حكومة دبي
GOVERNMENT OF DUBAI

المجلس الأعلى للطاقة
Supreme Council of Energy

Dubai Demand Side Management Strategy

2016 Annual Report

"For an Efficient Future"

طاقتي
TAQATI
برنامج دبي لكفاءة الطاقة
DUBAI ENERGY EFFICIENCY PROGRAM

2011 2012 2013 2014 2015 2016 2030

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His Highness Sheikh Mohammed bin Rashid Al Maktoum

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

"We recognize that preserving our energy resources will be one of the greatest challenges in our drive towards sustainable development. This, however, will not materialize unless the different facets of our society adopt energy conservation principles in their core values. The future generations will be the chief beneficiary of our achievements and the best judge of what we accomplish in this field."

His Highness Sheikh Hamdan bin Mohammed bin Rashid Al Maktoum

Crown Prince of Dubai and Chairman of the Executive Council

"History bears witness to our Founding Fathers' foresight and wisdom in the decisions they've made, decisions whose benefits we continue to enjoy today. Looking to the future is our leadership's permanent policy; they spare no effort in building a bright tomorrow for the nation's coming generations."

His Highness Sheikh Ahmed bin Saeed Al Maktoum

Chairman of the Dubai Supreme Council of Energy

"There has been much progress to date in the move towards a green economy, where economic growth and environmental responsibility are given equal importance in the development of a sustainable future. Indeed, the green economy is an engine of growth, providing opportunities for both the public and private sector."

HE SAEED MOHAMMED AL TAYER

Vice Chairman of the Dubai Supreme Council of Energy

Dear valued stakeholder,

Welcome to the 3rd annual report about the Demand Side Management (DSM) Strategy of Dubai. We are happy to report significant actions taken by Program Owners in 2016, resulting in savings well above the set targets and beyond our expectations. This demonstrates the potential of Dubai to be among the global leaders in sustainability: our aspirations are higher than some of the most developed nations in the world, yet we are well on track to fulfill our ambition.

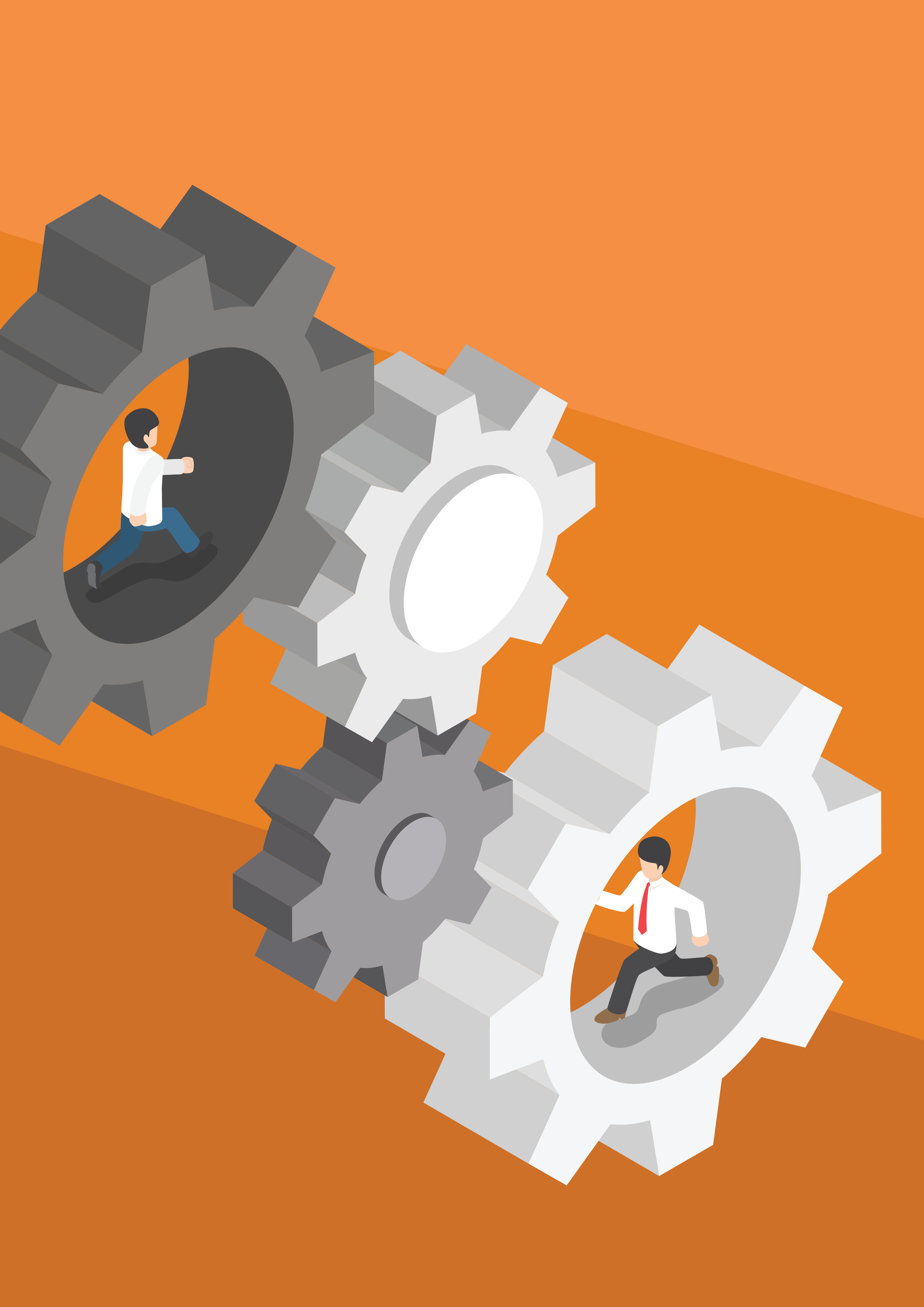
In 2016, we have achieved 2.8 TWh saving of electricity and 3.7 billion IG saving of water. These translate into reduction in per capita consumption since 2010 by about 6% and 8% of electricity and water, respectively. In turn, these correspond to approximately AED 720 million of avoided capex in new generation capacity as well as approximately AED 2.4 billion of generation opex, resulting from over 110,000 MMSCFT of natural gas and other operational expenses saved. These savings incurred some incremental cost as investments were required but, in summary, the DSM Strategy nearly broke even in 2016 with the overall average DSM cost of electricity saved for Dubai still substantially below the cost of generation of electricity.

Regarding our programs, 2016 has seen a higher impact of DSM Programs, notably Standards and Labels, Green Building Regulations, Building Retrofits and Appliances and Equipment. Compared to last year, electricity savings from the Dubai Green Building Code have increased by 83%, savings from building retrofits have increased sevenfold, and Standards and Labels for Appliances and Equipment have increased their savings contribution by 50%.

We have also made a remarkable accomplishment in the set-up of TAQATI, a dedicated office within Etihad Energy Services Company focused on supporting DSM Program Owners in achieving their DSM targets, raising targeted awareness on energy efficiency across all sectors and improving the level of delivering energy efficiency projects through capacity building and training.

Looking at the immediate future, we look forward to the collaboration with all concerned stakeholders for the adoption and enhancement of green building codes. We will see increasing activity in building retrofits, with further savings both from Etihad Energy Services Company and from private ESCOs, which have shown a significant uptake in 2016. We can also expect to see increased penetration of LED technology in outdoor lighting, following successful experiences with installations in new projects and in retrofitted areas. Shams Dubai, the Distributed Solar rooftop program has begun to show positive results and is on its way to increase penetration of photovoltaics on building rooftops, to the benefit of the general public. A special area of focus for the Supreme Council of Energy (DSCE) will be the development of an Integrated Water Resource Management Strategy to analyze and address challenges of the water sector in Dubai as a whole, involving all key stakeholders on a common agenda.

We look forward to bringing innovative and green ideas to life, together with you, to the benefit of the Emirate of Dubai and the UAE as a whole in energy efficiency and sustainable development.



HE AHMAD BUTI AL MUHAIRBI

Secretary General of the Dubai Supreme Council of Energy

Dear Reader,

The Dubai Supreme Council of Energy (DSCE) chaired by H.H. Sheikh Ahmed Bin Saeed Al Maktoum unites key stakeholders in a joint effort to ensure a sustainable energy sector in Dubai.. In this context, we approach sustainability as a challenge of moderating demand and maintaining a secure and economically optimized supply of energy. The pursuit of cost-effective energy efficiency is a primary objective and our guiding principle in the DSM Strategy 2030. The DSM Strategy 2030 is now in the 6th year of implementation, and we are pleased to report that Dubai is continuing to move in the right direction.

2016 marked another great step in our journey of achieving 30% savings of electricity and water by 2030. We are in a phase when we expect a sharper increase of target savings year-on-year and it is pleasing to see that all efforts invested in ensuring that the 8 DSM Programs are showing good results, ensuring readiness for escalation of savings in years ahead. We are delivering results above targets, with 6.8% of electricity and 3.4% savings in water compared to the business-as-usual scenario, and we can confirm our commitment to reach the expected 30% target by 2030.

This accomplishment comes as a result of an efficient governing structure, a dedicated Program Management Office, and a large team of individuals collaborating with us as part of DSM Program Owner entities or as part of an increasing number of partners and participant organizations. We thank all our stakeholders for the excellent work done.

In the next years, we expect a sharp increase of savings requiring implementing entities to scale up their activities. DSCE will continue to provide institutional guidance and endorsement, as the custodian of the Strategy, while TAQATI (a member entity of Etihad Energy Services Company) will continue to provide dedicated implementation support as a DSM Program Management Office.

Looking forward to offering our continuous support and to celebrating even greater DSM achievements in 2017.

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DSM STRATEGY WAS DEVELOPED BY DSCE AS PART OF DIES 2030, TO SUPPORT DUBAI VISION OF LEADERSHIP IN ENERGY SECURITY AND EFFICIENCY

SECURITY OF ENERGY SUPPLY

GAS SUPPLY / LNG • CLEAN COAL • NATURAL GAS
UTILITY SCALE SOLAR • IMPORT / NUCLEAR

REDUCTION OF DEMAND

DEMAND SIDE MANAGEMENT STRATEGY (DSM STRATEGY)

INNOVATION AND ENABLERS

R&D / NEW TECHNOLOGIES
POLICY & REGULATORY FRAMEWORK
FUNDING & FINANCING

SUSTAINABLE GROWTH

WASTE MANAGEMENT • GREEN MOBILITY
INVESTMENT IN CLEAN AND SMART TECHNOLOGIES

1

Executive summary

Executive summary

This report, in its third year of publication, presents progress and performance of the Dubai Demand Side Management (DSM) Strategy for the year 2016. The Strategy comprises 8 main programs, each having a responsible government entity for execution (Program Owner), and a dedicated Program Management Office (TAQATI), under the supervision of the Dubai Supreme Council of Energy (DSCE). The end goal of the Strategy is to deliver by 2030 yearly sustainable savings of 30% of electricity and water consumption compared to business as usual.

At the end of 2016, the DSM Strategy is achieving 2.8 TWh/year of electricity savings and 3.7 BIG/year of water savings, corresponding to 6.8% and 3.4% of baseline consumption respectively. This marks significant surplus savings vs. the 2016 targets of 2.2 TWh for electricity and 2.9 BIG for water, and also substantial growth of savings vs. 2015, +21% for electricity and +8% for water, as most Programs showed substantial growth. The avoided cost in generation capacity and natural gas consumption has already brought the Strategy close to the break-even point, about 6 years from its initiation.

This important achievement comes as a combination of efforts from all Program Owners, who are committed to yearly targets and roadmaps through 2030, and for whom the DSM Strategy is increasingly becoming part of their core activities.

2016 has been a year of progress for DSM beyond the continuous expansion of the Programs, and including multiple aspects, such as regulation, institutional set-up, capacity building and awareness.

Among the key achievements of the year are: The launch of TAQATI, a dedicated body within Etihad Energy Services providing program coordination and support to the DSM Programs; the launch of Etihad Solar, a specialized team to drive developments of the Shams Dubai Program; the successful completion of JAFZA retrofit project; enhancements in Standards and Labels for Appliances and Equipment by ESMA, the preparation of Al Sa'fat which will mark the evolution of Dubai Green Building Regulations, the launch of the Green Public Procurement (GPP) initiative with a dedicated Green Procurement Committee (GPC) and issuance of the first common GPP criteria and the establishment of the Integrated Outreach and Awareness Committee (IOAC) to coordinate and streamline DSM awareness efforts.

Executive summary

The coming years will see a steep increase of targets, and hence several Programs are expected to step up their measures. This would involve for example the update and expansion of application of green building regulations, the upgrade of efficiency standards for some classes of appliances, the scale up of retrofit activities, larger scale implementation of LED in street lighting, and solar PV for rooftop applications. Specific work will be dedicated to unlock synergies and enable growth of some Programs relying on multiple stakeholders for an effective implementation, such as district cooling and water reuse. Higher attention will be given to financing enablers, through preparatory work for the constitution of the announced Green Fund, as well as improving the accuracy of our measurement and verification of the DSM energy savings by enhancing our existing energy model.

In the current economic context, the DSM Strategy confirms its strong role in the sustainable growth of Dubai. Savings are becoming substantial, capabilities in the field of DSM are now available in the Emirate, and the energy efficiency market is under strong development. Remarkably, as the DSM Strategy is crossing the break-even point, it is expected from now on to bring net monetary contributions that can be reinvested in the Dubai economy. This is why there is strong and continuous support to our agreed roadmap from our leaders and institutions, which keeps us confident in the pursuit of our long term goals.

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Objectives and scope of this report

Objectives and scope of this report

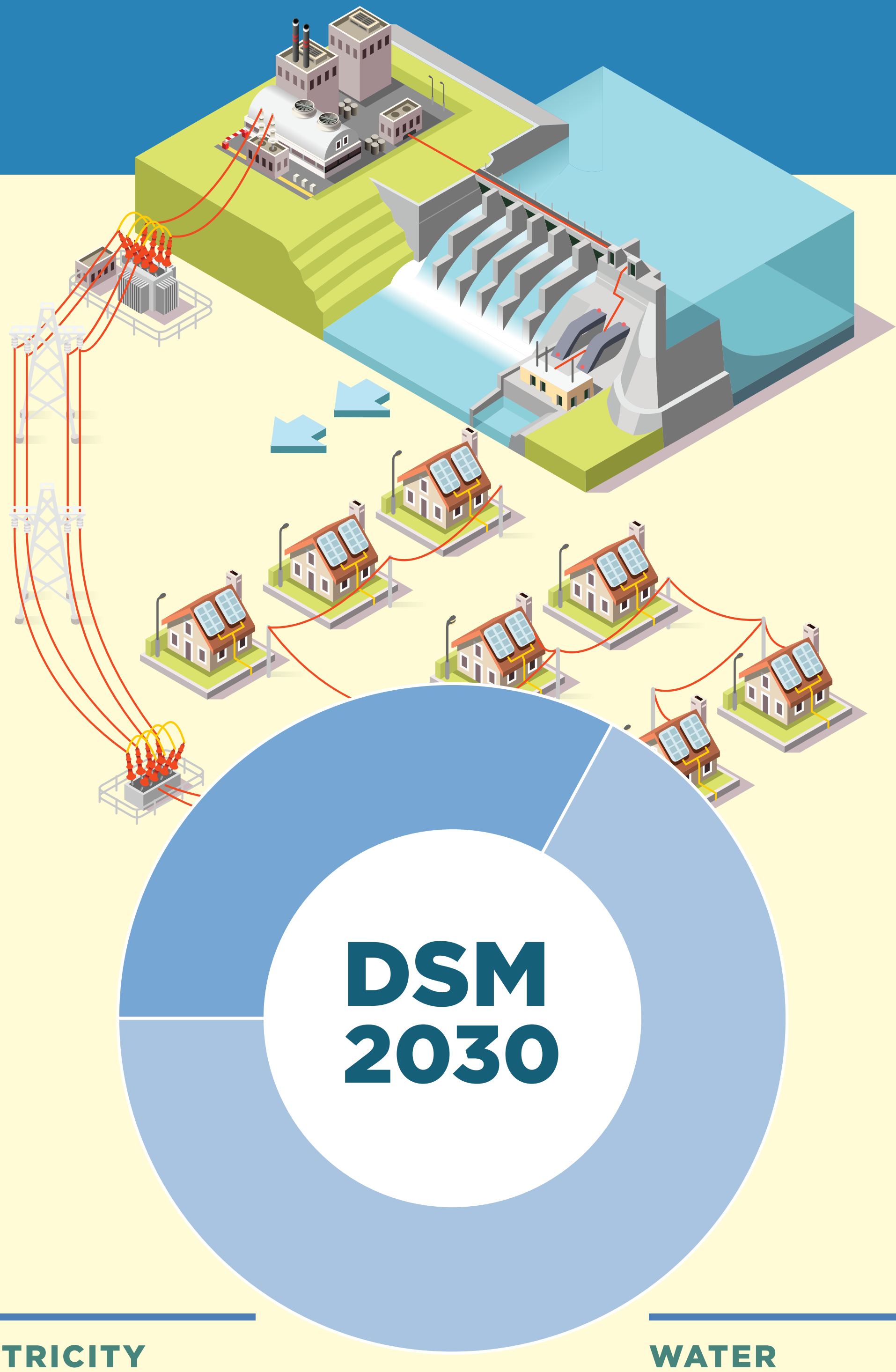
The goal of this report is to present the achievements up to 2016 of the Demand Side Management (DSM) Strategy, designed by the Dubai Supreme Council of Energy (DSCE), implemented by key government entities and supported by TAQATI.

Starting from the strategic context and institutional setup of DSM, this report presents a description of the 8 DSM Programs, highlights the key developments of the past year, and shows the achieved electricity and water savings in comparison to targets, leading to an outline of priorities to be pursued in the coming years. Data presented in this document is the result of a system of key performance indicators (KPI) that DSCE is maintaining through TAQATI in collaboration with the DSM Program Owners: Dubai Electricity and Water Authority (DEWA), Dubai Municipality (DM), Roads & Transport Authority (RTA), the Regulatory and Supervisory Bureau (RSB), Etihad Energy Services (Etihad ES) and Emirates Authority for Standardization & Metrology (ESMA).

The quantitative assessment is supported by qualitative insights provided by the authors and by Program Owners who, through a dedicated chapter of the report, express their points of view on the status, challenges and future outlook of their Programs.

DEMAND SIDE MANAGEMENT

TARGETS



ELECTRICITY CONSUMPTION SAVINGS

30%

BY **2030** VS. BAU

WATER CONSUMPTION SAVINGS

30%

BY **2030** VS. BAU

3

Context and overview of the DSM Strategy

Context and overview of the DSM Strategy

"The DSM Strategy is part of DIES 2030 and is aligned with the UAE and Dubai policy agenda"

3.1 POLICY CONTEXT

The DSM Strategy is part of the Dubai Integrated Energy Strategy 2030, whose main goals are to secure uninterrupted energy supply and moderate the growing electricity and water demand of Dubai, hence increasing sustainability and competitiveness of its economy.

In a context of high dependency on energy imports and fast growth of the economy, optimization of energy demand is a strategic priority for the Emirate. It moderates the need for expansion of generation capacity, and frees up resources for strategic investments and spend.

At the same time, demand side management creates new jobs and capabilities in the field of energy efficiency which support safety and the environment through best practices and lower emissions, and contributes to the idea of Dubai as a smart city through its reliance on new technologies, and develop a strong demand platform for a green economy.

The convergence of such important goals in the DSM Strategy makes it well integrated with the Dubai and UAE agendas, as outlined in Exhibit 2.

Demand Side Management Targets

Electricity consumption savings:

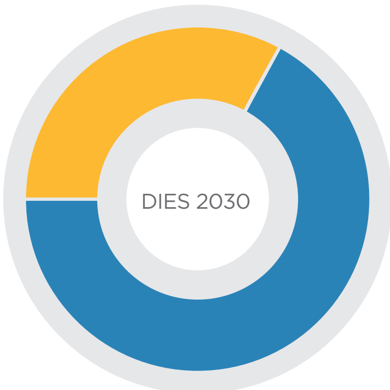
30%

by 2030 vs. BAU

Water consumption savings:

30%

by 2030 vs. BAU



Supply Side Targets (Energy Mix)

Solar and other clean energy source:

25%

by 2030

Exhibit 1: DSM as part of DIES 2030

Context and overview of the DSM Strategy

Exhibit 2: DIES and DSM in the context of the Dubai and UAE policy agenda

"Yearly targets have been established for the DSM Strategy and its Programs"

3.2 THE DSM STRATEGY, ROADMAP AND TARGETS

The DSM Strategy comprises 8 Programs, designed to address different aspects of electricity and water consumption applications within our city (see Exhibit 3).

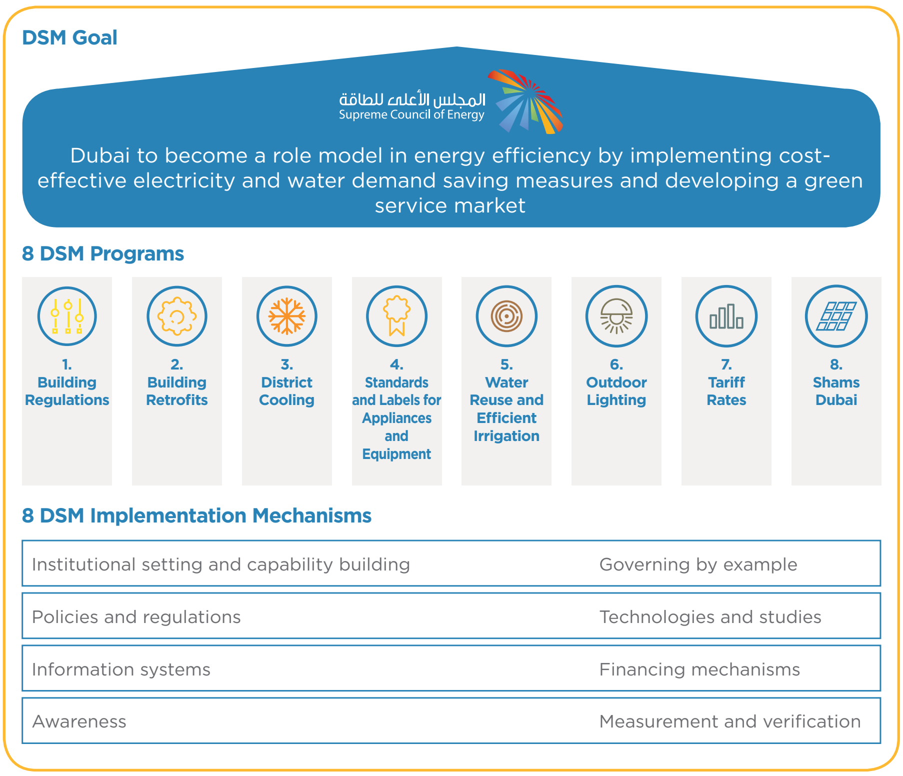


Exhibit 3: Architecture of the DSM Strategy, with its 8 Programs and its 8 Implementation Mechanisms

Context and overview of the DSM Strategy

	Program	Scope
1	Building Regulations	• Implement and periodically update the existing DM **green building code to increase electricity and water savings by double the current DGBR rate** • Introduce a **labelling scheme** for buildings
2	Building Retrofits	• Execute **a retrofitting** program for the existing buildings, targeting the main consumption drivers: cooling, lighting, water, industrial processes, building envelope, etc. • **Ambition to retrofit about 30,000 buildings by 2030** • Start from government buildings, followed by commercial and residential buildings
3	District Cooling	• **Increase penetration of district cooling (DC) from 16%** of refrigeration capacity in 2011 **to 40%** in 2030 by regulating the district cooling industry
4	Standards and Labels for Appliances and Equipment	• Introduce minimum energy efficiency standards and **a star rating system** for appliances and equipment • Categories include: air conditioners, large home appliances (e.g. refrigerators, washing machines), water heaters, electronics, electric motors and water fixtures
5	Water Reuse and Efficient Irrigation	• **Reduce use of desalinated water for irrigation** by promoting **efficient landscaping** practices and irrigation technologies and **maximizing the use of TSE** (100% of public areas irrigated by TSE)
6	Outdoor Lighting	• Use more efficient lighting fixtures **(retrofitting 75% of existing street lights)** and expand the **switch-off** initiative to **100% of residential areas**
7	Tariff Rates	• Review tariff rates to promote energy conservation and economic efficiency of consumption decisions
8	Shams Dubai	• Encourage households, building owners and commercial and industrial institutions to **install PV systems to generate electricity,** and connect them to DEWA's grid to allow transfer of surplus generation

Exhibit 4: Scope of the DSM Programs

Context and overview of the DSM Strategy

The deployment of the Programs is supported by a series of enablers and implementation mechanisms, including institutional setting and capability building, awareness, measurement and verification, policy and regulation, and financing.

