

INSIGHT SESSIONS

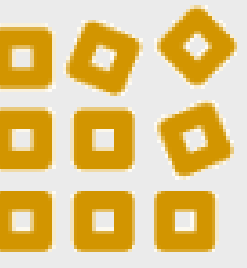
Breakthrough Innovations for the A2E Sector

Shell Foundation | 

SF Investor Day 2018
Oct 11, London

Pic Courtesy: @sumitpaliwalp

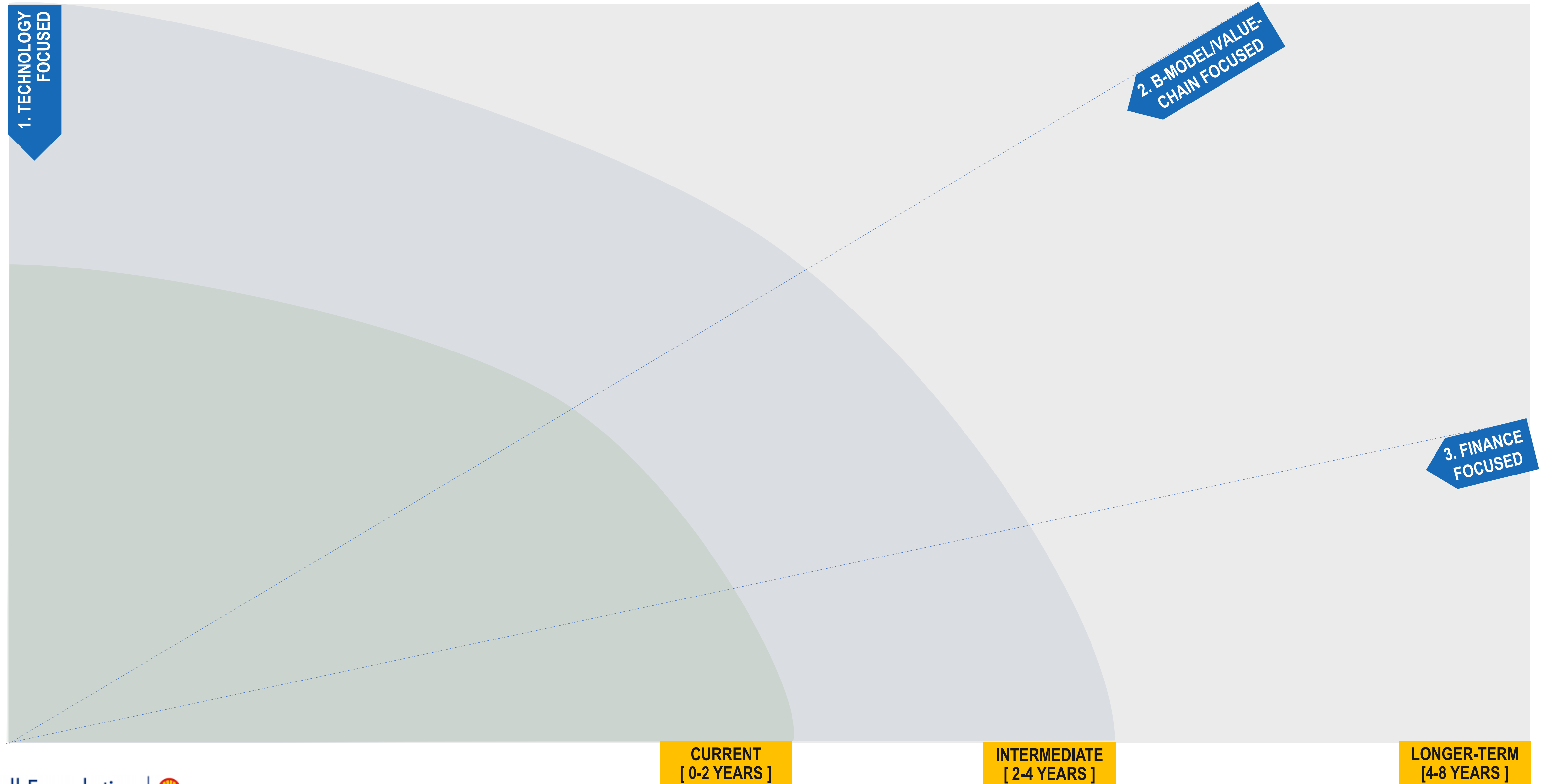




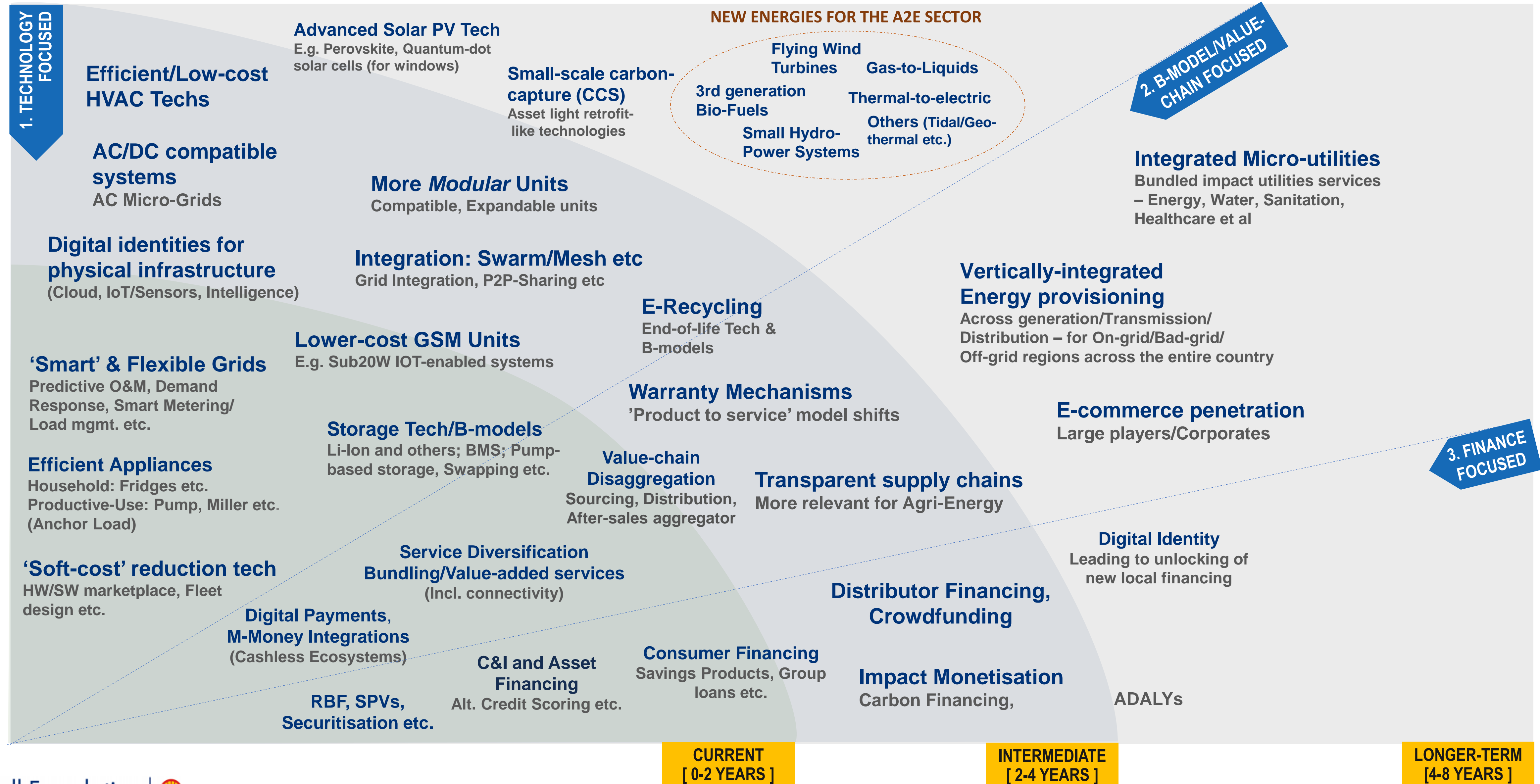
FOCUS: Innovations relevant mostly for **SHS & Mini-Grids**
(not much Productive Use/Agri/E4B, Mobility etc.)

AGENDA:	- Introduction & Context-setting	10mins
	- Presentations	
	- China Impact Ventures	10mins
	- Factor[E] Ventures	10mins
	- BBOXX	10mins
	- Discussion/Q&A	20mins
		60mins

Innovation themes relevant for the A2E Sector (Indicative not exhaustive; also doesn't cover all Innovation 'types')



