda. This chapter hence outlines the UAE financial sector's readiness, current practices and challenges in green finance, based on the analysis and extracts of a questionnaire survey conducted by MOCCA during 2015.

### Outline of the Survey

Against this backdrop, an online survey was jointly developed by MOCCA, the Central Bank of the UAE and UNEP FI, consisting of four sections and 17 questions (see box

below). It was circulated among 455 financial institutions operating in the country during the summer of 2015, in cooperation with the Central Bank, the Insurance Authority, the

Securities and Commodities Authority (SCA) and the Dubai Financial Services Authority (DFSA).

\* For details, see the *UAE State of Green Economy Report 2014*.

### Survey questions (abridged)

<b>Section 1: Details of you and your institution</b>	<ul style="list-style-type: none"> <li>• Country of headquarters</li> <li>• Type of institution</li> <li>• Geographical coverage of operations</li> <li>• Total assets/portfolio assets/gross premiums written [Global; UAE]</li> <li>• Is the institution regulated by the UAE authorities?</li> <li>• Does your institution offer any Islamic financial products and services?</li> </ul>	<p>Q8: Which type(s) of green finance products/services is your institution planning to introduce in the UAE in the near future?</p> <p>Q9: How many projects and how much has your institution invested in green projects through the above products/services offered in the UAE? [Total; Sectoral]</p> <p>Q10: What are the criteria of defining green projects and making decisions to invest in those projects?</p>
<b>Section 2: General engagement in green finance</b>	<p>Q1: To what extent are environmental issues affecting your institution's business risks?</p> <p>Q2: Which environmental issues and policies are largely (positively or negatively) affecting or going to affect your business?</p> <p>Q3: Does your institution incorporate environmental and social sustainability elements in its vision and strategy?</p> <p>Q4: Are environmental, social and governance (ESG) factors integrated into your institution's business decision-making processes?</p> <p>Q5: Does your institution regularly publish any non-financial reports?</p> <p>Q6: Is your institution a signatory or member of the global initiatives related to sustainable development and green finance?</p>	<b>Section 4: Challenges &amp; expectations of green finance</b>
<b>Section 3: Current status on green finance</b>	<p>Q7: Which type(s) of green finance products/services does your institution currently offer in the UAE and outside the UAE?</p>	<p>Q11: What are the reasons for adopting (or planning to adopt) green finance practices?</p> <p>Q12: Roughly, what is the success rate of the green projects/companies that your institution has already invested in?</p> <p>Q13: How much has your institution benefitted from the implementation of green finance practices through cost savings, additional revenues, increased share values, etc.? Please provide by a rough estimate of monetized values or a share in total profits benefits. What types of benefits?</p> <p>Q14: What are the main barriers/challenges for implementing green finance practices in your institution?</p> <p>Q15: Do you think that in five years there will be more emphasis on ESG issue in the UAE financial sector than today?</p> <p>Q16: Do you think that the rise of Islamic finance provides more opportunities to develop green finance products and services and to invest in green projects?</p> <p>Q17: What type of support or facilitation from the government is most required to grow green finance practices in the UAE?</p>

A total of 79 institutions replied back within the deadline (response rate: 17.4%). Among them, 60 (75.9%) locate their headquarters in the UAE and seven (8.9%) in other countries in the Cooperation Council for the Arab States of the Gulf (GCC) – i.e. Bahrain, Kuwait,

Oman, Qatar and Saudi Arabia. Of the total, 45 institutions (57.0%) operate only within the country, while most of the rest also cover the GCC (35.4%) as well as diverse regions around the world. Whereas relatively new establishments are more prominent (40.5%

were established in 2000 or later) among the respondents, older institutions established earlier than 1980 also constitute nearly one-third (31.6%).

Over one-third (35.4%) of the respondents are categorized as commercial banks, followed by

financial and monetary intermediary (mostly money exchange and transfer agencies), financial investment company, and property and liability insurance (see figure below). Notably, 28 out of the 48 banks operating in the UAE (58.3%) responded. Three-quarters (74.7%) of the respondents are under regulation of the Central Bank, 31.6% under SCA, and 19.0% under the Insurance Authority.

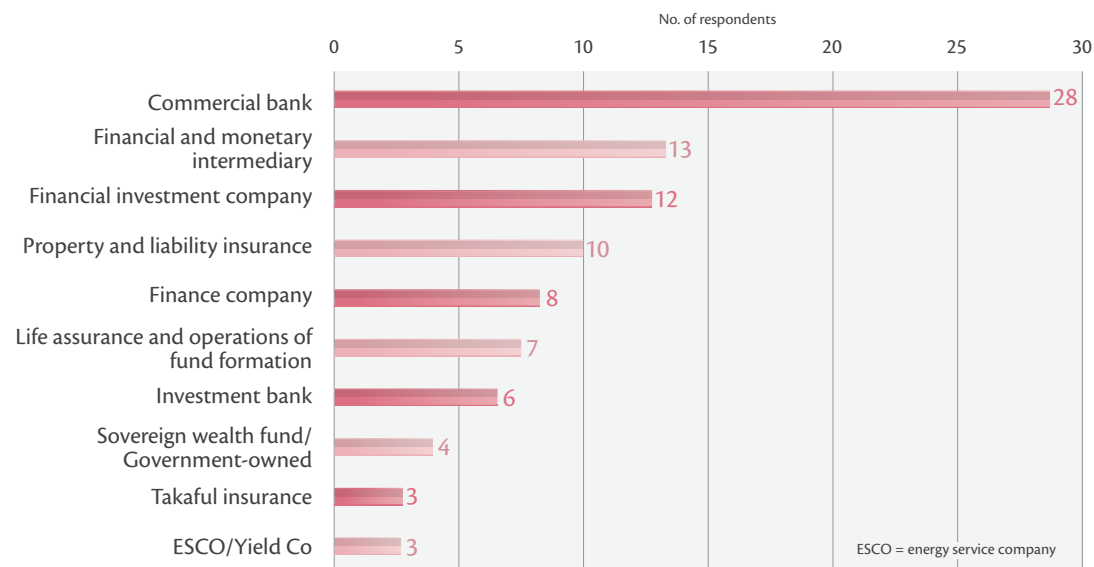
The aggregated domestic assets of the 79 respondent institutions (technically called

“portfolio assets” in investment firms and “gross premiums written” in insurance companies) amounting to AED 2,915 billion (USD 787 billion), which exceeds the total gross assets of UAE banks (AED 2,474 billion or USD 674 billion as of December 2015). Thus, this survey can represent a reasonably good sample of the entire UAE financial sector’s activities.

Since no universal definition of green or sustainable finance exists to date, the questionnaire generally referred it to as

“any of the financial institution’s practices supporting and facilitating sustainable development – whether it is for projects, businesses, industry, organizations, or general events and campaigns”. The actual identification of such practices was left to the respondents so as to understand and bridge gaps between government and the private sector in the efforts towards a Green Economy.

The respondents did not come up with any common definition or standards but provided diverse criteria from general environmental benefits to specific technologies or impact reduction measures, while others emphasized taking into account the balance between economic and environmental benefits. Interestingly, a few passively replied that green projects are defined by government or clients, reflecting the fact that most of such projects are currently arranged by the public sector and that the role of financial institutions tends to be limited to arranging loans for the contractors (see figure below).



Types of respondent institutions (multiple answers)



**Respondent institutions’ criteria of defining green finance and making decisions to invest in green project (excerpts)**

## Current Practices of Green Finance

The survey also asked whether and which green finance products and services the respondent institutions provide in the

UAE. Nearly half (38 institutions) already provide a green finance product or service to date.

Among the 28 types of products and services that the questionnaire listed to help the respondents answer, “green transactions” – a way to save material and energy use, e.g. paperless statements, online and mobile banking, and debit and credit cards made from plant-based or recycled plastics material – are overwhelmingly the most popular form of green finance. Overall, 16 types of products and services have been adopted by at least one institution to date. Meanwhile, the products that are supposed to have a substantive impact for enabling a Green Economy such as green project finance, green loans and green bonds, seem to be still at an early stage of adoption (see figure below).

Only 32 institutions (40.5%) answered that they are planning to introduce additional products and services in green finance in the near future, which were fewer than those who already have at least one product or service.

To date, the total amount of green investment is estimated to exceed AED 80 billion (USD 22 billion) including the nuclear energy projects ongoing in the Western Region of Abu Dhabi. Nearly a quarter of the respondents (18 institutions) from the banking and investment

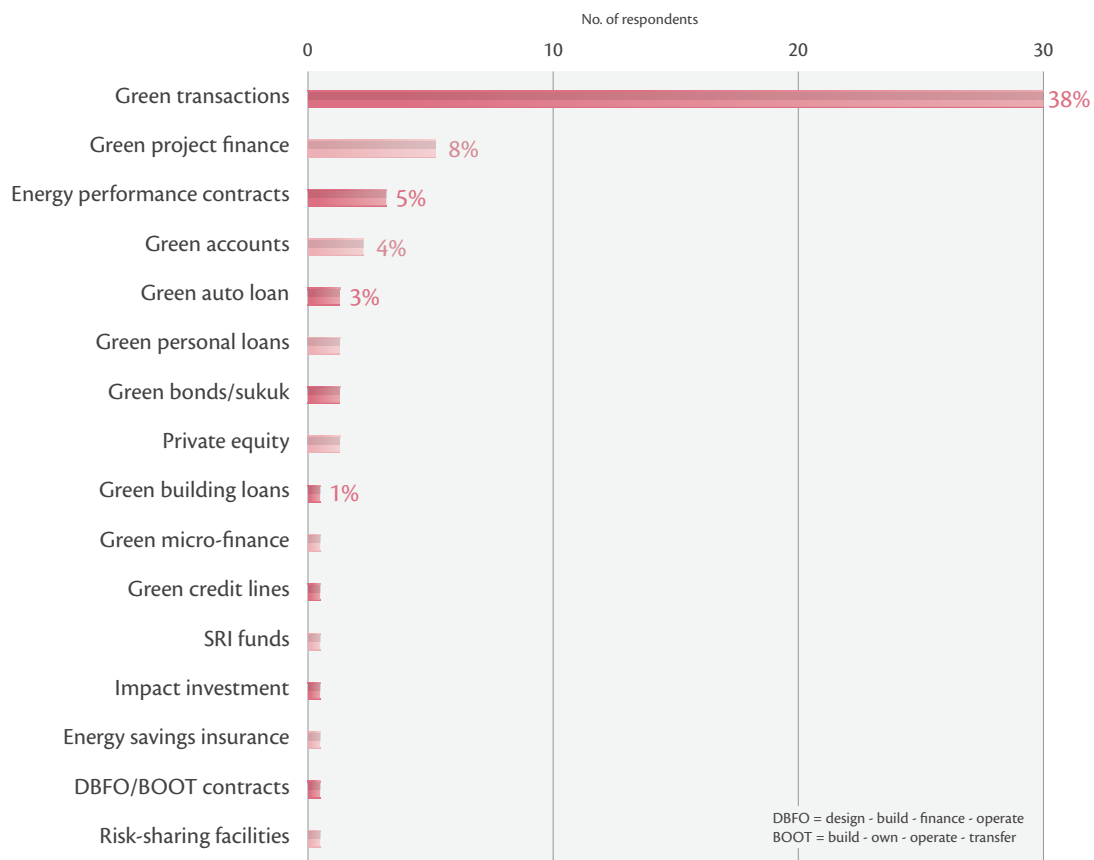
sectors have invested in green projects from their assets. Two-thirds of this green investment went to 75 domestic projects, which amounted to 0.27% of the country's

GDP in 2014. The rest were invested in 27 overseas projects. More green investment would also have been made that this survey could not capture.

Counting only the investment in which sector breakdowns were provided, half of the domestic green investment went to the water and electricity sector, such as efficiency and renewable energy projects. The transport and logistics sector received 29%, followed by oil and gas (14%) and buildings and construction (4%) (see figure below).

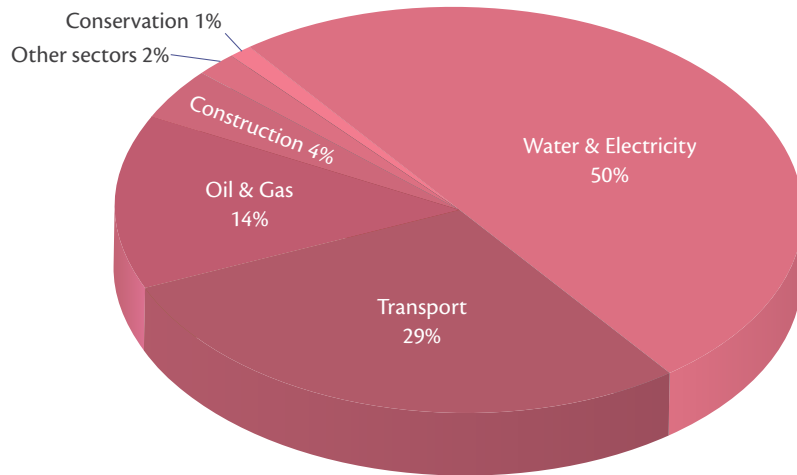
The survey included an open-ended question about the rough estimate of the benefits that the respondent institutions have gained from the implementation of green finance practices, for example through cost savings, additional revenues and increased share values. The answers were diverse – starting from negligible to as much as USD 20 million and 2% of total profits, while others answered by the amount of paper and energy saved by green measures (see figure below). If the entire UAE banking sector gained 2% of total profits from green finance, the total benefits would amount to AED 780 million (USD 210 million) a year.

The survey also asked the success rate of green projects in which the respondent institutions have invested, although the definition and degree of success is inevitably subjective. The rates were equally spread from very highly successful to low, their median being a little over 50%.

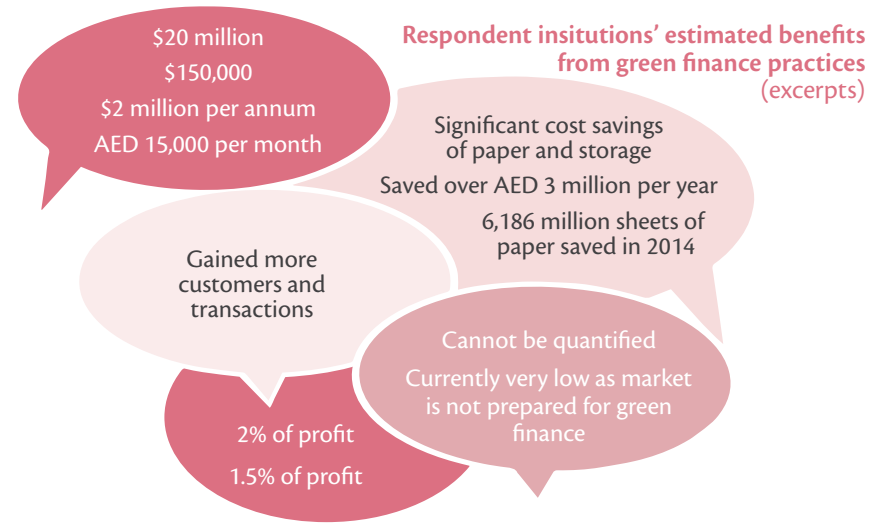


**Types of green finance products/services provided in the UAE by respondent institutions (multiple answers)**





Respondent institutions' green investment by sector



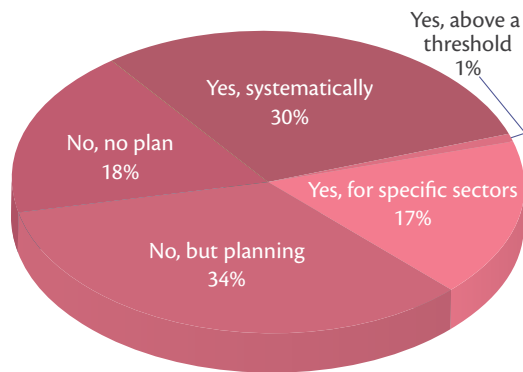
## Driving Force Behind Greening the Financial Sector

What is the driving force behind the increasing number of UAE financial institutions introducing green finance products and services and investing in green projects? The survey generally showed that respondents' positive attitudes to sustainability have already been well nurtured. Among the respondents, 25 institutions (31.6%) replied that they already incorporate environmental and social sustainability elements into their overall visions or strategies, and additional 33 institutions (41.8%) are planning to do so in the near future.

Such attitudes are clearly demonstrated by the systematic integration of sustainability into their regular operations and procedures. 24 institutions (30.4%) replied that they systematically integrate environmental, social and governance (ESG) factors into their business decision-making processes, such as due diligence, investment analysis, risk assessment and management (see figure below). 25 institutions (31.6%) regularly publish their non-financial performance – environmental, sustainability, or corporate

social responsibility (CSR) reports as stand-alone or integrated into annual financial reports.

Albeit still a minority, twelve institutions (15.2%) take part in one or more of the leading global initiatives that promote green finance and accountability, such as CDP (formerly the Carbon Disclosure Project), Global Reporting Initiative (GRI), UNEP FI and the UN Global Compact. Also among the respondents were a few signatories to the Equator Principles, UN



**Integration of ESG in respondent institutions' decision-making process**

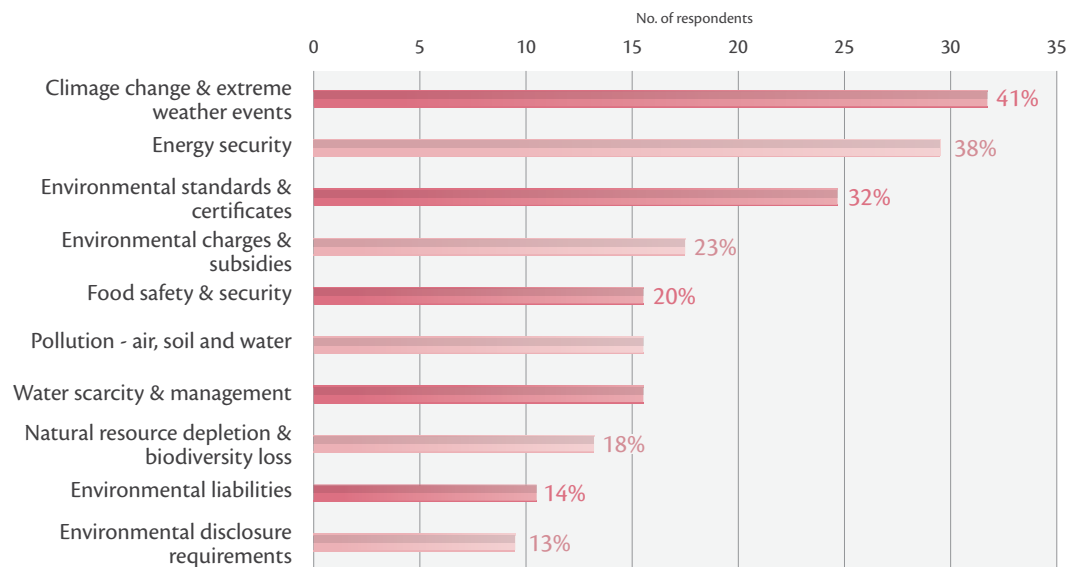
Principles for Responsible Investment, UNEP FI Principles for Sustainable Insurance, and UN Sustainable Stock Exchange Initiative.

Despite the fact that many institutions showed positive attitudes towards sustainability, environmental factors have not been felt as a material risk to their own business yet. Only 19.0% answered that the impact of environmental issues is “very high” or “high”, whereas 36.7% answered “low” and 21.5% even said “little” impact on their business.

On the other hand, when respondents were asked to share what they felt the impacts of specific issues and policies would be, 40.5% replied that climate change and extreme

weather events would be affecting or going to affect their business. The second most affecting issue is energy security (38.0%), followed by government policies such as environmental standards and certificates (31.6%) and charges and subsidies (22.8%). Those institutions seem to be less concerned with domestic environmental issues such as pollution, water scarcity and biodiversity loss, and potential liabilities for causing negative impact to the environment (see figure below).

CSR came to the top of the reasons for adopting or planning to adopt green finance practices among the respondent institutions (45.6%), while concerns about reputation and brand (38.0%) was also among the most significant factors. At the same time, many institutions seem to believe that green finance makes business sense, as cost savings and efficiency was chosen as the second most popular reason (44.3%), and competitive advantage (29.1%) and profitability (25.3%) were also considered highly important (see figure below). As a

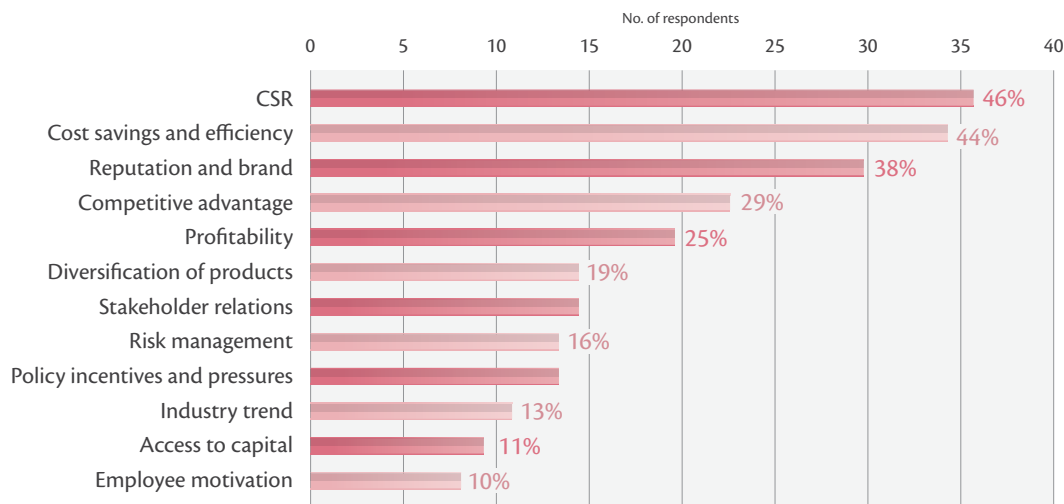


**Environmental issues/policies affecting or going to affect respondent institutions (multiple answers)**

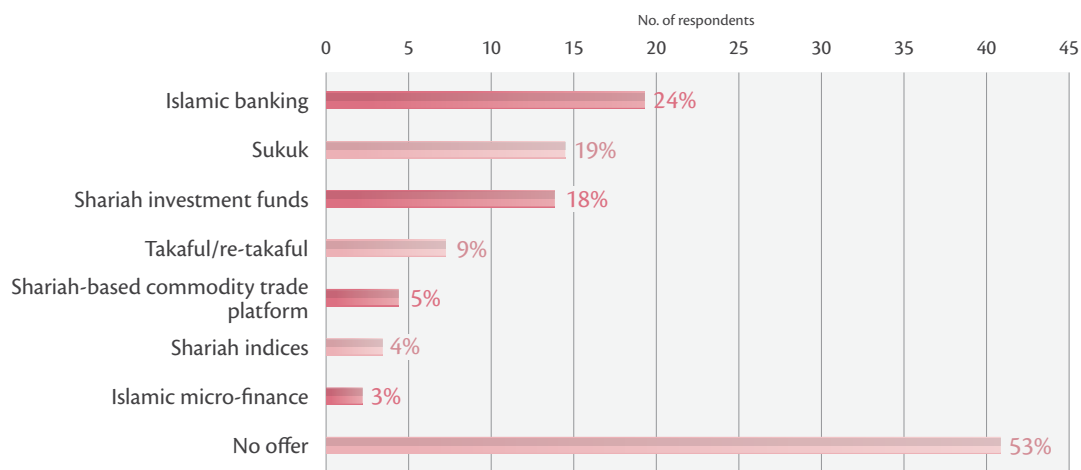
future prospect of green finance, the majority of institutions (70.9%) agree that ESG issues will be even more emphasized in the country's financial sector in the next five years.

