TITLE OF INVENTION: A METHOD OF INSTALLING A CONTAINER BATTERY AND A CONTAINER BATTERY STORAGE FACILITY

TECHNICAL FIELD

[0001] This invention relates to a method of installing a container battery. More particularly, this invention relates to a method of installing a container battery over another container battery.

BACKGROUND

[0002] The following discussion of the background to the invention is intended to facilitate an understanding of the present invention only. It should be appreciated that the discussion is not an acknowledgement or admission that any of the material referred to was published, known or part of the common general knowledge of the person skilled in the art in any jurisdiction as at the priority date of the invention.

[0003] Battery Energy Storage Systems (BESSs) are used to store electrical energy from sources like solar or wind power and to release it on demand, and are typically used for grid balancing, peak demand management, or backup power during outages. Some BESSs are housed within standard shipping containers for easy transportation and modular scalability. These BESSs are known in the industry as container batteries. The container batteries are fairly large in size. A BESS facility typically includes tens or hundreds of these container batteries. If they are all laid out flat on the ground, a large plot of land would be required to accommodate them. In a land scare country like Singapore, the land cost would add significantly to the levelized cost of energy (LCOE). To reduce the land size required, the container batteries may be stacked one on top of another. Alternatively, as implemented by the company Wartsila, a platform may be erected over container batteries located on the ground level for container batteries to be installed thereon. However, a crane with a fairly large tonnage rating will be required to hoist the container batteries on top of other container batteries or onto the platform. Furthermore, installing the container batteries in close proximity to one another may pose a fire hazard.

[0004] There is therefore a need for a method of installing a container battery which addresses, at least in part, one or more of the forgoing problems.

SUMMARY

[0005] According to an aspect of the present disclosure, there is provided a method of installing a first container battery at a designated location. The method includes erecting a platform having a space thereunder that can accommodate one or more second container batteries. The method further includes moving the first container battery onto a loading area on the platform, and transporting the first container battery on the platform from the loading area to the designated location on the platform.

[0006] In some embodiments of the method, moving the first container battery onto the loading area of the platform includes hoisting the container battery onto the loading area of the platform using a crane of a tonnage rating of no more than 250 tons.

[0007] In some embodiments of the method, moving the first container battery onto the loading area of the platform includes moving the first container battery onto carriages supported on two or more rails on the platform, and transporting the container battery on the platform includes transporting the first container battery seated on the carriages on the two or more rails from the loading area to the designated location on the platform.

[0008] In some embodiments of the method, the method further includes laying multiple rails on the platform before moving the first container battery onto the carriages on the rails, and removing the carriages and the rails from under the first container battery after the first container battery has been transported to the designated location.

[0009] In some embodiments of the method, laying the rails on the platform and transporting the first container battery on the platform includes laying two or more rail sections to define each of the rails to cover a segment of the platform between the loading area and the designated location, transporting the first container battery on the rail sections of each of the rails until it is at the tail rail sections of the rails, and moving one or more front rail sections of each of the rails to join the tail end rail section so as to extend the two or more rail sections to cover a further segment of the platform in a direction of the designated location. Laying the rails on the platform and transporting the first container battery on the platform further includes repeating transporting the first container battery and moving one or more front end rail sections as described above until the first container battery is transported to the designated location.

[0010] In some embodiments of the method, removing the carriages and the plurality of rails from under the first container battery includes lifting a first side of the

first container battery, removing the rails from under the first container battery, placing one or more supports under the first container battery, lowering the first side of the first container battery onto the one or more supports, and repeating the above-described lifting, removing and placing for a second side of the first container battery so that the first container battery is supported by at least two supports on the platform.

[0011] In some embodiments of the method, the method further includes clearing all rails off the platform.

[0012] In some embodiments of the method, erecting the platform includes erecting the platform over one or more second container batteries that are in operation.

[0013] In some embodiments of the method, the first container battery at the designated location on the platform is spaced apart from any adjacent container battery on the platform by no less than 2m.

[0014] In some embodiments of the method, an undersurface of the platform is spaced apart from a top of the at least one second container battery by no less than 0.75m.

[0015] In some embodiments of the method, the platform includes one or more panels that are coated on both surfaces with a fire-retardant coating.

[0016] In some embodiments of the method, multiple sprinkler heads are installed under the platform above each of the at least one second container battery thereunder. The sprinkler heads above a second container battery are triggerable by heat generated by the second container battery in the event of a thermal runaway of the second container battery.

