ACCELERATING DECARBONIZATION AND CLEAN ENERGY TRANSITION

THE CRITICAL ROLE OF SOFTWARE-DEFINED BATTERIES

DELOITTE SAYS...

Survey highlights show energy transition remains a priority for companies

Company plans for a lower-carbon future are well established across the power, oil and gas, chemicals, and manufacturing sectors.

Eighty-nine percent of executives surveyed reported that their companies either already had a plan in place or were developing a strategy to reduce reliance on fossil fuels. **Thirty percent** of those executives said that their company already had a fully developed plan in place.

The top benefits cited of transitioning to lower-carbon operations were gaining a competitive edge, reducing costs, and improving the environment.

While environmental benefits will likely be deemphasized as companies regain their footing through the economic crisis, reducing costs and maintaining a competitive position remain important even in the downturn.

Digital technologies and customer support were cited as key drivers of company plans for a lower-carbon future.

Nearly 70 percent of executives who reported that their company has a sustainability strategy in place cited digital technologies supporting sustainability and energy efficiency as the key driver. The second key driver cited was customer support for reducing carbon emissions.

Source: Deloitte analysis.

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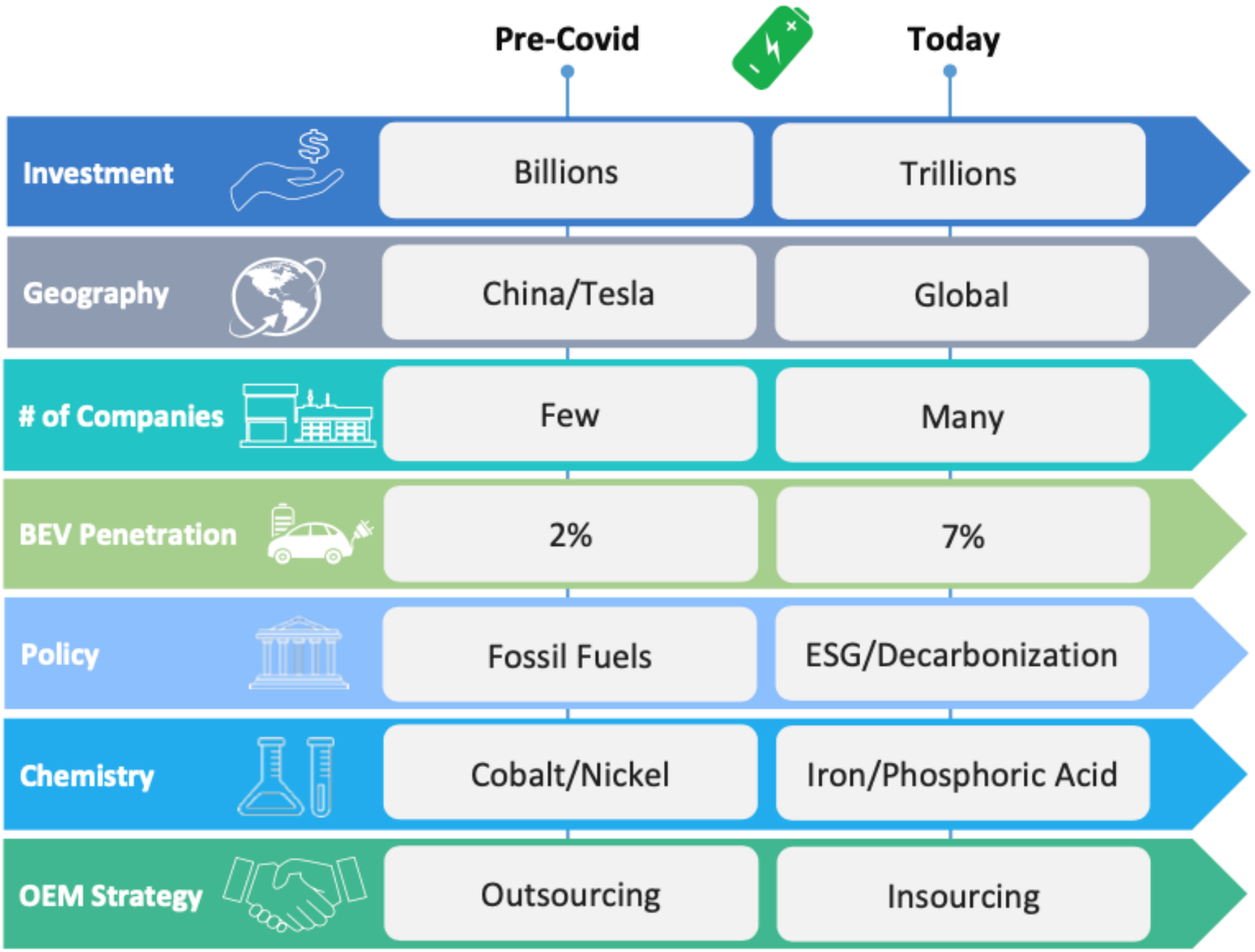
MORGAN STANLEY SAYS...