As interest in Islamic finance is rapidly growing not only in the Arab region but across the world, Islamic banks have been thriving in the UAE in the last few years. The Central Bank of the UAE has issued an Islamic banking license to eight banks to date. By the end of 2015, their share in total banking assets reached 19.0%, and their financing reached AED 307 billion (USD 83.6 billion), 22.2% of the domestic credit. The survey identifies far more institutions than the licensed Islamic banks – 37 institutions (46.8%) – provide a range of Islamic finance products. 24.1% have Islamic banking, 19.0% arrange *sukuks* (Islamic bonds), 17.7% offer Shariah investment funds, and 8.9% have *takaful* (Islamic insurance) and/or *re-takaful* (Islamic re-insurance) (see figure right).

In relation to green finance, 46.8% consider that the rise of Islamic finance will provide more opportunities to develop green finance products and services or to invest in green projects. On the other hand, a substantial number of institutions (43.0%) also answered that they were not sure about such a prospect, and the view over Islamic finance seems to be divided.



Reasons of respondent institutions for adopting or planning to adopt green finance (multiple answers)



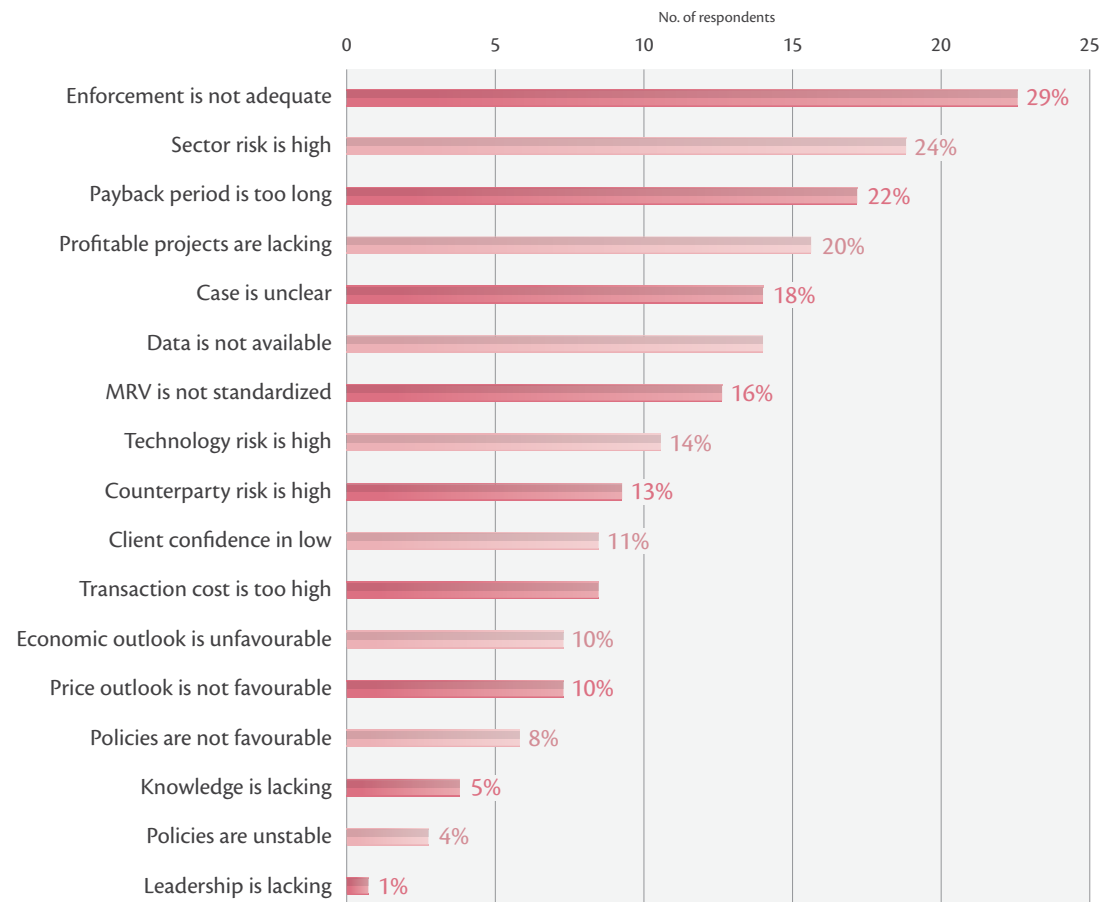
Islamic finance products offered by respondent institutions (multiple answers)

## Challenges and Enabling Policies for Green Finance

The practices of green finance are still at an embryonic stage among UAE institutions, as they face diverse barriers and challenges to starting it up and integrating it into their regular operations. The survey questioned the most significant barriers and challenges, which included macroeconomic situations, generic conditions surrounding green finance, transactional issues and public support.

The highest number of institutions (29.1%) had reported that the lack of adequate enforcement of policies and regulations had caused difficulty in introducing green finance in the UAE. Their proper implementation is critical to give clear incentives for industry to take greener actions and invest in greener solutions by penalizing non-compliers and continuously raising the bar on standards.

This was followed by the factors more directly impacting their bottom line, including high risk of green sectors (24.1%), long payback period and lack of long-term finance (21.5%), lack of profitability (20.3%) and lack of clarity in benefits (17.7%). Lack of data (17.7%) and standard methodology for measurement, reporting and verification (MRV) (16.5%)

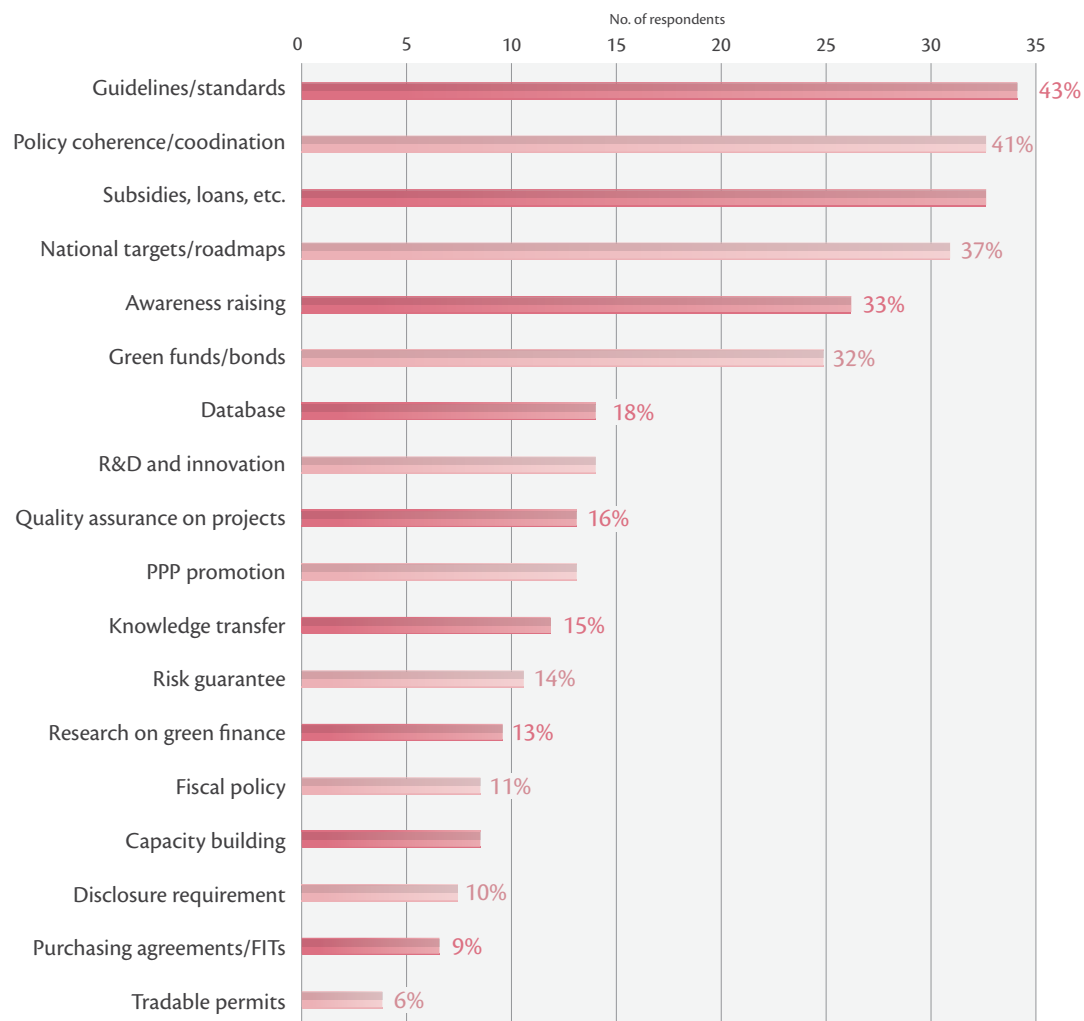


Barriers and challenges to implementing green finance among respondent institutions (multiple answers)

were also considered as important barriers, since they affect decision-making such as due diligence and risk assessment (see figure above).

To conclude the survey, its final question asked what type of support or facilitation from the government is most required to scale up and accelerate green finance practices in the country. Practical and direct support was the top answer, including guidelines and on green finance (43.0%) and grants, subsidies, loans and interest discounts (40.5%). Many respondents also requested improved policy coherence and government coordination (40.5%) as well as the establishment of national targets and roadmaps to disseminate green finance (36.7%).

These were followed by awareness raising and information dissemination (32.9%) and the establishment of governmental green funds and bonds (31.6%). In contrast, only a small number of institutions showed interest in government intervention through market mechanisms, or “getting prices right” policies, such as fiscal policy, purchasing agreements and feed-in-tariffs (FITs), and tradable permits (e.g. carbon credits) (see figure right).



Types of support or facilitation from the government required by respondent institutions to practice green finance (multiple answers)

## Way Forward to Mainstream Green Finance in the UAE

UNEP FI advises that in a world where the global population is approaching 9 billion, all of whom with basic needs to be met, where natural resources are rarefied, and where climate disruptions are mounting, “business as usual” is no longer sufficient. The world has changed, markets are changing fast and a new approach to finance is needed to adapt and keep up with the pace of change. Banks, for example, are at a historic tipping point where continuing to grow as a business has become closely interconnected with the fulfilment of broader goals such as social and environmental sustainability (see tables).

### Why is sustainability relevant to the CEO and the Board of your institution ?

Risks of inaction	Opportunities
<ul style="list-style-type: none"> <li>• Loss of business opportunities through a failure to adapt to changing market realities</li> <li>• Higher overall risk exposure through a failure to understand the materiality of environmental and social risks</li> <li>• Potential pressure or disengagement of investors prioritizing sustainable investment choices</li> <li>• Lack of preparedness for regulatory and policy adjustments</li> <li>• Risks to reputation, credibility and image of the company through a failure to respond to stakeholder expectations</li> </ul>	<ul style="list-style-type: none"> <li>• New business opportunities arise from a new understanding of the market and changing world context.</li> <li>• Stronger, more resilient institution thanks to proper understanding and management of sustainability issues</li> <li>• Better rated and valued company</li> <li>• Improved reputation, credibility and recognition of the brand</li> </ul>

Source : UNEP FI

### What can financial institutions do?

<p><b>Demonstrate vision</b></p> <p>Ensure that environmental and social sustainability issues are directly embedded into your organization’s vision.</p>
<p><b>Establish adequate governance</b></p> <p>Accountability on sustainability issues needs to be established at the highest levels of the organization, within the executive committee and/or the board.</p>
<p><b>Foster a new corporate culture</b></p> <p>Actively communicate and advocate within the organization to show top-level buy-in, and invest in developing staff awareness and expertise.</p>
<p><b>Be transparent</b></p> <p>Promote clear and transparent communication on your organization’s approach and progress in adapting to and incorporating to sustainability issues.</p>

Source : UNEP FI

Green sustainable finance practices need to be accelerated and promulgated in the UAE to realize the level of investment and scale of projects required for economic diversification through fostering green industry and jobs. A nationally coordinated, strategic implementation plan will therefore be developed and put into force under the framework of the UAE Green Agenda (Sub-Program 1.2.3: Green Finance and Investment Support Scheme).

Based on the feedback from the survey, such a strategy may be developed and implemented

around the following multiple steps (also see figure below):

**Step 1: Form a national group on green finance**

- A multi-stakeholder group consisting of financial institutions, green businesses and project developers, and government authorities, with a primary objective to learn from best practices through UNEP FI, knowledge exchange, and identifying innovative ways to overcome barriers.

**Step 2: Shift attention to impactful projects and products**

- Conduct a baseline study on the country's market potential of green projects and investment opportunities according to industries or technologies in order to help advocate more impactful green investment and engage more institutions.

**Step 3: Capacity building and awareness raising**

- Guidelines, technical toolkits and communication materials may be developed to help disseminate the notion and practices of green finance, while workshops and events may be organized for different target audiences.

**Step 4: Elaborate enabling policies**

- Identify practical policy measures that enable scaling up of green finance practices based on multi-stakeholder consultation, and introduce and implement such practices in a way the government can afford.

**Step 5: Monitor progress**

- Set a mechanism to estimate the green

finance market and benefits and monitor financial sector initiatives by setting up database, scaling up the questionnaire survey, etc.

- Report the progress through the Emirates Green Development Council (EGDC) and the State of Green Economy Report, and revise plans and targets regularly.



**A proposed roadmap for mainstreaming green finance in the UAE**

## First Step in Engaging Local Financial Institutions

In preparation for hosting the UNEP FI Global Roundtable, MOCCAIE organized the National Roundtable on Financing and Investing in Green Economy Projects in May 2015 in Dubai in cooperation with UNEP FI. The leading national and international practitioners and analysts provided global trends of sustainable finance and presented opportunities for UAE financial institutions to invest in low-carbon technologies and projects. In November, the ministry, EGDC and UNEP FI further co-organized the High-level National Meeting on Sustainable Finance where senior executives from banks, insurers, investment and finance companies were engaged directly with the two international experts.

Following those events, MOCCAIE and the Central Bank decided to convene the Multi-Stakeholder Steering Group on Sustainable Finance with support from UNEP FI to raise awareness and catalyze a process to address environmental and social issues among UAE financial institutions. The group will aim, among other objectives, to generate a momentum on green financing in the country to align with the UAE Green Agenda and the



High-level National Meeting on Sustainable Finance (Dubai, November 2015)

UN Sustainable Development Goals (SDGs), and with the international sustainable finance community for the forthcoming UNEP FI Global Roundtable. Several local financial institutions that are active in this field have been invited to the group, along with the UAE

Banks Federation as liaison with the financial industry, with an expectation that they will lead a joint effort to promote green, sustainable finance in the UAE and the region.





CHAPTER 7

UAE'S PERFORMANCE  
TOWARDS A GREEN  
ECONOMY

## UAE's Performance towards a Green Economy

As outlined in Chapter 2, 41 UAE Green Key Performance Indicators (Green KPIs) have been determined during 2015 according to three dimensions (environment, economic and social) of sustainable development, building on international efforts. These are intended to primarily help the Emirates Green Development Council (EGDC) monitor and review the overall progress of the nation's development towards a Green Economy as well as the advancement of the *UAE Green Agenda 2015-2030* in its quarterly meetings. These refined indicators should also be able to provide a solid evidence base for improved policy-making, target-setting

and evaluating impacts, and to inform the wider public. The set of indicators is well aligned with the national KPIs defined under the UAE Vision 2021, and is largely in line with the UN Sustainable Development Goals (SDGs) agreed as new universal targets for 2030 by 193 countries in September 2015.

This final chapter compiles the UAE's latest results of the 41 Green KPIs, along with brief contextual explanations to help the reader's understanding. It should be noted that where quality domestic data is not available a substantial portion of data is taken from authoritative international sources such

as the World Bank's *World Development Indicators*. The figures on the UAE's population and gross domestic product (GDP) are also taken from international sources to allow the UAE's standings to be benchmarked against other countries in the Cooperation Council for the Arab States of the Gulf (GCC) and around the world. The required improvement in collecting domestic socio-economic and environmental data and its consistency with international data sources will be addressed by the National Green Economy Data Program (4.3) under the UAE Green Agenda.\*

### Environmental Performance

#### ENV1: Rate of Groundwater Abstraction

**Rate of groundwater abstraction (2013): 13.9 times the recharge from rainfall**

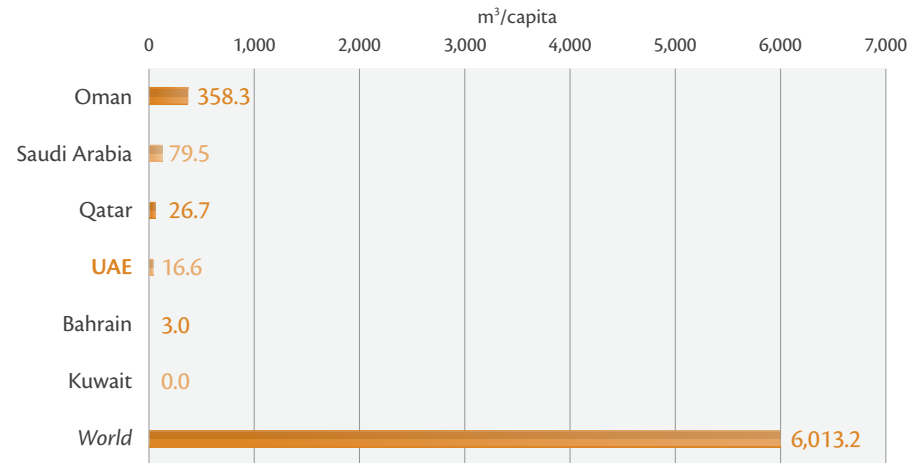
Traditionally, groundwater was the main natural water source in the UAE, and is now primarily

used for irrigating farmland and forests. According to the Ministry of Climate Change

and Environment (MOCCA), the total volume of groundwater was 740 billion cubic meters (m<sup>3</sup>) in 2005. Only 3% of this source, or around 20 billion m<sup>3</sup>, is considered to be "fresh" with salinity of less than 1,500 parts per million (ppm).

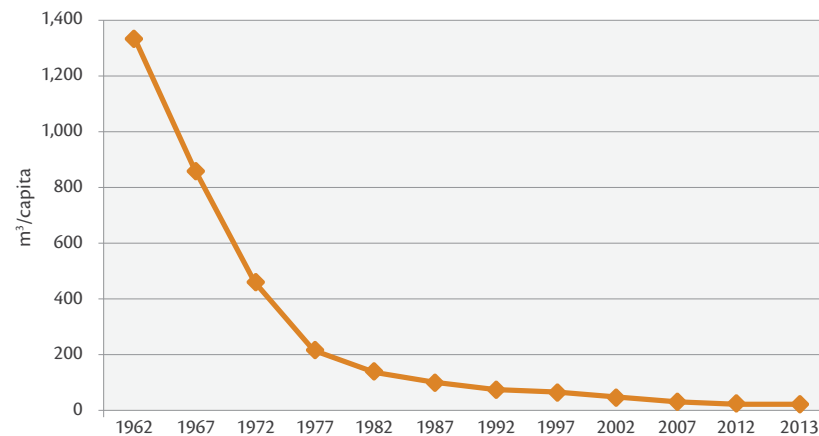
\* With regard to the performance data listed in this chapter, where the year the data was sourced is not clear or consistent, the year of publication is adopted. For example, since the World Bank's *Doing Business 2016* was published in October 2015, the data from this publication is indicated as that of 2015. It is indicated individually where this principle is not applied.

- MOCCA estimates that 1.85 billion m<sup>3</sup> of groundwater was abstracted in 2013, accounting for 44% of the total water consumption (4.2 billion m<sup>3</sup>). The UAE cannot meet its water demand without resorting to non-conventional sources such as desalination (42%) and wastewater recycling (14%).
- MOCCA's *Hydro Atlas of the United Arab Emirates 2014*, which compiled the result of research conducted with the UAE University, indicates that the total estimated recharge from rainfall in the UAE territory is 133 million m<sup>3</sup> per annum, which accounts only 7% of the abstraction volume. Over-extraction of groundwater for agriculture has resulted in a sharp drop in water levels and a deterioration of water quality.
- The UN Food and Agriculture Organization (FAO) has been compiling the estimated availability of internal freshwater around the world over the past several decades. The data reveals that the GCC is the region where freshwater is least available. The per-capita freshwater availability in the UAE has been steadily declining and recorded 16.6 m<sup>3</sup> per year in 2013 (1% down from 2012; 3rd lowest in the GCC), which accounts for merely 8.8% of municipal water consumption per capita (ENV2).



Annual renewable internal freshwater resources per capita in GCC countries, 2013

Source: FAO AQUASTAT; World Bank, World Development Indicators



Trend in annual renewable internal freshwater resources per capita in the UAE, 1962-2013

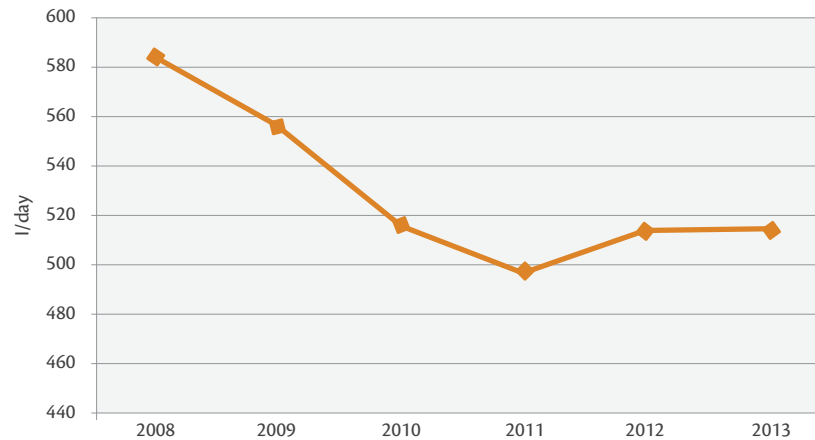
Source: FAO AQUASTAT; World Development Indicators

## ENV2: Water Consumption per Capita

Daily municipal water consumption per capita (2013): 514.6 liters  
(unchanged from 2012)

Due to the lack of freshwater resources, the UAE relies on energy-intensive desalination technologies for the provision of most of its municipal water, which is distributed by federal and local water and electricity authorities for industry, commercial, household and landscaping use. Improving efficiency in water use is, therefore, the top priority not only to ensure the sustainable management of water resources but to also lower energy consumption, mainly natural gas, which is used to power most desalination plants.