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CHINA
IMPACT
VENTURES

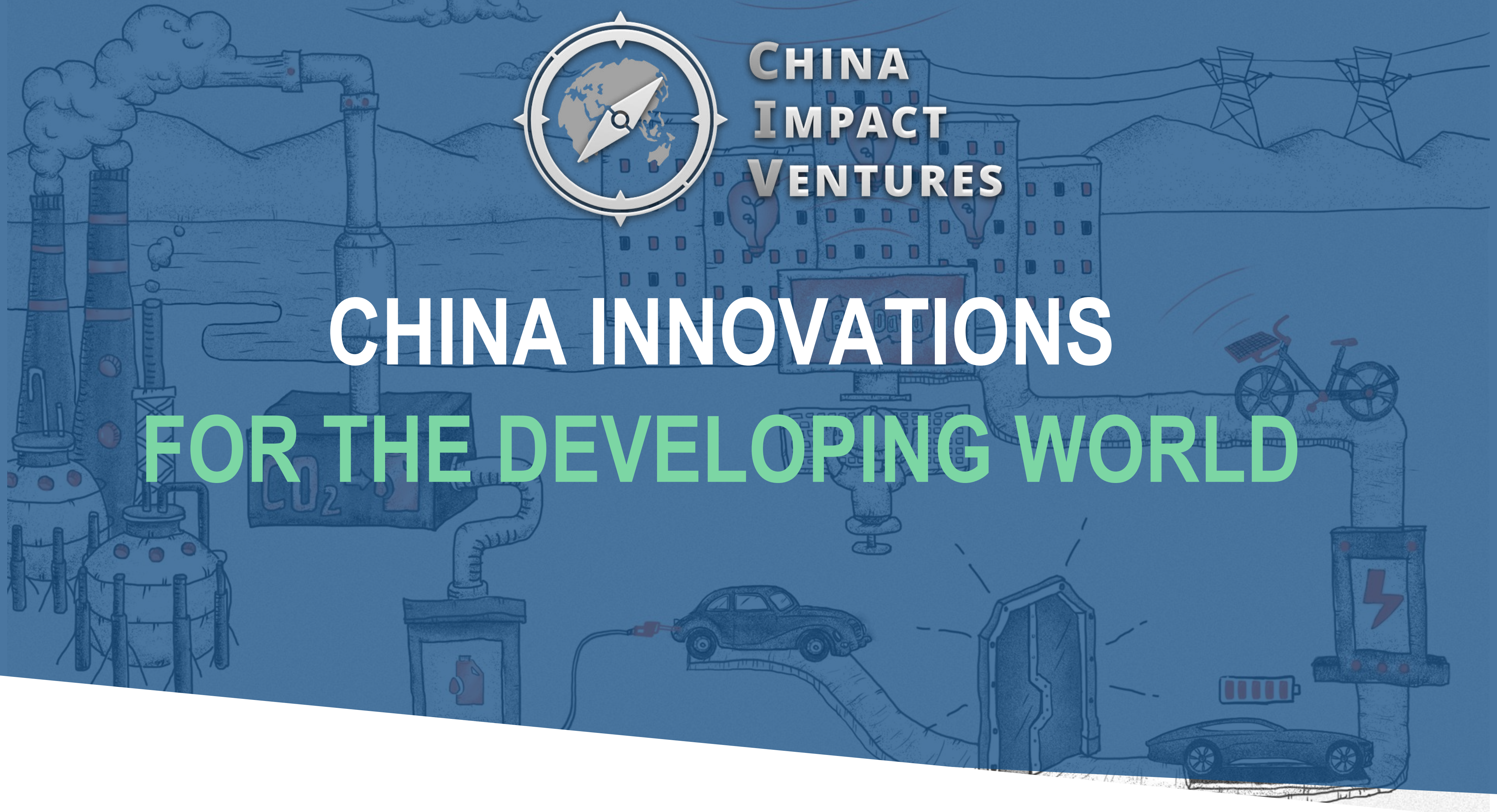


中文版



CHINA
IMPACT
VENTURES

CHINA INNOVATIONS FOR THE DEVELOPING WORLD



CIV is Uniquely Positioned to Leverage China's Resources and Innovations for Developing Countries

