

# best mag

The international quarterly for the battery technology industry

13 - 16 May 2024

## Advanced Automotive Battery Conference



14th INTERNATIONAL  
**aabc** advanced automotive battery conference  
**europe**

13-16 MAY 2024 | STRASBOURG, FRANCE

Record attendance is confirmed!

Hear 30+ talks directly from leading OEMs & battery developers, including

24m accelera Audi Blue Solutions BMW CATL DAIMLER electrovaya  
FARASTS gm HOPPECKE LG Energy Solution Nanoramic LABORATORIES northvolt nyobolt PORSCHE  
ProLogium QuantumScape RENAULT RIMAC SAFT SAMSUNG SCANIA SIEMENS  
sionic SKELETON TECHNOLOGIES STADLER STELLANTIS SVOLT TESLA TOYOTA VW

Event preview in association with



Cambridge

**EnerTech**

## Sustainable battery material production at a fraction of the cost

Wyatt Olson is a Senior Program Manager at 6K Energy responsible for product development and commercial programs. He started his career in chemical R&D at Moses Lake Industries (MLI), spending ten years developing and launching electroplating products at global chipmakers. After spending three years on lithium-ion battery products at MLI, Wyatt joined 6K Energy in 2022. He holds B.S. in Chemistry and an MBA from the University of Washington.



Massive societal, economic, and technological shifts are happening globally in response to the increasing threat of climate change. We are seeing a shift to electrification as a more sustainable energy source, causing an increased need for energy storage in the form of batteries. The need for a secure supply of battery material is growing exponentially because of this transition, both for mobility solutions like electric vehicles (EVs) and for stabilising and reinforcing renewable-fed electricity grids.

While battery technology has been constantly iterated and improved, the increased demand coupled with geopolitical instability and a race to secure finite — and rare — resources has hampered affordable and reliable battery production needed to support the mass electrification agenda. Cathode active materials (CAM), the most expensive component of a lithium-ion battery, remain time-consuming and environmentally hazardous to produce. In addition, regulations and incentives are being implemented to encourage the non-use of China-produced battery material.

**Leapfrog Technology for Sustainable Production of Battery Material**  
6K's UniMelt® microwave plasma

technology is transforming how we produce battery material by collapsing the production process time by 95%, resulting in over 50% reduction in conversion costs.

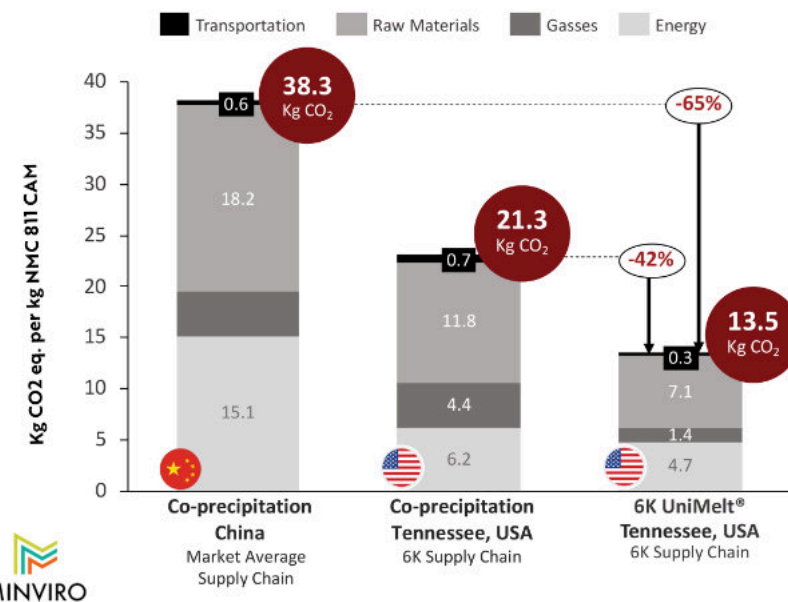
With 6K's UniMelt technology, we take a multiple-step process down to a one-step, closed-loop process, driving the overall cost of the material down. Our unique technology allows for multiple materials to be produced in the same plant, offering complete flexibility to meet the specific demands

of individual customers under one roof. 6K Energy can produce a wide range of battery materials, including NMC, LFP, LLZO, and LMR, all in the same factory. This allows for easy scalability and cost reduction, with a significantly lower environmental impact.

