Life Cycle Assessment

Vanadium Redox Flow battery

visblue
energy in the flow

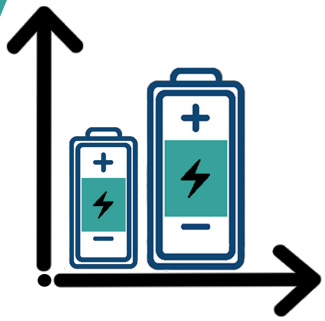
Redox Flow batteries - RFBs

What is a Redox Flow battery (RFB)?

Redox flow batteries (RFBs) offered by Visblue, differ from other types of batteries in the way they store and release energy. Unlike traditional batteries that rely on chemical reactions that occur within a single container, RFBs store energy in liquid solutions stored in separate tanks. These solutions are then pumped into cells where the chemical reactions take place.

Improved efficiency

Reusable electrolyte



Scalable

What are the advantages of Redox Flow batteries?

One of the main advantages of RFBs is that they can be scaled up or down in size to match the energy needs of a particular application. This makes them well suited for use in large-scale energy storage systems, such as those used in electric grid or renewable energy systems.

Another advantage of RFBs is that they use a homogenous porous electrolyte, in this case vanadium, which is used in stacked cells. This means that cross-contamination of the electrolyte solution can occur, but since both sides of the electrolyte are composed of vanadium, the issue of cross-contamination only results in lower efficiency, but not in loss of reactants. This is because the original species can be recovered, and up to 99% of the electrolyte can be reused in new batteries.

This feature can help to reduce the cost of the batteries over time, as well as reduce the environmental impact of the batteries, by reducing the need to constantly replace the electrolyte solution.

Overall, RFBs offer a number of advantages over traditional batteries, including scalability, improved efficiency and the ability to recover and reuse the electrolyte solution. This makes RFBs a more feasible option for large scale energy storage systems, such as those used in electric grid or renewable energy systems.

Life Cycle Analysis (LCA)

What is a Life Cycle Analysis (LCA)?

A Life Cycle Assessment (LCA) is a widely used commercial method for evaluating the potential environmental and climate impacts as well as resource consumption associated with a given product. An LCA examines the product's life cycle - from the extraction of raw materials, transportation, and production - until the finished product is ready at the gate.

The analysis assesses the product's influence on various aspects, including environmental impacts, social impacts, and resource use. In addition, the product is also divided into components, where the individual components' footprints are measured and weighed.

VisBlue's 8kW@40kWh Redox Flow Battery

A Life Cycle Analysis has been conducted!

The analysis has been prepared in accordance with standardized management systems designed to optimize and ensure quality. More specifically, the ISO 14040 and 14044 standards have been treated in this analysis.

What is the ISO standards and what can they be used for?

The ISO 14040 and 14044 standards are widely recognized as the international best practice for environmental management and assessment. These standards provide a systematic and transparent framework for evaluating the environmental performance of organizations, products, and services. They are based on scientific and technical principles, and have been developed through a rigorous and inclusive process involving experts from around the world.

Adhering to these standards can demonstrate an organization's commitment to environmental responsibility and can be used to build trust with stakeholders. Additionally, using these standards can help organizations to identify areas for improvement and to develop effective strategies for reducing their environmental impacts.

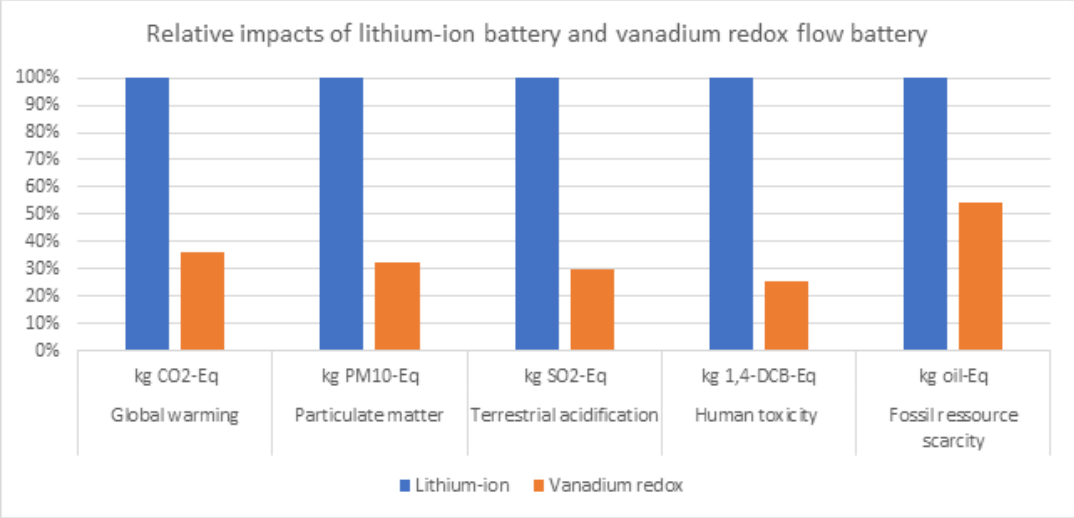
In collaboration with

AARHUS KOMMUNE

THE 5 MORE PROMINENT MEASUREMENT POINTS ARE:

Global warming
Particulate matter.
Terrestrial acidification.
Human toxicity.
Fossil resource scarcity.

