No Trust, No Dust

Incinerators are Not a Suitable Solution for Lebanon

New Guidance to Embed the SDGs into Corporate Reporting

How CSR is Changing the Way We Help the World

Spotlight on Lebanon’s VNR: A Milestone Towards Agenda 2030
The incinerator industry often promotes incinerators as having “zero emissions” or as being “safe for community health”. The truth, however, is that all incinerators contaminate people and the environment with toxic and cancer-causing emissions.
In 1972, the World Health Organization (WHO) estimated that more than 200 million people were exposed to POPs in their daily lives. These chemicals were later identified as causing serious health problems, including cancer, endocrine disruption, and the global burden of disease. With all the claims that newer WtE technology are free from toxic emissions, POPs’ emissions inventory by sector in Europe still shows that waste is considered a major source of POPs (see Chart 1). Furthermore, burning toxic products such as electronics can also emit ultrafine particles and nanoparticles that are not captured through air pollution control measures and as such they will be emitted into the air only to cause more deaths and diseases.

2. Fly and bottom ash are toxic and significant
WtE facilities erroneously report that they reduce incoming waste down to only 10%. The U.S. Environmental Protection Agency (EPA) states that ash constitutes up to 25% of processed waste by weight. This means incinerators cannot eliminate or replace landfills because a sizeable quantity of toxic ash will still need to be buried.

3. Not climate-friendly
When compared to other electricity-producing technologies, incineration contributes the greatest amount of greenhouse gas emissions (see Chart 2).

4. Deterrent to recycling and composting
Much of the waste in developing countries is plastics derived from fossil fuels. But once it’s burned, it can never be used for anything else. Incinerating waste also causes damage to the environment. The absence of effective controls, harmful pollutants will be emitted into the air, land and water which will influence human health and environment. Although incineration is NOT an option for solid waste management in Lebanon.

Des...
countries is formed of organic materials (around 50% in Lebanon). As such, its calorific value is low, meaning that one needs to add a lot more fuel and other burning waste to have the burner reach the optimal temperature of 850°C. This temperature is optimal because at T < 850°C, the energy produced cannot generate electricity. Instead, incomplete combustion of waste will produce larger quantities of the toxic gases already mentioned. Therefore, WtE facilities need to burn energy-rich materials like paper and plastic to reach optimal temperatures, which means facilities will select these types of waste to feed the furnace and not water-rich food scraps or non-combustible glass. By doing so, WtE facilities will be directly competing with recycling markets for these valuable paper and plastic materials. When enough paper and plastic are not available, WtE facilities add fuel to reach the proper calorific value to produce electricity (more on this point later). The only material that WtE facilities are claiming to re-cycle is metal, not because of their commitment to recycling but rather because metals do not burn and are a contaminant in the furnace.  

5. Waste of Energy

WtE is the most expensive method of generating electricity. In 2018, the U.S. Energy Information Administration (EIA) published a report showing that trash incinerators were more expensive to build and operate than nearly all other energy sources including wind, solar, and natural gas (see Table 1). It is evident in the case of Lebanon that the government needs to put more efforts in upgrading and maintaining current power plants to generate electricity rather than investing in the most expensive technology in the world to generate much less electricity than what is being advertised. More on the existing status of power generator emissions in Zouk in (8) below. 

6. Waste of Money

It requires a minimum of 7000 Kj/Kg for the furnace to burn at 850°C and $400 Kj/Kg to produce electricity. If we assume that the average organic waste in Lebanon is 52%, this means that the maximum calorific value that can be reached with this waste is 6500 Kj/Kg. The deficit calorific value necessary to produce electricity is then around 2000 Kj/Kg. This deficit will be compensated by adding, for example, diesel fuel that produces 40,000 Kj/Kg. 

Taking Beirut as an example, the 292,000,000 Kg of waste per year would need 17,600,000 liters of diesel at a cost of $117 million per year. 

