

# Focusing on Integrated Energy Fire Safety Plan in Bangladesh

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**B**angladesh government has been focused on uninterrupted electricity access to all citizens (100%) by 2025, especially endeavored during the last 14 years, to address energy inequality by improving energy and power services to all communities across the country. It is believed that many low-income households continue to utilize dangerous non-electric energy sources that cause fires by faulty or informal electric connections. Energy sources such as paraffin/kerosene, candles, and biofuels (firewood, coal) are still widely used by low-income households in suburban areas, mainly in the slums and rural areas. These energy sources are frequently blamed for fires, caused by old and faulty electronic appliances. The most informal electric and non-electric energy connections remain high and possess significant fire risk with unsafe and potentially hazardous forms of

energy used for daily activities.

The energy sector suffers lack of fire-safety equipment and deficiencies with safety problems, including locked or blocked fire emissions, electric short circuits, gas-lines fires, and cylinder explosions. A study by the International Labor Rights Forum (ILRF) claims energy and industrial sector fires are deadly in Bangladesh. The only life-saving fighting force, the Fire Service and Civil Defense (FSCD) is not equipped accordingly, not even possessing a single fire-fighting helicopter, either to control fires or rescue victims. FSCD is not capable enough to fight against the fires that are happening almost every day in all parts of the country. The time is now to focus on a better safety preparedness plan.

The recent tragic chemical fire explosion in the Sitakundu BM Container Depot on June 04, 2022, continuous flaming for 3 days that killed at least 49 people (9 were firefighters), indicated that there is still a fire risk and need for an integrated fire-safety plan. The depot containers were full of chemicals, including a huge quantity of Hydrogen Peroxide- the oxidizing chemical which can intensify fires, when combined with other chemicals. This flare is the biggest disaster in container depot history, caused by chemicals.

## *Energy Stacking Approach and Fire Risk*

Formal households acquire electricity through 'formal' electrical infrastructure built within their houses. The informal dwellings (e.g. slums, partition houses, improper structure houses) acquired their electricity through 'informal'/illegal electric connections in the form of extension cords or makeshift wiring called as "Energy Stacking Approach (ESA)". People are forced to alternate between electric and non-electric energy sources, which are cheaper but yet potentially risky to meet their daily energy needs. The households with low-per-capita income, seasonal or irregular employment, large households with a single worker, and those reliant on social grants, e.g. bank savings-interest holders, and pension holders, struggle to afford adequate electricity to meet their daily energy needs and are inclined with ESA.

## *Energy Storage and Fire Safety System*

An energy storage system (ESS) is





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implied with energy for future use, available in a variety of forms and sizes. Most utilities use pumped-storage hydropower (PSH) to store energy in a reservoir during low demand time, but the water is discharged on-demand, and drives a turbine which produces electricity, while other utility companies are using 'battery energy storage systems (BESS)'. The BESS represents a small sector (both commercial and residential use). The system in renewable energy-generators (e.g. solar panels and wind turbines), including lithium-ion-BESS into their installation. BESS is installed as an older version but needs more safety requirements.

### **Risks at Battery Energy Storage System**

The 'battery energy storage system-BESS' is an excellent application for energy management and storage, dealing with any form of energy and its storage, but there are always risks with associated hazards. The risk-PSH could fail to produce cascading water rushing surrounding areas, while most BESS operate without experiencing any unfortunate incidents. The primary risk with BESS is battery case damage or overheating of the system from an internal fault or exposure to fires. The hazards are releases of toxic and flammable gases which often lead to fire and potential explosions.

### **Risk at Solar Power System**

As part of the quest to de-carbonization, energy and power utilities producers are now widely engaged to generate power from solar and wind resources, which are intermittent and installed with parallel large-scale batteries and is rapid-growth in large-scale BESS without adequate attention to prevent fires and explosions.

Lithium batteries also bring fire risks, increased heat, mechanical failure, physical damages, or over-charging can cause internal short-circuit, which turn into thermal runaway, an extremely dangerous state, toxic gas emissions producing their own source of oxygen, and large explosions. One lithium-ion cell can trigger a thermal runaway, an



event that cascades to other cells, releasing flammable gases within the sealed container, oxygen filled the room and led to explosions.

### **Risks of Hydrogen Peroxide**

Every year, Bangladesh exports over USD 20 million worth of Hydrogen Peroxide to different countries. Hydrogen Peroxide is a diluted chemical compound, transparent, and viscous, with a pungent smell, but involves extreme health-hazard, and safety risks, and needs careful handling and storage, with sufficient safety measures (e.g. freight forwarders, warehouse, depot operators, safety showers, eyewash stations, gloves, splash goggles, and vapor respirator, etc.). The chemical is a strong oxidizer, it enormously increases the chances of combustion of other substances, such as paper, oil, wood, and garments items (for example the fire incident at BM Container Depot on 04 June 2022). Before working with this chemical, we need to provide adequate training to depot workers.

