

From the editor's desk



A recent report by the International Energy Agency (IEA) titled “Energy Efficiency 2019” states that energy efficiency has remarkable potential to boost economic growth and reduce greenhouse gases (GHG) emissions, but the global rate of progress is slowing. It reiterates that this trend would have major implication for consumers, businesses and the environment. Statistics published by Eurostat also indicates similar

trend in Europe according to which EU is moving as per plans to achieve its 2020 targets on GHG emissions and renewable energy (RE), but the same cannot be said for energy efficiency (EE).

On the other hand, there are positive signs for India as far as its rise in global energy markets is concerned. The report “India 2020: Energy Policy Review” released by IEA states that India’s impressive track record in increasing access to electricity and clean cooking for its citizens and rapid deployment of renewable energy technologies is an inspiring example for several other countries. It is a well known fact that enhanced use of energy efficient technologies have multiple benefits across the industry value chain that include reduction in specific energy consumption, reduction in cost of operation & maintenance, and adherence to environmental compliance. In this issue, an article on Coke Dry Quenching (CDQ) system talks about its Environmental and EE impact in steel industry. Similarly, another article talks about the role of RE in ensuring sustainable development of medium and small industries by providing frequent power supply, constant water supply, lower cost of production, etc.

Besides RE and EE, the policy makers across the world are increasingly laying emphasis on sustainable solid waste management. According to “Solid Waste Management Market Report” by Global Market Insights, Inc., the demand for solid waste management is expanding across the industrial, commercial and residential sectors and the annual capacity is anticipated to exceed 28 billion tons by 2026. India’s Swachh Bharat Mission is an exemplary initiative by Government of India towards a sustainable solid waste management system in the country, which is directly linked to addressing the woes of increasing waste and their scientific disposal. India has already initiated several schemes in that regard, but still there is a long way to go. Recently, Indian Railways commissioned country’s first governmental waste to energy plant at Bhubaneswar that uses a patented technology called *polycrack*. In this issue, an article on open burning of waste intends to highlight the impact of such a practice and what needs to be done for addressing this menace in a sustainable manner. As always, I would like to conclude by a famous quote from Dalai Lama where he says, “It is our collective and individual responsibility to preserve and tend to the world in which we all live.”

Hope you find this edition of the DESL newsletter worth a read!

R. Rajmohan
CEO, DESL

Down the memory lane...

That’s how we began: In the recently held DESL annual conclave, I had talked about the sterling contributions made by some of our colleagues in shaping up DESL in its formative years. For a new EE consultants like DESL, entry to the market in the year 1999 was elusive, as we did not have any story to tell the prospective clients. At that critical time, we were very fortunate to get support from a few individuals who had been pioneers in their own rights in pushing the case for energy efficiency. In this issue, I would like to share with you about how each one of them helped us in finding our bearing in the market.



DESL got its first contract from Dhampur Sugar Mills (DSM) in May 1999 for improving the performance of boilers in the Rauzagaon Sugar unit of the group, linking our compensation to fuel savings. We achieved huge success thanks to the collaborative model of working amongst DSM & DESL engineers. Mr. Gautam Goel, MD, Dhampur Sugar personally steered the project. He was not only our first client but soon made us a partner of the DSM group awarding several contracts for improving the overall energy efficiency of all the sugar mills of the group.

Our quest for entering the paper sector met with its first success with signing of an MOU in July 1999 with Kuantum Paper (then known as Amrit Paper) followed by a “Guaranteed savings performance contract (GSPC)” in 2001. Mr. Pavan Khaitan, the then Director in charge of operations along with senior management team of the unit cooperated with us for developing the GSPC. The GSPC incorporated many innovative features for transparently determining the investment & financial savings. The project delivered more than committed financial savings. However, there were some differences amongst the operating managers of Kuantum Paper and DESL team about the investment estimates and the final figures of shared savings. The matter was referred to Mr. Khaitan by the QPL team and in the review meeting, he asked me and I quote- “Doc saab, forget all the calculations-please let me know the amount that would make you happy”.

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Dr. GC Datta Roy
Advisor, DESL

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Environmental and EE impact of CDQ in steel industry

Coke Dry Quenching (CDQ) technology was first introduced in Switzerland in 1920 by Sulzer Brothers and later on several developed countries started research work to upgrade the technology. In simple terms, CDQ is primarily a heat recovery system that cools the hot coke from coke oven to a temperature appropriate for transportation. CDQ is an alternative to the traditional wet quenching of the coke wherein sensible heat of the red hot coke is recovered and could be utilized as steam or used for power generation.

