حكومة دبي
GOVERNMENT OF DUBAI

مكتب التنظيم والرقابة لقطاع الكهرباء و المياه
RSB FOR ELECTRICITY & WATER

2023

ANNUAL REPORT

REGULATORY & SUPERVISORY
BUREAU FOR ELECTRICITY & WATER

CHAIRMAN'S MESSAGE

As we reflect on the past year, I am pleased to present the Regulatory and Supervisory Bureau's Annual Report. This year has been one of significant advancement and adaptation, as we have restructured the Bureau to ensure it remains fit for purpose as our regulatory role develops.

Our focus has consistently been on ensuring the highest standards of efficiency and sustainability. We have striven to meet the growing needs of our vibrant city while upholding our responsibility towards environmental stewardship. The initiatives and policies introduced this year reflect our dedication to Dubai's Clean Energy Strategy 2050, aiming to transform Dubai into a global hub for clean energy and green economy.

Thanks to the unwavering commitment and expertise of our team, we have made considerable strides in enhancing our regulatory frameworks. These enhancements aim to encourage independent water and power producers (IWPPs), energy service companies (ESCOs), and district cooling facilities to excel in all areas from energy efficiency to customer service, and from health and safety to financial efficiency. Our efforts have facilitated a more competitive market, fostering innovation and attracting new investments to our sector.

We have also prioritized the development of smart and sustainable processes critical to effective regulation, so that our regulatory strategies remain aligned with the latest technological advancements in the sectors we regulate, ensuring that Dubai remains at the forefront of the global energy transition.

As we move forward, our focus will remain on supporting the UAE's strategic goals and contributing to a sustainable future. We are excited about the opportunities that lie ahead and are committed to continuing our work with transparency, integrity, and accountability.

I would like to extend my gratitude to our stakeholders for their ongoing support and to our dedicated staff, whose expertise and commitment drive our success. Together, we are setting the foundations for a resilient and sustainable energy future.

HE Qusai Al Shared

TABLE OF CONTENT

H.H Sheikh Mohammed bin Zayed Al Nahyan

President of the United Arab Emirates

H.H Sheikh Mohammed bin Rashid Al Maktoum

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

ABOUT THE RSB

01

Our vision is to become a leading example of regulatory practice in the Gulf region. Our mission is to support Dubai's economic, social, and environmental objectives through development of an effective, independent, and transparent regulatory regime for the Emirate's electricity, water, and district cooling sectors.

The RSB was established by the Executive Council Resolution Number 2 of 2010. We work under the auspices of the Dubai Supreme Council of Energy, developing regulatory frameworks to support Dubai's development through secure and affordable energy supply and efficient energy use, while meeting environmental and sustainability objectives.

Supporting the implementation of the Dubai Clean Energy Strategy 2050 is central to our role. By 2030 the aim is to improve energy efficiency by 30% and the electricity generation mix, historically dominated by gas, is to be transformed, particularly by the addition of renewables.

We license and regulate independent power & water producers, ensuring new entrants to the sector deliver safe, reliable, and efficient services to the benefit of all in Dubai. Governed by Law Number 6 of 2011, private sector participation in electricity and water production brings technology, expertise and capital to the energy sector enabling further efficiency and sustainability towards ensuring security of supply.

In 2021, the RSB became the regulator of Dubai's district cooling market following the promulgation of Executive Council Resolution Number 6 of 2021.

We develop and administer frameworks to encourage greater energy efficiency in buildings. Our energy service company (ESCO) and energy auditor accreditation schemes are designed to build trust and make the process of contracting for energy services smoother for accredited entities and their clients.

EXECUTIVE DIRECTOR REVIEW OF 2023

02

The 2023 annual report highlights a year of remarkable achievements and progress in Dubai's energy sector. The past year has been transformative, marked by substantial enhancements in electricity generation capacity and significant strides towards a more sustainable and resilient energy future.

In 2023, Dubai made significant advancements by adding 2.7 GW of electricity generation capacity, with 2.1 GW coming from Independent Power Producers (IPPs). This expansion featured a diverse energy mix, including new gas-fired units, solar power, and waste-to-energy solutions, demonstrating the commitment to integrating clean and renewable energy sources into the grid. Notably, DEWA's largest clean energy project to date, a 1,800 MW solar photovoltaic initiative, received its electricity generation license from the RSB, underscoring a dedication to sustainable growth.

The Mohammed bin Rashid Al Maktoum Solar Park continued to be a cornerstone of Dubai's clean energy strategy, contributing significantly to operational capacity. Additionally, the commissioning of Noor Energy 1, the world's largest single-site hybrid photovoltaic and concentrated solar power plant, exemplifies an innovative approach to energy production. The inaugural waste-to-energy plant also commenced operations, highlighting efforts to diversify energy sources and enhance environmental sustainability.

Health and safety remain paramount in operations, with 10.4 million man-hours recorded without any serious injuries or fatalities, reflecting an unwavering commitment to the well-being of the workforce. The energy services market saw robust growth, with the RSB's ESCO accreditation scheme achieving new milestones and the building retrofit market experiencing a significant rebound, attracting substantial new investments.

Energy Savings Performance Contracts (ESPC) continued to drive investments, with retrofit projects maintaining financial viability. Regulatory developments in efficient cooling have set new standards for service agreements and consumer protection, fostering a more efficient and fair market. Improvements in district cooling plant efficiency and increased use of recycled water have furthered progress towards sustainability goals, reducing the carbon footprint and conserving vital resources.

Cooling Degree Days (CDD) measured at Dubai International Airport continued to rise, underscoring the need for continued innovation in energy efficiency. Despite the warmer climate, the cooling sector's performance remained strong, with record breaking energy efficiency driving increased DSM savings, which exceeded targets.

The increase in escalated complaints reflects growing consumer awareness and a proactive approach to resolving issues. Efforts are continuously being made to streamline the complaint management process to better serve stakeholders.

Looking to the future, the focus remains on fostering sustainable growth, enhancing regulatory frameworks, and embracing technological advancements. The dedication and collaboration of stakeholders, partners, and team members are crucial to building a sustainable and innovative energy landscape for Dubai, setting a global standard for excellence in the energy sector.