### IRA-Compliant NMC and LFP Battery Material

6K Energy's production of lithium-ion cathode active material (CAM) will meet the stringent government

### 6K Energy LCA Summary for NMC Battery Material Produced Using the UniMelt® Process



mandates for compliance requirements outlined by the Inflation Reduction Act (IRA). 6K Energy is the only company that will offer both LFP and NMC battery materials that will qualify for all the IRA-compliant tax incentives offered for battery material production. These materials will be manufactured at 6K Energy's PlusCAM facility in Jackson, TN.

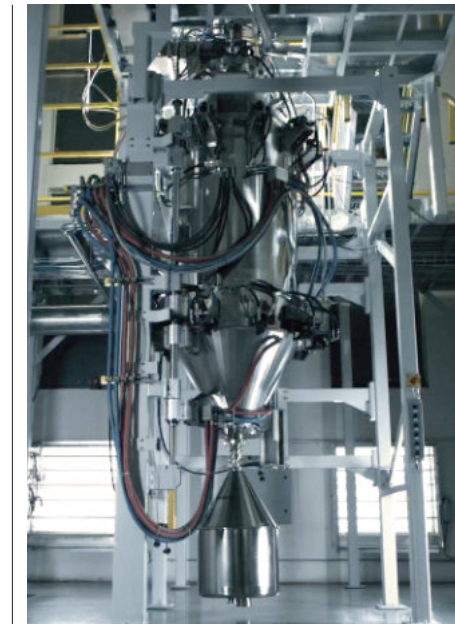
By securing a domestic supply chain of battery material, 6K Energy will significantly reduce dependence on foreign-made battery material and increase domestic supply. Domestic production reduces the national security risk, increases local jobs, and provides significant value in offering sustainably produced battery material at a lower cost. 6K Energy's plan for domestic sourcing of material will decrease the national dependency on raw material suppliers and will ensure a stable, secure source of feedstock for our future electrification needs.

### Sustainability of UniMelt Vs. Co-precipitation

The UniMelt process is significantly more sustainable than the current co-precipitation process, creating virtually no waste byproducts. The current co-precipitation process generates large amounts of pollutants, consumes huge amounts of water, and uses energy-intensive processes. By leveraging nitrates versus sulphates, commonly used in conventional processes, the UniMelt process produces zero hazardous waste, a significant reduction in water usage, and two times the reduction in power usage.

### Independent Life Cycle Assessment

A recent independent life cycle assessment (LCA) was conducted by Minviro, offering a comparative analysis between 6K Energy's process and conventional production routes for



NMC cathode active materials. This LCA highlights the substantial environmental benefits, including significant reductions in greenhouse gas emissions, water pollution, and air pollution.

The 6K Energy process has a significantly lower environmental footprint compared to traditional manufacturing techniques. Key factors in this comparison include raw material sourcing, energy consumption, emissions, and the overall environmental footprint.

The preliminary LCA data underscores the superiority of the 6K Energy process in minimising energy requirements and emissions. Notably, the use of less energy-intensive raw material processing methods contributes significantly to the overall reduction in environmental impact, even factoring in differences in energy supply.

A noteworthy finding of the LCA is the efficient energy use of the 6K Energy's UniMelt platform. Traditional production routes typically involve high energy consumption and substantial emissions, particularly from the use of fossil fuels. On a like-for-like basis, with both traditional and

6K Energy's processes using energy from the same source, the reduction in consumption is marked.

A significant advantage of the 6K Energy process is the use of nitrates as a feedstock, eliminating sodium sulphate waste and creating a closed-loop system to recycle off-gasses back into the process efficiently. Based on this method, 6K Energy's process can significantly reduce core climate change metrics, with the LCA assessment reporting:

- ~65% reduction in climate change impact of producing NMC-811 CAM via 6K Energy's PlusCAM process compared to the conventional China-based co-precipitation process.
- ~43% reduction in the climate change impact of producing NMC-811 via the PlusCAM process compared to the conventional co-precipitation process when the supply chain and manufacturing location are assumed to be the same.

### Conclusions

Reducing the cost, securing supply chain instability, and reducing the environmental impact of battery material production are essential to supporting the burgeoning electrification agenda. 6K Energy's UniMelt platform is set to revolutionise the production and recycling of CAM materials for all major battery chemistries in terms of monetary and environmental costs. The ability to establish the processing of materials domestically and close to existing supply chain nodes further improves the benefits.

At 6K Energy, we are setting a new standard for cathode active material production—sustainable, lower cost, domestic, and IRA compliant. To learn more about our process, please visit [www.6K-Energy.com](http://www.6K-Energy.com).