BULLETIN

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CCC TOWARDS CLEANER FUEL for All

CONTENTS

FROM THE DESK OF ...

SAMER S. KHOURY
Chairman

Towards Cleaner Hydrocarbon Future

Many environmental and green party leaders think we can keep powering the world and switch off our dependance on hydrocarbon.

My answer to all is that this will not happen. Oil and gas will remain part of the world's energy mix and if you read all projections by major oil companies, this is their belief as well.

On the other hand, we can transition the hydrocarbon industry to become cleaner, and this is what CCC is doing, as some of our major/new projects, e.g. LNG, have a sophisticated carbon capture mechanism.

CCC is also moving into green hydrocarbon and green ammonia products from renewables.

The above reinforce my earlier statement that the oil and gas industry will shift into cleaner products, but will remain a major source for our future.

RECENT AWARDS

EGYPT
City Gate Construction of Villas
+ Zone 2D/Clusters A, B & C

Award Date: *October 2021*
Completion Date: *November 2023*
Client: *Bawabet Al Sharq New Cairo for Real Estate Investments S.A.E (BASNC)*
Consultant: *Engineering Consultants Group (ECG) and Turner International Middle East (TIME)*

Project Brief and Scope of Work

- Construction of 430 standalone villas, twin houses, and townhouses *(288 Plots)* at zone 2D/Cluster A, B & C.
- Remedial works inclusive of investigatory work and certification for the constructed part of Clusters A & B.
- Structure works in Clusters A, B & C.
- Architecture works limited to GFRC, CMU, wooden frames for all openings, aluminum facades, metal works, internal plaster, external finishes, pergolas.
- MEP works include first fix for electrical, mechanical, and low current works.

EGYPT
Construction of 6 Buildings in Lagoon Residence
+ Murai Zone

Award Date: *January 2022*
Completion Date: *July 2023 (16 months)*
Client: *Arkan Palm for Real Estate Investment*
Consultant: *Badreldin Development*

Project Brief and Scope of Work

- Construction of 6 buildings with total BUA of 67,000 m² *(above ground).*
  - ↳ **Type A:** 2 buildings
  - ↳ **Type B:** 1 building
  - ↳ **Type C:** 2 buildings
  - ↳ **Type H:** 1 building
- Construction of one floor shared basement *(excluding earthworks).*

Rework in Construction Projects

QUALITY MANAGEMENT

Article by: **P. Kyriakopoulos**

During the online webinar on "Quality Management" held in November 2021, many attendees raised queries for the subject of Rework in Construction Projects, highlighting the impact of rework in the success or failure of a project and in achieving its performance targets.

The article below, is a synopsis of various bibliography and research papers based on the study of rework in construction projects internationally.

A popular quote in Quality is "Do it right the first time", which in this case may be paraphrased as:

> ***"While there never seems to be enough time to do the work right the first time, there's always enough time to do it over again"***,

emphasizing on the common problem of rework in construction projects, or to highlight the subject even more, it could be said that:

> ***"It takes 90% of the time to perform the first 90% of the work and another 90% of the time to perform the last 10%"***

Definitions

Rework:

- ***"The unnecessary effort of redoing an activity or process, that was incorrectly implemented the first time"*** *(Love, 2002; Love & Edwards, 2004);* or,
- ***"Activities in the field that have to be done more than once in the field, or activities which remove work previously installed as part of the project"***.

Root Causes Classification

Root causes of Rework in Construction are categorized into five main categories, which may be further divided into their related factors:

Client Related

- Lack of experience and knowledge of design
- Lack of knowledge for the construction process
- Lack of funding, such as for site investigation
- Lack of client involvement in the project
- Client changes of expectations
- Inadequate briefing
- Poor communication with stakeholders / design consultants
- Inadequacies in contract documentation, and/ or with documentation errors and omissions

Design Related

- Lack of design coordination and integration
- Ineffective use of information technology and systems
- Poor communication between design team members
- Inexperience in constructability methods
- Design errors / changes incomplete
- Late design changes
- Poor document management control
- Shortage of labour for the works
- Lack of professionalism of design team

Contractor - Site Management Related

- Inability of supervisors to plan work
- Unrealistic schedules
- Non-compliance with specifications
- Poor coordination of resources
- Inability of supervisors to communicate with work force / unclear instructions
- Lack of Quality system in place
- Setting out, surveying errors
- Errors due to increased defects and poor workmanship from:
  - ↳ Excessive workload / overtime
  - ↳ Multitasking
  - ↳ Pressures for early completion of works
- Disturbance in tasks planning when personnel are reallocated
- Failure to provide protection of works such as:
  - ↳ Scaffold erection on completed flooring
  - ↳ Paint protection works
  - ↳ Finishing and joinery protection works, etc.

Subcontractor Related

- Constructability problems and knowledge/ experience, qualifications
- Inadequate supervision
- Damage to other trade works due to carelessness
- Low skill of construction personnel and labor
- Use of poor quality materials
- Restrictions

Transporter Related

- Lack of safety
- Machinery breakdown
- Untimely deliveries/ materials not in place when needed

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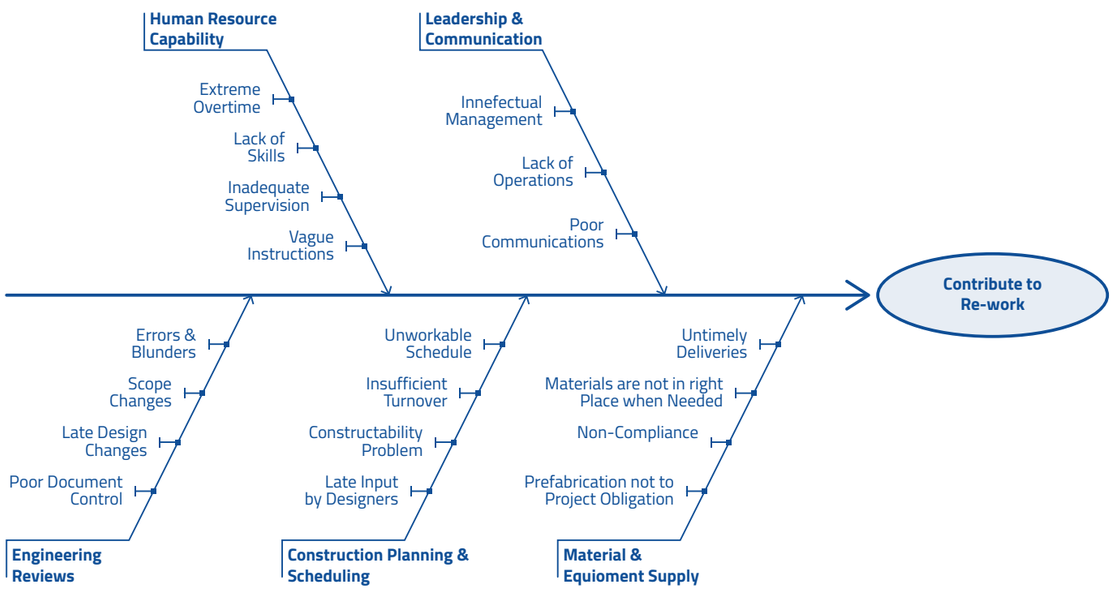
QUALITY MANAGEMENT: Rework in Construction Projects

Another method of categorization of root causes of Reworks in Construction projects, is provided in the fishbone Ishikawa root cause model below, further analyzed with their individual factors *(Fayek et al. 2003)*.



Although classification systems differ in perspective, the causes and the main areas do overlap. Construction companies experience most of these causes regardless of the categorization and the most important thing is the recognition of these main broad areas and their possible causes in order to manage reworks effectively and efficiently.

Impact of Reworks

Direct Impact

Based upon literature and research papers the median **direct cost** of rework on projects is between 4-6% of original contract cost, with a median of 5%.

The formula used for quantifying the impact of rework on construction works *(as per CII - Construction Industry Institute)* is set below:

> ***Total Field Rework Factor (TFRF) = Total direct cost of field rework / Total construction work***

Various studies calculate the percentage of field rework to the total construction cost as following *(examples)*:

STUDY NAME	YEAR PUBLISHED	FIELD REWORK %	No OF PROJECTS STUDIED
CII Research Summary	1989	**12% Total** Design = 9.5% Construction = 2.5%	9 Industrial Projects
Rework Costs in Building projects	2002	**12% Total**	161 projects
The Field Rework Index	2011	**4.4%**	153 projects
Investigation of Field Rework in Industrial Construction - CII Research Report	2011	**4.4%**	109 industrial projects

Studies show the following Mean Field Rework Factor for the next Projects of Industry Groups:

- **Heavy Industrial** 4.5% *(with max factor, design errors contributing 1.6%)*
- **All Building types** 5.2% *(with max factor, design error, omission contributing 1.8%)*
- **Infrastructure** 5.7% *(with max factors, Owner change 2%, design change, error/omission 1.6% and Constructor error omis sion 1% and design 0.9%)*

while the distribution of the Mean Field Rework Factor depending on the Project Size, is as follows:

- Projects < $15 million Mean TFRF = 4.9%
- Projects $15-$50 million = 5.9%
- Projects $50-$100 million = 7.3%
- Projects > $100 million = 0.9%

Indirect Cost *(adjusted)*

Studies and researchers note that costs other than direct field costs *(labor, material, equipment, subcontracts, etc.)* must be considered in order to produce a realistic estimate of the cost of rework, as field problems on construction projects also incur substantial management costs *(overhead costs, project management, site supervision, site safety, etc.)* while issues are examined, and solutions are reviewed and implemented. It is suggested that the estimated direct cost be marked up by 80% to include the indirect costs associated with the estimated direct cost of work.

- Thus, when the earlier identified range of the direct cost being 4-6%, is adjusted to include **indirect costs** it reflects the **Total Cost of Reworks with a range of 7.25 to 10.89%** and **with a median value of 9.07%**.

Schedule Impact of Rework

Studies and research determine that the average delay incurred on projects is approximately 19% of the original project schedule, and approximately 52% of project delays typically result from rework activities, setting aside the issue of the cause of reworks.

- Based on the above it is estimated that **Rework typically results in a 9-10 % schedule growth**, with all its consequences, such as extended office and accommodation overheads, extended labor and equipment costs, and payment of either liquidated or actual damages due to contractor caused delays.

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Measurement of Reworks

Research papers and studies of most authors and Institutions *(such as the CII, Construction Industry Institute, or BRE, Building Research Establishment and others)* base their research and programs on data collected through Questionnaires issued to the Construction Companies or Construction Expert Professionals, and then calculate their metrics based on the replies as these are attributed to the root causes factors of the Reworks.

These Questionnaires first gather personal information of the responders and then their replies on the objective questions. Responders include contractors, owners, consultants, design engineers, quality engineers, project managers and others as applicable.

It was found during the questionnaire surveys that the majority of the responders do not have systems to track and record incidences of rework and its cost impact, and it is difficult to accurately calculate them. From the studies it is seen that for the reduction of rework in construction projects to be a continuous process, events must be early identified and evaluated, and mechanisms be in place to record them and capture their costs.

It is also noted that most contractors do not allocate reworks to the total cost increase of the project, because rework costs generally have to be absorbed, as specified in their contractual agreements.

Remedies to Reduce Rework

Rework can be reduced by understanding what constitutes rework, by developing adequate awareness about the root causes of the rework in the construction projects, and by further implementing a systematic approach to measure the reworks.