Eng. Ramiz Hamdan Alaileh
Executive Director

SUSTAINABLE ELECTRICITY GENERATION

03

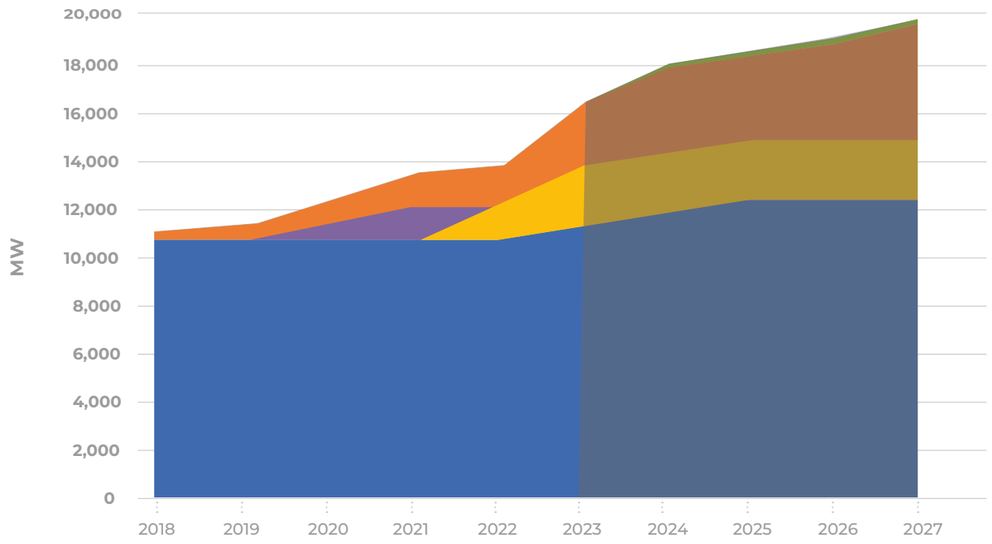
In 2023, 2.7 GW of additional generation capacity has entered Dubai's electricity grid, with 2.1GW originating from licensed Independent Power Producers (IPPs). This increase was achieved through a diverse mix of sources, namely: two new gas-fired IPP units (600 MW each), expansion of DEWA Aweer Power Station "H" (553 MW), concentrated solar power (500 MW), photovoltaic (360 MW), and waste-to-energy (84 MW).

In December 2023, the Dubai Electricity and Water Authority's (DEWA) most substantial clean energy project thus far has reached financial close and received its electricity generation licence from the RSB. This project was delivered through an arrangement with a capacity of 1,800 MW using solar photovoltaic technology. This milestone has increased the total capacity licensed by the RSB to 7,469 GW. The project, which is being developed by Masdar, is projected to achieve its full capacity by 2027.

The Mohammed bin Rashid Al Maktoum Solar Park, which is almost at its total planned capacity of 5 GW, contributed 2.8 GW of operational capacity in 2023, out of its licensed 4.8 GW. Noor Energy 1, the world's largest single-site hybrid photovoltaic (PV) and concentrated solar power (CSP) plant, commissioned 500MW of central tower and parabolic trough generation. The remaining 233 MW are scheduled for commissioning in the first half of 2024. Shuaa Energy 3 exceeded its designed capacity of 900 MW by 10%, leading to an amendment of its generation licence to reflect a peak capacity of 990 MW.

Dubai's first waste-to-energy plant and the UAE's largest, entered its early operation with 84 MW, helping in Dubai's waste management efforts and contributing to the Emirate's energy needs. The plant is expected to reach its peak capacity of 210 MW in early 2024.

Figure 1 illustrates the evolution of Dubai's electricity production capacity from 2018 to 2023, with a forecast extending to 2027 when all currently licensed capacity is expected to be fully commissioned.



IPP%	%4	%6	%13	%21	%23	%32	%34	%33	%35	%37
Self Supply	-	3	15	16	30	30	44	44	44	44
Waste-To-Energy	-	-	-	-	-	84	210	210	210	210
Solar IPP	405	705	1.005	1.622	1.992	2.782	3.615	3.615	4.015	4.815
Clean Coal IPP	-	-	600	1.200	-	-	-			
Natural Gas IPP	-	-	-	-	1.200	2.400	2.400	2.400	2.400	2.400
DEWA Owned	10.700	10.700	10.700	10.700	10.700	11.253	11.779	12.369	12.369	12.369

Projections

Figure 1: Evolution of Dubai's electricity generation capacity

In 2023, our licensees, both utility scale and captive generation, contributed almost 19% of the total grid energy requirement, feeding 10,595 GWh into the grid, of which 6,278 GWh is clean energy accounting for an 11% contribution (Figure 2).

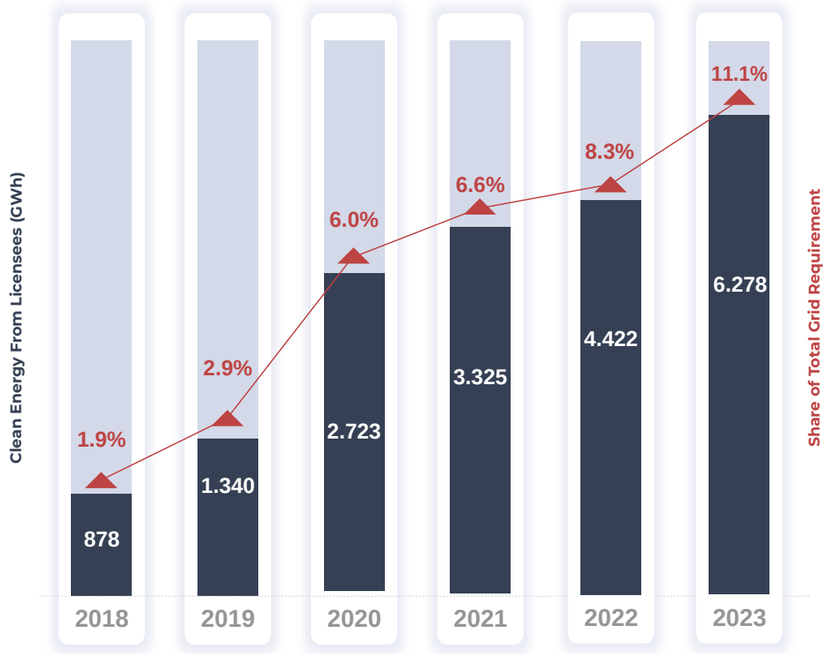
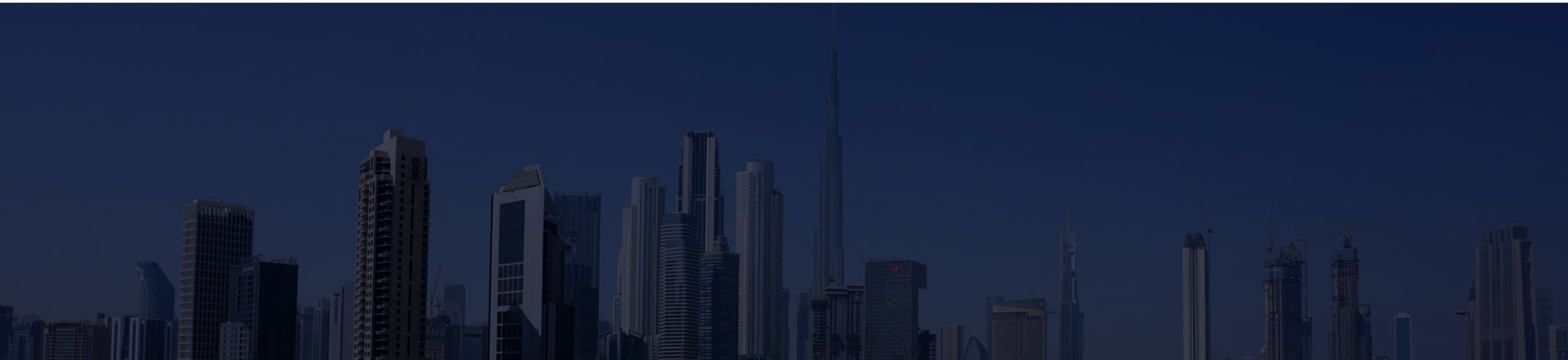


Figure 2: Clean energy production 2018 - 2023



Health & Safety

Our licensees reported a total of 10.4 million man-hours in 2023, with no serious injuries. During this period, there were 122 near misses. These figures suggest that, despite some incidents, a high level of safety was generally maintained, with no serious harm to employees. It remains crucial for companies to continue implementing measures to prevent accidents and foster a safe working environment.