A key mechanism that has been broadly adopted in the Strategy is the principle of "governing by example", whereby the government places the first steps in new initiatives, building success cases and developing an initial market, which the private sector can then leverage in subsequent phases. Remarkable examples of this approach are the initial test of the Dubai Green Building Regulations (mandatory for government entities only in the initial years), the implementation of the the Building Retrofits Program (supported by a DSCE Directive for government entities), and the implementation of Green Procurement (supported by specific Guidelines issued by DSCE, and currently in pilot phase within DSCE Member entities).

The government of Dubai is committed to achieving ambitious electricity and water consumption savings targets, associated to the implementation of the 8 DSM Programs. At the end of the foreseen journey, in 2030, we expect savings of about 19 TWh of power and 46 BIG of water compared to business as usual. These overarching goals of savings are the sum of individual Program targets as shown in Exhibits 5 & 6.

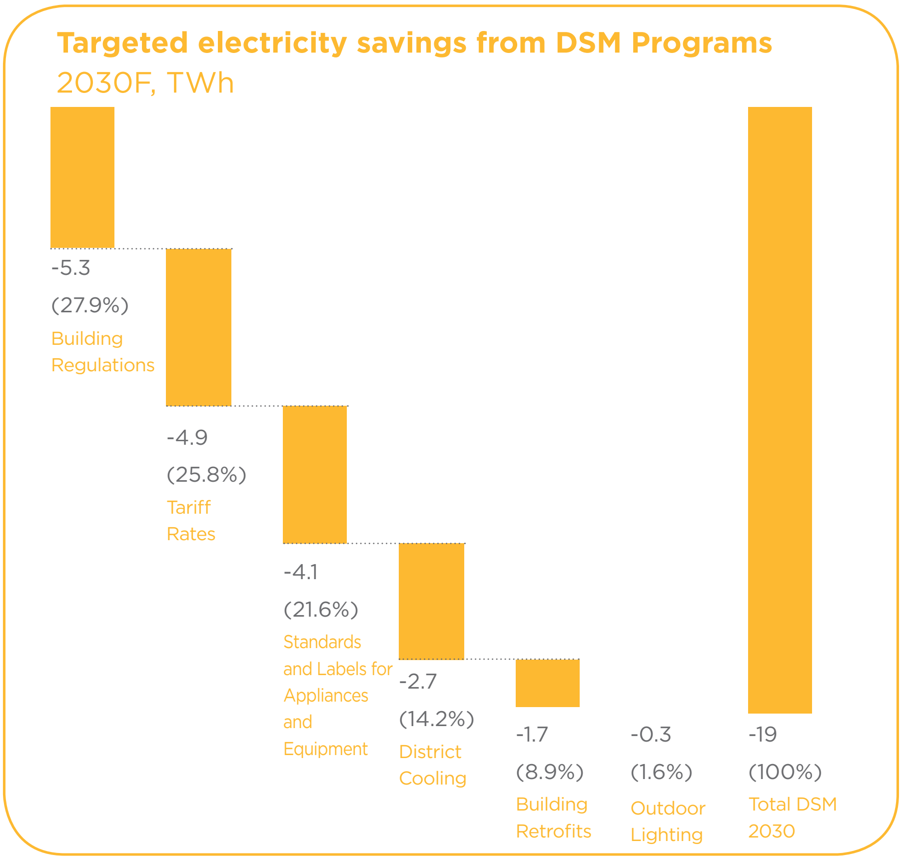


Exhibit 5: 2030 DSM targets for electricity consumption

Context and overview of the DSM Strategy

“We are in the ramp-up phase of the DSM Strategy, when Programs are expected to scale up rapidly”

Targeted water savings from DSM Programs
2030F, BIG

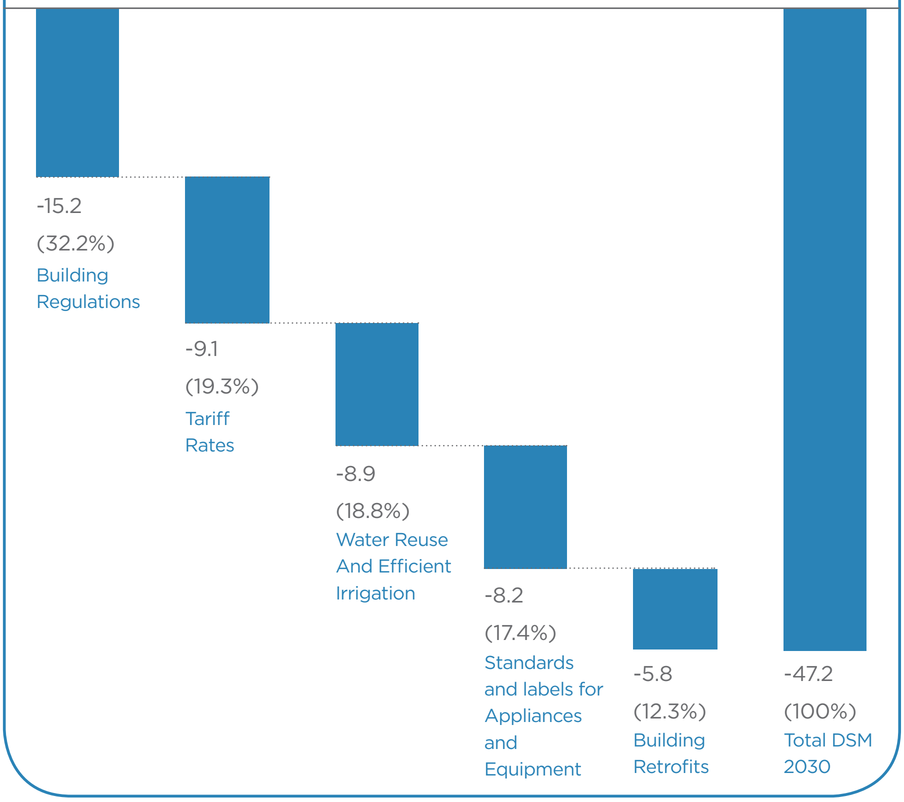


Exhibit 6: 2030 DSM targets for water consumption

A well-defined roadmap, agreed upon by Program Owners and DSCE through a specific DSM Policy document, provides guidance for the long journey through 2030. The preparatory and initiation phases of DSM implementation have been completed, leading to an established institutional set-up, agreed goals and roadmap, and activation of all Programs.

We are now in the ramp-up phase of implementation, when initial activities need to be rapidly scaled up, emerging capabilities need to be consolidated, pilot projects need to progressively move into larger scale roll-out, and programs need to start delivering substantial savings. In this phase, significant contribution is still expected from the government in leading by example, pioneering implementation, showcasing success stories and favoring development of an energy efficiency market. However, increasing participation from the private sector is also expected in the coming years. We expect, at the end of the ramp-up phase, in 2020, savings of up to 8-10% vs. business as usual.

The last 10 years of the Strategy, between 2020 and 2030, foresee a second wave of DSM measures, raising the bar for some key DSM Programs, and increasing

Context and overview of the DSM Strategy

penetration of measures affecting a large portion of Dubai government and private sector.

A plan of such duration needs to be subject to degrees of flexibility, not on the level of ambition, but on the ways (measures, technology choices, speed) in which savings are captured. As new technologies and best practices around the world continue to emerge, and Dubai growth patterns evolve, the DSM Strategy will undergo periodic revisions, to fit a changing context.

"A DSM Policy document commits stakeholders to pursue specific objectives of the DSM Strategy"

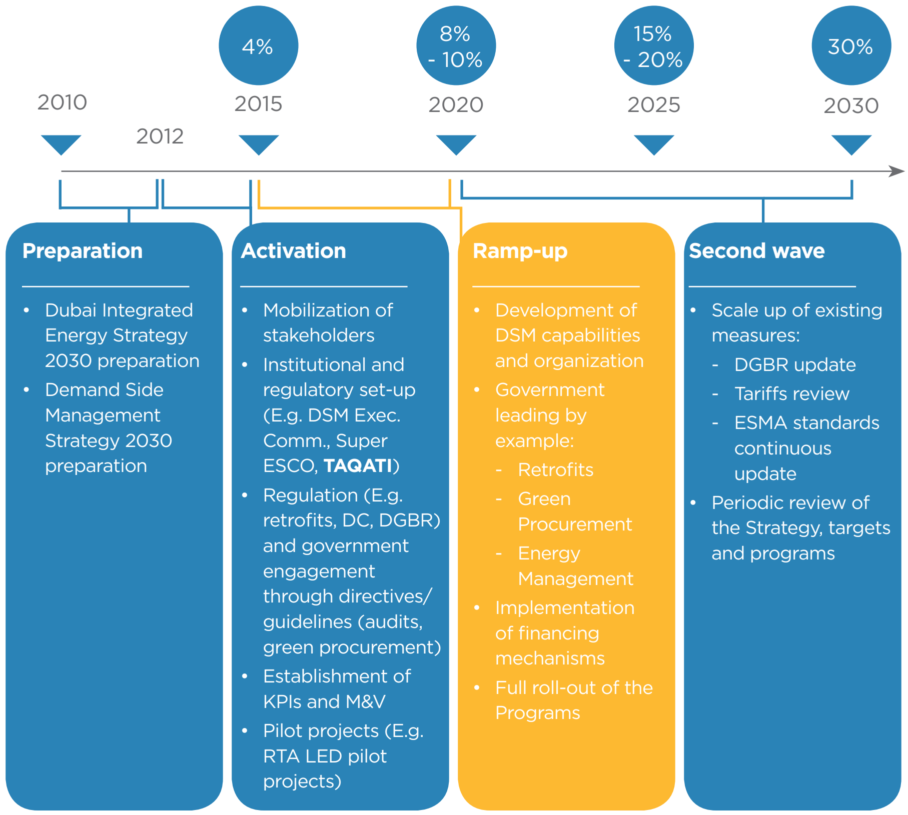


Exhibit 7: DSM roadmap through 2030

Context and overview of the DSM Strategy

“The Strategy is supervised by DSCE and coordinated through a dedicated DSM Executive Committee”

3.3 INSTITUTIONAL FRAMEWORK

Implementation of the DSM Strategy is supervised by the Dubai Supreme Council of Energy (DSCE). The DSCE, chaired by H.H. Sheikh Ahmed bin Saeed Al Maktoum, comprises top executives from key Dubai government institutions, including DEWA, RTA, DM, EGA, ENOC, DUSUP, DPA, DNEC and DPE, and governs broad aspects of energy supply and demand in Dubai.

Each DSM program has its respective government entity responsible for execution (Program Owner), selected on the basis of its mandate and strengths, focused on delivering results and on addressing challenges specific to the Program it owns.

A DSM Executive Committee, chaired by DSCE and comprising senior representatives from all Program Owners, has been established to ensure coordination and support to the DSM Strategy. On the date of publication of this report, Members of the DSM Executive Committee are:

- **H.E. Ahmad Al Muhairbi** (Secretary General, DSCE) – Chairman
- **Yousef Jebril** (EVP Power & Water planning, DEWA) – Vice-Chairman
- **Faisal Rashid** (DSM Director, DSCE) – Secretary
- **Ali Al Jassim** (CEO, Etihad Energy Services) – Member
- **Aref Abou Zahr** (Executive Director, TAQATI)
- **Dawoud AbdulRahman AlHajri** (ADG Engineering & Planning, Dubai Municipality) - Member
- **Graeme Sims** (Executive Director, RSB) – Member
- **Mohammed Al Shamsi** (Sr. Manager Climate Change and Sustainability, DEWA) – Member
- **Nabil Battal** (Director, Global Safety & Environment, DP World) – Member
- **Mustafa Al Yousuf** (Board Member, RSB) - Member
- **Nazim Faisal Saeed** (Director, Roads and Facilities Maintenance Department, RTA) - Member
- **Samer Khoudeir** (Chief Sales & Marketing Officer, Empower) - Member
- **Shamma Al Rahmah** (Manager, Business Planning & Performance Management, ENOC) – Member
- **Taher Diab** (Sr. Director, Strategy & Planning, DSCE)

Context and overview of the DSM Strategy

Exhibit 8: One of the DSM Executive Committee meetings

A dedicated office, TAQATI, established in May 2016 within Etihad Energy Services, is supporting stakeholders in planning and managing their relevant DSM Programs, monitoring and verifying performance as well as delivering specific cross-program enablers in the fields of awareness, capacity building, and financing.

Context and overview of the DSM Strategy

“TAQATI is a dedicated office to support DSM Stakeholders along their implementation journey”

Supervision

DSCE Board — المجلس الأعلى للطاقة Supreme Council of Energy

Direction

DSM Executive Committee

Support

DSCE DSM Directorate — المجلس الأعلى للطاقة Supreme Council of Energy

Management

DSM Manager — طاقتي TAQATI

Implementation

DSM Program Implementation Teams

	DSM Programs	Program Owners
1	Building Regulations	DM
2	Building Retrofits	Etihad ES
3	District Cooling (DC)	Etihad ES & RSB
4	Standards and Labels for Appliances and Equipment	ESMA
5	Water Reuse And Efficient Irrigation	DM
6	Outdoor Lighting	RTA | DM
7	Tariff Rates	DEWA
8	Shams Dubai	DEWA & Etihad ES

Exhibit 9: Governance structure for the DSM Strategy

Context and overview of the DSM Strategy

TAQATI, A DEDICATED OFFICE TO SUPPORT THE IMPLEMENTATION OF THE DSM STRATEGY

TAQATI - DSM Program Management Office

Aref Abou Zahr, TAQATI Executive Director

TAQATI is committed to collaboratively support the DSM Program owners to turn strategy into reality and achieve Dubai ambitious targets for energy savings. TAQATI supports the Program Owners to develop their operational plans, with clear KPIs that correspond to the DSM Strategy annual targets, identify associated intrinsic and extrinsic risks and corresponding mitigation measures through collaboration, innovation, industry-insight, market driven approach, and consistent awareness development and capacity building.

Since our official launch on May 31st 2016, we have ramped out our operations significantly fast to cover all the Programs across our 6 enabling workstream (Exhibit 11).

With a lean team of 5 people in 2016 bringing management and industry expertise, we have managed to cover the broad requirements of the DSM Programs and their challenges in depth and accuracy.

Looking ahead, the leadership at DSCE and Etihad share the vision of TAQATI driving the Integrated Awareness Strategy 2022, rolling out a comprehensive Energy Efficiency Capacity Building Program, and further supporting the DSM Program Owners in implementing and achieving the DSM targets as set by the DSM Strategy through close collaboration, analytical thinking and consistent dedication to maintain the same performance levels that we have shown in 2016.

Context and overview of the DSM Strategy

TAQATI VISION

Be the driving mentor of electricity and water efficiency strategies to make Dubai one of the most sustainable cities in the world

TAQATI MISSION

Identify and lead the implementation of result-driven electricity and water efficiency strategies, to achieve Dubai's sustainability goals

ENABLERS

Exhibit 10: Enablers to facilitate TAQATI's mission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4

DSM Strategy achievements in 2016

DSM Strategy achievements in 2016

“2016 showed a strong increase in activity, with the commissioning of 3,982 green buildings and the retrofit of 1,898 buildings”

4.1 KEY DEVELOPMENTS OF THE YEAR

2016 was an important year for the development of the Programs, some of which saw a substantial increase in activity. Clear examples of this trend are the Green Building Regulations, with the commissioning of 3,982 new buildings compliant to green building codes, representing over 50% of the total green GFA commissioned so far, and the Building Retrofits Program, with 1,898 new buildings retrofitted, representing over 90% of the retrofits accounted for since inception of the DSM Strategy.

In addition to the continuous expansion of the Programs, over the course of 2016 the DSM Strategy saw significant progress on multiple dimensions, including institutional set-up, regulation, capacity building and awareness. Some of the most remarkable achievements include:

- **The launch of TAQATI,** a dedicated office providing coordination and support to Program Owners in implementing the DSM Strategy. Positioned within Etihad Energy Services, and reporting to the Dubai Supreme Council of Energy, TAQATI reinforces the institutional set-up of the DSM Strategy with a dedicatedly permanent and flexible PMO establishment more permanent and flexible establishment.

Exhibit 11: H.H. Sheikh Ahmed bin Saeed Al Maktoum, Chairman of the Dubai Supreme Council of Energy and HE Saeed Mohammed Al Tayer, Vice Chairman of the Dubai Supreme Council of Energy, celebrating the launch of TAQATI, Dubai Energy Efficiency Program in Dubai on May 31, 2016. The ceremony was attended by HE Dr Thani Ahmed Al Zeyoudi, Minister of Climate Change and Environment, HE Mattar Al Tayer, Director General and Chairman of the Board of Executive Directors of the Roads and Transport Authority, HE Hussein Lootah, Director General of Dubai Municipality, HE Ahmad Buti Al Muhairbi, Secretary General of the Dubai Supreme Council of Energy, HE Mohammed Abdulla Ahli, Director General of Dubai Civil Aviation Authority (DCAA), HE Abdullah Abdul Qader Yousef Al Maeeni, Director General of the Emirates Authority for Standardisation and Metrology (ESMA), HE Ali bin Abdullah Al Owais, Chairman of the Regulatory and Supervisory Bureau (RSB) for electricity and water in Dubai, HE Saif Humaid Al Falasi, CEO of the Emirates National Oil Company (ENOC), and other senior directors and officials from public and private organisations

DSM Strategy achievements in 2016

Exhibit 12: HE Saeed Mohammed Al Tayer, Vice Chairman of the Dubai Supreme Council of Energy

- The launch of Etihad Solar, a business unit within Etihad Energy Services with the objective of developing the market for Solar Rooftop, complementing the regulatory effort of DEWA in the field.

The initial business development activities have been addressing the government sector, with a growing pipeline of projects and some first notable developments, including the solar rooftop project in Hatta for 640 villas.

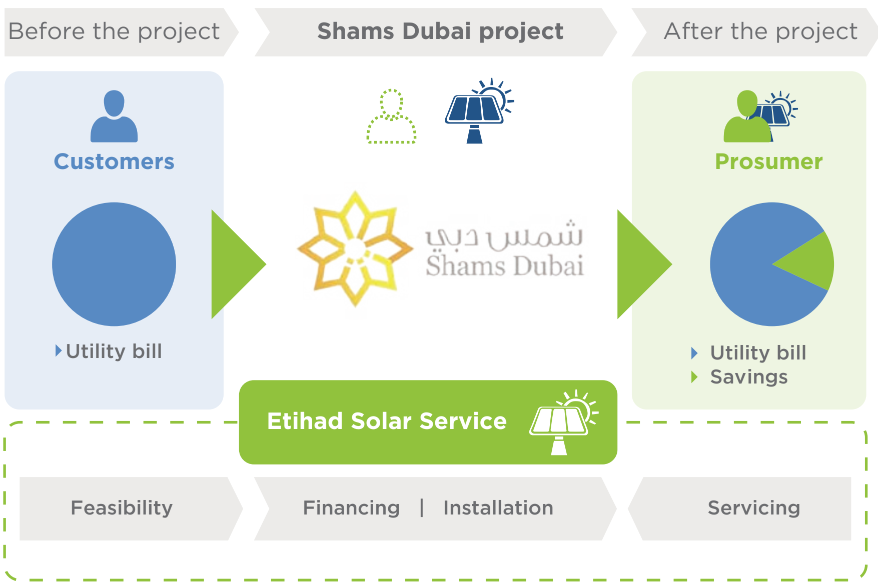


Exhibit 13: Etihad Solar services in support to the Shams Dubai Program

DSM Strategy achievements in 2016

- The development of Al Sa’fat by Dubai Municipality as an evolution of Dubai Green Building Regulations. In addition to providing minimum green requirements, the new scheme will operate as a building rating system, bringing market recognition and therefore incentivizing developments which go beyond minimum requirements from a sustainability point of view.

Exhibit 14: Draft of Al Sa’fat (version 1.0), the green building evaluation system marking the next stage of evolution of Dubai Green Building Regulations

- The completion of JAFZA retrofit project, the largest guaranteed energy savings project in the Middle East so far with an investment value of AED 64 million. Fully financed by National Bonds Corporation using a Shari’a compliant structure, replacing ACs, lights and water fixtures. Over 6 years, guaranteed savings will reach 158 GWh (28% savings) of Electricity, 1.2 billion IG (36% savings) of Water equivalent to AED 132m (31% savings). This important project provided market awareness and trust in the functioning mechanisms of the energy performance contracting. As a result, a strong pipeline of retrofit projects is taking shape, including for example the retrofit of over 240 buildings for Al Wasl Properties, and the retrofit of over 600 mosques for the Islamic Affairs and Charitable Activities Department.