- Improvement in the per-capita intensity of water use has been observed since 2008, but it has been kept steady at around 500 liters per day over the past four years.
- When comparing per-capita domestic water consumption (commercial and household only) with other advanced economies, the UAE's consumption level (353 liters per day in 2013) is ranked among the highest in the world. There is no comparable international data on municipal water use.
- It should be noted that water usage patterns in the UAE differ significantly between populations, emirates and residential types.



Municipal water consumption per capita per day in the UAE, 2008-2013

Source: Ministry of Energy, Statistical Annual Report Electricity and Water; World Development Indicators

## ENV3: Waste Generation per Capita

Municipal solid waste per capita (2014): 1.82 kg per day

The amount of waste generated by economic activity tends to rise in line with growing demand for materials and products. At the end of their use, many valuable materials may be disposed of and are potentially lost if they are not reused or recycled. Waste generation and treatment affects environmental quality

in terms of land use, sanitation, water and air pollution, as well as greenhouse gas (GHG) emissions.

- The per-capita generation of municipal solid waste (MSW) is recorded at 1.82 kilograms (kg) per day in 2014, which is comparable to major economies such as United States

(1.99 kg in 2011), Switzerland (1.90 kg in 2012) and Germany (1.67 kg in 2012).

- MSW is mainly produced by households but also includes waste from offices, public institutions, etc. It generally refers

to waste collected by or on behalf of municipal authorities and disposed of through their waste management system. Apart from MSW, there are other types of solid waste such as construction waste,

industrial waste (both hazardous and non-hazardous), medical waste (hazardous), agricultural waste, and sludge from wastewater treatment, which also need to be quantified and monitored.

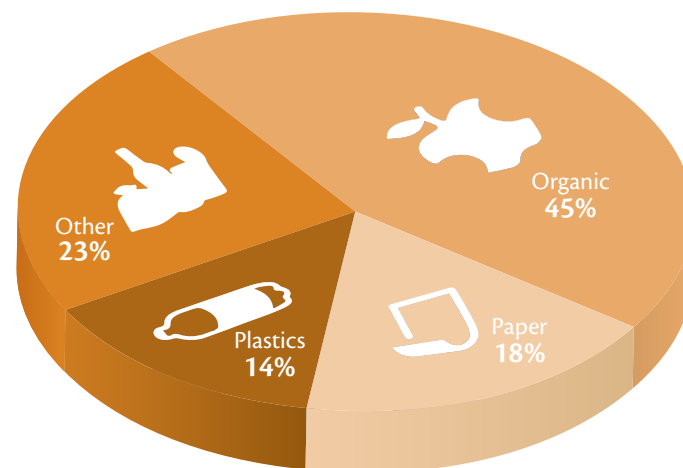
**ENV4: Rate of Waste Recovery**  
 Rate of municipal solid waste treated (2014): 14.08%

Recycling is still a relatively new notion in the UAE, but over the past few years each emirate has introduced integrated waste management and a number of supportive initiatives to effectively manage waste collection and encourage the recycling of various types of waste. This includes the establishment of the required recycling infrastructure, such as material recovery facilities, compost facilities, waste-to-energy facilities, and waste collection centers in residential areas, as well as public communication and education campaigns. Tariff systems have also been introduced for commercial, industrial, construction and agricultural sectors to reduce waste and encourage recycling.

- The country's overall recovery rate of MSW reached 14.08% in 2014, preventing that portion of waste from ending up in landfill by various methods including recycling and composting.

- 45% of MSW in the UAE consist of organic waste, followed by paper (18%) and plastics (14%), much of which can be recovered if properly segregated and treated.

- The UAE Vision 2021 and the UAE Green Agenda set an ambitious target of 75% recovery from MSW by 2021. Sharjah set a zero-landfill target (see Chapter 5).



**Composition of municipal solid waste in the UAE, 2012**  
 Source: Concerned departments of local authorities in the UAE

## ENV5: Energy Consumption per Capita

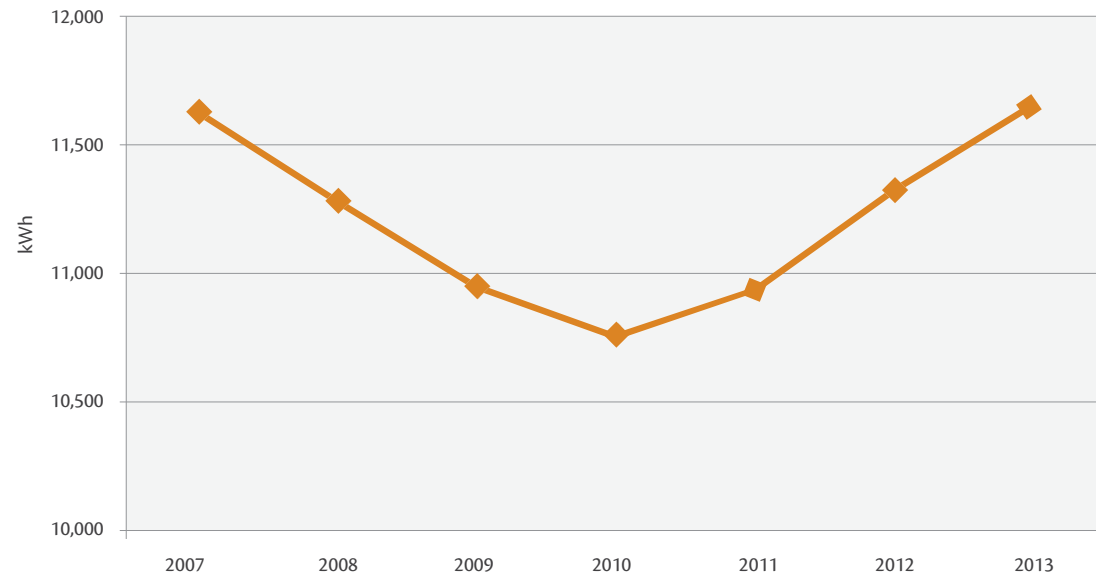
Annual electricity consumption per capita (2013): 11,655 kWh (3% up from 2012)

Energy, particularly electricity, is a major component of the economy as a fundamental input to all economic activities, as well as a sector itself. A transformation in the structure of a country's energy supply and the intensity of its energy use is one of the key factors in realizing a Green Economy. The main challenge is to decouple energy use and related emissions from population and economic growth, through improvements in efficiency of both production and consumption and the wider use of cleaner energy sources.

- According to the Ministry of Energy (MoENR), the total consumption of electricity in the UAE in 2013 was 105,363 gigawatt-hours (GWh), a 3.9% increase from 2012. The rate of increase has been steadily slowing down since 2007.
- On the other hand, per-capita electricity consumption has increased since 2010 and has reached the pre-financial crisis level. This hints at the urgent need to improve energy efficiency and promote energy saving at households and industries.

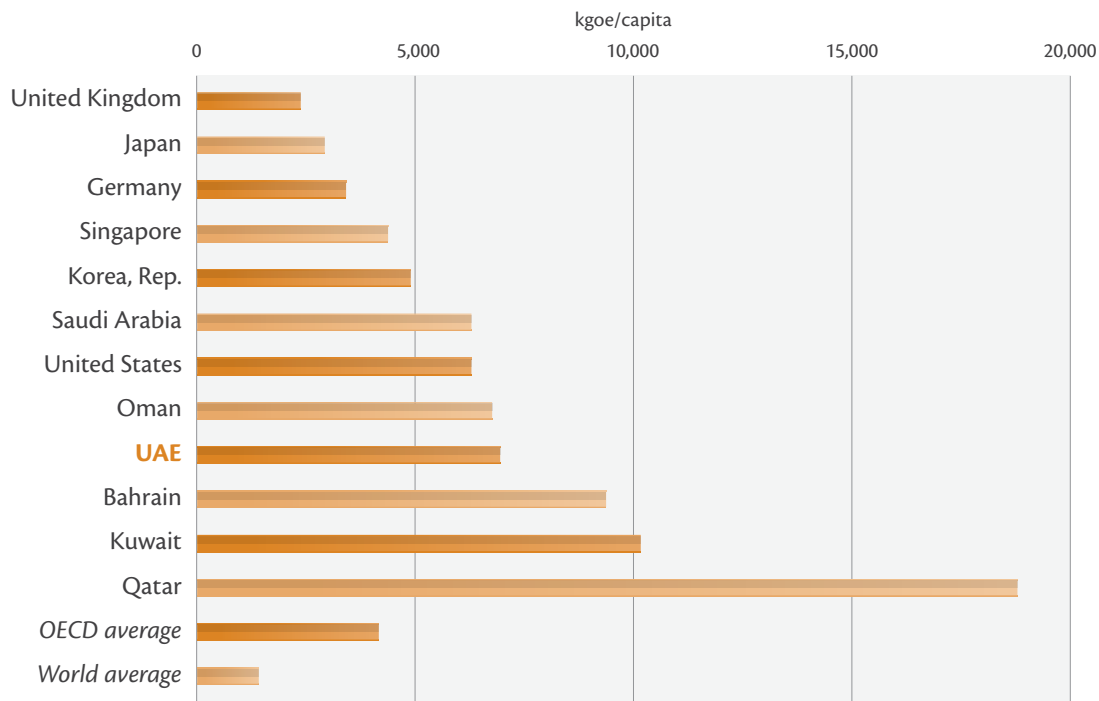
- The International Energy Agency (IEA) estimates the total energy consumption that includes the use of fossil fuels in industrial processes, heating and cooling, transport, etc., as well as electricity. The UAE's energy consumption was estimated 7,536 kg oil equivalent (kgoe) per capita,

which is the second lowest in the GCC after Oman but the eighth highest among 137 countries benchmarked. This figure is as much as 80% higher than the average energy consumption of the countries in the Organisation for Economic Co-operation and Development (OECD) (4,182 kgoe).



Trend in annual electricity consumption per capita in the UAE, 2007-2013

Source: Statistical Annual Report Electricity and Water; World Development Indicators



Annual energy consumption (kg oil equivalent) per capita in GCC and major countries, 2012

Source: IEA; World Development Indicators

**ENV6: Rate of Non-Fossil Energy**  
 Rate of electricity generation from renewable sources (2014; Dubai only): 0.072%

The use of renewable energy sources and low-carbon and clean fuel technologies plays a central role in addressing climate change as well as energy security. Despite the abundance

of conventional energy sources, the UAE has shown its ambition and leadership in advancing the development and deployment of renewable energy technologies. During

2015, even more ambitious targets and project development were announced, while the further establishment of a nationally unified strategy for energy mix is to take place as per the UAE Green Agenda.

- The current level of electricity generation from renewable sources is still very low, while the collection of accurate data on and estimation of renewable energy generation is very important. The amount of electricity generated from renewable sources in Dubai during 2014 was estimated at 28.4 GWh, against 39,599 GWh of the Dubai Electricity and Water Authority's (DEWA) total electricity generation. According to IEA, the global average in the rate of non-fossil energy use was 8.45% in 2012.
- Currently, the UAE set a national target of 24% for sourcing electricity from non-fossil fuels (including nuclear) by 2021, which was submitted to the United Nations Framework Convention on Climate Change (UNFCCC) as the country's Intended Nationally Determined Contribution (INDC) (see Chapter 4).

- To date, Shams 1, a 100 megawatt (MW) concentrated solar power (CSP) plant in the Western Region of Abu Dhabi, is the largest renewable energy installation in the UAE. This is followed by the first phase of Dubai's Mohammed bin Rashid Solar Park (13 MW) with advanced thin-film photovoltaic (PV) modules, and the 10 MW Masdar City solar PV plant. The region's first wind turbine was installed on Sir Bani Yas Island of Abu Dhabi, with a capacity of 850 kilowatts (kW).
- As Dubai announced an ambitious target of an energy mix where 25% of the emirates' energy comes from clean sources by 2030 and 75% by 2050, the planned capacity of the Mohammed bin Rashid Solar Park was expanded from 1,000 MW to 5,000 MW by 2030. Abu Dhabi also announced a tender for a 350 MW PV project, as it sets a target that at least 7% of power generation capacity should be from renewable energy by 2020 (see Chapter 4).

Emirate	Name of plant	Capacity	Technology	Status
Abu Dhabi	Shams 1	100 MW	Solar CSP	In operation
	Masdar City Solar PV Plant	Ground-mounted: 10 MW	Solar PV	In operation
		Rooftop: 1 MW		In operation
	Sir Bani Yas Island Wind Farm	0.85 MW	Onshore wind	In operation
	Sweihan Solar Park	350 MW	Solar PV	To be constructed
	Barakah Nuclear Power Plant	Reactor 1: 1,400 MW	Nuclear (Pressurized Water Reactor)	To be completed by 2017
Reactor 2: 1,400 MW		To be completed by 2020		
Reactor 3: 1,400 MW				
Reactor 4: 1,400 MW				
Dubai	Mohammed bin Rashid Solar Park	Phase 1: 13 MW	Solar PV	In operation
		Phase 2: 200 MW		To be completed by 2017
		Phase 3: 800 MW		To be completed by 2020
		Total: 5,000 MW		To be completed by 2030
	Rooftop solar projects (miscellaneous)	Total: 2.2 MW	Solar PV	In operation

List of major clean energy projects in the UAE, in operation and planned

Source: MoENR



### ENV7: Carbon Intensity of Energy

CO<sub>2</sub> emissions from electricity generation (2013, including water desalination):  
600 gCO<sub>2</sub>/kWh (unchanged since 2011)

The carbon intensity measured by the average amount of carbon dioxide emitted from electricity generation and/or overall energy production is a key benchmark to understand countries' advancement in de-carbonization and energy sector efficiency efforts.

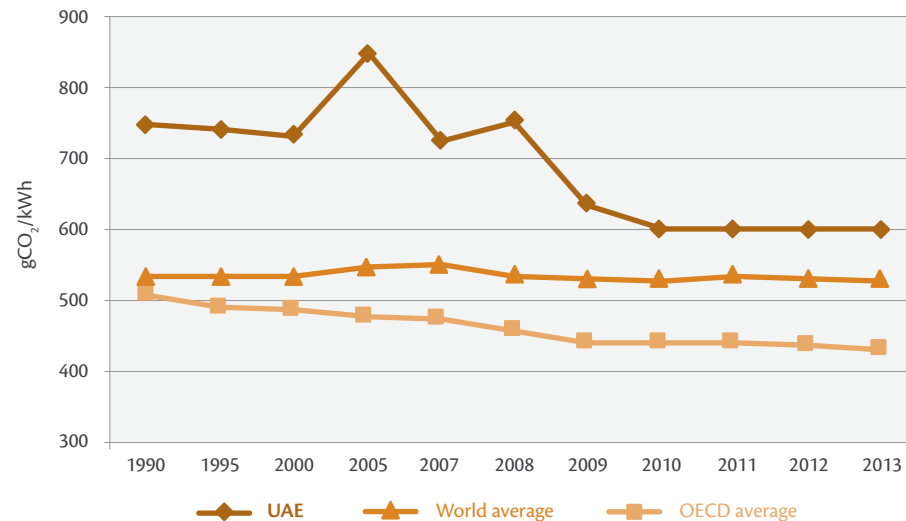
- According to the IEA's estimates, the carbon intensity of the UAE's electricity production has been steadily improving due to the active deployment of the latest efficient technologies in power plants. CO<sub>2</sub> emissions per kilowatt-hour (kWh) of electricity generation is 600 grams (g), representing a 34% decrease since the peak recorded at 913 grams in 2004, which is closing the gap with the global average of 528 gCO<sub>2</sub>/kWh. The UAE's intensity record has not been changed since 2011.
- The UAE's power producers extensively apply combined-cycle power and desalination technologies to make an efficient use of waste heat for steam generation and water desalination. The above carbon intensity figures include the

emissions resulted from both electricity and desalinated water production. Around 30% of the emissions can be attributed to desalination.

- IEA also provides the carbon intensity per total primary energy supply (TPES). This clearly shows the UAE's improvement in energy decarbonization, as the country

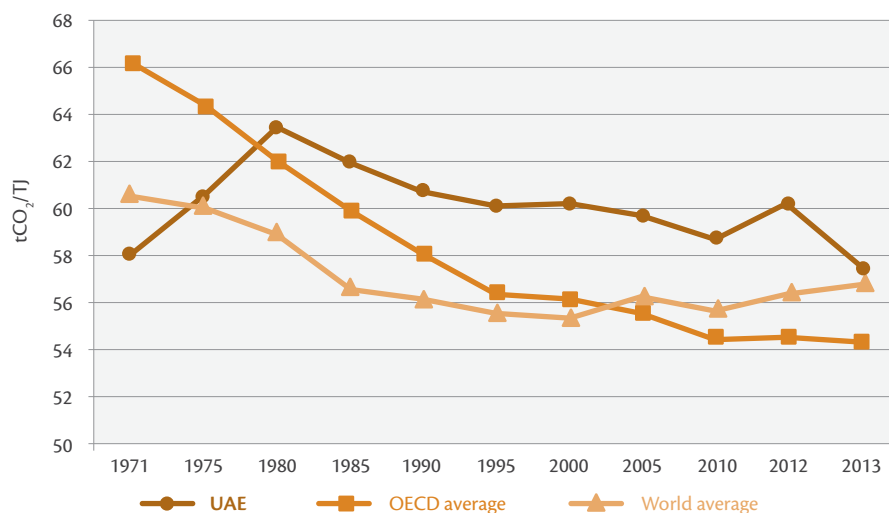
recorded 57.6 tons of carbon dioxide (tCO<sub>2</sub>) per telajoule (TJ), which is a 9% decrease since the peak in 1980 and now close to the world average of 56.8 tCO<sub>2</sub>/TJ.

- As the deployment of renewable and nuclear energy advances in the UAE, as per its energy mix targets, its carbon intensity is expected to improve even faster.



Trend in CO<sub>2</sub> emissions from electricity generation in the UAE, 1990-2013

Source: IEA, CO<sub>2</sub> Emissions from Fuel Combustion 2015



Trend in CO<sub>2</sub> emissions per total primary energy supply in the UAE, 1971-2013

Source: CO<sub>2</sub> Emissions from Fuel Combustion 2015

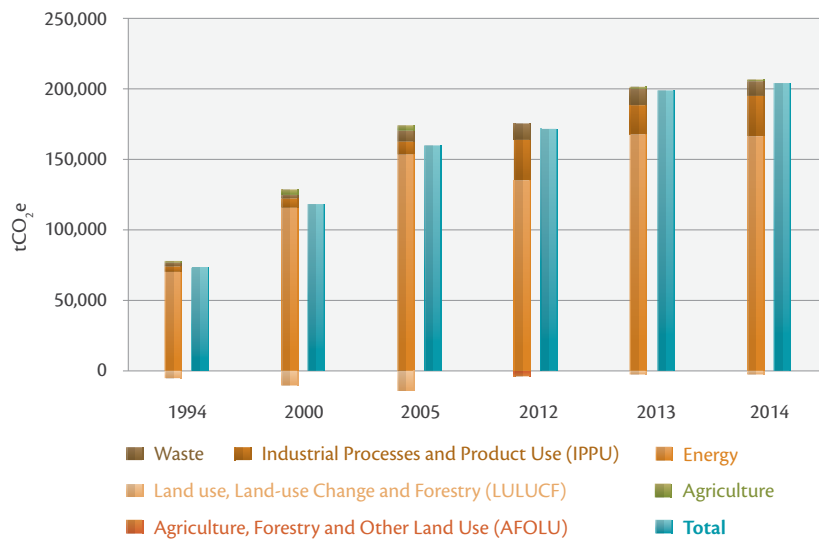
## ENV8: Total GHG Emissions

Total greenhouse gas emissions (2014): 203.67 million tCO<sub>2</sub>e (2% up from 2013)

Climate change is a major issue that could have significant effects on the global economy, let alone on the realization of sustainable development. The effects of the increasing atmospheric GHG concentrations on global temperatures and the earth's climate will lead to significant changes in ecosystems, human settlements, agriculture and other socio-economic activities that could ultimately affect

economic output. CO<sub>2</sub> from the combustion of fossil fuels is a major contributor to this phenomenon, along with other GHGs generated from industrial products and processes, land use, waste, etc. Progress in stabilizing the concentration of GHGs in the atmosphere is dependent on whether and how fast GHG emissions can be decoupled from economic and population growth.

- The UAE's total GHG emissions have increased by 174% in two decades between 1994 and 2014 from 74 million tCO<sub>2</sub>e to over 200 million tCO<sub>2</sub>e mainly due to a strong economic growth and an increase in the population.
- Since the UAE is a young, rapidly growing nation, it is important to understand its performance in terms of intensity per population and economic size. The emissions per capita have dramatically decreased by 38% between 2005 and 2014 (see also ENV7 and ECO13).
- The 2012 GHG Inventory was compiled based on the Intergovernmental Panel on Climate Change (IPCC) 2006 Guidelines for National Greenhouse Gas Inventories, while other years were based on the Revised IPCC 1996 Guidelines, which are required for non-Annex I countries including the UAE. Since the emissions values are likely to be estimated lower under the 2006 Guidelines than the 1996 Guidelines, the 2012 Inventory data may not be appropriate for comparison with other years. The emissions of hydrofluorocarbons (HFCs), non-methane volatile organic compounds (NMVOCs) and sulfur hexafluoride (SF<sub>6</sub>) have not been covered by the UAE inventories.

