

The Mobility Energy Transition

Ecosystems & Stakeholder Dynamics

August 2023

LEKE SERVICES

The logo for LEKE SERVICES consists of the text "LEKE SERVICES" in a sans-serif font, positioned to the left of a square outline. The square outline is empty and serves as a placeholder for a logo or image.

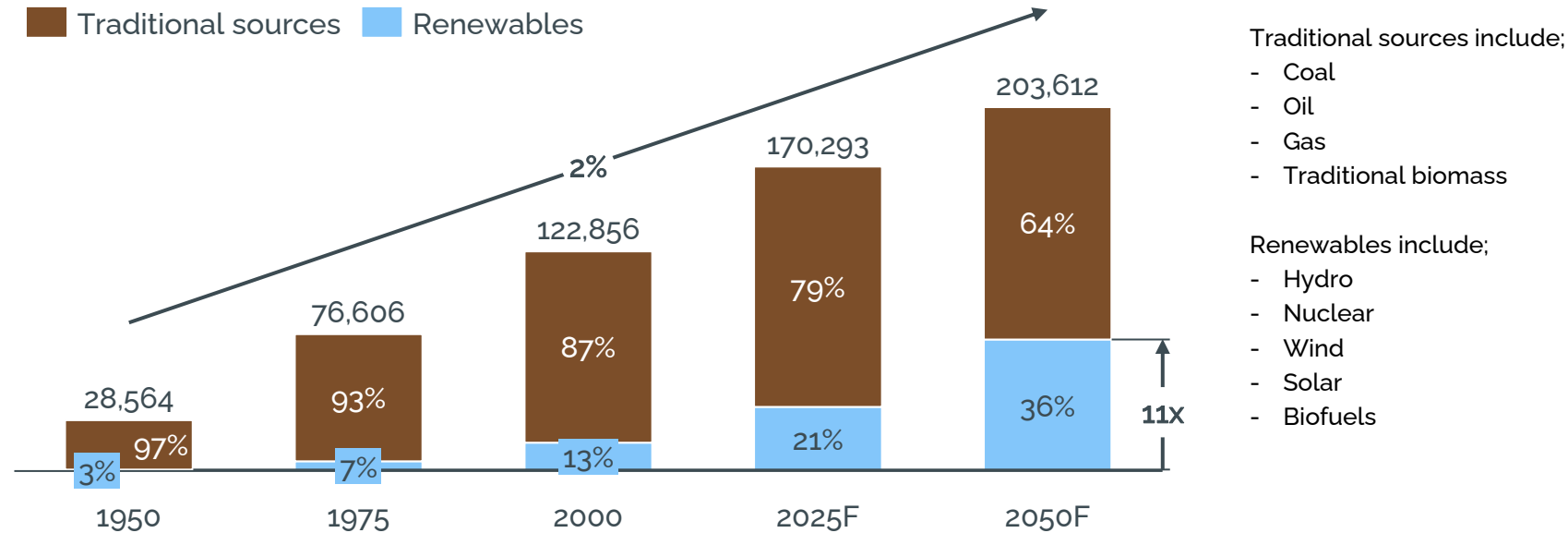
Summary

- The energy transition trends we are currently experiencing are here to stay
 - Global energy consumption is shifting from fossil fuels to renewables, which are projected to reach 40% of total supply by 2050
 - Battery demand is projected to grow 6 times 2023's demand to reach 4.7 terawatt hours (TWh) by 2030
- The dynamics between legislation, economics, and infrastructure will determine regional experiences
- Impacts will look different in cities across the globe by 2030
 - In California cities may continue to be car dependent, but they will also see more people share vehicles (think shared scooters, car shares, air shuttles, public transportation and more). The energy sources will be fully renewable but there will still be a mix of vehicle powertrains in use even though most cars will be electric.
 - In Lagos, Nigeria, the pace of transport may still be frantic, but that'll be largely due to the ability to move more around more predictably, with an increased mix of rail and waterway modes along and a fully digital payment ecosystem. Vehicles themselves will range from electric 2-wheelers to heavy vehicles powered using cleaner fuels.
- The reality will be dependent on how the stakeholders interact and collaborate within ecosystems that develop around large use cases.
 - Ecosystems are built around creating products (e.g., electric vehicles, batteries, aircraft, mobility apps) and connecting them with customers (e.g., businesses, consumers).
 - Communities, regulators, and financiers serve as the connectors within the ecosystems by looking after social interests, parties involved, and money matters.
- Organizations that understand the ecosystems within which they play, and the corresponding stakeholder dynamics are better positioned for successful outcomes
- Leke Services partners with founders, investors, leadership teams, and other stakeholders to navigate ecosystem dynamics, and overcome technical & operational challenges in the mobility industry