Source: Morgan Stanley Research

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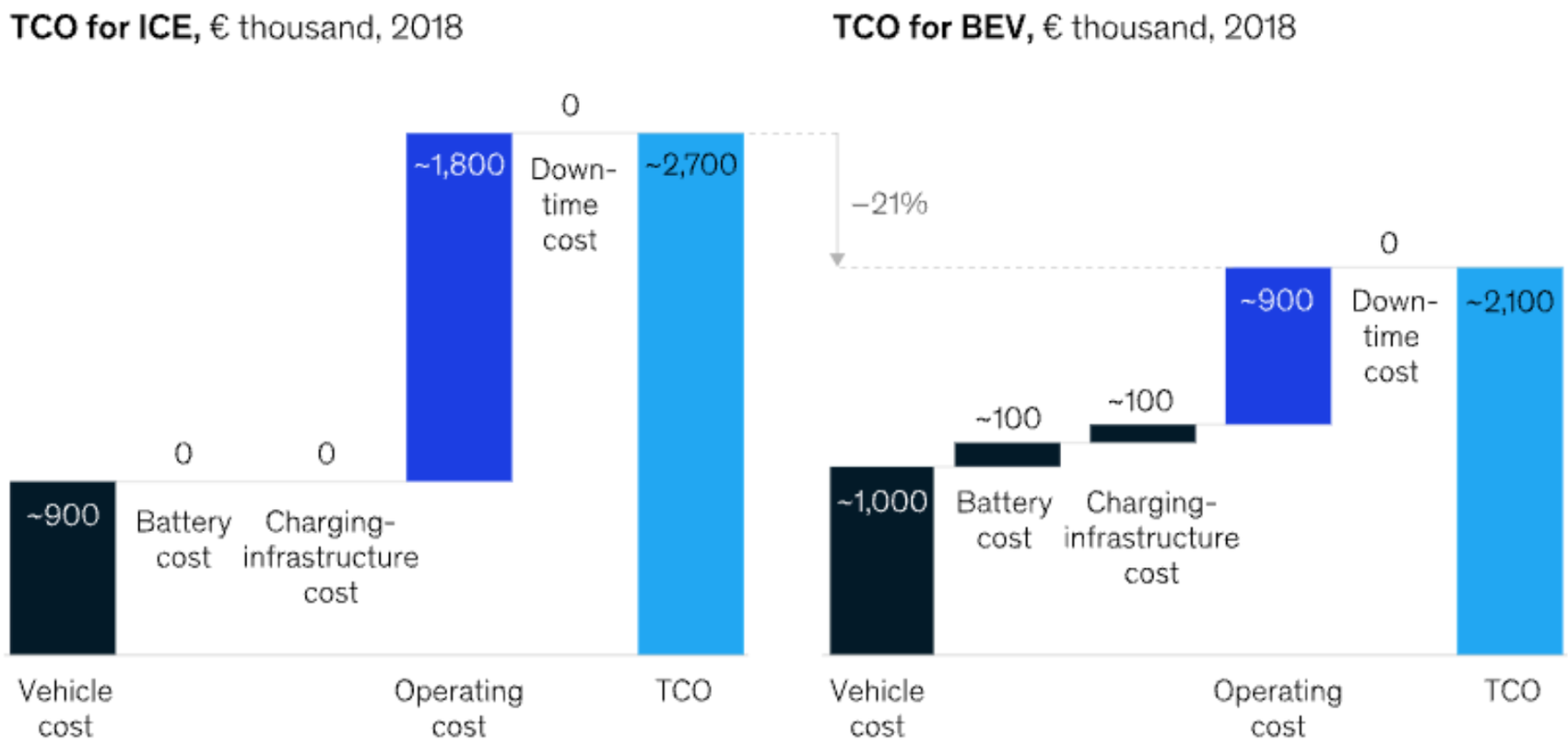
MCKINSEY SAYS...

