

21 October 2020

Ms Melissa Lim  
Adviser, Listings Compliance [Sydney]  
Australian Securities Exchange Ltd

Dear Melissa,

### Magnis Energy Technologies Limited [MNS]: Aware Query

Magnis Energy Technologies Limited [the Company] refers to your letter dated 9 October 2020 in respect of the abovenamed subject. In response to the seven specific questions set out in the ASX letter, the Company responds as follows:

1. Yes.
2. Not applicable.
3. The new information was the key statement quoted in the Company's announcement dated 6 October 2020 that:

"C4V's lithium batteries require 89 MJ of "dirty energy" per battery kWh manufactured. We found comparable batteries manufactured with more fossil fuels consumed 719 to 1,219 dirty energy-inclusive MJ per battery kWh manufactured."

The announcement made by the Company on Monday, 24 August 2020 was released immediately after the Company was informed about the 40 page report Abt Associates report which was released by NYSERDA. The Company was made aware of the report on Saturday, 22 August 2020, and undertook its best endeavours to quickly highlight a number of conclusions made in the report.

The report itself was published by Abt Associates on 2 September 2020.

The announcement made by the Company on 6 October 2020 was based on the recent article by Mr Ben Matek which simplified highly technical findings which the Company believes was new information as they were previously unreleased and detailed very important outcomes. The author simplified the Abt Associates report, and in the Company's opinion, the author's conclusions drawn from the report constituted new and material information which warranted release to the market.

By way of further background, the Company's Executive team did not have the expert skills to be able to read a technical report [the Abt Associates report] so quickly and discern all relevant points being made to be able to draw our own conclusions and hence the reason why the Company relied on the author of the article with his conclusions on both accounts. Since then, the Company has employed an individual who holds a Science Degree and leads the Company's battery initiatives and who will assist the Company going forward.

4. The Company first became aware of the new information on or about Sunday, 4 October 2020, of the Labour Day long weekend.

The Company was not previously aware of the existence of the article by Mr Ben Matek prior to 4 October 2020 and was certainly not aware of its existence on 23 September 2020 when it was first published. The author is an independent industry writer and the Company was made aware of the existence of the article by an employee of iM3NY.

5. Refer to the Company's response to question 3 above and note the comment below by Mr Shailesh Upreti, President of C4V:

*"As an expert in the area of lithium ion batteries and winner of many prestigious awards in the battery industry, as well as based on what Abt Associates has come up with, all the data available in the marketplace about commercially available cells, and the comments made by Abt Associates as an independent expert that "C4V's lithium batteries require 89 MJ of "dirty energy" per battery kWh manufactured. We found comparable batteries manufactured with more fossil fuels consumed 719 to 1,219 dirty energy-inclusive MJ per battery kWh manufactured".*

*"These numbers clearly indicate that C4V batteries are much lower in footprint verses comparable [meaning lithium ion] batteries."*

There is a full report available at: <https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Environmental/19-44-Lifecycle-Assessment-of-CV4-Li-ion-Battery-Cells-for-Electric-Vehicles.pdf>

*"From this report, here are some of the references that indicate that Abt used a very comprehensive database, which typically must contain all the commercially available batteries in the market."*

**Extracts from the Abt Associates report:**

**Page iii:** “A “cradle to gate” lifecycle assessment was performed using OpenLCA, along with the Ecoinvent 3.5 database and data provided by C4V.”

**Page ES2:** “Most comparable metrics of the C4V Li-ion battery cell fall within the lower end of the expected range of LCIs generated by the manufacture of a Li-ion battery cell for several reasons.”

**Page 2:** “Abt conducted an LCA of Li-ion batteries for electric vehicles, which was supported by the United States Environmental Protection Agency (EPA) and published in 2012 [EPA 2012]. The study assessed three Li-ion battery chemistries for an electric vehicle and two chemistries for long-range, plug-in hybrid electric vehicles. The battery chemistries included lithium-manganese oxide [LMO], lithium-nickel-cobalt-manganese oxide [Li-NCM], and lithium-iron phosphate [LiFePO<sub>4</sub>]. In addition, a single-walled carbon nanotube anode technology for possible future use in the batteries was assessed [EPA 2012]. The study relied on primary data from several battery suppliers, manufacturers, and recyclers as well as secondary data sources from published studies, including Notter [et al. 2010] and Majeau-Bettez [et al. 2011]. EPA conducted the analysis consistent with the International Organization for Standardization 14040 series and identified several opportunities for improvement based on the key drivers of environmental impact, which included increasing the lifetime of the battery, reducing cobalt and nickel use, reducing the percentage of metals by mass, incorporating more recycled metals during battery manufacturing, using a solvent-less process, and reassessing the manufacturing process and upstream material selection for the cathode to reduce energy use. Although the end-of-life [EOL] stage was also examined, it was based on very preliminary data from battery recyclers and included a process that was still in the research and development phase.