On average, global energy output grows 2% annually. Renewables are forecasted to contribute ~40% by 2050

Compared to 1950 levels, energy supply from renewable sources is forecasted to grow 11x by 2050

Global energy sources since 1950, terawatt hours (TWh)



***MOBILITY,
WHICH IS
RESPONSIBLE
FOR 30% OF
ENERGY
CONSUMPTION IS
TRANSITIONING
TO RENEWABLE
SOURCES***

Why the change is happening

- Nations & organizations are making bold moves as a response to the climate crisis
- Renewable energy prices have continued to drop below that of traditional sources
- Public opinion is driving demand for sustainable and clean energy solutions

How the change is happening

- Corporate commitments to lower emissions
- Government policy and incentives
- Mobility, which is responsible for about 30% of energy consumption is transitioning to renewable sources

What to expect next

- Most new energy capacity will come from renewable sources
- Decentralization of energy generation, storage and distribution
- Replacement of traditional energy sources with renewables

Battery demand is forecasted to grow 6x thru 2030 in its emergence as a dominant source of on demand energy

Sources of on demand energy

Traditional fossil fuels

Dominant in energy supply. Includes coal, oil, and natural gas. Known for on-demand availability but linked to emissions and climate concerns.

Batteries

Emerging as the key storage for renewable energy. Enables on-demand use by storing excess power, especially vital for electric mobility and grid stability. Lithium-ion batteries are paving the way in mobility.

