



## CLARIFICATION 02

ޕްރޮޖެކްޓް ނަންބަރު Project No:	TES/2016/G-007
ޕްރޮޖެކްޓް ދުވަސް Issued Date:	Monday, September 5, 2016
ޕްރޮޖެކްޓް ނަންބަރު Project:	Design, Supply, Installation and Maintenance of renewable energy hybrid power plants in HaaDhaalu Atoll – Maldives
ޕްރޮޖެކްޓް ދުވަސް Deadline for submission:	Monday, September 26, 2016 at 1300 hrs
ޕްރޮޖެކްޓް ނަންބަރު No. of Pages: - 17	

Please include this clarification when submitting the proposal

1. Please find the **Clarification 2** issued, attached with this sheet.

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Name: Aminath Juweriya

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Signature:





Ministry of Finance and Treasury  
Male' Republic of Maldives

### Preparing Outer Islands for Sustainable Energy Development

### Design, Supply, Installation and Maintenance of renewable energy hybrid power plants in HaaDhaalu Atoll – Maldives

#### CLARIFICATION 01

S.No	Document No.	Clause No/Page No	Tender Summary	Question / Clarification from bidder	Answer
1			Land & Wind data	Pls furnish general land characteristics and Wind data.	Please refer to Section 6 - Employer's Requirements - of Bidding Documents as well as to Section 6, Chapter 3.2.3.





2	Pollution Norms	Local statutes of Pollution control - Emission and Sound - Extent of Per- missions to be taken from any local authorities. Any specific Noise attenuation method proposed.	Please refer to Section 6, Chapter 3.4 for emissions of diesel engine. For noise emission please refer to Section 6, Chapter 3.12. EN 61000-6-4/A1 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments IEC 61183 Electro acoustics - Random-incidence and diffuse-field calibration of sound level meters "The Contractor shall keep the noise due to construction to a minimum during prayer times and other times when important activities are taking place and shall respect local customs and culture of the communities already living on the island"
3	Electrical Norms	Local Electrical Standards applicable for this project.	Please refer to Section 6 - Employer's Requirements - of Bidding Documents
4	Documents required	B03 - Existing Power house SLD required. Can we have Drawings of DG yard and Power house.	B03 Power house SLD is provided with the Amendment TES/2016/G-007 Addendum#01. Layout drawings are not available.
5	DG sets and supply scope	1. Is there any relocation of existing DG sets envisaged - If yes - Details 2. Any specific type of Exhaust systems to be considered - or can we offer our own design. 3. Details of "Diesel supply" scheme for the DG house - Does it envisage any additional systems to be considered or will the existing systems cater for new DG's requirement also. OR Do we have to consider the new Diesel yard - if yes- how many days of storage to be considered for sizing the tanks. If the Diesel yard is existing - then pls specify the "Battery limits" for Diesel supply lines. 4. Does the existing DG sets have electronic governors - for hooking on	1. Yes, for islands B04-Finey and B15-Vaikaradho, the powerhouses will be relocated in the future. If diesel gensets have to be replaced, the existing gensets stay with FENAKA. 2. Exhaust systems are to be build as per requirements from FENAKA. 3. Yes, additional tanks have to be installed in some islands. Please refer to TES/2016/G-007 Addendum#01 Item#8 for more details. 4. As per Section 6, Chapter 1.2, it is within the EPC's responsibility to collect and investigate all basic data which is needed for a proper design, planning and engineering. 5. It is mentioned separately for each island in Section 6, Chapter 2.x.4, if panels and related cables have to be supplied. 6. There is enough space in the powerhouse to have 3 diesel gensets installed.





				to plant controller. 5. Pls confirm whether we have to supply all panels as per Power house SLD along with interconnecting cables. 6. Whether there is space for the new DGs to be installed in the existing powerhouse or do new shelters for the same have to be constructed Any Preferred makes for PV Modules, Inverters, Diesel Generators (DGs), Li-ion Batteries - alternatively could we suggest the makes	No, no manufacturer is suggested. However, all supplied components must fulfill the requirements mentioned in the tender documents.
6.1	PV /Electrical and control systems related			Degree of the scope with respect to civil works on the islands	The civil works must fulfill the requirements mentioned in the tender documents. Specifications can be found in Section 6, Chapter 3.6
6.2				For the BESS system, while the Li Ion family of batteries is proposed, the actual battery chemistry being needed is not mentioned in the bid document. Is it that based on operational requirements, we will need to decide the battery chemistry ???. Please confirm	The concrete battery chemistry is not restricted. However, all supplied components must fulfill the requirements mentioned in the tender documents.
6.3					



