



2020

System of the Year

International District Energy Association

Table of Contents

2	System Description	2
2.1	District Cooling Plant Arrangement	2
2.2	Design Standards & Regulations	3
2.3	Remote Monitoring and Control Systems.....	3
2.4	Chilled Water Underground Network.....	4
3	Demonstrated Efficiency	4
4	Demonstrated Availability & Reliability.....	4
4.1	Availability & Reliability Calculations	4
4.2	Reliability Centered Maintenance.....	5
5	Demonstrated Resiliency:.....	8
5.1	COVID-19 Maintenance Challenge:.....	8
5.2	Digital Transformation (PI)	9
6	Environmental Benefits	9
7	Sustainability Efforts.....	10
7.1	Operational Excellence.....	10
7.2	Smart Water Management	14
8	Workplace Safety/Employee Training	16
9	Customer Relations Strategy	18
10	Community Involvement	18
11	Availability/Reliability Worksheet	20

2 System Description

National Central Cooling Company PJSC (DFM: Tabreed), is the leading UAE-based district cooling developer. For over 22 years, Tabreed has remained the partner of choice in providing environmentally friendly district cooling solutions that support the region's energy sustainability strategy with more than 83 plants spread across UAE and GCC. Tabreed has developed itself regionally and globally among leaders in the District Energy Sector becoming one of the leading District Cooling Provider.

District cooling industry is ideal for large-scale and enormous development for commercial towers, government establishment, malls, and towers. A typical district cooling plant shall consist of a fully insulated industrial type building with several levels for the District Cooling plant mainly: ground floor to house chillers, transformers, MV switchgear equipment & generator room; mezzanine floor to house MV switchgear equipment, control room, office, meeting room, pantry and toilets; basement floor to house all process pumps, LV switchgear equipment and makeup pumps; and roof floor to house cooling towers. Makeup storage tanks shall be situated underground in most of such DCP plants. The thermal storage tank required for the process shall be located above the storage tanks, adjacent to the plant and usually a key energy reservoir.

2.1 District Cooling Plant Arrangement

Usually the typical arrangements of our major equipment's with careful and robust design to optimize the space and cost. Below are the typical arrangements.

Basement Level

- Pump room including primary/secondary chilled water pumps, condenser water pumps expansion tanks, make-up water pumps, air compressor etc
- Cooling Tower Makeup Water Tanks & Potable Water Storage Tank
- LV switchgear room

Ground Level

- Chiller room to house centrifugal chillers, refrigerant reclaim unit
- Generator Room to house generator and diesel storage tank
- Medium voltage switchgear room
- Transformer room
- Thermal Energy Storage Tank (TES) is located at this level above underground water tanks

Mezzanine Level

- Control room
- Office spaces includes meeting room
- Pantry
- Toilets, Shower
- Chiller Soft Starter room

Roof Level

- Cooling towers
- Filtration system

2.2 Design Standards & Regulations

Our plants are designed in line with various industry standards and regulations which is why we are different among our competitors and other players in this field, some of them are listed below. The international and local codes and standards that will set the minimum requirements in the design stage and one of the notable features are:

- ✓ Acquiring ISO 50001 is the international standard for Energy Management Systems
- ✓ Registration with DOE (Department of Energy) and their compliance
- AHRI: Air-Conditioning, Heating and Refrigeration Institute
- ASHRAE: American Society for Heating, Refrigeration and Air-Conditioning Engineers
- ASME: American Society for Mechanical Engineers
- ANSI: American National Standards Institute
- API: American Petroleum Institute
- ASTM: American Society for Testing and Materials
- CIBSE: Chartered Institution of Building Services Engineers
- CTI: Cooling Tower Institute
- AWWA: American Water Works Association
- ASPE: American Standards for Plumbing Engineers
- NFPA: National Fire Protection Association
- IEEE: Institute for Electrical and Electronics Engineers
- IES: Illumination Engineering Society
- NEMA: National Electrical Manufacturers Association
- ISA: International Society of Automation
- Local Regulations (ADDC, ADSSC Abu Dhabi Municipality, UAE Civil Defense, UPC and any relevant local Regulations)
- Recently going towards Energy management for ISO 50001

2.3 Remote Monitoring and Control Systems

Tabreed is also having a robust remote monitoring and control system via integrated SCADA system and PLC that will fully automate the operation of the plant. Such an approach reduces the errors usually caused by man-managed plants and increases the efficiency of chilled water

delivery. The plant's main control system will also monitor and control the distribution network to ensure sufficient and efficient delivery of chilled water. Monitoring the distribution network has proven direct gains in improving the plant's ΔT and in assets management.

2.4 Chilled Water Underground Network

All underground piping shall be pre-insulated with minimum 2" with polyurethane foam and shall have an HDPE jacket protection. These pipes are Carbon steel and are robust in such application. They are divided in branches and are laid as a part of in-fracture development. Many such piping are kept blinded for future connections over a period and new developments can be connected at any point of time.

3 Demonstrated Efficiency

Tabreed O&M has placed substantial efforts to increase the efficiencies of their plants by lowering the electrical and water consumption of their plants. The collaborative efforts from all sub-departments and assisting units resulted in continuous and sustainable improvements year after year.

Electrical Efficiency (KW/RT) is being calculated based on Total electrical consumptions of all the plants (KWh) divided by the total refrigeration tons sold to the customers (RTh).