DSM Strategy achievements in 2016

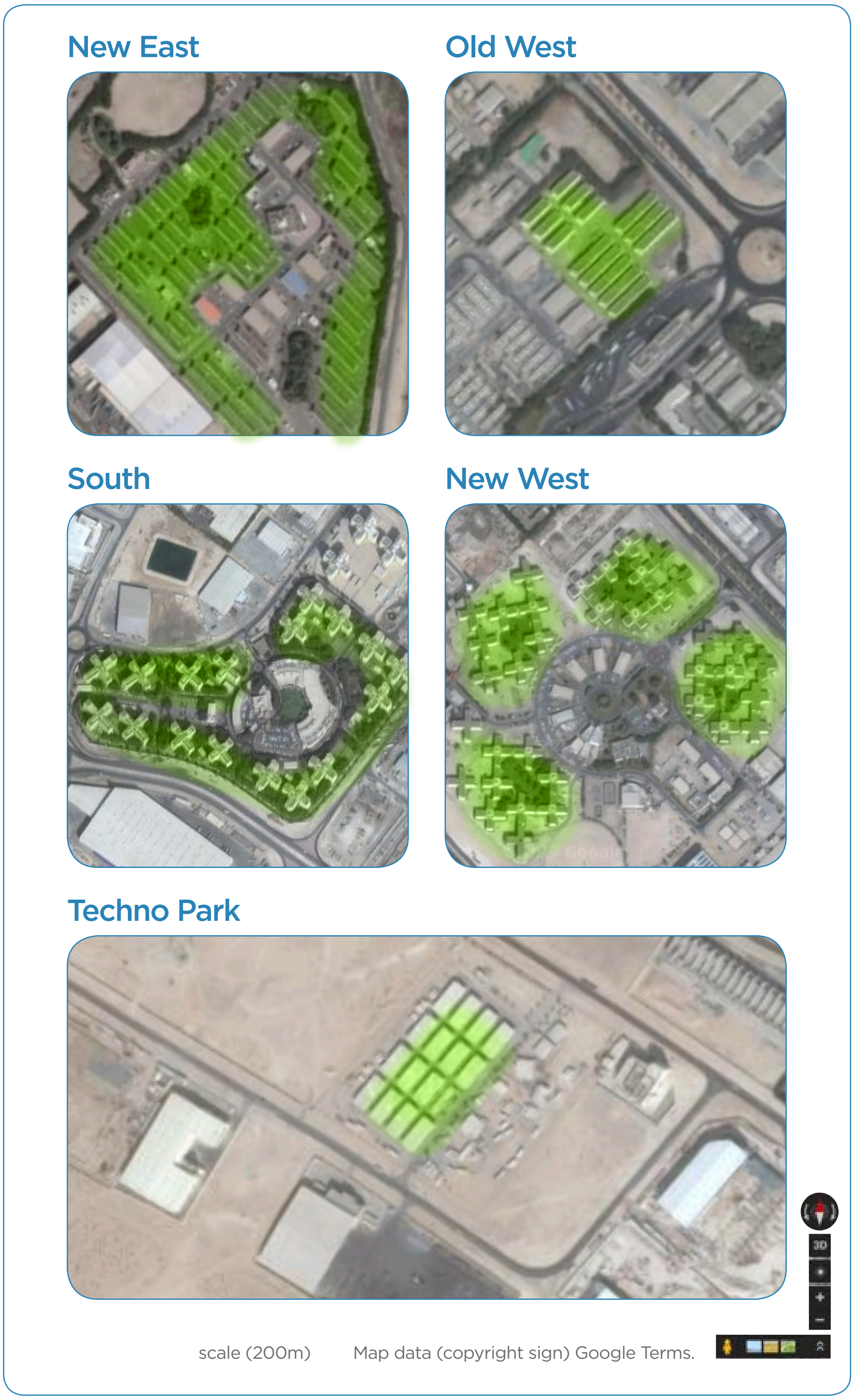


Exhibit 15: Aerial view of selected buildings affected by the JAFZA retrofit project in 2016

DSM Strategy achievements in 2016

Exhibit 16: Ali Al Jassim, CEO, Etihad ES, Faisal Ali Rashid, DSM Director, DSCE, Christos Mimikopoulos, Executive Director, Etihad Solar, Fatma Hussain, Senior Manager, CSR, JAFZA, and Mosaad Taher, Chief Engineer, Dubai Airports attending the Energy Users workshop on December 13, 2016. The workshop involved the most important government entities in Dubai, discussing progress in implementation of the DSCE Directive No.1, 2015, "Energy and Water Audits for Government Entities in Dubai"

- The appearance of important **retrofit projects in the field of District Cooling.** The connection by Empower of several landmark developments, including among others Burj Al Arab, Jumeirah Beach Hotel and Emirates Towers, poses great expectations on the opportunities of district cooling retrofits. In a context of excess capacity of existing plants and decreasing cooling density of new developments, district cooling retrofits are expected to undergo a period of increasing importance.

Exhibit 17: Burj Al Arab and Jumeirah Beach Hotel are now connected to District Cooling

DSM Strategy achievements in 2016

- The launch of a major **Green Public Procurement** (GPP) initiative within the Dubai Government. Following the issuance of Guidelines for Green Public Procurement by the Dubai Supreme Council of Energy in 2015, a GPP Committee was nominated, comprising green procurement officers of DSCE member entities, and new common criteria for GPP were issued, while numerous other initiatives are ongoing in the field of awareness and capacity building. The initiative will undergo significant expansion in the coming years, with new product categories being addressed and new entities participating in the implementation.

Exhibit 18: HE Ahmad Al Muhairbi and Members of the Green Procurement Committee attending the launch event of common criteria for Green Public Procurement, issued in November 2016 for a testing phase

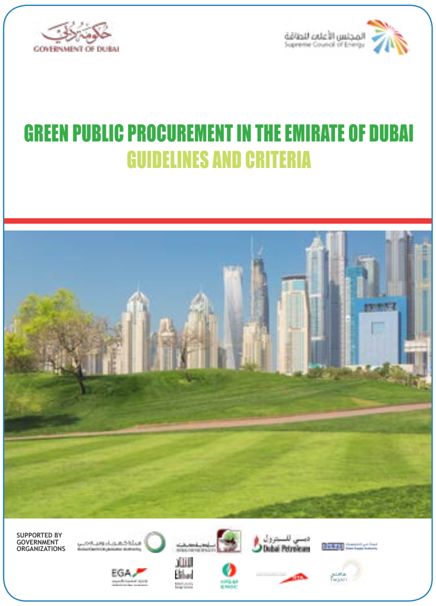


Exhibit 19: The Common Criteria for Green Public Procurement developed by DSCE Member Entities, following the DSCE Guidelines for Implementation of Green Public Procurement in the Dubai Emirate

DSM Strategy achievements in 2016

- The launch of a common effort in the field of DSM awareness, marked by the activation of an **Integrated Outreach and Awareness Committee (IOAC)** comprising nominated champions from DSM Program Owner entities. The newly established committee is expected to assess awareness priorities and lead participating entities to define more synergistic outreach plans in support to the DSM Programs.

Exhibit 20: Meeting of the Integrated Outreach and Awareness Committee

- The expansion and enhancement of ESMA standards for appliances and equipment, addressing new product categories and increasing requirements for key energy consuming equipment.

In particular, preparatory work has been done for the enhancement of requirements for unit ACs, from which a higher contribution to energy savings is expected in the coming years.

Exhibit 21: Illustrative example of a label issued by ESMA for dish-washers, incorporating electricity and water consumption performance in one combined rating

DSM Strategy achievements in 2016

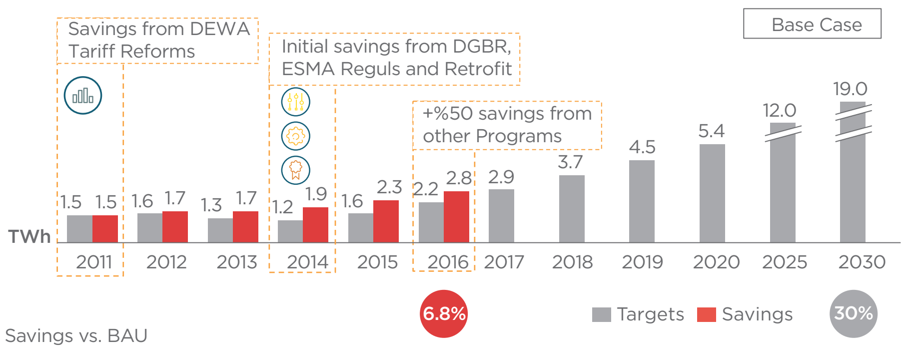
4.2 OVERALL PERFORMANCE TO DATE

2016 has been a positive year in terms of DSM performance. Electricity savings at the end of 2016 stand at 2.8 TWh, marking a 26% surplus vs. the 2.2 TWh target of the year. Water savings stand at 3.7 BIG, with a 29% surplus vs. the 2.9 BIG target. When compared to business as usual, which is the reference for our 30% targets by 2030, those consumption savings represent about 6.8% and 3.4% of total baseline consumption for electricity and water respectively.

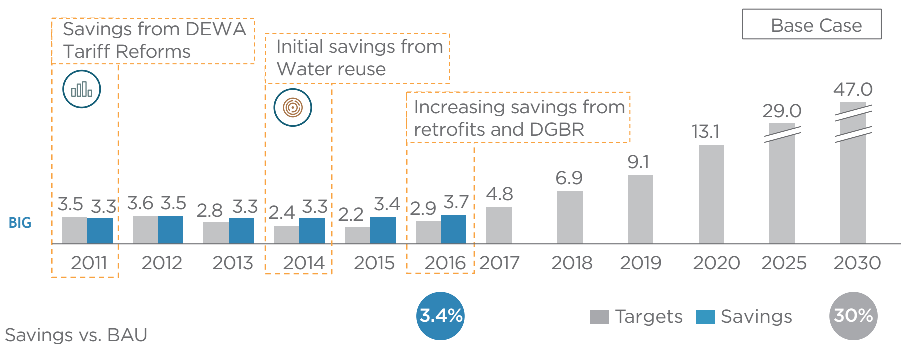
Consumption savings from the DSM Programs moderate business as usual consumption, which is undergoing an increase trend due to a variety of factors including the sustained growth in economic activity and wealth, the initiation of large scale development projects, climate change, and limited consumer awareness.

"In 2016, the DSM Strategy saved 2.8 TWh of electricity and 3.7 BIG of water, exceeding the assigned targets"

Electricity savings and contribution of DSM Programs
(TWh, 2011 to '16 actual, 2017 to '30 target)



Water savings and contribution of DSM Programs
(BIG, 2011 to '16 actual, 2017 to '30 target)



Source: DSM Program Owners, TAQATI analysis

Exhibit 22: Achieved DSM savings vs. targets in 2016

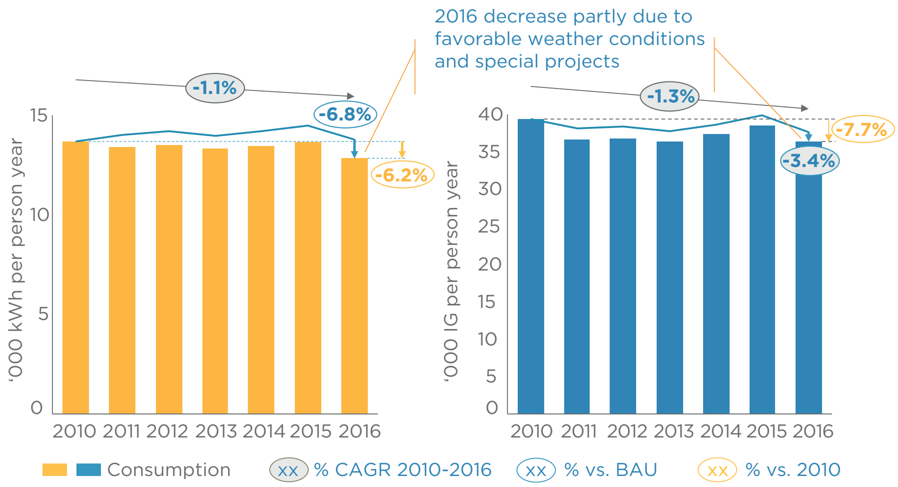
DSM Strategy achievements in 2016

An encouraging signal from the year 2016 has been a significant, 5.9% drop vs. 2015 of per capita consumption of electricity. While part of the decrease has to be attributed to the impact of special circumstances, like some development projects and favorable weather conditions in the first half of the year (notably a ~4% reduction in cooling degree days on a yearly basis, and higher rainfall), the result confirms the positive impact of DSM on unitary consumption. Similar positive results are visible in per capita consumption of water, with a 5.6% decrease vs. previous year. Looking at long term trends of the DSM Strategy since inception, we record an average of over 1% decrease in per capita consumption of both electricity and water, which is in line with other important, successful programs around the world.

"Consumption per capita has shown initial positive signals, partly as a result of the DSM savings"

Overall consumption per person – Electricity
('000 kWh, 2010-2016 Actual)

Overall consumption per person – Water
('000 IG, 2010-2016 Actual)



Note: Population figures used for the calculation represent an estimate of the "equivalent permanent population" of Dubai, considering Dubai residents and weighted contribution from tourists and non-resident workers.

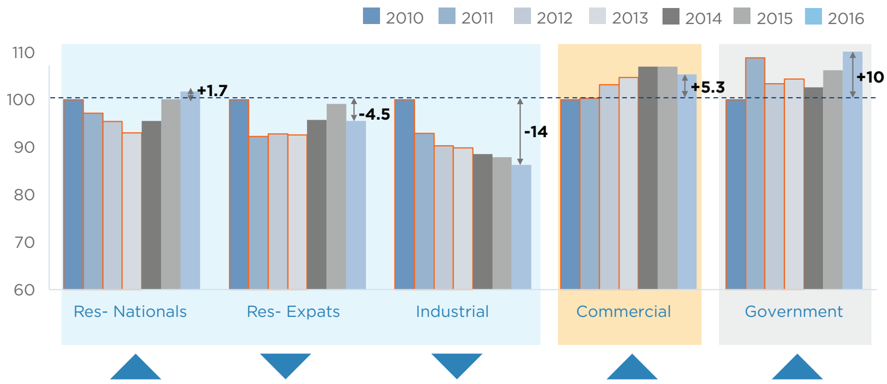
Source: DEWA, TAQATI analysis

Exhibit 23: Trends in consumption per capita (show CAGR since 2010 and past year decrease rate)

Such trends in per capita consumption are better understood when looking at the different consumer sectors. The only sector showing substantial and continuous improvement in electricity consumption per account over the long run is the industrial sector. The residential sector shows mixed trends, with improvements in water consumption for UAE nationals, and improvements in electricity consumption for expats. The commercial sector has shown an overall increase in consumption per account since inception of the DSM Strategy, at least partly justified by the increase in economic activity, with some positive signs in the past two years. The government sector, despite initial measures being undertaken, keeps showing an increasing unitary consumption.

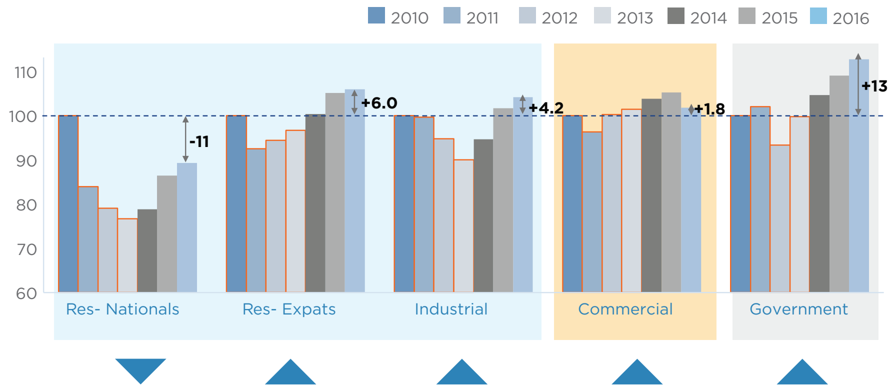
DSM Strategy achievements in 2016

Electricity consumption per account
(MWh, 2010-2016 Actual)



Indexed kWh per account (2010 = 100%)

Water consumption per account
('000 IG, 2010-2016 Actual)



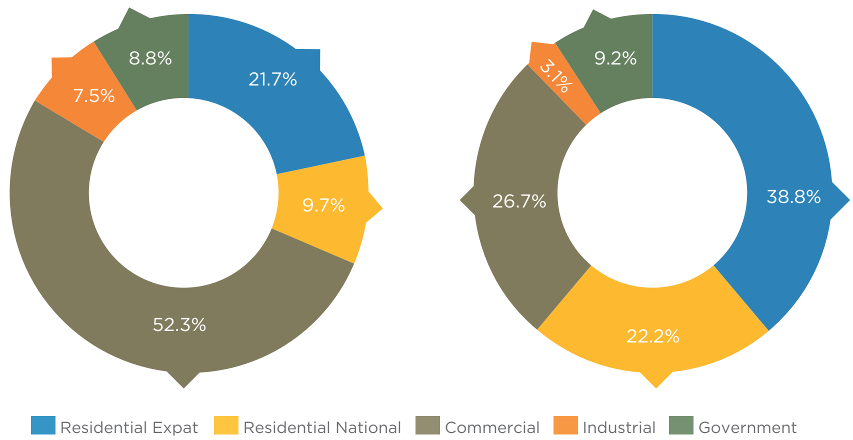
Indexed IG per account (2010 = 100%)

Source: DEWA, TAQATI analysis

Exhibit 24: Unitary consumption trends by customer sector for electricity and water (2010-2016)

Share of consumption by sector – Electricity (2016)

Share of consumption by sector – Water (2016)



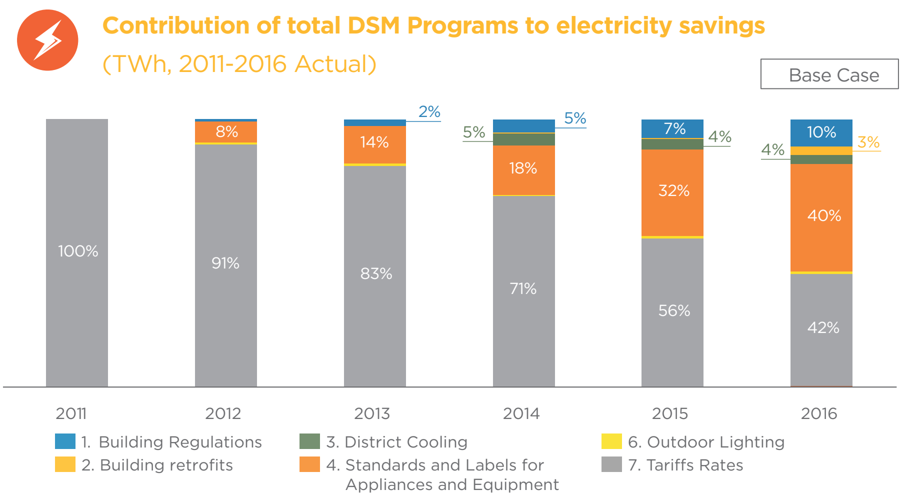
Source: DEWA

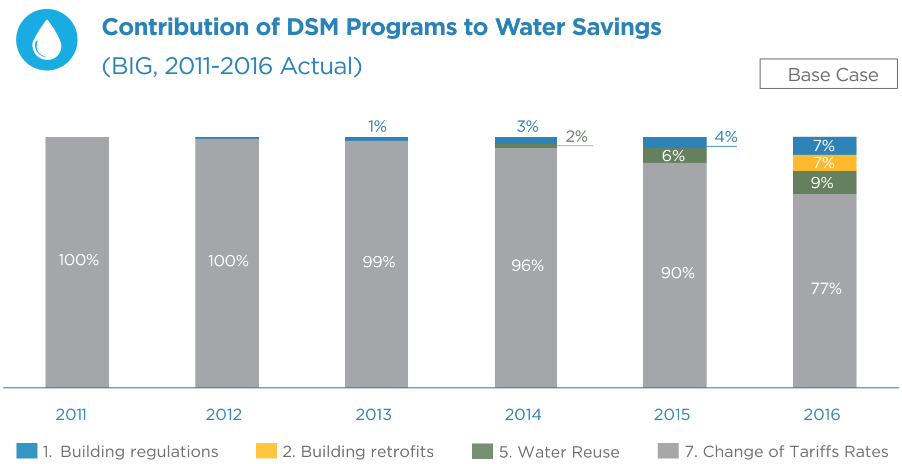
Exhibit 25: Share of 2016 consumption by customer sector, for electricity and water

DSM Strategy achievements in 2016

Going back to the results of the DSM Strategy, a remarkable fact is the contribution of all the Programs to the overall achievement, which makes the current level of savings increasingly robust.

The impact of the tariff review applied in 2011 by DEWA is still significant, but its share of the overall DSM savings has been decreasing, due to a natural reduction of the effects of price signaling over the long run, and due to more substantial savings brought by other Programs such as, for electricity savings, the Standards and Labels for Appliances and Equipment from ESMA, the green building regulations from DM and free zones, the District Cooling Program and the Building Retrofits Program. Other programs, which inherently target a lower consumption base, such as Outdoor Lighting from RTA and DM, though they are not yet contributing significantly to the consolidated results, they are contributing to the DSM Strategy through increasing visibility and general public awareness of the DSM initiatives. Although at a slower pace, the same trend is observed for water savings.





Source: DSM Program Owners, TAQATI analysis

Exhibit 26: Share of total DSM electricity and water savings by Program (2011-2016)

BASE CASE

		DSM Program	2015 Savings GWh	2016 Savings GWh	2016 Target GWh	Delta YoY (%)	Dev. vs. target (%)	Comments
	1	**Building regulations**	156	284	(2017)	+83%	+	Savings from DM and Trakhees codes on 4,639 commissioned buildings
	2	**Building retrofits**	12	88	31	+621%	+182%	Increase of savings YoY primarily due to new government projects.
	3	**District Cooling**	95	92	(2017)	%-3	+	Savings from district cooling efficiency gains based on data from 4 out of 5 operators only
	4	**Standards and Labels for Appliances and Equipment**	752	1,126	1,139	+50%	~	Savings from standards for unit AC, indoor lighting, refrigerators, washing machines
	5	**Water Reuse and Efficient Irrigation**	n/a	n/a	n/a	n/a	n/a	No electricity savings expected from this Program
	6	**Outdoor Lighting**	14	20	15	+40%	+34%	90% of the savings from switch-off programs
	7	**Tariff Rates**	1,293	1,188	1,042	%-8	+14%	Effect of 2011 tariff review, gradually decreasing over time
	8	**Shams Dubai**	0.3	8.5	n/a	+2300%	n/a	Generation in 2016 from initial projects with installed capacity of 7.3 MW
Grand Total			**2,322**	**2,807**	**2,228**	**+21%**	**+26%**	
Total as % of baseline			**5.9%**	**6.8%**	**5.5%**			

Source: DSM Program Owners, TAQATI analysis

Exhibit 27: Electricity savings by DSM Program in 2016

BASE CASE

		DSM Program	2015 Savings MIG	2016 Savings MIG	2016 Target MIG	Delta YoY (%)	Dev. vs. target (%)	Comments
	1	**Building regulations**	144	259	(2017)	+80%	+	Savings from DM and Trakhees codes on 4,639 commissioned buildings
	2	**Building retrofits**	2.5	246	109	+9800%	+126%	Increase of savings YoY primarily due to new government projects
	3	**District Cooling**	n/a	n/a	n/a	n/a	n/a	No water savings expected from this Program
	4	**Standards and Labels for Appliances and Equipment**	n/a	n/a	457	n/a	-	Ongoing updates in regulation are expected to address the gap in savings vs. targets
	5	**Water Reuse and Efficient Irrigation**	196	346	138	+76%	+150%	Initial savings from new irrigation standards and quantity/time optimization
	6	**Outdoor Lighting**	n/a	n/a	n/a	n/a	n/a	No water savings expected from this Program
	7	**Tariff Rates**	3,103	2,886	2,194	%-7	+32%	Effect of 2011 tariff review, gradually decreasing over time
	8	**Shams Dubai**	n/a	n/a	n/a	n/a	n/a	No water savings expected from this Program
Grand Total			**3,446**	**3,736**	**2,899**	**%+8**	**+29%**	
Total as % of baseline			**3.3%**	**3.4%**	**2.7%**			

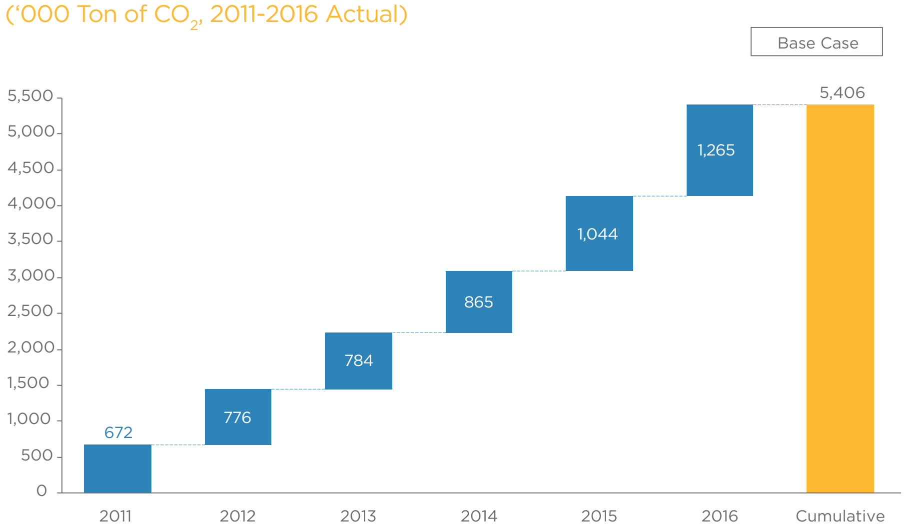
Source: DSM Program Owners, TAQATI analysis

Exhibit 28: Water savings by DSM Program in 2016

DSM Strategy achievements in 2016

An important impact of electricity and water savings is the lower CO_2 emissions resulting from avoided generation, which today relies in large part on non-renewable sources. Since its inception until the end of 2016 the DSM Strategy has abated CO_2 emissions by over 5.4 Mn Tons.