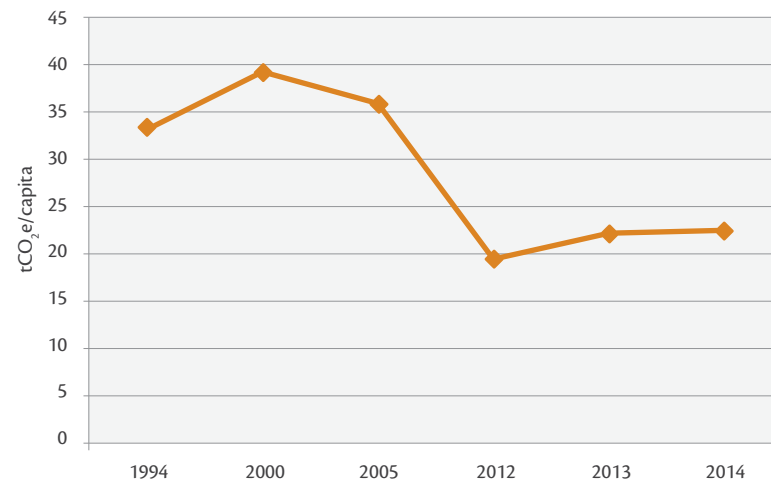


**Trend in the UAE's GHG emissions (total and per source), 1994-2014**

Source: MoENR; MOCCA

Note: The 2012 inventory was made according to the IPCC 2006 Guidelines. The other years followed the IPCC (Revised) 1996 Guidelines.

- In terms of sectoral distribution of emissions, energy generation represents 80% of the total emissions followed by industrial processes and product use (IPPU) (13%) and waste (6%) in 2014.



**Trend in the UAE's GHG emissions per capita, 1994-2014**

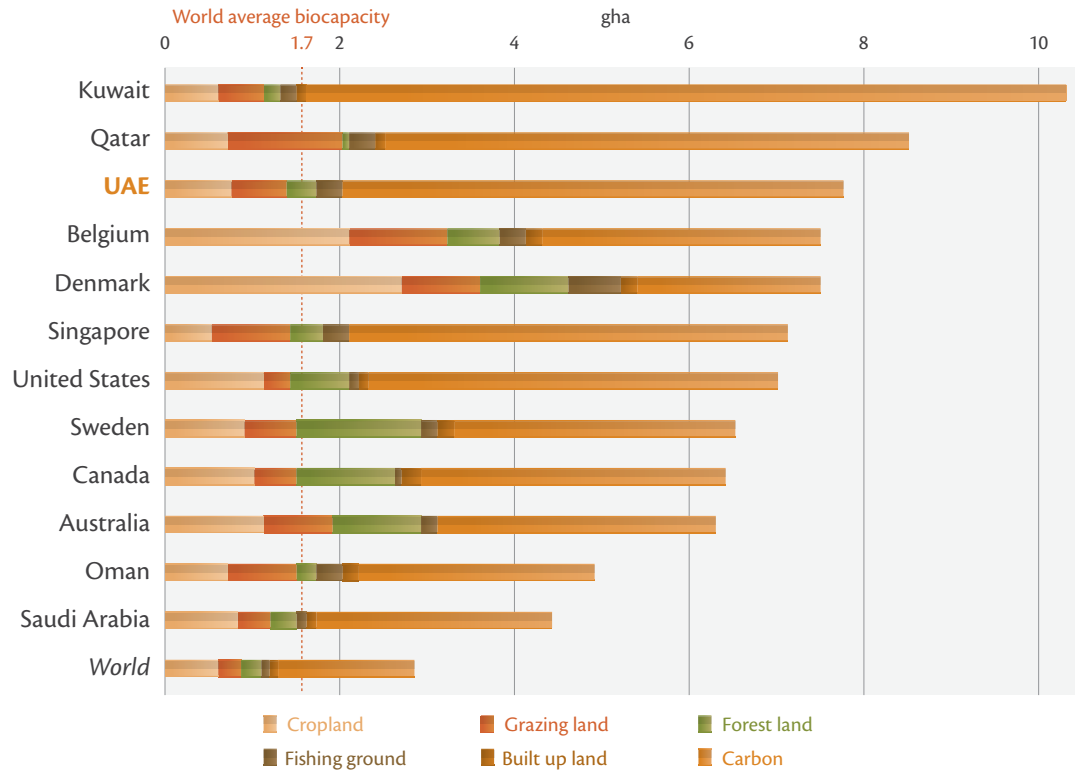
Source: MoENR; MOCCA; World Development Indicators

**ENV9: Ecological Footprint**  
 Ecological Footprint per capita (2014): 7.75 global hectares (8% down from 2012);  
 3<sup>rd</sup> highest in the GCC

Ecological Footprint is a measure of human demand for natural capital in contrast with the planet's ecological capacity to regenerate, which is called biocapacity. Ecological Footprint adds up all the ecological services a human

population demands, including the amount of biologically productive area needed for crops, grazing land, built-up areas, fishing grounds and forest products. It also includes the area of forest needed to absorb carbon emissions

that cannot be absorbed by the ocean. Both biocapacity and Ecological Footprint are expressed in a common unit, global hectare (gha). This indicator was developed in the early 1990s and has been compiled and promoted by WWF International and the Global Footprint Network as one of the most instructive composite indices that comprehensively captures the diverse environmental impacts



### Ecological Footprint of the largest 10 and GCC countries, 2014

Source: Global Footprint Network

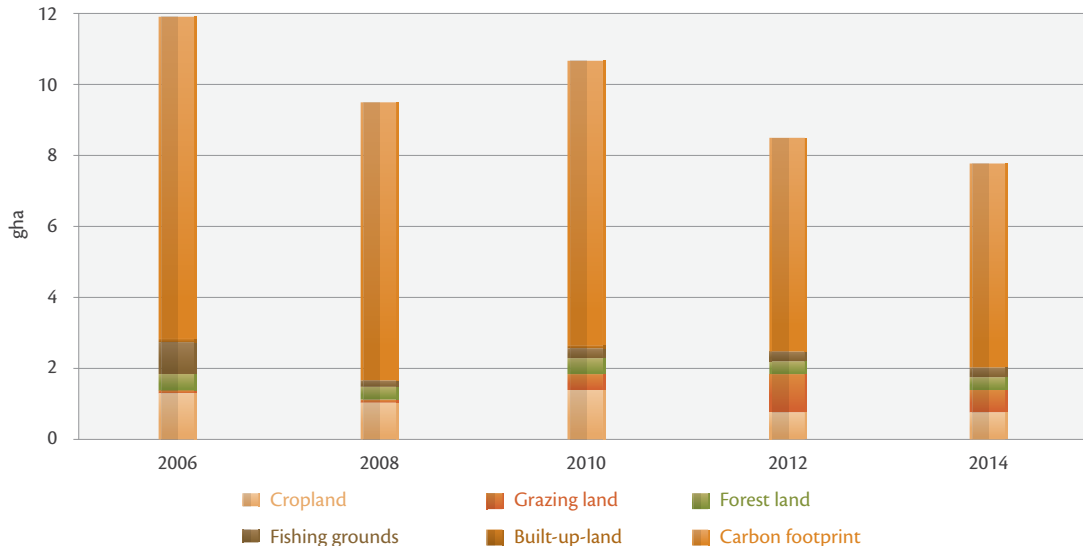
Note: 2014 results were compiled based on the data of 2010. Countries with less than 1 million population are excluded.

of a nation or region. To date, humanity uses the equivalent of 1.6 planets to provide the resources we use and to absorb our waste, resulting in the state of “global ecological overshoot”.

- Since the Ecological Footprint is compiled every two years, the latest available data is only from 2014, the same as that presented in the last version of this report. The 2014 Ecological Footprint results were globally

compiled based on the performance data of 2010.

- Compared to the last version issued in 2012 (compiled based on the 2009 data), the UAE’s 2014 Ecological Footprint went down from 8.4 gha to 7.75 gha per capita, putting the nation in third place again behind Kuwait and Qatar, and ahead of Denmark and Belgium.
- Despite the notable improvement in the results, the UAE’s consumption level remains high and unsustainable in contrast to the low amount of productive land and sea areas (The UAE’s biocapacity in 2014 was 0.63 gha per capita). Carbon emissions have been the dominant component of the UAE’s Ecological Footprint, comprising 74% against the global average of 53%.
- Once ranked as the country with the world’s largest footprint, the UAE launched the *Ecological Footprint Initiative* in 2007 to make proactive efforts to improve energy efficiency and consumer behavior.



**Trend in the UAE's Ecological Footprint per category, 2006-2014**

Source: Global Footprint Network

Note: 2006 results were compiled based on 2003 data; 2008 results were based on 2005 data; 2010 results were based on 2008 data; 2012 results were based on 2009 data; and 2014 results were based on 2010 data.

## ENV10: Number of Environmental Regulations

### Federal environmental regulations

(laws, executive orders and ministerial decrees) (2015): 87

Environmental regulations have been a most fundamental tool for policy makers around the world to tackle pollution and the degradation of natural resources and wildlife, as environmental regulatory agencies have been established in many national and local governments over the last few decades. An

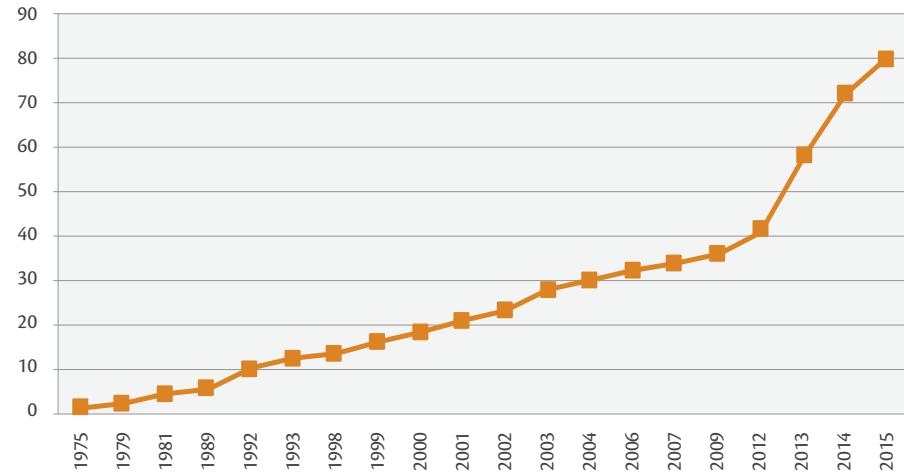
environmental regulation prescribes the maximum amount of pollution that a source can emit or the use of a particular technology, or bans particular environmentally harmful actions, as well as defines penalties for non-compliance and administrative procedures. Environmental regulations can offer a high

degree of assurance that the set objectives will be achieved when properly enforced. In the meantime, the use of market-based, non-prescriptive or voluntary instruments is increasingly becoming popular as alternative environmental policies.

- The UAE's environmental regulations at the national level have been underpinned by the Federal Law No. 24 of 1999 for the protection and development of the environment. Since then, more specific regulations have been gradually adopted as federal laws, executive orders or ministerial decrees. For the last three years between 2013 and 2015, more than ten new regulations have been introduced annually, including those developed by MOCCAIE and the Emirates Authority for Standardization and Metrology (ESMA).
- Due to the MOCCAIE's history and scope of work, the majority of regulations issued by the ministry are targeted to the agricultural, veterinary and fisheries sectors, which are not necessarily the typical scope of environmental regulators. However, in the last few years an increasing number of new regulations have been developed in the areas of waste

management, chemicals management, air quality, biodiversity and industry practices.

- Each emirate also has its own environmental regulatory body, which issues detailed local rules and guidelines and monitors violations, following the federal regulations and the ministry's guidance.
- To compile this indicator, regulations related to internal affairs and temporary food import restrictions were omitted. Its definition and methodology need to be further elaborated to ensure consistency.



Total number of federal environmental regulations in the UAE, 1975-2015

Source: MOCCA, ESMA

### ENV11: Number of Environmental Standards

ESMA environmental standards (2015): 25

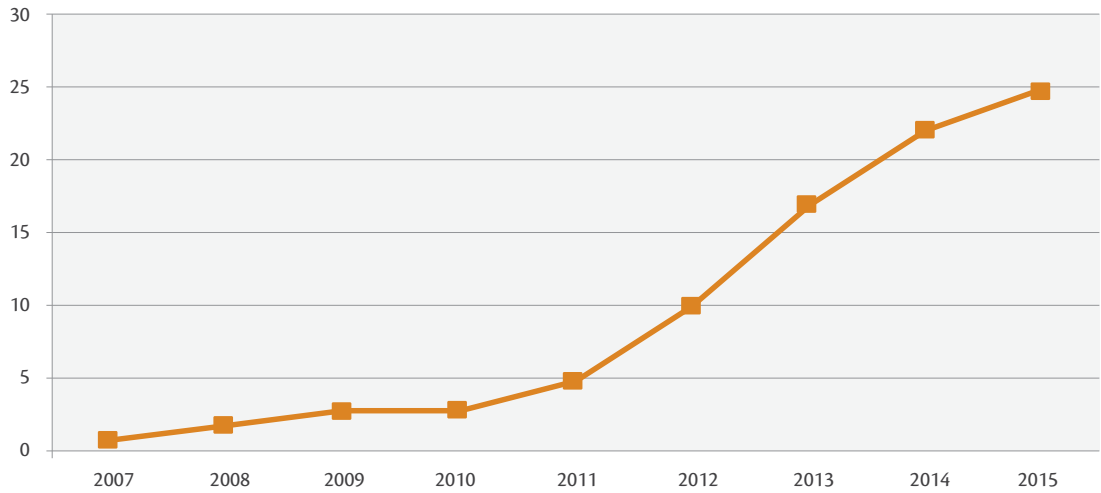
Environmental standards have increasingly been recognized as one of the most important policy instruments that enable a Green Economy. An environmental standard provides a set of quality conditions in a way to specify either a desired state or a limit to alterations so as to control the effect of human activity upon the environment. Standards may be legally binding but may also be non-statutory protocols, guidelines, targets and

sets of criteria. Standards that are set based on performance can encourage innovation and adoption of efficient technologies by creating a “level playing field” and stimulating demand.

- The development of national environmental standards in the UAE has been led by ESMA in the last decade, partly adopting multilateral standards of the International Organization for Standardization (ISO)

and the GCC Standardization Organization (GSO).

- In recent years, ESMA has embarked on innovative forms of standard setting such as eco-labeling and certification. Performance-based standards have been established for electrical appliances in combination with labeling, whereas new specifications have been set for packaging and cleaner energy sources such as natural gas and clean diesel. In 2015, a green labeling scheme for dishwashing machines was added to the family of performance-based standards and labeling (see Chapter 4).



Trend in the total number of federal environmental standards in the UAE, 2007-2015

Source: ESMA

### ENV12: Ratio of Protected Areas

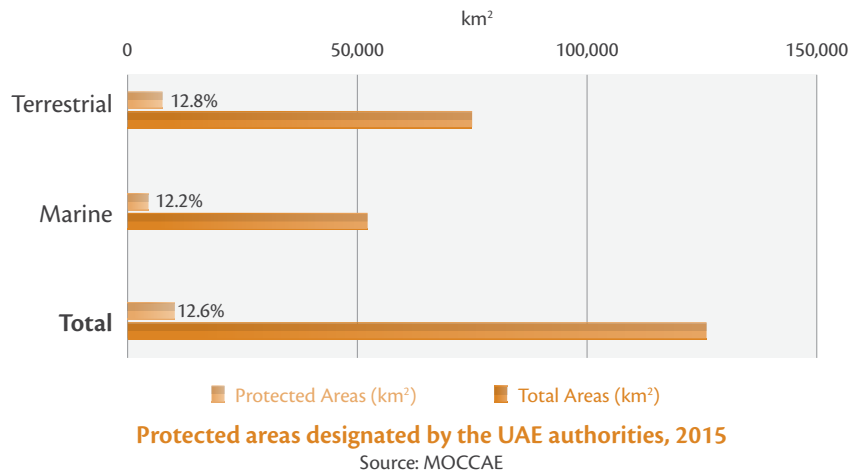
Ratio of protected areas against total territory (2015): 12.6% (terrestrial 12.8%; marine 12.2%) (unchanged from 2014)

The main challenge for conservation of nature is to maintain or restore the diversity and integrity of ecosystems, species and genetic resources while ensuring a sustainable use of biodiversity. This implies the need for policies that strengthen the protection of habitats and species, eliminate illegal exploitation and trade, and integrate biodiversity concerns into economic and sectoral policies, as well

as raise public awareness. Protected areas are at the core of those policy efforts for protecting ecosystem services that provide food, clean water and medicines as well as serving as a carbon sink and protection from natural disasters. The International Union for Conservation of Nature (IUCN) defines a protected area as “a clearly defined geographical space, recognized, dedicated

and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values”.

- In the UAE, the registration of protected areas (including both terrestrial and marine areas) was initiated in 1995 and their number has grown to 35 designations by the end of 2015. In total, 15,855 square kilometers (km<sup>2</sup>), 12.5% of the country's land and sea areas, have been designated as protected areas; 12.8% of the land areas and 12.2% of the marine territories. No new designation was established during 2015 so that the performance is unchanged since the last version of this report.
- The UAE's level of designating protected areas is almost equivalent to the global average's 14.0% and the OECD average of 13.6% (2012).
- The 2014 Environmental Performance Index (EPI) ranked the UAE among the top countries in the sub-index of marine protected areas (see ENV14). Among those protected areas, five wetland reserves are recognized in the List of Wetlands of International Importance under the inter-governmental Ramsar Convention (Ramsar Sites).



**ENV13: Environmental Expenditure**  
 Ministry of Environment and Water (then) budget (2015):  
 AED 308.6 million (USD 84 million)

Environmental expenditure is the primary indication of what extent the country considers environmental sustainability as a priority for running its economy and society. Environmental protection expenditure (EPE), which was recognized by the United Nations Statistical Commission in 2012 as part of the UN System of Integrated Environmental and Economic Accounting, compiles all goods and services aimed at protecting the environment and encouraging the sustainable use of natural resources, including those provided by the

public sector, industry and environmental service providers. The total EPE in the 28 Member States of the European Union (EU) in 2012 amounted to 2.2% of the bloc's total GDP. The public sector spending was 0.67% of GDP, of which waste management and wastewater treatment were the two main components.

- To date, the only available national data related to environmental expenditure in the UAE is the annual budget of MOCCAЕ. The UAE's federal budget is set for every

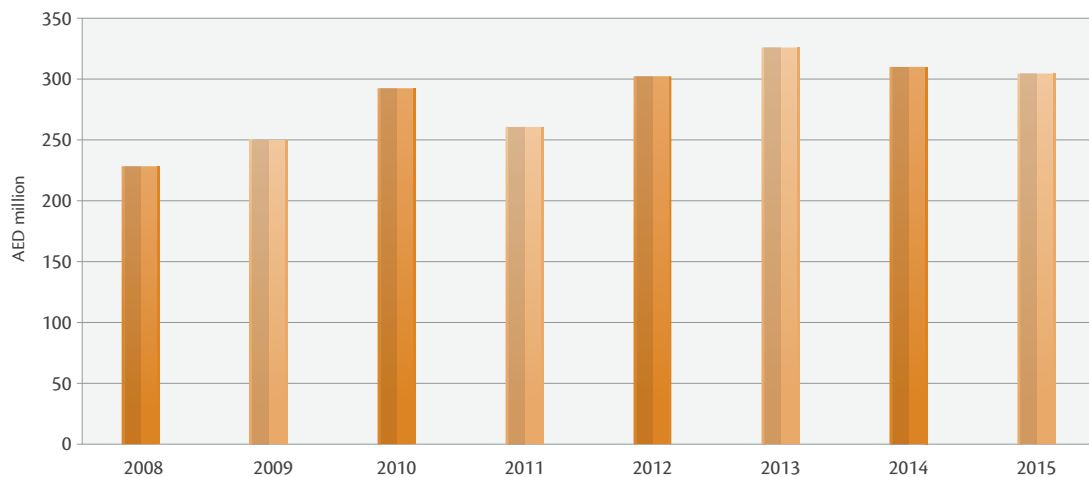
three-year term, and the total budget for 2011-2013 amounted to AED 122 billion (USD 33.2 billion) and that for 2014-2016 increased by nearly 15% to AED 140 billion (USD 38.2 billion). The budget of the then Ministry of Environment and Water for 2011-2013 was AED 882 million (USD 240 million) and that for 2014-2016 was set at AED 919 million (USD 250 million), a 4.2% increase from the previous term. The proportion of the Ministry of Environment and Water budget in the total federal budget is 0.66% for 2014-2016.

- Since the then Ministry of Environment and Water was originally established in 2006 by replacing the Ministry of Agriculture and Fisheries and absorbing the Federal Environment Agency, these figures include the budget that would usually be allocated for the agriculture ministry in many other countries. On the other hand, it should be noted that other ministries in charge of energy, economy, health, labor, public works, education, etc. also spend a part of their budget for environmental protection. Local authorities also have an agency or a department for environmental protection, dedicating a substantial budget.



- To have better understanding and tracking of how much is invested in greening the economy, the UAE needs to establish the accounting for EPE or a similar measure

under the UAE Green Agenda. EU's Eurostat collects this data from its Member States through a joint Eurostat/OECD questionnaire.



Trend in annual budget of the UAE Ministry of Environment and Water (then), 2008-2015

Source: MOCCA

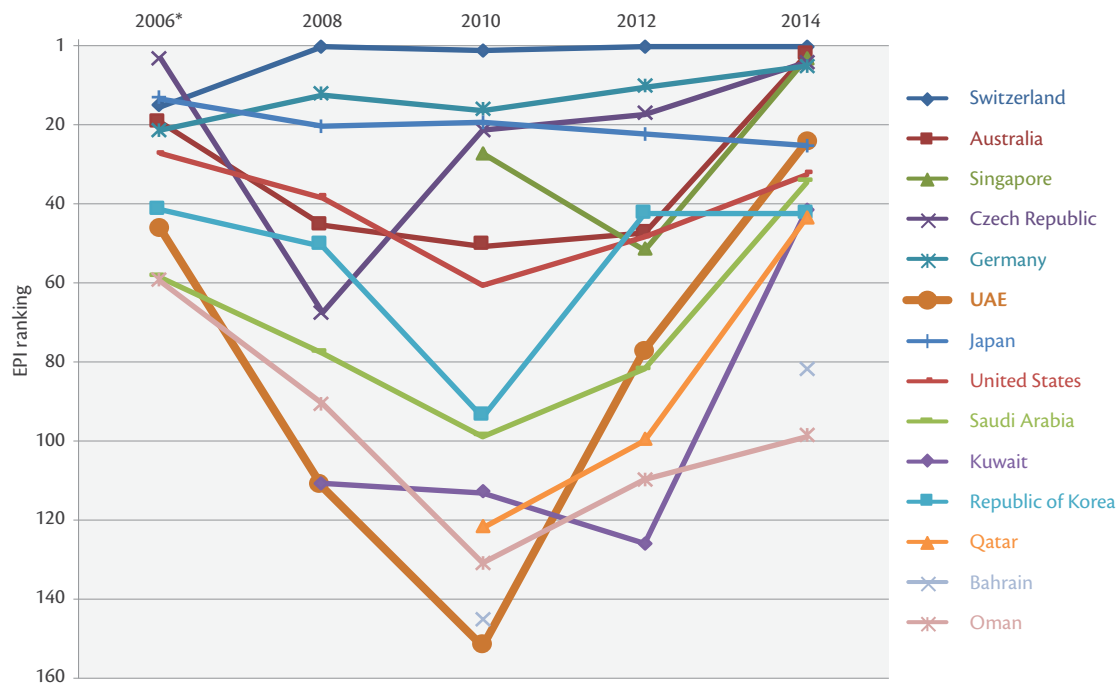
**ENV14: Environmental Performance Index**  
 Environmental Performance Index (2014):  
 25<sup>th</sup> in the world (52 places up from 2013); 1<sup>st</sup> in the GCC

The Environmental Performance Index (EPI) is a method of quantifying the environmental performance of countries in the most comprehensive way. It was developed by

the Yale Center for Environmental Law and Policy (YCELP) at Yale University and the Center for International Earth Science Information Network (CIESIN) at Columbia

University in partnership with the World Economic Forum (WEF). The 2014 EPI is constructed through the calculation and aggregation of 20 indicators from nine issue categories, including air quality, forests, fisheries, and climate and energy. Scores are converted to a scale of 0 to 100, with 0 being the furthest from the target and 100 being the closest.