Tabreed Plants recorded 0.935 KW/RT in 2017, 0.913 KW/RT in 2018 and 0.904 KW/RT in 2019. Improvement in 2018 total KW/RT by 3.32 % compared to 2017, demonstrating strong and continuous performance improvement across Tabreed portfolio.

Water Efficiency (IG/RT) is being calculated based on Total water consumptions of all the plants (IG) divided by the total refrigerant tons sold to the customers (RTh).

Tabreed Plants recorded 1.728 IG/RT in 2017, 1.741 IG/RT in 2018 and 1.691 IG/RT in 2019. Improvement in 2018 total IG/RT by 0.75% compared to 2017 and improvement in 2019 total IG/RT by 2.86 % compared to 2018.

4 Demonstrated Availability & Reliability

4.1 Availability & Reliability Calculations

Availability and reliability were calculated for 2018, 2019 and 2020 based on 340 (in years 2018-2019) and 415 (in year 2020) production units (i.e. Chillers), as shown below:

Availability	2020	2019	2018
	99.996%	99.999%	99.998%

Reliability	2020	2019	2018
	98.283%	99.561%	99.439%

Please see the attached sheet for detailed calculations.

These numbers were achieved by the collaborative efforts of operations and maintenance teams to keep the production plants under optimal working conditions. The section below provides a highlight on the maintenance efforts that contributed to high availability and reliability values.

4.2 Reliability Centered Maintenance

Over the past twenty-two years, Tabreed has built knowledge and experience to operate and maintain the district cooling process. The fundamental of this approach was to hire subject matter experts to do the operation and maintenance of the key equipment in this process such as chillers, cooling towers, mechanical rotating and static equipment, engines, electrical component, instrumentation and control system and HVAC systems.

The operation and maintenance (O&M) team worked with all the stakeholders to setup the policy, procedures and the centralized maintenance management system (CMMS). This CMMS is used to manage and record all the historical maintenance activities for each asset in the Tabreed process.

Based on the O&M team experience and on the best practices in the industry, the company implemented and followed a “time based” and “run to fail” strategy for it is preventive and corrective maintenance activities until end of 2018. Beginning of 2019, the O&M team found the necessity to evolve and transfer this strategy. A transformation project called “Tahweel” of the maintenance strategy was launched that introduced major changes to the maintenance practices that were in place until this time.

With Tahweel, the “Reliability Centered Maintenance” (RCM) was deployed. The goal of RCM within Tabreed, is to select and execute an appropriate maintenance strategy for each asset under the scope of the Maintenance organization, and thus, sustain continuous improvement on overall reliability.

More specifically, the purpose of successful execution of RCM is to:

- Improve maintenance cost effectiveness
- Optimize asset uptime
- Design and execute effective asset management strategy
- Extend operating life of assets
- Effective risk mitigation

The Tabreed RCM process is comprised of four key principles:

- To preserve system function
- Identify asset failure modes that can affect the system function
- Prioritize failure modes
- Define and execute applicable and effective tasks to control failure modes

The long-term dimension of RCM is focused on extending life cycle of assets in a reliable and cost-efficient manner that ensures uninterrupted provision of service to customers. That is

achieved through qualitative condition-based maintenance focusing on criticality of equipment and assets.

To achieve an effective implementation of this dimension, the maintenance team is working on multiple streams that are essential for this change:

- Asset data review, modification and addition.
- Asset linkage to fault code, team skills and inventory stock.
- Plant criticality identification.
- Condition monitoring introducing and implementation (note 1).
- Preventive Maintenance frequency review.
- Learning and improvement process at the heart of the RCM (note 2).

Note 1:

The condition monitoring methods that are introduced are partial discharge test, thermography scan, vibration spectrum Analysis, Instrument verification, chiller oil and refrigerant analysis, condenser tubes decaling and cooling towers fills material replacement base on approach temperature.

Note 2:

The following graph shows the Reliability Review Model where the learning and improvement is at the heart of this model. This is the close loop cycle to identify, implement and measure effectiveness of the reliability actions taken and its impact on the assets and the maintenance team performance.