Added to this high cost are the billions of dollars per year required to operate incinerators built to European standards of health and safety, which still allow the release of dangerous waste pollutants and ash residues. All over the developed world, more than half the investment is put in control systems and pollution control equipment to reduce toxic emissions. Examples are the ammonia injectors needed to remove nitrogen dioxide, activated carbon to remove mercury, lime injected onto dry scrubbers to remove acid gases, and electrostatic precipitators to remove particulates and toxins. Most importantly, the cost of a special landfill for fly ash disposal is almost ten times costlier than a municipal landfill with an even higher annual cost for operation and maintenance. 

7. WtE is not risk free as shown in the following case studies

Incineration facilities, while claiming the safety of their practices, are frequently cited for pollution violations and have been shut down in many places. Following, we review some case studies from around the world (a-d) : 

a. In 2011, the state of Connecticut sued its WtE plant for repeated excessive dioxin emissions.

b. The Thermoselect Karlsruhe facility in Baden-Württemberg, Germany was a gasification incinerator, designed to process 225,000 tons of municipal waste per year. Thermoselect falsely claimed that its technology completely destroys dioxins and furans. Recurring operational problems prevented the facility from reaching full operating capacity. It was closed in 2004 after losing approximately $500 million on municipal solid waste (MSW) gasification.

c. Brightstar Environmental gasification technology also called the Solid Waste & Energy Recycling Facility (SWERF) was promoted in many countries but was only constructed in Wollongong, New South Wales, Australia. The facility operated in test phase from 2000 to 2004. It closed thereafter after losing US$134 million. Brightstar’s website admitted to emissions of toxicants.

d. In 2002, the Malaysian government planned to install a gasification incinerator to treat an average of 5,000 tons of waste per day. The incinerator was originally planned to be installed in Kuala Lumpur but then moved to Broga in the state of Selangor under the community’s pressure and refusal. An environmental impact assessment for the proposed Broga facility noted concern for public health and safety and raised the possibility that dioxin emissions and accidents could cause cancer. The Japanese corporation “Ebara” that commissioned the project lost over $300 million (US) in plant repairs caused by contaminant leakage. To date, the Broga facility is still in the planning stage.

e. The Environmental Council of Zambia (ECZ) has reported recurring problems with incinerators due to malfunctioning equipment, improper operation, and poor communication between operators and maintenance personnel. The described scenario feels closer to home as inferred by current practices here in Lebanon.

8. Incinerators are NOT Suitable for Lebanon

According to a report published by the National Academy of Science, the incineration process requires extensive and continuous monitoring of the waste and the residue) and air emissions, water discharge, combustion temperature, and feed cut-off and restart when needed. Our experience over the past 20 years has shown the inability and the unwillingness of local public institutions to complete such serious tasks. Examples include: 

a. Power plants: Emissions from ill-maintained power plants have shown that the amount of carcinogens in the air around the Zouk power plant is 300% higher than other sites that are experiencing heavy traffic and im-
Industrial activities. Still, no filters or scrubbers have been put in place even after data was published and public officials were informed of the disastrous situation.

b. Old traffic fleet: Our data also showed that emissions from cars on the streets leading to Beirut are seven times more toxic than traffic in Los Angeles. This is not due to the higher number of cars but to the number of old and high emitting cars. Yet, no plan to remedy the situation is ready for implementation. c. Diesel generators: Our studies show that the number of carcinogens emitted from diesel generators in Hamra increase by 38% when the generators are on. It is important to note that this number is associated with three-hour outages and not six and twelve hours as is the case in most cities and villages in Lebanon.

d. Occupational health and safety workers at waste sorting facilities: Based on several visits conducted to waste sorting and treatment facilities, we witnessed workers doing their jobs without any protection and smelled the odor of waste fermentation from a distance. This indicates that care in handling waste has not been taken seriously by contractors or the supervising governmental bodies. Studies of incineration facilities workers found increased death rates from cancer and heart disease.

e. Law 174: Despite the issuance of law 174 that bans smoking indoors in restaurants and public spaces, the law is not enforced even in the ministry and municipality offices. This includes those offices that are claiming they will enforce the regulations for the incinerators, indicating that incinerator regulations may not be taken seriously.