[0017] According to another aspect of the present disclosure, there is provided a container battery storage facility. The storage facility includes multiple first container batteries, a platform above the first container batteries, and multiple second container batteries on the platform. The platform includes one or more panels. Each panel is coated on at least one surface with a fire-retardant coating.

[0018] In some embodiments of the container battery storage facility, each of the first container batteries and the second container batteries is spaced at least 2m away from any adjacent container battery at a same level.

[0019] In some embodiments of the container battery storage facility, an undersurface of the platform is spaced apart from a top of the plurality of first container batteries by no less than 0.75m.

[0020] In some embodiments of the container battery storage facility, multiple sprinkler heads are installed under the platform above each of the plurality of first container batteries thereunder. The sprinkler heads above each first container battery are triggerable by heat generated by the first container battery in the event of a thermal runaway of the first container battery.

[0021] In some embodiments of the container battery storage facility, each of the second container batteries includes a sprinkler system therein.

[0022] In some embodiments of the container battery storage facility, each of the second container batteries is moved onto a loading area of the platform and transported on the platform from the loading area to a respective designated location on the platform.

[0023] In some embodiments of the container battery storage facility, each of the second container batteries is hoisted onto the loading area of the platform using a crane with a tonnage rating of no more than 250 tons.

[0024] In some embodiments of the container battery storage facility, each of the second container batteries is hoisted onto carriages supported on rails on the platform and transported while seated on the carriages on the rails from the loading area to the respective designated location on the platform.

[0025] In some embodiments of the container battery storage facility, the carriages and the rails are removed from under each of the second container batteries after it has been transported to its respective designated location.

[0026] Other aspects and advantages of the invention will become apparent from the following detailed description, taken in conjunction with the accompanying drawings, illustrating by way of example the principles of the invention.

BRIEF DESCRIPTION OF DRAWINGS

[0027] The invention will be better understood with reference to the drawings, in which:

Figure 1 is a flowchart showing a sequence of steps for installing a container battery in a BESS facility according to one embodiment of the invention;

Figure 2 is a plan view of a section of the BESS facility in Figure 1 showing the location where a platform for installing the container batteries is erected;

Figure 3 is an isometric drawing of the platform and container batteries installed thereunder and thereon as view in the direction of arrow A in Figure 2;

Figure 4 is a side view of the platform and container batteries as view in the direction of arrow B in Figure 3;

Figure 5 is an isometric drawing of a rail section and a carriage thereon that is used for transporting the container batteries on the platform;

Figures 6A-6G are plan views of the platform illustrating the sequence of laying a track, segment by segment, for transporting a container battery thereon on the platform; and

Figure 7 is a block diagram showing fire protection components in the container batteries and in the BESS facility.

DESCRIPTION OF THE EMBODIMENTS

[0028] Throughout this document, unless otherwise indicated to the contrary, the terms “comprising”, “consisting of”, “having” and the like, are to be construed as non-exhaustive, or in other words, as meaning “including, but not limited to.”

[0029] Furthermore, throughout the specification, unless the context requires otherwise, the word “include” or variations such as “includes” or “including” will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

[0030] The following description refers to elements being “coupled” together. As used herein, unless expressly stated otherwise, “coupled” means that one element is directly or indirectly joined to another element, and does not necessarily mean a direct mechanical connection. Coupled elements are understood to exert mutual influence on one another. Thus, although the schematic shown in Figure 1 depicts one exemplary arrangement of elements, additional intervening elements, devices, features, or components may be present in an embodiment of the depicted subject matter.

[0031] Unless defined otherwise, all technical and scientific terms used herein have the same meaning as is commonly understood by a skilled person to which the subject matter herein belongs.

[0032] As shown in the drawings for purposes of illustration, the invention may be embodied in a more economical and safer method of installing a container battery at a designated location in a BESS facility. Existing methods of installing container batteries tend to be costlier and more prone to accidents. Figure 1 shows a sequence 2 of steps in a method of installing a container battery 4 at a designated location 5 in a BESS facility 6 according to an embodiment of the invention. The method includes erecting a platform 8 having a space 10 thereunder that can accommodate at least another container battery 12, moving the container battery 4 onto a loading area 14 on the platform 8, and transporting the container battery 4 on the platform 8 from the loading area 14 to the designated location 5 on the platform 8.