The relative impact from a redox flow battery is compared below with corresponding data points from a lithium battery.



GLOBAL WARMING

The redox flow battery has a significantly lower impact on global warming than a lithium battery. This is largely due to its lower greenhouse gas emissions throughout its life cycle.

The production of the redox flow battery generates fewer greenhouse gases than the production of a lithium battery, and the battery itself has a lower carbon footprint when it is in use. In addition, steps have been taken to reduce the carbon footprint of the redox flow battery such as the development of low-carbon manufacturing processes.

PARTICULATE MATTER

The redox flow battery also has a lower impact on air pollution in terms of particulate matter compared to a lithium battery. This is due to the lower levels of air pollutants emitted by the battery during its life cycle.

The production of the redox flow battery generates fewer air pollutants such as particulate matter, sulfur dioxide, and nitrogen oxides than the production of a lithium battery. VisBlue has also taken steps to reduce air pollution from the redox flow battery, such as through the use of cleaner production technologies and the development of more efficient batteries.

TERRESTRIAL ACIDIFICATION

In addition to having a lower impact on global warming and air pollution, the redox flow battery also has a lower impact on land pollution and soil acidification compared to a lithium battery.

The production and disposal of the redox flow battery generate less waste and use fewer toxic chemicals, resulting in a lower environmental impact on land and soil. VisBlue has also implemented measures to reduce the environmental impacts of the redox flow battery, such as through the use of recycled materials and the implementation of waste management systems.

HUMAN TOXICITY

The redox flow battery has a lower potential for negative health impacts compared to a lithium battery. This is due to the lower levels of hazardous chemicals used in the production of the redox flow battery and the lower potential for exposure to toxic substances during battery use.

The production of the redox flow battery generates fewer hazardous waste products and uses fewer toxic chemicals, resulting in a lower potential for negative health impacts. In addition, VisBlue has implemented measures to minimize the potential health impacts of the redox flow battery, such as through the use of safer materials and the implementation of health and safety protocols.

FOSSIL RESOURCE SCARCITY

The redox flow battery also has a lower impact on fossil resource depletion compared to a lithium battery. This is due to the lower resource consumption associated with the production and use of the battery.

The redox flow battery uses fewer materials such as lithium and cobalt in its production, and it has a lower energy requirement compared to a lithium battery. VisBlue has also taken steps to reduce resource consumption and promote resource efficiency in the production of the redox flow battery, such as through the use of recycled materials and the development of more efficient production processes.

CONCLUSION

Overall, the Life Cycle Assessment (LCA) results show that the VisBlue redox flow battery is a more sustainable and responsible choice compared to a lithium battery. The redox flow battery has a significantly lower environmental impact in terms of global warming, air pollution, land pollution, and human toxicity. It also has a lower impact on fossil resource depletion, due to its lower resource consumption in terms of materials and energy.

These findings are based on a comprehensive analysis of the product's life cycle, from raw material extraction and transportation to manufacturing and end-of-production. The LCA was conducted in accordance with standardized methodologies, including the ISO 14040 and 14044 standards, which are widely recognized as best practices in the field of life cycle assessment.

In summary, the LCA results demonstrate that the VisBlue redox flow battery is a superior choice for businesses and consumers who are looking for a reliable and environmentally responsible energy storage solution.

The Advantages of Reusing Vanadium Electrolyte in Redox Flow batteries

When it comes to energy storage solutions, Vanadium Redox Flow Batteries (RFBs) are a highly efficient and reliable option. And at Visblue, we are constantly looking for ways to improve our product and make it more sustainable. One such solution we have tried out is the concept of reusing vanadium electrolyte, the key component in our RFBs.

Reusing vanadium electrolyte not only reduces the amount of new vanadium that needs to be mined and processed, but it also extends the life of the battery. This means that by choosing Visblue RFBs, not only are you getting a top-performing energy storage solution, but you are also making a sustainable choice for your business and the environment.

Furthermore, reusing the electrolyte also reduces the lifecycle cost of the batteries. It will also add to the longevity of the battery and reduce the maintenance cost. This will provide a great return on investment and it will be a cost-effective solution.

Sustainable solution

Extend battery life

Reduce battery lifetime costs and maintenance costs

A Redox Flow Battery has a CO2 footprint of 10.855 kg per battery

However, this figure is significantly lower if the vanadium electrolyte is recycled. In that case, the CO2 footprint will be **8.356** kg lower. This represents a **77%** reduction in the environmental impact compared to a battery with brand new vanadium electrolyte.

At Visblue, we are constantly exploring new ways to make our products more sustainable and reduce the carbon footprint of our batteries.

The concept of reusing vanadium electrolyte is one such solution we have tried and considered, and we will continue to investigate and explore new ways to improve our products and make them even more sustainable.