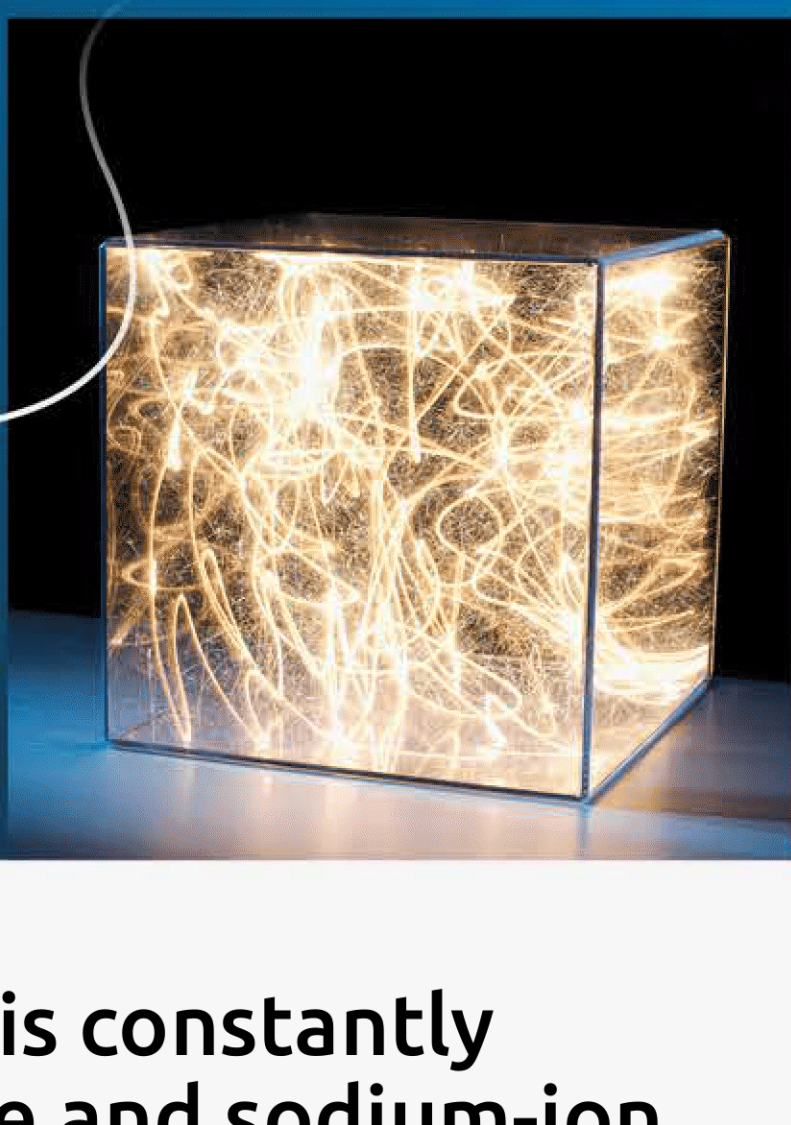
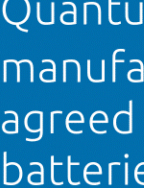


Batteries are powering a sustainable revolution in automotive

Capgemini
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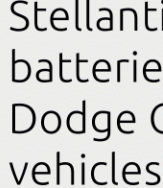


Battery technology is constantly evolving, with solid-state and sodium-ion batteries showing great potential



PowerCo, a Volkswagen Group subsidiary, and QuantumScape, an SSB manufacturer, have agreed to mass-produce batteries for Volkswagen's EV lines.

01



In partnership with Factorial Energy, Stellantis will deploy SSB batteries in its new Dodge Charger Daytona vehicles as a demonstration fleet.

02



CATL, the world's largest EV maker, aims to produce exclusively EV SSBs by 2027.

03

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Electrification presents automotive manufacturers with complex cost, regulatory, and technological challenges. Advances in battery design & engineering, manufacturing & digital continuity, resilience & intelligent supply chain can help resolve these, as well as enabling worthwhile business models. And, along with infrastructure changes, battery evolution could also shape the whole transition to renewable energy.