6.4			<p>In 1S2E Section 6 document, sub section 3 ( page 146 ), it is mentioned that the round trip efficiency of the inverter + battery system must not be less than 88 %. This will be quite difficult to achieve practically as the best round trip efficiency of Li Ion batteries is around 92 %. This means that the battery based inverter must have an efficiency of 96 % which will be quite difficult to achieve. Please discuss and advise of this can be reduced to 85 % from 88 %.</p>	<p>Value to be changed: Efficiency of battery inverters shall be greater than 94% (one way) Section 4, Form Data Sheet Battery Inverter</p> <p>Total efficiency of BESS system must be greater than 84% (roundtrip) Section 6, Chapter 3.3</p>
6.5			<p>In 1S2E Section 6 document, sub section 3 ( page 147 and 148 ), it is mentioned that the guaranteed cycle life of the battery shall have certain number of cycles at certain DOD and temperature. There seems to an error in what is mentioned. Two different values have been provided for 80% DOD. Please clarify on this</p>	<p>The guaranteed battery cycle life shall be dependent from energy throughput. 4000 cycles @80% correspond to the same energy throughput as 800 cycles @ 80% + 1500 cycles @60% + 2400 cycles @40% + 3500 cycles @20%, so both have to be fulfilled. Section 6, Chapter 3.3.1 "Batteries"</p>
6.6			<p>In 1S2E Section 6 document, sub section 3 ( page 148 ), it is mentioned that the minimum conversion efficiency of the inverter / charger system ( bi directional inverter ) must be 96 %. Please discuss and advise of this can be reduced to 94 % from 96 %. We can get to 96 % but this would mean operating the battery at fairly high battery voltages. Calls for product engineering and design specially for this bid.</p>	<p>Please refer to Answer S.No 6.4</p>





6.7		Is there any replacement of Poles and accessories in the power distribution system envisaged - or the cable to be drawn on the existing network . Path of poles.	There are no poles in these networks. All cables are layed underground. However, grid and network updates are to be done as stated in the tender documents in Section 6, Chapter 2.x.4 for each island and in general Chapter 3.5
7	Execution work	<ol style="list-style-type: none"> <li>Any specific Labour laws applicable for the execution work</li> <li>What if the Rooftops mentioned are found not suitable for PV installations?</li> </ol>	<ol style="list-style-type: none"> <li>Any foreigner working in Maldives should have relevant visas and meet all requirements under employment act of Maldives. Employment laws for the Maldives can be found here: <a href="http://www.lra.gov.mv/laws_and_regulation/2/104/employment-act-english">http://www.lra.gov.mv/laws_and_regulation/2/104/employment-act-english</a></li> <li>If mentioned rooftops are found not suitable, it has to be discussed with the Employer if proposed roof has to be reinforced or new roofs can be found.</li> </ol>
8	Commissioning	Do we have to plan for Spares and consumables during commissioning period.	Spare parts are to be provided as described in Section 6, Chapter 3.17 as well as mentioned in TES 2016 G 007 Addendum1 Item#2
9	O & M	<p>Confirm whether O &amp; M of exiting DG is in bidder's scope</p> <p>Can we use the supplied spares can be used during O &amp; M period and DLP.</p> <p>Pls specify the scope of supply of all consumables like diesel, lube oil, filters etc during O&amp;M period.</p>	For O&M as well as for spare part requirements, please refer to Section 6, Chapter 3.16 as well as the Amendment TES/2016/G-007 Addendum#01 Item#11.