Some suggestions based on the data analysis for the reduction of rework in the construction projects are as follows:

Client Related and Design Related

- Clients to provide construction companies with correct information and design at the right time, place and to the right people and maintain open communication channels for all issues, changes and requests.
- Companies, Owners and other Stakeholders to be engaged at the early stages of design process to avoid design change orders during the construction, or during the end phases of the projects.
- Companies should employ experienced and qualified designers to provide good quality designs, as incomplete design, with errors, and design changes are considered to be the most critical cause of rework in construction projects.
- Companies to allocate adequate funds and fees for the design teams to produce clear and well-defined contract documents.
- Companies to ensure that the information provided to the bidders is clear and adequately covers all aspects of the project's scope of work, and to further employ a professional consultant *(other than the designer)* to examine the project documents, perform a constructability review, and manage the construction phase of the project.
- Design companies should not execute design tasks in "time boxing" concept with limited time allocated to each design task, contributing to low quality or incomplete design products.
- Use of key design and construction expert personnel during the design process to provide their knowledge and experience, and improve teamwork and planning & scheduling of the operations. The adoption of a multidisciplinary team approach to the production and management of contract documentation could reduce errors and the potential for client initiated changes, while improve understanding of each stakeholder's goals and customer's requirements.

Leadership Related and Communication Related

- Contractors should be aware of the risks of project costs increase due to reworks, when projects are executed by Joint Ventures *(organizations with different goals and issues of inter-communication)*, when projects are executed in complex and distant areas, or for different types of contracts *(EPC, DBB, DB)*.
- Effective use of information technology, platforms and systems to allow simultaneous work, communication and exchange of information between the stakeholders, and improve document management, changes control, and visualization of scope, engineering and works, etc.

Contractor - Site Management Related and Subcontractor Related

- Fulltime experienced supervisors to be placed in site, being well trained to foresee and avoid mistakes made by the labor force.
- Clear instructions and communication channels to be established through the workforce.
- Employment of unskilled labor should be limited and if employed they should be given proper in advance training so that errors are minimized.
- Site inspections by senior managers and staff to be conducted on daily / weekly basis so as to identify and avoid errors at the earlier stages.
- Engagement of qualified and experienced subcontractors to perform the works. Placement of qualified Contractor supervisors to manage the S/Cs works.
- Inspection of all materials being supplied should be timely made on arrival, so that defective materials can be identified and separated.
- Procurement of good quality materials should be planned and managed in ways to avoid reworks.
- Improvement and total commitment to implementation of quality management systems would render and assure reduction of rework.
- Site documentation should be carried out as early as possible and all stages of works to be checked and reworks to be highlighted.
- Formal training to be given to supervisors to improve their skills for planning their works, communication, leadership and motivation.
- Ensure that site equipment are available on time and in good order before the construction works.

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QUALITY MANAGEMENT: Rework in Construction Projects

Summary

- Average rework on projects can cost between 7.25 to 10.89% of total construction cost *(when both direct and indirect costs are included)* and can cause an increase in the schedule *(project delay)* of approximately 9.8% of the planned project time.
- Studies indicate that there are a number of practical ways to reduce the need for rework if they are employed from the outset of the project.
- Apart from providing information for the Rework in Construction, this article aspires to initiate discussion on the root causes of reworks during project execution, on factual ways to measure rework on-site, and on the best ways to learn from these and take improvement actions to minimize rework in future projects. *(Note that the Fanous KM platform contains related examples of Lessons Learned, which can be queried via its search tab).*

References:

1. ***"The impact of rework on construction & some practical remedies"**, Navigant Construction Forum, 2012*
2. ***"A rework reduction model for construction projects"**, IEEE Transactions on Engineering Management, 2004*
3. ***"Factors affecting rework costs in construction"**, Journal of Construction Engineering and Management, 2017*
4. ***"Rework management in construction projects and comparison with time and cost"**, International Journal of Engineering Science and Computing, 2017*
5. ***"Corporate control" the root causes of reworks in the construction of projects"**, Corporate Ownership & Control, 2017*
6. ***"Factors contributing to rework and their impact on construction projects performance"**, International Journal of Sustainable Construction Engineering & Technology, 2017*

FEATURE

LNG Industry

Article by: **R. Rabbo**

This article provides an overview of the **Onshore Liquified Natural Gas** *(LNG)* industry in terms of LNG plant process conceptual design and process flow diagram, LNG sustainability, in addition to underlining of CCC LNG Strength and Capabilities, and CCC constructability approach of LNG plants. The Data is based on clients' shared information and CCC-Qatar expertise in this field.

With the expected global population growth and economic development, energy demand is projected to grow rapidly. To meet this demand, and because of economic and environmental pressure, **Natural Gas** *(NG)* demand is expected to grow in the coming decades, as such, natural gas could overtake coal as the second-largest fuel source of primary, and cheap energy; this is because the costs of all segments of the LNG chain have been substantially reduced compared to the last decades, as well as the fact that undeveloped or unconventional gas fields are often located far from the gas market or are too small for a pipeline.

Furthermore, natural gas is often seen as a transition fuel in the move toward a low **Greenhouse Gas** *(GHG)* economy because it is the cleanest fossil fuel, emitting about 29% to 44% less CO_2 per unit of energy compared to oil and coal. In addition, combustion of natural gas emits relatively small amounts of pollutants compared to oil and coal: 20% more and 81% less CO; 79% less and 80% less NOx; 99.9% less and 99.996% less SO_2; 92% less and 99.7% less particulates.

Natural gas can be transported mainly via two options: Gaseous or Liquified Natural Gas. Whereas the gaseous option is suitable for short to medium distances via pipelines i.e., less than 4800 km, as such it is less costly than LNG chain because there is no need for a capital-intensive liquefaction plant and regasification terminal. Alternatively, LNG transport, natural gas is condensed by cooling it to below -162°C *(-260° F)* at 1 atm, thereby reducing its volume by a factor of 600. LNG is transported cryogenically by trucks, trains, or ships. One benefit of LNG is that one liquefaction plant can serve several regasification plants and vice versa. Furthermore, LNG can easily adjust its supply capacity and destination, making it more adaptable than pipeline gas. Another advantage of LNG is that small-scale LNG and offshore LNG allow the exploitation of remote small gas resources and offshore gas reserves, for which it is not economical to build a pipeline.

Besides, the requirement of LNG plants became crucial for the clean power industry, and they are one of the hugest projects all around the world; since they have an overall integrity between gas processing and flow, pressure, and temperature control through control panels by compromising the feed data coming from plant instruments and controllers.

Qatargas II LNG Onshore Facilities (Trains 4 & 5), Qatar

CCC LNG Strength and Capabilities

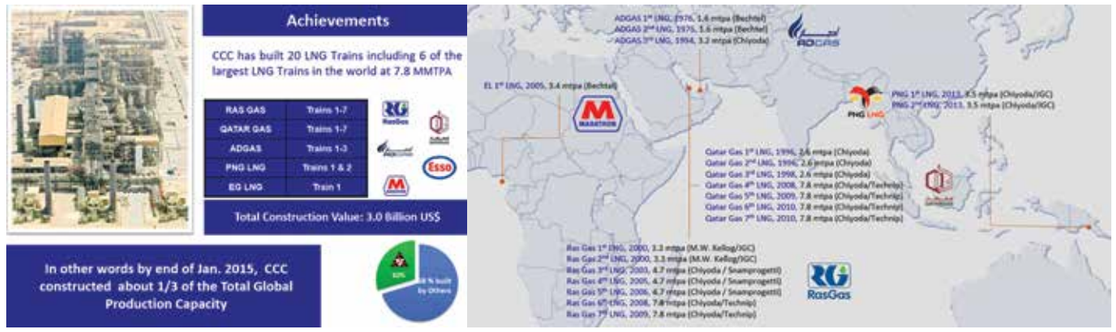

Figure 1: CCC LNG Strength and Capabilities

LNG Process Description

The LNG plant's function is to extract the Liquefied Natural Gas from the natural gas supplied from the offshore wells; however, the LNG plant is used to extract all the toxic material such as mercury and sulphur compounds [in the forms of H_2S and Mercaptan]; in order to get all the simple hydrocarbons series [CH_4 up to C_5H_{12}], helium, and Fuel Gas *(mainly N_2)* that form the LNG and LPG products. LNG products mainly consist 89.4% of CH_4, 6.1% C_2H_6 and 2.16% of C_3H_8, and LPG mainly consists of 39.5% of C_3H_8, 60% of C_4H_{10}.

Water is present in the hot wellhead gas as vapor and progressively condenses from the gas stream as it cools and passes through the undersea transmission pipelines to the onshore gas processing plants. Thus, water either in vapor or liquid phase is an objectionable impurity because it causes the following complications:

1. In combination with H_2S and CO_2 it is highly corrosive to steel pipelines and processing equipment.
2. Free water, entrained in natural gas containing the light hydrocarbons, methane, ethane and propane, forms ice-like solid hydrates which can block control valves, process pipelines and heat exchangers.
3. Water vapor carried into the gas plant in the natural gas feed stream deposits ice in the refrigeration equipment used for methane extraction.

It is hence essential to remove water from the natural gas soon after it leaves the platform wellheads, using some form of dehydration process capable of reducing its concentration in the gas to approximately 1 ppm. This is usually accomplished in two stages as follows:

a. By absorption in a selective solvent liquid such as Tri-Ethylene Glycol. And the chemical chain for it is:

$$\textbf{TEG: } CH_2\text{ - O - }CH_2\text{ -}CH_2\text{ - OH}$$
$$\qquad\qquad\qquad\qquad\qquad\qquad\quad |$$
$$\qquad\qquad\qquad\qquad\qquad\qquad CH_2\text{ - O - }CH_2\text{ -}CH_2\text{ - OH}$$

b. or by adsorption in a solid desiccant such as activated alumina or a molecular sieve.

Herein a briefed summary which shall illustrate the main units of any LNG plant starting from the feed gas units *(including offsite)*, process units and storage tanks, in addition to other required utilities.

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The following figures *(2 and 3)* are representing LNG process plant model and process flow diagram, which are typical for all LNG plants in terms of units' arrangement, equipment setting out, process sequence and functionality. Moreover, such setting out also ease the constructability of LNG plants.