- Since a pilot version was issued in 2006, the index has been published every two years. As there was no new EPI report published during 2015, the results presented in this report are the same as the last version.
- The UAE's EPI results have shown a dramatic upturn from being ranked 152th out of 163 countries benchmarked in 2010 (Score: 40.7) to the 77th in 2012 (50.91) and 25th out of 178 countries in 2014 (72.91).
- It should be noted that the EPI results may not be directly comparable between different years since the composition and weighing of indicators have been substantially revised each time.



**Trends in the Environmental Performance Index in major countries, 2006-14**

Source: YCELP et al., *Environmental Performance Index*

Note: 2006 survey was a pilot.

### ENV15: Ratio of Green Vehicles

Relevant data is not available

The combustion of transport fuels such as gasoline and diesel is one of the largest sources of GHG emissions in the UAE, as 15% of the total emissions originated from the road transport

sector in 2014 (see ENV9). The deregulation of fuel prices that started in August 2015 (see Chapter 3) is expected to encourage people to opt for public transport or fuel-efficient

vehicles, which would have a positive effect on the country's overall environmental and socio-economic conditions. Even though there is no universal definition of "green vehicles", the United States Environment Protection Agency (EPA) lists them as including fuel-efficient cars, alternative fuel vehicles (e.g. compressed natural gas), flexible fuel vehicles (FFVs), electric vehicles (EVs), hybrid-electric vehicles, and hydrogen fuel-cell vehicles (FCVs).

- There is no available data to distinguish conventional and green vehicles on the UAE roads. Firstly, a clear definition and a data collection method needs to be established.
- The public and private sectors in the UAE already promote greener vehicles such as hybrid cars and EVs as well as better fuels for conventional vehicles. DEWA has opened 100 EV charging stations in the emirate (see Chapter 3), while hybrid cars and the use of biodiesel and CNG have been introduced in public bus and taxi fleets in Abu Dhabi and Dubai. In 2014, the UAE became the first country in the region to mandate all commercial diesel vehicles to use "green diesel", which contains less than 10 parts per million (ppm) of sulfur.

## Economic Performance

### ECO1: Real GDP Growth

GDP growth (constant price based) (2014): National 4.6% (0.3 point down from 2013); Abu Dhabi 4.7% (0.5 point down); Dubai 3.8% (0.8 point down)

The GDP has been the most common, conventional measure of economic activity of a nation or region. It should be noted at the same time that GDP does not address all aspects of welfare, and GDP growth is limited as an output indicator. It is important to understand the outcomes of economic activities, as well as the progress in greening the economy, in combination with other relevant indicators.

- After the dramatic drop caused by the financial crisis in the late 2000s, the overall UAE economy has kept healthy growth rates around 5%. The Ministry of Economy's prediction for GDP growth in 2015 was 4.5% at the beginning of the year but has been lowered to 3% in January 2016 due to low oil prices.
- The economy of Abu Dhabi and Dubai have still been strong even though the

pace of growth is slightly reduced. The other emirates need to compile basic economic statistics to allow the analysis of local economies, particularly where the

industrial structure is very different from the two major emirates.

- It is predicted that despite the rapid decline in international oil prices since the summer of 2014, the UAE economy is resilient enough and will keep growing due to the long-term investment made for economic diversification.



**Real GDP growth rates (constant price based) in the UAE, 2002-2014**

Source: FCSA; Statistics Centre - Abu Dhabi; Dubai Statistics Center

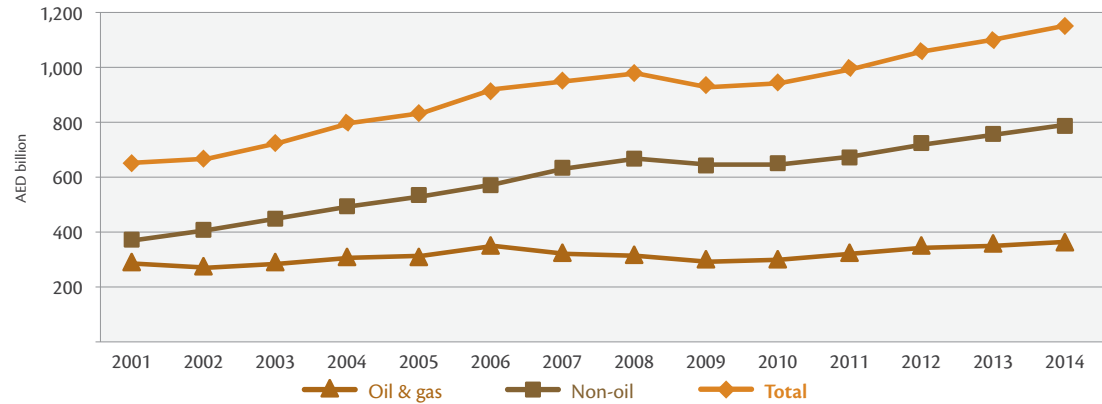
Note: UAE's 2014 rate is preliminary. UAE and Abu Dhabi's data are based on 2007 constant prices; Dubai data are based on 2006 constant prices.

## ECO2: Share of Non-Oil GDP

Share of GDP from non-oil sectors (2014): 68.6% (0.2 point up from 2013)

The revenues from the non-oil sectors have increased significantly over the years at an annual growth rate of 10%, whilst the GDP from fossil fuels has shown a relatively modest growth. The increasing economic contribution from the non-oil sector has greatly helped mitigate the impact of the fluctuation of oil revenues. It is important for the UAE to keep diversifying its economy as guided by the UAE Vision 2021.

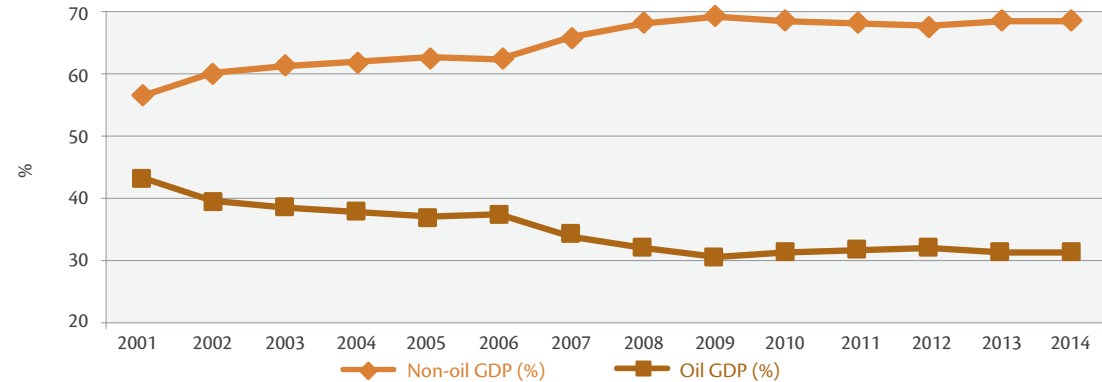
- Non-oil revenues represented approximately 57% of the UAE's total GDP in 2001 and had steadily increased to nearly 70% by 2014.
- The non-oil real growth rate was 4.8% in 2014 as the country recovered from a contraction caused by the financial crisis, whereas the growth rate of the oil and gas sector recorded 4.0% in the same year.
- The UAE aims to maintain 5% of annual real GDP growth from the non-oil sector under the UAE Vision 2021.



Trends in the UAE's GDP (2007 constant prices), 2001-2014

Source: Federal Competitiveness and Statistics Authority (FCSA)

Note: 2013 and 2014 data are preliminary



Trends in the shares of oil and non-oil GDP in the UAE, 2001-2014

Source: FCSA

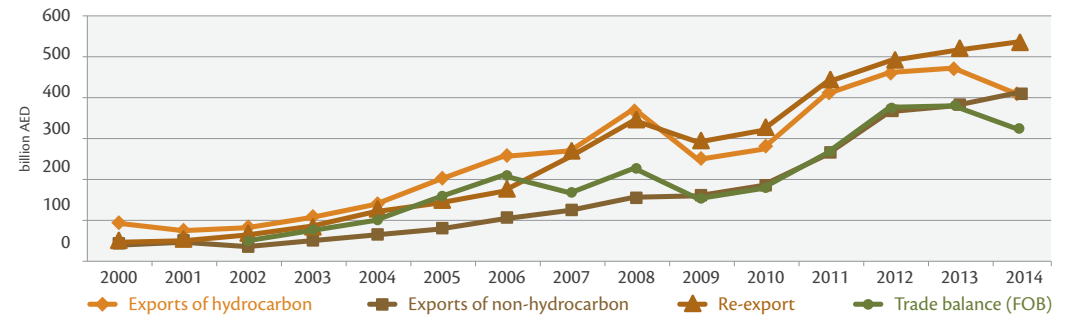
Note: 2013 and 2014 data are preliminary.

### ECO3: Share of Non-Oil Export

Share of the exports from non-hydrocarbon sectors (2014):  
30.3% (2.5 points up from 2013)

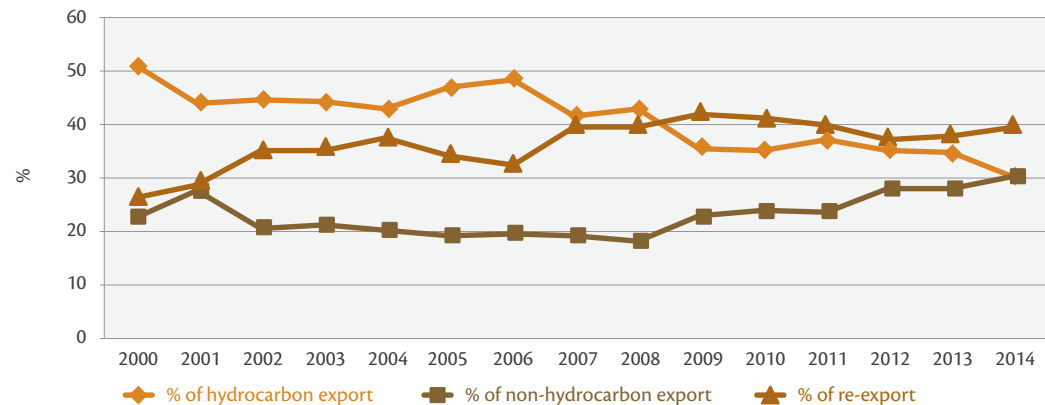
The balance of trade for the UAE is driven by significant imports of products produced locally as well as significant oil and gas export revenues. As the import of natural gas has been increasing in recent years due to the rise in domestic energy demand, the further stimulation of export of non-oil goods and services and the promotion of import substitution is key to maintaining a healthy level of trade balance.

- Non-hydrocarbon exports have been rapidly rising over the last decade, as its proportion of total exports has increased from 22.6% in 2000 to 30.3% in 2014. It has exceeded, for the first time, hydrocarbon exports (including oil, gas and petroleum products), which have been steadily declining from 51.0% in 2000 to 30.1% in 2014.
- Re-export has been supporting a significant part of the UAE economy, as Dubai and Abu Dhabi act as major trade hubs. It has occupied around 40% of the total exports since 2007.
- The most common non-oil export items from the non-freezones (AED 132 billion or USD 36 billion in 2014) include: precious metals, base metals, plastics, machinery, minerals and foodstuffs. Non-oil exports from the freezones account more than twice those from the non-freezones.



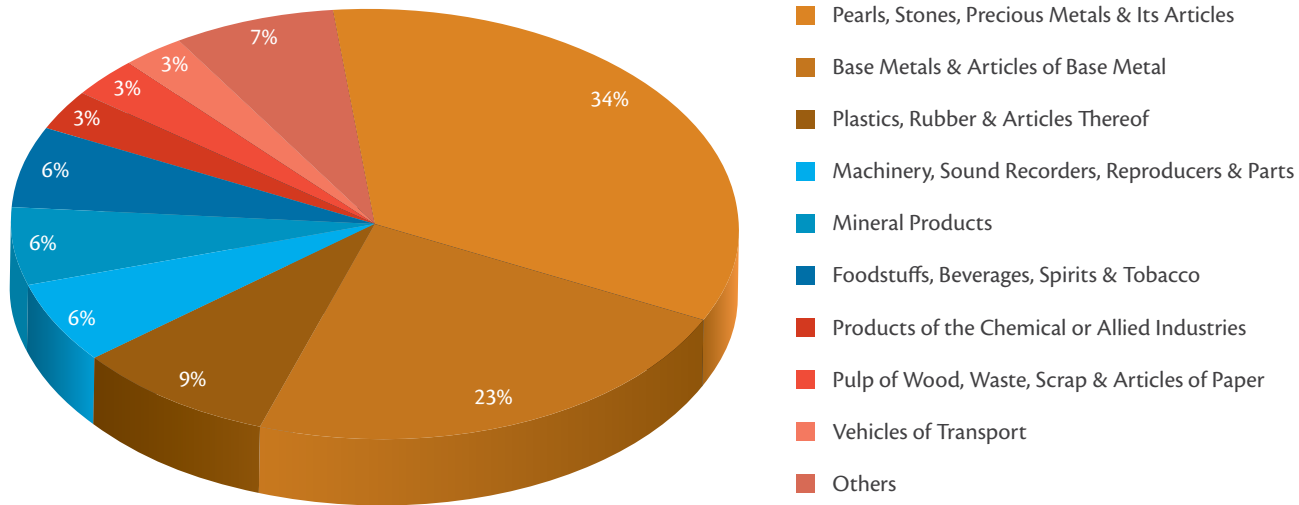
Trends in the UAE's exports and trade balance, 2000-2014

Source: Central Bank of the UAE  
Note: 2014 data is preliminary. Trade balance is calculated on a free-on-board (FOB) basis.



Trends in the shares of the UAE's exports by type, 2000-2014

Source: Central Bank of the UAE  
Note: 2014 data is preliminary. Trade balance is calculated on a free-on-board (FOB) basis.



**Breakdown of the UAE's non-oil exports (value based), 2014**  
Source: FCSA

#### ECO4: GDP from Environmental Goods and Services

Relevant data is not available

Environmental products and services could have significant potential to directly benefit the economy and generate growth and jobs from the existing and enhanced ecosystems. The UAE Green Agenda aims to support the domestic development of this emerging sector by ensuring the high quality and performance of goods and services.

- For example, in the last few years, demand for organic food has rapidly risen among

health-conscious consumers in the UAE. One study estimates that the country's organic market is valued at AED 367-550 million (USD 100-150 million) per year.

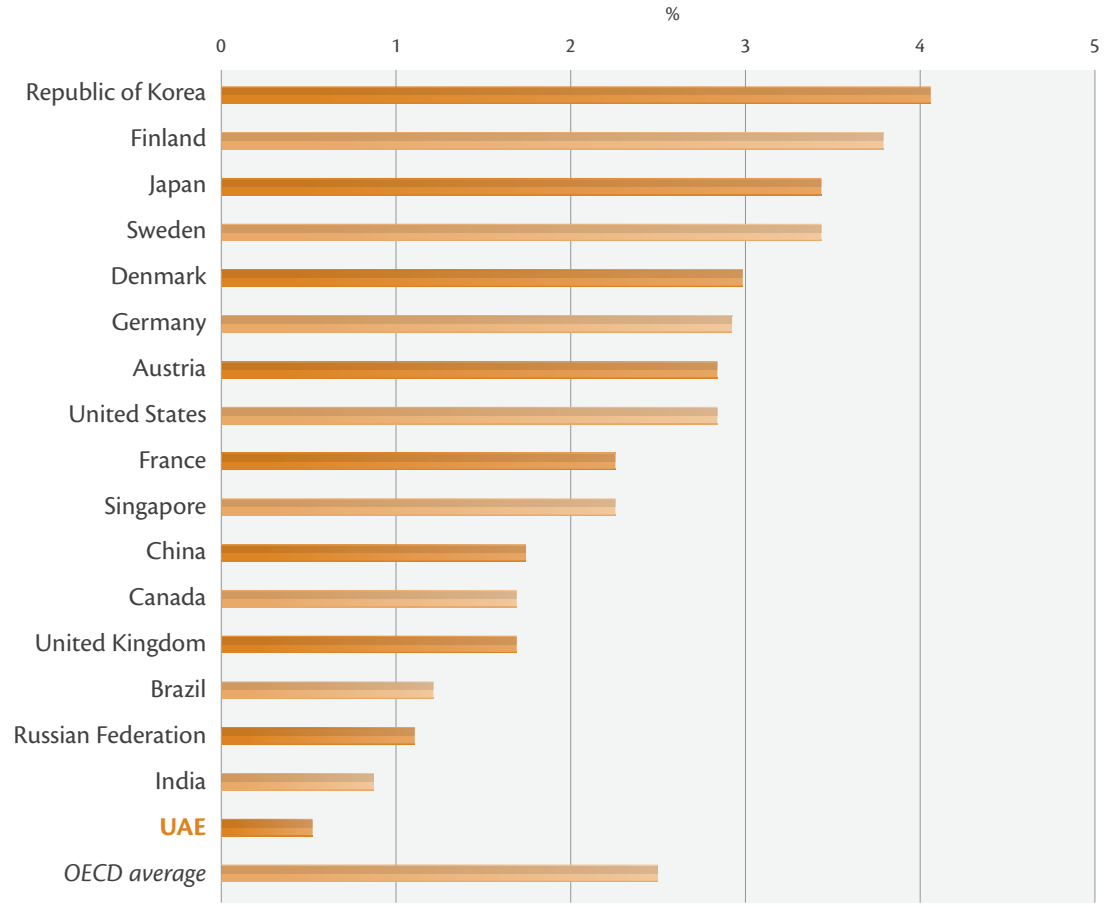
- There is no universal definition on what constitutes environmental goods and services and how to distinguish them from conventional ones. There have been some earlier efforts by international organizations such as

OECD and Eurostat to do so, while the World Trade Organization (WTO) develops the list of such goods and services to reduce or eliminate tariff and non-tariff barriers to their import. As a first step, the UAE needs to start working on the definition and the collection of relevant statistics.

**ECO5: R&D Expenditure in GDP**  
 Expenditure in research and development (2011): 0.49% of total GDP (48<sup>th</sup> in the world)

Technology developments and innovation are important drivers for growth and productivity in an economy. They are important for managing energy and material flows in a more sustainable manner and also have a bearing on policies intended to preserve natural resources and minimize emissions. Spending on research and development (R&D) has been considered one of the key factors to spur innovation and technology advances.

- According to the statistics of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the current and capital expenditures (both public and private) on R&D activities in the UAE during 2011 were 0.49% of the nation's total GDP, which is far behind the average spending of OECD countries (2.36% in 2013). The UAE Vision 2021 sets a target of raising this rate to 1.5% by 2021.
- It should be noted that technology and innovation may have adverse effects on the environment and resource use. It is therefore important to focus national efforts on promoting green R&D and innovation to enhance potential and capability for greening the economy.



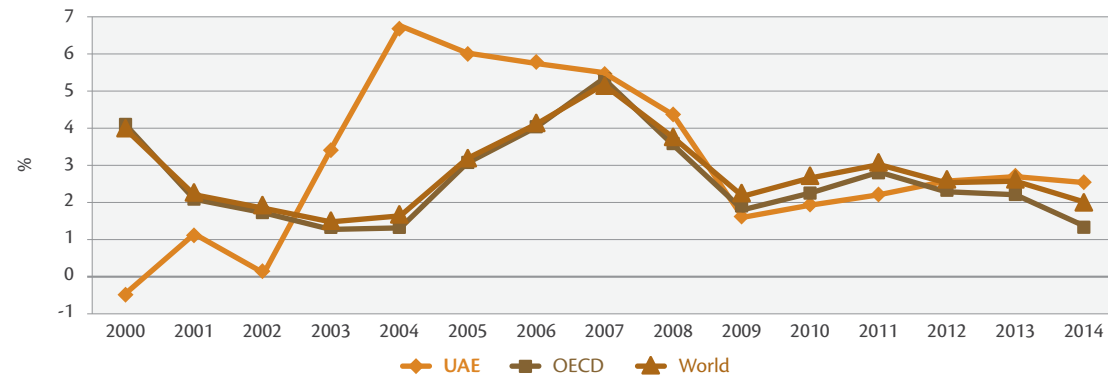
**R&D expenditure of major economies as a proportion of GDP, 2011**  
 Source: UNESCO; World Development Indicators

## ECO6: FDI Net Inflows

Foreign direct investment net inflows (2014): 2.52% of total GDP  
(0.19 point down from 2013)

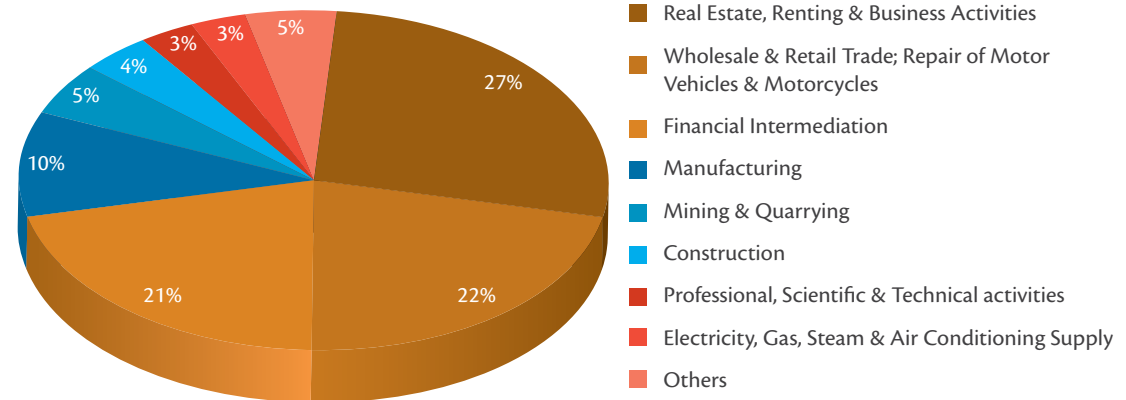
The UAE has excellent conditions for foreign direct investment (FDI) and many investors, both regional and international, have been seeking opportunities to place capital in the country. The UAE's attractiveness as an FDI destination stems from many factors including world-class infrastructure, political stability and an expatriate-friendly culture.