Through the New Energy and Industrial Technology Development Organization (NEDO) model projects in Japan, the introduction of CDQ system has been recognized in many countries like China, India etc.

In this process, red hot coke at temperature around 1,000°C is charged in the cooling chamber and cooled down to 200°C and kept dry by circulating inert gas (mainly composed of Nitrogen). The circulating gas is heated up to 800°C in the cooling chamber by recovering sensible heat from coke and passed through the primary dust catcher. After that, it is fed to the boiler, where sensible heat

is recovered by water circulating in the water tubes of the boiler, to produce high temperature and pressure steam. This steam may be used for electricity generation or to fulfill the process steam requirement.

The CDQ technology not only saves energy, but also protects environment, saves water and improves coke quality. An illustration of the utility of Coke Dry Quenching technology is provided in the case study of a steel plant in India. ■

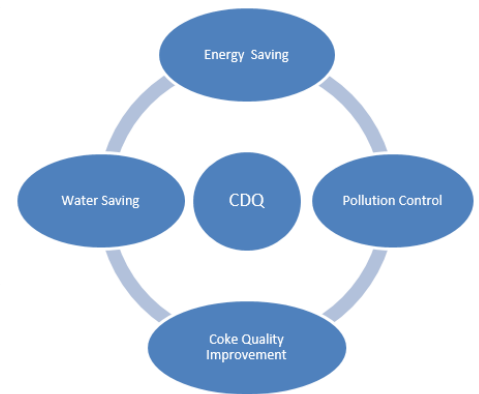


Figure 1: Advantage of CDQ

Rajendra Ninganuri | Dipanjan Roy

Case Study for CDQ in a steel plant

Recently, DESL carried out energy audit at a steel plant which has 7 coke oven batteries (COB# 5 to 11), where CDQ is already installed in coke oven battery (COB #5, #6 and # 7). In COB#10 & #11, CDQ is under commissioning stages. However, the coke produced in Battery #8 and #9 is cooled by direct water quenching. This requires huge quantity of water to cool the coke and also results in fumes and dust, affecting the environment. Also, moisture content in the coke is around 4 to 5%, resulting in higher coke consumption in the blast furnace. A detailed study was carried out by DESL to utilize the heat energy of coke by using dry quenching technology. After analyzing the collected data, CDQ technology was proposed in COB #8 and #9 in place of coke wet quenching (CWQ) system. Average red hot coke of 78 t/h at 1,025°C is coming out from COB #8 and #9 against design of 100 t/h, which needs to be cooled down by N₂ gas to 200°C. The sensible heat available in boiler is around 34.8 Gcal/h which can be used to generate 45 t/h of steam at 66 kg/cm² and 485°C. This steam will be used for generating electrical power of about 11 MW or for process requirement. A comparison of CDQ and CWQ is given in below table for COB #8&9:

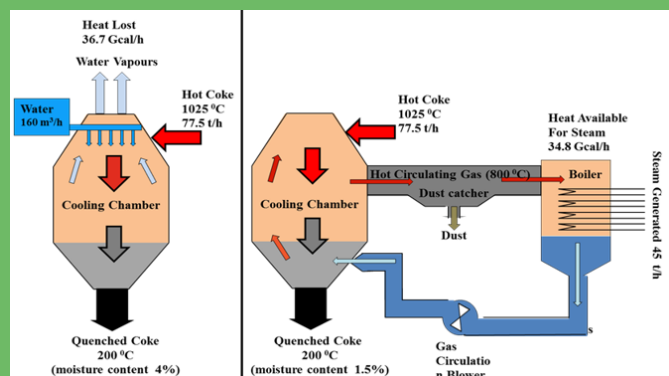


Figure 2: Process flow diagram for CWQ and CDQ

Parameters	UoM	CDQ (Dry Quenching)	CWQ (Water Quenching)
Steam Generation	tons/hour	45	0
Moisture in coke	%	1-1.5%	4-5%
Water Consumption	kL/day	0	2,995

The effective CO₂ emission is likely to be reduced by 84,862 tCO₂/y.