Total cost of ownership (TCO) for one battery-electric-vehicle (BEV)-equipment type is already 21 percent lower than for an internal combustion engine (ICE).



McKinsey & Company

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BUT THERE'S STILL A BIG DIVIDE...

… between what consulting firms project in whitepapers,
what executives map out in boardrooms…

… and what can be practically implemented in the field.

SOFTWARE-DEFINED BATTERIES,
DRIVEN BY THE TANKTWO BATTERY OPERATING SYSTEM (TBOS),
CAN BRIDGE THAT GAP.

Here's how >>

1. SUPPORT LOWER-CARBON POWER GENERATION

The cost of renewable energy sources has fallen dramatically over the past decade, making them cost-competitive in more regions. But unlike fossil fuel plants that can be built almost anywhere, solar and wind farms or hydro-power stations are location-dependent.

If a business purchases renewable energy from a source hundreds of miles away, it needs the infrastructure to transmit the power. However, the grid is already strained in many populated areas and has become less reliable in times of high demand. If a company generates power on-site, it needs a power storage solution to ensure uninterrupted operations. Batteries will play a substantial role in solving the distribution and storage challenges.

But today's monolithic battery solutions have many hidden environmental costs. The inefficient use of battery materials can undo the positive impact of transitioning to renewable energy sources.

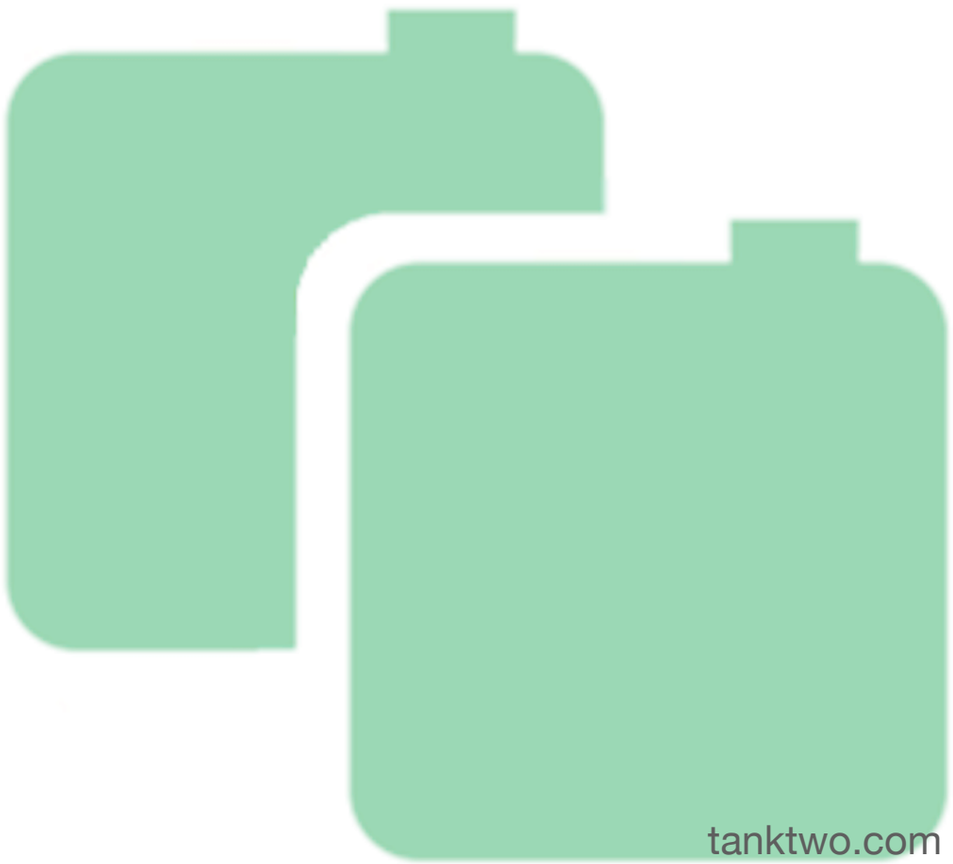
The Tanktwo Battery Operating System (TBOS) uses data and analytics to optimize the lifespan of each cell in a pack, so batteries can do more with less – relieving the pressure on the supply side and reducing the environmental impact of the industry.