Manhours		**10,446,778**
Incidents	Number	Accident Frequency Rate
Near Misses	122	0.6
LTIs	0	0.009
Serious Injuries	0	0
Fatalities	0	0

Table 1: Health and safety performance

ENERGY SERVICES MARKET ACCREDITATION SCHEMES:

04

A Legacy of Success

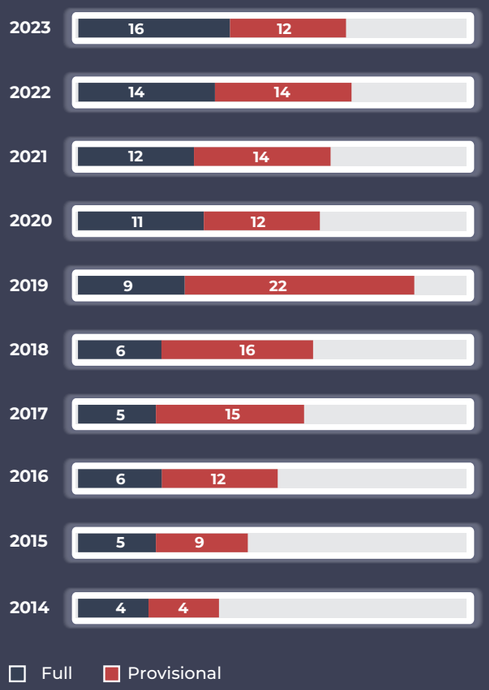


Figure 3: Number of accredited ESCOs in the past 10 years

Over the past ten years, the RSB's ESCO accreditation scheme has gathered significant interest, boasting a register of 28 accredited companies: 16 fully accredited and 12 provisionally accredited. In 2023, the scheme attracted 26 applications, with 23 companies meeting the rigorous criteria for new accreditation and renewal.

By the close of the year, the number of accredited energy auditors stood at 10 distinguished companies who are at the forefront of promoting building energy efficiency and sustainability through assessing energy performance and savings potential in buildings.

These accredited entities offer valuable insight into market activities through the data they report to the RSB, which informs the Dubai Supreme Council of Energy's Demand Side Management (DSM) Strategy monitoring and update.

Reclaimed Growth Amidst Evolving Dynamics

Following a difficult phase amid the Covid-19 pandemic, the year 2023 marked a significant rebound in the market for building retrofits. There were 37 new projects unveiled in 2023, representing an investment of AED 261 million, compared to AED 59 million added the year before. This marks a significant milestone, pushing the total sector investment to an impressive AED 1.38 billion since 2014 with a total of 417 projects reported to date involving more than 6,200 buildings. Villas constituted the majority of those buildings, followed by commercial office buildings and then residential buildings.

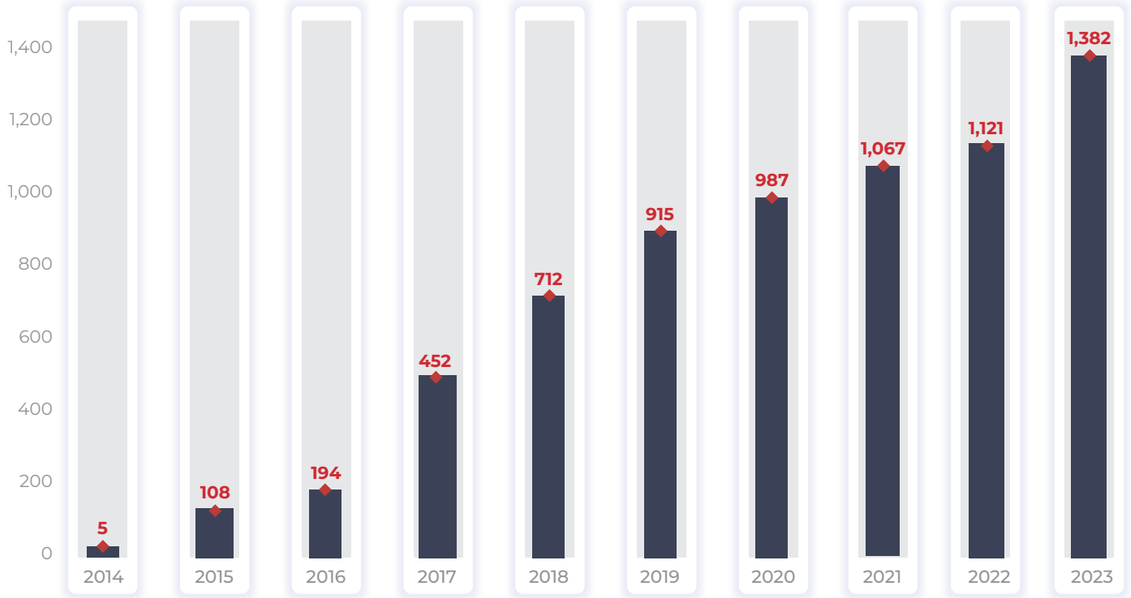


Figure 4: Investment growth from 2014 to 2023

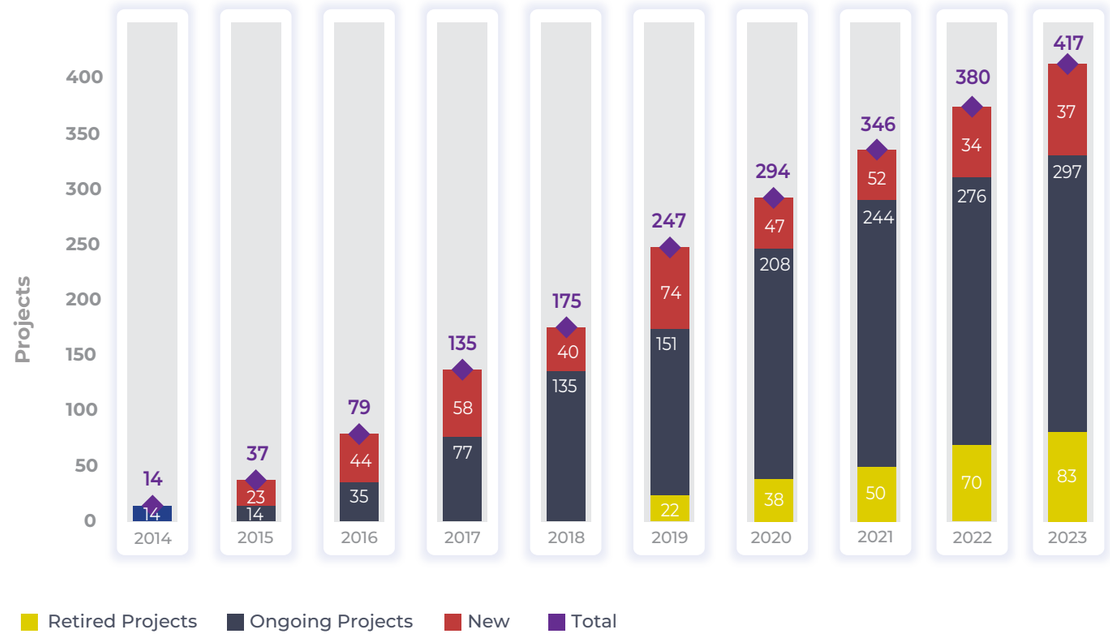


Figure 5: Project growth from 2014 to 2023

More investments continue to flow into governmental building projects, which still constitute more than half the total investments.