Avoided CO_2 emissions due to the DSM Strategy
('000 Ton of CO_2, 2011-2016 Actual)



Source: DSM Program Owners, TAQATI analysis

Exhibit 29: Cumulative CO_2 emission abatement from the DSM Programs (2011-2016)

"Since its inception, the DSM Strategy has resulted in 5.4 Mn Tons of CO2 emission abatement"

Behavioral change has been a clear area of focus for DSM Stakeholders in 2016, with significant preparatory work. The newly established Integrated Outreach and Awareness Committee will define more targeted awareness and communication initiatives, covering the identified gaps, while more training opportunities will be made available to Program participants in the field of energy efficiency. Changes in behavior are expected not only in terms of end-consumption patterns, but also across the key consumer choices which affect consumption, such as product and technology selection, system design and operations. For example, the application of the defined common criteria of Green Public Procurement will bring advantages not only in the efficiency of equipment that is purchased, but also in the design of more efficient and balanced system requirements (e.g., lighting capacity, AC capacity, etc.) and in the operations and maintenance phases. The impact of behavioral change initiatives is expected to be more clearly visible in the coming years, as it starts being subject to more specific monitoring and reporting.

DSM Strategy achievements in 2016

4.3 SENSITIVITY ANALYSIS AROUND ESTIMATED PERFORMANCE

The estimated yearly performance has been tested against degrees of uncertainty in key parameters used for the estimation of savings, resulting in different scenarios around our base estimate within which the actual savings from the DSM Strategy are expected to lie. The conservative case represents a minimum level of savings, obtained after discounting all sources of uncertainty. Such a scenario is significant to inform the most risk averse or capital intensive decisions associated to implementation of the DSM Strategy as a whole, such as supply side or other infrastructure developments for which service security and continuity are paramount. The optimistic case on the contrary is meant to recognize that some performance parameters of the Programs may actually be outperformed, as a result of either more efficient developments than initially foreseen or higher levels of activity than reported. Such a scenario is meant to provide a fair range to compare results of the DSM Strategy with other benchmarks at a national and international levels. Overall, we can conclude that at the end of 2016, the DSM Strategy is delivering between 4.3% and 7.8% of electricity savings and between 1.8% and 3.5% of water savings vs. business as usual.

DSM Strategy achievements in 2016

4.4 OPERATIONAL DASHBOARD

In addition to monitoring electricity and water savings, a series of key performance indicators is being tracked and reported for each Program. The indicators are relevant to interpret results, identify any obstacles, and understand progress of activities which will deliver savings in the coming years.

DSM Programs – Operational KPIs, 2016 YE
(% and GWh, Actual 2016)

	Program	Operational KPIs	2014YE	2015YE	2016YE	Issues and mitigation actions
1	**Building regulations**	No. of DGBR buildings commissioned under DM (cum.)	20	185	3,824	• Some Free Zones do not yet apply a green building code with similar standards as DM: consultation is ongoing, aiming at more complete adoption • Savings assumptions from implementation of green building codes need to be further validated to better support any future updates: a project is planned to articulate and verify assumptions
		No. of Green buildings commissioned under Trakhees (cum.)	325	472	815	
		No. of DGBR permits issued (buildings)	1,600	10,600	11,888	
		Penetration (% total GFA) in commissioned buildings (DM)	>0%	6.3%	30%	
		Penetration (% total GFA) in permitted buildings (DM)	18%	74%	91%	
		Avg. % savings vs. baseline	20%	20%	20%	
2	**Building retrofits**	No. of retrofitted buildings (cum.)	36	70	1,968	• 2016 has seen a significant increase of activities, both in projects performed through Etihad ES and in those executed by private ESCOs • Financing solutions need to be identified, in particular for retrofits in the private and residential sectors
		No. of equiv. retrofitted buildings (cum.)	79	217	1,563	
		Avg. % savings vs. baseline (cum.)	~12%	~27%	~25%	
		No. of accredited ESCOs	9	14	21	
		No. of accredited Auditors		5	13	
3	**District Cooling**	DC penetration	~18%	N/A	N/A	• DC penetration is not assessed, in absence of data from one of the five main DC operators • While DC plants are becoming more efficient, adoption of DC needs to accelerate to meet important targets in the coming years: incoming regulation needs to be supported by strong awareness activities
		DC efficiency (kW/TR delivered)	~0.88	~0.88	~0.88	
		DC efficiency vs. air cooled baseline	+37%	+37%	+36%	
		DC capacity utilization (at peak)	N/A	~54%	~50%	

DSM Strategy achievements in 2016

DSM Programs – Operational KPIs, 2016 YE

(% and GWh, Actual 2016)

	Program	Operational KPIs	2014YE	2015YE	2016YE	Issues and mitigation actions
4	**Standards and Labels for Appliances and Equipment**	• Unit AC efficiency impr. vs. baseline • Share of 4 & 5 star ACs • Share of 4 & 5 star refrigerators • Share of 4 & 5 star washing machines	• +27% • 38% • N/A • N/A	• +29% • 45% • N/A • 74%	• +29% • 39% • 17% • 78%	• Adoption of higher classes of appliances (4 and 5 stars) is not increasing significantly and it is still far from best practices: awareness and promotional measures need to be explored
5	**Water Reuse and Efficient Irrigation**	• TSE utilization • Efficient landscaping and irrigation penetration (% of landscaping area affected by DSM measures)	• ~85% • ~5%	• 92% • 7%	• 88% • 8%	• While measures to improve TSE consumption for irrigation are clear, there are challenges in using saved TSE for other applications in lieu of desalinated water • A specific strategy project is ongoing, aiming at identifying solutions
6	**Outdoor Lighting**	• Penetration of LED • Switch-off penetration in internal/residential streets	• ~3% • 100%	• 4% • 100%	• 8% • 100%	• Successful pilot projects are paving the way for LED implementation in new developments • However, a detailed plan is needed for the retrofit of existing street lights
7	**Tariff Rates**	• Elasticity of demand • Elasticity degradation • Number of installed smart meters	• 15-30% • 10-25% • ~100k	• 15-30% • 10-25% • ~200k	• 15-30% • 10-25% • ~550k	• Assumptions on impact of tariff changes need to be further verified after a few years of implementation: a specific study is planned to address the need
8	**Shams Dubai**	• Installed capacity (MW) • Pipeline of new installations (MW)	• N/A • N/A	• 1 • 70	• 7.3 • 100	• The target of having "solar panels on each roof" by 2030 requires a combined set of measures from the regulatory and awareness sides

Exhibit 30: DSM Operational Dashboard for 2016

DSM Strategy achievements in 2016

4.5 MONETIZING DSM SAVINGS

Electricity and water savings translate into economic savings in the form of avoided cost and freeing up resources that can be diverted to other purposes.

The Total Resource Cost (TRC) test measures the net benefits of the DSM Strategy from the perspective of all participants, including DSM Program Owners (including DEWA as both the utility and Program Owner), implementing entities (Developers, ESCOs, District Cooling Operators), and end users (DEWA customers). Taking participants as a whole (i.e. on a consolidated basis), the net benefits are the result of:

a) **Incremental cost brought by the Programs and the Strategy**
   - a1. Incremental technology investments in green buildings, in appliances, in efficient lighting, etc. vs. conventional solutions
   - a2. Incremental operating costs and overhead of the Programs and of the Strategy as a whole

b) **Lower operating costs:**
   - b1. Lower operations and maintenance cost for power and water generation, transmission and distribution including lower fuel (i.e. Natural Gas) consumption
   - b2. Lower maintenance cost for electricity and water consuming equipment, due to less intensive operating regimes (not quantified)

DSM Strategy achievements in 2016

c) **Lower capital investments in generation capacity and new equipment:**

c1. Capital investment avoidance for new generation capacity

c2. Lower replacement and disposal cost of electricity/ water consuming equipment, as less intensive operating regimes usually translate in its extended duration (not quantified)

Based on the TRC analysis, the DSM Strategy has almost passed in 2016 its break-even point. The cumulative savings in opex, which include over 110,000 MMSCFT of natural gas, and those in capex, equivalent to saving two open cycle gas turbine units of 200 MW each, are about to exceed the cumulative incremental costs of the Program, at least in our base case evaluation. This builds a robust foundation for net savings to start accumulating in the coming years. This positive view is confirmed by the assessment of the incremental cost of the Strategy per kWh saved over the lifetime of implemented measures. We estimate today a DSM cost of 6 fils per kWh saved, which is significantly below the cost of energy, confirming the high returns from investments in energy efficiency.

DSM Strategy achievements in 2016

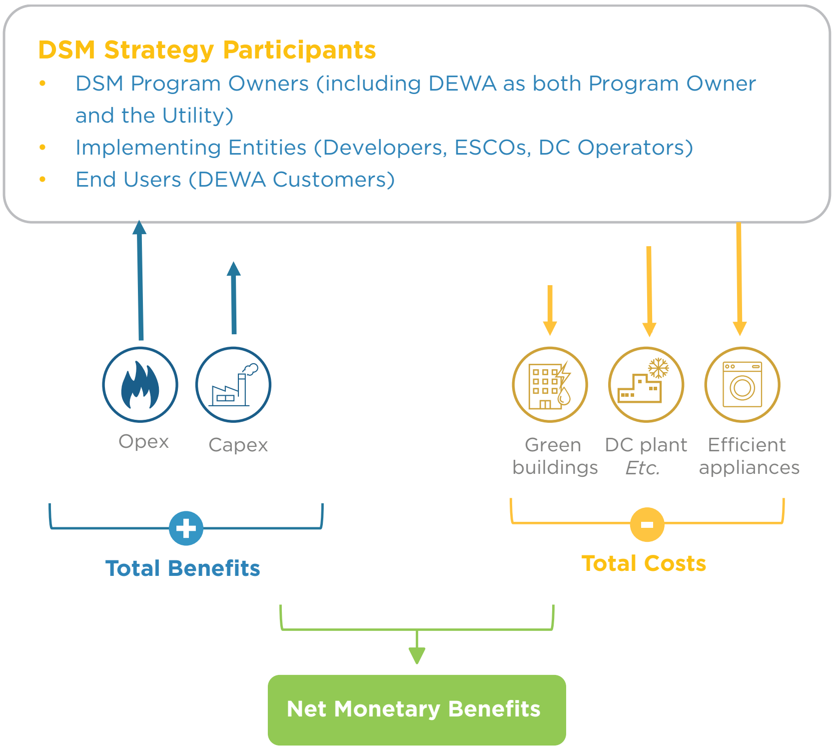
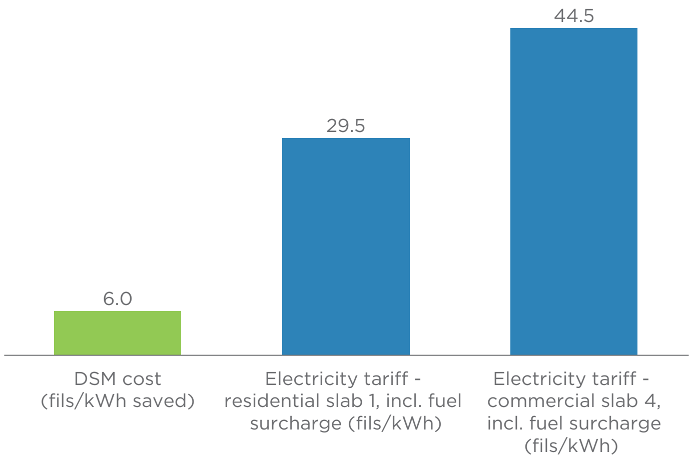


Exhibit 31: Methodology for the assessment of DSM net monetary benefits through the Total Resource Cost (TRC) test

DSM Program cost vs. electricity prices

(fils per kWh saved over the lifetime of implemented DSM measures 2011-2016 vs. electricity tariff rates)



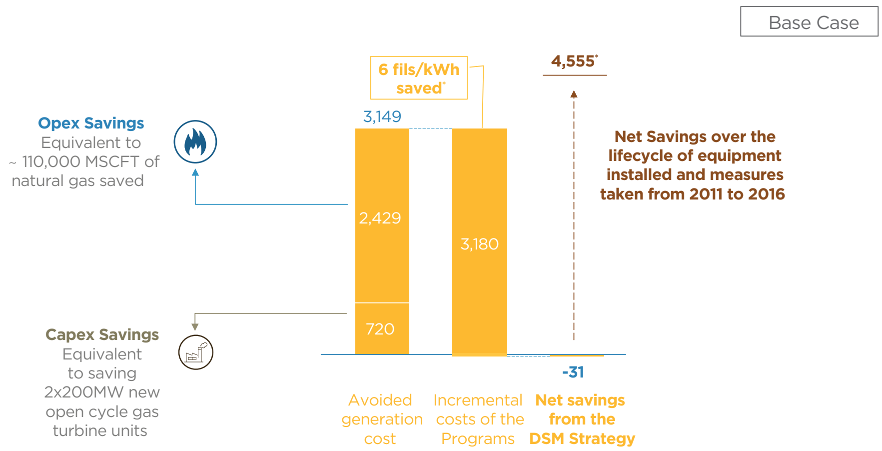
Source: DSM Program Owners, TAQATI analysis

Exhibit 32: Cost comparison of consumption avoidance measures vs. energy tariffs. Cost per kWh saved is estimated for implemented measures until the end of 2016, and calculated over the life cycle of those same measures

DSM Strategy achievements in 2016

Monetary net savings of DSM Strategy (TRC)

(Total Resources Cost Assessment, Cumulative Million AED, Actual 2011 to 2016)



*Calculated over the life cycle of installed equipment and measures. Future monetary savings discounted with a 5% yearly rate

Source: DSM Program Owners, TAQATI analysis

Exhibit 33: Estimation of DSM net monetary benefits (TRC test)

"The DSM Strategy is close to its break-even point, ahead of plan, and net economic benefits are expected from coming years"

In addition to the direct benefits for Program participants quantified in the TRC test, the DSM Strategy brings a variety of indirect benefits to the Dubai society as a whole (Societal test). This more extended set of advantages includes for example environment conservation, health impacts, job creation, returns from reinvestment of saved resources, and investment attraction from a more sustainable and efficient city. While most of these items are important to the development strategy of Dubai, and some of them are monitored (e.g., the CO_2 emission savings reported above), their economic impact is not quantified in this report for conservative reasons, as they are either difficult to quantify or subject to high degrees of discretion in their evaluation.

With such important rewards in mind, the Dubai government is strongly committed to addressing any challenges the DSM Strategy may face along its journey towards a more efficient Dubai.

DSM Strategy achievements in 2016

4.6 Special Report: DSM awareness survey - How much do we know about energy efficiency?

Awareness Improvement is a key enabler to the achievement of the DSM targets. Behavioral changes can only happen when people and organizations are aware of their energy consumption and of measures and practices they can adopt to reduce their consumption.

As part of its mandate to improve awareness on demand-side management and energy efficiency, TAQATI commissioned a market survey to understand current awareness levels and the extent to which energy-conscious behaviors are applied in Dubai.

Survey Methodology and Target Segments

The market survey covers all key demand-side target segments for electricity and water with a total sample size of 1,900 respondents. The survey was conducted using online panels and face to face interviews.

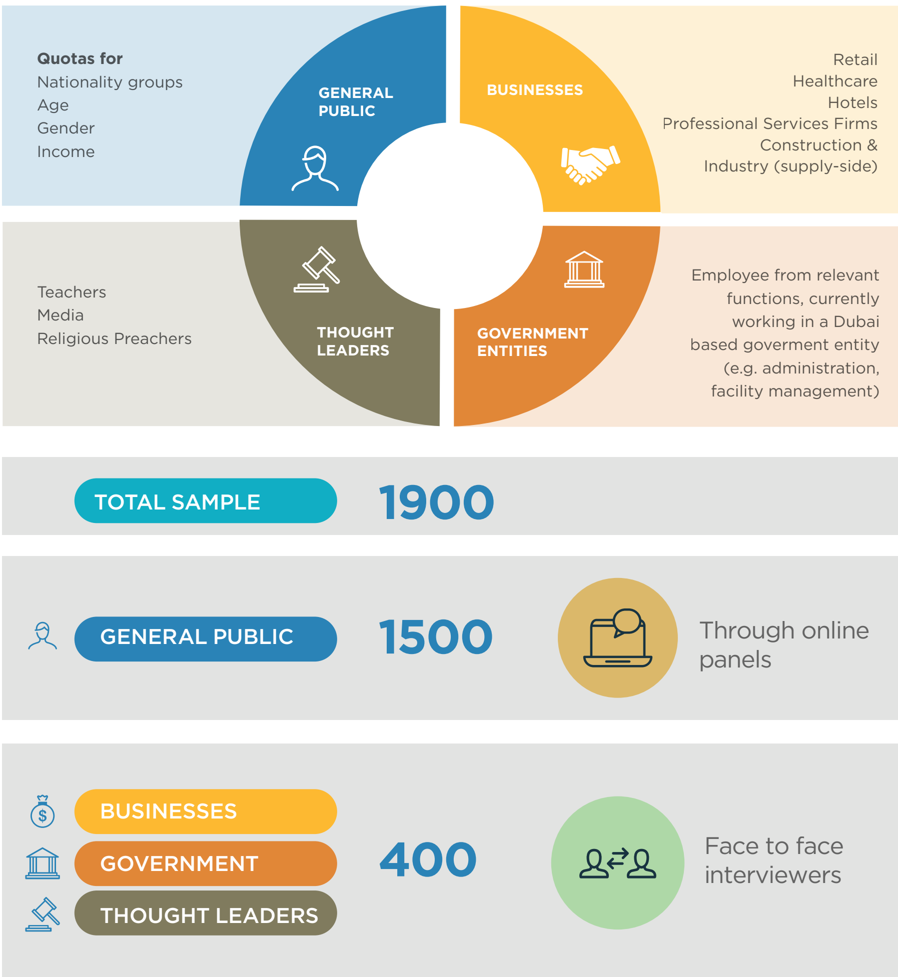


Exhibit 34: Survey target segments, sample size & surveying methodology

DSM Strategy achievements in 2016

Perception vs. Reality: How much electricity and water do we consume?

To instigate behavior change, one needs to understand how much they are consuming and the impact of their consumption. Respondents were prompted regarding their perceived levels of consumption of water and electricity.

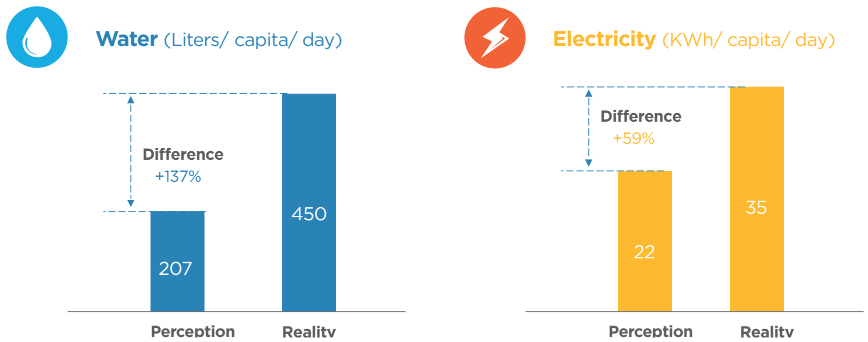


Exhibit 35: Average consumption of water and electricity across all target segments (general community, business, government, thought leaders)

Awareness amongst respondents of their consumption levels for water and electricity is generally low.

For water, actual consumption is more than double the perceived consumption, while for electricity actual consumption is almost 60% higher than perceived consumption.

Highest Energy Consumption Components

Which of these appliances have the highest impact on your electricity & water consumption? *(General Community Only)*

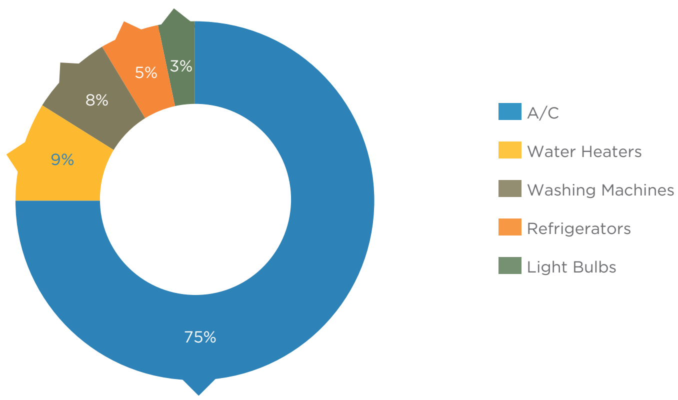


Exhibit 36: Percentage of general community sample who selected the appliance as the highest energy consuming appliances

Overall, general community respondents have a good understanding of the highest energy consuming components in their homes. 75% of respondents believe air conditioning is the highest energy consuming appliance. In fact, air conditioning accounts for approx. 50% of total electricity consumption in Dubai

DSM Strategy achievements in 2016

Energy Efficient Measures and Practices: Do we know what to do to reduce our consumption?

ONLY 38% of the general community respondents believe they know enough about measures and practices to save energy.

General community respondents were presented with a list of behavioral and technical measures and practices and asked to select the ones they believe might help in lowering their energy bills. Respondents could select multiple options.