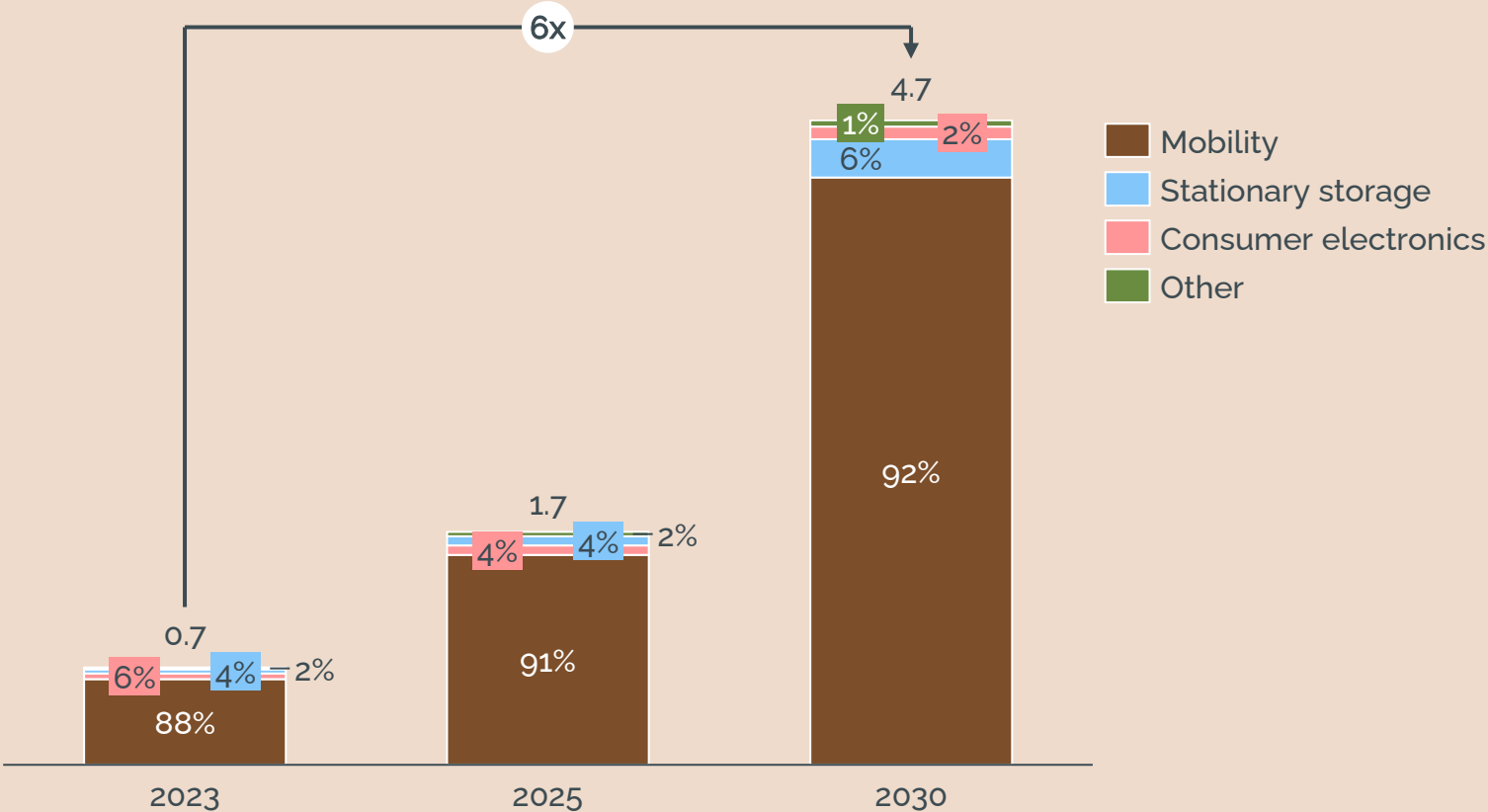
Hydrogen

Holds promise as a clean, on-demand energy carrier. Energy is generated via electrolysis or natural gas reforming. Used in fuel cells for transportation and manufacturing.

Clean combustion fuels

Include biofuels and synthetic gases that can be burned cleanly. Often derived from renewable sources, offering on-demand energy with reduced emissions.

Global lithium-ion battery demand forecast, terawatt hours (TWh)



The dynamics between legislation, economics, and infrastructure will determine regional experiences

Legislation



Regulatory actions by both governments and industry are shape how mobility patterns evolve within regions

- **Climate change** – as governments & large organizations commit to ambitious emissions targets, their constituents' mindsets and behaviors are bound to respond in kind.
 - *The UK's ban on traditional ICE¹ vehicle sales by 2030 means that car manufacturers need to act now to be prepared.*
- **Government action** – this includes international (e.g., trade partnerships) and local (e.g., incentive programs) actions that legislators adopt.
 - *The US's array of incentives and mandates around zero emission vehicles and infrastructure has led to increased electric vehicle adoption.*

Economics



The experiences in different regions will be based on understanding dynamics around purchasing power and how people prefer to travel

- **Purchasing power** – regions with the highest GDP have been at the forefront of incentivizing low emission travel, but other regions are looking to lower cost vehicles.
 - *In Southeast Asia, adoption of electric 2-wheelers is should grow by 53% annually thru 2030, due to their practicality and initiatives to reduce emissions.*
- **Dominant transport modes** – more than just replacing gasoline with batteries, alternatives to personal car travel will play a role in helping to manage transport costs.
 - *In Lagos, transport has mostly been by road, but increasing adoption of waterway and rail has the potential to reduce personal costs, and energy use.*

Infrastructure



Moving people & goods around requires context-specific considerations and determines mobility patterns within regions.

- **People** – human travel thrives with reliable transport networks, memorable destinations and safety guarantees.
 - *Since the launch of Medellin's MetroCable system in 2004, travel patterns have been transformed leading to reductions in poverty and improved livelihoods.*
- **Goods** – cargo movements are dependent on both regional demand, and available infrastructure (e.g., ports, warehouses).
 - *The port of Nagoya, Japan handled ~180 million tons of freight in 2021 due to its proximity to major industries and by keeping its robust infrastructure modern*

Lagos, Nigeria in 2030

2-wheelers will be predominantly electric, but heavier vehicles will run on low emission fuels like CNG & LPG. Even though the frenetic pace of transportation will continue,



it'll do so with an increased share of rail, ferries, and bus routes. Increasing predictably of travel times, with an integrated digital payment ecosystem.

Nigeria's 2021 Climate Action Act has positioned it to lead the energy transition in the region with commitments to reduce emissions (including from transportation).