LCA studies published prior to the EPA study relied primarily on secondary or modeling data to estimate impacts, while considering only a limited number of lifecycle stages, vehicle types, and/or impact categories [e.g., greenhouse gas [GHG] emissions from electric vehicles]. For example, using secondary data, Matheys [et al. 2008] conducted an environmental assessment of five types of batteries for internal combustion engine vehicles, electric vehicles, and hybrid electric vehicles, including lead-acid, nickel-cadmium, nickel-metal hydride, Li-ion, and sodium-nickel chloride. The study found higher technical and environmental performance of the Li-ion and the sodium-nickel chloride battery technologies [Matheys et al. 2008]. Notter et al. [2010] published an LCA of a

manganese oxide Li-ion battery. This study found that the impacts of a Li-ion battery used in electric vehicles are small relative to the whole vehicle, and the operation or use phase remains the dominant contributor to its environmental impact, assuming the electricity is not generated solely through renewable sources. Although the study used primary data from one battery cell manufacturing company (Kokam Co.), it relied largely on secondary data fromecoinvent1 and modeling data for the battery manufacturing, use, and EOL stages. Zackrisson [et al. 2010] also relied on modeling data for their LCA analysis, which found that it was environmentally preferable to use water as a solvent instead of N-methyl-2-pyrrolidone in the slurry for casting the cathode and anode of Li-ion batteries for hybrid electric vehicles. Majeau-Bettez [et al. 2011] conducted a “cradle-to-use”<sup>2</sup> analysis of three Li-ion battery chemistries for electric vehicles, including nickel metal hydride, nickel cobalt manganese Li-ion, and LiFePO<sub>4</sub>. Based on average European conditions, the nickel metal hydride technology was found to have the greatest environmental impact, followed by Li-NCM and then lithium-ion iron phosphate for all LCIA categories considered, except ozone depleting potential (ODP; Majeau-Bettez et al. 2011). Additional LCA studies have been conducted on automotive Li-ion batteries of comparable chemistries or designs to C4V batteries. For example, a study by Hawkins [et al. 2013] conducted a comparative LCA of conventional and electric vehicles, which included an analysis of Li-ion iron phosphate and Li-NCM batteries. This study found lower impacts from lithium-manganese oxide batteries compared<sup>3</sup> to Li-ion iron phosphate batteries. 2010] and Majeau-Bettez [et al. 2011] and assumed a battery lifespan equal to the vehicle lifespan [Hawkins et al. 2013].

The study relied on lifecycle inventory data from Zackrisson [et al. 3]

Other LCA studies on LiFePO<sub>4</sub> batteries were based on production data in China. For example, a study by Lu [et al. 2016] assessed the material production and battery production processes of LiFePO<sub>4</sub>, nickel metal hydride, lithium cobalt dioxide, and nickel manganese cobalt oxide batteries in electric vehicles. The study focused on GHG emissions and other air emissions (e.g., nitrogen oxides [NO<sub>x</sub>], sulfur oxide, and particulates). Lu [et al. 2016] found nickel metal hydride batteries to have the greatest impacts, while LiFePO<sub>4</sub> batteries had lower energy consumption and emissions, including GHG emissions. However, a cradle-to-gate LCA study on Li-ion batteries for electric vehicles manufactured in China found that LiFePO<sub>4</sub> batteries had higher GHG emissions than N-methyl-2-pyrrolidone and lithium manganese oxide (LMO) batteries [Hao et al. 2017]. Key drivers of GHG emissions included anode active materials followed by wrought aluminum.

Furthermore, the study found that Li-ion batteries manufactured in China emitted about three times the amount of GHG emissions compared to Li-ion batteries manufactured in the United States. This is primarily due to China's electricity grid, which generates more GHG emissions per kilowatt-hour [kWh] than the grid in the States [Hao et al. 2017].