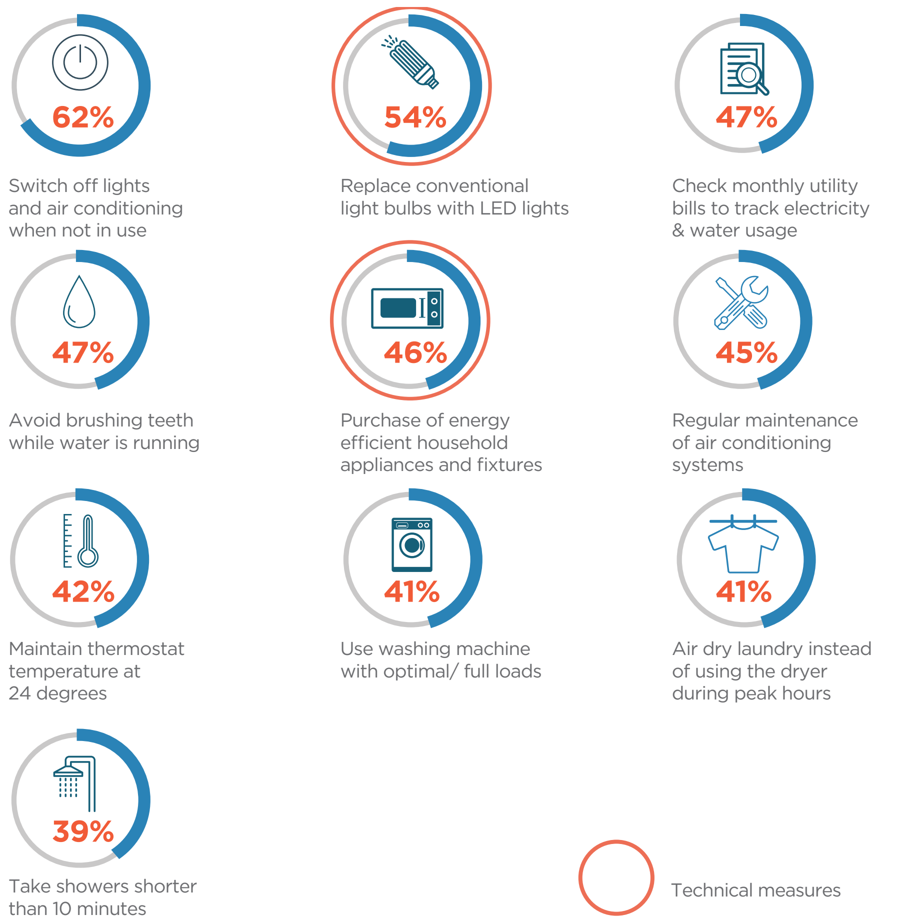


Exhibit 37: Top 10 measures selected by general community respondents to save electricity & water (% of general community respondents)

The top 10 measures and practices chosen by respondents are mostly behavioral, with the exception of some basic technical measures namely changing conventional light bulbs to LED and purchasing energy efficient household appliances and fixtures.

DSM Strategy achievements in 2016

With the exception of purchasing energy efficient appliances and fixtures, technical measures that contribute to significant electricity and water savings such as insulation of windows, ceilings, walls and floors as well as installation of smart or water-efficient irrigation systems were selected by less than 30% of respondents (25% and 28% respectively). This highlights the need for awareness raising on such measures and on their impact on energy consumption.

Leading by Example – Dubai Government Energy Efficiency Initiatives

Respondents were asked if they have seen or heard of any of the following initiatives taken in Dubai to promote efficient use of electricity & water.

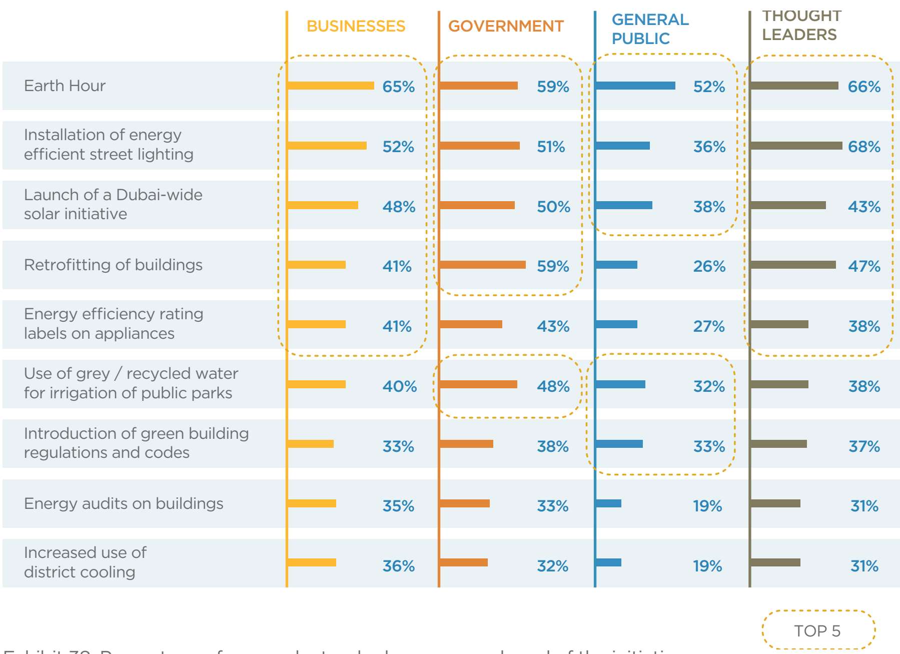


Exhibit 38: Percentage of respondents who have seen or heard of the initiative out of total sample in each target segment

While Dubai Government is leading by example on the energy efficiency front, awareness on some of the key initiatives is still low and shows significant room for improvement. This is particularly evident for district cooling, energy audits and green building regulations. In addition, awareness on retrofitting and energy efficiency labels on appliances is very low amongst general community respondents.

When zooming in on the top most recognized initiative, Earth Hour, a global and highly publicized initiative in which Dubai takes part, comes at the top across most segments (except thought leaders).

Dubai residents, businesses, government entities and thought leaders need to hear more about the work that the Dubai Government is doing on energy efficiency and the strong results achieved to gradually impact their own behaviors and hardwiring and further contribute to the Emirate's electricity and water conservation goals through adopting energy efficient measures and practices in their homes and organizations.

DSM Strategy achievements in 2016

What is Next?

In light of the findings of this survey, TAQATI is launching the development of the DSM Integrated Awareness Strategy 2022 (IAS 2022).

The Strategy aims to identify key awareness priorities and initiatives along the decision-making journey of consumers and across all DSM Programs, while ensuring integration of efforts between different entities to avoid duplications and provide consistent messaging.

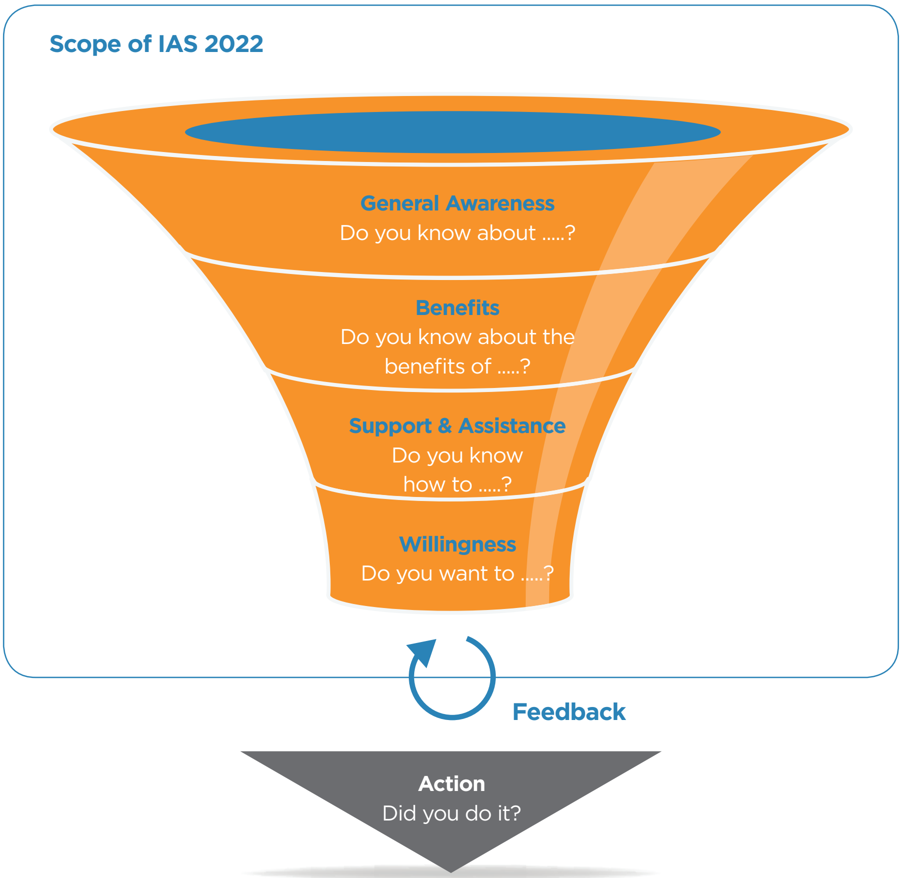


Exhibit 39: IAS 2022 Guiding Framework and Scope

DSM Strategy achievements in 2016

The Strategy will be developed as a joint and collaborative effort between all DSM Program Owners under the guidance and direction of a dedicated committee, the DSM Integrated Outreach and Awareness Committee (IOAC) which was established in November 2016 by the Dubai Supreme Council of Energy. The Committee includes members from all the DSM Program Owner entities, namely DEWA, Dubai Municipality, RTA, RSB Dubai, Etihad Energy Services Company, ESMA and TAQATI. The Strategy is expected to be completed by June 2017.

CHAIR

Faisal Ali Rashid
(DSM Director)

VICE CHAIR

Aref Abouzahr
(Executive Director)

SECRETARY

Joyce Honeine
(Senior Program Manager,Awareness Improvement)

MEMBERS

- **Ali Al Suwaidi** (Head of Corporate Communications)
- **Elie Matar** (Head of Electricity)
- **Ibrahim Mohammad** (Execution Manager)
- **Hana Mohamed Al Kokhardi** (Acting Head of Internal Conformity Affairs Section)
- **Amal Koshak** (Senior Manager, Marketing Communication)
- **Amin Aslam** (Senior Manager, Corporate Brand)
- **Mohammed Najem** (Director of Sustainability & Renewable Energy)
- **Fida Al Hammadi** (Head of Building Research)
- **Nazim Faisal** (Director, Roads Maintenance)

Exhibit 40: DSM Integrated Outreach and Awareness Committee Membership

DEMAND SIDE MANAGEMENT (DSM) STRATEGY OF DUBAI

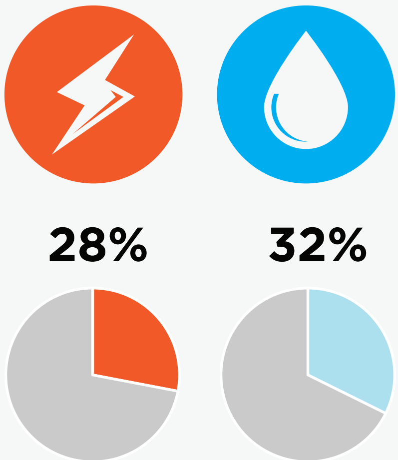
DUBAI TO BECOME A ROLE MODEL IN ENERGY EFFICIENCY BY IMPLEMENTING COST-EFFECTIVE ELECTRICITY AND WATER DEMAND SAVING MEASURES AND DEVELOPING A GREEN SERVICE MARKET

1. BUILDING REGULATIONS
2. BUILDING RETROFITS
3. DISTRICT COOLING
4. STANDARDS AND LABELS FOR APPLIANCES AND EQUIPMENT
5. WATER REUSE AND EFFICENT IRRIGATION
6. OUTDOOR LIGHTING
7. TARIFF RATES
8. SHAMS DUBAI

5

DSM Program deep dives: Program Owners' views

BUILDING REGULATIONS



AS % OF TOTAL CONSUMPTION
SAVINGS OF THE DSM STRATEGY

DSM PROGRAM 1: BUILDING REGULATIONS

PROGRAM SCOPE

Implement and periodically update green building regulations, targeting higher levels of energy efficiency

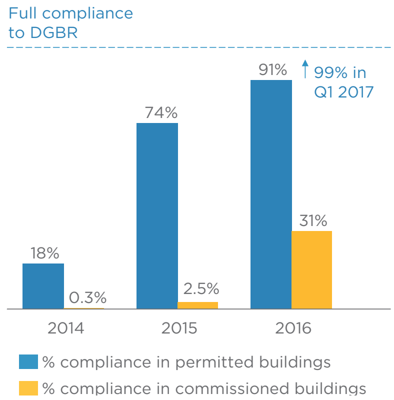
AL SAFAT MARKING THE 2ND WAVE OF EVOLUTION OF DUBAI GREEN BUILDING REGULATIONS

Dawoud A. AlHajri, Assistant Director General for Engineering & Planning, Dubai Municipality

Introduced by Dubai Municipality in 2011, following the vision of His Highness Sheikh Mohammed Bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE, and Ruler of Dubai, Dubai Green Building Regulations and Specifications (DGBR) are today among the most important regulations in Dubai aiming at protecting the environment, its natural resources and supporting the health and welfare of citizens.

The regulations were written after extensive research and study of several international green building regulatory systems, adopting only codes that suit the UAE environment, economy and culture while maintaining a reasonable and controlled increment in costs vs. previous regulations which would eventually disappear in a maturing market.

The DGBR were first made mandatory for new governmental buildings in January 2011, and optional for private ones. Then in March 2014, and after having tested the regulations across over 40 government buildings, Dubai Municipality made the code mandatory for all new private buildings under its jurisdiction. It is important to note that the DSM Strategy of Dubai relies on the full implementation of the DGBR (and future updates) to achieve its 30% electricity and water savings targets. We are glad to report that by the end of 2016 overall compliance to the DGBR at the building permitting stage has reached a level of 91%.



Source: DM, TAQATI Analysis

Exhibit 41: Trends towards full adoption of the DGBR

KEY FACTS

- Program with the highest impact, contributing about 30% of the overall targets of the DSM Strategy
- 20% electricity savings expected from the DGBR in new construction vs. previous regulation
- 35% electricity savings expected from future updates of the code

DSM PROGRAM 1: BUILDING REGULATIONS

To enable market recognition of buildings that are compliant with green standards and in light of the growing willingness of some developers and building owners to exceed minimum standards, Dubai Municipality has been working in 2016 on Al Sa'fat, a Green Building Evaluation System designed to replace the DGBR code. The First version of the code (v1.1) was circulated in September 2016 but it is yet to be implemented.

Al Sa'fat leverages the work done on the DGBR, as it is also a prescriptive code which first defines minimum standards to be followed for each building component. Provided minimum mandatory requirements are met, developers can choose to meet additional prescriptive requirements, and achieve for example Gold and Platinum Sa'fat ratings. By giving recognition to those proactive efforts, Al Sa'fat opens the way to market mechanisms which would eventually allow reflection on property prices and rents.

Source: DM, TAQATI Analysis

Exhibit 42: Al Sa'fat Evaluation System

The achievement of a Silver rating on Al Sa'fat raises electricity savings around 30% higher than DGBR standards. The main addition of Al Sa'fat to DGBR is the introduction of on-site solar generation requirements which goes hand-in-hand with Dubai's vision to maximize the penetration of Solar Rooftop in new (and existing) buildings in the Emirate.

Compared to other prescriptive building codes, some of which provide more flexibility in the selection of criteria to be met to achieve compliance, Al Sa'fat requires a more complete fulfillment of sustainability dimensions. Compared to LEED, it supports building operations and maintenance (e.g., electro-mechanical services), provides more guidance to the design and easier verification by the Authority.

Looking forward, while finalizing Al Sa'fat as the new green building regulations, Dubai Municipality will further work on strengthening its verification and enforcement procedures, to ensure full compliance across all phases of the development, from design to implementation.

DSM PROGRAM 1: BUILDING REGULATIONS

Another priority of DSM Program 1 is to encourage more homogenous green building codes across the different areas of Dubai. Among the 20+ Free Zones in the Emirate, DGBR is only applied in few free zones which rely on Dubai Municipality for building permitting. Other free zones adopt different green building regulations, even if partially in line with DGBR. Beyond the loss of opportunity from lower energy efficiency standards accepted in some Free Zones, differences in methodologies and requirements cause inefficiencies in the real estate value chain. Shared regulations would lead to simplification of work for the entire supply chain, higher compliance to green building regulations, lower design and contractor service cost for developers and eventually reduced cost for the final customer.

As promoted by the Supreme Council of Energy, Dubai Municipality confirms its commitment towards improving sustainability requirements in Dubai, in collaboration with DSM Stakeholders.

Free Zone Authority / Free Zone	Dubai Municipality (DGBR 2014)	Trakhees Green Building Code	Own Green Building Code
Dubai Creative Clusters Authority*	●		
Dubai Airport Free Zone Authority	●		
Jebel Ali Free Zone Authority		●	
Dubai South Authority	○		●
Dubai International Humanitarian City Authority	●		
Dubai Healthcare City Authority	●		
Dubai Silicon Oasis Authority		●	
Dubai Multi Commodities City Authority		●	
Dubai Maritime City Authority		●	
Dubai Textile City and Dubai International City		●	
Nakheel Communities		●	

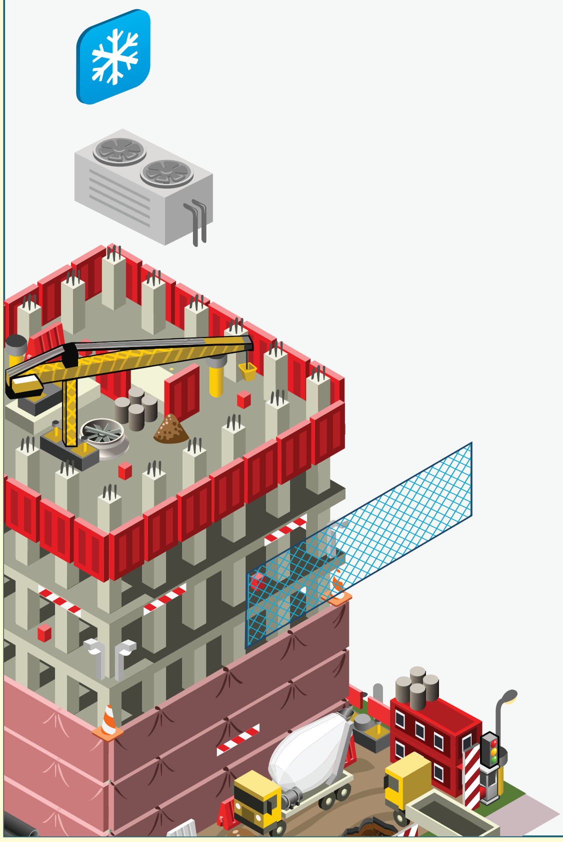
● Current regulation ○ Regulations to be adopted (in progress)

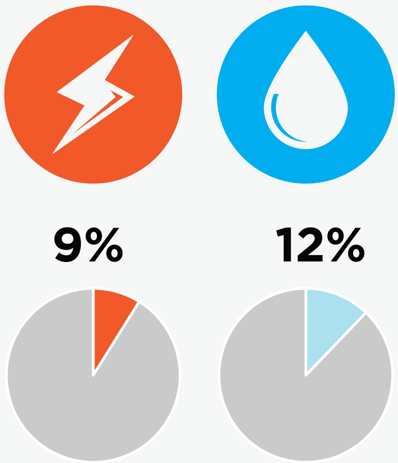
* DCCA regulates all free zones fostering creative and innovative industries, among others Dubai Design District, Dubai Science Park, Dubai Academic City, Media City and Dubai Studio City. Dubai International Financial Centre (DIFC) complies with DCCA's building regulations

Source: Free Zone Authorities

Exhibit 43: Green building code adopted by Free Zone Authorities and enforced on Free Zones (non-comprehensive list)

BUILDING RETROFITS





AS % OF TOTAL CONSUMPTION
SAVINGS OF THE DSM STRATEGY

DSM PROGRAM 2: BUILDING RETROFITS

PROGRAM SCOPE

Execution of a retrofit program for electricity and water efficiency, with the ambition to improve performance of up to 30,000 buildings in Dubai by 2030, saving 1.7 TWh of electricity and 5.6 BIG of water annually by 2030

DUBAI GOVERNMENT LEADS THE WAY WITH LARGE RETROFIT PROJECTS

Ali Mohammed Al Jassim, CEO of Etihad Energy Services Company

In line with the Demand Side Management Strategy and the ambition to reduce the energy intensity of the existing building stock of Dubai, the first stepping stone of the Building Retrofit Program was the launch of Etihad Energy Services Company in 2013, a Super ESCO set-up by Dubai government to execute on DSM Program 2 with the role of developing the Energy Performance Contracting market in Dubai.

In addition to the stimulation from Etihad Energy Services Company (Etihad ES), the EPC industry is regulated by the Regulatory Supervisory Bureau, who has defined an accreditation scheme for ESCOs in 2014, and one for Energy Auditors a year later. The scheme which is kept under close review ensures a level of competency among market players.

With the idea of governing by example, the Dubai Supreme Council of Energy enacted Directive #1 of 2015 which mandates energy audits for all Dubai Government buildings exceeding 1000sqm followed by retrofit projects for those buildings with a large savings potential and a low payback time. This Directive helped kick-off implementation of the program and we have been working with government entities to support them in its execution. By end of 2016, one half of the entities had completed the audit, while execution of the retrofits is facing some delays.

KEY FACTS

- DSCE Directive No. 1 2015:
  - Target for Dubai government entities to save 20% of their electricity and water consumption by 2021
  - Walk-through energy audits required on all government buildings > 1000 sqm
  - Detailed energy audits and retrofits required when potential savings are >20% of consumption and payback is <10 years

DSM PROGRAM 2: BUILDING RETROFITS

The model was first applied to our major project with Economic Zones World for the Jebel Ali Free Zones Authority. The project required Etihad ES to bring financing, and hence we partnered with National Bond Corporation to create a Shari'a structure that accommodates retrofit projects. The project includes 157 buildings to retrofit, it is the largest guaranteed energy savings project in the Middle East and this year the retrofit was successfully completed.

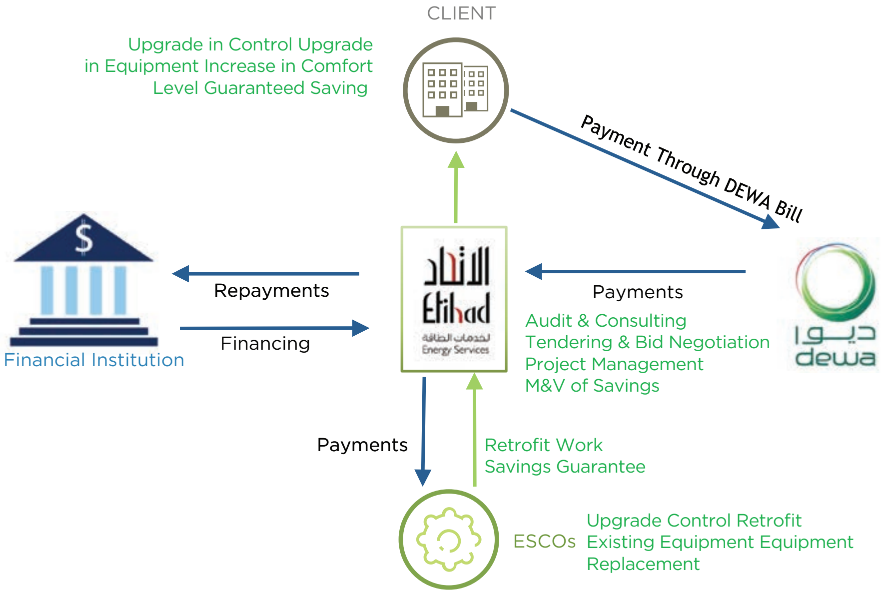


Exhibit 44: Etihad Energy Services Business Model

While previous years where more focused on set-up and initial business development, this year, projects have started delivering savings and we see a tremendous increase compared to last year. Results are positive for 2016, as electricity and water savings from Etihad ES projects alone (56 GWh and 234 MIG), exceed the targets set by the DSM Strategy for that year (31 GWh and 109 MIG).