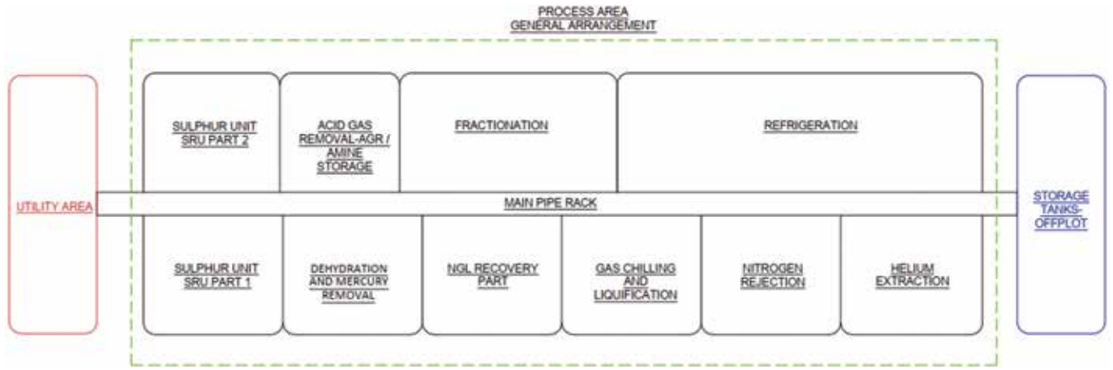

Figure 2: LNG Process Plant General Arrangement

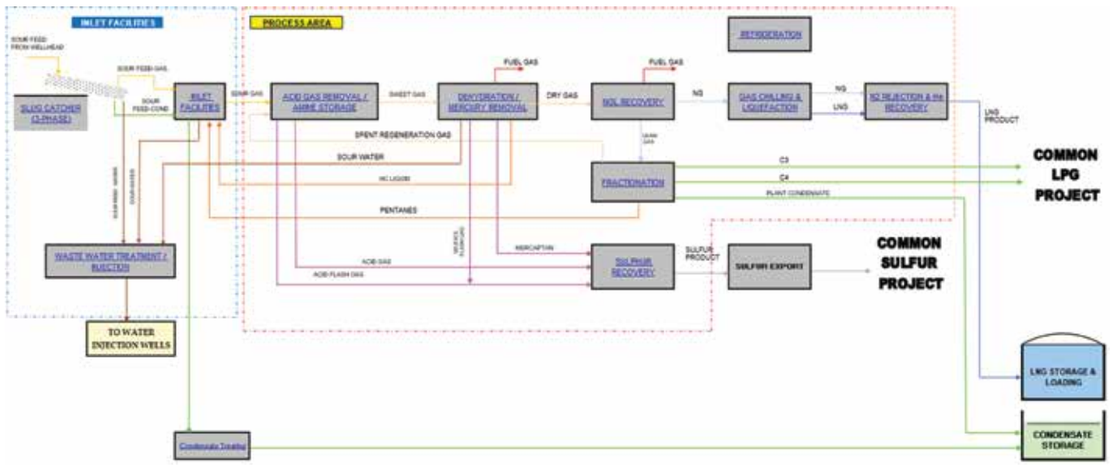

Figure 3: LNG Plant Process Flow Diagram

I. Inlet Facilities

The Gas Inlet Station, comprising the Pig receiver, Slug Catcher, TEG unit, and Gas Metering Station which are situated at the inlet of the Plant. The incoming feed gas is above the dew point of hydrocarbon liquid and water 'dry', so a liquid Slug catcher is not considered necessary. The main functions of the inlet facilities are:

1. Receive the gas and liquids from the offshore production platforms and separate the three physical liquid from the gas apart *(gas, condensate, and water)* via normal gravity separation by density i.e., Removal of the slugs, dust, sand, sludge, and water from the feed gas.
2. Deliver the gas stream to the downstream LNG plant at a constant temperature and pressure and at a stable flow rate consistent with the marketing demand and the downstream plant's throughput capabilities.
3. Sepa-rate the incoming liquid into a hydrocarbon and an aqueous phase.
4. Strip the light ends from the natural gas condensate to stabilize it before sweeting and storage in atmospheric storage tanks and eventual shipment to overseas markets.

V. Acid Gas Removal-AGR / Amine Storage

The Acid Gas Removal Unit- AGR is designed to remove acid gases *(predominantly carbonyl sulphide COS, carbon dioxide CO_2, with some hydrogen sulphide H_2S)* from the sour feed gas by means of chemical absorption using the **aMDEA** *(activated Methyl-Di-Ethanol-Amine)* technology, to prevent solidification and freezing during Gas Chilling and Liquefaction at low temperature, and to meet the LNG product specification.

VI. Dehydration and Mercury Removal

The gas which has been treated in the Acid Gas Removal unit *(sweet gas)* is the feed gas to the Dehydration and Mercury removal unit. The purposes of this unit are:

1. To remove water from the feed gas to avoid freezing in the downstream Gas Chilling and Liquefaction unit *(NGL Recovery)*
2. To remove Mercaptans *(RSH)* from the feed gas to meet the total sulphur specification for the LNG product which is <14 ppm.
3. To remove mercury from the feed gas to protect the downstream Main Cryogenic Heat Exchanger *(liquefaction exchanger)* from the adverse effects of mercury.

IV. NGL Recovery

The purpose of the NGL Recovery Unit is to separate C3 and C4 components *(Propane and Butane respectively)* from the sweetened and dehydrated feed gas prior to liquefaction. This allows the plant to meet the heating value specifications for Lean LNG and recovers a mixed NGL stream which is subsequently fractionated into valuable propane, butane, and plant condensate products.

V. Gas Chilling and Liquification

The processed Lean Natural Gas feed from the NGL Recovery Unit becomes the feed for Gas Chilling and liquification, and is cooled by high, medium, low, and low-low pressure level propane refrigerant in MP Propane Evaporator and LP Propane Evaporator respectively up to -350C. The cooled two-phase feed stream enters Scrub Column where the lighter components are going overhead, and the heavier ones are going to the bottom.

VI. Refrigeration

The main purpose of the Refrigeration Unit is the supply of the C3 and MR refrigerants to the Gas Chilling and Liquefaction Unit and other units *(Dehydration and NGL Recovery)*. These refrigerants are used to condense the natural gas into LNG in the Main Cryogenic Heat Exchanger, and then to sub-cool it in the Sub-Cooling Heat Exchanger

VII. Fractionation

This unit is inserted as a part of the process area to achieve the following purposes:

- To separate LPG products *(Propane and Butane)* from the mixed NGL by fractionation.
- To treat the Propane and Butane products to meet the sales product specifications *(LPG Treating unit)*.
- To produce high-purity Propane suitable for Refrigerant make-up.
- To separate heavy hydrocarbons *(C5+)* in the Debutanizer and the De-isopentanizer to produce a stabilized Plant Condensate product and a pentanes stream which is returned to the Field Condensate.

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VIII. Nitrogen Rejection

This unit is the last unit in LNG processing, where the feed gas to this unit is the LNG produced in MCHE in Gas Chilling and Liquefaction unit. The objectives of this unit are:

- To flash-out and reduce the nitrogen components in LNG product under allowable level for ship transportation.
- To lower the temperature and the pressure of the LNG, by expanding the "live" LNG stream leaving Gas chilling and liquification unit from *(-145.8°C and 42.3 barg)* to *(-159.6 °C and 0.32 barg)*.
- To pump the Rich and Lean LNG product to LNG storage tanks in the off-plot area.
- To produce and deliver the flashed gas to high pressure Fuel Gas System.
- To extract Helium from the LNG product and send it to Helium Recovery unit.

IX. Sulphur Recovery

The Sulphur Recovery Unit is a subsidiary unit to treat the sulphur extracts from Acid Gas Removal unit and it consists of following sections:

1. The **Acid Gas Enrichment** *(AGE)* section
2. The Claus Sulphur Recovery section
3. The **Tail Gas Treating** *(TGT)* section
4. The Sulphur Degassing
5. The Incinerator

VI. LNG Storage and Loading

LNG storage tanks are located at the Offsite facility, which receive product run down from the production trains. Each is maintained under a very slight positive pressure, at -161oC to minimise vaporisation of the LNG.

There are two distinct modes in the normal operation of the LNG Storage and Loading Facilities:

i. Holding Mode
ii. Loading Mode

I. Condensate Treating Facility

The condensate treating system is designed to receive and treat condensate from inlet facilities, condensate stabilization section. This unit deodorizes the condensate by converting the mercaptan compounds into disulphide oil using the Merichem caustic wash condensate treating process before forwarding the treated condensate into the common condensate storage tanks.

II. Condensate Storage

The Condensate Storage Unit is a common facility for the collection and storage of condensate i.e., which comprises mainly Pentane *(C5+)* and hexane *(C6+)*, produced in the Inlet Facility and Fractionation Unit of process trains. This Unit is operated in conjunction with the Condensate Loading Unit.

CCC Constructability of LNG Plants

LNG plants are somehow typical in their conceptual design, principle as well as their general arrangement in such a way to economically construct and operate the plants.

CCC had adopted many inhouse constructability methods and techniques to successfully construct LNG plants, in addition to other innovated techniques externally endorsed by clients. The table No.1 shows some of the techniques.

LNG Sustainability

LNG is the energy of the future; it is the cleanest fossil fuel. In the context of the current energy transition sought by the European Commission, it represents an excellent alternative to reduce greenhouse gas emissions and help combat global warming.

Liquefied Natural Gas *(LNG)* has increased rapidly in the global energy market because of its ease of distribution, high energy density, and clean combustion emissions compared to other fossil fuels. It has been recognized as a bridge for transitioning to a low net carbon energy society before renewable energy and firm dispatchability is available in large-scale.

LNG supply chain includes natural gas liquefaction, LNG storage, LNG shipping, and LNG regasification. Each part of the LNG supply chain has the chance to be enhanced from the perspective of energy and process engineering. Thus, it is advantageous to building a green and sustainable LNG supply chain to achieve a low net carbon energy society.

Natural gas liquefaction processes are fundamentally energy intensive due to the cryogenic working conditions. Energy enhancement of liquefaction processes through process retrofit, global optimization, and introducing novel components is worthy of investigation. The interest in the condensation heat transfer of natural gas and mixed refrigerants in the main cryogenic heat exchanger is also increasing, but it is limited by the lack of numerical and experimental studies.

Furthermore, utilization of **Boil-Off Gas** *(BOG)* i.e., the gas which is naturally evaporated from LNG in the insulated storage tanks while reaching the boiling point, which is unavoidable, and the generated boil-off gas *(BOG)* must be removed to preserve the tanks' pressure. Whilst the warming that's responsible for the formation of boil-off is created by several sources. These include:

- Mechanical heat input from pumps
- Tank equilibrium changes
- Atmospheric pressure changes
- Heat leak into bulk storage tanks
- Displaced vapours during ship offloading

On the other hand, there are some operational considerations that could minimise the production of BOG such as:

1. Further cooling the LNG while loading operation, but this uses a significant amount of power and affects the value chain
2. Decrease the pressure inside the tanks at loading
3. Limit the amount of liquid motion inside the cargo tanks either through defined maritime routes or anticipate agitated passages *(turbulent maritime routes)* and reduce tank pressure when possible
4. Setup fuel gas system to avoid recirculating warm fuel gas
5. Monitor the empty space between compartments' temperatures and keep the temperature at the required value

Nowadays, BOG produced during transportation is being collected, heated to ambient temperature, odorised, compressed, and then distributed to the boilers, which power the steam turbines used for the ships' propulsion instead of methane or oil.

Finally, potential BOG treatment and re-liquefaction technologies should be developed. As for LNG regasification, the evaporation heat transfer characteristic of LNG in vaporizers should be further explored to improve the terminal efficiency.

CATEGORY	TECHNIQUE	NOTES
Inhouse	Work Face Planning	
Inhouse	Talisman Database	**For Tracking Activities**
Inhouse	Railing System for Pipe Rack Piping Installation	
Inhouse	Gantry Crane at the Top of Pipe Racks	
Inhouse	Automated Fabrication Shops	**Endorsed for NFE1 project**
Inhouse	3D Modeling - C3D	
External	Advance Work Packaging-AWP	**Endorsed for NFE1 project**
External	Pipe Rack Assembly by Lasagna Method	**Endorsed for NFE1 project**

Table No.1

Egypt

CCC's Journey in Egypt

A Model for Success

Article by: **M. Doukanish**

Over the past few years, Egypt has seen a huge leap in the Construction industry; due to the fact that the Egyptian Government has placed a strong emphasis on infrastructure and construction as a key driver for economic growth and stability. This has opened more and more opportunities for the construction of new projects in Egypt from roads, transportation, water, power to new cities such as **The New Administrative Capital**, **New Alamein** and **New Galala**. As a result, the Egyptian construction industry grew by 8.5% in the first three quarters of 2021, according to the central Bank of Egypt, and is expected to continue to grow for the coming years.