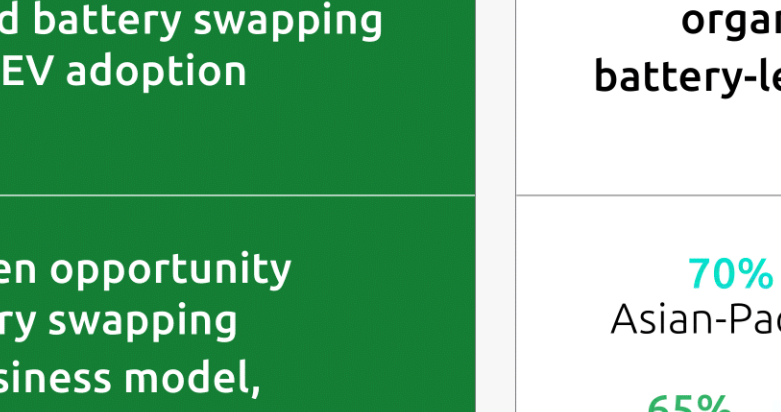
Emmanuelle Bischoffe Cluzel, Vice President, Sustainability Lead, Global Automotive Industry, Capgemini

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Batteries are crucial to the future of automotive manufacturers – and that of their customers

More than half of automotive manufacturers are exploring new battery-related business models to address EV infrastructure challenges and cost-effectiveness

Exploring new models such as battery as-a-service rental or subscription for EVs



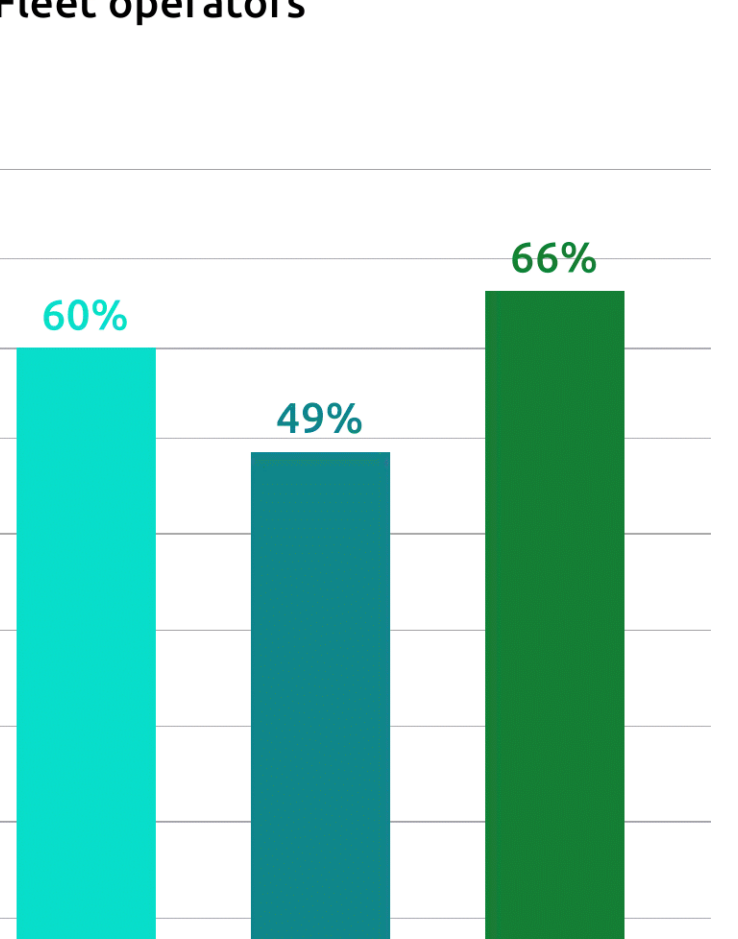
Global average
North America
Europe
Asian-Pacific