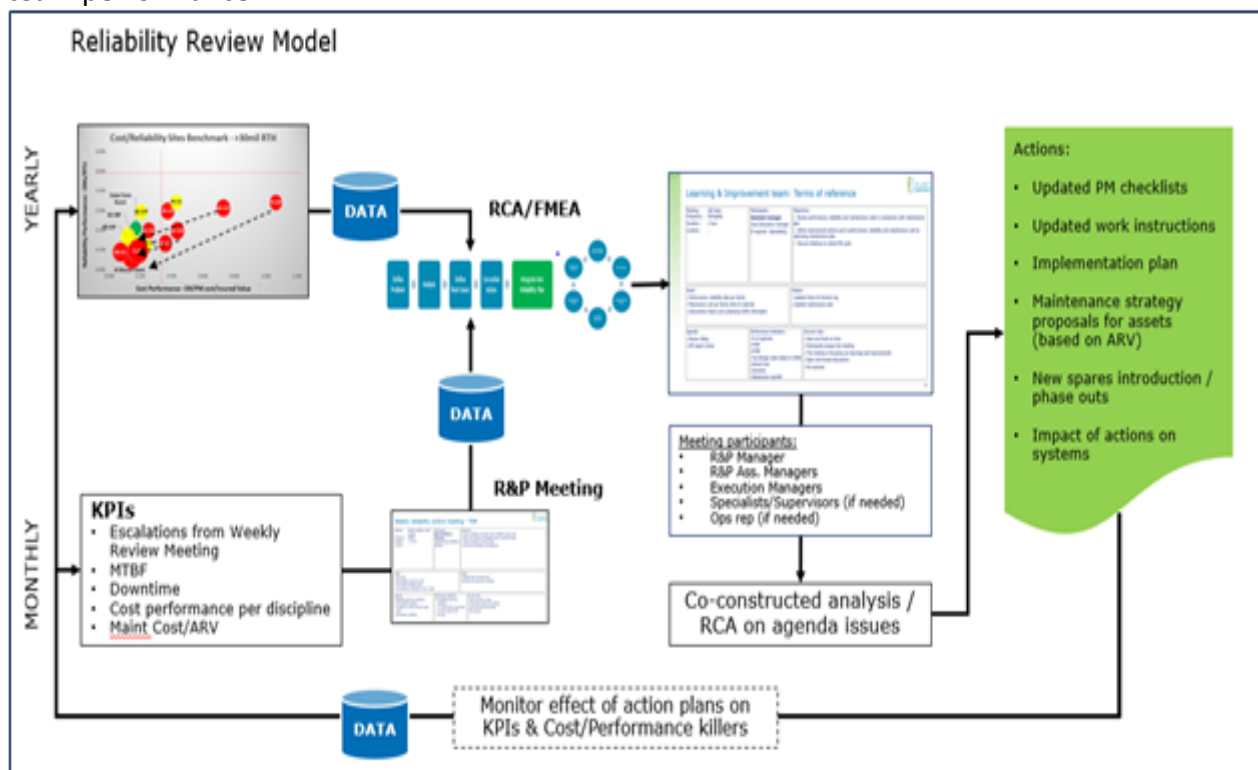


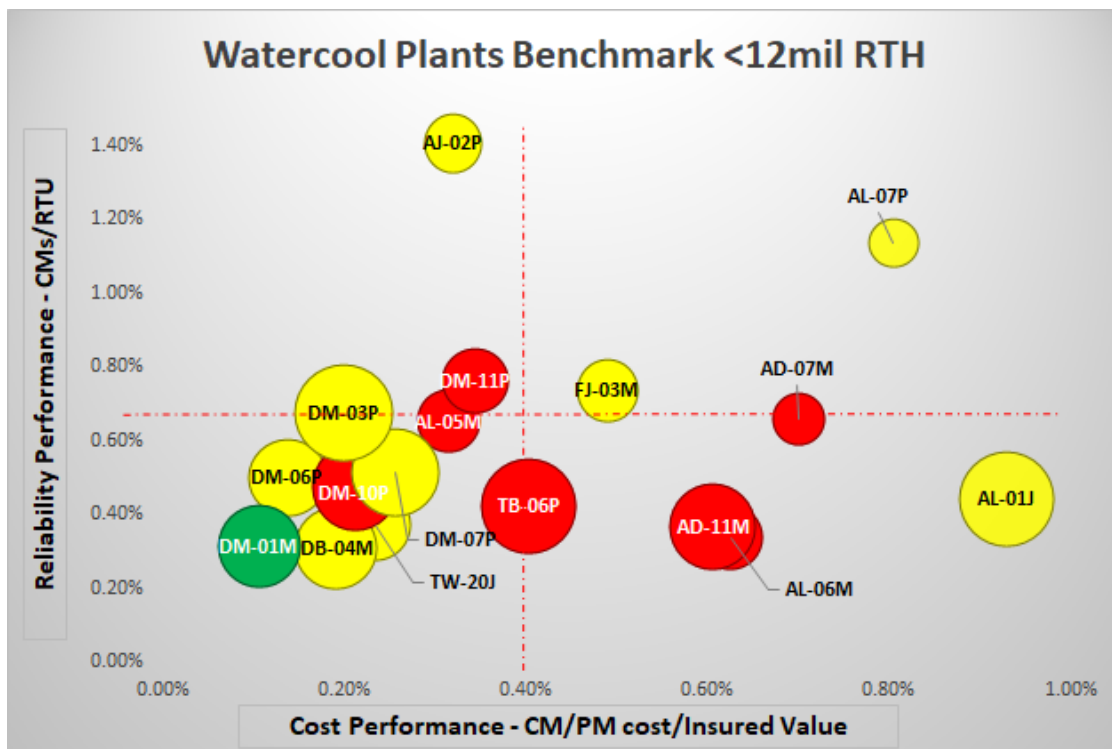
Figure 1: Reliability Review Model

Moving forward and to sustain these major changes, maintenance KPI are in place to monitor the effectiveness of this transformation. The two main KPI are mean time between failure (MTBF) to monitor the quality of the maintenance activity and mean time to repair (MTTR) to monitor the skills and resources level to fix a breakdown. These KPI are captured and recorded in the CMMS system, reviewed on monthly basis and evaluated by “The Reliability and Planning” team who will continuously review the procedures and practices applied by the “Execution” team and look for room of improvement to achieve the main goal of the Reliability Centered Maintenance.