- FDI net inflows – the value of inward direct investment made by non-resident investors – are rapidly recovering from the financial crisis and reached 2.52% of the total GDP in 2014. This is a slight decline from 2.71% in 2013. The level of FDI inflows became higher than the global average (2.0% in 2014) and OECD countries (1.35%) again in the last few years.
- The real estate sector received the largest amount of FDI in 2012 (27%), followed by wholesale and retail (22%), finance (21%), manufacturing (10%), mining (5%), and construction (4%). The UK was the leading investor country for the UAE in 2012, followed by India, France, Japan and United States.
- The UAE Vision 2021 targets doubling the proportion of FDI inflows against GDP to 5% by 2021.



Trends in the UAE's FDI net inflows, 2000-2014

Source: World Development Indicators



Breakdown of the UAE's foreign direct investment by activities, 2012

Source: FCSA



Country	FDI value (AED million)
United Kingdom	35,555
India	15,628
France	14,989
Japan	14,648
United States	11,414

Country	FDI value (AED million)
Kuwait	11,189
Australia	10,534
Saudi Arabia	10,356
Switzerland	8,131
Netherlands	7,196

Top 10 countries for the UAE's foreign direct investment by value, 2012

Source: FCSA

**ECO7: Ease of Doing Business Index**  
 Ease of Doing Business Index (2015): 31<sup>st</sup> in the world  
 (1 place up from 2014); 1<sup>st</sup> in the GCC (unchanged)

Launched in 2002, the World Bank's Ease of Doing Business Index promotes business-friendly regulatory environments by measuring aspects of business regulation affecting domestic small- and medium-sized firms in eleven areas across 189 economies. Ten of these areas — starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts, and resolving insolvency — are included in the Distance to Frontier score and Ease of Doing Business ranking. The index also measures features of labor market regulation, which is not included in these two measures.

1	Singapore
2	New Zealand
3	Denmark
4	Republic of Korea
5	Hong Kong, China
6	United Kingdom
7	United States
8	Sweden
9	Norway
10	Finland
13	Australia
14	Canada
15	Germany

- The UAE improved its global ranking from the 68th in the world and the bottom in the GCC in the Doing Business 2006 result published in 2005 to the world's 31st and top in the GCC in *Doing Business 2016*, published in October 2015. Please note that the World Bank adjusted the UAE's 2014 ranking from 22nd to 32nd and a caution is required in the time-series analysis.
- The *Distance to Frontier* measure evaluates the absolute distance of economies to the best performance on regulatory practices

18	Malaysia
26	Switzerland
27	France
<b>31</b>	<b>UAE</b>
34	Japan
65	Bahrain
68	Qatar
70	Oman
82	Saudi Arabia
84	China
101	Kuwait
130	India

Country ranking of Ease of Doing Business Index, 2015

Source: World Bank, *Doing Business 2016*

on a scale from 0 to 100. The UAE has shown a substantial improvement in regulatory efficiency, moving up from 71.6 in 2009 to 75.1 in 2015. The country provides business-friendly conditions in taxes, electricity connection and construction permits, while it needs improvement particularly in cross-border trading, credit issuance and insolvency.

- The UAE has an ambition to attain the world's top position in this index by 2021 under the UAE Vision 2021.

Category	2014	2015
<b>Overall</b>	<b>32</b>	<b>31</b>
Starting a business	57	60
Dealing with construction permits	3	2
Getting electricity	4	4
Registering property	10	10
Getting credit	90	97
Protecting minority investors	64	49
Paying taxes	1	1
Trading across borders	100	101
Enforcing contracts	27	18
Resolving insolvency	90	91

**UAE's ranking in 10 categories of Ease of Doing Business Index, 2014-2015**

Source: *Doing Business 2016*

**ECO8: Global Competitiveness Index**

Global Competitiveness Index (2015): 17<sup>th</sup> in the world (5 places down from 2014); 2<sup>nd</sup> in the GCC (1 place down from 2014)

National competitiveness is considered to be particularly important for small open economies like the UAE to attract foreign investment, talented workforce, and new technologies and knowledge. These in turn will provide the scale necessary for productivity increases, including those in green sectors. Given the strategic importance of raising

national competitiveness, the UAE established the Emirates Competitiveness Council (ECC), which serves as a conduit between the public and private sectors, actively informing policy creation and process development of federal and local government bodies. ECC was further elevated to the Federal Competitiveness and Statistics Authority (FCSA) in September

2015. The World Economic Forum (WEF) has been ranking the competitiveness of countries on a yearly basis since 2004 through the Global Competitiveness Index (GCI), which integrates macroeconomic and micro and business aspects of competitiveness into a single index.

- The UAE's GCI ranking is steadily moving up and has reached the 12th position in the last results in the 2014-2015 version, showing a remarkable improvement in the general business environment. In this latest 2015-2016 version, the ranking dropped to 17th out of 140 economies. WEF explains that this is mainly due to the new availability of an indicator on tertiary education.
- The UAE's macroeconomic environment, highly developed infrastructure and strong institutions were highly valued in the breakdown of the index, as they provide a solid base for competitiveness. Its business environment was also considered as welcoming to investment and characterized by regulations that are easy to comply with, a fairly efficient labor market, and the presence of sophisticated businesses. On the other hand, WEF concluded that the country needs to

1	Switzerland
2	Singapore
3	United States
4	Germany
5	Netherlands
6	Japan
7	Hong Kong, China
8	Finland
9	Sweden
10	United Kingdom
11	Norway
12	Denmark
13	Canada
14	Qatar
15	Taiwan, China
<b>17</b>	<b>UAE</b>
21	Australia
22	France
25	Saudi Arabia
26	Republic of Korea
28	China
34	Kuwait
39	Bahrain
62	Oman

**Ranking of Global Competitiveness Index, 2015**

Source: WEF, Global Competitiveness Report 2015-2016

- strengthen its capacity for innovation, including by upgrading scientific research.
- In the 2014-2015 version, the UAE became the most competitive nation among GCC members for the first time, but in the latest 2015-2016 result it

was returned to the 2nd position after Qatar (Bahrain, Kuwait and Oman were surveyed in the latest edition for the first time). The UAE Vision 2021 targets becoming one of the top ten countries in the GCI by 2021.



**Breakdown of the UAE performance in the Global Competitiveness Index, 2015**

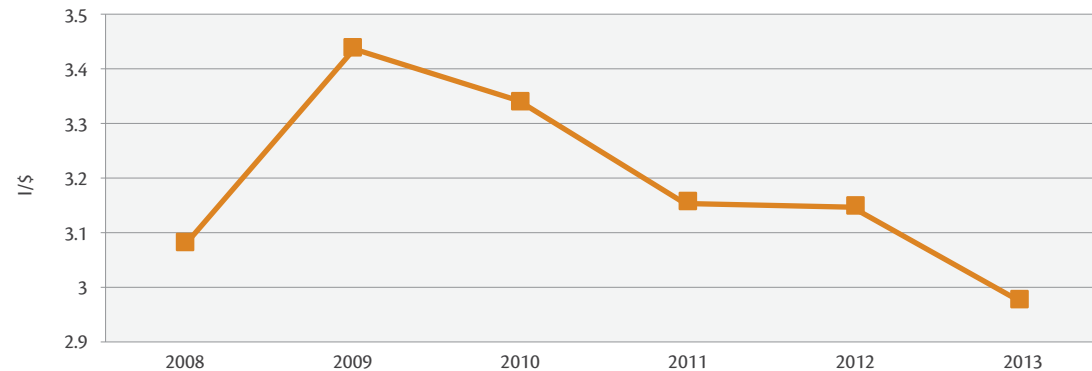
Source: Global Competitiveness Report 2015-2016

## ECO9: Water Consumption per GDP

Municipal water consumption per GDP (2013): 2.98 liter/\$ (5.4% down from 2012)

The efficiency of water use is critical for the UAE to ensure continuous growth, as the country relies on modern desalination technologies for most of its municipal water. In relation to the economy's health, the efficiency should be understood in terms of how much water is used for making added value in the economy. The economic efficiency in the use of water for agriculture, most of which comes from underground sources, needs to be understood separately.

- Progress in the intensity of municipal water use has been observed in recent years in terms of both per capita and per GDP. The relative decoupling of municipal water use from economic growth has been realized after the peak recorded at the time of the financial crisis.
- A radical decline in per-GDP water intensity has been observed between 2012 and 2013, and it was recorded at below 3 liters per US dollar added value for the first time. The continuous improvement would support the country's healthy growth while limiting resource use.



Trend in municipal water consumption per GDP (PPP) in the UAE, 2008-2013

Source: Statistical Annual Report Electricity and Water; World Development Indicators

## ECO10: Waste Generation per GDP

Relevant data is not available

The per-GDP waste generation measure is a useful barometer to understand the efficiency of material use in generating economic value as well

as the level of reuse and recycling, which would affect environmental quality in terms of land use, water and air pollution, and GHG emissions.

## ECO11: Energy Consumption per GDP

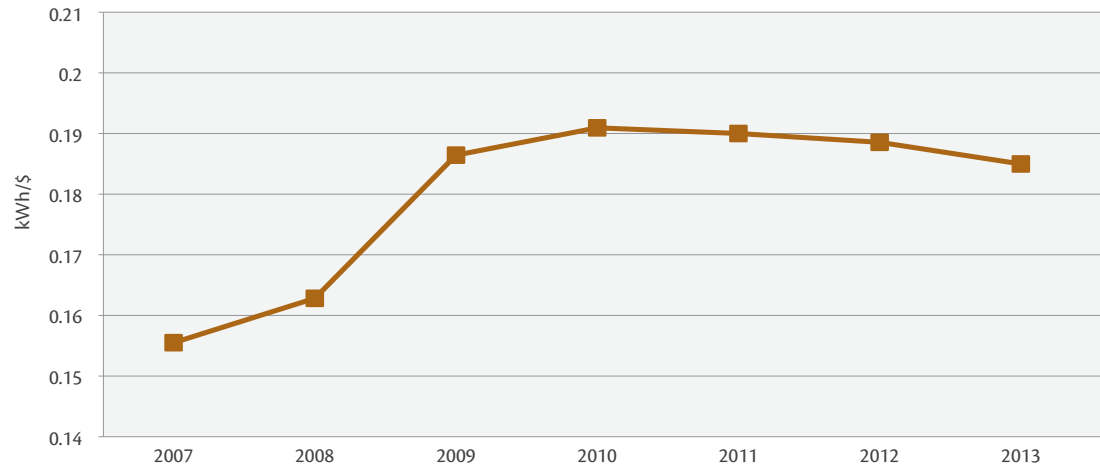
Electricity consumption per GDP (2013): 0.18 kWh/\$ (3% down from 2012)

The main energy challenge for the UAE is to decouple energy use and related

emissions from economic growth through improvements in energy efficiency and the

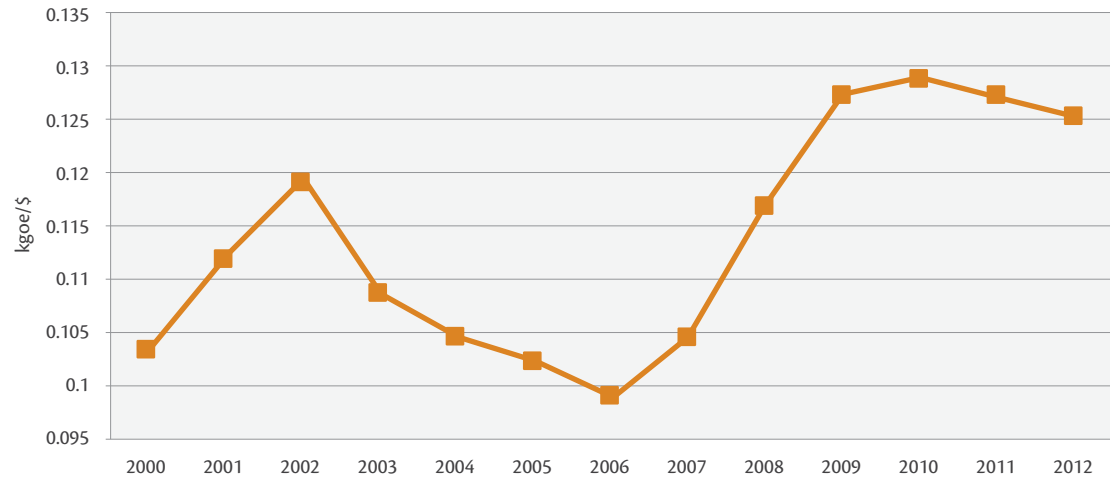
development and use of cleaner energy sources. Progress towards a Green Economy in this area can be assessed by the energy productivity or intensity of the economy.

- While the per-capita intensity of electricity use has been slightly increasing in the last few years, the intensity per GDP has been slowly but steadily declining since the peak recorded in 2010.
- IEA estimates the intensity in terms of total energy use (including the use of fossil fuels in industrial processes, heating and cooling, transport, etc. as well as electricity) around the world. The trend is similar to that of electricity alone as the UAE's per-GDP energy use started decreasing since the peak in 2010 after the rapid rise from 2006.
- The 2012 energy intensity was recorded at 0.125 kgoe per US dollar added value, which was the lowest and the most efficient among GCC countries, and was placed between the OECD average (0.114 kgoe/\$) and the world average (0.134 kgoe/\$).



**Trend in electricity consumption per GDP (PPP) in the UAE, 2007-2013**

Source: Statistical Annual Report Electricity and Water; World Development Indicators



**Trend in energy use per GDP (PPP) in the UAE, 2000-2012**

Source: IEA; World Development Indicators

## ECO12: Material Consumption per GDP

Domestic material consumption per GDP (2010): 478 g/\$ (5% down from 2009)

Economic growth is generally accompanied by growing demand for raw materials for production and consumption. The main challenge is to ensure that materials are managed well and used efficiently at all stages of their lifecycle (extraction, transposition, transportation, consumption and disposal) so as to avoid waste of resources and reduce the associated negative environmental impacts. Progress towards a greener economy in this area can be assessed through changes in the extraction of resources and domestic consumption of materials, and in the associated material intensity per capita and economic output.

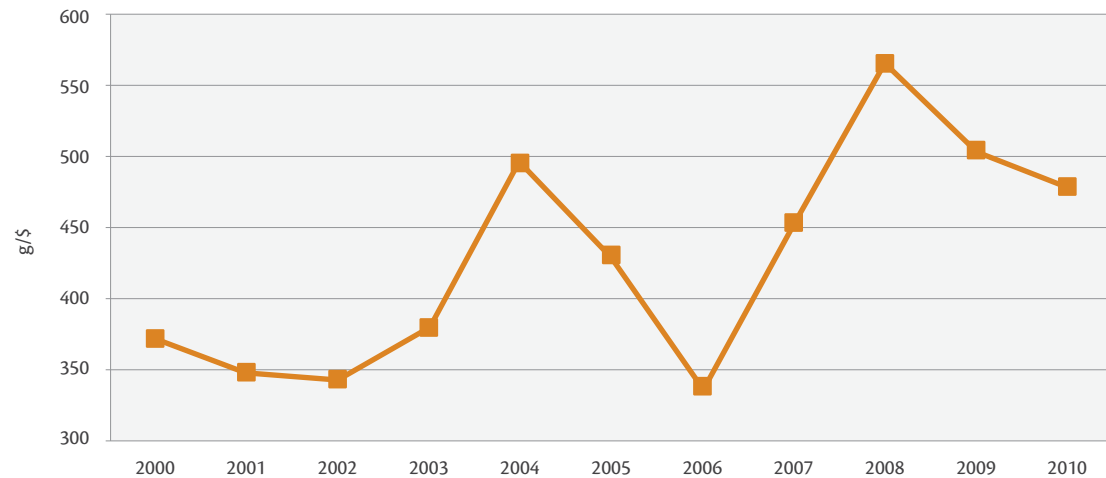
- The estimation of domestic material consumption (DMC) has been compiled by the Vienna-based Sustainable Europe Research Institute (SERI) together with the Vienna University of Economics and Business (WU), which has been adopted by OECD and Eurostat. DMC around the world has been estimated between 1980 and 2010. The UAE's total DMC has grown 7.8 times in three decades while the per-GDP DMC has started a decline after the financial crisis. The per-capita DMC has

also shown a rapid decline between 2008 and 2010, reaching the level below that in 1980.

- Since the recent DMC data is not yet compiled, domestic steel consumption was also reviewed as a proxy, since steel is one of the most essential materials used in the majority of economic activities. The UAE's per-GDP steel use (finished steel products) was recorded at 11.9 g per US dollar, showing a similar trend as that of

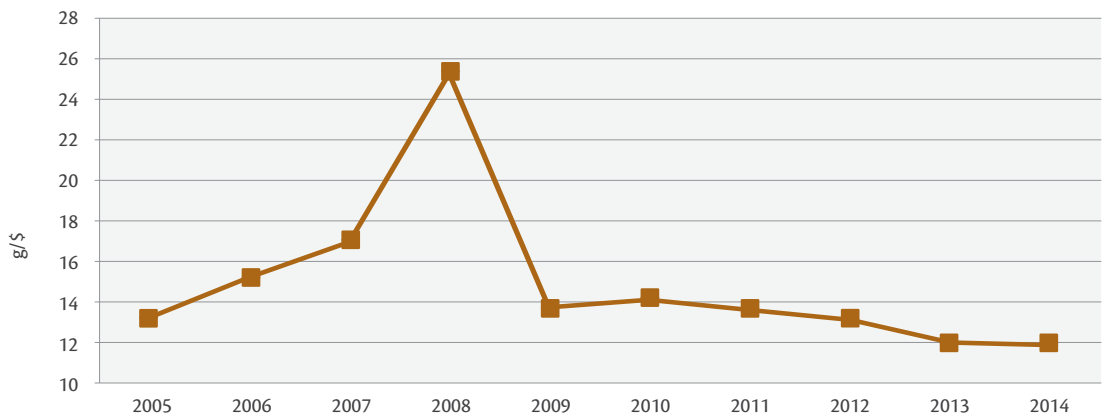
DMC, as it has gradually declined after the financial crisis.

- It should be noted that DMC looks at only the materials directly consumed within the country. However, since a large amount of materials originated from other countries are used for the goods and services produced and consumed in the country, the total material consumption (TMC) needs to be compiled for better understanding. Furthermore, it should be noted that DMC data is compiled only on a weight basis and aggregates all materials, without weighing their scarcity or environmental impacts.



Trend in domestic material consumption per GDP (PPP) in the UAE, 2000-2010

Source: SERI and WU, *materialflows.net*; World Development Indicators



Trend in the UAE's apparent steel use (in finished products) per GDP (PPP), 2005-2014

Source: World Steel Association, Steel Statistical Yearbooks; World Development Indicators

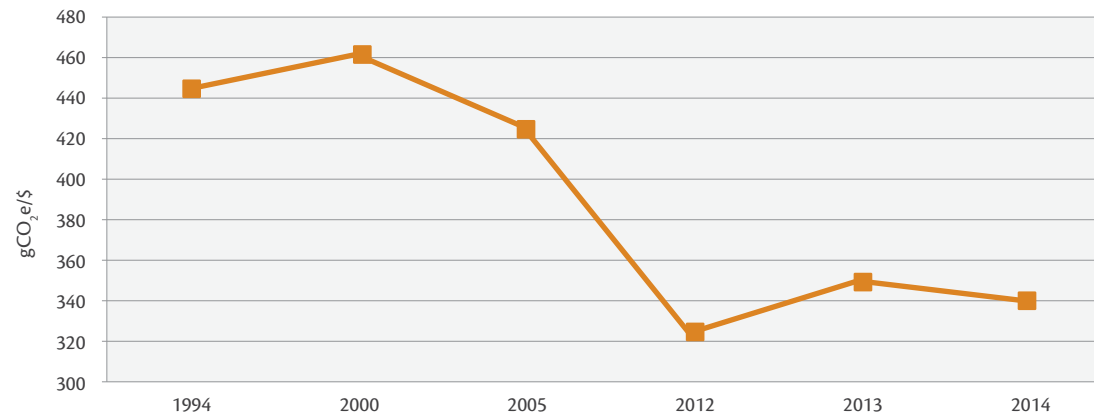
by 3% from the previous year.

- As explained earlier (ENV9), the straight comparison between the 2012 data and the other years is not appropriate as different IPCC guidelines were applied for estimation.
- According to the World Bank's 2011 data, the UAE is the second least carbon-intensive economy in the GCC, almost equivalent to the United States and India, in the per-GDP terms.