The year 2023 set a new ambition underscoring the sector's commitment to energy and water conservation, with 728 GWh in targeted energy savings, outperforming the previous year's figure by 12%, and a significant 22% jump in targeted water savings, from 504 MIG in 2022 to 615 MIG in 2023.

Actual savings have closely followed targets, where 709 GWh of energy savings as well as 462 MIG of water savings have been achieved, an increase of 6% and 7% respectively from the previous year.

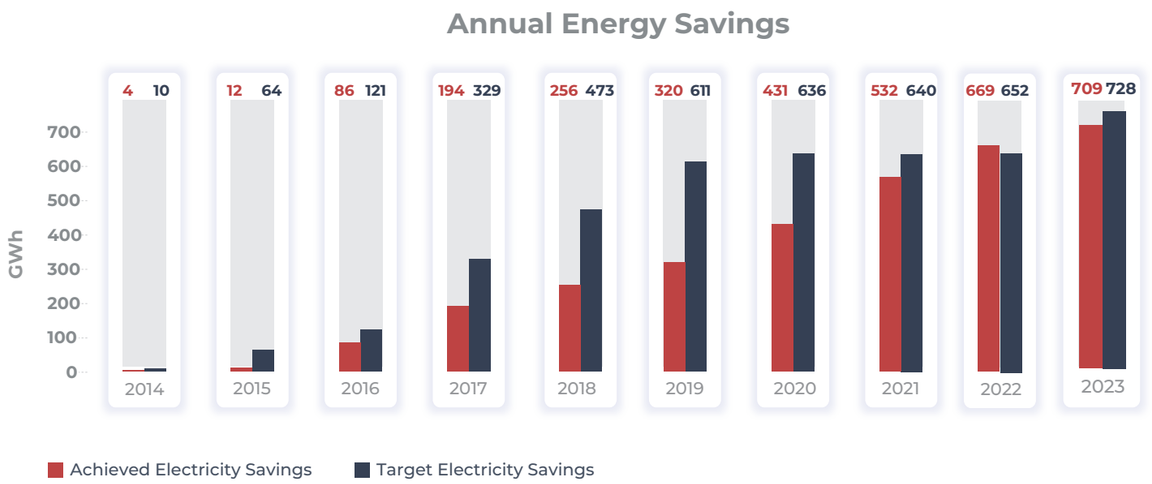


Figure 6: Energy Savings

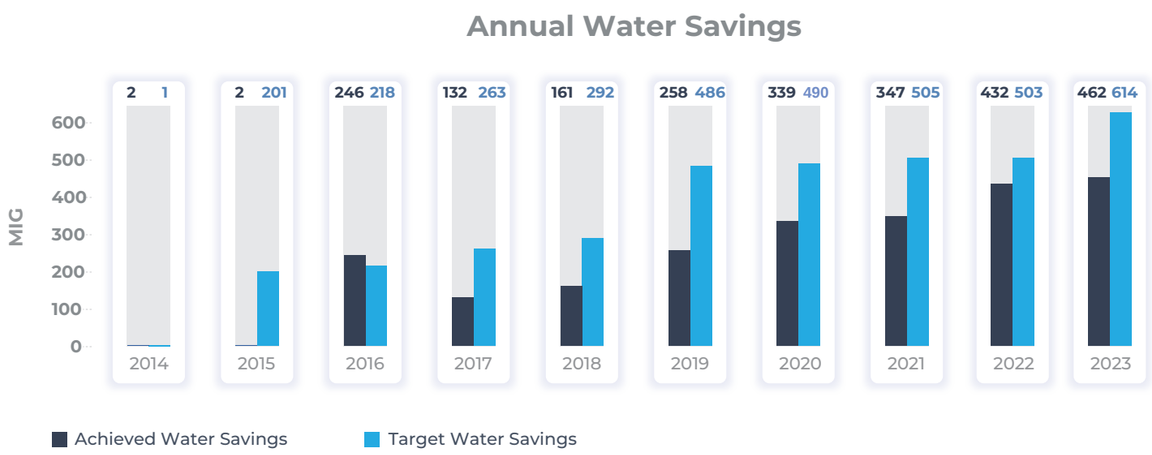


Figure 7: Water Savings

The ESPC Model: A Dual Approach to Energy Savings

ESCOs continue to offer their Energy Savings Performance Contracts (ESPC) in at least two successful models:

- Guaranteed Savings or Client-Financed: Clients invest upfront, and ESCOs guarantee the energy savings.

- Shared Savings or ESCO-Financed: ESCOs invest in projects, sharing the resultant savings with clients.

Of the total investment since 2014, 18% have been directed towards non-ESPC projects, which, while not guaranteeing savings as in ESPCs, aim for substantial energy conservation. Interestingly, however, the proportion has dropped to less than 4% for the new projects reported in the past couple of years, with more investment going into guaranteed savings contracts recently.

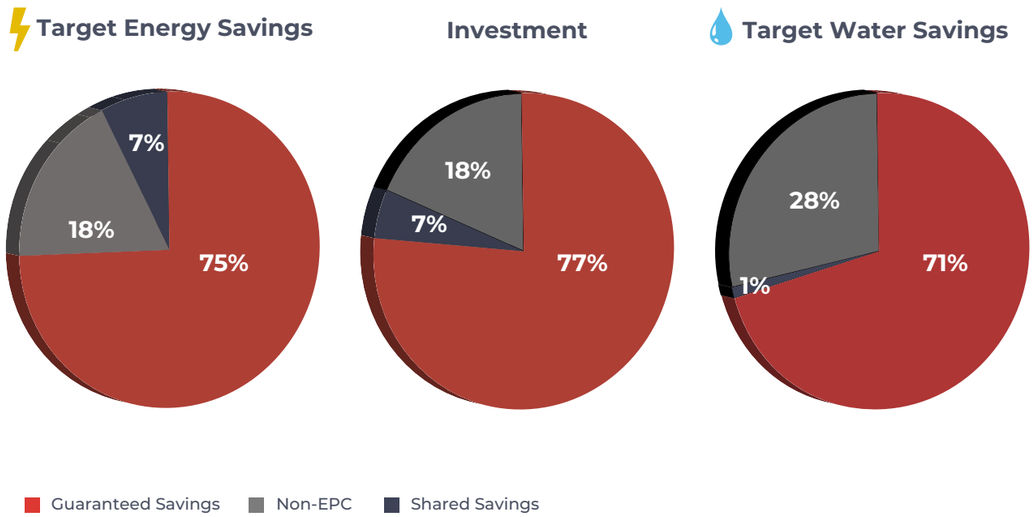


Figure 8: Breakdown by contractual arrangement

Investment Returns: A Calculated Impact

The average payback period for retrofit projects has slightly increased to 3.5 years instead of 3.3 resulting from 2022 figures, yet it still supports the financial viability and attractiveness of investing in energy efficiency.