Even though buying power in the region should rise, investments patterns into clean energy infrastructure will look very different to that of richer economies, driving the types of technology that's widely adopted.

Sustaining its role as a cultural and economic hub of the region, passengers and cargo traffic should continue to grow but it'll be dependent on improvements in mobility access as much as other factors like economic stability.



Los Angeles, CA in 2030

Vehicles will predominantly run on fully renewable energy sources even though a mix of powertrains may remain (i.e., batteries, fuel cells, clean combustion fuels)



Car travel may retain its dominance, but shared vehicle use will also grow (think shared scooters, car shares, air shuttles, public transportation and more).

California's regulatory bodies have some of the most ambitious legislation in place to address the climate crisis. This is in addition to the US's long-term strategy to achieve net-zero emissions no later than 2050.

LA will retain its role as a hotbed for mobility innovation. Higher purchasing power, combined with rapidly maturing infrastructure (e.g., public fast charging, urban air mobility ports) will continue to drive low emission options to the region.

The combination of Hollywood, a temperate climate, beautiful vistas, the Port of Long Beach, and a thriving economy will continue to draw passengers and cargo to the region as is reflected in its expanding infrastructure.

Stakeholder dynamics within ecosystems will determine whether organizations succeed

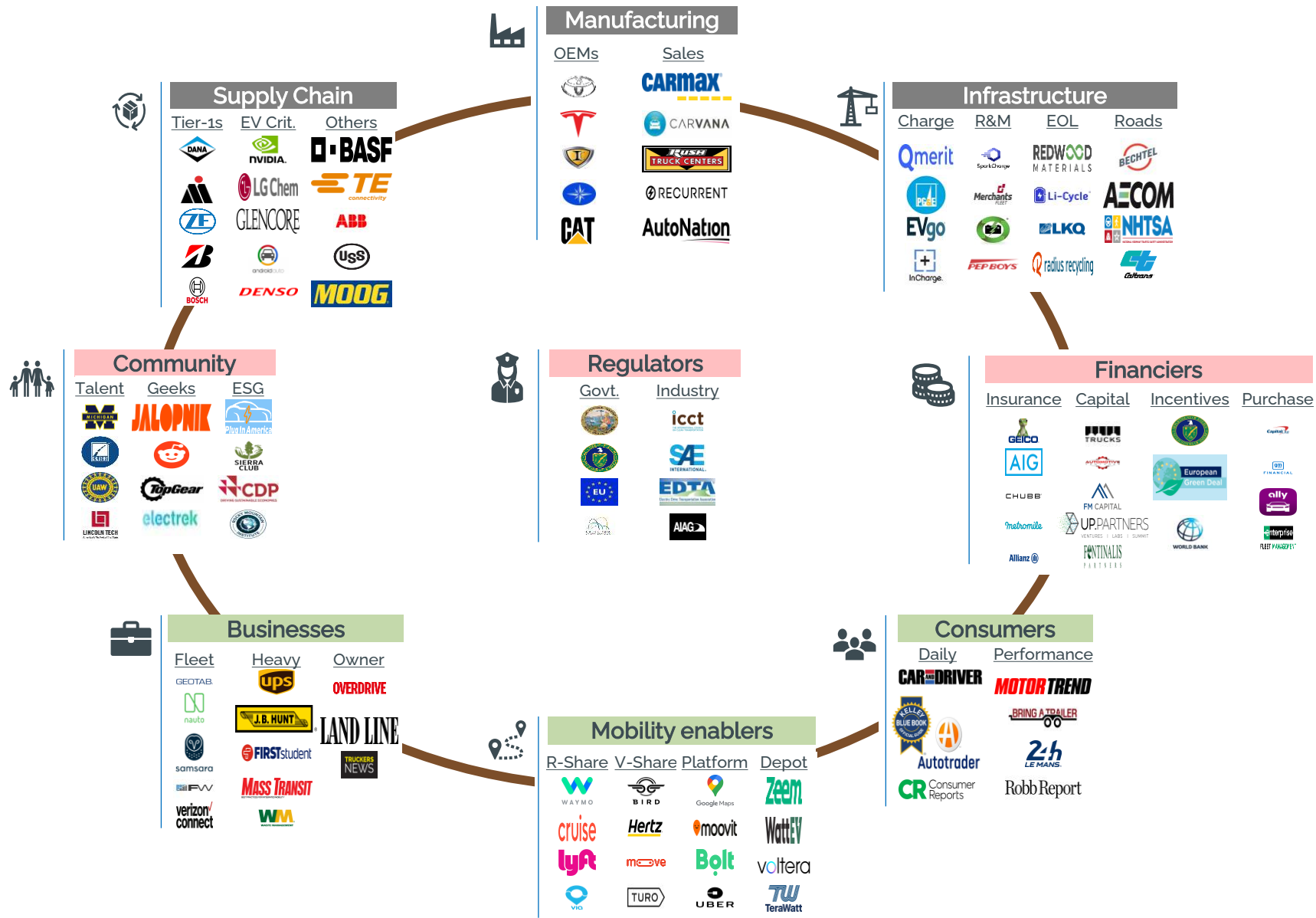
Ecosystem stakeholders



Ecosystems – let's delve into the following mobility ecosystems:

- 1 Electric Vehicles
- 2 Batteries
- 3 Aerospace
- 4 Smart Mobility

1. Electric Vehicles Ecosystem



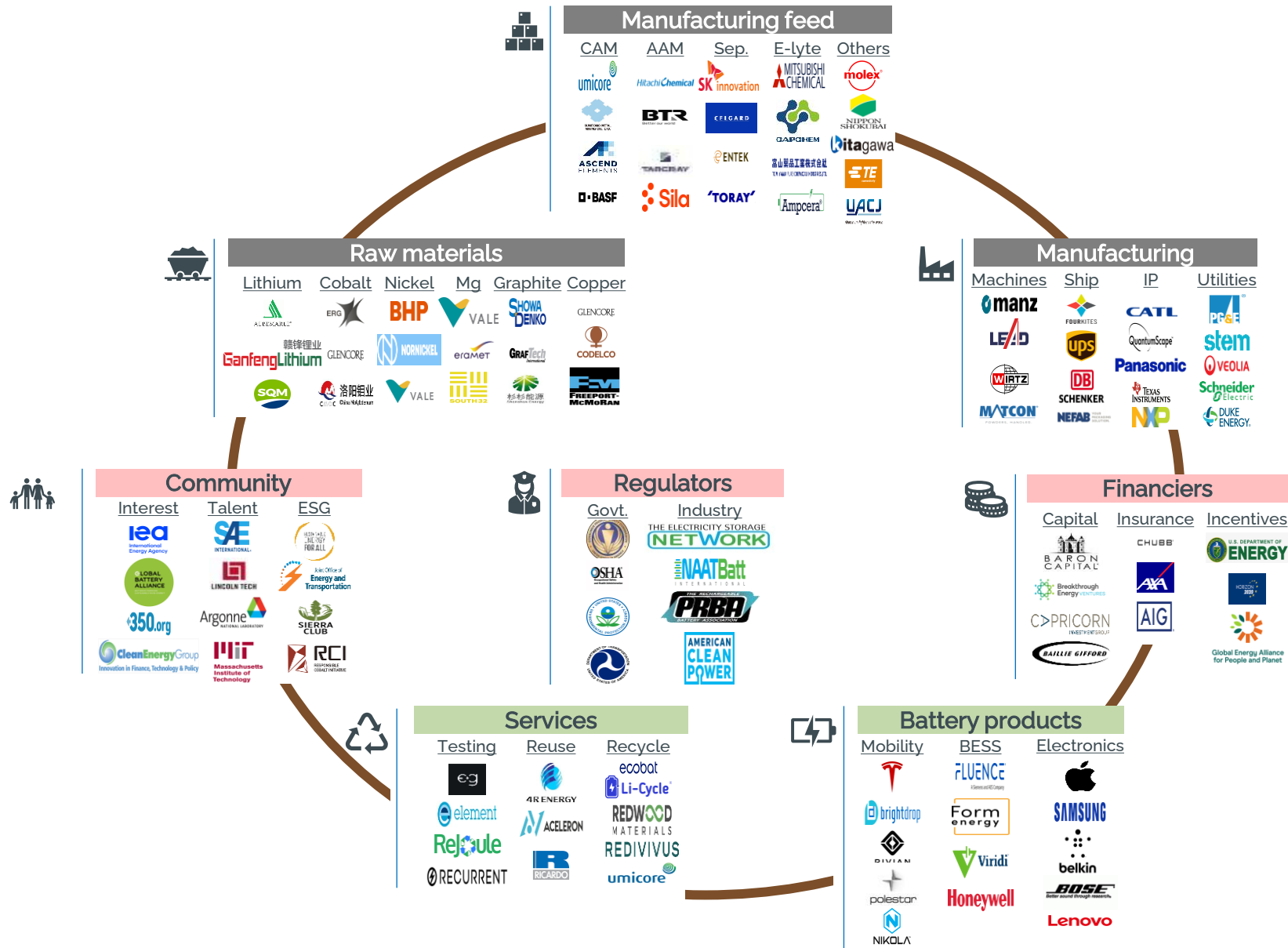
Stakeholder dynamics to consider

- Production ramp up – e.g., navigating supply chain shortages, developing operational discipline
- Infrastructure development – e.g., building out charging infrastructure, increasing grid capacity, establishing charging standards
- Talent – e.g., attracting & retaining talent, developing technical skills within the labor pool
- Business sustainability – e.g., short- & long-term profitability, managing cash flow needs

Glossary

- OEM:** Original Equipment Manufacturer
- Tier-1:** Traditional critical suppliers
- EV Crit.:** EV critical suppliers
- R&M:** Repair & maintenance
- EOL:** End of life
- ESG:** Environment, social, & governance
- Govt.:** Government
- R-Share:** Ride share
- V-Share:** Vehicle share