Both charging and battery swapping are key to EV adoption

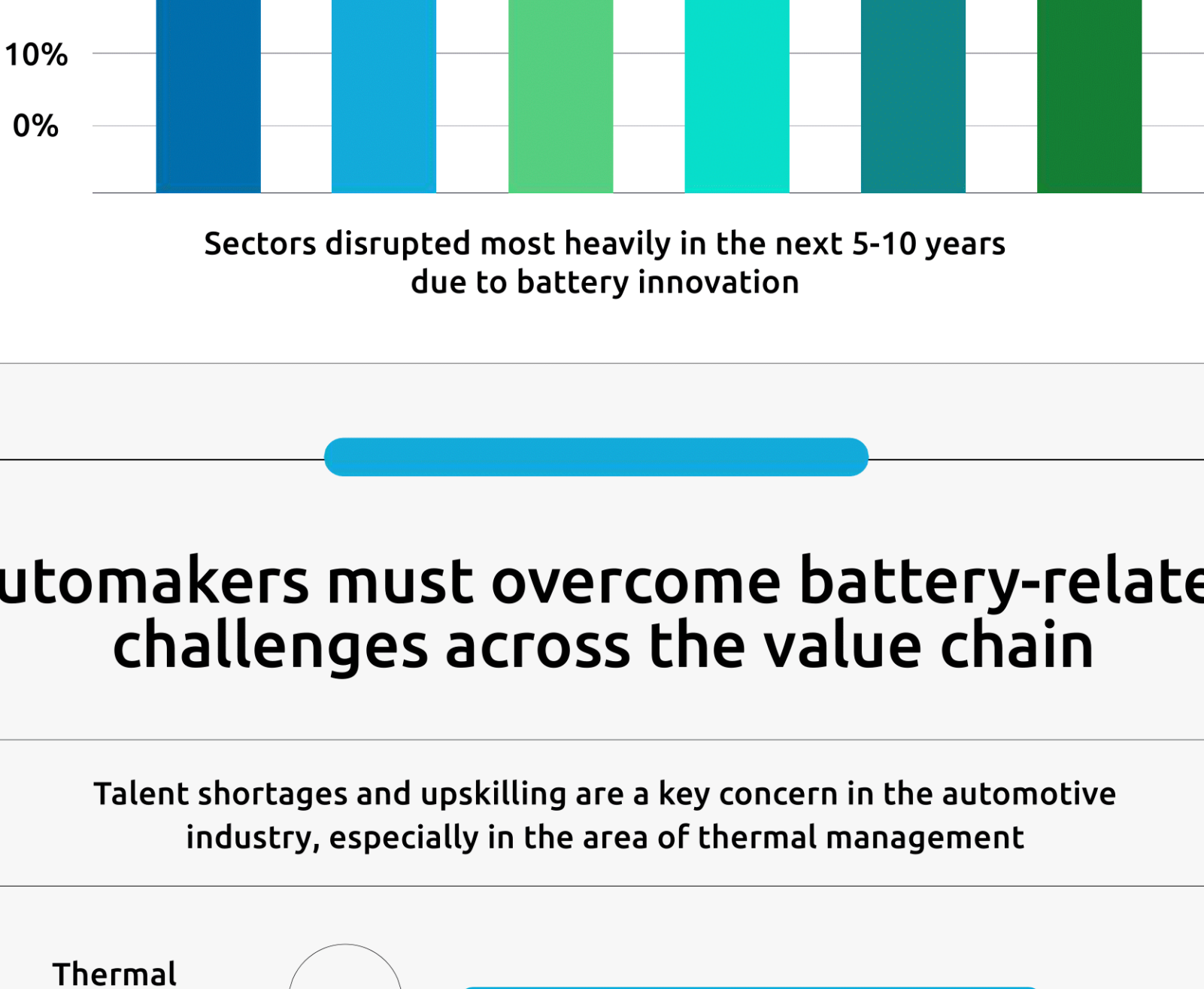
“The choice between opportunity charging and battery swapping depends on the business model, operational needs, and battery size requirements. Both methods can be viable, depending on the specific use cases and how companies choose to set up their logistics.”

Gopala Rao Uppala, CTO at E-Trio Automobiles, an EV manufacturer in India

Nearly two-thirds of automotive organizations are exploring battery-leasing options to make EVs more affordable