As a result of this carelessness, the ambient air pollution level in Beirut has reached 3.2x higher than what is recommended by the World Health Organization (WHO) and has caused many diseases and deaths. It is important to note that according to the recent report of the International Agency for Research on Cancer, the incidence of lymphoma in Lebanon is the highest among children (5-9 years old) and adolescents (15-19 years old) (see Chart 3) when compared to other neighboring countries.

9. Incinerators present major environmental injustice

Certain areas in the suburb of Beirut have suffered from environmental injustice. Added to the poor status of most of the population, these areas have carried the disproportionate burden of air and water pollution due to waste, sewage, and untreated industrial discharges. Discriminatorily enough, the same areas are being suggested as ideal sites to host the new incinerators if implemented. Several studies have demonstrated a correlation between people living near pollution sources and increased rates of death from cancer.

Recently, research has shown that air pollution may play a major role in causing fetal/newborn malformations. It can even inappropriately alter the function of some genes changing when or what they instruct cells to do. This can only imply that this population will be condemned for future generations.

10. Most importantly WtE will cause the death of innovation and young minds

Most developing countries are looking to “research and evaluate new and emerging non-combustion thermal, chemical, and biological technologies”. They are convinced that there is a great need to adopt alternative and cleaner methods for the disposal of municipal garbage. It is a shame to see that our country officials do not have faith in our young minds. Many studies conducted at their ministries and public offices are completed by foreign consultants who are eager to fulfill their agenda before looking at local needs and benefits.

The option of incineration might suit several consultants, contractors and narrow-minded people who are keen on cashing-in by burning the problem as quickly as possible. Hopefully, they realize they are burning resources and creating an even more toxic and dangerous problem that will still need a much costlier landfill. Moreover, this approach
will burn not only waste but also our health and all the hopes of creating new industries and new innovative alternatives based on local research as well.

*****

Moving beyond trash into a circular economy requires collective commitment, dedication, and hard work, qualities that are not foreign to Lebanese youth, entrepreneurs, and researchers. Building an infrastructure and technologies that keep systems circulating endlessly will make us global leaders in technological, regulatory, social, and business-model innovation. You and I both know very well that this is not a dream because all of us doctors, engineers, philanthropists, artists, teachers, media experts, farmers, and crafters have proven to be leaders in our fields and innovators in the international arena. We shall have, and continue to strive to excel even in municipal waste management.

Dr. Najat A. Saliba is the Director of the Nature Conservation Center (NCC) and Professor of Chemistry at the American University of Beirut.

1- Lorber et al. 1998. Relationships between dioxins in soil, air, ash, and emissions from a municipal solid waste incinerator emitting large amounts of dioxins, Chemosphere, 37, 2173-2197
2- Citizen concern with waste to energy incinerators, a presentation to the Canadian Institute conference, Jackson, November 2009
4- Dorn et al. 2012. A review of energy recovery from waste in China Waste Management & Research 30(4) 432–44
6- Council for Development and Reconstruction, Republic of Lebanon, SWM in Lebanon, phase 1 report, 2012
7- Practical Manual (FINAL) Services to support Member States’ enforcement actions and inspections concerning the application of EU waste legislation, check list waste incineration
9- Quina et al., Air Pollution Control in Municipal Solid Waste Incinerators The Impact of Air Pollution on Health, Economy, Environment and Agricultural Sources, 2011.
10- Incinerators in Disguise Case Studies of Gasification, Pyrolysis, and Plasma in Europe, Asia, and the United States, Global Alliance for Incinerator Alternatives (GAILA), April 2006
11- Minimum specifications for Health Care Waste Incineration, Environmental Council of Zambia
12- Baalbaki et al. 2018. Comparison of atmospheric polycyclic aromatic hydrocarbon levels in three urban areas in Lebanon, Atmospheric Environment 179, 260-267
13- Daher et al. 2014. Oxidative potential and chemical speciation of size-resolved particulate matter (PM) at near-freeway and urban background sites in the greater Beirut area Science of the Total Environment 470-471, 417–426
15- Shihadeh et al. 2013. Effect of distributed electric power generation on household exposure to airborne carcinogens in Beirut, Climate Change and Environment in the Arab World Research Study Report.