2. Battery Ecosystem



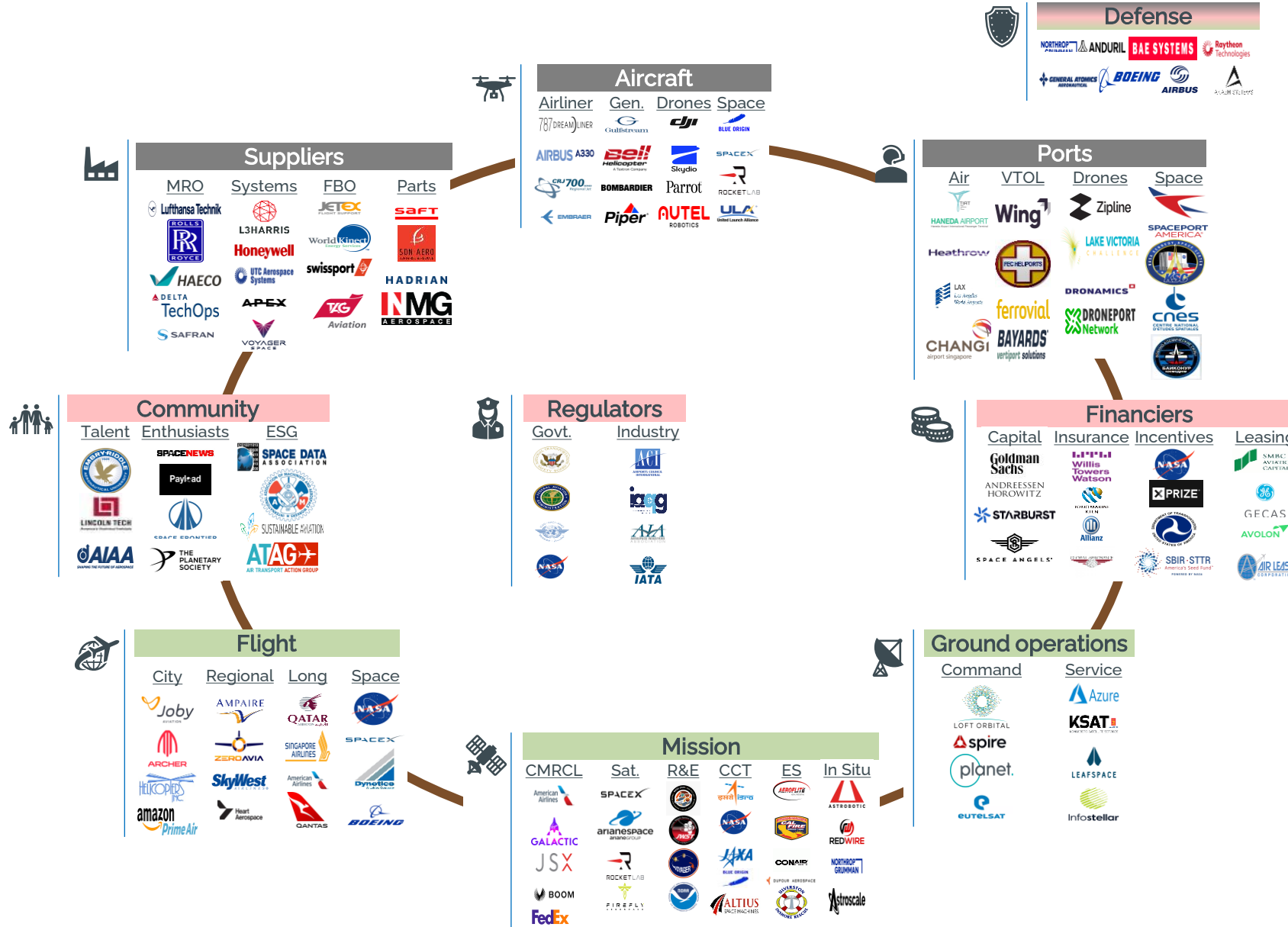
Stakeholder dynamics to consider

- Raw materials – e.g., securing ethical supply of cobalt, reducing carbon emissions from extraction
- Battery chemistry / IP – e.g., choosing what battery type to manufacture at scale, mitigating thermal runaway risks
- Gigafactory development – e.g., identifying the right location for gigafactory development, navigating skilled labor shortages
- Logistical considerations – e.g., establishing networks to collect used batteries, determining the appropriate ownership structures for batteries used in mobility

Glossary

- Mg:** Manganese
- CAM:** Cathode Active Material
- AAM:** Anode Active Material
- Sep.:** Separator
- E-lyte:** Electrolyte
- IP:** Intellectual property / know-how
- ESG:** Environment, social, & governance
- Govt.:** Government
- BESS:** Battery Energy Storage Systems