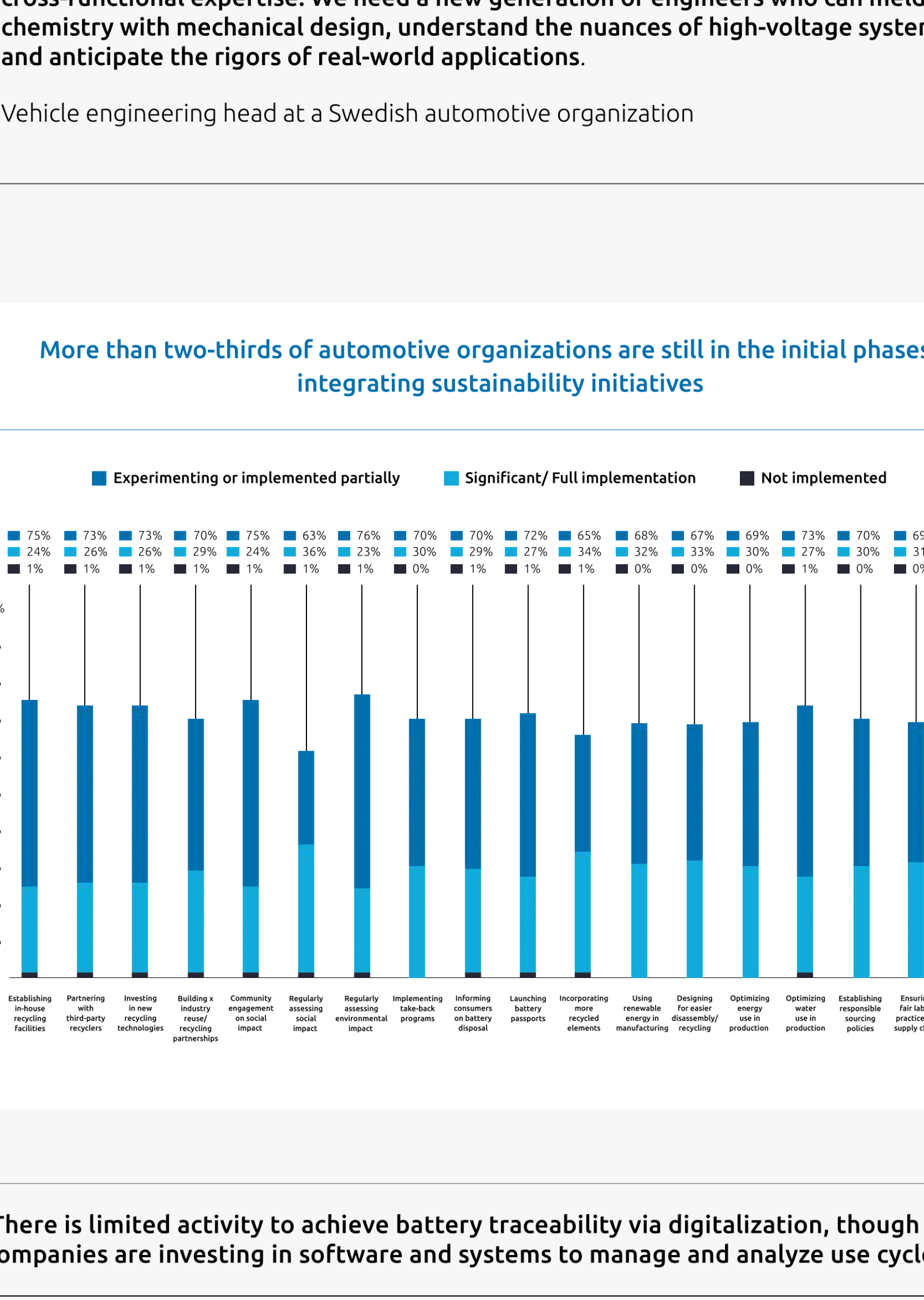


Battery innovation will also affect automakers' customers



Automakers must overcome battery-related challenges across the value chain

Talent shortages and upskilling are a key concern in the automotive industry, especially in the area of thermal management