In parallel, we are observing a growing market interest as the number of accredited ESCOs and energy auditors is consistently increasing year over year. Adding savings from accredited ESCOs, actual savings for 2016 well exceed targets for both water and electricity, by 182% and 126% respectively. Buildings for which a retrofit project has been completed or is in progress, adds up to a total of 1,968 buildings.

DSM PROGRAM 2: BUILDING RETROFITS

Water and Electricity Savings from retrofits

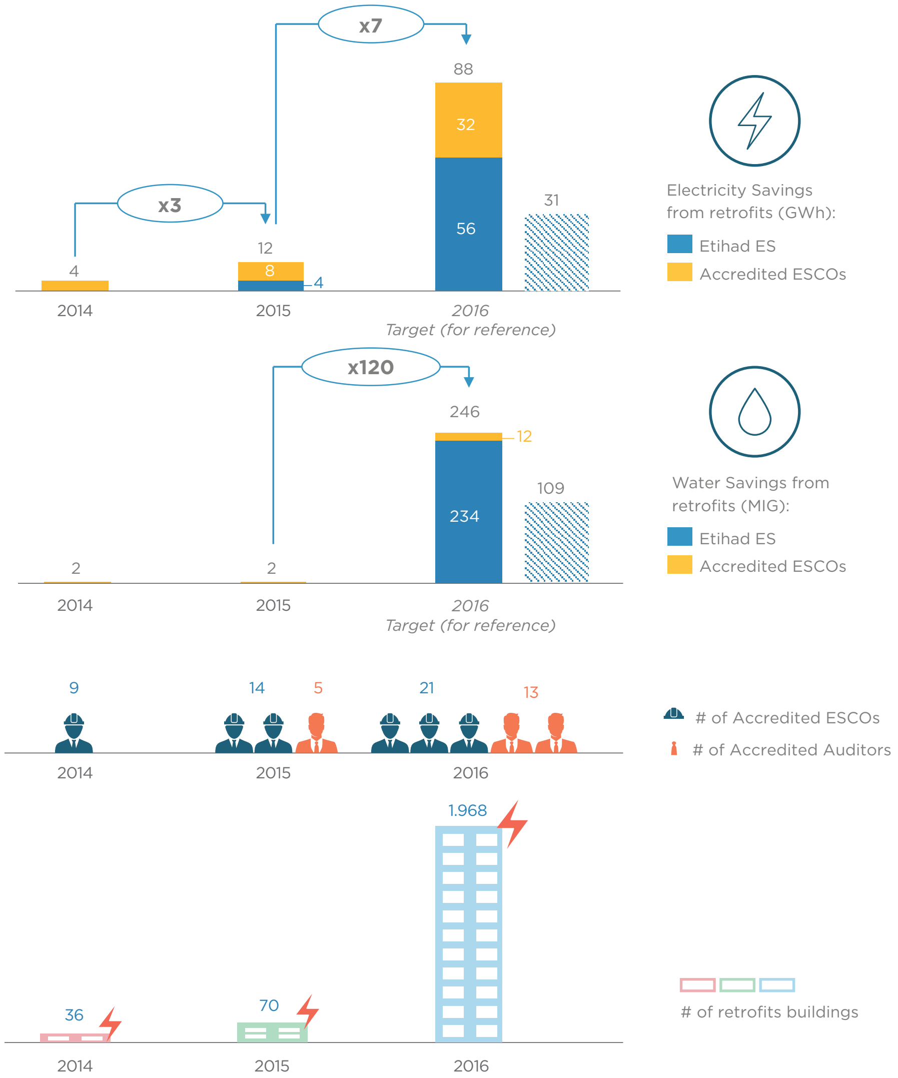


Exhibit 45: Trends in the EPC market, Etihad Energy Services and accredited ESCOs

The driver for increased penetration of retrofit is the increased interest in the industry, marked by an increase in the number of accredited ESCOs and auditors, and international OEMs bringing in innovative solutions that can deliver affordable and pragmatic projects.

While 2016 was marked by larger involvement from the public sector, we expect 2017 targets to be met through the involvement of private investments and projects in the commercial buildings followed by the industrial buildings in later years. Etihad Energy Services is expecting to implement up to AED 160 million worth of new projects in 2017 out of a total of AED 392 million in the pipeline. We expect the aggregate of accredited ESCOs' projects to double that value.

DSM PROGRAM 2: BUILDING RETROFITS

As for the residential sector, the involvement in retrofit activities, in the form of energy efficiency home improvement is still none existent due to lack of awareness, lack of organized support mechanisms and perceived long term payback period in the absence of affordable funding. In response, Etihad Energy Services is working on promotional programs targeting SME and residential sectors.

TAQATI alongside with DSM Program Owners will work to increase awareness and willingness of the market segments as well as develop a comprehensive go-to-market plan and value proposition that can address the barriers, especially for the residential and SME segments.

The largest guaranteed energy savings project implemented in the Middle East

In 2016, Etihad Energy Services with Enova successfully completed the energy retrofit of 157 staff accommodation buildings for the Jebel Ali Free Zone Authority (JAFZA).

The project involved the replacement of,

- 5,280 old AC units with high efficiency split units and upgrade of 5,800 ACs
- 83,000 old light fixtures with high efficiency LEDs
- 31,000 old water fixtures with highly efficient fixtures

And the installation of 530 meters for monitoring

With an investment value of 64 million, it is fully financed by the National Bonds Corporation and uses a Shari'a compliant structure

It is a 6 years guaranteed savings contract of cumulative savings of 158 GWh (28% electricity savings) and 1.2 BIG (36% water savings), equivalent to AED 130m (31% monetary savings)

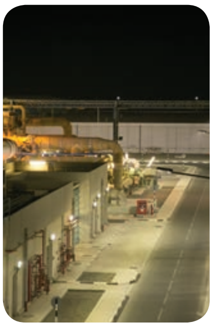
DSM PROGRAM 2: BUILDING RETROFITS

DEWA lighting retrofit project – Phase II

After having completed the retrofit of 8,500 lights in Phase I of the project in 2015, in 2016, 15,010 lights were retrofitted in 2 DEWA power stations with high efficiency LEDs from Philips Lighting

Project (phase II) provides a 70% decrease from initial electricity consumption from lighting, with Measured and Verified savings of 9.5GWh/year

Project investment value is AED 23M with a payback period of 5.4 years



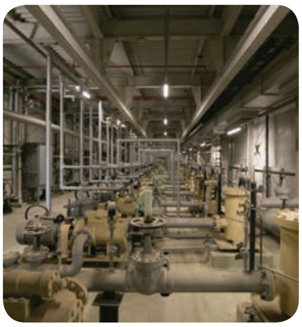


Exhibit 46: Examples of retrofit projects implemented by Etihad Energy Services in 2016

DISTRICT COOLING

14%

AS % OF TOTAL CONSUMPTION

SAVINGS OF THE DSM STRATEGY

DSM PROGRAM 3: DISTRICT COOLING

PROGRAM SCOPE

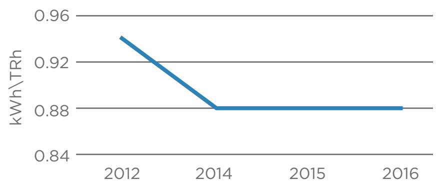
Increase penetration of efficient cooling by regulating the district cooling (DC) sector in Dubai. The Program assumes an increase in DC's share of demand to 40% in 2030 and that DC firms will continue to improve efficiency and customer satisfaction against a baseline.

PROMOTING FURTHER IMPROVEMENTS IN COOLING EFFICIENCY

James Grinnell, Head of Water, RSB

Program 3 targets District Cooling to achieve a 40% share of the cooling market by 2030 and with near 40% superior electrical efficiency over other cooling technologies, annual electricity savings of 3.4TWh are expected.

This year, plant electrical efficiency has remained broadly stable driving electrical savings of 92GWh - well ahead of the Program which only has explicit saving targets as of 2017.



Source: RSB analysis

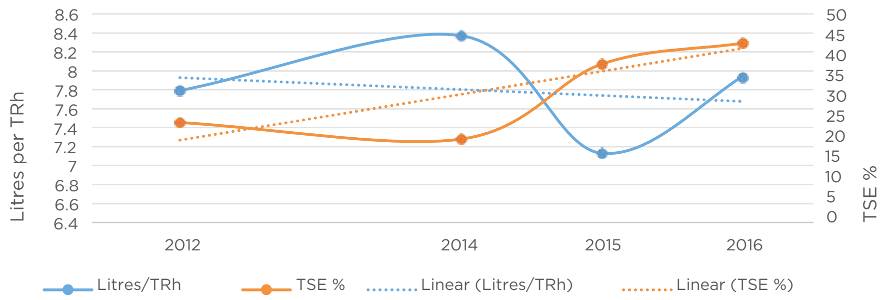
Exhibit 47: Production efficiency of District Cooling plant

Whilst the year on year water efficiency of district cooling plant fluctuates as shown in Exhibit 47, there is an emerging trend of improving performance. Perhaps what's more encouraging is that the improved water efficiency is coinciding with increased use of TSE for make-up water. This is an important achievement because using TSE ensures the maximum energy savings are gained by adopting district cooling.

KEY FACTS

- On average water cooled solutions deliver the same cooling for 30% less energy than the air cooled solutions
- District cooling is the most popular water cooled solution, with over 70% of water cooled capacity provided by DC firms
- Peak demand utilizes less than 60% of the installed district cooling capacity, allowing new connections at limited incremental cost

DSM PROGRAM 3: DISTRICT COOLING



Source: RSB analysis

Exhibit 48: Water efficiency and TSE use in DC plant

Exhibit 49 below compares the primary energy required by each of the three main cooling technologies operating in Dubai for large building systems: air cooled; water cooled with drinking water; and water cooled with TSE and a RO polishing plant.

Technology	Primary Energy Cost (indexed)
Air cooled	100
Water cooled – with drinking water	89
Water cooled with TSE and RO	72

Exhibit 49: Comparison of primary energy cost across cooling technologies (indexed, air cooled = 100)

It shows that even allowing for the energy cost associated with drinking water, water cooled air conditioning systems, such as are typically used in district cooling, have a 11% efficiency advantage over air cooled systems. But this advantage grows to 28% when TSE is used, even allowing for the electricity used in applying reverse osmosis to TSE to raise its quality, as district cooling providers do in most cases.

We encourage district cooling providers to continue to seek out opportunities to utilize TSE in their plants whilst focusing on water efficiency in their operations.

Historically, district cooling schemes have focused on new developments but the DSM Strategy foresees significant retrofit activity; that is the connection of existing buildings to district cooling plants. There are now encouraging signs of growth in retrofit activity.

DSM PROGRAM 3: DISTRICT COOLING

Retrofitting district cooling can involve supplying an existing building from an existing plant or an existing building from a new plant. There are case references of district cooling providers adopting existing cooling systems. Evidence suggests that district cooling providers can run cooling plants more efficiently over the long term so it is little surprise to see some growth in retrofit cooling as buildings age. Innovative pricing strategies coming from retrofit activity could make district cooling more attractive to customers. District cooling firms that innovate their pricing structure in customer's interests stand to gain the largest share of market growth.

These initiatives are consistent with our view that a flourishing district cooling sector can be achieved where the three key stakeholders share the benefits of the technology. That is where:

- Customers: choose to occupy or buy properties that are supplied by district cooling
- Developers: choose district cooling as their preferred technology recognising their customer's wishes
- Investors: invest in DC providers to generate reasonable returns

We will continue to work with district cooling providers through our annual return process to assess performance and promote competition in the sector.

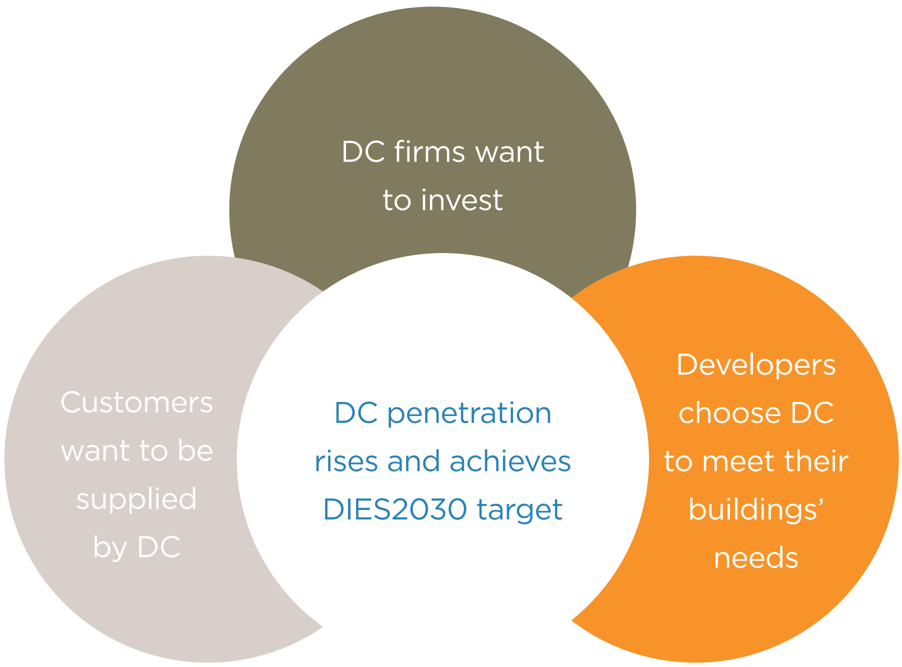
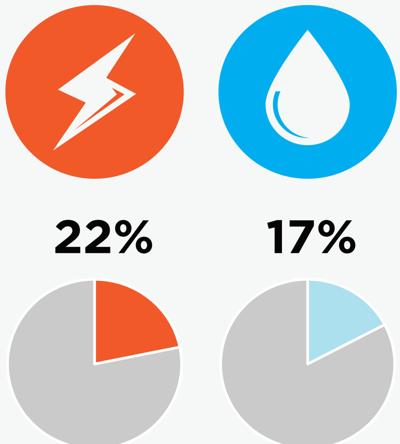


Exhibit 50: Conditions favouring adoption of District Cooling

STANDARDS AND LABELS FOR APPLIANCES AND EQUIPMENT



AS % OF TOTAL CONSUMPTION
SAVINGS OF THE DSM STRATEGY

DSM PROGRAM 4: STANDARDS AND LABELS FOR APPLIANCES AND EQUIPMENT

KEY FACTS

- High-impact program, contributing over 20% of the DSM electricity targets for 2030
- Standards for each class of appliances and equipment are updated every 2-3 years

PROGRAM SCOPE

Develop and implement Minimum Energy Performance Standards (MEPS) and Comparative Labeling Scheme relative to electricity and water consumption for electrical appliances for use in the UAE.

The Program covers main household appliances, particularly room air-conditioners, refrigerators and freezers, clothes washing machines and dryers, dishwashers, electric storage water heaters, lamps, water fixtures and others.

RAISING THE EFFICIENCY BAR FOR APPLIANCES AND EQUIPMENT USED IN DUBAI

HE Abdulla Al Maeeni, Director General, Emirates Authority for Standardization and Metrology

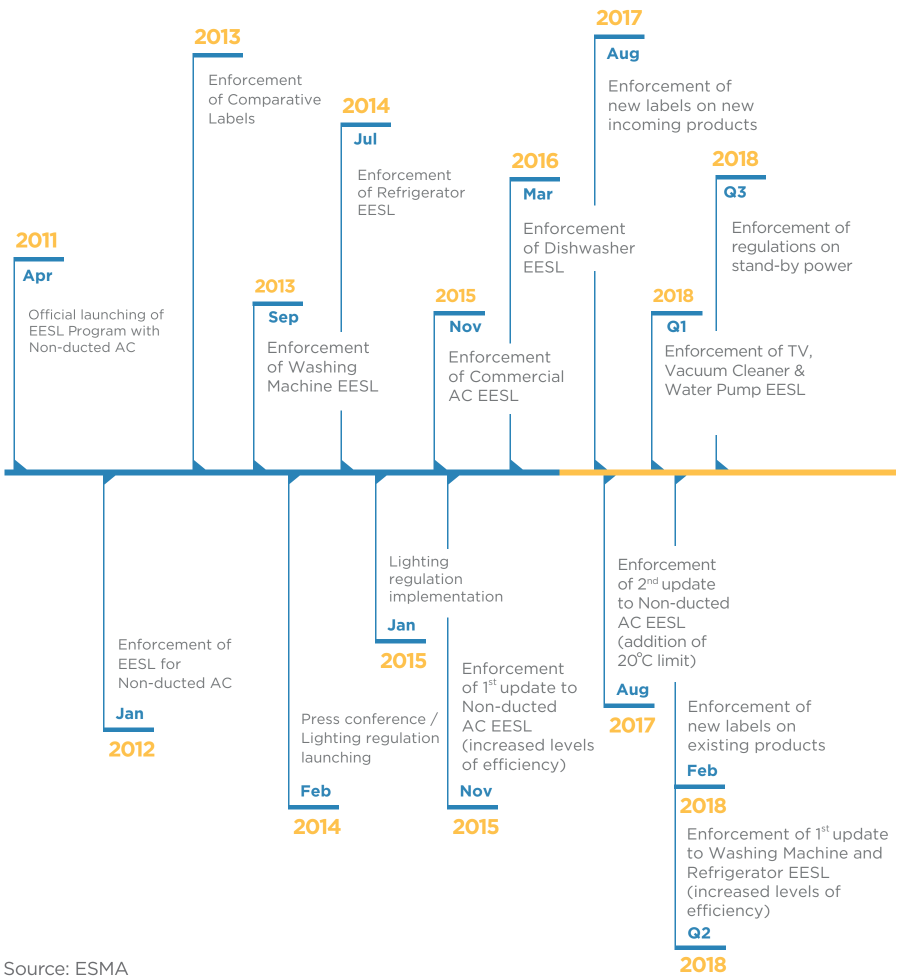
In line with the UAE Vision 2021 and the UAE Green Growth Strategy, the Energy Efficiency Standardization and Labelling (EESL) Program drives the increasing adoption of electricity and water efficient appliances and equipment in the UAE. The key mechanisms of the program are a mandatory compliance to Minimum Energy Performance Standards (MEPS), testing at T3 conditions (Tropical Climate, 46°C) of products entering the market, as well as a Comparative Labeling of products accessible for purchase. Since the introduction of the first minimum standards for non-ducted room air-conditioners in 2011 and the enforcement of comparative labels in 2013, the Program has extended to include most of the high consuming product categories, and has undergone several steps of improvement. This year, among other developments, we have circulated the second update to the standards for non-ducted ACs, and we have redesigned and enhanced labels with RFID technology and QR codes for greater consumer protection. Benefits of the Program so far include avoidance of CO_2 emissions for over 1.2 million tons across the UAE.

Within the context of the DSM Strategy of Dubai, ESMA (leading the ESSL program) has been working closely with the Dubai Supreme Council of Energy to harmonize the issuance of labels and develop effective monitoring for DSM Program 4, Standards and Labels for Appliances and Equipment.

DSM PROGRAM 4: STANDARDS AND LABELS FOR APPLIANCES AND EQUIPMENT

Exhibit 51: Highlights of UAE's Comparative Labeling scheme

DSM PROGRAM 4: STANDARDS AND LABELS FOR APPLIANCES AND EQUIPMENT



Source: ESMA

Exhibit 52: Implementation roadmap for ESMA Energy Efficiency Standardization and Labelling Program

Effective implementation of the Program requires action along the entire supply chain of appliances and equipment, from import to consumer purchase and usage.
It consists of enforcing the regulation, building awareness and education of consumers to guide their purchase towards higher class appliances, and monitoring and controlling the improvement in efficiency in the market.

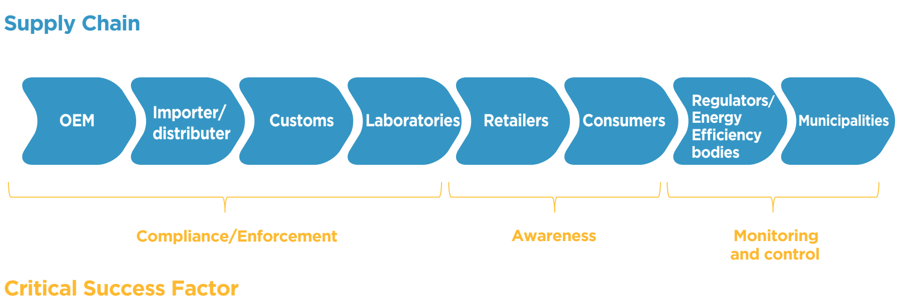


Exhibit 53: Supply Chain of Appliances and Critical Success Factors for implementation

DSM PROGRAM 4: STANDARDS AND LABELS FOR APPLIANCES AND EQUIPMENT

A Market Surveillance unit was formed this year within ESMA as part of our National Market Surveillance plan. The dedicated unit will be employing multiple testing methods, including comprehensive testing in local research centers to enforce the regulation. Cooperation between ESMA and the Department of Economic Development, UAE customs, Dubai Municipality (for Dubai) and free zone authorities is needed to close the loopholes and prevent fully the influx and sale of non-compliant products. Department of Economic Development and Dubai Municipality are already involved in issuing fines and recalling non-compliant products from the market. We are seeing a decrease in the “grey market”, however more is to be done.

In parallel, we have improved our consumer outreach through increased presence in the media and in conferences, and the plan for the coming years is to integrate awareness and promotion efforts with other DSM stakeholders in Dubai for maximum outreach.

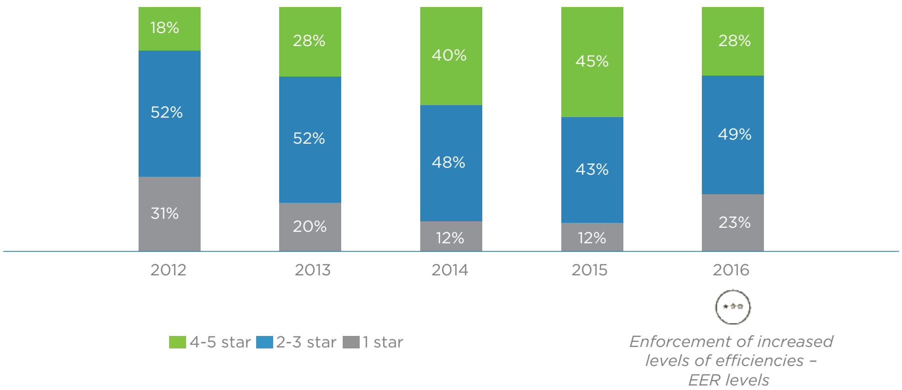
Exhibit 54: HE Abdulla Al Maeeni, Director General, and Essa Abdul Rahman Al Hashimi, Director of Conformity Affairs, ESMA, presenting regulatory developments in WFES, Abu Dhabi, January 2017

In collaboration with the Dubai Supreme Council of Energy and TAQATI, a system has been put in place to monitor the adoption of efficient appliances in the market and overall improvement in electricity and water efficiency of appliances. The monitoring system benefits from input from manufacturers, importers, distributors and retailers, and is guiding future updates of the regulation.