3. Aerospace Ecosystem



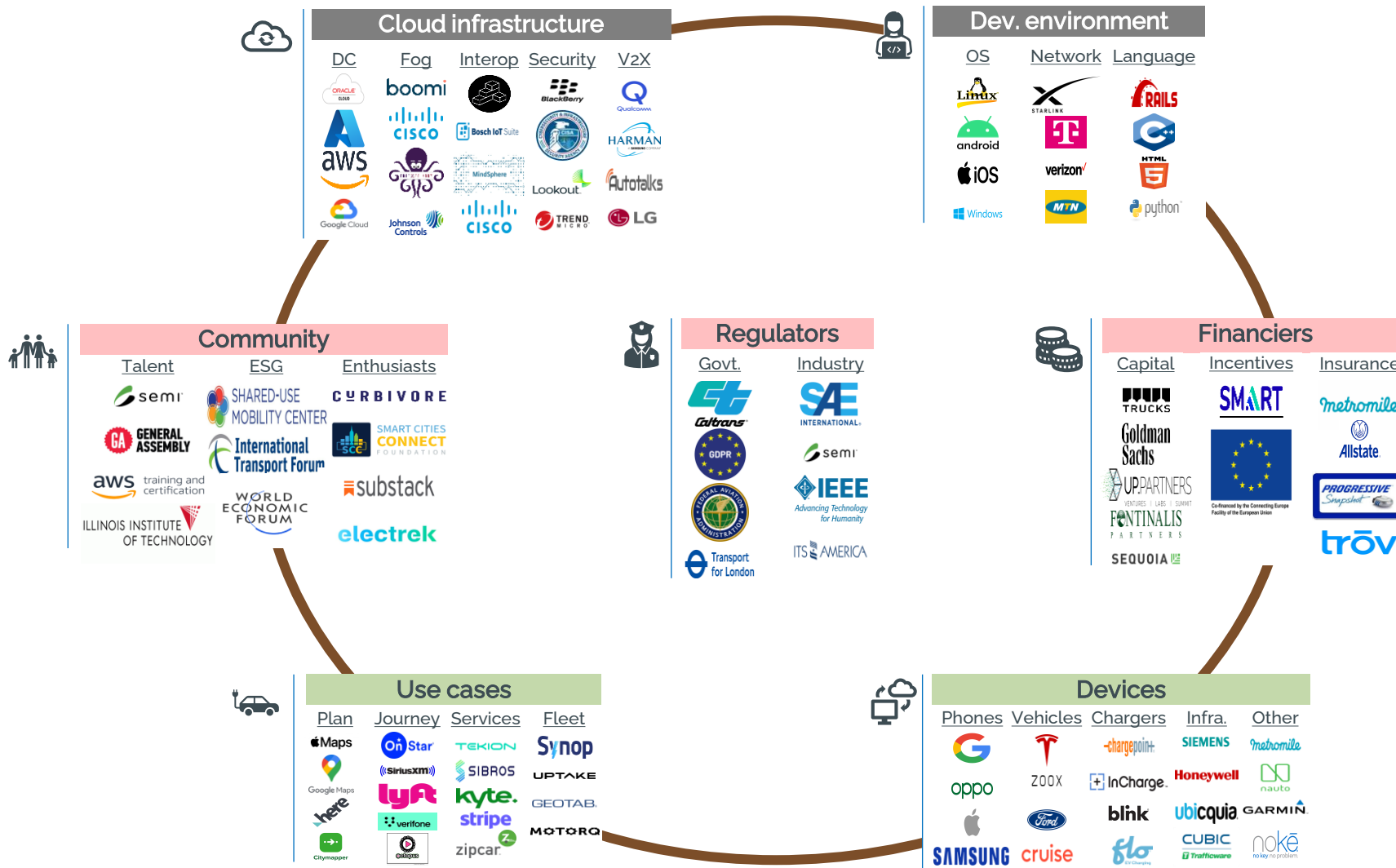
Stakeholder dynamics to consider

- Development timeline – e.g., managing expectations given long lead times and unproven technologies
- Regulatory concerns – e.g., working with regulators to develop frameworks for unprecedented technology, establishing standards on a global scale
- Business sustainability – e.g., establishing a stable talent pipeline especially given security considerations, diversifying customer base without compromising operating model

Glossary

Gen: General aviation & private planes
 VTOL: Vertical takeoff & landing
 CMRCL: Commercial
 Sat.: Satellite deployment
 R&E: Research & exploration
 CCT: Cargo & crew transport
 ES: Emergency services
 In Situ: In situ space operations
 ESG: Environment, social, & governance
 Govt.: Government
 MRO: Maintenance, repair & overhaul
 FBO: Fixed-base operators

4. Smart Mobility Ecosystem



Stakeholder dynamics to consider






- **Safety & security** – e.g., authenticating users across different environments, protecting critical vehicle systems
- **Consistent experiences** – e.g., minimizing negative impacts to customer experiences while constantly pushing out updates, establishing & maintaining reliable partnerships for mission critical systems
- **Scaling** – e.g., identifying the right product mix that also allows for sustainable growth, finding the sweet spot of an operating model that still allows for continuous improvements

Glossary

DC: Data center
Fog: Fog computing
Interop: Interoperability
V2X: Vehicle to everything
OS: Operating system
ESG: Environment, social, & governance
Govt.: Government