10		Bid bond	Is there any possibility of considering the Bid bond (EMD) in terms of Bank Guarantee	The Bidder shall furnish an unconditional bank guarantee using the Bid Security Form included in Section 4 of Bidding Documents. If a bidder submits a bid security that deviates in form, amount, and/or period of validity, the Employer will request the Bidder to submit a compliant bid security within fourteen (14) days of receiving such a request. Failure to provide a compliant bid security within the prescribed period of receiving such a request will cause the rejection of the Bid.
11	In section 6, chapter 1.2	page 4-9	is mentioned that the diesel generator system must include "safety installations". Need further clarifications on the nature (kind) of the safety installations.	Safety installations include all parts that are required from the manufacturer to ensure a safe operation of the system.  Section 6, Chapter 1.2
12	In section 6, chapter 1.2	page 4-9	is mentioned that the bidder needs to review the static calculations, and if not available the bidder needs to verify buildings and rooftops statically. Is there any available static calculations?	There are no static calculations for the buildings available.
13	In section 6, chapter 2.4.1	page 4-15	is mentioned: The controller will constantly calculate the spinning reserve needed from the diesel generators and communicate with the genset system. Spinning reserves calculation based on a power/time model? Is there any preferences (for example, t=10 min and P=25%)	There are several parameters that influence the calculation of the spinning reserve. They have to be flexible and will be defined during detail design and commissioning of the power plant.





14				<p>Euro efficiency of the inverter to be at least 98%, is it valid for the string inverters and batteries inverters independently of their rated capacity? In the PV inverter data sheet form is stated Euro ETA = 97.8% and in the Battery inverter data sheet form the efficiency is requested to be more than 96 % (100% to 25% of the rated power). Please clarify</p>	<p>Efficiency of PV inverters and efficiency of battery inverters are to different parameters that have to be treated separately. For PV string inverters the requirement is changed to be: The requirement for the minimum euro efficiency of the proposed inverter shall not be less than 97%.  Section 6, Chapter 3.2.4.5  For battery inverters, specifications can be found in Section 6, Chapter 3.3 and Section 4</p>
15				<p>String Inverters (PV) to be installed outdoors, any indication of the IP protective class of the enclosure? Is it valid the IP class mentioned in the related data sheet form (IP65).</p>	<p>Yes, IP-Class of inverters as stated in Section 4, Data sheets.</p>
16				<p>Data loggers (for Meteorological Stations and monitoring system). What is the minimum requirement for the registration frequency in terms of time (for example, every 1 min).</p>	<p>The minimum timestep for datalogging is 1 minute.</p>
17				<p>The BESS will be hosted in existing rooms and rooms that need to be built by the bidder. Is any detail on this matter available (where / how many new rooms need to be build).</p>	<p>The equipment is to be installed as close as possible to the LVDB room. The therefore needed extension of the powerhouse or building of a new housing next to the powerhouse or the containerized solution for those islands where the powerhouse will be relocated, shall be included in the scope of work of the EPC.  Section 6, Chapter 3.3.3</p>
18	section 6, chapter 3.4.5 and page 6-153			<p>The required diesel generator specific fuel consumption is expressed in terms of weight, in the diesel generator data sheet form its expression is in terms of volume. Is the same way to express the diesel engine performance if we use a known and fixed value for the diesel's density. Please clarify.</p>	<p>For the calculation of the weight the standards of the used fuel will be used.</p>





19	section 6 chapter 3.2.4.8 and page 6-138	Communication protocol	<p>It is stated that can be used "A proven communication protocol such as Profibus, Modbus, and Ethernet" between PV inverters and PCMS. In chapter 3.3.1 and page 6-147 the communication protocol between BESS BMS and PCMS is stated as Modbus only. Same for the communication protocol between diesel generator controller and PCMS is Modbus only (chapter 3.4.3 and page 6-151). In the related data sheet forms (for all the above components) is stated as communication protocol Modbus or RS485 only. Please clarify which communication protocols can be adopted.</p> <p>For diesel generator, is sound isolation required? (Silent/Open type)</p>	<p>The communication between genset controller, battery inverter, PV-inverter and PCMS shall be Modbus. The Subsystems like genset controller to sensors/actors can have their own communication protocol such as CAN for example.</p>
20				<p>Yes, exhaust systems including silencer have to be provided.</p>
21	Section 3 2.4.2		<p>Experience in Key Activities - Please define clearly the requirement of 40km per project LV distribution grid. What is constituted as distribution grid?</p>	<p>LV distribution grid for cities, villages and industries, etc.</p>





