Gasin Cement's road to RDF

Faruk Investment Group (FIG) has recently launched a mechanical biological treatment facility in the city of Sulaymaniyah, northern Iraq. The project aims to tackle the issue of uncontrolled municipal solid waste by converting it into refuse-derived fuel, thereby providing FIG-owned Gasin Cement Co with an alternative fuel source and reducing the environmental impact of waste disposal in the region.

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The city of Sulaymaniyah is located in the Kurdistan region, northern Iraq, with a population of approximately 1.6m. Faruk Investment Group (FIG) is a private company based in Sulaimaniyah that has always been an early adopter of new businesses in the region, such as in the fields of telecommunication, cement production, steel fabrication, international standard healthcare, and holiday resorts.

FIG embraced the opportunity of Sulaymaniyah's solid waste management contract as soon as it became a reality. The contract was to invest in a build-and-operate mechanical biological treatment facility (MBT) with associated sanitary landfill, located in Tanjaro, Sulaymaniyah.

The concept behind the facility is to stop the traditional methods of uncontrolled dumping and reduce the environmental impact of waste disposal. In addition, the project would utilise the refuse-derived fuel (RDF) produced by the MBT facility at FIG-owned Gasin Cement Co (GCC).

Faruk Investment Group's Mechanical Biological Treatment facility in Sulaymaniyah, northern Iraq, is designed to receive and process 480,000tpa of municipal solid waste (MSW) and produce 223,000tpa of RDF

MSW treatment

The MBT facility is set up directly adjacent to the existing traditional dumpsite. In the first year of operation, the MBT works will be able to treat 400,000tpa (1100tpd) of unsegregated municipal solid waste (MSW). MSW with a moisture content of ~55 per cent is converted into a minimum of 115,000tpa of RDF with a moisture content of ~20 per cent for use at GCC.

Overall, the plant is designed to be able to receive and process 480,000tpa of MSW and produce 223,000tpa of RDF. This takes into account an expected increase of MSW due to the city's rising population.

Completed at the end of 2020, the MBT facility has been set up directly adjacent to the existing traditional dumpsite

Project implementation

In early 2019 FIG's design and supply companies found that the project could be implemented in 15 months. Although the COVID-19 pandemic slowed the implementation time by a few months, commissioning started in summer 2020 and was successfully concluded by the end of the year.

Currently, on approximately 65,000m^2 of built up area, the city's waste is received, shredded, biologically dried and refined to RDF seven days-a-week, 365 days-a-year.

The parties involved are proud to note that less than 10 per cent of incoming MSW has to be landfilled. The landfilled material comprises mainly inert material rejected during the RDF production process.

Supplying the GCC works

Approximately 300tpd of RDF is transported in bulk form by walking floor trailers to GCC and fed to the kiln's precalciner. The RDF baling option is used during annual cement kiln maintenance to

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ensure the continuation of MSW treatment and RDF production. By using RDF GCC has become less dependent on fossil fuels such as the heavy fuel oil (HFO) currently used. RDF has a lower heating value of ~15.5GJ/t, compared to ~41GJ/t for HFO, resulting in a substitute of approximately 3t of RDF for 1t of HFO. The current total substitution rate of HFO by RDF at GCC is 40 per cent.

Asset to the region

The Tanjaro MBT facility provides direct employment to 130 people, ranging from non-skilled workers to highly-qualified technical personnel.

Moreover, it significantly contributes to reducing pollution of the Tanjaro river (situated in the periphery of the dumping area) from the highly polluted leachate generated by the dumping of unprocessed MSW. The poisonous clouds of smoke from intentionally set fires and wildfires at the dumpsite, which negatively impact the surrounding commercial and residential area, are dissipating. It is expected that the dumpsite can be soon properly closed or even removed over time by landfill mining activities in parallel to the fresh waste processing.

As a result of the project, Sulaymaniyah, a modern city with universities and a popular base for businesses, is gaining in reputation and popularity for not only having reliable freshwater infrastructure but also for now having a proper waste management infrastructure in place.

FIG soon began receiving requests from a number of international companies in Sulaymaniyah and from the provincial capital Erbil to treat the mixed waste from their premises, even though the distance between Sulaymaniyah and Erbil is ~180km. This is proof that state-of-the-art waste management is an asset for regional governments to attract businesses and investment.