Infra: Infrastructure

Organizations need to understand their ecosystems & stakeholders

Leke Services can help you

	Evolve from:	To:
Stakeholder relationships	 <p>Surface level engagement & a transactional approach to stakeholder relationships</p>	Deeper, more empathetic stakeholder partnerships by understanding their core value drivers (even when it's outside your core business) can lead to increased trust and responsiveness
Diversified growth	 <p>Tunnel vision on a core offering that is showing some traction driven primarily by risk aversion of uncharted markets</p>	Holistic perspectives with a better understanding of market verticals with real growth potential – by creating opportunities to run pilots, and validate alternate revenue streams
Niche opportunities	 <p>Getting caught in the spending or cost cutting race by continuing to participate in an increasingly saturated marketplace</p>	Discovery of niche markets or operating models via taking advantage of a deeper understanding of ecosystem dynamics
Avoid tragedy of the commons	 <p>Missed opportunities in addressing threats across the ecosystem, instead expending scarce resources alone</p>	Collaborations to address common issues across the ecosystem via strategic alliances with defined scopes
Risk evaluation	 <p>Being reactive to crises when they occur due to a poor understanding of 'failure modes' across stakeholders</p>	Improved risk prioritization & governance that allow leadership teams be better equipped to handle inevitable crises



Electric Vehicles | Battery Value Chain |
Aerospace | Smart Mobility

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