The environmental impact of lithium mining

- Pollute water sources
- Impact farming activities
- Promote waterborne diseases
- Increase CO2 emissions
- Remove local vegetations
- Produce massive wastes
- Release toxic chemicals
- Reduce water table
- Disrupt the water cycle

Meanwhile, serviceability is virtually non-existent in traditional battery solutions. Operators have no choice but to replace the entire pack even if just one cell fails – tossing out the good ones with the bad.

TBOS allows maintenance personnel to mix and match cells of any age, chemistries, and characteristics without impacting performance. You can replace one broken cell instead of tossing out the entire battery pack to maximize resource utilization and minimize wastage.



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2. ENABLE THE ELECTRIFICATION OF MORE ENERGY END USES

Passenger electric vehicles (EVs) are just the tip of this iceberg. The transportation sector must address challenges associated with electrifying commercial fleets to reduce emissions substantially.

However, today's monolithic battery solutions require lengthy downtime (i.e., having vehicles stuck in charging stations for hours each day, even with fast-charging solutions), drastically reducing utilization rates and profitability.

Tanktwo's software-defined string cells were designed to address this challenge. The technology allows operators to swap used cells with fully charged ones in minutes so commercial EV fleets can be on the road 23 hours 55 minutes a day.

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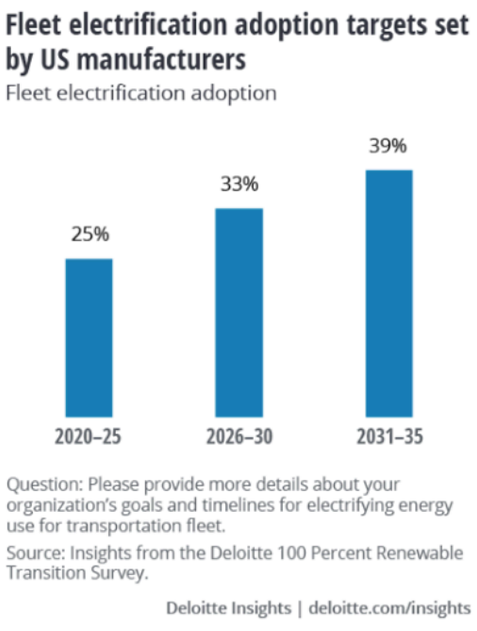
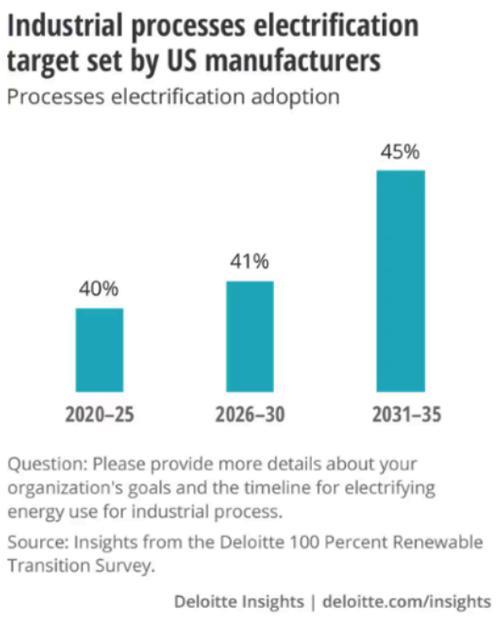
Besides EV fleets, the electrification of industrial equipment will play a critical role in decarbonization. But building custom battery packs is time-consuming and labor-intensive. The high cost prohibits many small and medium enterprises from starting their electrification journey or inventing innovative solutions to accelerate the transition.