More investments still flow into cooling system retrofits followed by lighting systems, highlighting the prioritization of these key areas in energy conservation efforts.

EFFICIENT COOLING

05

Developing Regulations

New regulations:

RD04b was implemented setting minimum requirements for all new cooling service agreements. The objective of this regulation is to ensure that these agreements which are often long lasting with implications on end users, are fair respecting the need for DC providers to efficiently finance their functions whilst minimizing the cost burden on customers and introducing guaranteed levels of service.

Consulted on RD09: Establishing the connected load.

This regulation aims to raise awareness among developers about the benefits of obtaining accurate estimates for the building cooling load requirements. Many of Dubai's developers are on the side of caution and contract excessive cooling loads for fear of not having sufficient cooling. The reality is that many of existing buildings in Dubai have excessive contracted cooling. This results in poor operating efficiency and high cost for occupants of the building. The regulations, establish a process in the contracting cycle, point to useful reference material, and require district cooling providers to share anonymized information about similar buildings so the developer is fully informed when deciding how much cooling load is required. The final version of the regulations will be implemented in 2024 subject to DSCE approval.

Revised RD02: Handling customers in arrears.

In response to escalated consumer complaints concerning the application of late payment fees, we reviewed the requirements of RD02: Handling Customers in Arrears. We now require permit holders to issue a specific notice to a customer in advance of applying a late payment fee, warning them that if they fail to settle the outstanding amount, they will incur an additional fee.

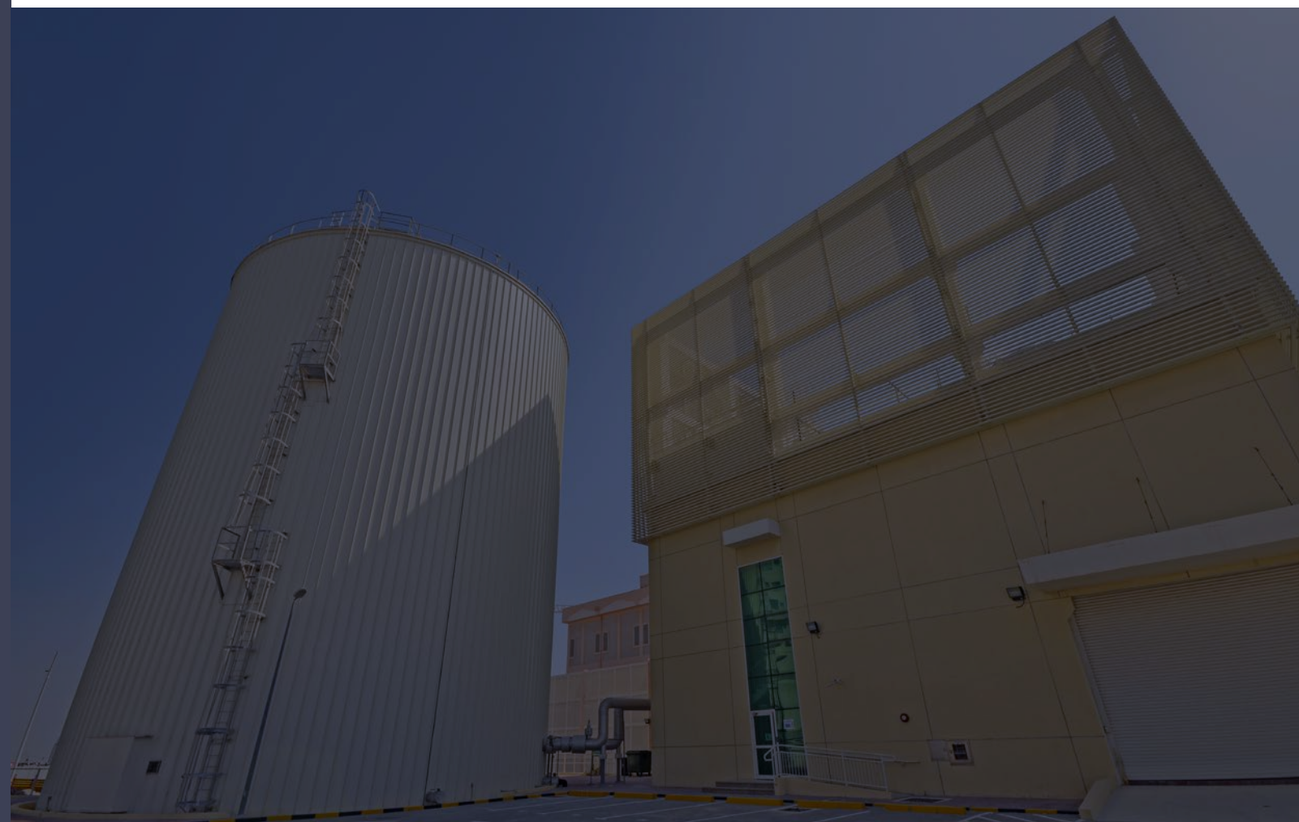
Revised RD03 - Energy Performance:

We have opted to measure efficiency at the system level rather than for individual district cooling. We have observed that in some cases where there are several plants serving the same district cooling system, one plant may be used to meet peak demand enabling other plants to run at optimal performance. The plants used to meet peak demand often will have relatively poor energy efficiency, but when taken in aggregate with the other plants servicing the system, the energy performance is superior.

Regulations must encourage innovative energy efficiency practices and we are careful to ensure that the introduction of any regulations do not create a barrier to innovation. The revised RD03 has also suspended electrical efficiency threshold for air-cooled chillers. We will consider re-establishing this threshold in 2024 and we expect district cooling providers to continue to pursue improved energy performance from these plants in the meantime.