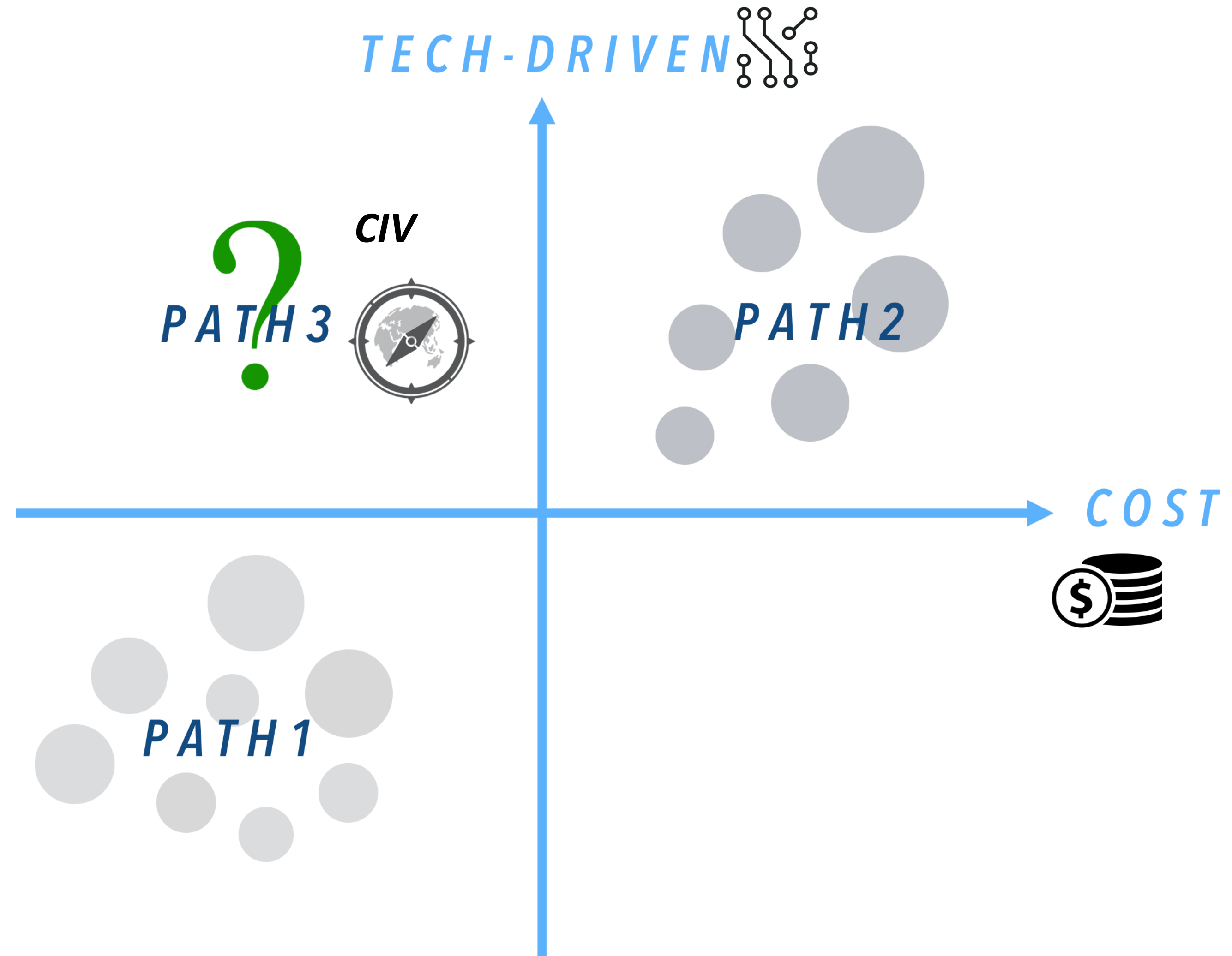
Why CIV is a Leader under Path #3

China has valuable lessons, resources and environment

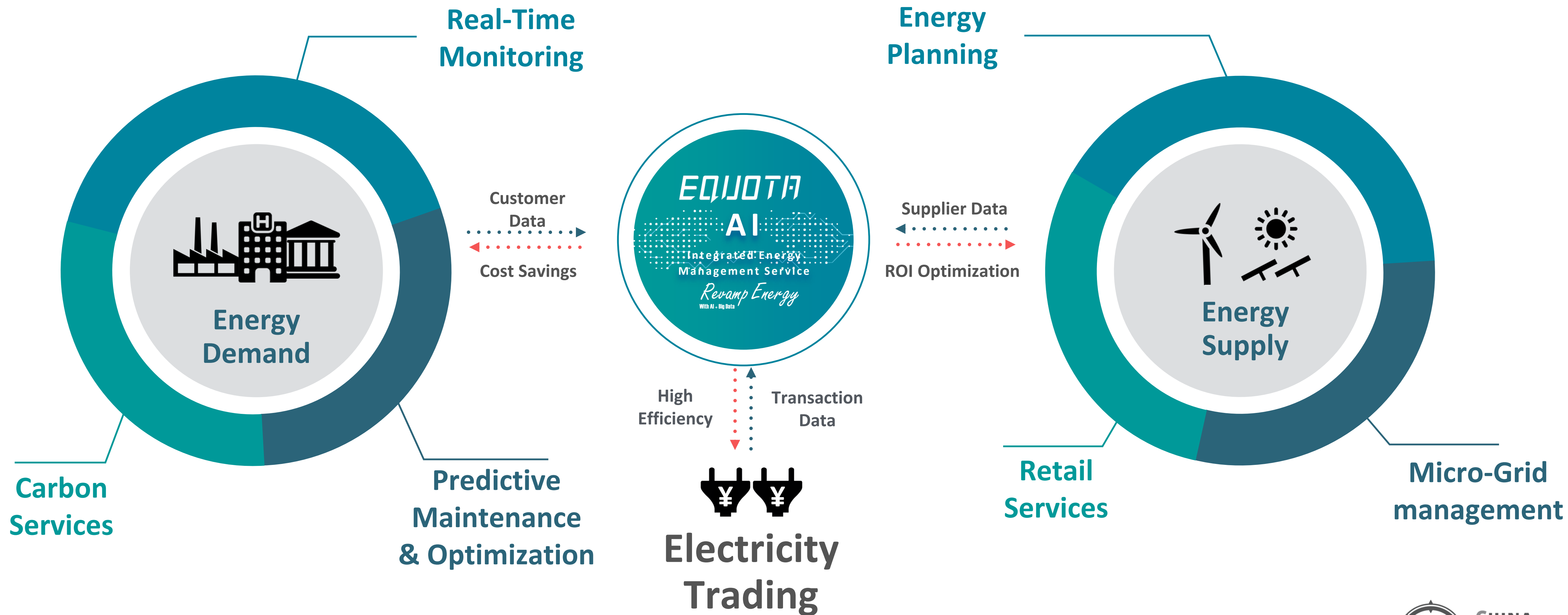
- Hyper competitive market with **Electrification of 700M people over the past 3 decades**
- **Pro-innovation macro/social environment**
- **h diverse market needs**
- **Strong and cost effective supply base**