CCC Egypt was established in 1984 and since then, it has continued to grow and become a major player in the Egyptian contracting field within commercial, residential, and energy related projects. During the early 90's, CCC started to have its first joint venture with Orascom Construction for two major projects which were JW Marriot and Golden Pyramids Plaza. In 2002, CCC had an agreement with Hassan Allam to expand into the power sector. A partnership that has started since 2002 and is still ongoing to date, which started with building 8.4 GW of power plants and expanded outside the power sector as well into more diversified projects like; Kattamiya Airbase, Almaza City Center, New Alamein City. Today CCC Egypt has become one of the most important areas of operation for CCC worldwide, we are proud to be the only International Contractor who is into continuous operational existence in Egypt for more than 25 years. Not only has CCC not stopped operating throughout this period of time, but on the contrary, it is in full growth mode.

Today CCC Egypt has 19 ongoing projects with the value of $1.73 billion, including but not limited to Alamein New City, Marassi, Mivida, Cairo West Power Station, Zaafarana Power Plant, Cairo Festival City, Four Seasons Hotel, Telecom Egypt. This outgrowth that has happened over time for CCC Egypt was due to many reasons **Dynamic Market Response**, **Partnering with local Companies**, **Cairo Estimation Unit** and **Qualified Local Staff**.



Almaza City Center

Alamein City Towers

Dynamic Market Response is the best term to describe how CCC adapted its growth strategy with the market changes in Egypt. CCC's top management is continuously assessing the branch performance in view with the market conditions delt with the challenges that faced the market during its political instability. Upon stabilization and with the new boom of the local market, CCC was geared to participate in building the new Egypt and took its role by selecting the most convenient business, partners and clients. This dynamic strategy had enabled the regional management to conclude new business deals that secured a continuous growth and profitable business.

Partnering with Local Companies has proved to be a successful approach. Not only has it aligned with the continuous nationalization approach, which is currently being implemented by the Egyptian Government, but it has also confirmed that CCC's strategy locally was aiming to "complement and cooperate" and not just "compete". CCC's list of JV partners in Egypt includes Orascom, Hassan Allam Construction, Atrium, and AlSweedy Group amongst others. Some of our relationships have been quite successful over a span of 20 years such as our local partnership with Hassan Allam.

Cairo's Estimation Unit has grown organically and has become a fully Integrated Department covering all fields ranging from Cost Estimation, Tenders and Proposals management in full accordance with MOA procedures. With a very efficient cost base being formed by the local staff, CCC Cairo's Estimation Unit has played a major role in achieving the sales of CCC Egypt and has expanded to cover all bidding requirements of heavy civil and building projects in North Africa and Africa. The Estimation Unit team has been able to achieve positive continuous feedback and currently acts as channel of communication with other departments to gather all data required while enhancing competitiveness through communication with local partners, suppliers, and subcontractors. The hard work and technical professionalism of the Cairo Estimation Unit led to the production of reliable cost estimates representing the actual market norms while maintaining CCC's excellent standards.

CCC Egypt's qualified local staff have remarkably helped in providing a detailed sharp view on the Egyptian market's dynamics and local structure in means of any potential projects and materials availability. This has promoted CCC as an entity that supports the country by recruiting locals, by training and upgrading the local skills. Upgrading and promoting local Projects staff encouraged CCC Egypt's employees to be more dedicated and committed to the organization and paved way for the hiring and motivation of younger generations.

Overall, as the construction industry is substantially thriving in Egypt, CCC Egypt is foreseeing more growth and success stories in the upcoming period, with a vision to penetrate new fields that represent a major part of our construction plan. These include fields such as transportation, metros, water treatment, desalination, and petrochemicals. CCC Egypt will continue to expand in successful joint ventures in addition to exploring new partnerships with Private and Governmental entities with a larger pipeline of business. Through CCC's international network, Egypt Area is planning to structure partnerships with International Infrastructure developers who are exploring opportunities in Egypt. Last but not least, CCC Egypt is heading towards growth, success and more expansion in the coming years. **"The sky is the limit"** as quoted by **Mr. Mohamed Tarek** *(AMD-North Africa).*

Leave Management System

Article by: **M. Helou**

INFORMATION TECHNOLOGY

In response to the CCC digitization strategy and paperless initiative, a new **Leave Management System** *(LMS)* was recently developed and deployed as a replacement to the old VBC LMS system.

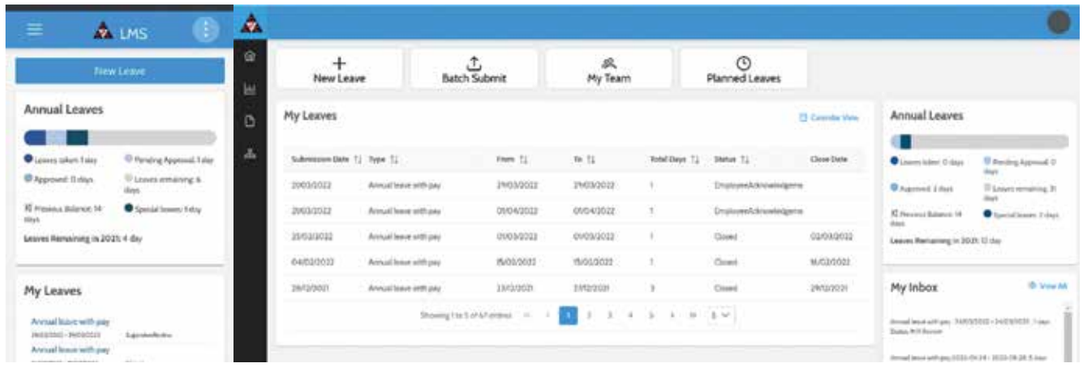
The old LMS system was working well, however it was running on the Adobe Flash technology, which was discontinued, hence it required immediate replacement. The new system added major improvements over the old system. It automated all HR activities related to Leave management and removed the need to print leaves and reports.

Currently the new LMS is deployed in MOA and MOB offices. In the new future it will be deployed in other areas.

The following is the list of main features of the new LMS:

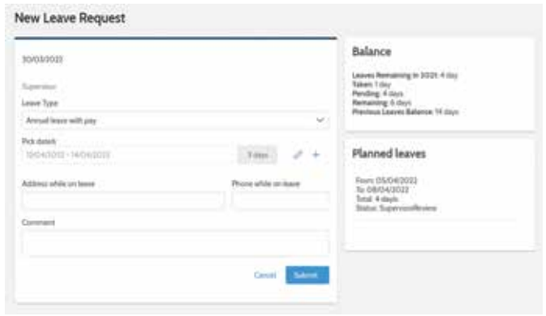
- **Accessibility and UI/UX**
  Our main goal was accessibility, ease of use and transparency. LMS runs on the cloud, hence it can be accessed from any browser on desktops and mobile devices. It has an intuitive and simple UI that requires no user training.

  It is a one-page interface via which the end user *(normal employee or a team leader)* can view a summary of his approved leaves, his entitlement, remaining leaves, planned leaves and a history of previous leaves.



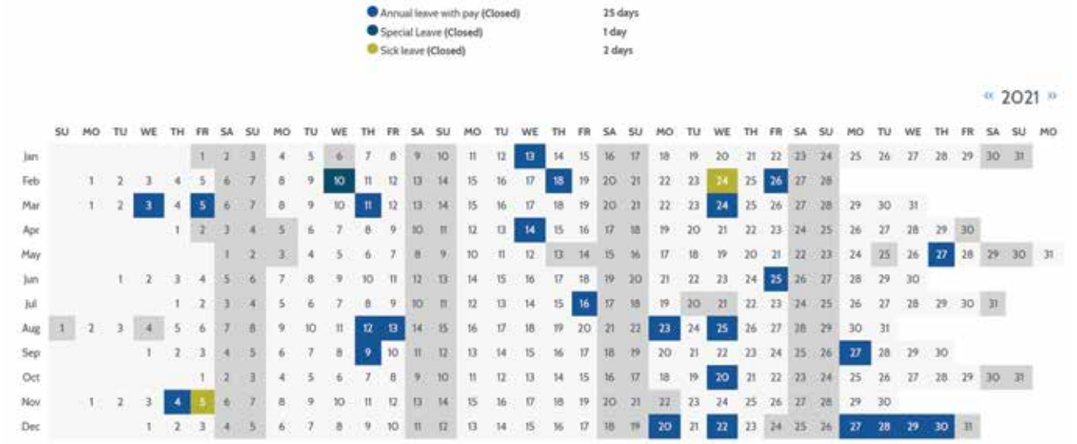
It also includes an Inbox where we list the actions to be taken by the employee. For example, approving a leave, acknowledging a leave, or reviewing it.

- **Submit a Leave**
  The Leave Form allows submitting multiple leaves in one request, hence reducing the time to submit leaves. It shows the employee planned and approved leaves before submitting a new leave. It also integrates with the company holiday Calendar.



- **Calendar**
  The system displays visually the leaves information in an integrated Calendar. It uses color coding to show different type of leaves, hence quickly identify what has been taken. The Calendar has two modes:

  - **Yearly:** This shows a full year information about the leaves of an employee.
  - **Monthly:** This shows leaves for one to two months' timeline. It is used to show team and department leaves. It will be used more by Team leaders and Secretaries.



The Calendar can be printed and exported as PDF

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INFORMATION TECHNOLOGY: Leave Management System

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- **Planning Leaves**
  Employees in the same department can now plan summer or end of year leaves before submitting them for approval. Team leaders can see the planned leaves in the Calendar and will coordinate with their subordinates to finalize the plan. If there are no conflicts, planned leaves can be submitted as final leaves.

- **Delegation**
  If an employee does not have a login to the system, LMS allows another employee to submit and manage leaves on his/her behalf. Usually, department secretaries can take this role. They can submit or plan leaves, acknowledge them and view the Calendar.

  Also leave approvers and department heads can delegate their role as approvers to another employee.

- **Integration with Daily Disposition**
  LMS has a bidirectional integration with the **Daily Disposition** *(DD)* application. If an employee was flagged as absent in DD, LMS will send the employee a notification to submit a leave. HR will be also notified to follow up. LMS pushes the leaves information to DD which will auto populate it with the employee status.

- **Admin Console for HR**
  The HR Admin Console is a major improvement from the previous system. Now, an HR Agent can fully administer the system without going back for help from IT. HR can perform the following:

  ↳ Full Employee Management: Add and Terminate employees, Update Employee Entitlement, Update Employee Information, Change Delegates, View Employee Calendar
  ↳ Manage Leaves Workflow: Close and Formalize leaves, Change Approvers, Delete Leaves, Revert Decisions and Manage Missing Leaves.
  ↳ Submit Leaves in batches: Can submit and view leaves on behalf of special employees.
  ↳ Close year: At the end of the year, HR Agents can call a simple function to close the year and compute the balances. This will also calculate the next year entitlement using configurable formulas.
  ↳ Reports: LMS provides built in reports that can be run on the screen or exported to PDF and excel. It also provides Ad-Hoc reporting where complex filters can be applied to the list of leaves. For example, you can quickly display the leaves in a department that were closed on a specific day

- **Historical Data:**

All historical data from the old LMS system was migrated to the new system. Employees, team leaders and HR can view this data and can report on it. This allowed the new system to be a seamless continuation of the old LMS

- **Technology:**

For tech savvy people, the system was built using Java Spring boot, Angular and Postgres SQL. It is hosted on CCC cloud network, and it Integrates with the company deployed services such as: OrgUnit, OrgChart and Calendar

Credits

This was achieved due to the big effort of the developers who did a wonderful job in a very short time and to the HR and IT team who guided and supported us.