All regulatory documents can be found on our website:

www.rsbdubai.gov.ae/regulating-efficient-cooling



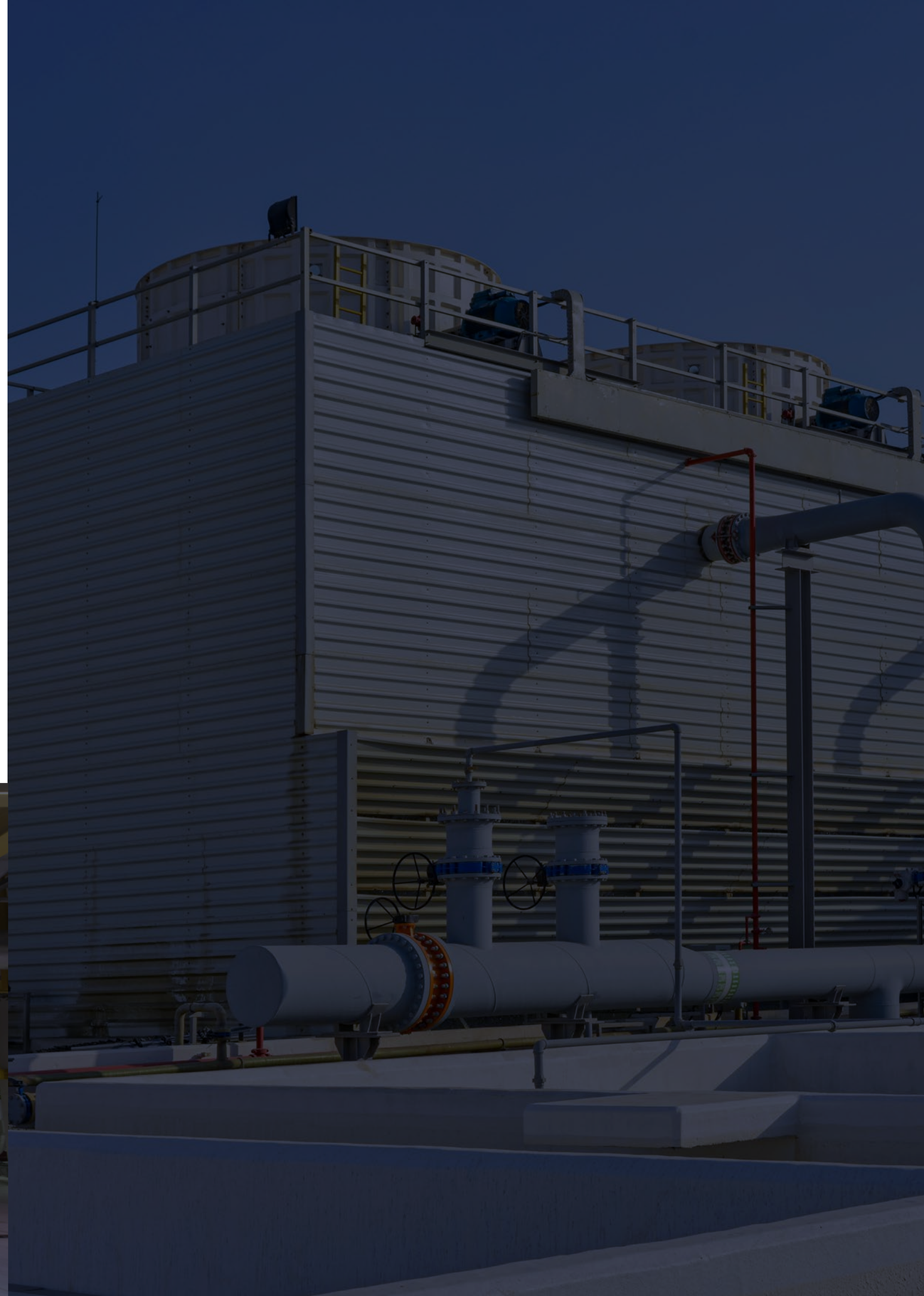
Identification of further RDs

Establishing minimum requirements for billing services:

It has become evident that there is a clear need to establish minimum requirements for commencing billing services. This minimum requirement will establish specific data that is required to be made available when sub-metering services are first commissioned, and whenever there is a change of Billing Service Provider. The minimum requirements have been designed to be incorporated into RD01 and we will consult on the requirements in 2024.

Escalated Regulatory Action project:

We engaged with Dubai Department of Economy and Tourism with a view to establish clear processes and procedures in the event that escalated regulatory action has to be taken against a permit holder. In the course of this initiative, we are also working to ensure the activities related to district cooling and billing services added to trade licences are controlled so that only those entities which have obtained the necessary permit from the RSB may add these activities.



The Permitted Sector

The RSB received several applications for Billing Service Provider Permits, which it took to imply that the current billing service fees combined with other peripheral charges make for a relatively low risk / high return business. The RSB is concerned to ensure that customers receive excellent value for their money and may consider recommending adjustments to billing service fees where it considers them excessive.

At the end of the year sector comprised:

DC Providers	Billing Agents	Contract Capacity (TR)
17	14	2.40M

Cooling Plant	DC Systems	Building Schedules	Supplies
148	108	2709	0.22M

Figure 9: The Permitted Sector

Cooling Degree Days

Cooling Degree Days (CDD) are a measure used to estimate the energy needs for air conditioning or refrigeration. They reflect the demand for energy to cool buildings and are particularly relevant in hot climates. Dubai International Airport (DXB) serves as a strong example for analyzing trends in CDD over the past two decades, given its location in a region with significant seasonal fluctuations in temperature.

Working with a baseline of 22°C, the year 2000 had a total of 2,407 CDD, while by 2023, the figure had risen to 3,048 CDD. This indicates a marked increase in the demand for cooling energy at DXB, reflective of the broader impacts of global warming, as well as potentially the urban heat island effect.

The trend in CDD is somewhat irregular but exhibits an overall increase. The early 2000s saw totals hover around the 2,500 CDD mark, but from year 2010 onwards, there has been a clear shift towards higher totals, regularly exceeding 2,700 CDD. The period between 2010 and 2023 has seen the highest values, with peaks in 2017 and 2023 reaching over 3,000 CDD. This surge is indicative of the rising temperatures in the region.

Focusing on 2023, the monthly CDD data show high values consistent with the rising trend observed over the years. July and August continue to be the months with the highest CDD, which is expected due to these being the peak summer months in Dubai. However, a significant increase is also noticeable in September and November, suggesting that the warmer conditions are extending beyond the traditional summer months.

One of the most striking observations in 2023 is the substantial CDD recorded in November, a month that traditionally sees a decrease as the region transitions out of summer. With 182 CDD, it is markedly higher than any November in the previous 22 years, potentially signifying a shift in seasonal patterns.

In summary, the CDD data from DXB from year 2000 to 2023 exhibits a clear upward trend, with particularly high numbers in the most recent year, which aligns with global patterns of increasing temperatures. This has significant implications for energy consumption and the need for sustainable energy solutions.