### **Impact of Sitakundu Chemical Fires**

After the Sitakundu incident, the Shipping Companies are slowing down from carrying or transporting any chemical goods for exporting purposes, considering the risky threat of any explosion or fires. The effects of these fires stopped or slow down the exports of chemical goods, and some companies have already reduced their chemical produc-

tion. The top companies of the country (e.g. Tasnim Chemical Company Ltd of Meghna Group of Industries, Samuda Chemical Ltd) are facing big financial threats and the country is also deprived of foreign earnings (Bangladesh earns USD 23.2 million through chemicals exporting in 2021-2022, which is a sector of prospect).

### **Safety Measures at Solar System**

At present near about 13 million solar-system power panels are installed throughout Bangladesh, and the safety issue is a growing concern. While properly installed systems by qualified professionals need to comply with current safety codes, appropriate training and education to manage fire hazards are also required. The solar-panel process seems simple, but there are many steps required to ensure safety.

The fire safety of solar photovoltaic (PV) is considered with various aspects: (a) solar-heating, (b) installation process (defects, or faults which cause rooftop fires), and (c) cause for bursting into flames. There is a need for developing general standards for PV risk with appropriate fire-fighting equipment (e.g. anti-fire foam spray, electric resistance, personal protective measures, etc.). The Fire Service Department needs to prepare a database of all installed home or commercial solar PV systems and to mark safety-label on each panel for advance preparedness.

## Progress on Fire Safety Preparedness - Not Enough

The tragic Sitakundu chemical fire laid bare the danger still facing millions of the country's workers a decade (2010-2012-2022) after a series of tragedies in the export-oriented garment industries spurred a safety revolution. Safety is more or less better in some RMG factories than in other non-RMG industries, because there is an international compliance monitoring system in the RMG sector, whereas flexible or relaxed compliance is maintained in other sectors.

The world is now more concerned about Bangladesh fires and woke up to make a better-safety plan. The earlier tragic fires happened following 2006-2007, 2010, and the Tazreen Fashion fires-2012, the collapse of Rana Plaza (24 April 2013) killing 1135, and injured of 2500 garment workers, triggering a wave of public outrage around the world, about the human cost of cheap-clothes. This prompted global buyers and donor agencies to improve safety and labor conditions in Bangladesh. IFC provided USD 40 million in credit facilities to upgrade the sector's structural, electrical, and fire-safety standards.

The lessons from the safety improvement in the garment sector now need to be channelized to other industries (e.g. energy and power) and step up to comply with fire-safety plan-rules-guidelines. International Bromine Science and Environment Forum (IBSEF) members were deeply moved by better safety measures with law reforms that would have prevented hundreds of workers from dying or being injured in the future. In May 2013, a legal binding on fire and building safety in Bangladesh (National Building Codes), to establish a safety program, was signed by a number of stakeholders. In July 2013, EU-ILO-Trade Commission launched a "global sustainability compact" in response to fire tragedies. The major multi-stakeholder agreement with the EU-ILO actions, aims at improving labor rights, working conditions, and fire safety in the RMG and other industries, to reduce the risk of tragedy in the future.



### National Tripartite Plan of Action

After a series of fire incidents in 2010-2012, the foreign buyer's stakeholders, the International Labor Organization (ILO), and the government of Bangladesh with the Ministry of Labor and Employment (MOLE), the tripartite-partners adopted a Joint-Statement of Commitment on February 2013, committed to working together to develop a National Tripartite Plan of Action (NTPA) on fire safety. The NTPA has a view to taking comprehensive action aimed at preventing any further loss of life, limb, and property due to workplace fires. Accordingly, the MOLE established a Tripartite Committee- the NTPA and endorsed it on March 24, 2013.

The NTPA is chaired by the MOLE Secretary and reports to the Cabinet Committee for its progress. Within the framework of the mission, NTPA committed to developing an action plan focusing on "short and medium-term steps" aimed at improving the structural integrity of RMG factories, with an "integrated approach". The plan of action has prepared detailed guidelines for building assessments for the RMG sector on November 24, 2013. The NTPA is also making a platform to coordinate the stakeholders, for their support, wishes, or initiatives for a better fire-safety environment in Bangladesh. The plan is also concerned with Occupational Safety and Health (OSH), the benchmark con-

ditions for industrial safety, monitoring and enforcement through DIFE, Remediation Coordination Cell-RCC (2017), and RMG Sustainability Council-RSC (2020).