Cloud-based Systems
Timesheet/Timecard

Article by: **G. Moubarak / R. A. Saab / J. P. Wehbe / K. Choulias**

As digital transformation became essential to construction companies' survival, ISD took the initiative of digitizing most of its core systems using the recent cloud technologies. The developed solutions are made available to the people in charge on sites and in the area offices, and the reported data are always consolidated and up to date through its cloud storage.

Timesheet

Timesheet *(or timecard)* is a "method recording and tracking the amount of time a worker spends" on various construction tasks over a given period.

In CCC, Timesheet is a daily transaction, which is delegated mainly to timekeepers or foremen, to record the time spent on multiple tasks for specific crew of employees. The time-keeper/foreman submits the timesheet which goes through a process of approval before it's finalized.

Due to the dynamic nature of work on site, timesheet had to be easy to use and accessible from anywhere by the authorized people to submit and approve freely without the need of a terminal. Therefore, this system was designed as a cloud-based system using the modern UX design standards and is made available on both desktop and mobile platforms.

Every timesheet follows a certain approval workflow which is defined on a project basis. Once a timesheet is submitted, it goes to the first approval defined in the company organizational chart using a role-based responsibilities assignment.

Timesheet calendars define the sequence of working and non-working days, and each project might be configured with one or more calendars to be assigned to the its employees. Every timesheet is linked to a project calendar, and the system uses the calendar information to categorize the employee hours specifying the normal and overtime hours for working days, weekends, and holidays. Later on, these categorized hours are used with the project cutoff definitions to be processed into the payroll system.

Finally, timesheet allows the preparation of an n-day planning in which timekeepers and foreman with the supervision of their site engineers plan their n-day timesheet tasks.

Timecard

Timecards, similar to timesheets, are assigned to the office employees who submit on a daily, weekly, or biweekly basis by recording the time spent on various assignments during the time-basis selected.

To accommodate with these various time-basis configurations, the timecard system displays a view which is adequate to the employee time-basis settings even if the subordinate and supervisor choose different time-basis views.

Approval responsibility in timecard, as well as in timesheet, can be configured to be across companies. For instance, employees of a department in MOA submit their timecards to be approved by someone in a different project and country, and then go back to Athens for a second approval.

Systems Integration

As some of the solutions are moving to cloud, it's natural that integrating with current project-based solution can't be hindered. Therefore, secured ETL *(Extract, Transform, and Load)* were provided to expose the timesheet project related data to be integrated with the CCC payroll as well as MOA timecard data with Midas.

Further integrations are in the roadmap with different site planning tools based on the site requests and needs.

Organizational Knowledge
Building Blocks

Article by: **F. Prouzos / P. Kyriakopoulos**

KNOWLEDGE MANAGEMENT

For any enterprise, determining and maintaining organizational knowledge should be an essential part of their operation and one of the foundations for continuing success and maintaining quality standards. Organizational knowledge is the sum of all knowledge contained within that organisation that can provide value to the business. This includes: the collective knowledge and abilities accumulated from a range of sources, such as intellectual property; the experience of skilled people; lessons gained from success and failure; information about products and processes, and the facility to share that through mentoring or knowledge-sharing programmes.

The importance of determining and maintaining this knowledge is clearly defined in ISO 9001:2015 Quality management systems - Requirements (clause 7.1.6), as a necessity for any company to operate its processes and achieve conformity of its products and services. However, in our experience, many construction firms have realised recently that their collective knowledge is disappearing as a result of poor knowledge management and lack of transfer of knowledge within the organisation.

Failures that occur at various phases of projects can have an impact on the overall cost and financial status of a construction business that is so severe that it may threaten its ability to continue. These failures may also deliver such reputational damage to the company that its relationship with potential future customers will be jeopardised.

So, one of the keys to the quality standards and long-term success of any construction firm is its ability to ensure all knowledge is captured properly, shared and used within the organisation. This knowledge is obtained through: the management of 'lessons learned'; good practices and successful experiences; process or product failures; and the implementation of innovative methods during the initiation, planning and execution of projects.

Factors Impacting Organizational Knowledge

A number of factors, as outlined below, are at play in determining whether construction companies are able to capture and transfer their organizational knowledge and, ultimately, deliver successful projects.

- **High turnover of the personnel involved in the industry**. Many experienced personnel leave projects before completion to work on other assignments within the same organisation, or to provide their services to other companies in the same, or different, fields. Organisations often fail to capture and record their lessons learned, practices and other experiences on the project, which are then lost when employees disengage.
- **Processes for continuous learning and improvement for inexperienced personnel**. Often in construction industry projects, a large number of employees, who are new to the organisation, are allocated to the projects or the scope of works that is being executed. The learning curve of the new personnel has a direct impact on the quality of the works and, ultimately, the quality of the end product delivered to the customer. Construction companies must establish programmes to provide continuous training around proven construction practices and methods, right from when personnel are engaged on the initial stages of projects. Also, lessons learned and own experience and practices should be cascaded to relevant employees for continuous improvement of their works.
- **Application of experience**. Construction firms often engage qualified and experienced personnel to projects only at later stages, to reduce costs and achieve budget savings. It should, however, become a lesson learned for firms to engage highly qualified people in the early stages of a project, to provide knowledge and experience, train new employees, improve performance, and minimise failures.
- **Process to capture lessons learned from experienced, short-term personnel or contractors**. Construction businesses often engage personnel on projects for two to four years, and may not have projects of similar scope for reallocation of experienced personnel within the organisation after their demobilisation from completed projects. It is essential that their personnel's lessons learned, practices and innovative methods are captured and maintained, even if the employees are no longer in the organisation. Relevant tools and programmes should be in place to manage the process.
- **Internal communication, transfer of knowledge and sharing information**. As construction companies become multinational organisations - with various departments or disciplines, locations of operations, nationalities of employees, and levels of hierarchy and expertise within the organisation - they have to develop communication channels and establish an open-door policy to facilitate the capture and transfer of organizational knowledge. This should remove obstacles - such as personality and culture-barrier issues - that might get in the way of employees sharing their knowledge with colleagues. When employees realise they may retrieve any piece of knowledge from the organisation, it is more likely they will be willing to share their own knowledge.

To overcome these issues, and to ensure all knowledge obtained during the life of a project is properly captured, shared and used across an organisation, construction companies need to develop and implement an effective knowledge management programme.

Knowledge Management Programme

CCC established its knowledge management process in 2007, with the assigned process owner being the corporate learning and innovation department.

Since then, it has developed as a mature knowledge management platform and been further implemented as a well-structured, effective programme that helps the organisation accomplish its strategic objectives, delivering projects to customers in an effective and efficient manner.

The objectives of CCC's knowledge management programme are to:

- capture and share lessons learned across the organisation in a consistent, repeatable and traceable manner;
- use lessons learned within day-to-day operations, learn from past mistakes, and reduce failures and waste;
- continuously increase the participation and contribution of employees to the organisation's knowledge management programme;
- assist employees to prepare project documentation after reviewing the available ones;
- connect employees with company experts who can help solve their problems and improve project performance;
- create an innovation platform by gathering company experts to share and implement new ideas.

CCC implements various methods and processes to successfully achieve its knowledge management programme objectives.

Sources of Lessons Learned

The main source of lessons learned is CCC employees, who upload them directly onto the organisation's knowledge management platform.

Lessons learned are also identified by extracting information from the following sources:

- **project completion workshops** conducted towards the end of works (around 90% progress) to capture all lessons learned and best practices acquired through the execution of the project;
- **quality management system and health, safety and environment *(HSE)* audits** conducted by corporate and third-party auditors on whether the project quality management and HSE system is effectively established, implemented and maintained;
- **internal audits** conducted by corporate internal auditors on the economic and efficient use of project resources, safeguarding of assets, reliability and integrity of information, and accomplishment of the established project objectives;
- **site visits** conducted by the assigned corporate project coordinators, based on the criticality and complexity of the project, to assess the overall performance of the project operations;
- **lessons learned exchanges** with clients or other entities (such as joint-venture partners, consortiums, and so on);
- **Other sources**, such as improvement initiatives and discussions on the organisation knowledge management platform.

Lessons learned are submitted on the organisation knowledge management platform via the online 'lessons learned input form', then reviewed by assigned coordinators and forwarded to the respective project managers or department managers for validation and approval. The platform uses machine learning tools to avoid repetition of lessons learned.

When deemed necessary, lessons learned are sent to the appointed subject matter experts (SME) for further validation, approval or technical feedback.

Upon final approval, lessons learned are published on the organisation knowledge management platform, where they can be reviewed by all users, who may further engage, comment and contribute ideas, recommendations or similar experiences.

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Knowledge Management Platform

CCC uses a commercial platform that has been customised to support the knowledge management programme. The following key features are applicable in the platform for the successful implementation of the organisation knowledge management programme.

- A centralised system that provides a user-friendly environment to capture, store and share lessons learned.
- Support for the lessons learned review and final approval process.
- Keyword search capability to trace and retrieve the appropriate lessons learned, document or article.
- Identification of repeated lessons based on lessons learned context.
- Alert users by email when a new lessons learned entry is put into the system.
- Establishment of communities of practice (CoPs), where employees can communicate and cooperate.
- It allows employees to identify colleagues based on experience or expertise.
- Q&A section, where employees on site can ask technical questions and receive feedback from SMEs.
- It conducts knowledge management analytics and generates automated or on-demand charts and graphs.
- Mobile compatibility and ease of access from a mobile browser or mobile app.

Methods for Sharing Lessons Learned

CCC has taken its own lesson from the lessons learned process experience. The initial policy of limited access to lessons learned, and keeping the content protected and accessible only to a restricted number of people - such as project managers and senior executive management - has been replaced by an open knowledge management platform, accessible to all employees.

In this way, the process became more valuable and effective, with high visibility by the employees, who also engage by providing their comments and feedback.

In addition, a number of actions are taken at different timeframes of projects to promote the lessons learned process, all of which can have a positive impact on quality standards.

- **Project lessons learned workshops** are conducted at the early phases with all team members, to present and discuss lessons learned relevant to the project works. The assigned project coordinators liaise with the project management and the learning and innovation department to conduct the workshop.
- **Internal lessons learned staff workshops**, conducted by department managers to present and discuss lessons learned relevant to their scope. This is an effective way to cascade knowledge down through the project.
- **Corporate lessons learned workshops** conducted by corporate staff on specific segments or topics, such as civil, mechanical, airports, HSE, quality, engineering, procurement, and so on. The workshops are also used to promote our knowledge management programme and provide an update on the latest developments.
- **New activity kick-off meetings**, conducted by the project team, to ensure that relevant lessons learned are presented and discussed with key internal and external project stakeholders (for example, customers, suppliers and subcontractors).

The strong commitment and active participation of the project management team is critical for the accomplishment of the objectives of the lessons learned workshops. Emphasis is placed on preparing and conducting the workshops in a thorough manner at the earlier stages of projects, otherwise they lose out on the lessons learned opportunity.