[0033] Specifically, the sequence 2 in Figure 1 starts in an ERECT PLATFORM step 16, wherein a platform 8 is erected over a row of live container batteries 12 (Figure 3) on a ground level 18 in a container battery storage facility 6 as shown in Figure 2. The row of container batteries 12 are flanked on two sides by boundary walls 20 of the storage facility 6. The storage facility 6 includes a fire engine access road 22 at one end of the row of container batteries 12.

[0034] In the embodiment, the row includes eight container batteries 12. Each of these container batteries 12 measures about 6m in length, about 3m in height and about 2.5m in width, and weighs about 30 tons. The erected platform 8 measures about 45m in length and about 9.8m in width although other dimensions for the platform 8 are also possible. The platform 8 is supported by any suitable number of supporting beams 24 that extend upwards from reinforced concrete footings 26 in the ground. For the sake of brevity, conventional techniques related to erecting the platform 8 is not described in further detail herein. Based on the static and dynamic loads of the container batteries 4 and soil and other stability characteristics, a civil engineer would be able to design and build a suitable platform for supporting the container batteries 4. As shown in Figure 4, each container battery 12 at the ground level 18 is spaced apart from adjacent container batteries 12 by a distance 28 of about 3m to attain a desired fire resistance rating of about 2 hours for each container battery 12, which is more than the regulatory requirements of 2m corresponding to a fire

resistance rating of about an hour. In other words, the distance 28 should be 2m or more to meet regulatory requirements. There is a distance 30 of about 1m between a top of the container batteries 12 and an undersurface of the platform 8, again to attain a desired fire resistance rating of about 2 hours for the platform 8, which is more than the regulatory requirements of 0.75m corresponding to a fire resistance rating of about an hour.

[0035] The platform 8 may include one or more panels (not individually shown) of any suitable material, such as steel. Each panel has a thickness of about 10mm. Each panel may be coated on at least one surface thereof with a fire-retardant coating that is sufficiently thick to attain a two-hour fire resistance rating thereof. In this embodiment, both the upper and under surface of the panels are coated with the fire-retardant coating (not shown). Any suitable type of fire-retardant coating may be used. An example of such a fire-retardant coating is one from the Hempacore range of passive fire protection coatings from the company Hempel (Kongens Lyngby, Denmark).

[0036] The sequence 2 next proceeds to a LAY TRACK ON PLATFORM step 32, wherein a track 34 (Figures 6A-6G) of any suitable number of rails, for example four rails 36A-36D, are laid on a segment of the platform 8. Each rail 36A-36D is made up of two or more rail sections 38. Figure 5 shows an example of a short rail section 38 and a carriage 40 thereon that may be used. In this particular embodiment, each rail 36A-36D is made up of four rail sections 38, one measuring 3m in length and the other three measuring 4m in length each. Rail sections 38 of other lengths may also be used. The rail sections 38 is from, but not limited to, the JR series linear motion (LM) rails from THK Co., Ltd, (Tokyo, Japan). Laying of each rail section 38 involves first laying a metal plate/bar (not shown) on the platform 8. The metal plate is of a same length as the rail section but whose base is wider than the base of rail section 38. The rail section 38 is clamped onto the metal plate under it using multiple clamps (not shown) that are bolted to the metal plate. The rail sections 38 of each rail 36A-36D are laid end to end to define an at least substantially straight track 34 that is about 15m long. The four rails 36A-36D are laid spaced apart and at least substantially parallel to one another at a proximal end of the platform 8 where a loading area 14 is designated. In this step 32, a number of carriages 40, for example four JR series LM blocks 40 from THK Co., Ltd, are also placed on each rail section 38 at the loading area 14.

[0037] The sequence 2 next proceeds to a MOVE CONTAINER BATTERY ONTO PLATFORM step 41, wherein a crane 42 is used to hoist a container battery 4 weighing 42 tons on a container trailer (not shown) onto the carriages 40 on the four rail sections 38 at the loading area 14 on the platform 8. As the crane 42 is close to the loading area 14, only a low tonnage crane, for example one that is no more than 250 tons may be used. In this embodiment, a 150 ton crane is used. The container trailer is driven on the access way 22 to be close to the proximal segment of the platform 8. A power pack roller/machine skate 44, such as but not limited to, the machine skate Model TS35T from ShanDong Finer Lifting Tools Co., Ltd (Shandong, China), is placed under the container battery 4 to couple to it.