DSM PROGRAM 4: STANDARDS AND LABELS FOR APPLIANCES AND EQUIPMENT

Exhibit 55: Example of an operational workshop, involving manufacturers, importers, distributors and retailers, done with the support of TAQATI in DEWA Sustainable Building, Dubai, March 2016

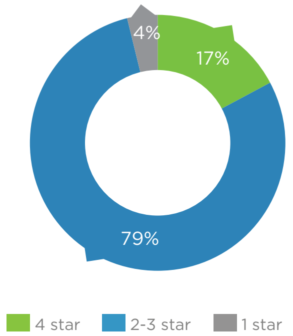
Overall, there are signals of increasing consumer response to the Program, apparent mostly for non-ducted air conditioners, the first product category included in the Program. Indeed, the share of products with 4-5 star labels increased stably, while the share of 1 stars decreased. The positive trend seems to be interrupted in 2016, with a drop in the share of 4-5 star products. This is likely to be due to updates enforced at the end of 2015 which raised the efficiency bar for products sold in 2016. That being said, the majority of products sold today in Dubai remains within the 2-3 star rating and hence increasing efforts to promote the adoption of higher efficiency products are needed. This may involve reinforcement of awareness and communication, and the activation of specific initiatives in collaboration with retailers and importers.



Source: ESMA, TAQATI Analysis

Exhibit 56: Share of non-ducted ACs per star rating (2012-2016)

DSM PROGRAM 4: STANDARDS AND LABELS FOR APPLIANCES AND EQUIPMENT



Source: ESMA, TAQATI Analysis

Exhibit 57: Share of refrigerators per star-rating (2016)

While we work on enhancing the Program further, We are collaborating with its peer authorities in other GCC markets to leverage possible synergies. As MEPS and rating systems are increasingly being adopted in the region, there is an opportunity for unification of some standards, which would address cost and complexity implications for OEM and importers originating from dealing with multiple different requirements. A first significant step in this direction has been done recently with the issuance of a unified label across GCC for vehicles, applied since 2016 for 2017 models.

Exhibit 58: GSO Conformity Tracking Symbol (GCTS: G-Marking including the Notified Body number and a QR code), used across the GCC on regulated appliances, in addition to local label

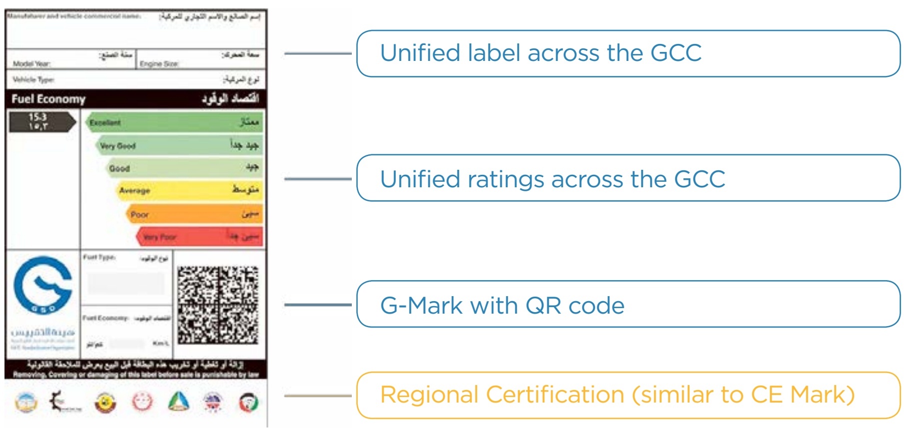


Exhibit 59: GCTS label for fuel economy, unified label used across the GCC for vehicles

WATER REUSE AND EFFICIENT IRRIGATION

19%

AS % OF TOTAL CONSUMPTION
SAVINGS OF THE DSM STRATEGY

DSM PROGRAM 5: WATER REUSE AND EFFICIENT IRRIGATION

PROGRAM SCOPE

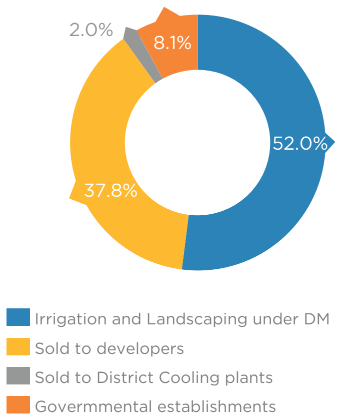
Implement efficiency measures in public irrigation, and use the TSE made available through those measures as a substitute for desalinated water where applicable.

A COMPREHENSIVE AND COLLABORATIVE APPROACH TO IRRIGATION EFFICIENCIES IN DUBAI

Talib Julfar, Assistant Director General for Environment and Public Health Services, Dubai Municipality

Usage of treated water sewage effluent (TSE) for public irrigation has been a major achievement for Dubai. The TSE network is one of the largest in the world, making the Emirate a global best practice in the field. Today, public landscapes under Dubai Municipality's supervision are fully irrigated by collected and treated municipal water. With a treatment capacity exceeding 650,000 m3/day, the use of TSE saves annually around 55 BIG of desalinated water.

The DSM Strategy recognizes the value of TSE as an asset for Dubai beyond public irrigation, and therefore aims at further optimizing its consumption, so that the resulting excess could be diverted to other purposes which today use mostly desalinated water. The low price of TSE compared to desalinated water (TSE prices are for most customer groups more than 80% below their rates for desalinated water) drives significant market demand for it, and in fact major quantities of TSE are being provided to commercial and governmental establishments. District Cooling is also being served where possible, following The Executive Council Order No. 27 of 2008.



Source: Dubai Municipality

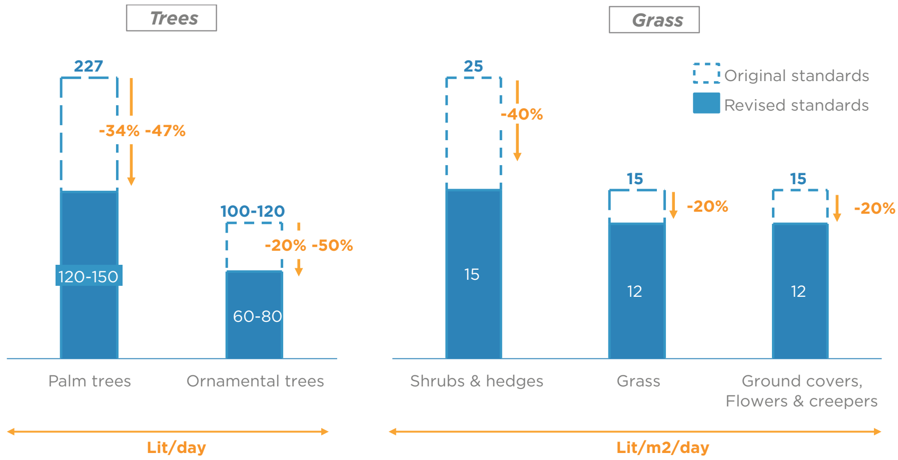
Exhibit 60: Volume share of TSE applications in 2016

KEY FACTS

- TSE costs over 80% less than desalinated water
- 100% of public spaces under DM supervision are today irrigated with TSE
- TSE can be an effective substitute of desalinated water for a variety of applications, including irrigation, district cooling and industrial uses
- The Program is expected to generate over 8 BIG of water savings by 2030

DSM PROGRAM 5: WATER REUSE AND EFFICIENT IRRIGATION

In line with the DSM Strategy, Dubai Municipality is already applying measures to reduce consumption of TSE in public irrigation, including the 1 day/week switch-off program in some communities during summer times, and the adoption in new developments of the revised irrigation quantity standards introduced in 2015. Moreover, Dubai Municipality is currently working on implementing new standards for an increased share of hardscaping elements (e.g., gravel, glass) in upcoming landscaping projects.



Source: Dubai Municipality

Exhibit 61: Revised irrigation standards for new developments (2015)

Landscaping project in Al Khail Road from Business Bay Bridge to Za'abeel Interchange 1:

- Hardscaping elements will cover over 65% of the landscape area. This contributes to reducing water consumption while fulfilling beautification goals
- Solar panels will be used as a source of renewable energy for landscape lighting at night

Source: Dubai Municipality

Exhibit 62: Example of adoption of hardscaping measures in landscaping for new DM projects

DSM PROGRAM 5: WATER REUSE AND EFFICIENT IRRIGATION

Plantation in Al Qudra lake area:

- The selected trees in the area, e.g., Ziziphus Spina (Jujuba), are particularly suitable to the local climate and draught
- These types of trees require 30 – 40 lit/day as compared to the 60 - 80 lit/day for other ornamental trees

Source: Dubai Municipality

Exhibit 63: Example of adoption of local species for public greenery, characterized by minimal consumption of TSE

While potential savings in TSE consumption from those measures could be massive in the coming years if those levers are applied extensively, a few challenges need to be tackled first, in order to enable the use of saved quantities of TSE in lieu of desalinated water. The main challenges are the following:

- Seasonality of TSE demand vs. a more stable supply, entailing an excess of TSE in winter while in the summer supply and demand are more balanced. In the absence of larger storage facilities for TSE, it would be difficult to supply large quantities of TSE on a continuous basis for uses beyond irrigation
- Impact of the blowdown of District Cooling on TSE salinity levels. With the 3-stage treatment that is currently used today in Dubai, the high concentration of DC blowdown results in increasingly salty TSE, with negative effects on its usage for irrigation
- Need for new connections of TSE to District Cooling plants. New connections have to be coordinated with plans for development of the TSE and sewerage network. This is a large scale intervention which requires a comprehensive approach

DSM PROGRAM 5: WATER REUSE AND EFFICIENT IRRIGATION

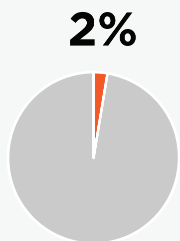
- Financing of irrigation retrofits. Given the current low price of TSE, there is a limited business case for Dubai Municipality to execute irrigation retrofits to provide TSE savings. However, looking at the opportunity from the perspective of the entire Dubai system, benefits are much larger, as TSE savings would displace equal quantities of desalinated water.

It is important to keep in mind, as well, that following the foreseen measures of the overall DSM Strategy, availability of TSE per capita is expected to decrease (lower water consumption will mean lower sewage returns, and therefore lower TSE production), while irrigation needs will increase in compliance with DM's 2030 greenery expansion plan, targeting an increase in green space as a percentage of total constructed areas in developed urban areas from 21.3% in 2011 to 25% in 2025. The total green space estimates in 2016 is about 32 m^2/resident including areas under DM and developers.

Addressing the above-mentioned challenges requires an integrated approach that looks at reducing demand for the variety of uses of TSE and maximizing and stabilizing supply. This is why DM is currently collaborating with DSCE, with endorsement from the Executive Council, to develope a comprehensive strategy around irrigation efficiencies. The strategy will look at the entire water cycle, and it will aim to:

- Prioritize uses for TSE
- Adopt new measures and technologies to further increase irrigation efficiency (involving for example more capillary metering and control systems)
- Maximize and stabilize supply of TSE by examining TSE storage opportunities which will better leverage winter excess (overcoming the limitations of only a few hours of storage capacity available today)
- Evaluate network enhancements and other centralization – decentralization options
- Identify financing requirements and model for water network enhancements and landscaping retrofits

OUTDOOR LIGHTING



AS % OF TOTAL CONSUMPTION
SAVINGS OF THE DSM STRATEGY

DSM PROGRAM 6: OUTDOOR LIGHTING

PROGRAM SCOPE

Adopt LED solutions for outdoor lighting in streets and other public spaces, both on new projects and through retrofits in existing assets. Implement further efficiency measures such as dimming and/or partial switch-off.

INTEGRATING ENERGY EFFICIENCY AND SMART TECHNOLOGY FOR OUTDOOR LIGHTING

Nazim Faisal Saeed, director of Roads & Facilities Maintenance Department, RTA

The Outdoor Lighting Program is among the DSM initiatives with the highest potential, given the evolution that street lighting is undergoing worldwide across many dimensions: technology innovation (driving quality and efficiency of the lighting assets), and integration with multiple other services and smart city programs.

Energy efficiency and sustainability have been an integral part of RTA's strategy for many years. Since 2011, we have been implementing measures to minimize consumption of our existing, conventional lighting assets while examining the potential application of LED technology in street lights. In 2011 we reduced operating hours at dawn and sunset by a total of 20 minutes per day, and in 2013 we started implementing a switch-off program for every second light in residential areas (one-on one-off activation), which has reached today 100% penetration in internal roads.

These measures enabled us to reduce electricity consumption for outdoor lighting and consistently meet our DSM targets, while waiting for LED technology to mature and become financially viable. While being reassured about the technology by a number of successful applications in many parts of the world through ongoing partnerships that have provided extensive information on global best practices (e.g., the city of Los Angeles) RTA has been studying the applicability to the harsh environmental conditions of Dubai, and to the strict safety requirements of Dubai roads.

As a result of these studies, replacement of all traffic lights with LED has been decided and it is already in advanced stage. Successful pilot projects have been completed for outdoor lighting in residential areas, for example in Barsha South 1&2, providing substantial energy savings and outstanding quality standards. At the same time we have examined the potential application of LED to larger roads, and the opportunity to start retrofitting part of the existing lighting stock.

KEY FACTS

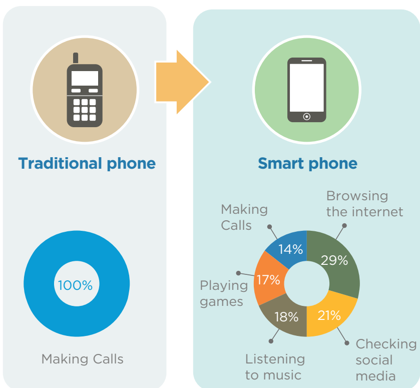
- Over 50% savings are provided by LED retrofits vs. conventional lighting
- Penetration of switch-off/ dimming measures in residential streets has reached 100%
- 75% of Dubai's street lights to be replaced with LED by 2030

DSM PROGRAM 6: OUTDOOR LIGHTING

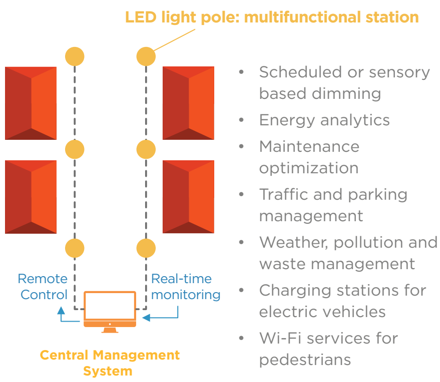
The LED lighting on the Dubai Water Canal Bridge is an example of those initial tests, and shows benefits from multiple dimensions: energy efficiency, quality, community services, and landscape beautification. Following those positive results, RTA can today confirm its reliance on LED technology, in line with the DSM Strategy.

Furthermore, recognizing the potential of street lighting assets beyond lighting and energy efficiency, Dubai's plan for LED retrofits and new installations will align Smart Dubai with Demand Side Management objectives. Connected streets are at the core of smart cities as each light pole can be powered, connected and located and hence be used to receive and send information across the city. We will leverage usage of smart applications to support maintenance and operations of our lighting assets (i.e., direct detection of defects, removing the need for patrolling), and to better serve Dubai residents by improving road safety and quality and offering additional services through the lighting assets. Examples of the wide range of potential applications can be seen in the Dubai Water Canal Bridge, where street light poles provide pedestrians with WiFi hotspots, phone charging outlets and other interactive features.

Usage of mobile phones
(share of usage time)



Potential usage of smart street lights



Source: Feilo Sylvania

Exhibit 64: Examples of possible services and functionalities from the evolution of street lighting into smart lighting. For comparison, usage patterns of smart phones vs. traditional mobile phones

DSM PROGRAM 6: OUTDOOR LIGHTING

In addition, energy efficiency will improve further, due to the enhanced controls. Complementing LED with dimming technology will, on one hand, further increase energy savings from LED retrofits and new installations, and on the other, contribute to a better perception of the impact of energy efficiency measures, compared to the currently adopted partial switch-off solutions.

In conclusion, implementation of efficient lighting should take into account the continous innovation in this field. RTA is preparing to structurally accommodate and leverage this evolution, by working on several dimensions: adopting open communication and tendering platforms with suppliers, reinforcing R&D capabilities in our dedicated center in Al Sufouh, and embedding a systematic look at emerging technologies (e.g., Li-Fi, 5G, fiber optic networks, etc.) in our planning.

Highlights of the LED retrofit pilot project in Rashidiya & Nad Shama:

Total LED Fittings: 1102 pcs. | 44 W: 436 pcs. | 84 W: 666 pcs.

Technology	Conventional	LED	Expected Savings
Annual Consumption (kWh)	628,362	329,060	299,302 (annual savings excluding switch off/ dimming)
Annual Energy Cost (AED)	238,778	125,043	113,735

Exhibit 65: Examples of LED retrofit projects conducted by RTA in Rashidiya and Nad Shama

DSM PROGRAM 6:
OUTDOOR LIGHTING

Highlights of the Dubai Water Canal Bridge project:

- Smart LED lighting installation
- Light features include remote monitoring and dimming system, Wi-Fi connectivity and monitoring cameras

Exhibit 66: Example of smart LED application on a large road: Dubai Water Canal Project

DSM PROGRAM 6: OUTDOOR LIGHTING

DUBAI MUNICIPALITY OUTDOOR LIGHTING PROGRAM IN PARKS AND OTHER PUBLIC FACILITIES

Dubai Municipality is undergoing an energy efficiency transformation for outdoor lighting in parks and public facilities under their supervision. The transformation entails three initiatives:

- 100% adoption of LED in new projects, partly in combination with solar energy supply
- Progressive replacement of existing conventional lamps with LED
- Reduction in operating hours

From 2012 to date, about 10,000 LED lights have been installed across Dubai parks:

- 4,000 through new projects
- 6,000 through retrofit of conventional lights

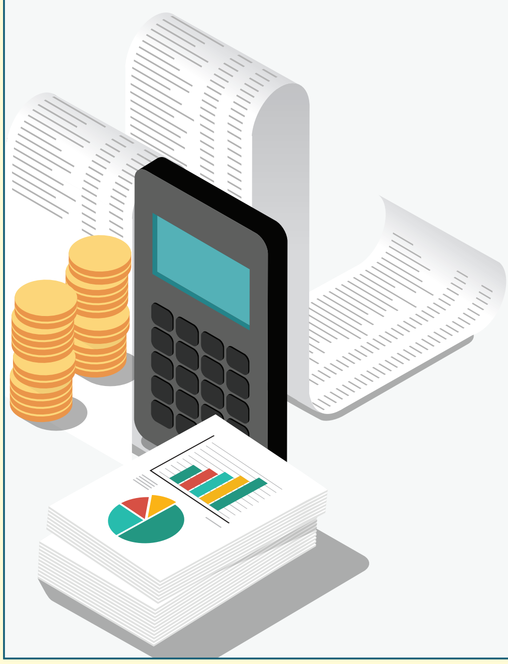
In addition, operating hours have been reduced to a maximum of 6 hours per night, with switch-off after 12 am.

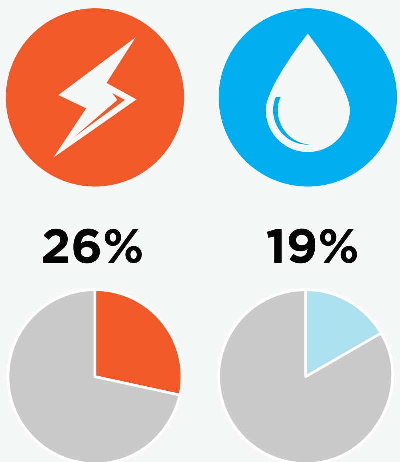
Dubai Municipality has been awarded 2016 Middle East Electricity Exhibition Award for Lighting Project of the Year, for their efforts in the field.

Exhibit 67: Al Khazzan Park, the first zero-energy park in Dubai

Exhibit 68: Solar-LED lighting systems at Nad Al Sheba Park, Dubai

TARIFF RATES





AS % OF TOTAL CONSUMPTION

SAVINGS OF THE DSM STRATEGY

DSM PROGRAMS 7: TARIFF RATES

PROGRAM 7: TARIFF RATES

Electricity and water (E&W) tariff rates to be adjusted to be cost-effective and to ensure economic efficiency and align ratepayer with demand-side-management objectives.

ENERGY PRICING SUPPORTING COLLABORATION WITH ELECTRICITY AND WATER USERS

Yousef Jebril, EVP – Power & Water Planning, DEWA

Price signals are a very important tool to induce energy efficient behaviors from customers and to promote their collaboration with the utility on optimizing load. This ultimately results in avoided capital investments in new generation capacity and lower consumption of fossil fuels, on which our energy supply still depends strongly.

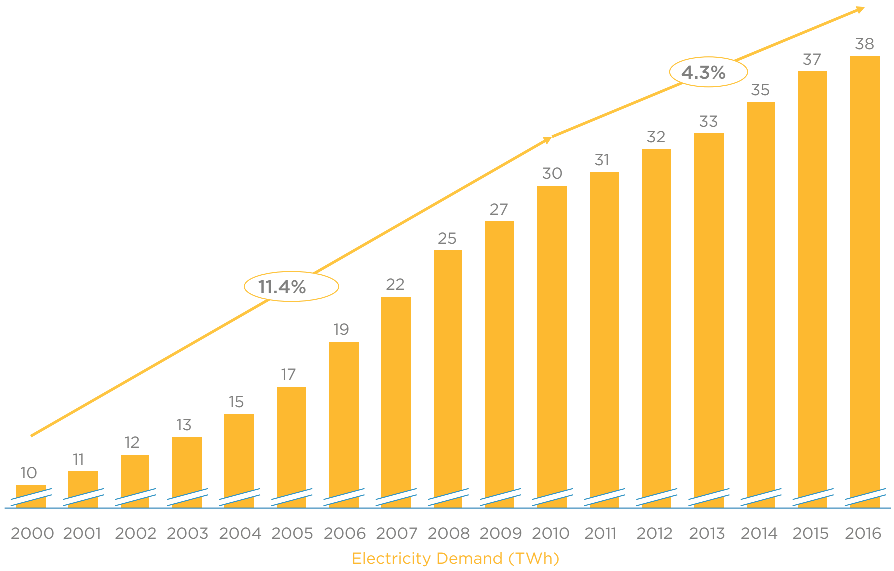
For this reason, DEWA implemented in 2011 a tariff increase for electricity and water, which has been very effective in curving demand trends towards more sustainable patterns. The price change marked the beginning of the DSM Strategy of Dubai, characterized by a lower slope of the demand growth curve.