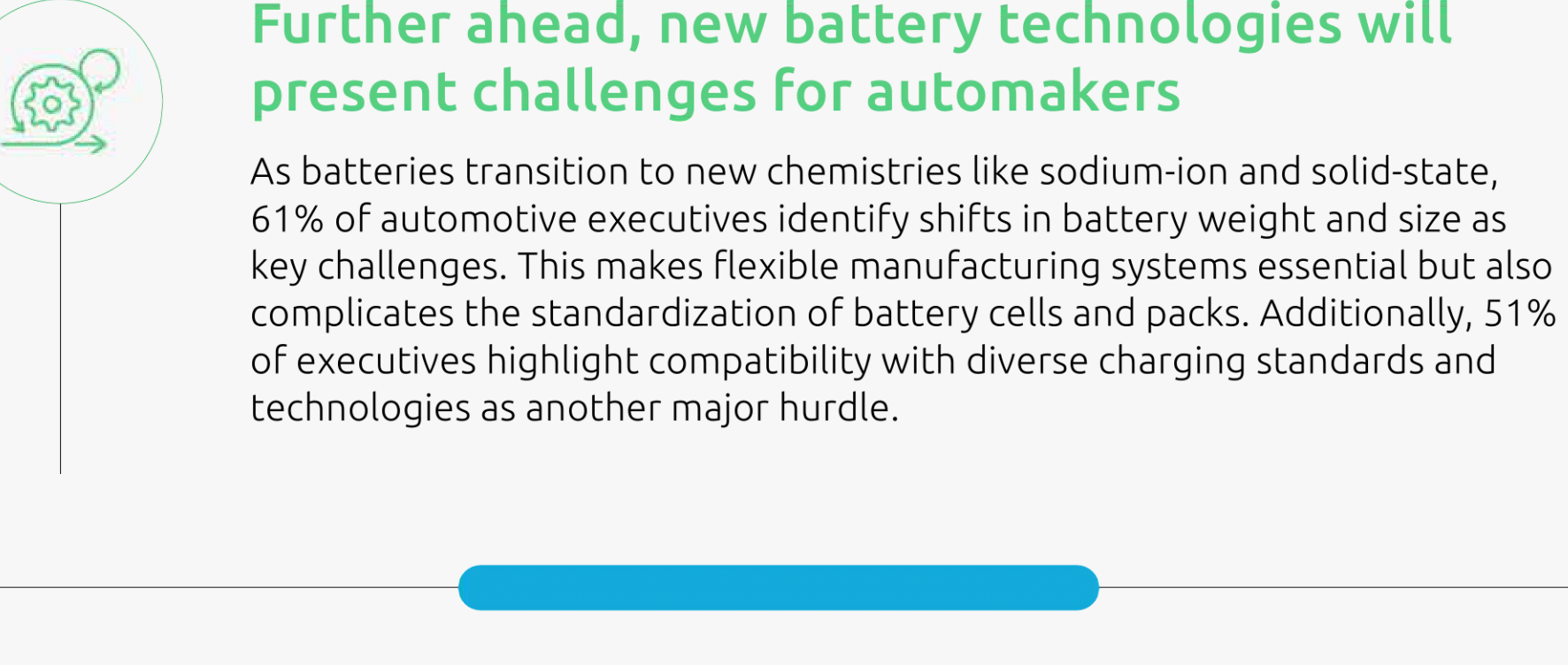
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More than technical know-how, talent is about bridging disciplines and nurturing cross-functional expertise. We need a new generation of engineers who can meld chemistry with mechanical design, understand the nuances of high-voltage systems and anticipate the rigors of real-world applications.