22	Section 3 page 3-9 point 2.4.1 and Section 4 page 4-66 Form EXP – 1	<p>Section 3 page 3-9 point 2.4.1 states: "Participation in at least two contracts that have been successfully or substantially completed within the last 3 years and that are similar to the proposed contract, where the value of the Bidder's participation exceeds \$ 4,000,000.00 per contract. The similarity of the Bidder's participation shall be based on the physical size, nature of works, complexity, methods, technology or other characteristics as described in Section 6 (Employer's Requirements)."</p> <p>However, Section 4 page 4-66 Form EXP – 1: Contracts of Similar Size and Nature stated: "Participation in at least two contracts that have been successfully or substantially completed within the last 3 years and that are similar to the proposed contract, where the value of the Bidder's participation exceeds \$ 2,500,000.00 The similarity of the Bidder's participation shall be based on the physical size, nature of works, complexity, methods, technology or other characteristics as described in Section 6 (Employer's Requirements)."</p> <p>Would like to clarify which figures to follow?</p>	<p>Please refer to criterion 2.4.1 of Section 3 of Bidding Documents only for this requirement:</p> <p>"Participation in at least two contracts that have been successfully or substantially completed within the last 3 years and that are similar to the proposed contract, where the value of the Bidder's participation exceeds \$ 4,000,000.00 per contract. The similarity of the Bidder's participation shall be based on the physical size, nature of works, complexity, methods, technology or other characteristics as described in Section 6 (Employer's Requirements)."</p>
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23		<p>In case of schools, the total PV Capacity is 71.24kWp in your drawing. You defined the AC cable from inverter to DB B8 as 65m only. The voltage drop for this cable defined as lower than 2%, even though other Distribution Board as 5%. We need DC cables from modules (number of modules in series will be decided through the MPPT Window of applied Inverter) to Combiner (Perhaps this will be installed near Inverter) &amp; inverter. The DC cable shall be supplied as solar cable instead of flame retarded XLPE with voltage drops lower than 1.5% according to the cable length and use connector instead of shrinking tube (because it is defined as UV-protected cable in the Employers Requirements)</p> <p>The quantity &amp; specification was not defined in your Price Schedule and drawings.</p> <p>The DC Cable length and quantity will be decided by the location of inverter for the school (if inverter is located in school C as above, string cable from school A &amp; B shall be pulled to school C) Please refer to the above schematic.</p> <p>Could you define the DC cable in your price schedule?</p>	<p>Please precisely define your question. It is not understood what is the question.</p>
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24	<p>Module array is also defined each side of roofs, it is very difficult to decide number of modules in a series even though we arrange modules as above. If we choose 18 modules in a series, which will be based on the inverter Max input DC voltage, MPPT window of inverter, Temp coefficient of module &amp; module degradation rate, 2 modules each roof of school A is remaining and 6 modules of health Center is remaining</p> <p>How where do we use the remained modules? Shall we put remained area as dummy module, and then, total PV capacity for power generation will be reduced, even though we can install 8 modules more as I explained. Think again the DC cable length and cable size as employer's requirement.</p> <p>What is the solution and method for above explanation? You defined the capacity should be greater than 2.27MWp, but we are worrying about keeping the capacity.</p>	<p>The roofs shall be equipped with the capacity stated in the tender documents Section 6, Chapter 2.x.3 for each island.</p> <p>The total capacity of 2.27MW shall be met with an accuracy of (+2.5%/-0%).</p> <p>If the capacity does not fit on some of the roofs, it is possible to have a variation of the islands of +/-10% without affecting the total capacity.</p> <p>Details about string length will be clarified during the detailed design phase. During the detailed design phase, it can also be discussed if there are more roofs available in case the planned capacity can't be met.</p>
25	<p>You connected the PV power to the DB-B8 for Schools, and DB-E7 for Health Center and Council</p> <p>Perhaps, the connected DB will be near the PV location.</p> <p>And you specified the voltage drop from the PV inverter to the DB is lower than 2%, even though you specified 5% from the main DB to the outer DB.</p> <p>Voltage Drop from Main DB Bus to DB B8 is 10.15% for existing (present)</p> <p>Voltage Drop from Main DB Bus to DB B8 is 4.9% for proposed (future) Voltage Drop from Main DB Bus to DB E7 is</p>	<p>PI indicate for which island this case has been studied.</p>