[0038] The sequence 2 next proceeds to a TRANSPORT CONTAINER BATTERY step 46, wherein the power pack roller 44 is remotely controlled by an operator to move, more specifically pull, the container battery 4 coupled thereto, bit by bit, along the rails 36A-36D until it is over the end rail sections 38 of the four rails 36A-36D as shown in Figure 6A.

[0039] The sequence 2 next proceeds to a CONTAINER BATTERY AT DESIGNATED LOCATION? decision step 48, wherein the operator will determine if the container battery 4 has been moved over to the designated location 5. If it is determined that the container battery 4 is not at the designated location 5, the sequence 2 proceeds to a LAY TRACK ON NEXT SEGMENT step 50, wherein the front three rail sections 38 of each of the four rails 36A-36D are moved from their current positions to join the end rail section 38 so as to form the track 34 at another segment of the platform 8 extending in the direction of the designated location 5 as shown in Figure 6B.

[0040] The sequence 2 next returns to the TRANSPORT CONTAINER BATTERY step 46, wherein the power pack roller 44 is again controlled to move the container battery 4, bit by bit, along the track 34 until it is over the end rail sections 38 of the track 34 as shown in Figure 6C. The CONTAINER BATTERY AT DESIGNATED LOCATION decision step 48, the LAY TRACK ON NEXT SEGMENT step 50 and the TRANSPORT CONTAINER BATTERY step 46 are repeated so as to transport the container battery 4 segment by segment on the platform 8 until the operator determines in the CONTAINER BATTERY AT DESIGNATED LOCATION? decision step 48 that the container battery 4 is at the designated location 5 on the platform 8. Figure 6D shows

the track 34 on a third segment of the platform 8. Figure 6E shows the container battery 4 moved across the third segment of the platform. Figure 6F shows the track on a fourth and last segment of the platform 8. Figure 6F shows the container battery 4 moved across the fourth segment of the platform 8 to its designated location 5. In this manner, the container battery 4 is transported on the platform 8, i.e., in physical contact therewith, to its designated location on the platform 8.

[0041] When the container battery 4 is determined to be at the designated location 5, the sequence 2 ends in a REMOVE TRACK FROM PLATFORM step 52, wherein one end of the container battery 4 is raised, for example by jacking it up using a suitable number of hydraulic jacks, so that the container battery 4 is no longer sitting on one or more rail sections 38 thereunder. Next, the one or more rail sections 38 are removed from under the container battery 4 and at least one support, such as a 300mm high I-beam 53 (Figure 7), is placed under the raised end of the container battery 4. After the at least one support is located under the container battery 4, the container battery 4 is lowered onto the at least one support to be thereby supported. The other end of the container battery 4 is then raised and the remaining rail sections 38 under it are removed. At least one further support, such as another 300mm I-beam, is then placed under the raised end of the container battery 4. The raised end is again lowered onto the at least one further support 53 to be thereby supported. In this manner, all rail sections 38 and carriages 40 may be removed from under the container battery 4 so that it is left being supported on the platform 8 by the at least two supports 53. Alternatively, the supports 53 are not used and the container battery 4 is lowered directly onto the platform 8.

[0042] The above steps are repeated so that other container batteries 4 can be transported on the platform 8 from the loading area 14 to their respective designated locations thereon. All rail sections 38 of the rails 36A-36D are cleared from the platform after all the container batteries 4 are installed on the platform 8. Just like the container batteries 12 located on the ground level 18 below the platform 8, the container batteries 4 on the platform 8 are also spaced 3m apart, which is again more than the regulatory requirements of 2m. This is to attain a 2-hour fire resistance rating based on fire engineering simulations.

[0043] As is known to those skilled in the art the container batteries 4, 12 are connected to one or more power conversion systems (PCS) 54 so that the direct

current produced by the container batteries 4, 12 can be converted into alternating current that can be used for power consumption on the power grid. For example, during off-peak time, the PCS takes the energy from the grid to store in the container batteries 4, 12. Essentially, the PCS's main function is to convert the power between the container batteries 4, 12 and the grid, and vice versa. It accomplishes that by offering a bi-directional flow from DC-AC and AC-DC.