**ECO13: GHG Emissions per GDP**  
 Greenhouse gas emissions per GDP (2014): 340 gCO<sub>2</sub>e/\$ (3% down from 2014)

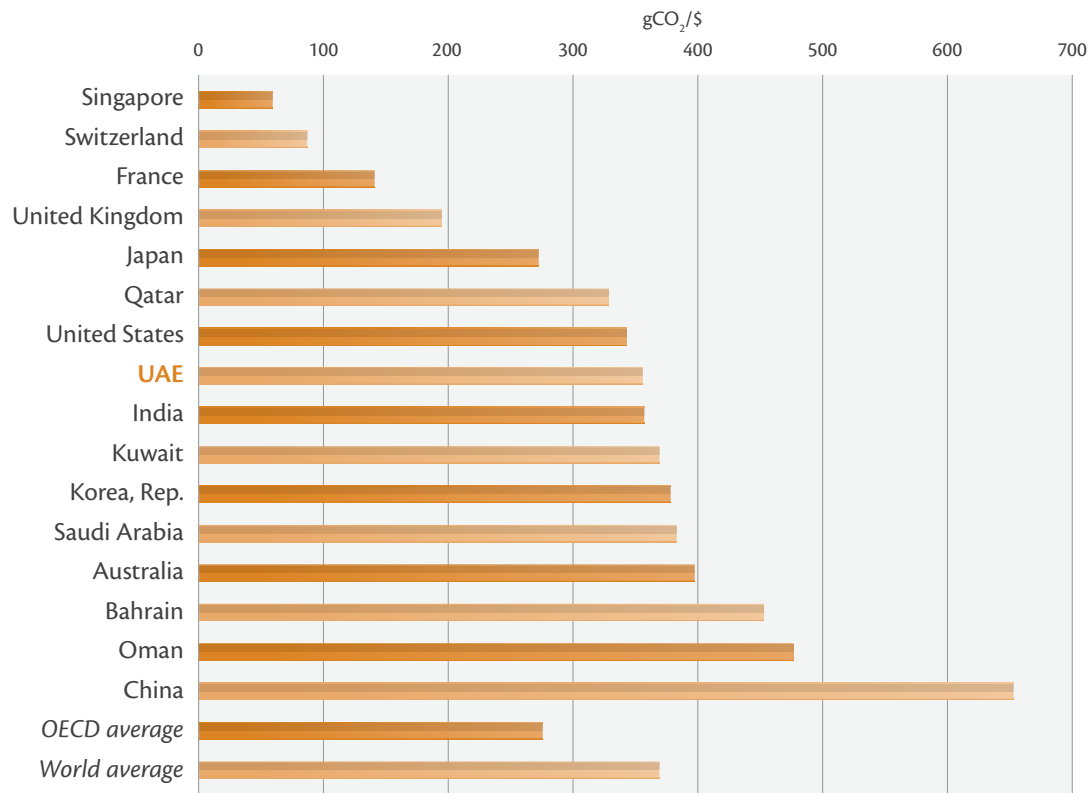
As the UAE is a rapidly growing country, the GHG emissions need to be understood in the context of economic size – how much GHGs are emitted per production. The improvement in per-GDP emissions would determine the country's continuous growth potential as an overall radical reduction in GHG emissions has been required globally.

- The GHG emissions per GDP have decreased by 27% from the peak recorded in 2000 till 2014, showing a clear improvement in efficiency. The 2014 efficiency increased



Trend in the UAE's GHG emissions per GDP (PPP), 1994-2014

Source: MoENR and MOCCA; World Development Indicators



**CO<sub>2</sub> emissions per GDP (PPP) in major countries, 2011**  
 Source: World Development Indicators

water desalination and power production throughout the country. This requires setting clear targets for medium- to long-term retrofitting and efficiency improvement as well as encouraging knowledge sharing and demonstration to help align efforts and attract investment.

- One measure of the efficiency of a generator or power plant that converts a fuel into heat and into electricity is the heat rate. The heat rate is the amount of energy used by an electrical generator or power plant to generate one unit of electricity, most commonly expressed by gigajoule (GJ) per gigawatt-hour (GWh). It is the inverse of the efficiency: a lower heat rate is more efficient.
- There is no available data on heat rate or relevant efficiency measures in the country.

### ECO14: Efficiency of Water and Electricity Production

Relevant data is not available

In addition to looking into alternative energy sources, the UAE government needs to encourage the adoption of best available technologies in fossil fuel-based

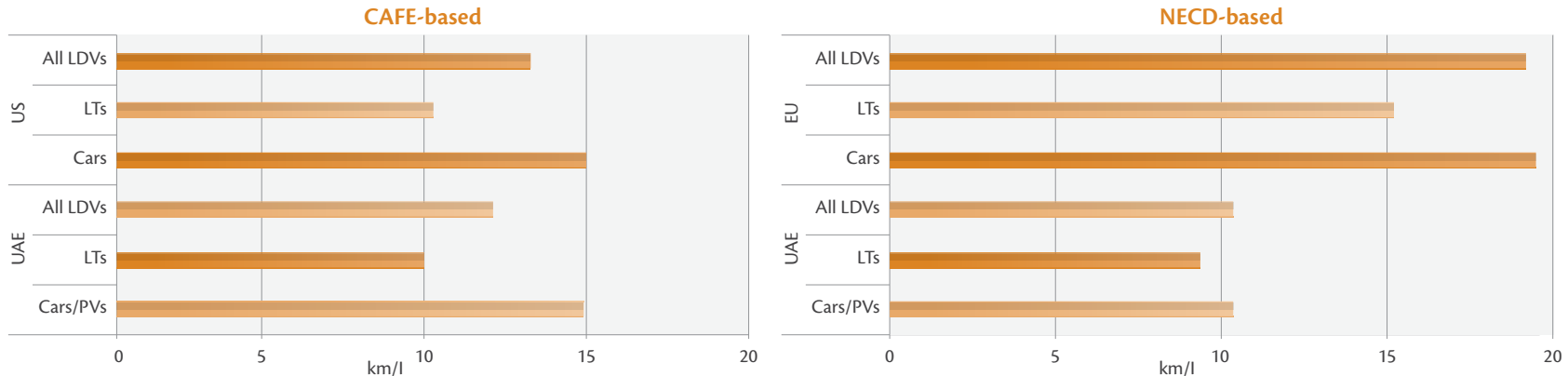


**ECO15: Average Fuel Efficiency of Vehicles**  
 Average fuel consumption of new light-duty vehicles (2013): 12.1 km/l (CAFE-based); 10.7 km/l (NECD-based)

The UAE Green Agenda aims to elaborate the best way to make cleaner and more efficient vehicles attractive to consumers in a country where fuel prices are low. This could include the development of national fuel efficiency and/or emissions standard and labeling of passenger and commercial vehicles. While the diffusion of greener and new types of vehicles is measured by ENV15, this indicator focuses on fuel efficiency, which would help reduce the loss in potential export revenues and save government subsidies, as well as limit environmental impacts.

- Although no official estimation of average fuel efficiency is available, the US-based International Council on Clean Transportation (ICCT) estimated the average efficiency of light duty vehicles (LDVs) on the UAE roads based on market data on the portfolio of vehicle types sold in the country. This study was commissioned by the UAE Ecological Footprint Initiative in consideration of national vehicle fuel efficiency standards.

- According to the measurement based on the US Corporate Average Fuel Economy (CAFE) standards, the average fuel efficiency of vehicles sold in the UAE in 2013 was 12.1 km per liter (cars: 14.8 km/l; light trucks: 10 km/l), which is close to the US average of 13.0 km/l (cars: 15.0 km/l; light trucks: 10.5 km/l).
- However, compared with the portfolio of vehicles running in European countries according to the methodology defined under the EU National Emissions Ceilings Directive (NECD), the UAE's average fuel efficiency (10.7 km/l) is substantially lower than the EU's (18.8 km/l) as the portfolio of vehicle types is significantly different, consisting of more larger fleets.



Average fuel efficiency of light-duty vehicles sold in the UAE, 2013  
 Source: ICCT  
 Note: LDV = light duty vehicle; LCV = light commercial vehicle; LT = light truck; PV = private vehicle

## Social Performance

### SOC1: Labor Participation Rate

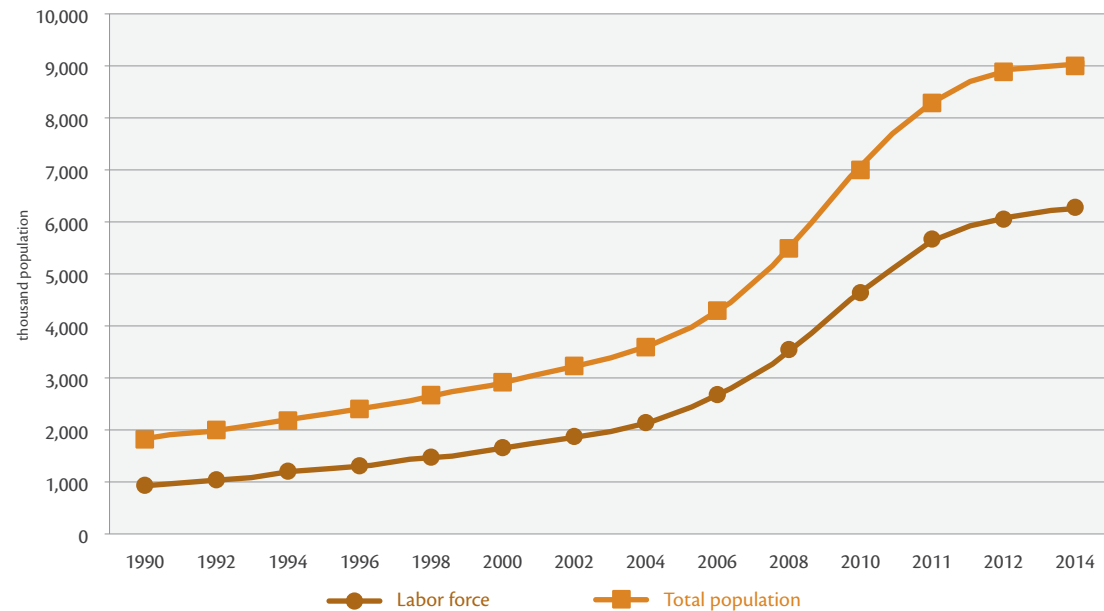
Labor participation rate (15-64 years old) (2014): Total 80.8% (1.3 points up from 2012); Male 93.3% (2.1 points up); Female 46.7% (0.1 point down)

Needless to say, labor is one of the most essential inputs for the production of goods and services. Labor market dynamics in countries are generally measured by labor force participation rates and unemployment rates.

- According to the International Labour Organization (ILO) statistics, the UAE's working population in 2014 reached around 6.3 million, growing at a historic pace along with the country's population growth. The proportion of the population aged between 15 and 64 that is economically active was 80.8% in 2014, indicating the high level of labor supply and even improving from the 2012 rate reported in the last version of this report.
- The rapid increase of female participation in labor market is notable, with 46.7% recorded in 2014. Nevertheless, women

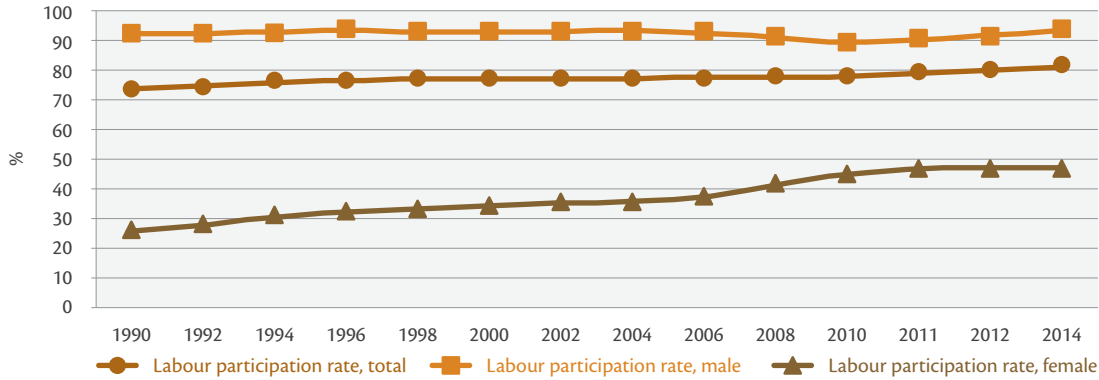
remain a relatively untapped resource in the UAE and the pace of improvement is slow compared to the rate of male workforce.

The UAE government recognizes that women will be a key factor in the state's future prosperity and is pursuing a strategy to empower women. One study shows that if female employment rates were to match those of men, it could boost the country's GDP by some 12%.



Trends in total population and labor force in the UAE, 1990-2014

Source: ILO; World Development Indicators



Trends in the UAE's labor participation rate, 1990-2014

Source: ILO; World Development Indicators

since the last reporting. The total rate has reached 96.4%.

- However, the gap between male and female rates has not been lowered and continuous efforts to improve female employment are required.

**SO2: Employment Rate**  
 Employment rate as a proportion of labor force (2014): Total 96.4%  
 (0.4 point up from 2012); Male 97.3% (0.3 point up); Female 91.4% (0.5 point up)

Foreigners comprise over 95% of the UAE workforce, with the largest communities coming from South Asia and a substantial presence from the Middle East and North Africa (MENA) region. Since most foreigners gain their residence permit based on employment, the employment rate (one minus unemployment rate) of foreigners is considered nearly 100%.

- The employment rate of both the male and female labor force has even improved



Trends in the UAE's employment rate as a proportion of labor force, 1991-2014

Source: ILO; World Development Indicators

### SOC3: Emiratization Rate

Share of UAE nationals in total labor force (2014): 5.0%

Share of UAE nationals in total private-sector employees (2014): 1.0%

The government is working to ensure that the imbalance in the workforce is addressed with active “Emiratization” efforts. Public bodies such as the UAE National Human Resource Development and Employment Authority (Tanmia, now part of the Ministry of Human Resources and Emiratization) are working

to develop the skills and competitiveness of Emirati citizens.

- The latest figures on the share of UAE nationals in total labor force is 5.0% in 2014. The UAE Vision 2021 aims to achieve 8% of the total workforce coming from UAE nationals by 2021.

- The lack of UAE nationals in the private sector has been a significant concern and the government is making efforts to encourage UAE nationals to shift their choice of employment away from the public sector. The latest rate of nationals in the private sector workforce is 1.0%.

### SOC4: Number of Green Jobs

Relevant data is not available

The successful transition to a Green Economy rests on the skills and expertise of the country’s workforce and its ability to leverage local talent. To encourage and support the shift towards greener jobs, the government policy needs to be designed to explicitly address the skill gaps between the current labor market and the requirements for a Green Economy and to ensure education

and workforce training to contribute to the overall efforts for moving towards sustainable development.

- There is no universal definition or categorization of green jobs, even though some international organizations such as ILO and EU are currently working on developing such a definition. The UAE firstly needs to establish a frame work of

green jobs in collaboration with those organizations to outline the expected skill and workforce requirement for a Green Economy transformation.

- This would further help estimate the potential for new employment opportunities and shift in workers from conventional to new and fast-growing green sectors.

### SOC5: Number of UAE Patents

Number of patents granted by GCC Patent Office (2015): 3,913 (659 added in 2015)

The government can nurture and activate new technologies and businesses by incentivizing the research community and industry to capture emerging opportunities. In addition to investment in R&D, the active use of intellectual property rights (IPRs) such as patents and trademarks, are considered to be one of the key factors to secure economic benefits from innovation and technology advancement, as well as a convenient measure to understand the level of innovation in a country.

- The number of local patents is still relatively small, reflecting the current level of R&D activities. The GCC Patent Office was established to facilitate inventors to register their IPRs throughout the region, and the application for and approval of GCC patents is rapidly increasing. It is also important to understand how many UAE-originated patents are registered in major economies such as the US, EU and Japan so that local innovation would

have a global impact and economic benefits.

- In relation to the Green Economy, “green patents” may well be distinguished from other types of patents to gauge the R&D efforts in this direction. International organizations such as the World Intellectual Property Organization (WIPO), OECD and EU are working on extracting green patents from their patent registries.

### SOC6: Global Innovation Index

Global Innovation Index (2015): 47<sup>th</sup> in the world (11 places down from 2014); 2<sup>nd</sup> in the GCC (1 place down)

The Global Innovation Index (GII) is an annual publication that was launched in 2007 and has been valued globally as one of the most comprehensive measures to understand different countries' enabling environment for innovation and their innovation outputs. The 2015 version of the GI was co-published by Cornell University, INSEAD, and WIPO. It ranks the innovation performance of

141 economies based on a composite of 79 indicators.

- The 2015 GI report revealed the UAE's overall score was 40.1 and ranked the country 47th, showing a significant drop from the last result in 2014 (43.2; 36th) after keeping a stable position since 2011. The UAE has become the 2nd position among the GCC countries after Saudi Arabia. The

UAE, Qatar and Saudi Arabia dropped their positions from the last result, while Bahrain, Kuwait and Oman were benchmarked for the first time in the 2015 report.

- This change can be explained by the modification made in the GI methodology and composition of indicators, as the UAE's latest performance in the 79 indicators is not largely different

from that of the 2014 report. In the 2015 GII, a total of six indicators were modified from the previous year: three indicators were deleted or replaced, two underwent methodological changes, and one changed its indicator number as a result of the framework adjustments. The authors state a caution that the scores and rankings from one year to the next are not directly comparable.

- As one of the national KPIs under the UAE Vision 2021, the UAE aims to become among top 20 economies in the GII by 2021.

1	Switzerland
2	United Kingdom
3	Sweden
4	Netherlands
5	United States
6	Finland
7	Singapore
8	Ireland
9	Luxembourg
10	Denmark
11	Hong Kong, China

12	Germany
14	Republic of Korea
19	Japan
29	China
43	Saudi Arabia
<b>47</b>	<b>UAE</b>
50	Qatar
59	Bahrain
69	Oman
77	Kuwait

**Ranking of major economies and GCC countries in the Global Innovation Index, 2015**

Source: INSEAD et al., *Global Innovation Index 2015*

### SOC7: Global Entrepreneurship Index

Global Entrepreneurship Index (2015): 19<sup>th</sup> in the world  
(1 place up from 2014); 1<sup>st</sup> in the GCC (unchanged)

The entrepreneur who looks for new ideas and puts them into effect provides a spark to economic activities by his or her bold decisions and could eventually contribute to growth and employment creation. Entrepreneurial solutions would also be required for intricate global challenges such as poverty and climate change and to enable a Green Economy. The US-based Global Entrepreneurship and Development Institute (GEDI) has been measuring the health

of “entrepreneurship ecosystems” in 15 pillars – a mix of attitudes, abilities and socio-economic infrastructure – in over 100 economies through the Global Entrepreneurship Index (formerly the Global Entrepreneurship and Development Index) since 2011.

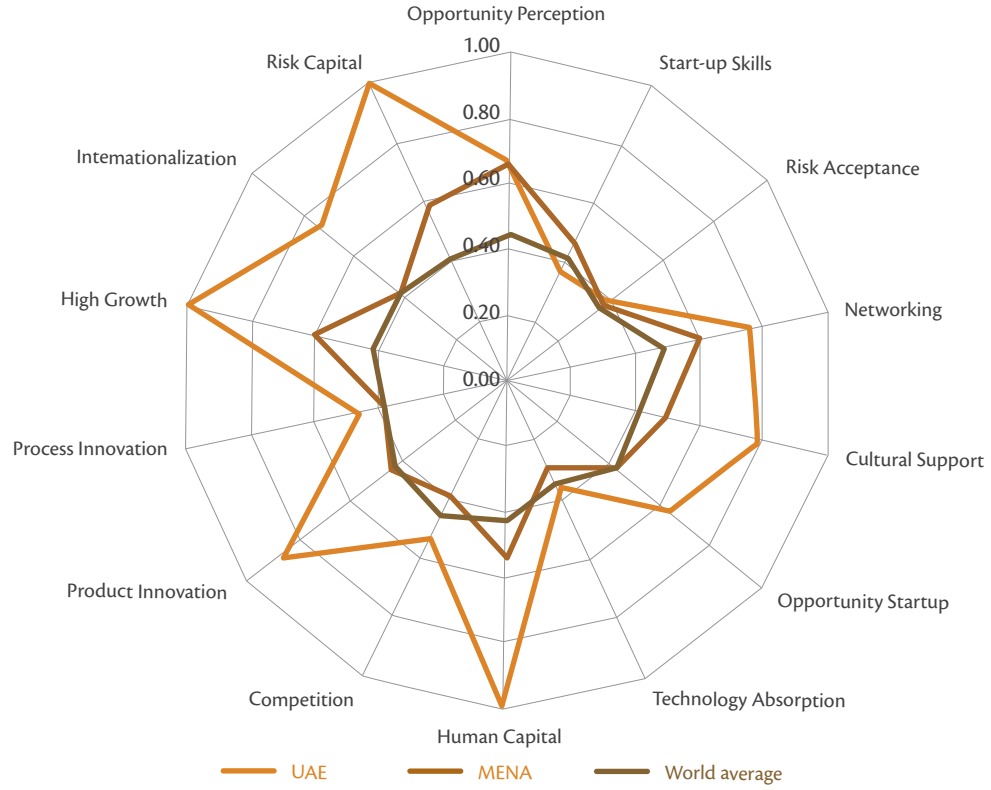
- The UAE was ranked 19th out of 132 economies in its 2016 version announced in November 2015 with its score of 61.4,

moving up one position from the last version and keeping the top position in the GCC.

- Looking into the breakdown of the scores in the 15 pillars, the UAE is one of the top performers globally in human capital, risk capital and high growth.
- On the other hand, bottlenecks were also observed in the areas of start-up skills, risk acceptance, technology absorption and process innovation.

1	United States
2	Canada
3	Australia
4	Denmark
5	Sweden
6	Taiwan, China
7	Iceland
8	Switzerland
9	United Kingdom
10	France
11	Singapore
14	Germany
19	<b>UAE</b>
24	Qatar
27	Republic of Korea
29	Bahrain
30	Japan
36	Saudi Arabia
38	Oman
39	Kuwait

**Ranking of major economies and GCC countries in the Global Entrepreneurship Index, 2015**  
 Source: GEDI, 2016 Global Entrepreneurship Index



**UAE's scores broken down in 14 pillars of the Global Entrepreneurship Index, 2015**  
 Source: 2016 Global Entrepreneurship Index

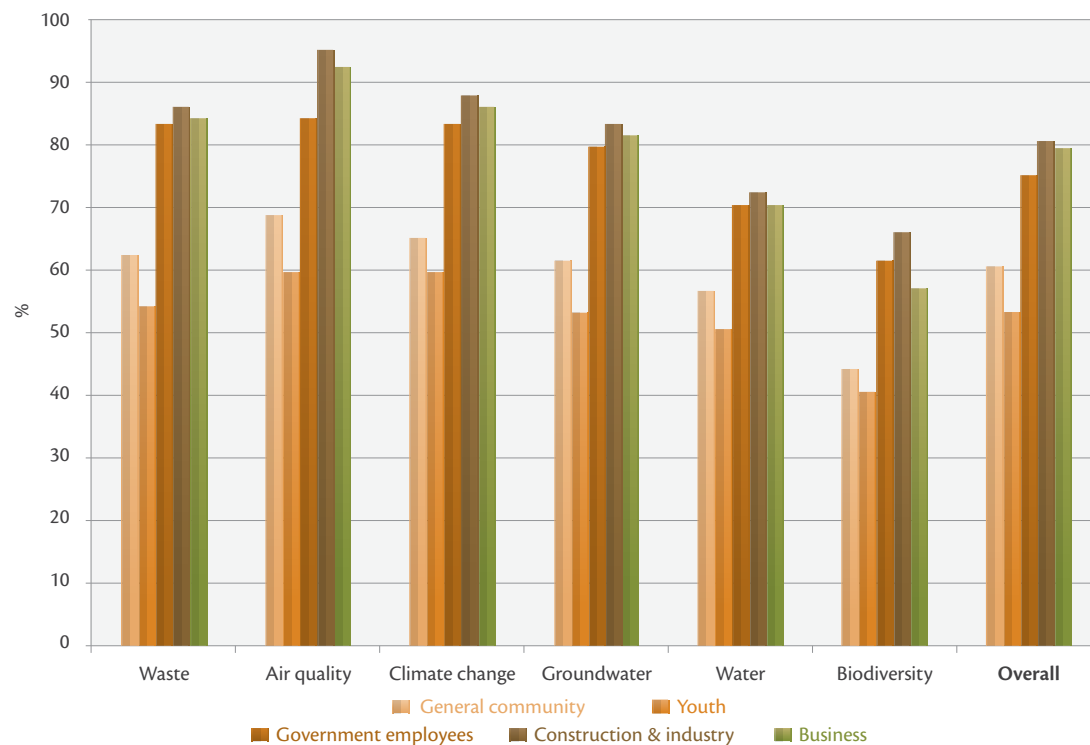
**SOC8: Environmental Awareness Rate**  
 Average rate of environmental awareness (2014): 63%

Raising environmental awareness is the first and fundamental step of any actions that aim to facilitate a Green Economy transformation

and is important for producers and consumers alike. In 2014, the then Ministry of Environment and Water conducted a nation-wide survey of

residents' environmental awareness and eco-friendly behavior for the first time, involving 4,000 people representing various segments of population (The Environment Agency – Abu Dhabi is conducting a similar survey in Abu Dhabi since 2008). The ministry aims to regularly monitor and analyze the trends in environmental awareness and behavior to support better, more targeted policy-making.