Some of the common tools used by the team as part of Reliability improvement are as follow:

- 1- RCA (root cause Analysis)
- 2- FMEA (failure mode and effects analysis)
- 3- Asset replacement value (ARV)
- 4- Yearly reliability cost performance plan (note 3)
- 5- Plant criticality factor: combination of operational and commercial criteria (note 4)

Note 3:



Note 4:

High Criticality Plants	Overall Score
TB-07P Tabreed 7 Plant	2.66
AL-06M Al Ain Mlty School Modu	2.64
TB-06P Tabreed 6 Plant	2.64
AD-01P Muroor Street Plant	2.56
AD-11M Khaldya Mall Modular	2.55
DB-01P SZR 1 Plant	2.48
AD-02P Zayed Sports City Plant	2.46
DM-09M Al Nahda	2.45
AL-05M Al Ain Al Wadi Modular	2.43
DM-11P Palm Deira Plant	2.43
TB-05P Tabreed 5 Plant	2.38
DM-14M Jedaf	2.36

5 Demonstrated Resiliency:

One of main pillars and core values of Tabreed, is being resilient in the face of challenges. This enabled the organization to survive many challenges during the past 22 years. It was also a main driver behind not only the continuity to provide district energy to customers, but also the continuous improvement of services provided. Below are two examples demonstrating Tabreed resiliency in operations and maintenance.

5.1 COVID-19 Maintenance Challenge:

Covid-19 pandemic added many challenges on the Operation and Maintenance team. The team was part of the company committee who draw the company strategy to ensure the wellbeing of the staff without interruption of the service.

The Resources team of the maintenance department worked hand in hand with the committee and put procedures and plan in place that are aligned with the international and local authorities' requirement to save guard Tabreed personnel.

A detailed contingency plan was put in place to address the following:

- Lockdown periods and movement of people in coordination with local authorities
- Reduction of manpower presence at site and limiting the support to the emergency call to ensure social distancing is applied

- Scheduled Covid-19 testing for the team to check for new cases.
- Support and follow up of the Covid-19 cases discovered within the team.
- Backup plan with onboarding schedule at different phases (30 %, 50 % and 100 %) to resume full manpower support to end user
- Support for the team member who were lockdown abroad with follow up with the concern department and authorities to arrange their safe return on duty

The results of the above plan were very successful. Our customer did not face any service interruption at any point of time, the wellbeing of our workforce has always been maintained and we did not face any shortage and the number of cases was very low.

5.2 Digital Transformation (PI)

Tabreed has embarked on digital transformation to improve the resiliency and effectiveness of its organization. One of the main building blocks of digital transformation was the implementation of a centralized “Plant Historian” system, called “PI”. This system enables the collection of process data from the geographically spread plants of Tabreed in one centralized location at HQ. The data is updated on a 1-minute frequency basis and is accessible over the internet through secure and protected protocols. This enabled the operations team to have a centralized visibility, perform advanced data analytics and provide recommendation to elevate the operation strategies levels towards higher efficiency zones.

This tool also helped during the COVID-19 situation, enabling lockdown engineers to study the plants’ performances and provide timely feedback to the operations team on ground to avoid any degradation in the plants’ efficiencies.

6 Environmental Benefits

District cooling is established to be more efficient than conventional cooling. This usually results in district cooling consuming 50% less energy in comparison to conventional cooling units. Such power and energy reductions are detrimental especially in the GCC Region that is considered as hot areas throughout the year and consumes a lot of cooling. Tabreed maintains a quarterly record of the environmental impact across its plants. The below numbers demonstrate the environmental benefits across the plants for the entire year.

Tabreed's Environmental Impact 2020



Sustainability - Committed to Health Safety & Environment



Tabreed's energy - efficient and environmentally - friendlier cooling services have saved across GCC by:

2.26 Billion KWH



This is enough energy for up to

128,443 Homes

in the UAE in 2020



Leading to elimination of over

1,348,394 Million Tons



The equivalent of removing

293,129 cars

From our streets in 2020

7 Sustainability Efforts

7.1 Operational Excellence

Tabreed aim has always been to provide cooling as a sustainable solution focused on optimizing its energy consumption, which will result in providing an environmentally friendly solution. Driven by this strategy and commitment from Top Management, Tabreed established a specialized team "The Performance Management Team (PMT)" in March 2018 to drive the energy optimization efforts in the company. The aim of the team is to reduce the energy consumption across Tabreed chilled water plants, by enhancing operational excellence and focus on implementing energy efficiency measures holistically. As a recognition of Tabreed's energy management efforts that were vividly reflected by PMT initiatives, ISO 50001 was attained in 2019 making Tabreed the first District Cooling company to do so under the 2018 revised version.

PMT was instrumental in transforming the way Tabreed operated their plants by seeking and deploying innovative engineering approaches to enhance Operational Excellence. The PMT consists of 5 engineers from different backgrounds including one IT specialized personnel lead by the Operation Sr. Manager. All collective efforts and initiatives motivated by the team yielded electrical energy savings in the scale of 11% in some plants (measured as 2019 vs. 2017 baseline prior to PMT formation).

These results motivated Tabreed to look on studying and expanding the successful implementations in the upcoming years, which would result in enhanced operation strategies

and substantial reduction in energy and operational costs, while keeping district cooling an environmentally friendly solution.