[0044] Fire protection of the storage facility 6 is next described. As shown in Figure 7, each of the container batteries 4 on the platform 8 has a smoke detector 60, a heat detector 62, a deluge sprinkler system 64, a gas suppression system 66, and a BESS alarm panel 68. A deluge control valve 72 outside the container battery 4 is connected to the deluge sprinkler system 64. The deluge control valve 72 is controlled by a sprinkler panel 70. The deluge control valve 72 is connected to a hydrant pipe 73 that supplies water thereto. The deluge control valve 72 is also connected to a breeching inlet 74. The storage facility 6 includes a main alarm panel (MAP) 76 that is connected to a decentralized alarm monitoring system (DECAMS) 78.

[0045] If there is thermal runaway in a container battery 4 on the platform 8, the smoke detector 60 in the container battery 4 will be activated to produce a Level 1 signal 80. When the temperature in the container battery 4 rises to a predetermined temperature of, for example about 70^{o}C, the heat detector 62 will also be activated to produce a Level 2 signal 82. When both the Level 1 signal 80 and the Level 2 signal 82 are detected by the BESS alarm panel 68, it will send a solenoid actuation signal 84 to actuate a solenoid valve 86 of the gas suppression system 66 to thereby activate it and send another signal 85 to the sprinkler panel 70. When activated, the gas suppression system 66 will release a gas suppression agent, e.g. an inert gas, in the container battery 4. This will reduce the oxygen level within the container battery 4 such that the oxygen concentration in the container battery 4 will not be able to sustain any form of combustion. The gas suppression system 66 when activated will also send another signal 87 to the sprinkler panel 70. The signals 85, 87 are also sent to the main alarm panel (MAP) 76 and the DECAMS 78 for an alarm signal to be sent to a civil defense force. The MAP 76 also sends a signal 89 to the sprinkler panel 70.

[0046] When the sprinkler panel 70 detects both the signal 85 and the signal 87, it will output a control signal 88 to open the deluge control valve 72. Water from the hydrant pipe 73 will flow through the opened deluge control valve 72 to be sprinkled

inside the container battery 4 via the deluge sprinkler system 64 in an attempt to suppress the thermal runaway. An alarm will also be sounded to alert in-house emergency responders of the thermal runaway.

[0047] The emergency responders will decide to either isolate/disable the alarm signal or allow it to continue so that it will activate the deployment of firefighters from the civil defence force (CDF) from a fire station closest to the storage facility 6. When the firefighters arrive at the storage facility 6, a fire safety manager or an emergency responder will brief the firefighters on the situation of the affected container battery 4. If the thermal runaway in the container battery 4 is out of control, the firefighters will deploy a figure engine 95 roughly midway between the breeching inlet 74 and a nearest fire hydrant 96. They will connect fire hoses between the fire hydrant 96 to the fire engine 95, and connect fire hoses between the fire engine 95 and the breeching inlet 74 to supplement water ingress into the container battery 4. The firefighters may also decide to remotely open the deluge control valves 72 of the container batteries 4 adjacent to the affected container battery 4 via the sprinkler panel 70 to contain the spread of thermal runaway.

[0048] In this embodiment, the container batteries 12 at the ground level do not contain any deluge sprinkler system 64 therein. External sprinkler bulbs 100 are mounted to the undersurface, i.e., the soffit, of the platform 8 above each of these container batteries 12 instead. In the event when the gas suppression system 66 fails to control the thermal runaway in a container battery 12 at the ground level, heat generated by the container battery 12 will cause the closed sprinkler bulbs 100 above the container battery 12 to break, and water in sprinkler pipes will be sprinkled onto the external surfaces of the container battery 12 via the broken sprinkler bulbs 100. This water flow in the sprinkler pipe will be detected by a flow switch 102, which in turn will send a signal 104 to the sprinkler panel 70 and the main alarm panel 76. This causes the sprinkler panel 70 to open a valve 110. Water from a hydrant pipe 112 will flow through the opened valve 110 to be discharged over the container battery 12. As described above, if the alarm signal from the DECAMS is not stopped, firefighters will be sent to the facility to supplement additional firefighting water from a breeching inlet 74 and a fire hydrant 96 as described above.