In addition, Kim [et al. 2016] conducted a cradle-to-gate LCA analysis of the electric Ford Focus battery pack, which is a mixture of LMO and Li-NCM. The Ford Focus battery consists of 430 cells with a nominal voltage of 3.7 V and has a specific energy density of 0.08 kWh per kilogram [kg]. Cradle-to-gate GHG emissions were found to be 140 kg of carbon dioxide-equivalent [CO<sub>2</sub>e] per battery pack. The gas, electric, and water consumption accounted for 45% of the GHG emissions. Additionally, GHG emissions from cell manufacturing, cell components, and battery enclosure accounted for 82–92% of the criteria pollutant emissions [e.g., NO<sub>x</sub>, volatile organic compounds [VOCs], carbon monoxide, particulate matter [PM], and sulfur dioxide [SO<sub>2</sub>]].

In 2016, a study concluded that the majority of automotive Li-ion cell production was located in Asia and owned by firms with experience producing Li-ion cells for electronics. While Asian firms still dominate the market, price-competitive production may be possible from North American manufacturing locations given material pricing equivalent to that achieved by cost leaders and an 8% weighted average cost of capital [Chung et al. 2016].”

*“As it can be seen from the cross references, US Government EPA data, and other database studies done by Abt, C4V came out to be the cleanest and greenest batteries by far, to be produced from the iM3 New York [iM3NY] plant.”*

6. The Company confirms that, to the extent that it is aware, and to the best of its knowledge, it is complying with the ASX Listing Rules, including Listing Rule 3.1.
7. The Company confirms that its responses above to the ASX questions have been authorised and approved by its Board of Directors.

Yours sincerely

**MAGNIS ENERGY TECHNOLOGIES LIMITED**



**Company Secretary & Legal Counsel**





9 October 2020

Reference: 25727

Mr Frank Giordano  
Company Secretary  
Magnis Energy Technologies Limited  
Suite 9.03  
88 Phillip Street  
Sydney NSW 2000

By email

Dear Mr Giordano

**Magnis Energy Technologies Limited ('MNS'): Aware Query**

ASX Limited ('ASX') refers to the following:

- A. MNS's announcement titled 'NYSERDA Report Highlights Greenest Lithium-ion Batteries' released on the ASX Market Announcements Platform ('MAP') on 24 August 2020 ('August Announcement'), which included the following statements:
  - i. *'World renowned agency Abt Associates conducts report on batteries produced by C4V'*;
  - ii. *'Report sponsored and funded by New York State Energy Research and Development Authority (NYSERDA)'*;
  - iii. *'C4V Generation-1 lithium-ion batteries with its qualified supply chain highlighted as potentially the greenest in the market'*; and
  - iv. *'iM3NY to be the first factory to make these batteries at Gigawatt scale'*.
- B. The report referred to in paragraph A above dated October 2019, which is available at:  
<https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Environmental/19-44-Lifecycle-Assessment-of-CV4-Li-ion-Battery-Cells-for-Electric-Vehicles.pdf>
- C. MNS's announcement titled 'iM3NY Batteries to be the Greenest in the Marketplace' released on MAP on 6 October 2020 ('October Announcement'), which included the following statements (emphasis added):
  - i. *'World renowned agency Abt Associates conducts and publishes a special article on batteries produced by C4V funded by New York State Energy Research and Development Authority (NYSERDA)'*;
  - ii. *'New information points to batteries produced at the iM3NY Lithium-ion Battery Plant containing at least 87% less dirty energy per kilowatt hour versus comparable batteries'*; and
  - iii. *'iM3NY to be the first factory to make these batteries at Gigawatt hour scale starting in 2021'*,  
(together the 'Information').
- D. The article referred to in paragraph C.ii above dated 23 September 2020 ('Article'), which is available at:  
<https://www.abtassociates.com/insights/perspectives-blog/newer-cleaner-battery-technology-proves-old-adages-true>
- E. Listing Rule 3.1, which requires a listed entity to immediately give ASX any information concerning it that a reasonable person would expect to have a material effect on the price or value of the entity's securities.

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F. The definition of 'aware' in Chapter 19 of the Listing Rules, which states that:

*'an entity becomes aware of information if, and as soon as, an officer of the entity (or, in the case of a trust, an officer of the responsible entity) has, or ought reasonably to have, come into possession of the information in the course of the performance of their duties as an officer of that entity" and section 4.4 in Guidance Note 8 Continuous Disclosure: Listing Rules 3.1 – 3.1B "When does an entity become aware of information.'*

G. Listing Rule 3.1A, which sets out exceptions from the requirement to make immediate disclosure, provided that each of the following are satisfied.