				<p>8.73% for existing (present) Voltage Drop from Main DB Bus to DB E7 is 3.65% for proposed (future)</p> <p>Schools PV power current will be flowed to the lower DB such as DB B8, B9 and B10</p> <p>If the load capacity is smaller than PV capacity(71.24kW), the remained capacity will be counter-flowed to the main DB bus side, but we think the remained capacity is not fully working to the load because of the voltage drop from the main DB as you specified above for present and future.</p> <p>For example, if B8~B10 capacity is 20kW, the remained 51.24kW shall be counter-flowed to the main bus side. The remained capacity will be consumed according to the load status</p> <p>We assume it will affect to the hybrid controller, too. It is the same idea for Health Center and Council.</p> <p>We suggest the connection point should be near main DB Bus, instead of DB B8 or DB E7.</p> <p>Shall we keep the PV connection as your drawing or move it to near main bus?</p> <p>Keep that in mind, the cable length and size will be differed from your proposed.</p>
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26			<p>DB replacement at the construction stage</p> <p>Temporary cable between DB and DB shall be supplied?</p> <p>Do we make other cable route such as manhole and trench on the road for replacement of cable?</p>	<p>All temporary cable required during execution stage shall be arranged by the contractor.</p> <p>Other cable routes and trenches are not allowed. Contractor to use the existing cable routes / trenches for very short time before the energisation.</p>
27	Section 3	Evaluation and Qualification Criteria	<p>1) Under the "Compliance Requirements" from page 3-5 to page 3-10, there are two options, one is "Single Entity" and the other option is "Joint Venture".</p> <p>Please confirm for "Joint Venture" option, do we need to have a legal entity registered, or it can be just an MOU between each partners.</p>	<p>You don't need to establish a legal entity at the time of bid submission. You need to include evidence from all proposed Joint Venture partners of their intent to enter into a Joint Venture. In particular, a Letter of Intent to execute a Joint Venture Agreement in the event of a successful bid shall be signed by all partners and submitted with the Bid, together with a copy of the proposed agreement.</p>
28	Section 3	Evaluation and Qualification Criteria	<p>2) 2.5 - Sub-contractor and Manufacturers (Page 3-11) – If we decided to bid the Project as a Single Entity, can we use our sub contractors' experience to qualify for all the criteria listed from page 3-9 to page 3-10.</p>	<p>The Bidders are encouraged to hire subcontractors for those major items of plant and services which are indicated on criterion 2.5 of Section 3 (page 3-11). The Bidder is responsible for ensuring that any subcontractor proposed complies with the requirements of ITB 4 of Section 1 of Bidding Documents, and that any plant, or services to be provided by the subcontractor comply with the requirements of ITB 5 and ITB 15.1 of Section 1 of Bidding Documents.</p>
29	Section 3	PVs Panel -Employer's Requirements	<p>1) Please advise if we can use Thin Film solar panel, instead of Monocrystalline. Please refer to attached on the Thin Film (CdTe) solar panel</p>	<p>No, only Monocrystalline and Polycrystalline Modules are allowed.</p>
30			<p>Expected sound proofing in generator installation</p>	<p>Please refer to answer S.No.20</p>



31			Can we claim BOO - Built Own Operate basis experience	Yes, as long as your company has provided EPC services on its own within the BOO project as per experience requirements (Design, supply, installation, supervision, commissioning) and can prove it. BOO references with subcontractors employed to provide all the EPC services will not be accepted.
32			If BOO can be claimed, what proof documents needed	Any document proving that the EPC services have indeed be provided by your company.
33			How work visa will be arranged for foreign employment requirements.	It is Contractor's responsibility to acquire and pay for all work visas for the Contractor's and Subcontractor's personnel, as per clause GCC 9.3, Section 7 of Bidding Documents.
34			The total required installed capacity for solar plant is around 2,270kWp, distributed onto 13islands. According to our preliminary design, found that for some islands we can not install enough required capacity, while for some islands we could install more than required capacity.(For example, B03 island required installed capacity is 70.7KW, but actually we could install 83.2KW for B03 island; while for B07 island, the required installed capacity is 196.6KW, but actually we could install only 187.2KW) But finally we could achieve the total required installed capacity 2,270kWp or more. So if is this ok?	Please refer to answer S.No.24
35		In Section 4 BDS	Number of cells per Crystalline module preferred as 60. Is it acceptable to use 72 cells per module panels for PV installation?	No, only Modules with 60 cells are allowed.
36			For the PV Panel recycling gaurentee certification, will it be sufficient providing a commitment letter from Bidder/Supplier?	Yes, an official statement from Bidder and supplier is necessary that proves that there is a active recycling program from the manufacturer, where the components will be included after their lifetime





