

Waste Treatment Innovation a Key to Sustainability in Future Cities on the Arabic Peninsular

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Introduction

The leadership of the United Arab Emirates have stated in their national agenda for the vision 2021 that the percentage treated of total waste generated should be 75% by 2021. With availability of landfill space in the UAE running low, several emirates have pledged to divert 100% of waste from landfills within the next decades. These goals might seem to be very ambitious, but especially the goal of 75% of generated waste to be treated is highly feasible. Data from 2012 suggests that the general waste fraction in Dubai accounts for approximately 28% of the overall waste generation. Within this sector, organic waste makes up over one third of it and another quarter is paper and cardboard. In addition, construction and demolition waste by far accounts for the biggest contributor to the overall waste production in the UAE with more than two thirds. All of these waste types are rather easy to recycle and will support the diversification of UAE's economy.

There are several small and large scale projects in the UAE related to waste management. The projects range from large scale centralized sorting facilities, biogas facilities to separation at source pilot projects limited to specific neighborhoods.

The Concept of Circular Waste Management which has been developed by Green Business Norway is based on the assumption that waste is a valuable

resource and targets a comprehensive approach to waste management of generated household waste. If implemented, it will not only help to reach the goal of 75% treated waste but will also secure maximum material recycling and give an impulse for the development of a circular economy.

The Concept is based on best available technologies developed and successfully implemented in Scandinavian countries. The waste is separated at the source into two waste streams: 1) daily waste fractions (residuals, recyclables and food waste) and 2) special waste fractions (oversized, green waste, WEEE and hazardous fractions). Circular Waste Management includes user friendly collection (it is enough to separate glass and pre-sort food waste), central sorting (of the two fractions: food waste and residuals with recyclables) and relevant treatment methods: biogas from food waste, material recycling of recyclables and energy recovery of residuals.

95%-98%. This allows for high yields in energy and or CNG². The energy extracted from the biogas plant can power sorting and drying equipment as well as the waste collection vehicles and compressors. Thanks to the fact that the biogas production technology is scalable, it would be possible to start the waste system development process by piloting a small biogas reactor based on chosen sources of food waste.

Energy recovery

In a proper designed waste treatment facility, the incineration process is only fed by residuals which should account for a maximum of 35% of the total general waste and optimally should be much less.

Requirements

In order to create a socioeconomic successful project, a community or city district has to be identified preferably fulfilling most or all of the below requirements:

- Critical mass of waste
- Space for technologies
- Infrastructure
- Preferably green field opportunity

While the central districts are in general generating more waste, functioning collection systems are in place. In addition, the lack of space for installation of technology makes them a difficult environment for pilot projects. The optimal community or district would be either an isolated area such as an island or a district which is newly developed and where the necessary infrastructure for the pilot project can be easily implemented. Furthermore, this would provide greenfield opportunities for waste collection and sorting at source approaches which is in general are easier to implement compared to adjustments of existing collection processes. However, in both cases proper awareness programs are required in order to ensure the participation of the waste generators (private and commercial).

² CNG – compressed natural gas; in case of the gas produced from bio-waste it could be referred to as CBG – compressed biogas

Advantages of Piloting New Concepts vs. Direct Large Scale Implementation

The differences in environmental conditions, legislative frameworks and cultural habits between the countries producing the most innovative and advanced technologies and concepts for waste treatment and the Arab world, in particular the Arab peninsular, are significant. It would be rather reckless to transfer technology from Scandinavia or Europe without a proper assessment of these circumstances. The most robust and secure way to assure that a technology is not only suitable for the environmental conditions, but also will be accepted and utilized by the local population are small and medium scale pilot projects. Not only will the local entity who is acquiring the technology have assurance that it works from a technical aspect, it also will be able to design a suitable legislative framework if necessary, identify potential unforeseen obstacles on the social or economic level, do training and awareness campaigns and can monitor the public conception of the technology in general. This will allow the leadership to fine tune the integration of new technologies into the cities to ensure the highest possible level of efficiency, quality of life as well as happiness.