*'3.1A Listing rule 3.1 does not apply to particular information while each of the following is satisfied in relation to the information:*

*3.1A.1 One or more of the following applies:*

- It would be a breach of a law to disclose the information;*
- The information concerns an incomplete proposal or negotiation;*
- The information comprises matters of supposition or is insufficiently definite to warrant disclosure;*
- The information is generated for the internal management purposes of the entity; or*
- The information is a trade secret; and*

*3.1A.2 The information is confidential and ASX has not formed the view that the information has ceased to be confidential; and*

*3.1A.3 A reasonable person would not expect the information to be disclosed.'*

### **Questions and Request for information**

Having regard to the above, ASX asks MNS to respond separately to each of the following questions and requests for information:

1. Does MNS consider the Information (or part thereof) to be information that a reasonable person would expect to have a material effect on the price or value of its securities?
2. If the answer to question 1 is 'no', please advise the basis for that view.
3. If the answer to question 1 is 'yes', please advise the basis for that view, commenting specifically on what 'new information' was contained in the October Announcement (see paragraph C above) that had not previously been disclosed in the August Announcement (see paragraph A above).
4. If the answer to question 1 is 'yes', please advise when MNS first became aware of the Information and why no announcement was made when the Article was published on 23 September 2020. If MNS was not aware that the Article had been published on 23 September 2020, please explain why not.
5. On what basis did MNS determine that 'iM3NY Batteries to be the Greenest in the Marketplace' (see paragraph C above)?
6. Please confirm that MNS is complying with the Listing Rules and, in particular, Listing Rule 3.1.
7. Please confirm that MNS's responses to the questions above have been authorised and approved in accordance with its published continuous disclosure policy or otherwise by its board or an officer of MNS with delegated authority from the board to respond to ASX on disclosure matters.



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### **When and where to send your response**

This request is made under Listing Rule 18.7. Your response is required as soon as reasonably possible and, in any event, by no later than **9:30 am AEDT on Wednesday, 14 October 2020**. You should note that if the information requested by this letter is information required to be given to ASX under Listing Rule 3.1 and it does not fall within the exceptions mentioned in Listing Rule 3.1A, MNS's obligation is to disclose the information 'immediately'. This may require the information to be disclosed before the deadline set out in the previous paragraph and may require MNS to request a trading halt immediately.

Your response should be sent to me by e-mail. It should not be sent directly to the ASX Market Announcements Office. This is to allow me to review your response to confirm that it is in a form appropriate for release to the market, before it is published on the ASX Market Announcements Platform.

### **Trading halt**

If you are unable to respond to this letter by the time specified above, you should discuss with us whether it is appropriate to request a trading halt in MNS's securities under Listing Rule 17.1. If you wish a trading halt, you must tell us:

- the reasons for the trading halt;
- how long you want the trading halt to last;
- the event you expect to happen that will end the trading halt;
- that you are not aware of any reason why the trading halt should not be granted; and
- any other information necessary to inform the market about the trading halt, or that we ask for.

We require the request for a trading halt to be in writing. The trading halt cannot extend past the commencement of normal trading on the second day after the day on which it is granted. You can find further information about trading halts in Guidance Note 16 *Trading Halts & Voluntary Suspensions*.

### **Suspension**

If you are unable to respond to this letter by the time specified above, ASX will likely suspend trading in MNS's securities under Listing Rule 17.3.

### **Listing Rules 3.1 and 3.1A**

In responding to this letter, you should have regard to MNS's obligations under Listing Rules 3.1 and 3.1A and also to Guidance Note 8 *Continuous Disclosure*: Listing Rules 3.1 – 3.1B. It should be noted that MNS's obligation to disclose information under Listing Rule 3.1 is not confined to, nor is it necessarily satisfied by, answering the questions set out in this letter.

### **Release of correspondence with ASX**

ASX reserves the right to release a copy of this letter, your reply and any other related correspondence between us to the market under Listing Rule 18.7A.

### **Questions**

If you have any questions in relation to the above, please do not hesitate to contact me.

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Yours sincerely

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**Melissa Lim**  
Adviser, Listings Compliance (Sydney)