TBOS offers an API-like, plug-and-play SDB solution so product builders can create custom battery packs that fit their equipment (not the other way around) while reducing R&D costs and shortening development timelines.

Additionally, SDBs will allow equipment manufacturers and industrial enterprises to reduce the complexity of retrofitting their current fossil fuel-powered equipment with battery packs to eliminate the high cost of purchasing new machinery and training employees.

3. INCREASE OPERATIONAL ENERGY EFFICIENCY

Decarbonization without compromising progress is really about efficiency.

	TOP TECHNOLOGIES	TOP STRATEGIC PRIORITIES
Large companies *REVENUES GREATER THAN US$10 BILLION*	Digital technologies that improve energy efficiency and management Operational technologies such as carbon capture that reduce energy loss and carbon footprint	Maintaining oil and gas investments by commercializing decarbonization technologies **Focusing on natural gas and low-carbon fuels**
Medium companies *REVENUES OF US$500 MILLION TO US$10 BILLION*	Digital technologies that improve energy efficiency and management Technologies for water treatment and disposal	**Focusing on natural gas and low-carbon fuels** Diversifying energy portfolio by making investments in clean energy
Small companies *REVENUES OF US$100 MILLION TO US$500 MILLION*	Operational technologies such as carbon capture that reduce energy loss and carbon footprint Digital technologies that improve energy efficiency and management	**Focusing on natural gas and low-carbon fuels** Divesting legacy oil and gas assets

Deloitte survey: Using digital technologies to support energy efficiency is a key element in low-carbon transition strategies for companies of all sizes.

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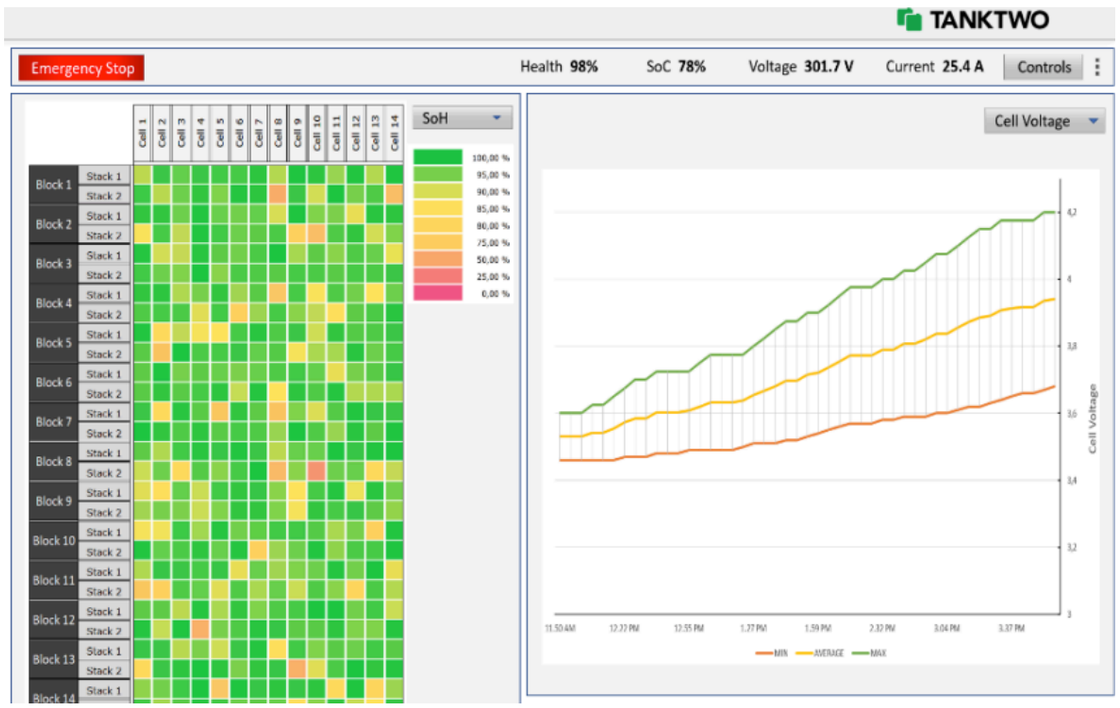
70% of companies with a sustainability strategy incorporate digital technologies to support their decarbonization initiatives.