Addressing the menace of open burning of garbage

Waste management is an issue that impacts all across socio-economic groups, regions and cultures. One of the methods of waste management, followed in most countries is the burning of waste which includes either controlled or uncontrolled (open) burning. While controlled waste burning by incinerators is a necessity to deal with different types of wastes, improper incineration or uncontrolled and open burning of waste can create health and environmental hazards for a variety of reasons.

When waste is burnt in open, the products of combustion resulting from the burning are emitted directly into the atmosphere without any treatment. Open burning of garbage is much more harmful to our health and the environment than we may think; the most prominent one being release of hazardous mixture of cancer-causing compounds and other toxic substances.

Open burning of wastes is very common in India; the most common examples are:

- Open burning by waste-pickers for recovery of metals from mixed wastes
- Open burning in bins by municipal workers or residents to empty MSW collection bins
- Open burning of plastic wastes by street dwellers for warmth at night
- Self-combustion or burning by rag pickers at landfills

In addition to open burning of wastes, landfill fires are also common at the landfills in India. The fire in the landfill are caused due to the build-up of heat inside waste beds due to decomposition of (aerobic or anaerobic) organic matter. Sometimes, the fire may continue for weeks at a stretch.

Table: Annual Particulate Matter emissions due to open burning of waste and their health effects

Pollutant	Global Emission due to open burning (kg/year)	% of total global emissions of pollutant	Potential health impacts
Coarse Particulates (PM ₁₀)	12 Billion	24	• Lung cancer • Respiratory disease • Heart failure
Fine Particulates (PM _{2.5})	10 Billion	29	
Black Carbon (BC)	632 Million	11	
Organic Carbon (OC)	5.1 Billion	43	



Open burning by rag pickers



Open burning at collection bins



Open burning of plastic wastes by street dwellers



Landfill fire



MSW is combusted on the streets, exposing millions of urban Indians directly to these emissions every day. MSW burning in the landfill happens in areas with lesser population but the activity emits pollutants into the lower atmosphere, where the dispersion of pollutants is very low, increasing the risk of exposure to these harmful emissions. The first step, of course, is education that focuses both on the disastrous health effects of burning waste and the high economic cost for governments and individuals for

treatment of illnesses due to open waste burning. Second step includes the disposal of the waste with proper measures for the environment using different technologies available such as Waste to Energy, Bio-Methanation, Composting, etc. This is also one of the mandates of “Swachh Bharat Mission” and “Smart Cities” initiatives of Government of India that endorses segregation and utilization of waste in a scientific manner. ■

Rajesh Kumar | Annata Singh

Air Emissions from Open Burning and Landfill Fire: A Case Study of Mumbai

Open waste burning contributes to emissions of various pollutants which cannot be precisely measured, but are estimated to be significant. In fact, open burning is the primary source of some pollutants. A 2010 study by NEERI titled “Air Quality Assessment, Emissions Inventory and Source Apportionment Studies: Mumbai” found that open burning and landfill fires are a major source of air pollution in Mumbai. The study found that about 2% of the total municipal solid waste (MSW) generated in Mumbai is openly burnt on the streets and 10% of the total MSW generated is burnt in landfills by humans or due to self landfill fires.

Source of Emission	Emissions (tons/year)					
	PM	CO	SO ₂	NO _x	HC	Total
Commercial food sector	2,429.3	12,271.1	315.4	628.5	10,312.9	25,957
Domestic sector	564.9	19,723.7	1,262.0	9,946.9	368.1	31,866
Open Burning	3640	11374	135	813	5822	21,784
Crematoria	300.7	2,213.0	7.9	44.4	1,991.9	4,558
Central & Western Railway	514.0	3,147.0	1,449.0	19,708.0		24,818
Aircraft & Marine Vessels	77.4	791.7	96.7	1,003.4	33.8	2,003
Road Transportation	1,544.8	18,856.2	606.4	13,203.1	2,427.1	36,638
Power plant	5,628.3	3,215.7	24,473.3	28,944.5	1,266.6	63,528
Industrial	503.7	879.7	28,510.2	8,435.2	116.8	38,446

Open burning contributes to 19% of air pollution due to CO, PM and HC in Mumbai. More than twice as much particulate matter is emitted by open burning of MSW as compared to emissions from road transportation in Mumbai. Also, a quarter of volatile hydrocarbons entering the atmosphere in Mumbai are a result of such activity.

The study identifies that open burning of MSW on streets and landfill sites need to be stopped immediately to increase air quality in Mumbai and points out the need for credible solutions to this problem. The study has calculated that 50% reduction in open burning and a 100% reduction in landfill fires are required to reduce PM pollution in Mumbai by 98%, along with many other initiatives.