"This is an effective way to cascade knowledge down through the project"

"Access to documented organizational knowledge is provided to all employees for their reference, review and use"

Lessons Learned Add Value

CCC uses several methods to add value within the organisation after capturing and sharing the lessons learned. For example, lessons learned are converted into risk items - the estimation department at the initial stages and, upon award of a project, the project management team review the lessons learned relevant to the project scope and convert them into risk items that are managed through the project risk management process. The contracts manager also evaluates the need for transferring lessons learned/risks to other parties, such as suppliers, vendors, contractors, and so on, through contract terms.

Lessons learned are also converted into process improvement initiatives - for example, the development of a centralised suppliers and subcontractors electronic management system.

In addition, organisation manuals and procedures are revisited to incorporate best practices as extracted from the lessons learned. During the lessons learned review and approval cycle, the appointed SMEs identify best practices and propose them to the quality management department for incorporation into the relevant documents.

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Engagement

One of the main challenges CCC had to overcome was the initial low participation and contribution of employees to the knowledge management programme. To address this, several methods were deployed to foster greater engagement with it.

Training sessions for employees were introduced by the learning and innovation department to raise awareness and use of the knowledge management platform. Communications were also an important element, with employees getting regular knowledge management updates in their email inboxes and on the knowledge management platform, while a weekly knowledge newsletter highlights success stories with new and valuable content.

Employees also receive automatic notifications when new questions or content items are posted in their communities or in their topics of interest. Knowledge management is accessible through mobile versions of the platform, with Q&A options available. Meanwhile, the learning and innovation department looks at well-designed activity metrics and analytics for further improvements.

Another element of the engagement strategy is knowledge management participants being recognised, through their peers, for contributing innovative ideas, providing input with business impact, and answering technical and expertise questions. Participants also receive recognition in published success stories on the company newsletters, and on the knowledge management platform.

Project Documentation

CCC maintains a large source of its organizational knowledge as part of the project documentation - such as manuals, procedures, method statements, plans, and so on - which is uploaded upon completion of the project in the knowledge management platform, under the responsibility of the corporate quality department.

Access to documented organizational knowledge is provided to all employees for their reference, review and use as required, to facilitate preparation of new project documentation.

Communities of Practice

CCC has also established several key communities of practice (CoPs) within the organisation knowledge management platform for subjects such as risk management, HSE, quality, contract administration, project controls, concrete works, piping, and so on. This is to promote communication, knowledge sharing, and cooperation among the employees, and provide them with in-house expertise and knowledge when requested.

CoPs rely on in-person community meetings two or three times a year, as well as on the organisation knowledge management platform to communicate, connect and conduct community activities.

Monitor and Control of Knowledge Management Programme

CCC's learning and innovation department tracks engagement by monitoring activity on the knowledge management platform, surveying project teams and collecting success stories. It also monitors metrics related to the:

- number of users, by project, disciplines, areas, and so on;
- content items published, most reviewed or commented on;
- interactions between users, with queries and replies or comments;
- system interactions, such as 'likes' or 'forwards' to other personnel.

This information helps determine where improvements and investments are required, which content is to be highlighted, and where further engagement of the executive management is required.

In addition, the quality management department conducts audits to evaluate the level of implementation of the knowledge management programme and identify opportunities for improvement.

CCC Knowledge Management Programme - Key Success Factors

In summary, the success of CCC's knowledge management programme for organizational knowledge is the result of a number of essential factors. These include:

- the strong commitment and active participation of the organisation's executive management;
- the establishment of a dedicated knowledge management organisation with clear roles and responsibilities;
- using a customisable knowledge management platform to manage organizational knowledge;
- access to the knowledge management content and lessons learned for everyone in the organisation;
- use of lessons learned workshops to capture and record lessons learned before project completion and to motivate sharing;
- the use of lessons learned workshops and kick-off meetings in projects to reinforce sharing of lessons learned to all personnel;
- the application of lessons learned within the organisation's operations (such as risks, methods of works, and documentation);
- access to past project documentation for all employees;
- the establishment of CoPs and SMEs to promote communication and cooperation among the organisation's employees, and provide them with in- house expertise and knowledge;
- the development of peer-to-peer recognition for valuable input and contributions within the knowledge management programme.

Any organisation in the construction industry, no matter the size, may utilise the aforementioned methods and processes to achieve an effective knowledge management programme.

Sustainability Initiatives

Article by: **B. Kanj**

CCC projects in Qatar participated in **Qatar Sustainability Week 2021** which was organized by the Qatar Green Building Council *(QGBC)*. The week-long national campaign aimed to engage the community in a wide range of sustainability-oriented activities and played an important role in raising awareness about the importance on how we can meet our needs without compromising the ability of future generations to meet their own needs.

From 23rd to 30th October, CCC carried out various activities to promote the nation's sustainability vision and contribute to the achievement of sustainable development goals. These activities include:

1. Awareness raising activities among its office and project staff by sending out informational videos, posters, and a toolbox talk on environmental sustainability and how to minimize the use of resources such as wood, steel, concrete, water, paper, as well as how to save energy, and tips on reusing and recycling the material.
2. Paperless day observed on all project sites, where all printers were switched off. Posters and banners were posted in the offices to reduce the use of paper. At CCC, Printing on both sides of the paper is mandatory for all project sites. Separate bins are placed specifically for paper to be recycled. CCC projects sites in Qatar recycled 8 tonnes of paper and cardboard this year which is equal to saving: 140 trees, 50000 gallons of water, 3000 gallons of oil, 25 cubic yards of landfill, 35000 KW energy, and 500 pounds of air pollutants.
3. Organized a photo session with staff holding sustainability-related posters. Management, office staff and site workers participated in this activity.
4. Engaged employees in planting 100 trees and pruning existing trees on project sites. The theme incorporated in this activity was "Build Today, Plant for Tomorrow".
5. Engaged staff in beach clean-up driver in Qetaifan Island North, Lusail. Recyclable waste was segregated on-site and was sent for recycling.

Besides these activities, few Sustainability initiatives were taken at QIN 4 - package that includes installation of water saving aerators in faucets and displacement bottles in all the toilets/washrooms of the project sites. It is measured that water saving aerators save 60% of the normal flowing water from faucets whereas displacement bottles will save 1 liter of water for every flush.

Increasingly, companies are making public commitments to sustainability through actions like reducing waste, investing in renewable energy, and supporting organizations that work towards a more sustainable future. Through its participation in this campaign, CCC renewed its commitment and pledge to implement sustainable construction and workplace practices.

Due to its valuable contribution to the success of Qatar Sustainability Week, CCC received the Qatar Sustainability Week award and certificate of appreciation from Qatar Green Building Council during the celebration event that was held on Dec 14, 2021.

CCC named
Sustainability Leadership of the Year 2021

Article by: **S. Thabet**

Consolidated Contractors Company (CCC) has been named **Sustainability Leadership of the Year 2021** by the **Middle East Leadership Awards**. The awards ceremony took place virtually in December 2021, and Dr. **Samir Thabet**, Corporate sustainability Manager, has received the trophy on behalf of CCC.

The Middle East Leadership Awards recognize Leaders / Organisations who have contributed value & made a change as a strategic tool for sustainable growth. Such Leaders/Organisations who are impactful & believe that there is a MAD *(Making A Difference)* approach to their work.

The judges' criteria for leadership to be outstanding was based on a number of attributes, including:

- Environment strategist and change manager
- Incorporating Ethical Values
- Develops responsible leaders
- Involvement in Communities & Protection of the Environment
- Strategic Perspective & Building Collaborate Relationships
- Effective and sustainable mobilisation of resources in support of programme and project work, including support from local communities
- Demonstration of efficient management of financial and human resources, good governance practices, transparency and accountability, and effective communication

CCC sincerely thank World CSR Day and the Middle East Leadership Awards committee for honoring us with this Sustainability Leadership Award. This award affirms the positive impact that sustainability efforts have created on the construction industry.

As one of the region's oldest/biggest construction companies, our leadership approach is always to lead by example. Therefore, we developed and implemented a sustainable construction guideline to make the construction activities greener. Also, this year, we developed our Net-zero roadmap that will help us achieve our carbon emission reduction targets.

The biggest honor goes to the team who supported the company to attain its overwhelming success for the past few years.

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CSR Projects

Articles by: **R. Nasser / D. Ntalachani**

Contribution to CSR Initiative

CCC Staff are encouraged to come up with ideas and activities related to CCC's CSR Initiatives including Going Green and community involvement events. Please send your ideas, initiatives and achievements to "CSR-CCC" email address csr@ccc.net.

CCC Participates in Qatar's 2021 Sustainability Week Campaign

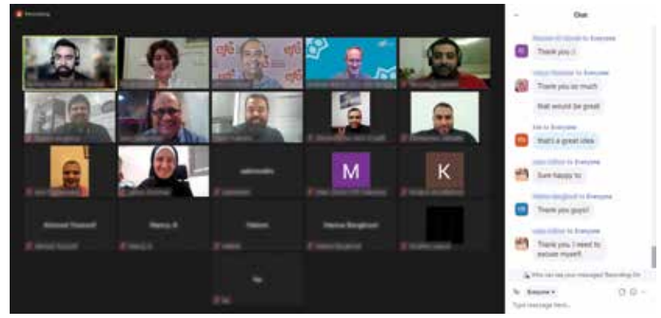
CCC projects in Qatar participated in **Qatar's 2021 Sustainability Week** which was organized by the **Qatar Green Building Council**. The week-long national Campaign aimed to engage the community in a wide range of sustainability oriented activities and played an important role in raising awareness about the importance on how we can meet our needs without compromising the ability of future generations to meet their own needs.

From the 23rd to the 30th of October, CCC carried out various activities to promote the nation's sustainability vision and contribute to the achievement of sustainable development goals. These activities included:

1. Awareness raising activities which included the distribution of informational videos, posters, and a tool box on environmental sustainability. Information on how to minimize the use of resources such as wood, steel, concrete, water, paper, as well as how to save energy, and tips on reusing and recycling of material were also shared with office and project staff.
2. The implementation of paperless day on all project sites, where all printers were switched off. By recycling 8 tons of paper and cardboard this year, CCC managed to save: 140 trees, 50,000 gallons of water, 3000 gallons of oil, 25 cubic yards of landfill, 35,000 kilowatt of energy and 500 pounds of air pollutants.
3. The organization of a photo session with staff holding sustainability related posters.
4. Engaged employees in planting 100 trees and pruning existing trees on project sites.
5. Staff engagement in a beach clean-up in Qetaifan North Island, Lusail. Recyclable waste was segregated on site and was sent for recycling.

Increasingly, companies are making public commitments to sustainability through actions like reducing waste, investing in renewable energy, and supporting organizations that work toward a more sustainable future. Through its participation in the campaign, CCC renewed its commitment and pledge to implement sustainable construction and workplace practices.