- **Belt Road Initiative (BRI) and China-Africa collaboration**

CIV has built credibility and credentials with a "Developing China for Developing World" strategy

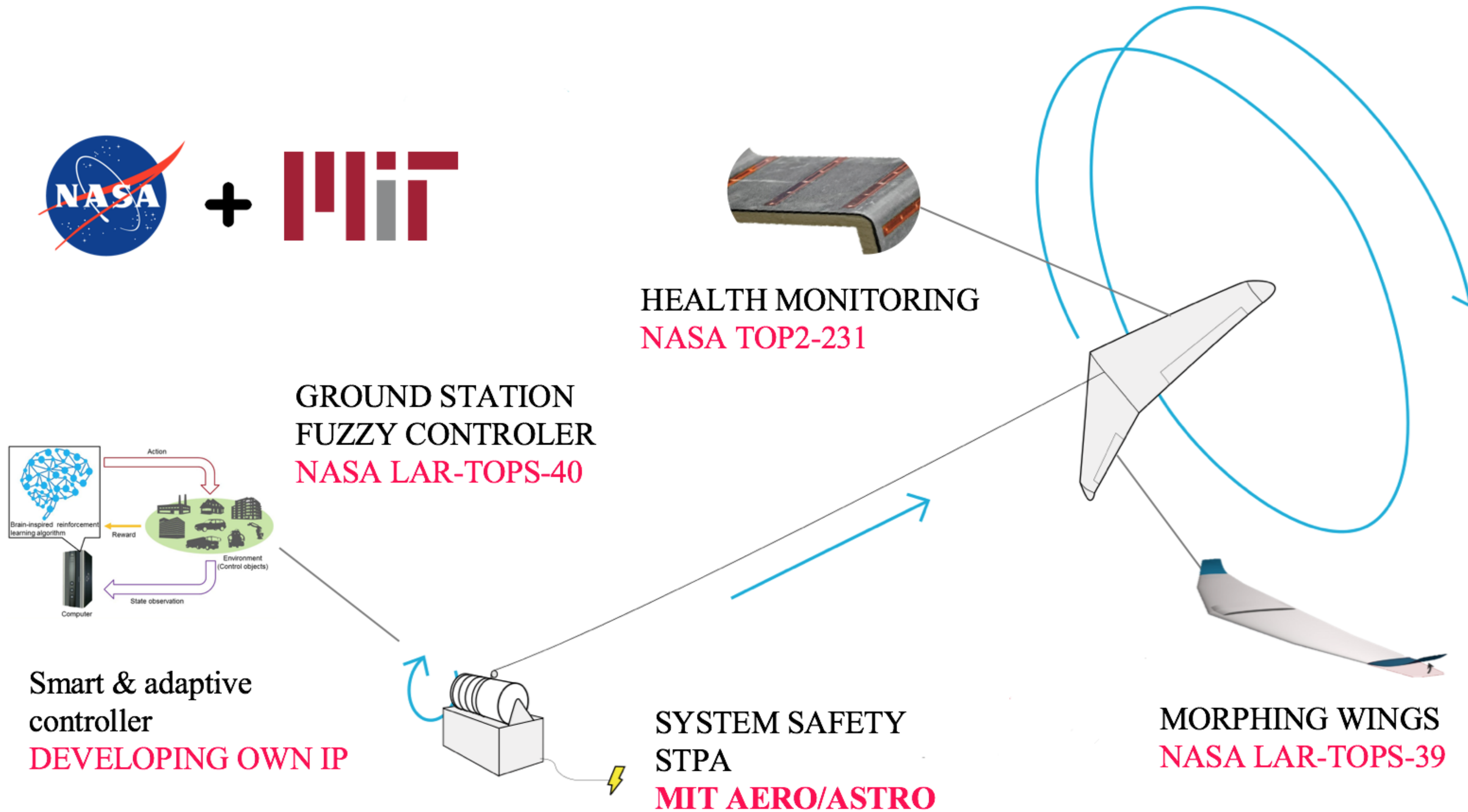
- **Solid reputation to work with entrepreneurs**
- **The only impact investor in China with a global perspective**
- **CIV's portfolio has started to serve clients in Africa**