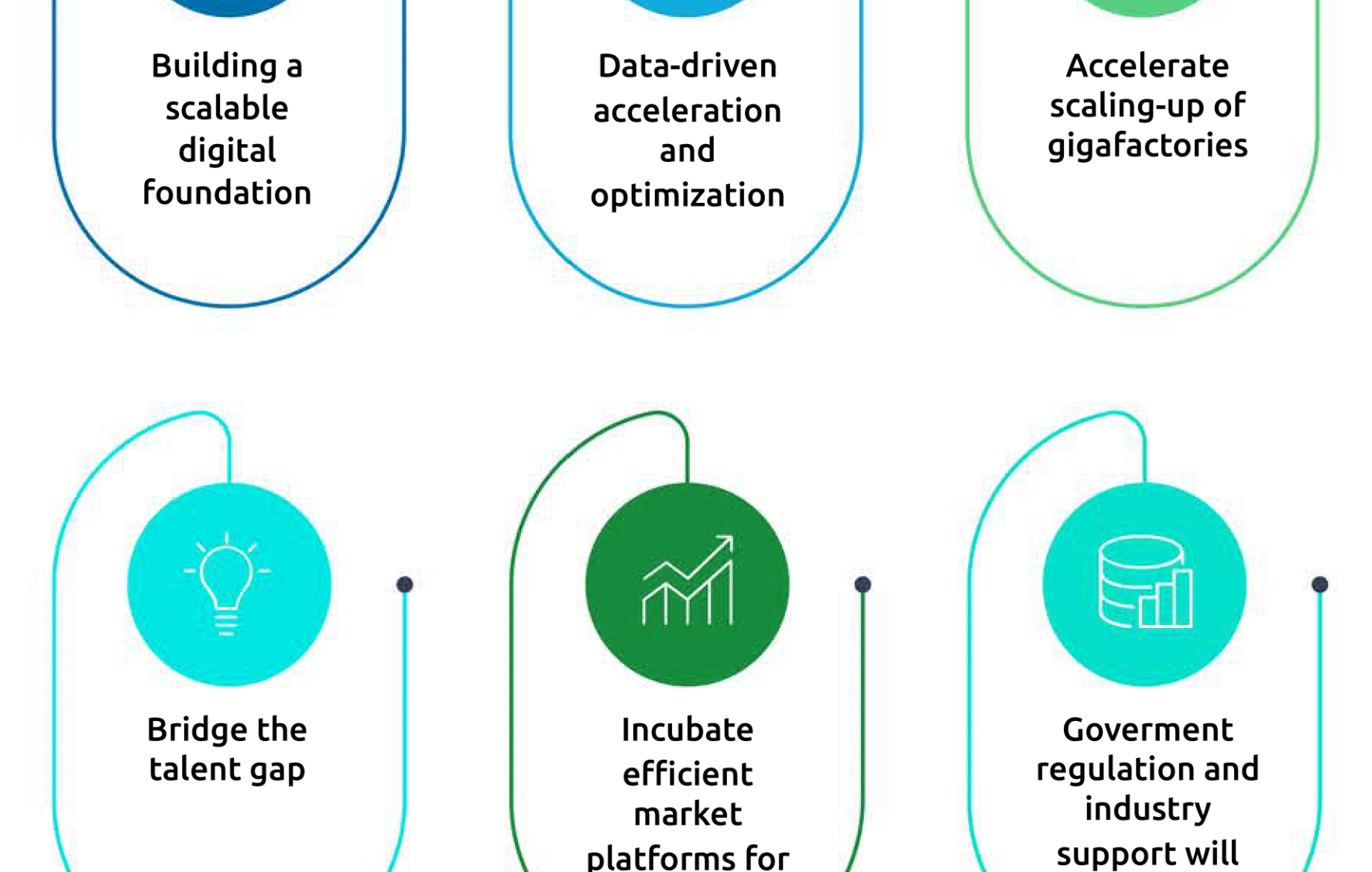
Vehicle engineering head at a Swedish automotive organization

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More than two-thirds of automotive organizations are still in the initial phases of integrating sustainability initiatives



There is limited activity to achieve battery traceability via digitalization, though many companies are investing in software and systems to manage and analyze use cycle data



Battery production problems need to be managed by automotive companies

Another pressing challenge is manufacturing inefficiencies and high scrapage rates during the scale-up phase of battery production. Most (68%) automotive organizations state difficulty in maintaining standards across large-scale production. Based on the experience of Capgemini experts, at initial manufacturing phase, the scrapage rate can be as high as 70%, as 57% of automotive manufacturers struggle to achieve desired battery quality. Over half (54%) of automotive firms report high scrapage rates due to equipment and process variations, fragmented data systems, and lack of real-time monitoring systems, hindering in-line quality inconsistency detection and delaying production process improvement. This underscores the critical need for an IT and data-centric strategy from the early stages of a project, ensuring it can be effectively implemented during scale-up.

Further ahead, new battery technologies will present challenges for automakers

As batteries transition to new chemistries like sodium-ion and solid-state, 61% of automotive executives identify shifts in battery weight and size as key challenges. This makes flexible manufacturing systems essential but also complicates the standardization of battery cells and packs. Additionally, 51% of executives highlight compatibility with diverse charging standards and technologies as another major hurdle.

Key levers can improve battery use in the automotive industry

Building a scalable digital foundation

Data-driven acceleration and optimization

Accelerate scaling-up of gigafactories

Bridge the talent gap

Incubate efficient market platforms for growth

Government regulation and industry support will drive growth

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The ability to design and build high-quality performance batteries is key to the energy transition and decarbonization of transport. Western countries must ramp up their ambitions and actions if they are to compete with leading players from Asia, secure supply chain sovereignty, and achieve their own sustainability objectives. Today's leaders are not standing still, so it's imperative that late arrivals to the battery game aim high and formulate strategies that go beyond merely 'catching up' and aspire toward long-term leadership.

Laurence Noël, Executive Vice President, Head of Global Automotive Industry, Capgemini

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