CSR Launches a Mentoring Program with Education for Employment



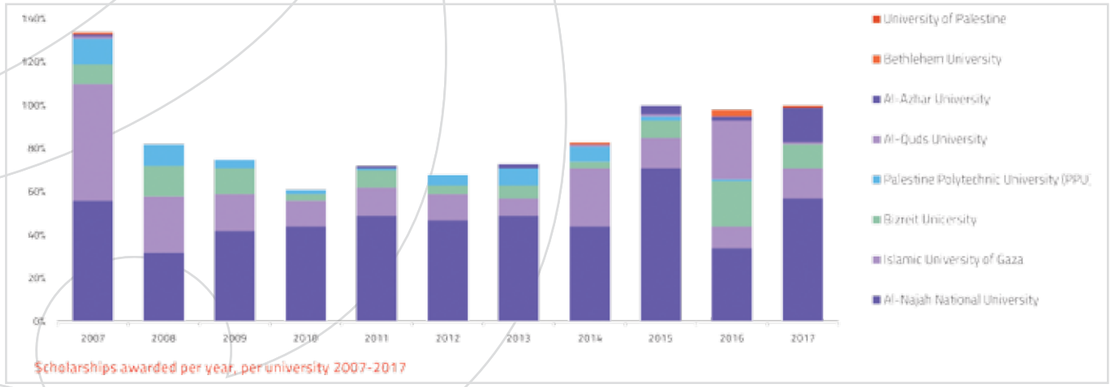
In December 2021, CSR launched its youth mentoring program in partnership with the Education for Employment *(EFE)*. The program targets Palestinian youth to help them stand on their feet, empower their mindset and increase their opportunities for a self-sustainable life. CSR recruited 21 CCC volunteers from **Qatar**, **Greece**, **Saudi Arabia**, **Egypt**, **Jordan** and the **UAE**. They have been matched with their mentees and will provide them with 12 mentoring sessions to:

1. Guide them in identifying career goals, objectives and aspirations *(Career Development)*
2. Support them in the development or enhancement of skills needed to achieve goal(s) *(Skills Enhancement)*
3. Support and provide them with insights to enhance performance and development of mentee's professional journey
4. Expose them to opportunities for creating new professional relationships *(Networking)*

The mentoring program falls under CCC's commitment to help those most in need and contributes to the following sustainable development goals of the United Nations: **Goal 1:** No Poverty, **Goal 4:** Quality Education, and **Goal 8:** Decent Work and Economic Growth.

CCC Supports Excellence in Education for Palestinian Youth

CCC's 14 years of collaboration with the Qaddumi Foundation *(QF)* resulted in the education of 946 Palestinian students in various engineering categories. Today the majority of students have graduated from eight Palestinian universities, and are actively engaged in creating a career, and bringing affluence for their communities, and Palestine as a whole.



In 2007, CCC partnered with QF to support undergraduate students under the Hani Qaddumi scholarship program of the Foundation by providing $2.2 million. CCC supported 11 rounds of scholarships *(2007-2017)* and 53% of the scholarships were awarded to females and 47% were awarded to males chosen from 11 different cities across the entire West Bank and the Gaza strip. In addition to the 11 regular rounds, CCC supported an exceptional round of scholarships for 41 students under the **"WAJEBNA"** *(Our Duty)* initiative of the Foundation, a special scholarship which targets students from Jerusalem.

CCC's and QF's shared values, and commitment to education provided the 946 Palestinian youth their basic right to education and an opportunity to lead sustainable and prosperous lives. Education and capacity building is one of CCC's CSR priorities, and CCC's 14 years journey with QF contributes directly to the Sustainable Development Goals of the United Nations; particularly to **Goal 1:** No Poverty, **Goal 4:** Quality Education, and **Goal 8:** Decent Work and Economic Growth.

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CCC Celebrates the Efforts of Volunteers on International Volunteer Day

CCC celebrated the **International Volunteer Day** by recognizing and appreciating its volunteers. Celebratory events were organized and held by CSR in **Saudi Arabia**, **Kazakhstan**, **Greece**, **Oman** and the **UAE** in which best volunteer awards were presented, and certificates of appreciation were distributed to all those who volunteered during 2021.

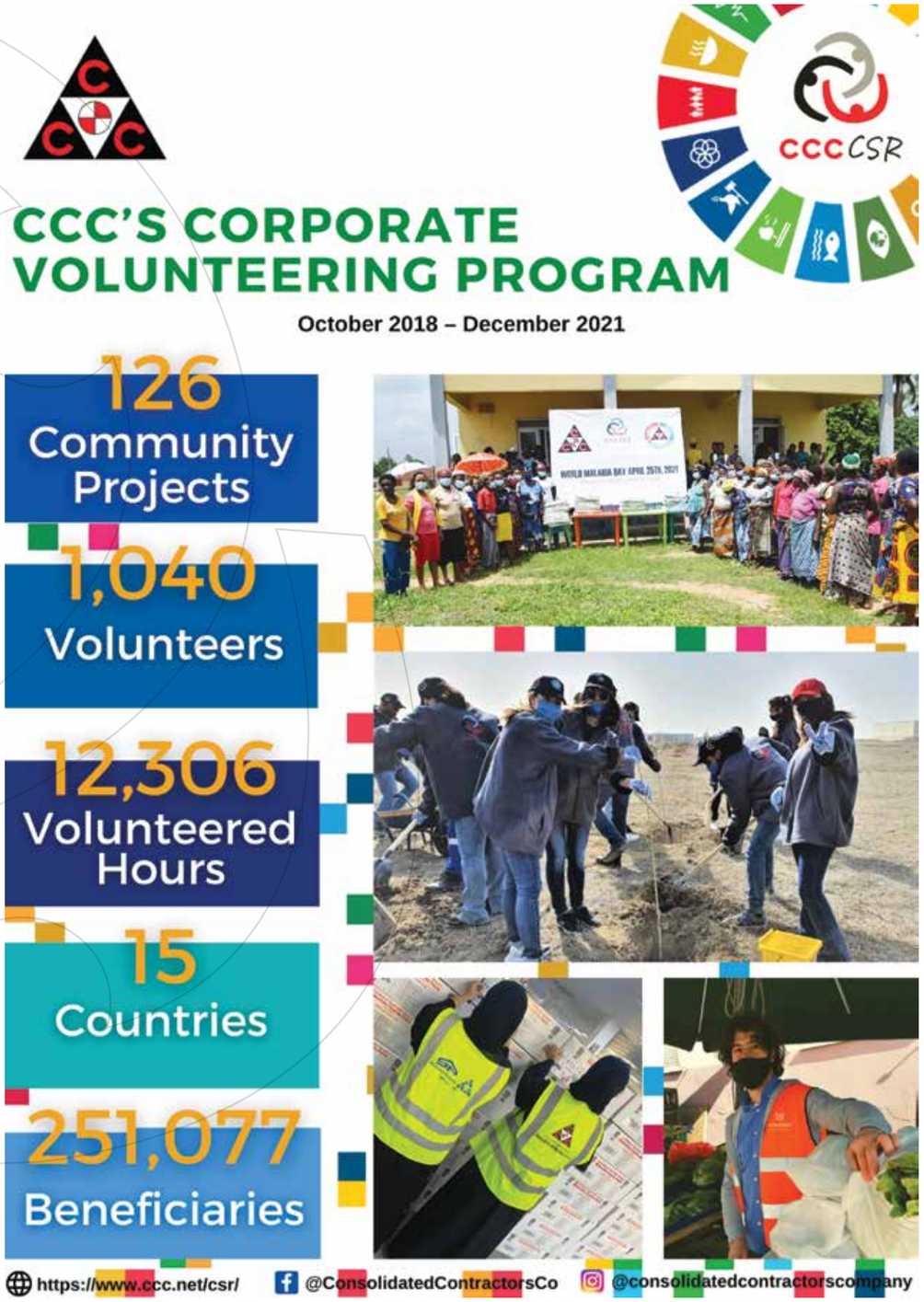
On December 5 of each year, the International Volunteer Day, is viewed as a unique chance for volunteers and organizations to celebrate their efforts, to share their values, and to promote their work among their communities, **non-governmental organizations** *(NGOs)*, United Nations agencies, government authorities and the private sector.

International Day of Education

CSR Highlights CCC's Commitment to Supporting Educational Programs, and employees in the UAE Support Education in their own way…

On the occasion of the **International Day of Education**, January 24th, 2022 CCC employees in the UAE donated 77 books and novels to the library of **Amity International School** in Abu Dhabi, and the Emirates Red Crescent. Twenty-nine novels went to support and enrich the library of the School, and the forty-eight books donated to the Red Crescent will go towards supporting their programs especially those that provide humanitarian assistance to vulnerable people such as orphans and the needy.

In addition, CSR produced the below infographic depicting CCC's CSR commitment to education and capacity building by providing some examples of the implemented educational projects that impacted and improved the socio-economic status of youth, women and marginalized populations in countries where CCC conducts its business.



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World Cancer Day Awareness

On **World Cancer Day**, CSR distributed an awareness poster to all employees highlighting facts about cancer and providing tips for reducing the risk. By raising awareness, and prompting personal, collective and government action will impact the world where millions of preventable cancer deaths can be saved and access to life-saving cancer treatment and care can become available for everyone.

Unused Medicines Put to a Good Use, Greece

In response to the unused medication drive initiated by CSR in Athens on November 15, CCC employees donated 870 medication pills, 70 vials, 5 boxes of sterilized gauze, 1 box of eye drops and 2 boxes of face mask to the Social Pharmacy of Marousi. The pharmacy, on a monthly basis, serves around 500 people who are in poverty or at risk of poverty and who lack medical care. Upon prescription, the pharmacy is providing free medication to those most in need.

According to the Ministry of Health in Greece, it is estimated that every year, medicine worth of one billion Euros end up in the trash. Many of these medicines that end up in the landfill and drainage, are dangerous for the environment and the public health, as they return to the human organism through the food chain. **Donating unused medication or medical supplies does not only help the 1,900,000 people who live below the poverty line in Greece but also protects our ecosystems**.

CCC Volunteers Help NGOs by Providing Translation Services

CCC volunteers in Athens, have been active in translating educational material and program reports to assist two NGOs. In February 2022, **Rashid Ennimer** assisted **Desmos** by translating the organization's program report from Greek to English. The 15-page translation of Desmos' final report on its youth program will in the future, help Desmos in soliciting additional financial support for its program.

With **Safe Water Sports** *(SWS)* organization, CCC volunteers; **Nabil Najjar**, **Basheer Abu Eid**, **Rama Dajani**, **Jinan Samman** *(wife of Wissam Mikati)*, and **Rabi Daoud** translated 4 mini educational books and a teachers' manual on safety at sea and in swimming pools. The educational books aim to increase awareness amongst children about safety precautions in order to avoid and decrease the number of water-related accidents.

Since September 2020, the educational program of SWS has been officially included in the Skills Workshops of the Ministry of Education in Greece, giving the opportunity to teachers to attend seminars on how to teach the material too. In addition, the program has been added to the official curriculum of elementary schools in Greece and it targets 2nd to 6th grade students.

The volunteers translated the 2nd, 3rd, 4th, 6th grade books as well as the teacher's manual from Greek to Arabic. The translation of the books into Arabic, will be used by SWS to increase its outreach and spread awareness among children living in the Middle East and the Gulf.

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Providing Pensioners with Access to Information, Kazakhstan

CCC volunteers took it upon themselves to research and create a database of people who are interested in getting the local newspapers but for financial reasons are not able to. From the database, 100 pensioners with low income were chosen to get a free subscription to Ken Zhylyoy newspaper for 2022. The CSR activity was coordinated with the local executive bodies especially in identifying those in need, and those who do not have smartphones, and their only source of information is the local media.

CCC volunteers distributed the newspaper subscription receipts to the pensioners, who now have access to read the news, and get acquainted with information about events taking place in the region.