Multiple energy management systems were set in place, based on gaps analysis and areas of improvement that were studied and identified by PMT at the initial phase of the project. The main initiatives are described as follows:

- **Operational Excellence:** to elevate the skill level of the operations team with the focus on energy efficiency operations in line with reliable and un-interrupted production
- **Digital Transformation:** collecting and historizing operational data from its geographically scattered plants
- **Big Data Analysis:** to improve online condition monitoring techniques using live and historical data
- **Energy Optimization Software and R&D:** to enhance the plants' electrical performance
- **Design Modification Projects:** convert legacy production systems to more energy efficient designs



Figure 2: Discussion on plant energy efficiency data (using PI Tool) at PMT's Center of Operational Excellence (COE)



Figure 3: PMT members monitoring Tabreed plants in real time in the Center of Operational Excellence (COE)

In 2019, these initiatives were led by PMT with the support of Tabreed management to embark on certain energy efficiency endeavors including but not limited to:

- **Establishing a real time monitoring room** (Center of Operational Excellence) including a number of selected high potential plants to optimize. This enabled the PMT to monitor the different operation techniques followed at the plants and set more energy efficient strategies, by proactively sharing recommendations with the operations team through different means of communication.
- **Designing and conducting specific training programs** to bridge the gaps in areas related to energy management and operational excellence (e.g. Introduction to Energy Management, PID Tuning and Optimized Cooling Towers Operation).
- **R&D Initiatives:** Building partnership with UAE-based Khalifa University (KU) to develop research initiatives called 'Optimal Chiller Plant Control'. Achieved 2% in electrical energy savings, were the proprietary solution built by Khalifa University and Tabreed provided optimal control to modulate the Cooling Tower fan speeds depending on actual measured samples, using accurate empirical heat exchange models and historical data collected. The tool used engineering simulation tools and mathematical optimization techniques, utilizing the historical and extra process data collected at the site (e.g. chiller's refrigerant flow, cooling water temperature at the compressors motor, etc...). Ultimately, it ensures that the total electrical power consumed through the condenser and chiller systems is aggregated at its lowest possible.
- **Big Data Analysis:** collecting, monitoring and historizing process data from 20 Tabreed's geographically scattered plants, by 1-minute frequency using "PI Software". It provided more

process insights and recommend enhancements proactively. This contributed towards 1% of electrical consumption reduction in the 20 plants connected to PI system.

- **Artificial Intelligence “Chiller Management Solution”:** condition-monitoring techniques using live data of chillers to monitor its performance, analyze its current conditions, provide automated notifications to Tabreed’s Operation and Maintenance teams, rank most efficient chiller to run and assist Maintenance to enhance the quality of their work. Since chillers consume 70-80% of total plant electrical input, this initiative resulted in achieving significant energy reductions.
- **Collaboration with customers:** A custom-made recommendation plan was presented to each customer in order to enhance their air and chilled water systems, which would result in higher Delta T and lower electrical consumption for the customer and Tabreed.
- **Retrofit Projects:** Convert constant speed driven motors to variable speed, for applications such as condenser water pumps and chillers. This was motivated to gain more energy savings in plants where such investments would yield attractive ROIs and sustainable financial gains despite load changes or other process disturbances that constant speed motors cannot tackle. This resulted in about 3% savings of the electrical consumption after changing the constant speed motors driving the condenser water pumps to variable speed drives, coupled with optimal control schemes.
- **Logic standardization:** Implement the standardization of the operation logic based on the dynamic set points for the cooling towers, TES according to the WBT, chiller supply temperature set points, distribution pumps on remote index Delta P and ETS flow control.
- **Optimization Software:** Sophisticated dynamic optimization software was added in 7 of Tabreed plants that provides either autonomous or offline control to minimize the electrical consumption. Savings captured were in the range of 5-11% in comparison to the plants’ baselines over a year of operation.

The rapid evolvement of undertaken measures was based on complexities and expected gains, starting with operational and process improvements at zero investment costs to more complex optimization retrofit projects, Artificial Intelligence and dynamic optimization software implementations. Percent of overall cost savings that was due to operational savings were between 50-75%.