### Laws-Rules on Fire Safety

Presently, there are more than two-dozen laws-rules-guidelines related to fire safety in Bangladesh. Some of them are very old, scattered, and confusing to follow. Therefore, "integrated and comprehensive" fire-safety guidelines are needed with related rules and laws. The main safety-rules are: Ammonium Nitrate Rules-2018; Bangladesh Environment Preservation Act-1995 (2010); Bangladesh National Building Codes-2012; Boiler Act-1923; Dangerous Cargoes Act-1953; Dangerous Waste (e-waste) Management Rules-2021; Dangerous Waste and Shipbreaking Waste Management Rule-2011; Explosive Act-1884; Explosive Rules-2004; Factory Rules-1979 (known-as SRO-101/78/LSW-VI/II(4)/78); Fire Prevention and Extinction Act-2003; Fire Prevention and Extinction Rule-2014; Gas Cylinder Rules-1991; Gas Storage (Pressure Vessel) Rules-1995; National Fire-Safety Policy-2014; Petroleum Act-1974 (2016); Petroleum Rules-2018; Ship-Breaking and Recycling Rules-2011; and Smoke-Nuisance Act-1905.

### Handling of Dangerous-Chemical Goods in Ports /Depots

The dangerous goods mean (a) any



cargoes containing goods-chemicals shown as 'Explosives' in the Comprehensive Classified Explosives list, or any ammunitions; (b) petroleum, the flashing point is below 150°F; (c) goods classified as dangerous, fixed by the Government time to time; (d) any cargoes which are liable to fire or explosion (Dangerous Cargoes Act, 1953). Handling these chemical items (goods) are needed to (i) submit customs declaration with necessary import/export documents, (ii) NOC clearance/approval required by the Bangladesh Navy (Chittagong Customs-House: Letter-no: S-4/9/ Admin/Study/2013-14/356, Date 06 January 2016), (iii) declaration of IMO-Class and International Maritime Dangerous Goods Code.

### Recommendations

(1) To enhance the capacity of FSCD with well-equipped equipment as international standards to face fires and other disasters; (2) Need to move all energy plant factories, depots, business centers and buildings with risk-covered infrastructures and fire fighters-equipment; (3) A well water-source (pond, reservoir, tanks) need to be constructed in each energy-factory compound, or nearby; (4) Need to prepare an "integrated fire-safety plan" for all sectors, and related rules-regulations be strictly maintained; (5) Arrange extensive awareness-training programs regularly at all industrial-plants; and (6) Dangerous goods (energy, chemical, etc.) which are stored in the ports, or depots for a long-period should be properly acknowledged and handle (loading-unloading) with special cares, and taking safety-measures.

### Conclusions

The recent tragic chemical and energy fires by explosions and their consequences the death tolls and material-goods losses were the second wake-up call for the government, and various stakeholders focusing on fire-safety issues. The Fire Service Department is to de-



velop its own fire codes and international standards, and appropriate guidelines to date. Being the only life-saving force in Bangladesh, the FSCD is needed to be more modernized and build the capacity to face the fire-incidents efficiently immediately after the call. A comprehensive fire-safety preparedness plan, with a formal risk assessment, fire-modeling, or full-scale task should be conducted by FSCD to avoid any threat.

The other compliance supporting agencies, the DIFE and NTPA are also strengthened to implement the fire safety plan guidelines in each industry. The Ministry of Power and Energy, MO-Industries, MOLE, and Home Affairs (Security Service Division) and other related government organizations (e.g. Boiler, Explosive, NTPA, DIFE) are to take appropriate initiatives, actions and supports to make an "integrated safety plan" immediately. All individual energy, power and industrial plants (especially chemicals, RMG, and Oxygen) are to be maintained with a dedicated safety plan. Also need to focus on more precautionary measures regarding the power density of batteries (e.g. solar, electric vehicle -both for occupants,

rooftop floor, and parking garages) and transformers which can increase fire and explosion risk.

The usage of non-electrical energy sources and informal illegal electrical connections by low-income households (the approach of energy stacking) is to be strictly stopped, showing alternative sources, and building a conscious citizen. In order to effectively reduce fires and their detrimental effects, it is important to prepare/update the regulations, guidelines, and standards that can ensure a good level of protection from fires. Besides, enhanced workplace safety must remain a priority for the benefit of all workforces for minimizing their cost of lives. The updated and integrated safety plan can be scaled-up to create a better safety framework to support Bangladesh for making a smart one and hope to be a developed country in 2041.

(Sources: FSCD-ILO Report: Fire and Building-Safety in Bangladesh-2021; UN-ILO Brief-Industrial Safety-2020; NTPA Fire-Safety Statement-2019; and FSCD Report-2021).

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