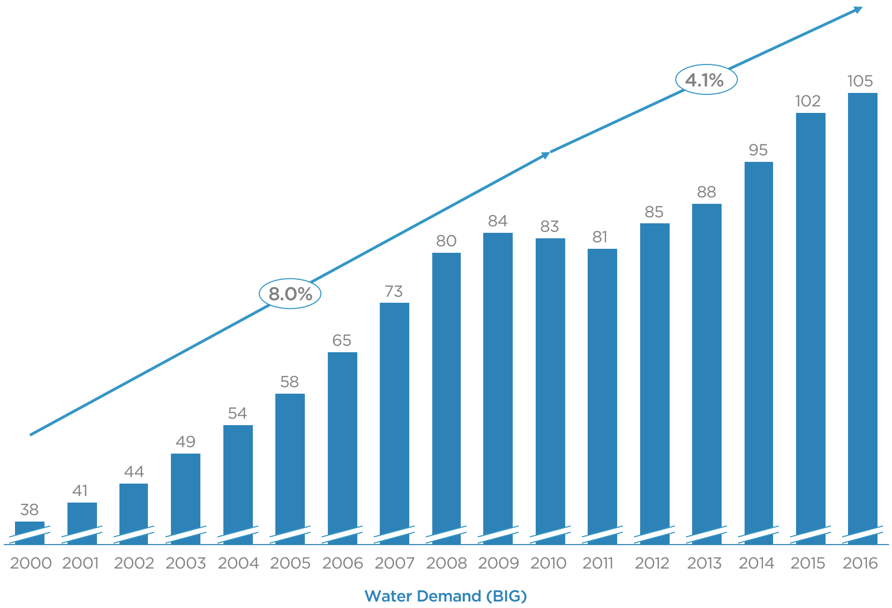
The current electricity and water tariff structure is slab-based for all customer sectors, and higher consumption slabs correspond to higher tariffs. This pricing strategy, which has become common in the GCC due to increasing concerns for energy consumption, clearly incentivizes consumers to rationalize their consumption in order to achieve a lower marginal rate. The addition of a fuel surcharge component in the tariff structure allows more transparency with consumers on drivers for price changes.

KEY FACTS

- The 2011 tariff review resulted 4% - 5% reduction in consumption of electricity and water vs. business as usual in the first two years of implementation. The Impact of that initial tariff change is decreasing over time
- Due to excessive use of ACs, summer peak load period occurs during daytime and a second peak load period is also noticed during the evening

DSM PROGRAMS 7: TARIFF RATES





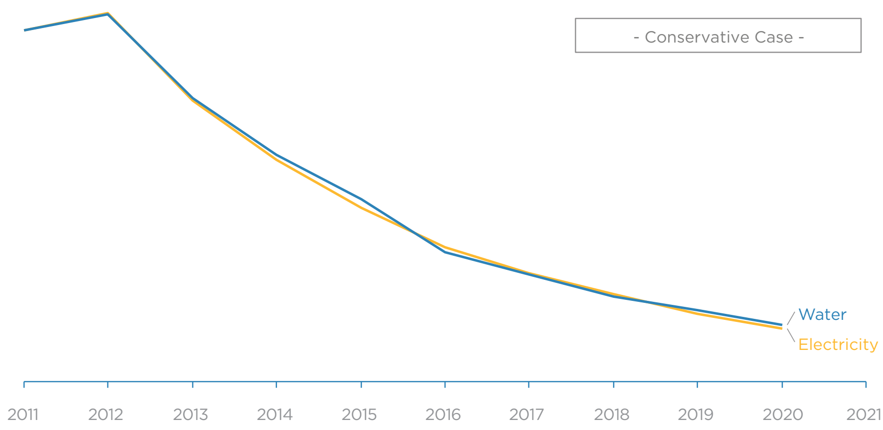
Source: DEWA

Exhibit 69: Long term electricity and water demand trends in Dubai

From an energy efficiency perspective, pricing is a signaling tool which governments and utilities often use to inform consumers on the costs of their energy consumption decisions, inducing cost conscious consumption habits. For this reason, pricing can also be considered a collaboration tool between consumers and the utility.

Nevertheless, tariff reviews need to be accompanied by prolonged communication efforts so that changes are sustained over time. In Dubai, as it is seen in many other pricing programs around the world, the impact of the 2011 tariff review is diminishing over time. This is why DEWA is investing significant resources in awareness measures across a variety of channels.

DSM PROGRAMS 7: TARIFF RATES

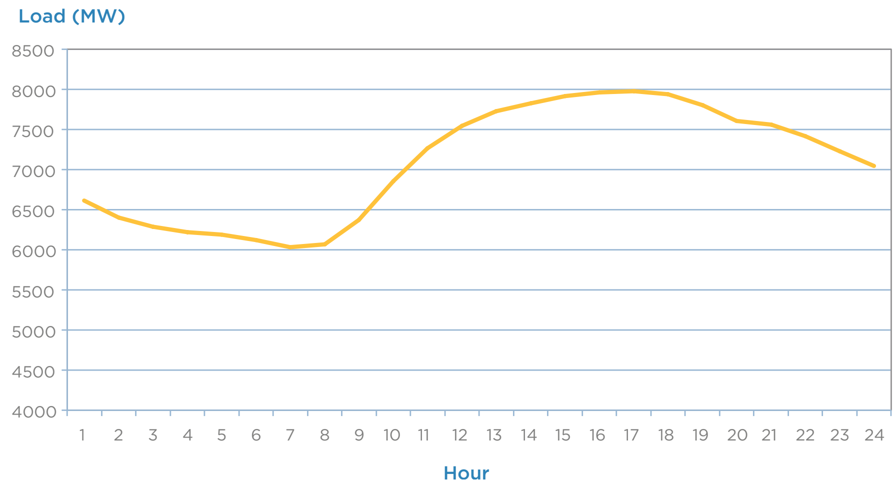


Source: DEWA

Exhibit 70: Degradation of 2011 tariff reform's impact on electricity and water savings

DEWA is also modernizing the grid. Implementation of Smart Grid systems makes the utility observable, controllable, automated and fully integrated, and can be leveraged to raise consumer awareness and induce behavioral change.

In addition to overall consumption, another important factor affecting system cost is the load profile, since peak consumption defines generation capacity requirements and therefore capital expenditure. The DSM Strategy through its combination of programs is also meant to smooth down the load profile. For example, an increase share of solar generation from Shams Dubai will support abatement of the day-time peak, while the Outdoor Lighting program and ESMA standards (e.g., lighting) will help reduce the evening-time peak.



Source: DEWA

Exhibit 71: Dubai peak day load profile, 2016

SHAMS DUBAI

Targets to be developed if required

DSM PROGRAM 8:

SHAMS DUBAI

PROGRAM SCOPE

The Program implements the Executive Council Resolution number 46 of 2014, issued by H.H. Sheikh Hamdan bin Mohammed bin Rashid Al Maktoum, Crown Prince of Dubai and Chairman of the Dubai Executive Council, to regulate the connection of solar energy to Dubai's power distribution grid.

It encourages households and building owners to install solar photovoltaic systems to generate electricity for their needs, and to connect them to the DEWA grid to allow transfer of any surplus generation.

SHAMS DUBAI PROGRAM BUILDING MOMENTUM

Launched in March 2015, Shams Dubai is the Solar Rooftop Program of Dubai. It was added to the DSM Strategy as Program 8 in November 2015 to further highlight the significance of renewable power generation in Dubai.

Shams Dubai is highly endorsed by Dubai's leadership and supports the vision of H.H. Sheikh Mohammed Bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, to have a solar PV system on every rooftop in Dubai by 2030.

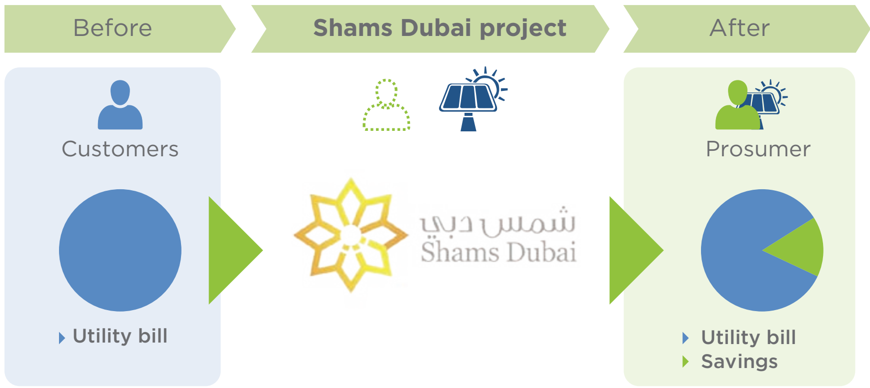
The program, led by DEWA as part of Dubai Integrated Energy Strategy 2050, will contribute, in parallel to DEWA's utility scale solar parks, to the share of Solar in the Clean Energy Generation mix (solar will contribute 55% of total electricity generation by 2050).

With the existing framework, and the growing penetration in the market, Shams Dubai is transforming the electricity sector in the Emirate by empowering electricity consumers to produce clean energy and hence take part in achieving sustainable development in Dubai. Built on a net-metering scheme, the Program allows consumers to become "prosumers" by connecting their PV systems to DEWA grid and offsetting electricity consumption with solar generation. While the Program is around distributed generation, it is a component of the DSM Strategy as it provides electricity customers another lever to reduce their electricity bill.

KEY FACTS

- Shams Dubai is the first comprehensive framework for Solar Rooftop in GCC
- Up to 100% of electricity needs of a building can be supplied from a solar PV system through net-metering
- 50+ enrolled Shams Dubai consultants and contractors
- Component & contractor/consultant accreditation scheme institutionalizes program quality

DSM PROGRAM 8: SHAMS DUBAI

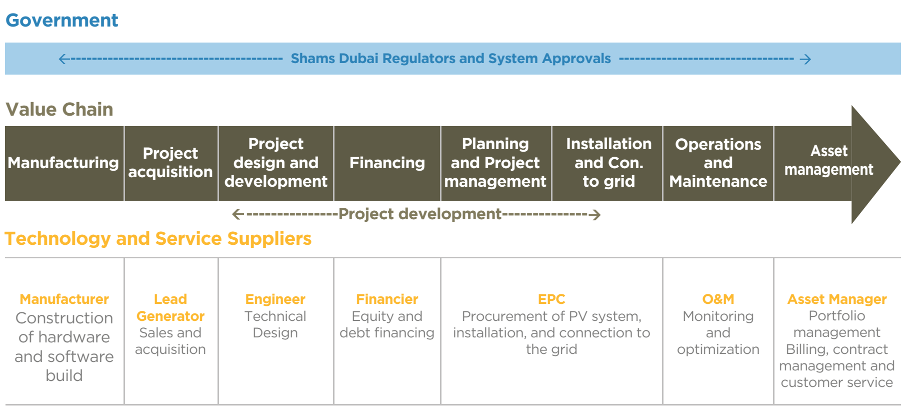


Source: Etihad Energy Services

Exhibit 72: Customer and utility bill before and after Shams Dubai project

By 2015, the regulatory landscape of Shams Dubai was defined and enablers were activated. In addition to the net-metering system, connection conditions on solar installation capacity (not to exceed customer's electricity load), and consumption (not to be used outside the land plot where it is generated) are the main regulatory elements shaping the growth of the market. Among others, program enablers include the development of the agents in the market, through a certification process and training for contractors; the definition of an eligibility scheme for solar PV systems, based on the technical standards developed for the purpose; and the implementation of an end-to-end Shams Dubai permitting, connection and billing process.

Since its inception and as of end of 2016, the program had over 100 MW of projects under permitting and execution, with the first projects (7.3 MW) already interconnected. A significant capacity is expected to be interconnected in 2017, and studies conducted by leading industry players looking at sheer rooftop surface area where Solar Rooftop could be economically deployed, confirm the long-term growth potential of Shams Dubai.



Source: Etihad Energy Services

DSM PROGRAM 8:
SHAMS DUBAI

Exhibit 73: Shams Dubai value chain and key players

To understand the market barriers to Solar Rooftop penetration today, which need to be addressed to fulfill the existing market potential, TAQATI has conducted an in depth market study covering the entire Solar Rooftop value chain and involving key players in the market through one-to-one interviews and surveys. We have identified two business models prominent in the market today and a number of challenges.

1. Direct Ownership	• Customer buys and maintains ownership of the solar PV system *The majority of the projects to date fall under this model*
2. Third Party Ownership	• Also known as solar leasing, customer pays a rental fee to a Solar Financing Company who remains the owner of the PV system installed on the customer's rooftop during a lease agreement period (15 – 20 years) *Projects following this model are expected to be completed as of 2017*

Exhibit 74: Solar Rooftop business models in Dubai

DSM PROGRAM 8:
SHAMS DUBAI

A. Economics	• Despite market efficiencies, current financing and connection costs limit the attractiveness of Solar Rooftop to market segments where solar generation has high potential in reducing electricity bill
B. Financing	• Today, cost of financing is high as the asset class of Solar Rooftop generation is relatively new to the investor base
C. Regulations	• There is an active and continuous debate with respect to the risks associated with a Solar Rooftop investment, and the way regulation could help mitigate some of these risks. Shams Dubai incorporates significant learning and innovation from international market experience, and is expected to further evolve over time
D. Operations	• Capabilities across the value chain (utility, designers and contractors) are still growing as Solar Rooftop is a new industry in Dubai affecting the efficiency and lead time of the end-to-end sale, permitting and connection process
E. Awareness	• Even though demand is significant (as evidenced by the level of pipeline), awareness levels among customers and financiers are still relatively low, as reasonably expected for a new market offering, and more effort is required by all market participants to drive market demand

Exhibit 75: Extract of market barriers to penetration of Shams Dubai

Program Owners have already started addressing some of the challenges. In the area of financing, the Dubai Green fund is currently being set up and will catalyze investments in Solar Rooftop projects.

Furthermore, the implementation of Dubai Municipality's new Green Building Regulations, Al Sa'fat, which incorporates a minimum Solar Rooftop generation requirement on all new buildings (≥ 5% of the actual electrical load of building - code 504.04 in version 1.0), will further encourage the adoption of Solar Rooftop in the market.

Finally, DEWA Operations is carrying out a number of initiatives in the aim of streamlining the permitting and connection process that have significantly reduced permitting times since the program was first introduced.

The target to have a solar PV system on each rooftop in Dubai by 2030 announced by H.H. Sheikh Mohammed bin Rashid Al Maktoum last November is a clear direction. The journey has started and we are committed to continuously improving the prospects of Solar Rooftop, while ensuring safety and quality of the DEWA grid.

ETIHAD SOLAR: A DEDICATED TEAM TO DRIVE ADOPTION OF SHAMS DUBAI

Christos Mimikopoulos,
Executive Director of Etihad Solar,
Etihad Energy Services

Towards the end of 2016, Etihad Energy Services launched Etihad Solar a business unit focused on further stimulating the Solar Rooftop market. Etihad Solar is expected to play an increasing role in enabling market expansion now that the regulatory framework has been established.

Highlights of Shams Dubai projects in Hatta
Comprehensive development plan

As part of Hatta's Development Plan, launched by H.H. Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE and Ruler of Dubai, and among DEWA's initiatives in support of the Plan, Etihad Solar will be leading the development and installation of solar photovoltaic panels on 640 national villas, as well as on other government buildings in the area.

The project is the largest residential Solar Rooftop project in the region and Etihad Solar expects that deployment could reach 3MWp of installed capacity, and have a significant impact in raising consumer awareness.

Once the project is completed, the rooftop solar PV systems will be connected to the DEWA grid through Shams Dubai's net-metering scheme, and residents of the villas will benefit from savings on their electricity bills. The project is expected to be in full rollout by the 2nd half of 2017.

Exhibit 76: Example of major projects in the pipeline to be executed by Etihad Solar in 2017

DSM PROGRAM 8:
SHAMS DUBAI

- DEWA M Station Potable Water Reservoir, Jebel Ali, 1500 kWp
- Red Tag Group, Jebel Ali Free Zone, 573 kWp

- City Center Me'aisem, Tecom, 474 kWp
- Premier Composite Technology, DIP, 210 kWp

DSM PROGRAM 8
SHAMS DUBAI

- DUBAI Municipality, Al Warqa Third, 99 KWp

- DEWA E-Station Carport, Jebel Ali, 81 kWp

- Zayed Bin Sultan School, Al Mankhool, 10 kWp

- Awqaf and Minors Affairs Foundation (Mosque), Al Twar, 6 kWp

Exhibit 77: Examples of Shams Dubai projects connected in 2016 by public and private entities, from large to small scale installations


STRATEGY

6

Future outlook and key priorities for 2017

Future outlook and key priorities for 2017

"DSM priorities are defined on a yearly basis to address identified and expected challenges"

6.1 STRATEGIC PRIORITIES FOR THE COMING THREE YEARS

From the perspective of DSCE and the DSM Strategy as a whole, the strategic priorities identified in the past year review are confirmed. They include actions that will support the scale-up of the main Programs, and actions addressing some of the identified risks.

The main ones are the following:

- Ensure more extended implementation of green building codes in Free Zones, possibly targeting higher levels of harmonization among the different codes
- Ensure the District Cooling Program receives adequate regulatory and awareness support
- Introduce additional measures to further increase consumer adoption of efficient appliances
- Reinforce financing mechanisms in support of the Retrofits Program (specifically to penetrate residential and commercial markets), and identify financing solutions for irrigation retrofits
- Unlock synergies in water reuse, by defining and activating a set of measures to allow savings in treated sewage effluent (TSE) from public irrigation to be used as a replacement of desalinated water in other applications, e.g., district cooling
- Monitor and provide the necessary support to Shams Dubai towards its ambitious 2030 goals
- Implement stronger awareness measures, supported by an energy performance labelling scheme for new and existing buildings
- Keep enhancing the main cross-cutting capabilities in support to DSM, including awareness, capacity building, financing, energy management, monitoring and control

Such priorities add to and support the existing plans followed by Program Owners in executing their DSM Programs.

Future outlook and key priorities for 2017

6.2 MAIN 2017 ACTION ITEMS FOR DSCE AND TAQATI

For 2017, the identified strategic priorities will be addressed by DSCE and TAQATI with a first set of concrete measures. The main ones are the following:

1. Collaborate with Dubai Municipality to ensure Al Sa'fat standards result in more stringent requirements vs. the existing DGBR
2. Re-activate collaboration with Free Zone Council to extend and possibly harmonize implementation of green building codes across the Emirate
3. Reinforce institutional support to District Cooling, in particular in the area of retrofits
4. Prioritize implementation of the designed consumer programs, in support to adoption of more efficient classes of appliances
5. Complete the Water Resource Management Strategy study in support to the Water Reuse Program, and ensure a roadmap of resulting initiatives finds stakeholder endorsement
6. Keep reinforcing DSM analytical capabilities, including forecasting and predictive analysis to ensure higher integration with supply planning, measurement and verification of the energy savings estimations through an effective re-calibration the DSM Energy Model with validated assumptions
7. Activate the energy intensity mapping initiative
8. Develop and launch the DSM Integrated Awareness Strategy 2022 (IAS 2022), and ensure synergies among stakeholders are captured through harmonized outreach and communication plans
9. Enhance current capacity building efforts by launching more focused training programs in support to DSM
10. Obtain stakeholder buy-in to roll-out a set of measures in support to Shams Dubai, resulting from a dedicated study conducted by TAQATI

7

Acknowledgements

Acknowledgements

We are grateful to our leaders, peers, colleagues and consultants who have helped us achieve the important targets of 2016. In particular, we express deep gratitude to DSCE Board Chairman and Members, DSM Executive Committee IOAC members, executives and working groups from the entities listed below:

- Dubai Electricity & Water Authority (DEWA)
- Roads & Transport Authority (RTA)
- Dubai Municipality (DM)
- Dubai Land Department
- Dubai Petroleum Establishment (DPE)
- Dubai Regulatory & Supervisory Bureau for water and electricity (RSB)
- Dubai Supply Authority (DUSUP)
- Emirates Authority for Standardization & Metrology (ESMA)
- Emirates Global Aluminum (EGA)
- Emirates National Oil Company (ENOC)
- Empower
- Etihad Energy Services Company
- Free Zone Council and its member Authorities
- Real Estate Regulatory Agency (RERA)
- The Department of Tourism and Commerce Marketing (DTCM)
- The Executive Council of Dubai
- Trakhees

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List of abbreviations

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AC	Air Conditioning
BIG	Billion Imperial Gallons
CLM	Curtailable Load Management
DC	District Cooling
DEWA	Dubai Electricity & Water Authority
DGBR	Dubai Green Building Regulations & Specifications
DIES	Dubai Integrated Energy Strategy 2030
DM	Dubai Municipality
DNEC	Dubai Nuclear Energy Committee
DPE	Dubai Petroleum Establishment
DSCE	Dubai Supreme Council of Energy
DSM	Demand Side Management
DUSUP	Dubai Supply Authority
EESL	Energy Efficiency Standardization and Labeling Program
EGA	Emirates Global Aluminium
ENOC	Emirates National Oil Company
ESCO	Energy Service Company
ESMA	Emirates Authority for Standardization & Metrology
Etihad ES	Etihad Energy Services Company
GFA	Gross Floor Area
GPP	Green Public Procurement
GPPEWE	Green Public Procurement for Energy and Water Efficiency

List of abbreviations

GPC	Green Procurement Committee
GWh	Gigawatt Hour
HVAC	Heating Ventilation and Air Conditioning
IG	Imperial Gallon
IOAC	Integrated Outreach and Awareness Committee
KPI	Key Performance Indicator
kW	Kilowatt
kWh	Kilowatt Hour
LED	Light Emitting Diode
MIG	Million Imperial Gallons
MW	Megawatt
MWh	Megawatt Hour
PV	Photovoltaic
RSB	Regulatory & Supervisory Buerau
RTA	Roads & Transport Authority
STP	Sewage Treatment Plant
TR	Ton Of Refrigeration
TRC	Total Resource Cost Effectiveness Test
TSE	Treated Sewage Effluent
TWh	Terawatt Hour
UAE	United Arab Emirates

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About DSCE

The Dubai Supreme Council of Energy (DSCE) was formed in August 2009 under Law 19 of 2009, issued by His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE, and Ruler of Dubai.

His Highness Sheikh Ahmed bin Saeed Al Maktoum was appointed as Chairman for the Council, His Excellency Saeed Mohammed Al Tayer as Vice Chairman,and His Excellency Ahmad Al Muhairbi as Secretary General.

The Council consists of the following members: the Director General of the Department of Petroleum Affairs, the President & Chief Executive Officer of DUBAL Holding, the Chief Executive Officer of Emirates National Oil Company (ENOC) and one representative each from the Dubai Supply Authority (DUSUP), Dubai Petroleum (DP), Dubai Municipality (DM), Dubai Nuclear Energy Committee (DNEC) and Roads & Transport Authority (RTA).

The Council has an Advisory Committee from competent and specialized workforce.

The new Governing body seeks to ensure that the Emirate’s growing economy will have sustainable energy while preserving the environment. The Authority is developing alternative and renewable energy sources for the Emirate, while increasing energy efficiency to reduce demand.

Under the visionary guidance of His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the UAE, and Ruler of Dubai, the Dubai Integrated Energy Strategy 2030 (DIES) was developed in 2010 and deployed in 2011 to set the strategic direction of Dubai towards securing sustainable supply of energy and enhancing demand efficiency (water, power & transportation fuel).

طاقتي

TAQATI

برنامج دبي لكفاءة الطاقة

DUBAI ENERGY EFFICIENCY PROGRAM