Digital transformation will play a crucial role in the energy transition conversation because it encompasses many aspects that focus on improving operational cost-efficiencies, with software/cloud services and data analytics as the key components.

TBOS addresses hardware (battery) problems with an agile software solution. By leveraging telemetry, wireless communication technologies, and data analytics, TBOS enables operators to program and adjust battery behaviors and characteristics on the fly to optimize efficiency in real time without compromising performance.

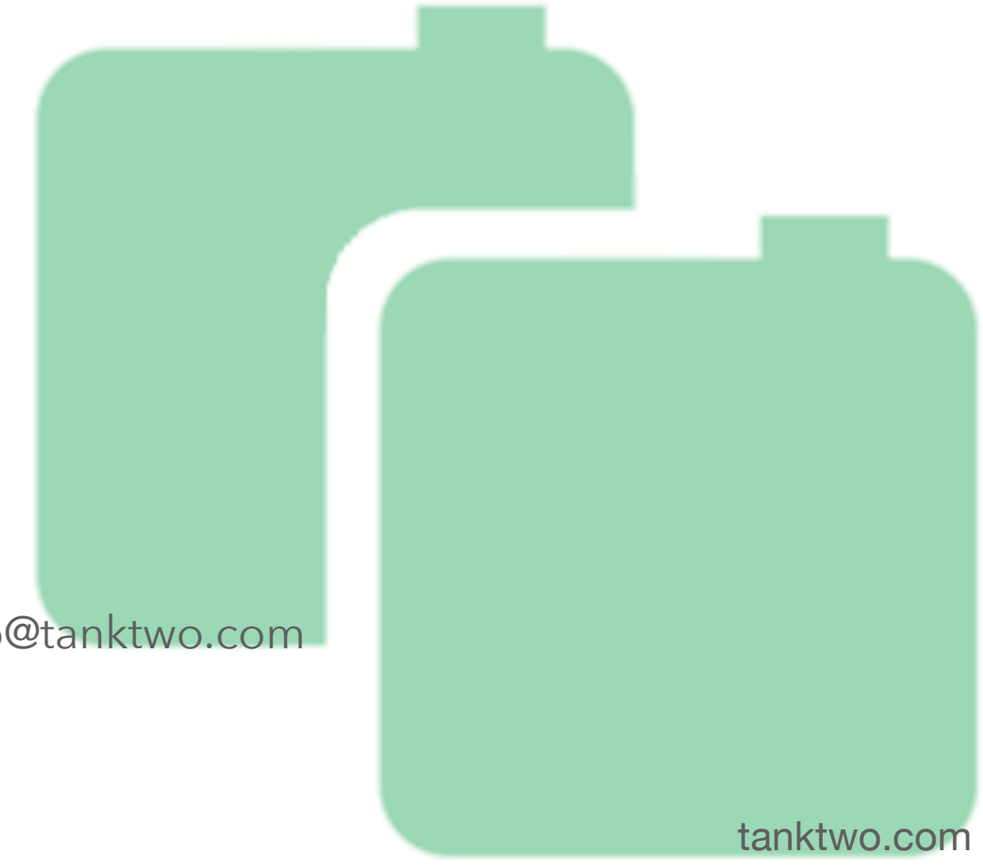


TBOS: BRIDGING PROJECTION AND EXECUTION

Deloitte and the likes say clean energy transition is happening, electrification is inevitable, and decarbonization is knocking at the door.

Meanwhile, many industrial manufacturers and the guys on the floor struggle to understand what the predictions and projections mean for them – how do they overcome the cost, knowledge, and resource barriers to take advantage of the trend (without hiring an army of battery engineers)?

TBOS bridges the gap by enabling every business in every industry to participate in the electrification revolution without battery expertise. We provide a critical piece of the puzzle that will make electrification feasible and profitable at an unprecedented scale.



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