AI for Energy Management, Optimizing Power Supply and Demand



Smart Airborne Wind Energy Systems



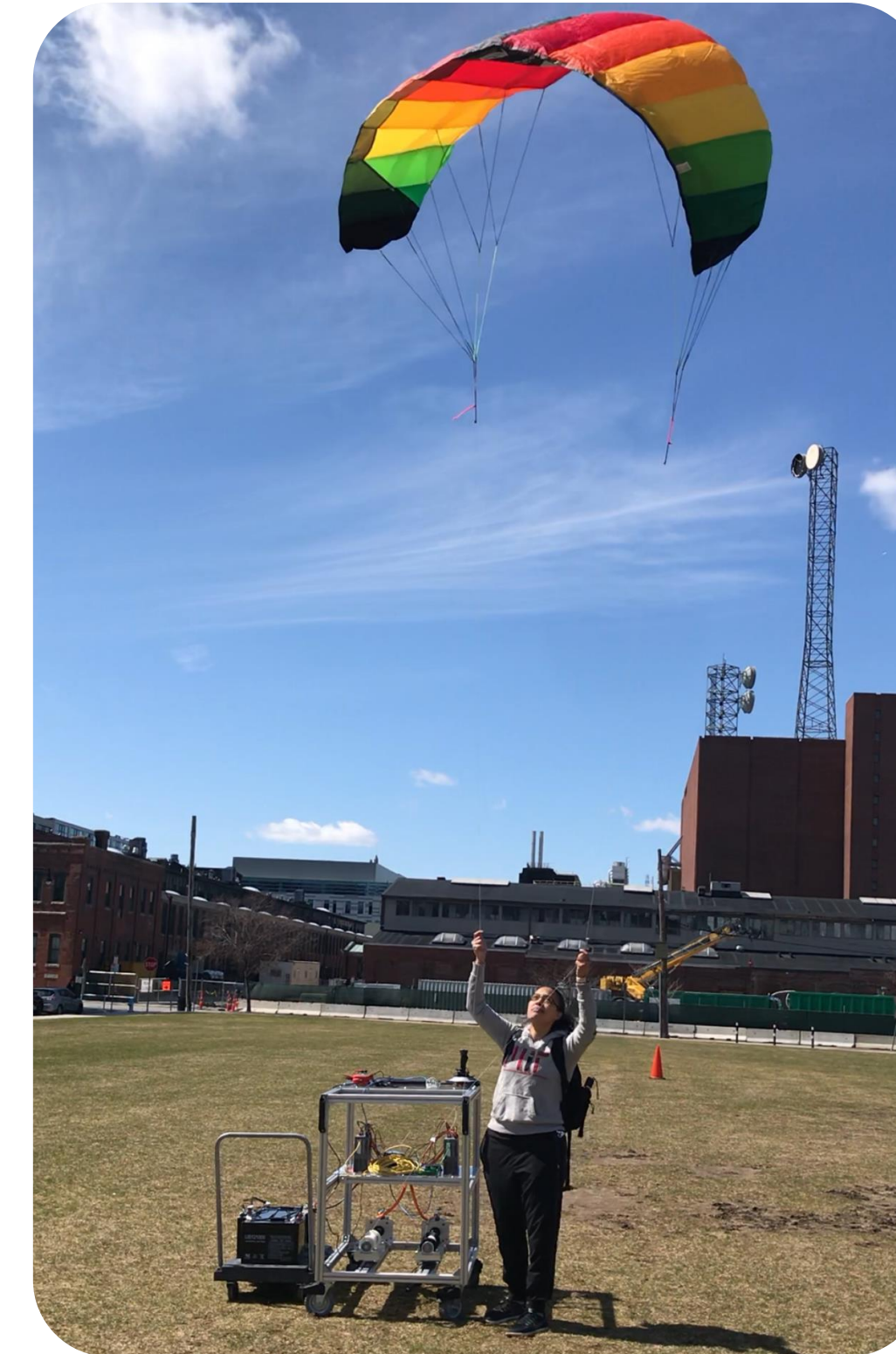
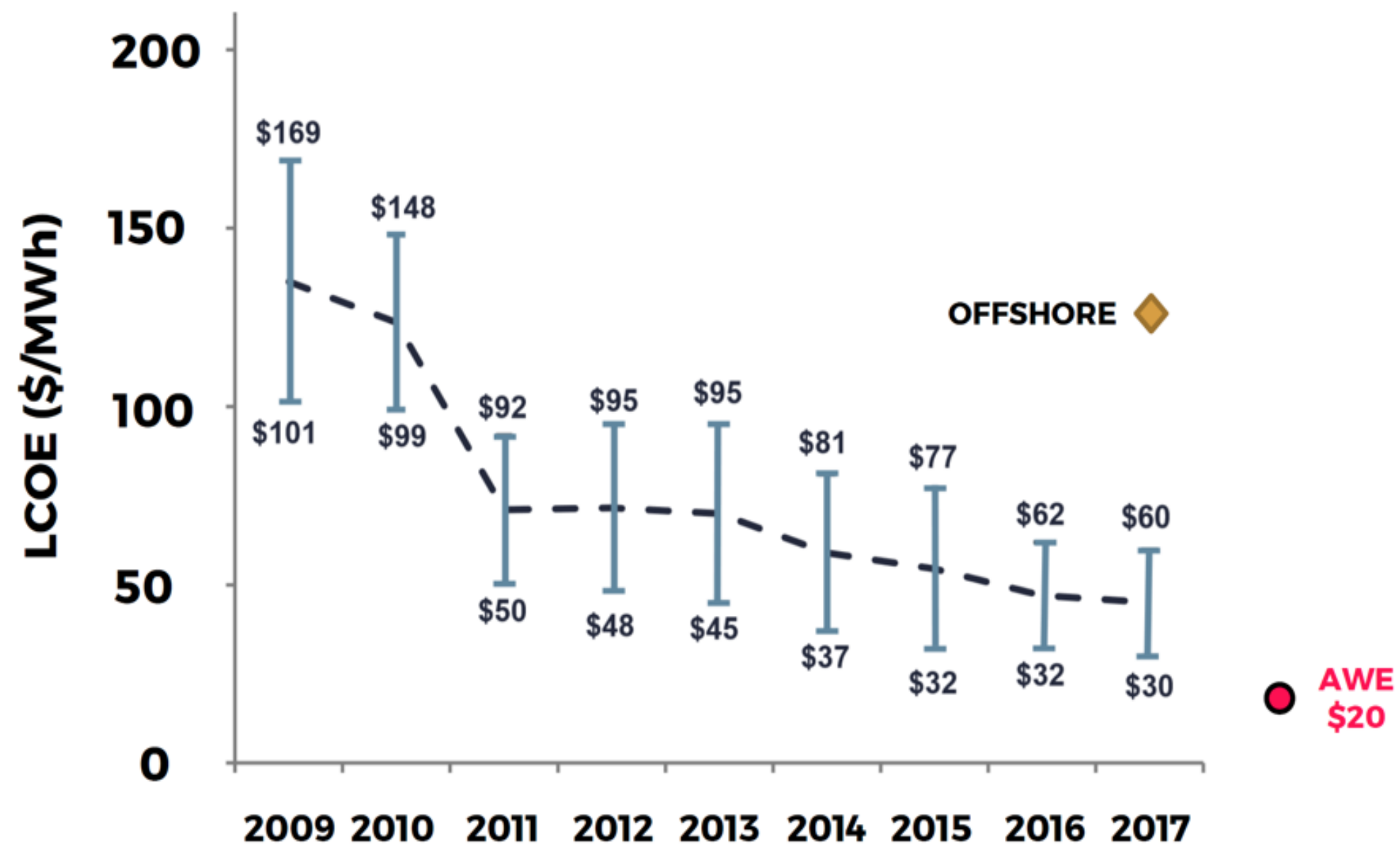
Smart Airborne Wind Energy Systems