Renewable Energy in MSMEs in India

The Indian micro, small and medium enterprise (MSME) sector is the backbone of the national economic structure. The MSME sector contributes around 6.11% of the manufacturing GDP, generates employment for around 120 million people and contributes about 45% of the overall exports from India.

Despite being the backbone of country's economic structure, the MSME sector is quite energy intensive.

Adoption of modern energy efficient technologies and alternative sources of energy could lead to significant savings, making these units more cost-competitive.

When talking about renewable energy sources, various options such as solar photo-voltaic (PV) system, solar thermal, biomass and wind energy can be used in the industries for power generation, process heat, hot water generation, steam generation, refrigeration and air conditioning etc. Some of the successful models include biomass gasification systems for thermal application in textile dyeing and food processing industry, solar-grid hybrid models for sewing machines, solar thermal application for steam generation in dairy industries etc.

The challenges faced by MSME industries include limited access to information, knowledge and technology, fragmentation of policies across several government agencies, limited access

to finance, high level of uncertainty related to market, high risk premiums, lack of capacity of MSMEs in adopting high-end RE technologies, barriers in the supply chain for the delivery of RE technologies and services, etc.

However, in recent times, awareness related to the environment, improvement in technology, reduction in investment cost and conducive government policies have increased the use of RE technologies in the industrial sector. There are various initiatives going on in India for promotion of RE in MSMEs, such as Sustainable Finance Scheme by SIDBI, Partial Risk Sharing Facility for Energy Efficiency, GEF-UNIDO-BEE Programme on "Promoting Energy Efficiency and Renewable Energy in selected MSME clusters in India" etc.

A recent study (Ozorhon, Batmaz and Caglayan, 2018) suggests that RE investment decision is majorly influenced by policies and regulations, availability of funds and investment cost. It is imperative that government policies are now re-shaped for investment programs to satisfy the needs of the investors to increase the RE share in the total energy production. They can also establish efficient incentive mechanisms and maintain them under situations such as economic and political fluctuations, so that both local and foreign investors would feel more comfortable and increase their investments in the field of RE.





One such step is 'Carbon Taxation'. It is a tax which puts the price on GHG emissions motivating carbon users to reduce their emission levels. In India, this needs to be introduced at a grass root level, thus discovering unconventional strategies to raise fiscal resources.

The industries producing carbon intensive products would introduce reduced cost options; hence giving consumers more

choices. Such developments would finally enable a country like India to explore and invest heavily in renewable energy generation options.

The study by Suryavanshi and Srivastava, 2017, states that MSMEs and low income households invest more in carbon intensive goods due to low costs. Hence, they are more likely to bear the burden in case the economy is adjusted to such taxes. It further describes that the fuel is less price elastic and more income elastic in India due to the absence of alternative energy sources and, in the past, fuel subsidies. Therefore, for an effective outcome, it is suggested that the government should ensure a simultaneous process of higher fuel pricing and also focus on investment towards renewable energy. ■

Sakshi Tripathi / Srikant Kasturi



Contd..... from page 1 (Down the memory lane)

I quoted a figure. He added another 10% and asked his finance manager to issue the cheque before conclusion of the meeting. The association of two organizations continues even today for continued reduction of energy cost of the unit. The M&V protocol (technical & financial) was highly appreciated by the then IPMVP Inc. (currently EVO) leading to my nomination by the IPMVP Board to serve on their executive committee.

While looking for opportunities in the building sector, we came to know about a possible opportunity in the New Delhi Municipal Committee in early 2001. We met Mr. B P Misra (IAS), the then Chairman of NDMC and the NDMC senior engineers offering our services for identification and implementation EE&C projects. We were informed that an energy audit of the lighting system had been carried out in the Palika Kendra but recommended projects could not be taken up due to apprehensions about adverse impact of the project on harmonics and power factor. There was also procedural difficulty in taking project under performance contract. We suggested steps for addressing these concerns based on learning from global experiences. A few months later, we were pleasantly surprised to see 'Notice Inviting Tender (NIT)' soliciting proposal for implementation of a project under ESCO shared savings performance contract. We decided to participate and succeeded in getting highest technical score and competitive financial score. However, we did not have any prior experience in execution of such projects in Government buildings and we requested Mr. Misra to waive the condition, as no company in India had implemented such projects under ESCO system of performance contract. We had also been keeping him informed about the results of our initiatives on product improvement. He finally recommended our case to the Standing Committee of NDMC, and we got the opportunity of presenting our case to the committee. They spent considerable time reviewing our submissions and asking numerous questions on ESCO concept, M&V, Financing and the qualification and experiences of our team members. A few days later, Mr. D N Gupta, the then Chief Engineer of NDMC informed us that the Standing committee had cleared our proposal. We succeeded in implementation of the project with total support from Mr. Misra and other senior executives and staff members of NDMC. Rest, as they say is history. This became an international case study, as it was the 1st successful commercial ESCO project in India. I was invited to many conferences all over the globe in presenting the case, helping us establishing our credential globally.