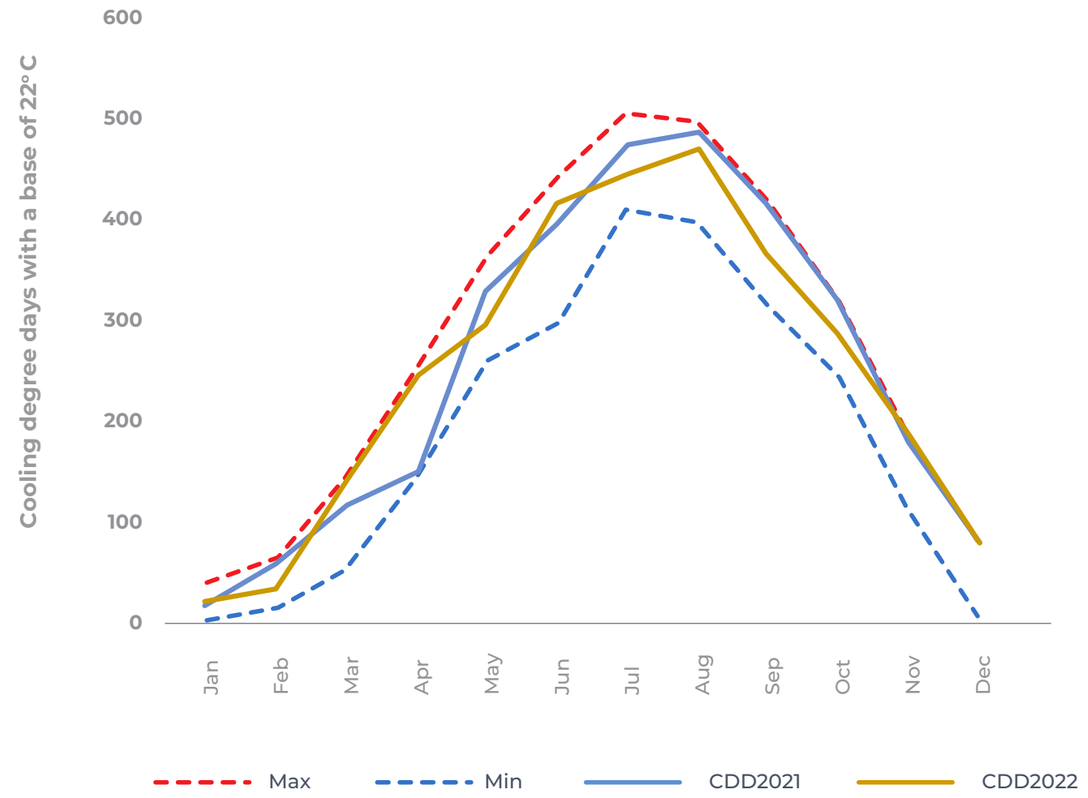


Figure 10: CDD Profiles

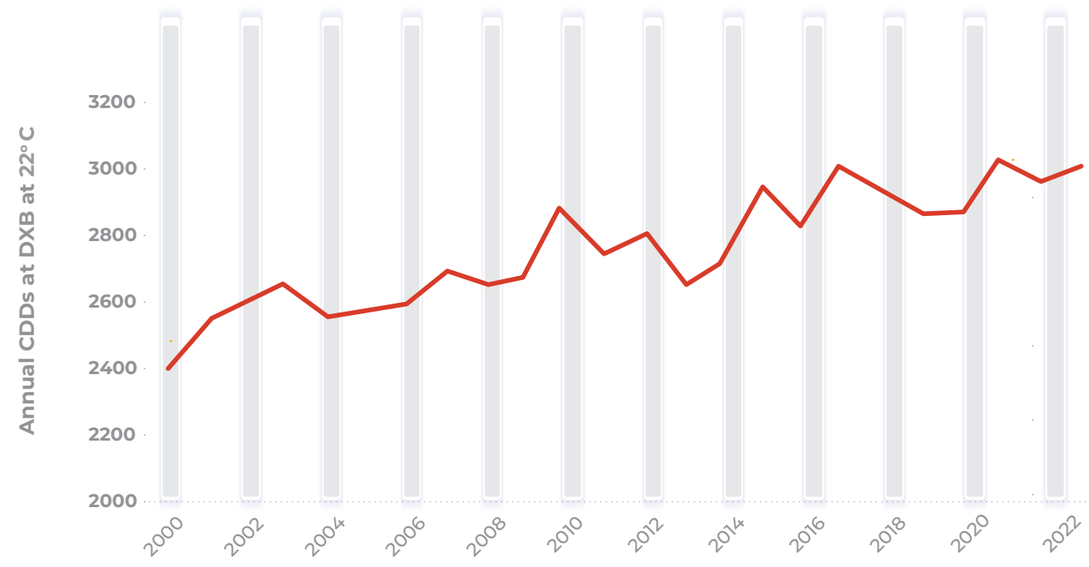


Figure 11: Annual CDDs at DXB

Output and Market share

Electrical demand for cooling is estimated at 24,520 GWh which accounted for 48% of total demand on DEWA's grid in 2023.

DC Cooling output at 4,246 TRh was up 10% on 2022 and accounted for 23.5% of total cooling demand versus 24.5% in 2022. The slight drop in market share is attributed to the significant growth in the number of villas being completed and occupied. Villas almost exclusively use DX technology for cooling. The lower cooling load density associated with lower rise developments means that district cooling is rarely the more energy efficient solution.

DSM Savings

DSM savings continued to grow reaching 1,171 GWh (1,099 GWh in 2022). The 10 GWh of savings lost due to the reduction in market share, was more than offset by the additional 82 GWh of savings from improved efficiency. Overall DSM savings remain well ahead of 830 GWh target for 2023.

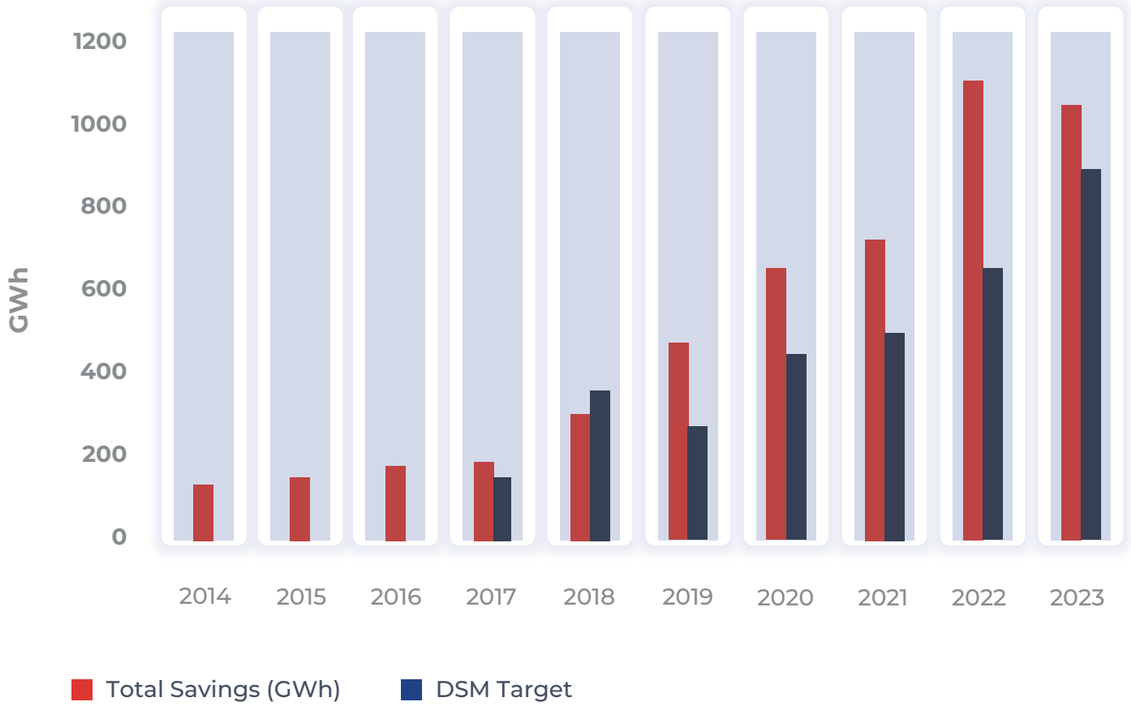


Figure 12: DSM Savings

Electrical Efficiency

Improvements in district cooling system efficiency continued unabated in 2023. The average electrical efficiency of water-cooled DC plants in 2023 was 0.845 kWh/TRh down from 0.852k Wh/TRh in 2022 and closing in on the 2030 target of 0.824 kWh. The best performing cooling plants in Dubai are amongst the best in the world, indeed we are yet to find evidence of any plants that match the 3 best performing plants in Dubai which all operate at efficiencies below 0.7 kWh/TRh.