Further Lower Electricity cost

\$0.02/KWh

Wind LCOE Improvements are Diminishing
AWE Can Provide The Next Jump in The Curve!



Finished 2kW prototype, system simulation and system control test



IoT-based Hay Balers for Cost-Efficient Biomass Energy Market

Zhi Jing Tech produces cost efficient hay balers to recycle straws for biomass power generation. Through its self-developed IoT platform, it can map out and better balance the straw supply and demand in rural China; its IoT technology also enables innovative business models such as “pay as you go” model for baler managers and “sharing baler” model when it scales up. Collected data is valuable for add-on services.



✓ **70%+ Cost-savings vs. international peers**

✓ **1 baler can reduce 59 tons CO2 emission/day on average**

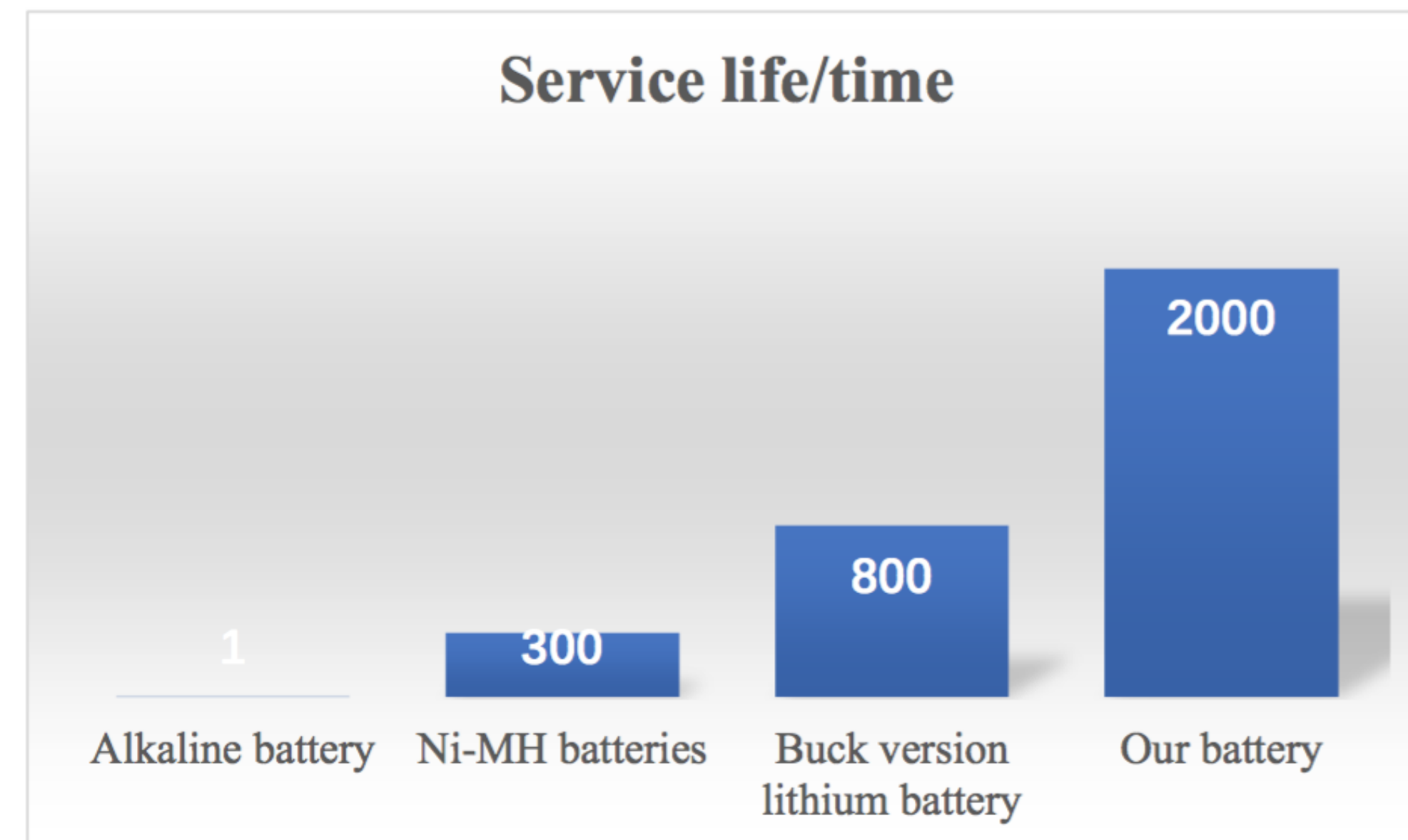
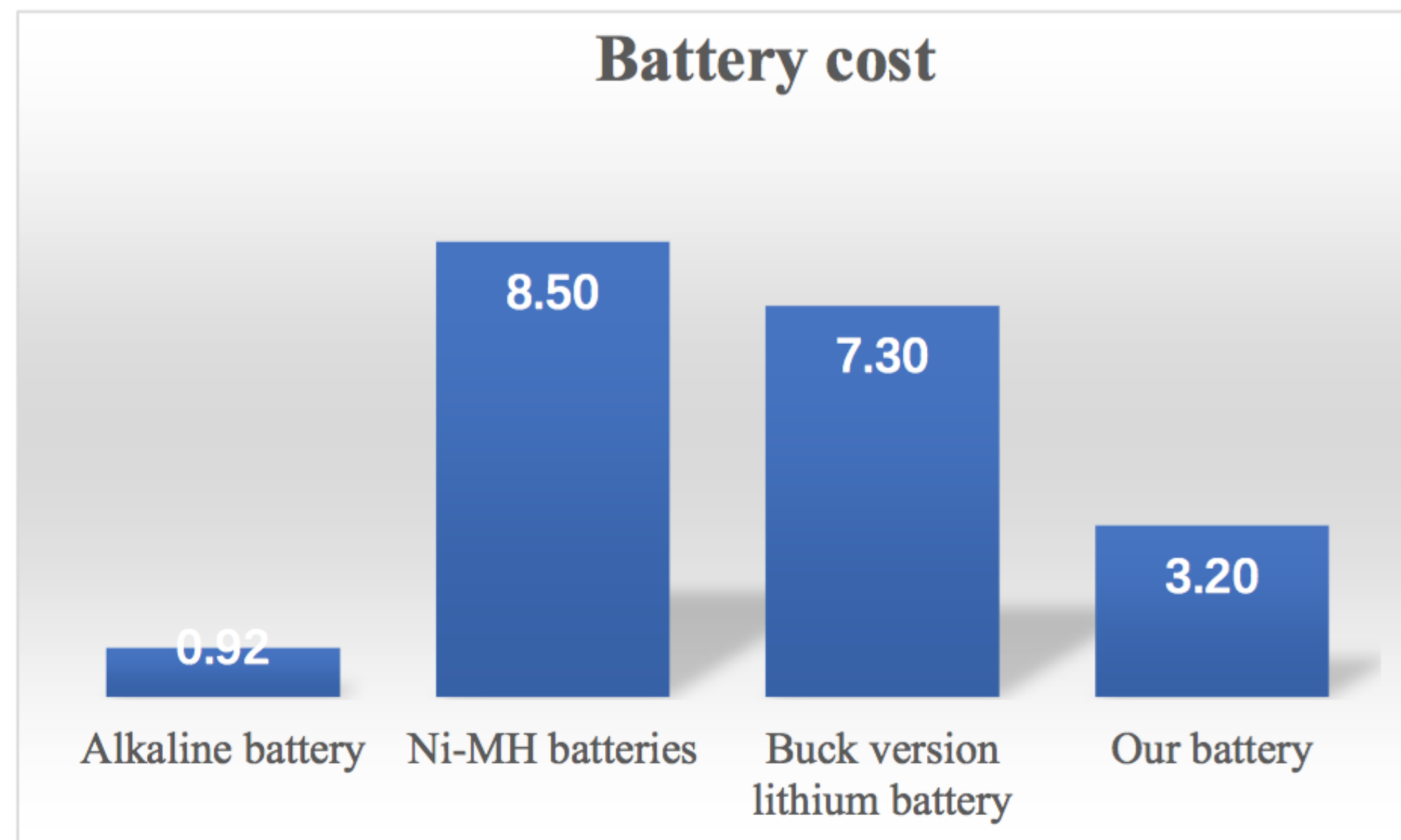
✓ **IoT enables PAYG model to lower cost burden for rural people**