37				Photovoltaic Module Technology is not mentioned in the tender document. Will it be acceptable to use crystalline (Poly/Mono) or Thin film modules?	Please refer to answer S.No.29
38				In order to calculate DC Cable length, bidder needs to have building height details or else distance to the Prospective Inverter mounting wall. Please provide this detail	It is in the responsibility of the Bidder to gather this information during a site visit on the islands. Please refer to Section 6, Chapter 1.2
39				If bidder had to use free standing mounting structure, Free standing mounting structure specification not provided in the Tender Document	There is no free standing mounting structure needed for this tender.
40			In Section 3.2.4.5	minimum euro efficiency mentioned as at least 98% and In Section 4 BDS Allowed Euro efficiency mentioned as 97.5%. Please specify the correct benchmark	Please refer to answer S.No.14
41				Communication protocols mentioned as Profibus, Modbus and Ethernet in the section 3.2.4.8. Is it acceptable to use CAN or any other technically sound communication protocol	Please refer to answer S.No.19
42				Do we have to monitor breaker status per inverter in AC Combiner box ?	Monitoring of breaker is not necessary.
43				Will it be sufficient Weather station data logger linearity +/- 0.01%	A weather station data logger linearity of 0.01% is acceptable.
44			In Section 3.3.1	A minimum of 4000 Cycles at 80% of DoD at 25C and A minimum of 800 Cycles at 80% of DoD at 25C" statements are found to be conflicting, please clarify	Please refer to answer S.No.6.5
45			In Section 3.3.2	Battery inverter communication protocol is suggested as Modbus, will it be acceptable to use a technically sound other communication Protocol for communicating between PCMS	Please refer to answer S.No.19





46				Will it be acceptable to use Single core armoured cables from Inverter room to Power House when cable size is larger than 95mm <sup>2</sup> , Practically 4C cables with a large diameter creates difficulties in handling compared to single core cables	It is acceptable to use armoured single core cables.
47				Do we have to monitor Voltage, Current, Active Power, Reactive Power and PF for each phase in each string inverter AC Side ? (According to the SCADA Signal List)	Yes, monitoring has to be done as stated in the tender documents. Please note that this signals have to be provided for a centralized SCADA system which will be implemented by a third party.
48			In section 3.7.2.7	PV inverters as well as the battery inverters shall used to provide reactive power to the grid. Does the PV String inverters should operate in reactive power compensation mode when PV power (At Night) is unavailable ?	Yes, PCMS shall decide when and how much reactive power compensation should be done from the PV inverters.
49				In Island B03 - Hanimaadhoo, summation of total PV Installed Capacity is 328.9kWp not 334.1kWp, please clarify	Section 6, Chapter 2.6.2 : The correct number is 328.9kWp
50				Is that necessary to submit SEPERATE PVSyst simulation reports for each location ?	PVSYST simulation report for each location is required.
51				According to the Addendum 1, Inverters are planned to be mounted on outer walls of the buildings. For Larger PV Capacity locations (Ex University at B12 Island) it is required to go for floor mounted AC Combiner box. Is it acceptable to build small room to place AC Combiner Box Panel	Ground mounted AC combiner boxes are allowed. Also building of rooms to include AC combiner box panel is allowed.
52				Will it be acceptable to use Powder coated Enclosures for AC combiner box, for larger size PV Capacity locations AC	AC Combiner boxes shall follow the requirements defined in Section 6, Chapter 3.5.6.3





53					No, as per tender documents, only Lithium Ion Battery technologies are allowed.
54					All relevant information can be found in the tender documents