Merry Streetmas; a Christmas Treat for People in Need

To bring the Christmas cheer to those living on the streets under very difficult conditions, CSR cooperated with Emfasis Foundation to help them organize a Christmas event for the homeless. CSR in Athens engaged staff members in baking sweets and cookies, and cupcakes and in preparing Christmas cards and wrapping Christmas gifts for children and adults living on the streets.

Emfasis is a humanitarian foundation based in Athens. It caters to the needs of the homeless, the unemployed, families who live below the poverty line and supports socially excluded families who live in distress. Through their presence on the streets of greater Attica, the Foundation provides humanitarian help, counseling, and family support by cultivating trusting relationships with those living on the streets and implementing programs to meet their basic needs.

Independence Day Charity in Kazakhstan

On the eve of **Kazakhstan's State Independence Day**, CCC's Corporate Social Responsibility Department organized a charity event to provide various toys and gifts to 50 children with disabilities. The charity was coordinated with the Department of Coordination, Employment and Social Protection, the Association of the Disabled in Atyrau, and mayors of the suburban villages of Kayyrshakty and Yerkinkala.

Aid Distribution with the Goodwill Caravan

From the 9th until the 23rd of November 2021, CCC's award winning volunteer; **Abdallah Yamin** volunteered with the Goodwill Caravan *(GWC)* to assist them with their **Aid Distribution Program**. GWC is non-profit humanitarian charity which carries out refugee protection projects including emergency aid distribution, sheltering the most vulnerable, and legal and medical support for refugees in the UK and Greece.

Yamin was responsible for preparing the donation packages which included toothbrushes, toothpaste, masks, soap, wet napkins and diapers. Access to these hygienic essentials which most of us take for granted is a necessity and a basic right. Yamin also participated in the distribution of the packages to the beneficiaries of the Goodwill Caravan beneficiaries who included immigrants from South African countries Iran, Syria, and Pakistan.

Recycling of Computers and Office Equipment and Furniture for a Good Cause, Kazakhstan

On two different occasions CCC in Kazakhstan donated computers, printing office equipment, computer accessories, and office furniture to support the work of three organizations. Some computers and equipment went to the Regional Society of the Disabled in Atyrau. The Society caters to the needs of more than 800 disabled and to socially vulnerable and low income families. The computers will be used by the Society to automate, compile, and update necessary information about its beneficiaries in its database. They will also facilitate the daily work of the 12 administrative staff, and will be used by the beneficiaries who often come to the Society for their e-learning.

In addition CSR in Kazakhstan coordinated the donation of used computers, printers, office furniture and computers accessories from CCC's Tengiz Project to benefit Atyrau's Veterans Association and the Young Rescuer Public Foundation. The Veterans Association serves 62,000 veterans, and helps them in improving their housing conditions, and provides them medical and other types of services. The Young Rescuer Foundation serves 50 school students aged 10-16 years. The Foundation provides the students with practical rescue skills training in emergency situation, guidance on their basic legal rights, as well as improving their physical fitness by introducing them to healthy lifestyle.

The three organizations lack governmental support and depend on the support of the private sector operating in the region to serve their beneficiaries. CCC's donation will improve their workflow efficiency and productivity thus, providing better service to their beneficiaries.

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Awareness and Recognition of CCC Women Employees on International Women's Day

March 8, marks the **International Women's Day** as a global day to celebrate the social, economic, cultural and political achievements of women. The day also marks a call to action for accelerating gender equality and activities are regularly held worldwide as groups come together to celebrate women's achievements or rally for women's equality.

This year CCC celebrated the day by recognizing and distinguishing 7 employees from CCC's areas of operation in **Kazakhstan**, **Greece**, **Saudi Arabia**, **UAE**, **Mozambique** and **Egypt** either for their achievements or for their excellence and outstanding performance at work. These exceptional women include:

1. **Amaal Alwahedi**, HSE Officer *(UAE)*
2. **Mashael Al Dawsari**, Legal Advisor *(Saudi Arabia)*
3. **Selbayeva Almagul Kabdulovna**, Industrial Relations Manager *(Kazakhstan)*
4. **Iria Duarte**, Senior Secretary, and Accounts Assistant *(Mozambique)*
5. **Io Chroni**, Senior Insurance Officer *(Greece)*
6. **Maha Doukanish**, Marketing Assistant *(Egypt)*
7. **Serene El Kreidli**, Head of Technical Support *(Egypt)*

Breaking the Bias *(#BreakTheBias)* is this year's theme for International Women's Day which focuses on gender equality, and a world free of bias, stereotyping and discrimination. In this context CSR produced an awareness building poster that engaged staff members and highlighted the importance of decreasing biases and misconceptions for the purpose of creating a more inclusive and gender-equal world.

CCC in Egypt and Kazakhstan Celebrate Women's International Day with Flowers, Gifts and Awards

To appreciate and celebrate **International Women's Day,** CCC in Egypt and Kazakhstan distributed flowers to all women working at **Cairo's** and **Atyrau's Area Offices**. In addition, a sports competition and musical event was organized by CSR at Tengiz field with the participation of all women working there, the project director, CSR's lead coordinator, and the chairman of the trade union. The congratulatory speeches were followed by the presentation of appreciation letters, gifts and awards to the winners of the sports competition. The events of the day in both Egypt and Kazakhstan built a positive vibe, motivated everyone, and strengthened the team spirit of the employees.

World Water Day: "Groundwater; Making the Invisible Visible"

On March 22, CSR distributed the below poster about water preservation and he importance of groundwater as it provides drinking water entirely or in part for as much as 50% of the global population and accounts for 43% of all of water used for irrigation.

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CCC Volunteers Participate in Turtle Beach Clean-up Day in Doha, Qatar

On March 10, 2022, Ninety of CCC's volunteers joined the turtle beach clean-up day organized by **Qatar Energy** and the **Ministry of Municipality and Environment** *(MME)* to clean the **North Beach of Ras Laffan Industrial City**.

The **Voluntary Beach Clean-up Day** aimed to increase awareness about the importance of protecting the environment specifically the ocean, which produces half of the oxygen in the air we breathe, and is the habitat for all marine life.

By protecting and preserving the environment, we are ensuring that future generations have clean air to breath, fresh water to drink and a healthy environment to live in. Author of the book, The Global Economic Prospect, Lester Brown's statement **"We do not inherit the earth from our ancestors, we borrow it for our children"** meant just that. We should be environmentally aware and instead of living just for today and gratifying our own immediate needs, we should think about how our current actions will affect the planet and future generations.

CCC's volunteers included employees from 3 projects in Qatar: **North Field East Onshore Project EPC1 Package** *(NFE1)*; **Jet A1 Supply Pipeline Project** *(JSPP)*; and **North Field Expansion Pioneer Camp** *(NFXPC)*. In four hours the volunteers collected all kinds of waste that could be very harmful for marine life, and learned that by keeping their environment trash free they help protect and preserve marine life, and that each individual can better the ocean's ecosystem by playing their part in keeping the beaches clean.

Water Preservation Invitation in Qatar, and River Clean-up in Kazakhstan

On the occasion of **World Water Day**, and before the spring flooding, 35 CCC volunteers in Kazakhstan cleaned the water protection zone of the Ural River. About 4 tons of debris and waste were collected and placed in Atyrau's garbage dump. The river flowing through Kairshakhta district of Atyrau is often used by many residents of the area as a resting and recreational spot and is a place where amateur fishermen visit during the year to fish. Cleaning the river bank before the melting of the snow, was a very timely volunteering activity to preserve and protect the river from waste contamination.

In Qatar, CSR focused on the importance of water conservation to ensure availability for future generations, and invited all project staff to take an active role in conserving the use of water in the project and at home. A flyer providing simple water saving ideas was distributed to all project staff. In turn CCC's WMFF project reported on their water conservation procedures including their immediate repair of any leakages, and the regular monitoring of water tanks.

CCC Volunteers Give the Gift of their Time, Egypt

On March 24, 17 CCC volunteers spent 3 hours of their time packaging 500 boxes of dry food for needy families in Egypt. The volunteering activity was organized with **Misr El Kheir Foundation**, who will distribute the food boxes during the holy month of Ramadan. Misr El Kheir is a non-profit organization with a mission to contribute to the development of individuals and serve them in the hope of eliminating unemployment, illiteracy, poverty, and disease.

Planting Hope by Planting Trees in Qatar

On March 31, CCC's volunteers participated in planting 2000 trees in Ras Al Laffan city. The tree planting activity was organized by the Corporate Social Responsibility coordinator in Qatar; Saif al Shadfan with Qatar Energy through involvement of three CCC projects' *(NFE EPC1, NFXP, and JSPP)* representatives to increase awareness on the importance of planting trees and the role it plays in cooling the environment. Trees absorb massive amounts of carbon emissions which cause climate change, cleans the air we breathe, and beautifies the city.

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CCC Volunteers Help Cyclone Victims in Oman

When cyclone **Shaheen** struck Muscat with strong winds and heavy rains flooding streets and prompting evacuations of coastal area residents, CCC volunteers quickly mobilized to help the community and CCC employees. Those living in **Al Suwaiiq** and **Al Khaboura** where greatly affected and the volunteers helped them in cleaning their houses from mud which had infiltrated into their homes. In addition, they helped **Nidaa Charity** in the distribution of 450 boxes of food supplies to those affected by the cyclone.

Mental Health Wellness Awareness at Riyadh Metro Project

Between July 5 and September 16, 19 mental health wellness awareness sessions were held at Riyadh Metro Project to empower CCC supervisors' ability to identify the early warning signs of stress and depression amongst workers; foremen, charge hands and others. The Covid-19 pandemic has had negative effects on staff and workers leaving many with signs of stress such as panic attacks, confusion, and uncertainty.

It was observed that CCC workers were undergoing tremendous stress due to the locked downs, travel restrictions and other protective measures. It was also noticed that workers were having insomnia, with reduced functionality causing an increased amount of absenteeism and reduced productivity.

The sessions were delivered by CCC's project welfare officer and were designed to enable leaders on site to identify warning signs of stress and depression in order to address issues and take the appropriate supportive measures. As a result of the sessions, and in addition to improving the team morale, some cases of mild depression and acute stress were identified and were provided with the needed support to address and thus to overcome their problems.

Sports and Team Building Activities in Kazakhstan

On the occasion of Kazakhstan's national **Nauryz** holiday, a team building and sports event was organized for CCC's employees in Tengiz Field project. Various sports activities and competitions were held in the presence of CCC's project coordinator; **Timothy Ashton**, and the trade union's chairman; **Zhaksylyk Musepov**.

The sports included mini-football, table tennis, weight lifting, arm wrestling among other activities which strengthened employees' motivation and team spirit as well as highlighted cultural diversity, and religious tolerance.

MILESTONES

Habeeb Hussain, *(Qatar - Hamad International Airport DIAR)* and his wife Munira Mohamed are pleased to announce the birth of their son **Hafsah**. He was born on the 18th of March 2022 in Qatar.

Rani Sowayleh (*Kuwait Area - Senior Adminstrator)* and his wife Olga Khokhlova are pleased to announce the birth of their third baby, a baby daughter named **Uliana**. She was born on 19 June 2021 in Kuwait City, Kuwait.

Mohammad Abu Zahra, *(Qatar - Hamad International Airport DIAR)* and his wife Khadija Abu Abed are pleased to announce the birth of their baby daughter named **Zeina**. She was born on the 22nd of February 2022 in Qatar.

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