Figure 4: Chiller Management Solution Monitoring Screen on PI

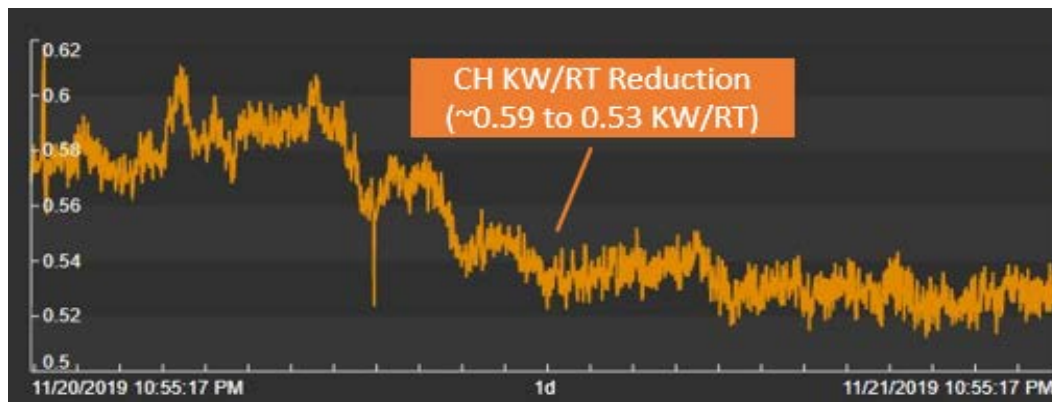


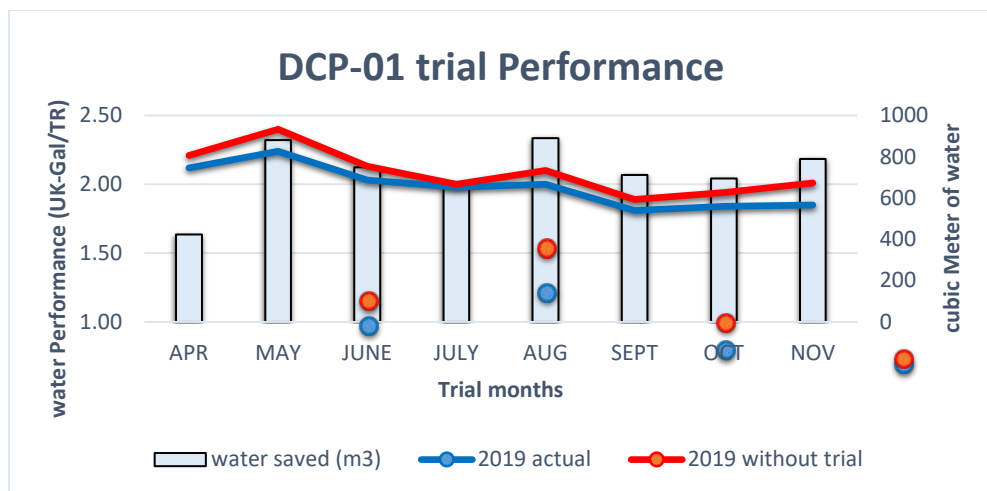
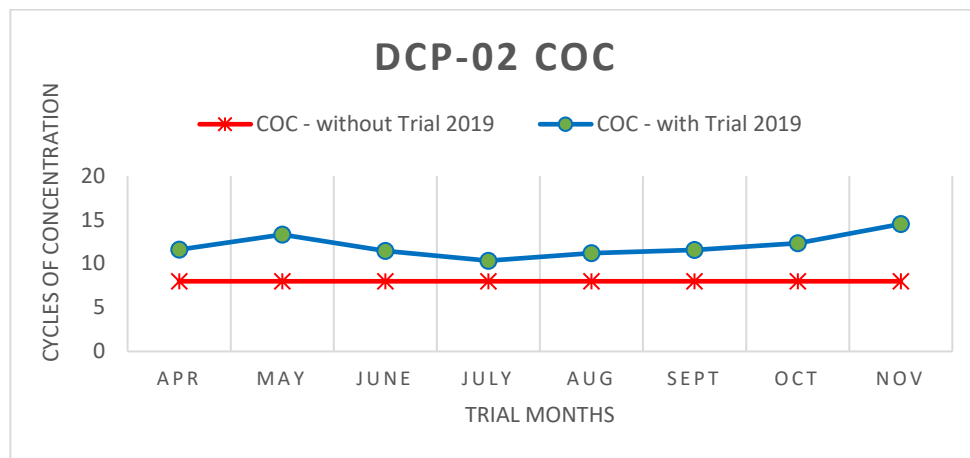
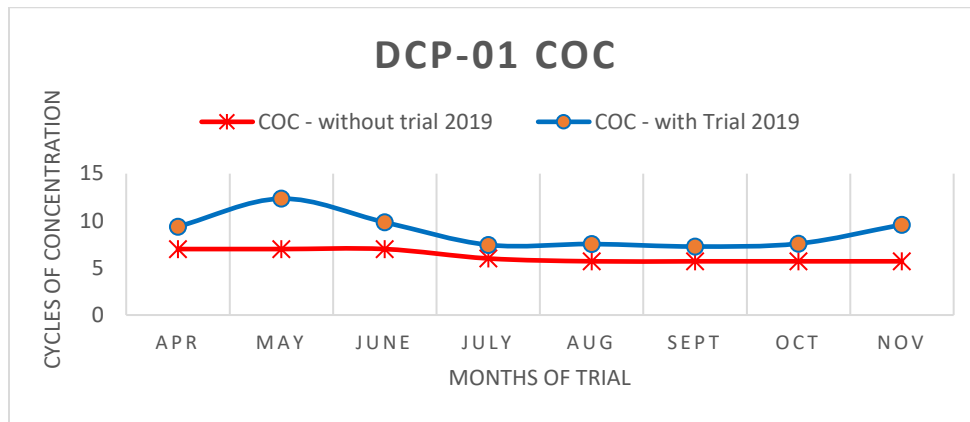
Figure 5: Data Analytics Sample- Lower Inlet Temp. Effect on Chiller Performance