- The results show that the overall level of awareness on environmental issues was 63%. Breaking into different stakeholders, awareness among government employees (75%) and industry (construction and industry being 80% and business being 78%) is significantly higher than that among general community (60%) and youth (53%).
- When looking into awareness of different environmental subjects, awareness on air quality was the highest, followed by climate change and waste. Less attention is paid to biodiversity and water issues.



Rates of environmental awareness among UAE stakeholders according to subjects, 2014

Source: MOCCA

Note: Business = hospitality, hospitals, corporate and retails

### SOC9: Environmental Behavior Rate

Average rate of taking pro-environment actions by general community (2014): 55%

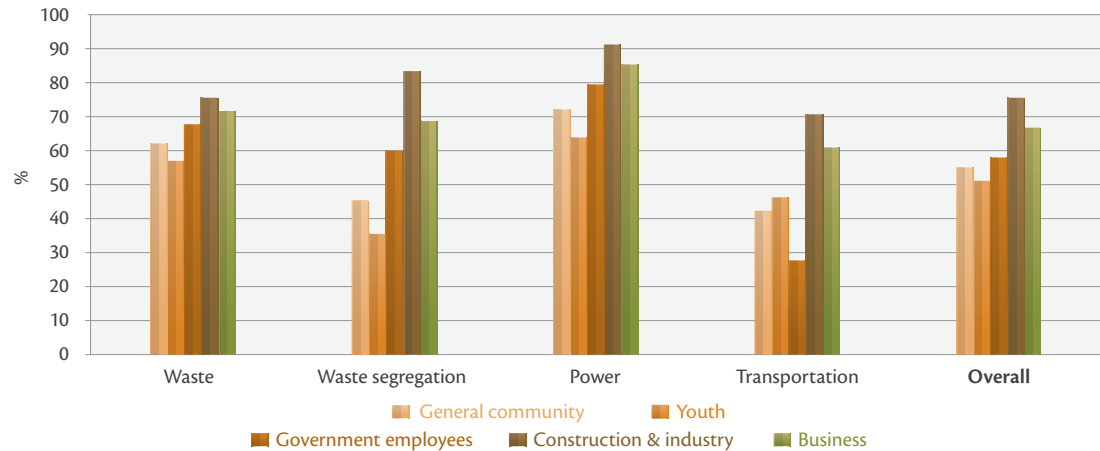
Personal behavior and choices in daily life – such as what to eat, what to wear and how to get to work or school – are one of the most critical

factors to determine the success in greening the economy as they have a significant effect on the environment as well as on economic

outcomes. In reality, there is a substantial gap between good intentions of people (attitude) and their actual behavior, and extra efforts are needed to change people's actual behavior. The MOCCA's survey investigated both awareness and behavior to better understand this gap.



- The overall difference between environmental awareness and pro-environment behavior among the general community was 5%, which seems relatively small.
- Looking into different areas, people take more pro-environment actions in energy saving and waste segregation. Residents tend to be more reluctant to take action on transportation areas.
- More people in the industry take pro-environment actions in all areas (average: construction and industry 76%; business 67%), whilst government employees (58%), general community (55%) and youth (51%) are less active on environmental initiatives.



Rates of taking pro-environment behavior among UAE stakeholders according to subjects, 2014

Source: MOCCA

Note: Business = hospitality, hospitals, corporate and retails

### SOC10: Human Development Index

Human Development Index (2014): 41<sup>st</sup> in the world (1 place down from 2013); 3<sup>rd</sup> in the GCC (unchanged)

Measuring “human development” is an alternative approach to measuring welfare comprehensively instead of by focusing only on economic growth. Human development is defined as “the process of enlarging people’s choices”, which allows them to “lead a long and healthy life, to be educated, to enjoy a decent standard of living”. The Human Development Index (HDI) was developed and has been measured by the United Nations Development

Programme (UNDP) since 1990. The UNDP’s 2015 *Human Development Report* presented the HDI values for 2014 for 188 countries and UN-recognized territories.

- The UAE’s HDI value for 2014 is 0.835, positioning the country at the 41st. The ranking has gone down from 2013 by one position, but the country maintains membership to the “very high human

development” group. The fundamental drivers of the UAE’s strong performance in the HDI are health, education and social improvements, which have delivered consistently better life chances and life expectancy for people.

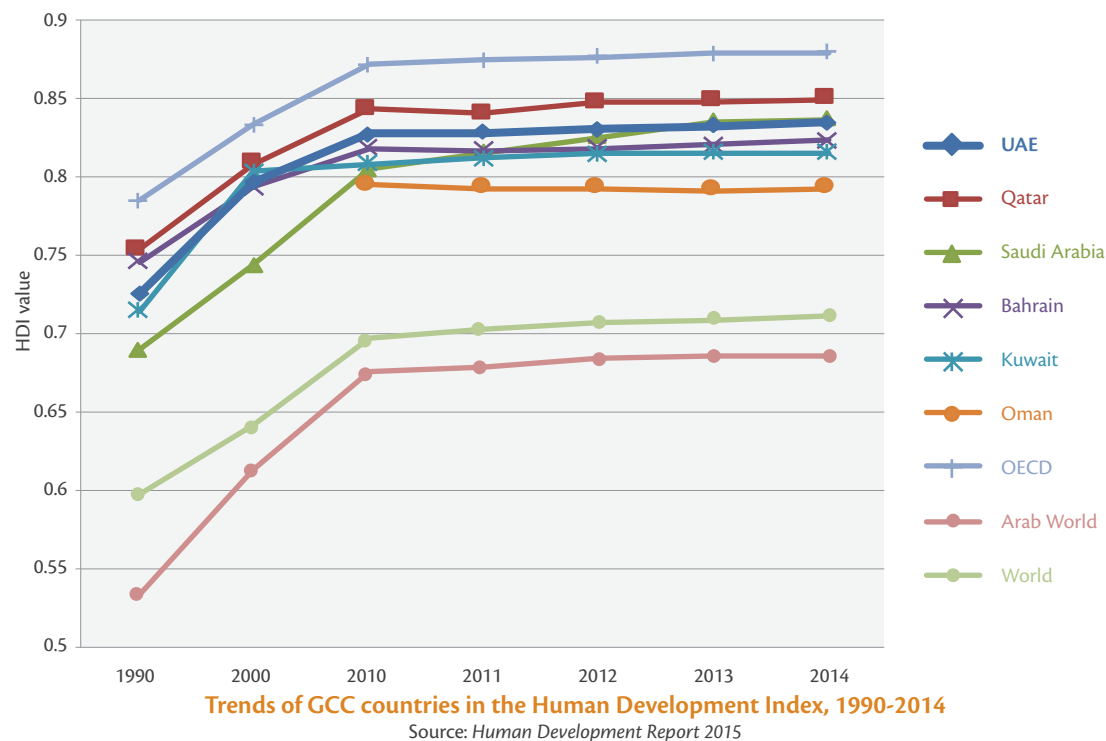
- Between 1990 and 2014, the UAE’s HDI value increased by 15.1%, or an average annual increase of about 0.59%. During the same period, the UAE’s life expectancy at birth increased by 9.4 years, mean years of schooling increased by 5.9 years, and expected years of schooling increased by 4.7 years.

- The UAE Vision 2021 aims for further advancement in human development, targeting its HDI ranking to be among the top ten by 2021.

1	Norway
2	Australia
3	Switzerland
4	Denmark
5	Netherlands
6	Germany
6	Ireland
8	United States
9	Canada
9	New Zealand
11	Singapore
12	Hong Kong, China
14	United Kingdom
17	Republic of Korea
20	Japan
32	Qatar
39	Saudi Arabia
41	<b>UAE</b>
45	Bahrain
48	Kuwait
52	Oman

#### Ranking of major economies and GCC countries in the Human Development Index, 2014

Source: UNDP, Human Development Report 2015



### SOC11: World Happiness Index

World Happiness Index (2015): 20<sup>th</sup> in the world (6 places down from 2013);  
1<sup>st</sup> in the GCC (unchanged)

In July 2011, the United Nations General Assembly passed a resolution inviting member countries to measure the happiness of their people and to use it to help guide their public

policies. At the first UN High-level Meeting on Happiness and Well-Being in 2012, the *World Happiness Report* was launched by the Sustainable Development Solutions Network

(SDSN) as a global measure of happiness. This report uses data from the Gallup World Poll (the first edition used data set from 2005-07; the second from 2010-12; the third from 2012-14) to assess the extent to which individuals feel happy and satisfied with their lives. On a scale from 0 to 10, six key variables explain three-quarters of the variation in annual national average scores of happiness, including real GDP per capita, healthy life expectancy, having someone to count on, perceived freedom to make life choices, freedom from corruption, and generosity.

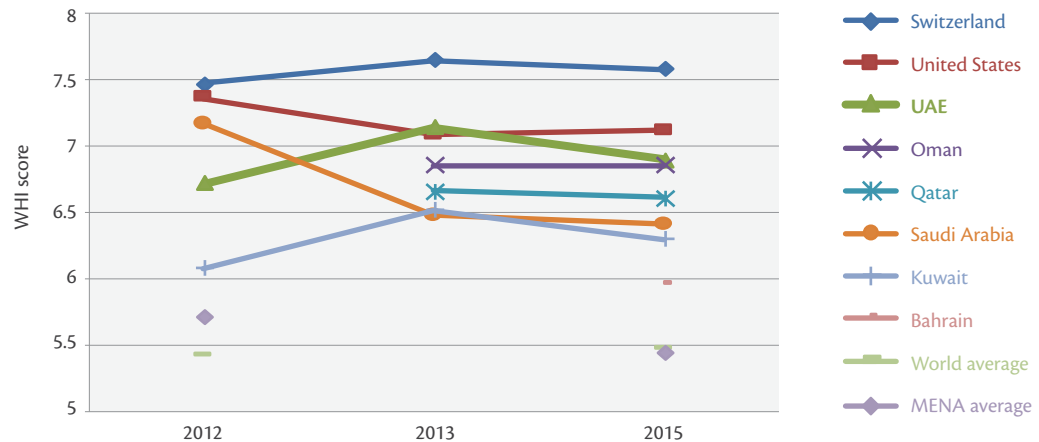
- In the first edition in 2012, the UAE was ranked the highest in the Arab world, with a global rank of 17th out of over 150 countries. This improved to 14th in 2013, indicating the positive trend in perceived happiness and quality of life. The latest edition launched in 2015 ranked the UAE six positions lower than its 2013 ranking, but the country kept the top position in the region. Overall, the UAE's score of happiness improved by 0.167 between the first edition and the latest report.
- The UAE Vision 2021 has a goal of seeing the UAE reach among the top five in this index by 2021.

1	Switzerland
2	Iceland
3	Denmark
4	Norway
5	Canada
6	Finland
7	Netherlands
8	Sweden
9	New Zealand
10	Australia
12	Costa Rica
15	United States

20	<b>UAE</b>
21	United Kingdom
22	Oman
24	Singapore
26	Germany
28	Qatar
29	France
35	Saudi Arabia
39	Kuwait
46	Japan
47	Republic of Korea
49	Bahrain

**Ranking of major economies and GCC countries in the World Happiness Index, 2015**

Source: SDSN, World Happiness Report 2015  
 Note: 2015 results are based on 2012-14 data.



**Trends of major and GCC countries in the World Happiness Index, 2012-2015**

Source: World Happiness Report 2015

Note: The 2012 report was based on 2005-07 data; the 2013 report based on 2010-12 data; and the 2015 report based on 2012-14 data.



UNITED ARAB EMIRATES  
STATE OF  
**GREEN  
ECONOMY  
REPORT**

SECOND EDITION  
2016

### Annex: Latest Results of UAE Green KPIs (listed according to the UAE Green Agenda's Strategic Objectives)

Strategic Objective (Committee)	Designated Green KPIs	Performance	Year	World ranking	GCC ranking	Latest trend	2021 target
1. Competitive Knowledge Economy	ECO8: Global Competitiveness Index [H] [N]	17 <sup>th</sup> in the world	2015	17 <sup>th</sup> /140	2 <sup>nd</sup>		Top 10 in the world
	SOC6: Global Innovation Index [H] [N]	47 <sup>th</sup> in the world	2015	47 <sup>th</sup> /141	2 <sup>nd</sup>		Top 20 in the world
	ECO1: Real GDP growth	4.6% (Abu Dhabi: 4.7%; Dubai: 3.8%)	2014				
	ECO2: Share of non-oil GDP	68.6%	2014				
	ECO3: Share of non-oil export	30.3% (non-hydrocarbon)	2014				
	ECO5: R&D expenditure in GDP [N]	0.49%	2011	48 <sup>th</sup> /77	1 <sup>st</sup>		1.5%
	ECO6: Foreign direct investment net inflows [N]	2.52%	2014	101 <sup>st</sup> /181	2 <sup>nd</sup>		5%
	ECO7: Ease of Doing Business Index [N]	31 <sup>st</sup> in the world	2015	31 <sup>st</sup> /189	1 <sup>st</sup>		1st in the world
	SOC5: Number of UAE patents	3,913 (GCC)	2015				
SOC7: Global Entrepreneurship Index [N]	19 <sup>th</sup> in the world	2015	19 <sup>th</sup> /132	1 <sup>st</sup>		Top 10 in the world	
2. Social Development & Quality of Life	ECO12: Material consumption per GDP [H]	478 g/\$ (domestic material consumption)	2010				
		11.9 g/\$ (finished steel products)	2014				
	SOC10: Human Development Index [H] [N]	41 <sup>st</sup> in the world	2014	41 <sup>st</sup> /188	3 <sup>rd</sup>		Top 10 in the world
	SOC1: Labor participation rate	80.8% (Male: 93.3%; Female: 46.7%)	2014	23 <sup>rd</sup> /187	2 <sup>nd</sup>		
	SOC2: Employment rate	96.4% (Male: 97.3%; Female: 91.4%)	2014	28 <sup>th</sup> /173	3 <sup>rd</sup>		

Latest trend: **Improving** **Stable** **Deteriorating**

[H]: Headline indicator of Green KPIs; [N]: National KPI defined by the UAE Vision 2021

Strategic Objective (Committee)	Designated Green KPIs	Performance	Year	World ranking	GCC ranking	Latest trend	2021 target
2. Social Development & Quality of Life	SOC3: Emiratization rate	5.0% (total)	2014				8%
		1.0% (private sector)	2014				5%
	SOC4: Number of green jobs	Not available					
	SOC11: World Happiness Index [N]	20 <sup>th</sup> in the world	2015	20 <sup>th</sup> /158	1 <sup>st</sup>		Top 5 in the world
3. Sustainable Environment & Valued Natural Resources	ENV9: Ecological Footprint [H]	7.75 global ha/capita	2014	146 <sup>th</sup> /148	4 <sup>th</sup>		
	ENV14: Environmental Performance Index [H]	25 <sup>th</sup> in the world	2014	25 <sup>th</sup> /178	1 <sup>st</sup>		
	ENV1: Rate of groundwater abstraction	13 times the recharge from rainfall	2013				
		16.6 m <sup>3</sup> /capita (Annual renewable internal freshwater resources)	2013	175 <sup>th</sup> /177	4 <sup>th</sup>		
	ENV10: Number of environmental regulations	87 (federal)	2015				
	ENV11: Number of environmental standards	25 (federal)	2015				
	ENV12: Ratio of protected areas	12.6% (terrestrial: 12.8%; marine: 12.2%)	2015				
	ENV13: Environmental expenditure	AED 308.6 million (\$ 84 million) (Ministry of Environment and Water budget)	2015				
	ECO4: GDP from environmental goods and services	Not available					
	SOC8: Environmental awareness rate	63% (overall)	2014				
SOC9: Environmental behavior rate	55% (general community)	2014					

Strategic Objective (Committee)	Designated Green KPIs	Performance	Year	World ranking	GCC ranking	Latest trend	2021 target
4. Clean Energy & Climate Change Adaptation	ENV7: Carbon intensity of energy [H]	600 gCO <sub>2</sub> /kWh (electricity, including desalination)	2013				
		57.6 tCO <sub>2</sub> /TJ (total primary energy supply)	2013				
	ECO14: Efficiency of water and electricity production [H]	Not available					
	ENV6: Rate of non-fossil energy [N]	0.072% (electricity, Dubai)	2014				24% (incl. nuclear)
	ENV8: Total GHG emissions	203.67 million tCO <sub>2</sub> e	2014				
	ECO13: GHG emissions per GDP	340 gCO <sub>2</sub> e/\$	2014	148 <sup>th</sup> /187 (2011)	2 <sup>nd</sup> (2011)		
5. Green Life & Sustainable Use of Resources	ECO9: Water consumption per GDP [H]	2.98 l/\$ (municipal water)	2013				
	ECO11: Energy consumption per GDP [H]	0.125 kgoe/\$	2012	78 <sup>th</sup> /133	1 <sup>st</sup>		
		0.18 kWh/\$ (electricity)	2013				
	ENV2: Water consumption per capita	514.6 l/day (municipal water)	2013				
	ENV3: Waste generation per capita	1.82 kg/day (municipal solid waste)	2014				
	ENV4: Rate of waste recovery [N]	14.08 % (municipal solid waste)	2014				75% (municipal solid waste)
	ENV5: Energy consumption per capita	7,536 kgoe	2012	130 <sup>th</sup> /137	2 <sup>nd</sup>		
		11,655 kWh/year (electricity)	2013				
	ENV15: Ratio of green vehicles	Not available					
	ECO10: Waste generation per GDP	Not available					
ECO15: Average fuel efficiency of vehicles	12.1 km/l (new vehicles, CAFE-based) 10.7 km/l (new vehicles, NECD-based)	2013					

Latest trend: **Improving** **Stable** **Deteriorating**

[H]: Headline indicator of Green KPIs; [N]: National KPI defined by the UAE Vision 2021

# UAE STATE OF GREEN ECONOMY REPORT

Second Edition 2016

Copyright © United Arab Emirates Ministry of Climate Change and Environment 2016

## Citation:

MOCCA (UAE Ministry of Climate Change and Environment) (2016)  
*United Arab Emirates State of Green Economy Report: Second Edition 2016*, MOCCA, Dubai.

## Acknowledgements

**Editor:** UAE Ministry of Climate Change and Environment, Green Development Department

**Special contribution:** United Nations Environment Programme (Achim Steiner, Steven Stone)

**Design & Print:** E-design, Dubai [www.edesignuae.com](http://www.edesignuae.com)

**Proofreading:** Zarina Khan

## Special thanks to:

Abu Dhabi Quality and Conformity Council  
Ajman Executive Council  
APCO Worldwide  
Bee'ah  
Center of Waste Management – Abu Dhabi  
Central Bank of the UAE  
Clean Energy Business Council  
Department of Municipal Affairs, Abu Dhabi  
Desolenator  
Dubai Chamber of Commerce and Industry  
Dubai Electricity and Water Authority  
Dubai Financial Services Authority  
Dubai Municipality  
Dubai Supreme Council of Energy  
Emirates Authority for Standardization and Metrology  
Emirates Transport  
Emirates Wildlife Society in association with WWF  
Enerwhere

Environment Agency – Abu Dhabi  
Eole Water  
Federal Competitiveness and Statistics Authority  
Fujairah Municipality  
Global Footprint Network  
Global Green Growth Institute  
General Executive Council, Umm Al Quwain  
Green Energy Solutions & Sustainability LLC  
INSEAD Innovation and Policy Initiative  
Insurance Authority  
International Council on Clean Transportation  
International Renewable Energy Agency  
Masdar  
Masdar Institute of Science and Technology  
Ministry of Economy  
Ministry of Education  
Ministry of Energy  
Ministry of Foreign Affairs and International Cooperation

Ministry of Infrastructure Development  
Mubadala Development Company  
Municipalities and Agriculture Affairs Department, Sharjah  
Municipality and Planning Department, Ajman  
Neutral Fuels LLC  
Prime Minister's Office  
Public Works and Services Department, Ras Al Khaimah  
Regulatory and Supervisory Bureau, Dubai  
Roads and Transport Authority, Dubai  
Securities and Commodities Authority  
Sheikh Zayed Housing Programme  
Sustainable Europe Research Institute  
Takeleap  
Tatung  
UNEP Finance Initiative  
Wuppertal Institute for Climate, Energy and Environment  
Yellow Door Energy  
All financial institutions responded to the UAE green finance survey

Unless specified, the data and information on the activities of UAE and overseas entities presented in this publication are taken from publicly available sources.

For further information or for provision of feedback, please write to:

**UAE Ministry of Climate Change and Environment  
Green Development Department**

PO Box 1509, Dubai, United Arab Emirates

E-mail: [greendevlopment@moccae.gov.ae](mailto:greendevlopment@moccae.gov.ae)

This publication is available for download from [www.moccae.gov.ae](http://www.moccae.gov.ae).





تقرير حالة  
الاقتصاد الأخضر  
لدولة الإمارات العربية المتحدة

UNITED ARAB EMIRATES  
STATE OF  
**GREEN**  
ECONOMY REPORT

الإصدار الثاني  
SECOND EDITION 2016



@MOCCAUEAE  
www.moccae.gov.ae