Several plants missed the regulatory requirement to achieve a minimum electrical efficiency of 0.98 kWh/TRh. However, over 95% of chilled water produced was from plant that met the minimum efficiency requirements.

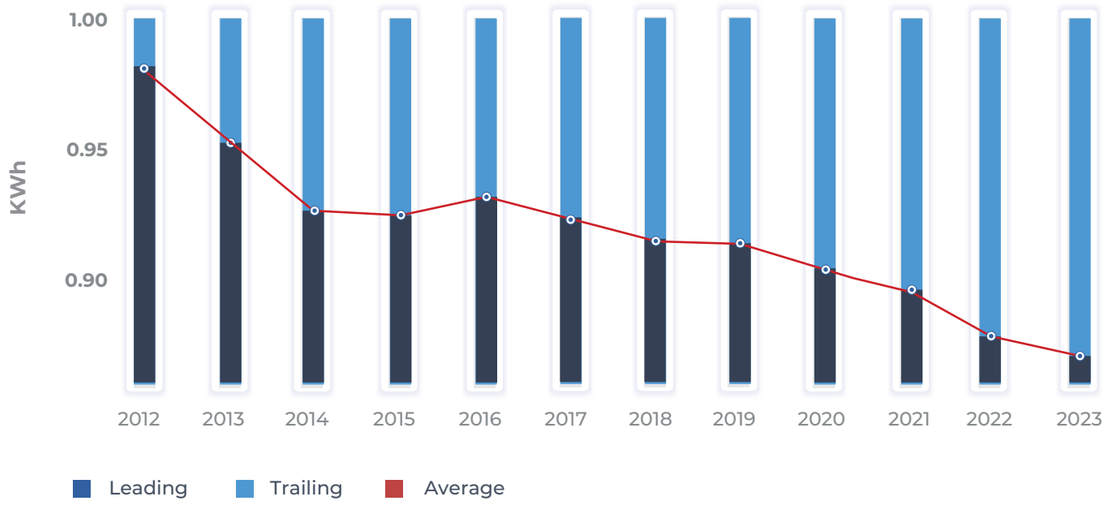


Figure 13: Electrical Efficiency

Water Efficiency

Water efficiency has remained stable between 7 and 7.5 litres per ton-hour. It has hovered around this value since 2018. There are still wide variations in the individual performance of water-cooled plants. Only 4 plants were non-compliant with the water efficiency threshold set out in RD03 and 98% of production came from plants that met the standard.

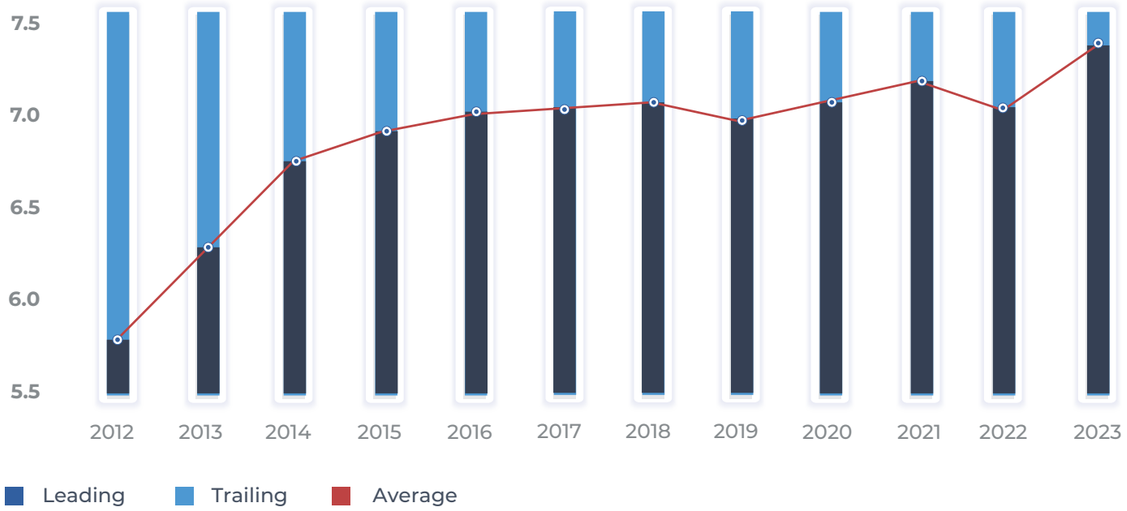


Figure 14: Water efficiency

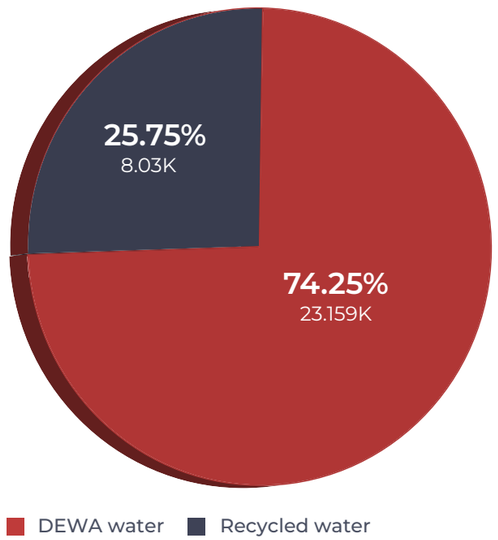


Figure 15: Share of DEWA and Recycled Water

Total Water Use

The sector used 31 million cubic metres (Mm^3) of water during 2023 comprising 23 Mm^3 from DEWA and 8 Mm^3 from recycled sources. We continue to encourage use of recycled water wherever possible because relying on it, rather than high quality drinking water derived from cogeneration facilities, is more energy efficient.

Recycled Water Use

The proportion of water provided from recycled sources increased to 25% due to increased availability. The total recycled water used in district cooling jumped 25% to over 8 Mm^3 up from 6.5 Mm^3 in 2022. Increased use of recycled water eases pressure on DEWA's water desalination capacity and makes a significant contribution to reducing greenhouse gas emissions because less seawater is required to undergo thermal desalination. Companies are monitoring the quality of recycled water which is known to vary depending on location and time of year. Sufficient supplies of good quality recycled water is key to attaining broader energy efficiency goals.

Escalated Complaints

As awareness of the regulatory regime increases, the number of complaints escalated to the RSB or DSCE also increases, and in 2023 we continued to observe this trend with complaints escalated to the RSB increasing 470% year-on-year. Work to streamline the complaint management process started later in the year and will be completed in 2024.

مكتب التنظيم والرقابة لقطاع الكهرباء و المياه
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