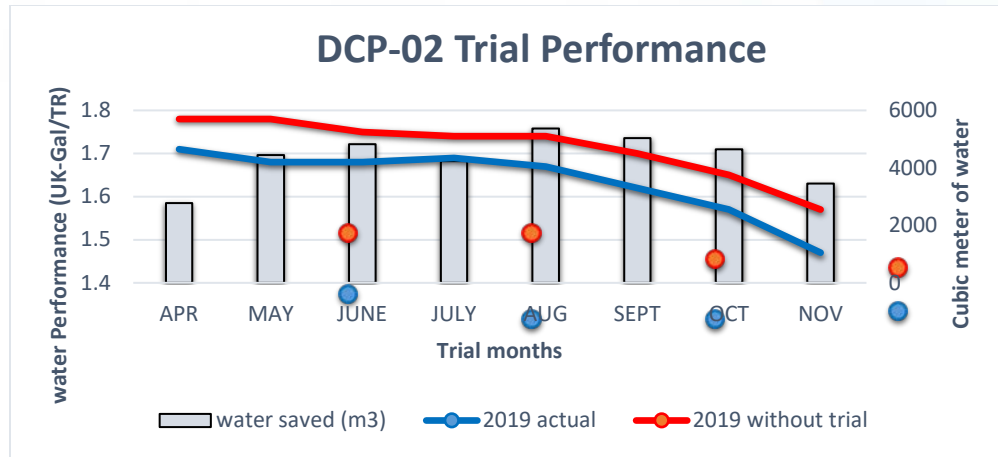
7.2 Smart Water Management

Cooltech being a subsidiary of Tabreed focused on water chemical treatment, has successfully implemented a pilot to increase the cycles of concentration in 2 District Cooling plants resulting in 5% saving of water volume used as Make-up to the Cooling Towers. Doing so is usually expected to increase scale levels in the condenser tubes, but this was controlled using high tech chemicals and online monitoring tools to within the targeted limits. This prevented losses in energy consumption in the chillers and additional maintenance cost.

Worked at 1000ppm (parts per million) of chloride for over 8 months period in regards of chemical treatment, while also developing further plans to push this limit. This pilot did not increase nor add additional stress on the chillers in terms of electrical consumption. Approach temperatures for chillers are maintained as per manufacturer's recommended values. Project investment was kept to as low as 15- 20% of the total savings recovered. The following trends

illustrate the increase of COC in the 2 DCPs under study and the resulting water savings across the 8 months of trials in comparison 2019 baseline.





8 Workplace Safety/Employee Training

HSEQ Statistics 2018-2020												
2018												
	Jan	feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
LTI	0	0	0	0	0	0	0	0	0	0	0	0
TRIR	0	0	0	0	0	0	0	0	0	0	0	0
LTIFR	0	0	0	0	0	0	0	0	0	0	0	0
2019												
	Jan	feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
LTI	0	0	0	0	0	0	0	0	0	0	0	0
TRIR	0	0	0	0	0	0	0	0	0	0	0	0
LTIFR	0	0	0	0	0	0	0	0	0	0	0	0
2020												
	Jan	feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
LTI	0	0	0	0	0	0	0	0				
TRIR	0	0	0	0	1.2	2.01	1.73	1.51				
LTIFR	0	0	0	0	0	0	0	0				
Lost Time Injury Frequency Rate (LTIFR): The number of Lost Time Injuries (LTIs) per 1,000,000 man-hours worked.												
$LTIFR = \frac{\text{Total No. of LTIs}}{\text{Manhours}} \times 1,000,000$												
Total Reportable Injury Rate (TRIR): The number of reportable injuries (Fatalities + Permanent Total Disabilities + Partial Total Disabilities + Medical Treatment Cases) per 1,000,000 man-hours worked. TRIR does not include First Aid Cases.												
$TRIR = \frac{\text{Total No. of Reportable Injuries}}{\text{Manhours}} \times 1,000,000$												

HSE Training 2018 – August 2020

No. of Employees provided with HSE Training

HSE E-Learning	2018	2019	Aug 2020
Overall Total – No. of Employees	600	600	600
No. of Training Hours	2,529	2,227	420

Internal, External & SLOT Training	2018	2019	Aug 2020
Overall Total – No. of Employees	1,056	1,279	658
No. of Training Hours	9,654	11,586	5,114

Internal Training			
Permit to Work	536	716	383
Gas Testing	8	0	41
Chemical Safety	94	0	34
Emergency and Crisis Management	0	53	45
Incident Reporting Automation (AIRS)	69	0	21
Energy Management System Awareness	17	0	0
Total	724	769	524

External Training			
Basic Firefighting	90	128	38
Basic First Aid	54	146	16
IOSH Supervising Safely	40	40	10
IOSH Working Safely	108	80	47
NEBOSH IGC	15	15	0
Defensive Driving	25	15	0
Working at Heights	0	20	0
Electrical Safety	0	20	0
Total	332	464	111

SLOT Training			
Lone Working	N/A	12	12
Noise Awareness	N/A	12	0
Ergonomics	N/A	11	0
Manual Handling	N/A	11	0
Confined Space	N/A	0	11
Total		46	23

9 Customer Relations Strategy

Tabreed invited all its commercial customers to take part in a customer satisfaction survey at the start of 2020, with the results being used to develop a 12-month customer experience improvement plan. Key components of this plan include:

- Providing commercial customers with easy access to their key information, either by communicating via their bill or by accessing an on-line portal where they can find their outstanding balances as well details of all invoices they have been sent, copies of all correspondence between the customer and Tabreed as well as the original version of their cooling services agreement.
- Standardizing the collections, treatment plans to ensure that customers receive early warning when their accounts become overdue in order to avoid suspension of services.
- Introduction of a 24/7 hotline for customers to contact Tabreed particularly for technical issues and complaints. Out of hours, calls are handled by trained customer services representatives who are able to route urgent issues to the appropriate operations teams for speedy resolution.

Major customers are managed by dedicated key account managers to ensure continuity and consistent treatment of any issues that may arise.

Customer Care representatives have been especially active during the recent pandemic, with the ability to react quickly in case of payment difficulties while offering technical support to ensure that affected customers are able to manage their consumption whenever customer premises have had to close.