[0049] And as described above, the MAP 76 is activated by either the Level 1 and Level 2 signals from the smoke detector 60 and heat detector 62, or by the signal 104

from the flow switch 102. Additionally, the MAP 76 may be activated by a manual call point 114. When the MAP 76 is activated, the emergency responders may also identify the affected container battery 4, 12 and deploy a nearest hose reel for firefighting.

[0050] Advantageously, by placing container batteries 4 on a platform erected above existing container batteries 12, additional land is not required to accommodate the additional container batteries 4 for increasing the capacity of the storage facility 6. And by using the track 34 on the platform 8 to transport/skid the container batteries 4 to their designated locations 5 on the platform 8, only a crane of a low tonnage rating is required to hoist the container batteries 4 onto the platform 8. Furthermore, the track 34 is laid segment by segment on the platform 8 so that the number of rail sections 38 required is small. All these result in a reduction in the LCOE. Furthermore, the fire protection system described above includes four levels of fire safety design. A first level of protection includes cell, pack and rack level protection in the container battery, which employs voltage, temperature and current sensor, pack and rack disconnect protection, and positive pressure oxygen barrier. A second level of protection includes the gas suppression system in the container battery. A third level of protection involves the water sprinklers in and outside of the container batteries. A fourth level of protection is the spacing apart of the container batteries, both horizontally and vertically, and the use of fire-rated coatings of the platform. A detailed fire simulation was carried out to ensure that there is no fire propagation when one of the container batteries catches fire. Because of these multiple levels of fire safety design and simulation results, regulatory approval was obtained to allow the container batteries 4 to be stacked on the platform 8 above other container batteries 12 on the ground.

[0051] Although the present invention is described as implemented in the above-described embodiment, it is not to be construed to be limited as such. It is to be appreciated that modifications and improvements may be made without departing from the scope of the present invention.

[0052] For example, although only one additional level of container batteries 4 above the ground level 18 is described, it should not be construed to be limited thereto. More levels, for example three or more levels above the ground level 18 of container batteries 4 are also possible.

[0053] As another example, it is described that the track 34 is straight, those skilled in the art would know that it is also possible to transport the container batteries 4 along

a curved track. Also, the rails 36A-36D may also span the entire length of the platform 8 so that they do not have to be laid segment by segment as described above.

[0054] As yet a further example, although it is described that the container batteries 4 are transported on rails 36A-36D on the platform, other methods of transporting the container batteries 4 on the platform may also be employed. For example, the container batteries 4 may be transported on the platform 8 using roller skids/machinery skates or a gantry crane mounted on the platform.

[0055] As yet another example, the platform 8 may also be erected over the PCS.

[0056] As yet a further example, the method may include first installing container batteries on the ground level, erecting the platform over the installed container batteries before they become operational and installing more container batteries on the platform. Alternatively, it is also possible to erect the platform first and then installing the container batteries 4, 12 under it on the ground level 18 and on the platform 8 itself. The container batteries 12 on the ground level 18 may be transported to its respective designated locations under the platform 8 using the track 34 as described above.

[0057] As yet another example, to achieve the particular installation of container batteries 4, 12 as described having a 2-hour fire resistance rating, it is possible to also transport the container batteries 4 by other means, for example over the platform 8 instead of on the platform 8 as described above. For example, the container batteries 4 may be hoisted using a crane that has a tonnage rating of more than 250 tons, for example, one that has a tonnage rating of 750 tons that is parked at the access road 22 so as to be able to hoist a container battery 4 to a distal end of the platform 8. In other words, the installation of the container batteries 4, 12 may be a standalone invention that is independent of how the container batteries 4 are transported to their respective designated locations on the platform and how fire protection is implemented.

[0058] Similarly, the fire protection implementation may also be a standalone invention that is independent of how the container batteries 4 are transported to their respective designated locations on the platform and their installation configuration in the storage facility.

[0059] It should be further appreciated by the person skilled in the art that one or more of the above modifications or improvements, not being mutually exclusive, may be further combined to form yet further embodiments of the present invention.

CLAIMS

Claim 1. A method of installing a first container battery at a designated location, the method comprising:

erecting a platform having a space thereunder that can accommodate at least one second container battery;

moving the first container battery onto a loading area on the platform; and

transporting the first container battery on the platform from the loading area to the designated location on the platform.

Claim 2. The method according to Claim 1, wherein moving the first container battery onto the loading area of the platform comprises:

hoisting the container battery onto the loading area of the platform using a crane of a tonnage rating of no more than 250 tons.