An important intermediate step

The operation of an MBT site is not without its challenges. However, these can be managed and are all part of capacity building in terms of knowledge, operational experience and extensive insights into risks and the cost structure of such a business. For future expansion within the region this is both essential and a major asset.

In the Middle East there is no shortage in waste but there is a shortage of electric power and space for future landfills as well as a lack of action to reduce the environmental impact of current lifestyles.

It is inevitable and undisputed that societies in developed countries, as well as in developing countries, have to move away from a fossil fuel-based economy to a more sustainable one. Using waste as a source of energy is only an intermediate step but an important one.

Projects that convert waste to alternative fuels are relatively fast to implement and provide solutions to various issues. MSW to RDF projects contribute to a minimum of five of the United Nations' Sustainability Development Goals.

For the Sulaymaniyah project, the positive contribution towards fighting global warming by reducing climate gases was calculated to be 501,000t CO_2 equivalent per year.[1] Approximately 10 per cent of CO_2 reduction is from the biogenic organic part of the RDF replacing HFO in clinker production. A total of 90 per cent of the CO_2 equivalent emissions reduction by this project comes from preventing methane emissions from the dumpsite when organic waste degrades without control or any landfill gas collection.

The savings are equivalent to the annual CO_2 emissions of an average city of 100,000 inhabitants. (The worldwide average emission is approximately 4.8t CO_2 equivalent per capita per year [2].)

VER potential

While generation and sale of voluntary emission reductions (VERs) was neither a focus during project development nor could it be considered due to the short project lead time, it will be one of the considerations for the financial foundations of future projects. Especially in developing countries and lower-income countries, a broad revenue base is the best foundation for each project. VERs can be sold to institutions, traders and businesses, voluntarily compensating their CO_2 emissions from personal travel or usual business activities, to allow the claim of being carbon neutral.

While the sale of VERs at present would generate approximately an additional US$1.5m in revenue per year, the potential revenue from VERs will very likely increase in the future. There might even be an extended commercial trading scheme for CO_2 reductions after the COP26 climate change conference in Glasgow, Scotland, this November. (Note: assumed is a sales price of US$3/VER. In 2020 the price was around US$2-3/VER, while in March 2021 the price had already increased to US$5-7/VER, with further upward tendency).[3]

Revenue from VERs can lower the tipping fees to be paid by municipalities and can make RDF competitive even when compared with cheap fossil fuels such as lignite or subsidised gas. However, reliable and proper waste processing always requires revenue from at least the tipping fee and sale of RDF. The RDF consumer (currently GCC) is paying for the calorific value delivered in the form of standardised fuel. The solid RDF fuel is produced in the vicinity of the consumer, with low impact from world market fluctuations and partly

Approximately 300tpd of RDF is transported in bulk form by walking floor trailers to GCC and fed to the cement kiln's precalciner

from renewable sources. While not always recognised in monetary terms, these facts are definitely a bonus for the consumer.

For this project, GCC is paying for the calorific equivalent to HFO with a slight discount for recovering the additional investment into the RDF receiving and feeding system which had to be installed.

Gaining a competitive edge

The Faruk Investment Group was willing to take some risks to implement this kind of project in the region. For GCC, on the other hand, it might turn out to be a competitive edge when fossil fuel prices increase while cement demand is below production capacities. ■

"The solid RDF fuel is produced in the vicinity of the consumer, with low impact from world market fluctuations and is partially from renewable sources."

NOTES/REFERENCES

[1] FIG calculations on CO_2 equivalent based on:
- IPCC Guidelines for National Greenhouse Gas Inventories: Volume 5: Waste (2006)
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- Institute for Global Environmental Strategies, IGES List of Grid Emission Factors (2019)

[2] RITCHIE, H, ROSER, M (2020) 'CO_2 and greenhouse gas emissions' *https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions* [Accessed on 25 August 2021]

[3] DIETZ, V (2021) 'Preisanstieg bei CO_2 Zertifikaten – Vorteile für Projekte, die Zertifikate verkaufen' *https://www.bettervest.com/de/2021/03/13/preisanstieg-bei-co2-zertifikaten* [Accessed on 25 August 2021]