Retail customers also have access to an on-line portal where they can monitor their consumption and compare against similar properties, as well as seeing their invoicing history and make payments on-line. Recently Tabreed, through its dedicated customer services company Tasleem, launched an on-line process for residential customers moving in or out to speed up the processes of connecting new supplies and returning security deposits when customers move out of their properties.

10 Community Involvement

As the regional pioneer in district cooling, Tabreed has a responsibility and commitment to developing the next generation of leaders for the district energy sector, by providing high quality training, mentorships and practical experience to engineering and management graduates. Ethra'a initiative sits at the heart of this commitment, creating stronger links between academia and the industry through greater collaboration on knowledge creation, research, innovation, and skills development. This smart and forward-looking approach to education is key to achieving the UAE's wider vision of developing a thriving, knowledge-based economy.

Tabreed's Ethra'a initiative, which means 'enrichment' in Arabic, aims to build a highly skilled talent pool, and develop human capital by facilitating knowledge sharing and innovation between

the industry and academia. This will further drive knowledge-based economic growth in line with the Abu Dhabi Economic Vision 2030, and strategic talent development to support environmental sustainability and green economy ambitions outlined in the UAE's Green Agenda 2030, an overarching framework to transform the country into a green economy. The initiative is also aligned with Abu Dhabi Government economic reform plan 'Tomorrow 2021' (Ghadan 2021), which places significant focus on the development of technology, talent, and research.

In addition, Tabreed's Ethra'a initiative is built on five engagement pillars, with an overall objective to create opportunities for engineering and graduates, by equipping them with the knowledge, skills and competencies to become successful in highly skilled roles within the district energy sector. These are: **guest lectures** delivered by subject matter experts at Tabreed to initiate knowledge transfer and improve understanding of the district energy sector; an **in-house, capability-building program**, which features Training for Work, Undergraduate Internship Program, a Post Graduate Assistance Program to equip graduates of UAE Nationals with workplace skills and help improve their performance; **educational tours** at district cooling plants, designed to develop a greater understanding of how sustainable engineering theory can be put into practice; **establishing cooperative research clusters** for scientific advancements in the field of renewable energy and sustainable technologies; and a **Sponsorship Program**, designed to give outstanding Emirati students the opportunity to pursue a career with one of the granted local (UAE) based Accredited Universities and Technical Colleges.

In 2018, Tabreed has developed over 40 UAE National graduates and employees through different training schemes that offer a chance to build a strong career portfolio through skills development and hands-on experience. Tabreed remains committed to developing a strong pool of Emirati talent through recruitment and retention of UAE Nationals in various fields, having currently achieved an Emiratization rate of 40%.

In 2019 Tabreed successfully completed a three-year research and development (R&D) pilot project with Masdar Institute to deliver energy efficiency through enhancing operational performance in district cooling plants. Titled 'Optimal Chiller Plant Control', the project aimed to develop and operate a proprietary next-generation digital 'smart controller' capable of intelligently managing district cooling plants to improve operational performance by decreasing energy consumption.

In 2020, Tabreed launched a new initiative titled '#TabreedCares'. The initiative includes individual programs run across Tabreed's operations in collaboration with partners in the region. This initiative illustrates Tabreed's commitment to using its resources and expertise to support those that need it most. As Tabreed navigates a sustainable way out of the COVID-19 crisis, this initiative is the first step towards building a stronger community and extending a helping hand. For years now, Tabreed has worked closely with its partners, not just in the UAE but also around the region to address critical cooling challenges – and these contributions are an extension of those efforts. 'Tabreed Cares' is one of the many ways in which the company supports the communities it operates within.

In the UAE, the company has announced its support to the "Your Families Are Ours" initiative with SAAED Association. The initiative took place under the banner of *The International*

Humanitarian Work day, which provided daily contributions of necessities to families in the UAE that have been impacted by the recent pandemic. The program was run in collaboration with the SAAED Association, the Ministry of Interior, and the UAE Red Crescent.

In addition to this, Tabreed will be providing technical instruments that produce a mixed oxidant solution that can be used to disinfect the potable water used at selected touristic sites in the Emirate of Abu Dhabi to help with post-COVID operational precautionary measures, through its subsidiary, Cooltech Energy Water Treatment.

In Oman, Tabreed has committed to supporting the funding of testing for COVID-19, by partnering with Opal (Oman Society for Petroleum Services), a non-profit member association in the Sultanate, in addition to the Oman Ministry of Health to fund the testing. Tabreed operations in Oman are overseen by its subsidiary *Tabreed Oman*, whose portfolio includes projects such as the Knowledge Oasis Muscat and the Oman Avenues Mall.

In Bahrain, Tabreed is collaborating with Bahrain's Royal Humanitarian Foundation (RHF), by taking part in the national "Feena Khair" initiative by providing financial support in Bahrain to help combat the effects of the coronavirus pandemic. Tabreed's operations in Bahrain are managed under *Tabreed Bahrain* and includes projects such as Villamar, Avenues Mall and the Bahrain Financial Market.

Tabreed's recent list of awards illustrates the constant commitment towards innovation and reliability:

- Smart District Cooling Company of the Year Award 2016 by Frost & Sullivan UAE
- District Cooling Utility Provider of 2018 by Climate Control
- Group Carbon Champion Award 2018 by International District Energy Association (IDEA)
- Employee Engagement Awards – Outstanding Employer 2018 by Korn Ferry
- Excellence in HSE on a Project by Big Project Awards 2018

11 Availability/Reliability Worksheet

Attached

For more information, visit:
www.tabreed.ae



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