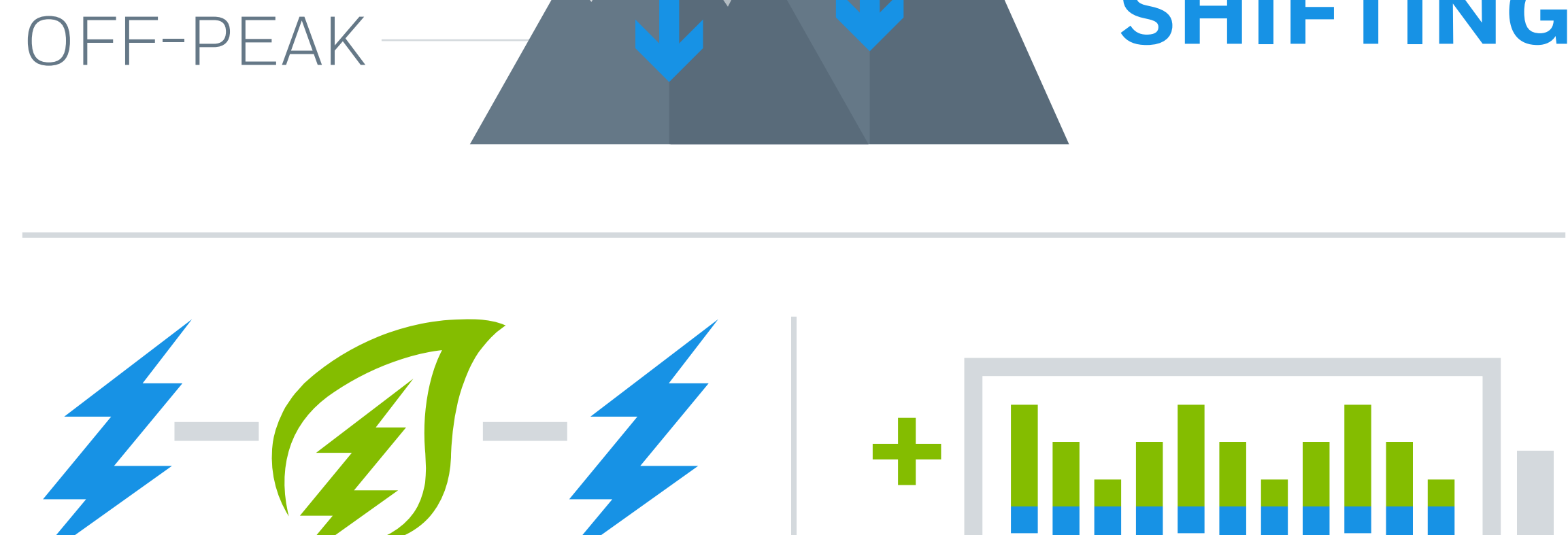


# BURNING TRUTHS ABOUT LI-ION BATTERY FIRES

## LI-ION BATTERY STORAGE: THE ANSWER TO GREEN, SMART GRIDS



**RENEWABLE POWER INTEGRATION**

**FREQUENCY REGULATION**

## BUT THE THREAT IS REAL

**23** LI-ION BATTERY ENERGY STORAGE SYSTEM (BESS) FIRES IN SOUTH KOREA (2017-2018)<sup>1</sup>

**4** FIREFIGHTERS SEVERELY INJURED BY BESS EXPLOSION IN ARIZONA, US (2019)<sup>2</sup>

**20MW** BESS DESTROYED BY FIRE IN LIVERPOOL, UK (2020)<sup>3</sup>

## LI-ION BATTERY FIRES HAPPEN IN 4 STAGES

- 1 ABUSE FACTOR** (ELECTRICAL/THERMAL/MECHANICAL)
- 2 OFF-GAS**
- 3 SMOKE**
- 4 FIRE** (THERMAL RUNAWAY)

## KEY RISKS AND CHALLENGES INCLUDE:

- FORMATION OF EXPLOSIVE GAS/ VAPOUR MIXTURES**
- FORMATION AND DISPERSION OF TOXIC GAS CLOUDS**
- INTENSE HEAT FIRES (DIFFICULT TO EXTINGUISH)**

## EXISTING TECHNOLOGY CANNOT:

- MONITOR SINGLE CELL TEMPERATURES/ VOLTAGES (BMS)
- ACTIVATE UNTIL THERMAL RUNAWAY HAS OCCURRED (FIRE DETECTION/ SUPPRESSION)

## OFF-GAS DETECTION, THE OPTIMUM LI-ION BESS FIRE PREVENTION TECHNOLOGY

### OFF-GAS SENSOR AVERAGE ACTIVATION TIMES<sup>4</sup>:

**06:11** BEFORE THERMAL RUNAWAY

MINS SECS

**06:00** BEFORE CELL VOLTAGE SENSORS

MINS SECS

**06:30** BEFORE LEL SENSORS

MINS SECS

FOR MORE ON THIS TOPIC DOWNLOAD THE ULTIMATE GUIDE TO FIRE PREVENTION IN LITHIUM-ION BATTERY ENERGY STORAGE SYSTEMS HERE.

1 <http://www.businesskorea.co.kr/news/articleView.html?tid=91012>  
 2 [https://allfirefightersafety.org/docs/Four\\_Firefighters\\_Injured\\_in\\_Lithium\\_Ion\\_Battery\\_ESS\\_Explosion\\_Arizona.pdf](https://allfirefightersafety.org/docs/Four_Firefighters_Injured_in_Lithium_Ion_Battery_ESS_Explosion_Arizona.pdf)  
 3 <https://www.energy-storage.news/news/fire-at-20mw-uk-battery-storage-plant-in-liverpool/#~:text=Carnegie%20Road%20BESS%20in%20Liverpool,when%20complete%20in%20early%202019.&text=The%20fire%20service%20said%20that,zz%20smoke%20from%20the%20incident>  
 4 <https://www.dnvgi.com/maritime/publications/Technical-Reference-for-Li-ion-Battery-Explosion-Risk-and-Fire-Suppression-report-download.html>