Mr. Shashi Shekhar (IAS), the then Director General of Bureau of Energy Efficiency (BEE), had come to know about our success in the NDMC project and invited us for a presentation on how BEE could promote a project for wide scale implementation of ESCO performance contract project in Central Government buildings. He then set up a consortium of energy audit firms including DESL to undertake energy audit and provide a template for bidding of performance contract projects in the identified buildings by CPWD, Government of India. At around the same time, ADB had invited an RFP for a technical assistance (TA) project, "Preparing the Energy Efficiency Enhancement-India" with BEE as the executing agency. Impressed with our performance in the energy audit work in the Government buildings, we were encouraged by Mr. Shekhar to participate in the bid. Charles River Associate of Australia in association with DESL won the project. That's what emboldened us to take a plunge in the global market winning our first multi-lateral supported project, "GEF-KAM Industrial Energy Efficiency Project-Demonstration Project, Kenya" from UNEP as the sole consultant in 2004. This was followed by our participation as lead consultant in an international quality cum cost based (QCBS) competitive bid (ICB) TA project by ADB, "PRC-Renewable Energy for Poverty Reduction" in China in 2004. We won the bid against stiff competition from well-established global consulting firms and were highly successful in meeting the project delivery. That established DESL in the global market. I would never forget the moral support from Mr. Shekhar in facing the trials and tribulations that we went through during the initial phase of the project work.

Whenever I would think of DESL, I would never forget the support and encouragement we received from these gentlemen in establishing the brand DESL.

DESL ROUNDUP

Project Updates

Energy Audit of St. Mary's Hospital in South Korea

Veolia South Korea engaged DESL for carrying out energy audit of St. Mary's Hospital at Seoul, South Korea. The primary objective of the assignment is to identify energy saving opportunities and potential, quantifying the achievable reduction in CO₂ emission. The scope includes detailed energy audit of the hospital that consists of 6 buildings.



Development of a cluster level/unit level cloud based data analytics tool in India

UNIDO engaged DESL for designing and developing a cluster level/unit level cloud-based data analytics tool to maintain energy usage data base and develop benchmarking system. This data will help as an analysis tool for assessing energy performance of the enterprises and also comparing their performance with respect to the optimal usage of an enterprise in the sector periodically. This tool will also provide regular insights on daily, weekly and monthly basis to units on their energy consumption and performance.

Cable sizing in ETAP software

As informed earlier, DESL has acquired comprehensive electrical distribution system analysis software, ETAP. The ETAP software can be used for cable sizing. The ETAP cable sizing study module calculates optimal and alternative cable sizes for phase conductors based on the following criteria:

- Load Current
- Voltage Drop
- Motor minimum starting voltage
- Short circuit current
- Protective device requirements
- Ampacity of Cable considering the suitable derating factors.

Cable Sizing Software Key Features

- Cable parameters and calculation results
- Grid-based interface for sorting, searching, and filtering
- Multiple filters for selection
- Batch updating from library
- Batch selection from the library
- Accessing to Model Forms
- Individual or Consolidated Report

DESL extends support to its clients with enhanced qualitative approach using the ETAP software.

DESL Business Meet- 2019

The annual business meet of DESL was organized on November 7th & 8th, 2019 at Best Western Resort Country Club, Manesar, Haryana.

The two-day meet was attended by the entire staff of DESL in India and Mr. Philippe Bloch from Veolia Environnement Ingénierie Conseil (VEIC), Paris.

The itinerary of the event included discussions on DESL's growth strategy, team building activities, session on business communication & personality development and fun-filled cultural night.

The DESL Annual Awards were also presented to top performers of the year.



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