Claim 3. The method according to any of the preceding claims, wherein moving the first container battery onto the loading area of the platform comprises moving the first container battery onto carriages supported on at least two rails on the platform and transporting the container battery on the platform comprises transporting the first container battery seated on the carriages on the at least two rails from the loading area to the designated location on the platform.

Claim 4. The method according to Claim 3, further comprising:

laying a plurality of rails on the platform before moving the first container battery onto the carriages on the plurality of rails; and

removing the carriages and the plurality of rails from under the first container battery after the first container battery has been transported to the designated location.

Claim 5. The method according to Claim 4, wherein laying the plurality of rails on the platform and transporting the first container battery on the platform comprises:

laying at least two rail sections to define each of the plurality of rails to cover a segment of the platform between the loading area and the designated location;

transporting the first container battery on the at least two rail sections of each of the plurality of rails until it is at the tail rail sections of the plurality of rails;

moving at least one front rail section of each of the plurality of rails to join the tail end rail section so as to extend the at least two rail sections to cover a further segment of the platform in a direction of the designated location; and

repeating transporting the first container battery and moving at least one front end rail section until the first container battery is transported to the designated location.

Claim 6. The method according to Claim 5, wherein removing the carriages and the plurality of rails from under the first container battery comprises:

lifting a first side of the first container battery;

removing the rails from under the first container battery;

placing at least one support under the first container battery;

lowering the first side of the first container battery onto the at least one support; and

repeating lifting, removing and placing for a second side of the first container battery so that the first container battery is supported by at least two supports on the platform.

Claim 7. The method according to Claim 6, further comprising clearing all rails off the platform.

Claim 8. The method according to any one of the preceding claims, wherein erecting the platform comprises erecting the platform over at least one second container battery that is in operation.

Claim 9. The method according to any one of the preceding claims, wherein the first container battery at the designated location on the platform is spaced apart from any adjacent container battery on the platform by no less than 2m.

Claim 10. The method according to any one of the preceding claims, wherein an undersurface of the platform is spaced apart from a top of the at least one second container battery by no less than 0.75m.

Claim 11. The method according to any one of the preceding claims, wherein the platform comprises at least one panel that is coated on both surfaces with a fire-retardant coating.

Claim 12. The method according to Claim 11, wherein a plurality of sprinkler heads are installed under the platform above each of the at least one second container battery thereunder; the plurality of sprinkler heads above a second container battery being triggerable by heat generated by the second container battery in the event of a thermal runaway of the second container battery.

Claim 13. A container battery storage facility comprising:

a plurality of first container batteries;

a platform above the plurality of first container batteries; and

a plurality of second container batteries on the platform;

wherein the platform comprises at least one panel, each of which is coated on at least one surface with a fire-retardant coating.

Claim 14. The container battery storage facility according to Claim 13, wherein each of the plurality of first container batteries and the plurality of second container batteries is spaced at least 2m away from any adjacent container battery at a same level.

Claim 15. The container battery storage facility according Claim 13 or Claim 14, wherein an undersurface of the platform is spaced apart from a top of the plurality of first container batteries by no less than 0.75m.

Claim 16. The container battery storage facility according to any of Claims 13-15, wherein a plurality of sprinkler heads are installed under the platform above each of the plurality of first container batteries thereunder; the plurality of sprinkler heads above

each first container battery being triggerable by heat generated by the first container battery in the event of a thermal runaway of the first container battery.

Claim 17. The container battery storage facility according to any of Claims 13-16, wherein each of the plurality of the second container batteries includes a sprinkler system therein.

Claim 18. The container battery storage facility according to any of Claims 13-17, wherein each of the plurality of second container batteries is moved onto a loading area of the platform and transported on the platform from the loading area to a respective designated location on the platform.

Claim 19. The container battery storage facility according to Claim 18, wherein each of the plurality of second container batteries is hoisted onto the loading area of the platform using a crane with a tonnage rating of no more than 250 tons.

Claim 20. The container battery storage facility according to Claim 18 or Claim 19, wherein each of the plurality of second container batteries is hoisted onto carriages supported on rails on the platform and transported while seated on the carriages on the rails from the loading area to the respective designated location on the platform.

Claim 21. The container battery storage facility according to Claim 20, wherein the carriages and the rails are removed from under each of the plurality of second container batteries after it has been transported to its respective designated location.