Storage: Low-cost, longer lifecycle, rechargeable 1.5V

use cost **0.001 yuan**



use life **2000 time⁺**

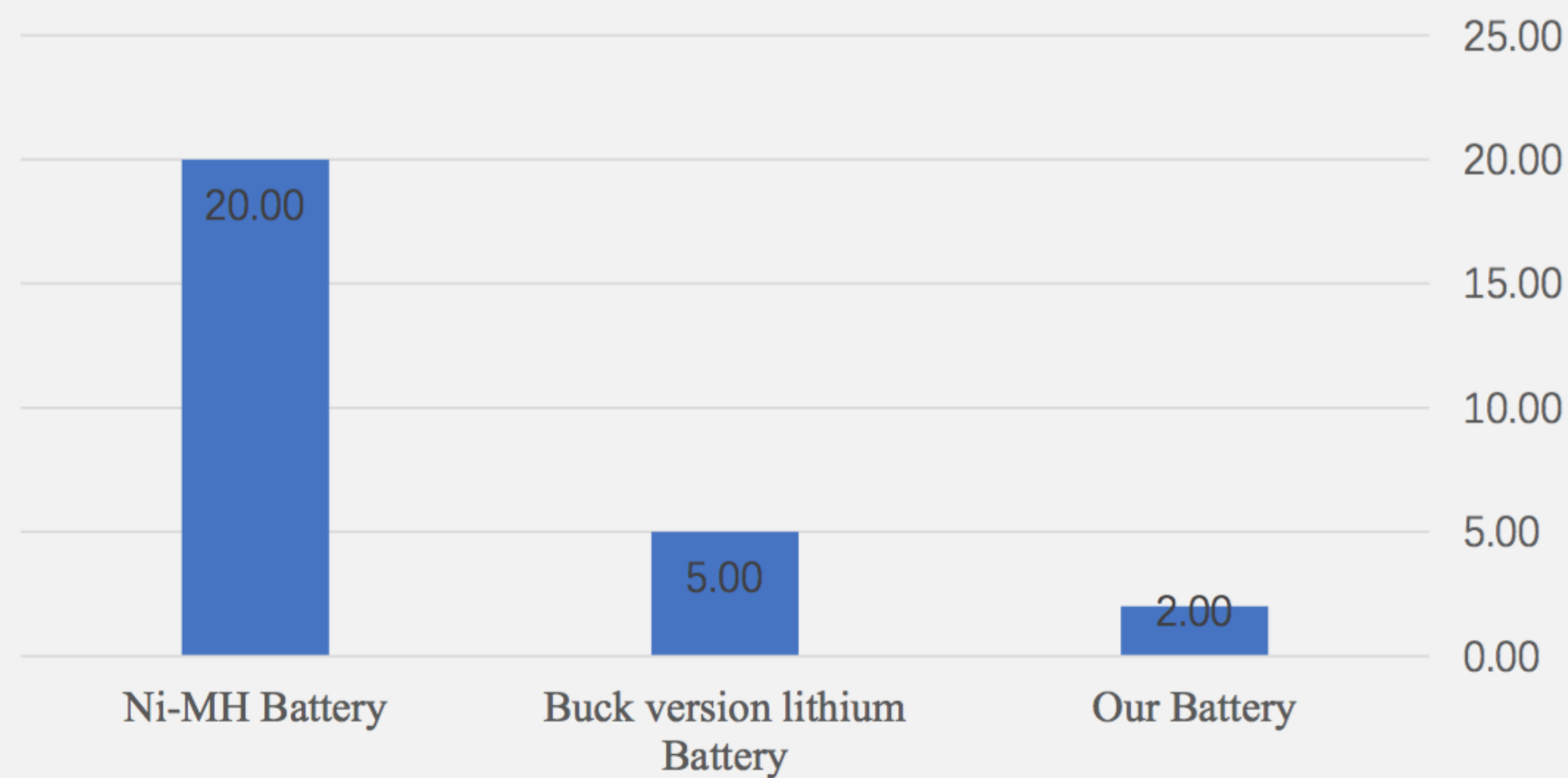


Storage: Low-cost, longer lifecycle, rechargeable 1.5V



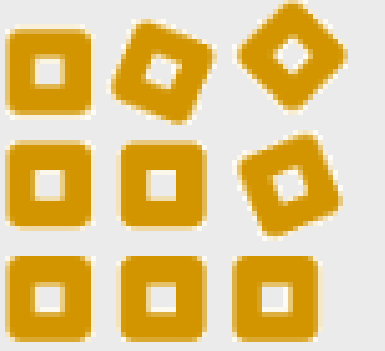
Low self-discharge

Monthly self-discharge rate/ %



Recycling without pollution

	Alkaline battery	Ni-MH Battery	Buck version lithium battery	Our Battery
Heavy metal pollution	√	√	×	×
Electrolyte leakage	√	√	×	×
Battery recycling	×	×	√	√



FACTOR[e] VENTURES

A global presence with a
Unique Approach to Impact Investing

Factor[e]: a Global Presence with a **Unique Approach** to Impact Investing

Our mission is to support technology-enabled ventures in the energy, agriculture, waste, and mobility spaces that are operating in emerging and frontier markets.

We aim to be a **pioneer in de-risking impact investments** in these markets, with the goal of influencing \$1 billion in private capital over the next ten years to support companies that reduce carbon, save lives, and develop sustainable economies.

Access to Electricity



Mobility



Waste & Resource Management



Agriculture



Thesis Driven Investing: Mini-Grids

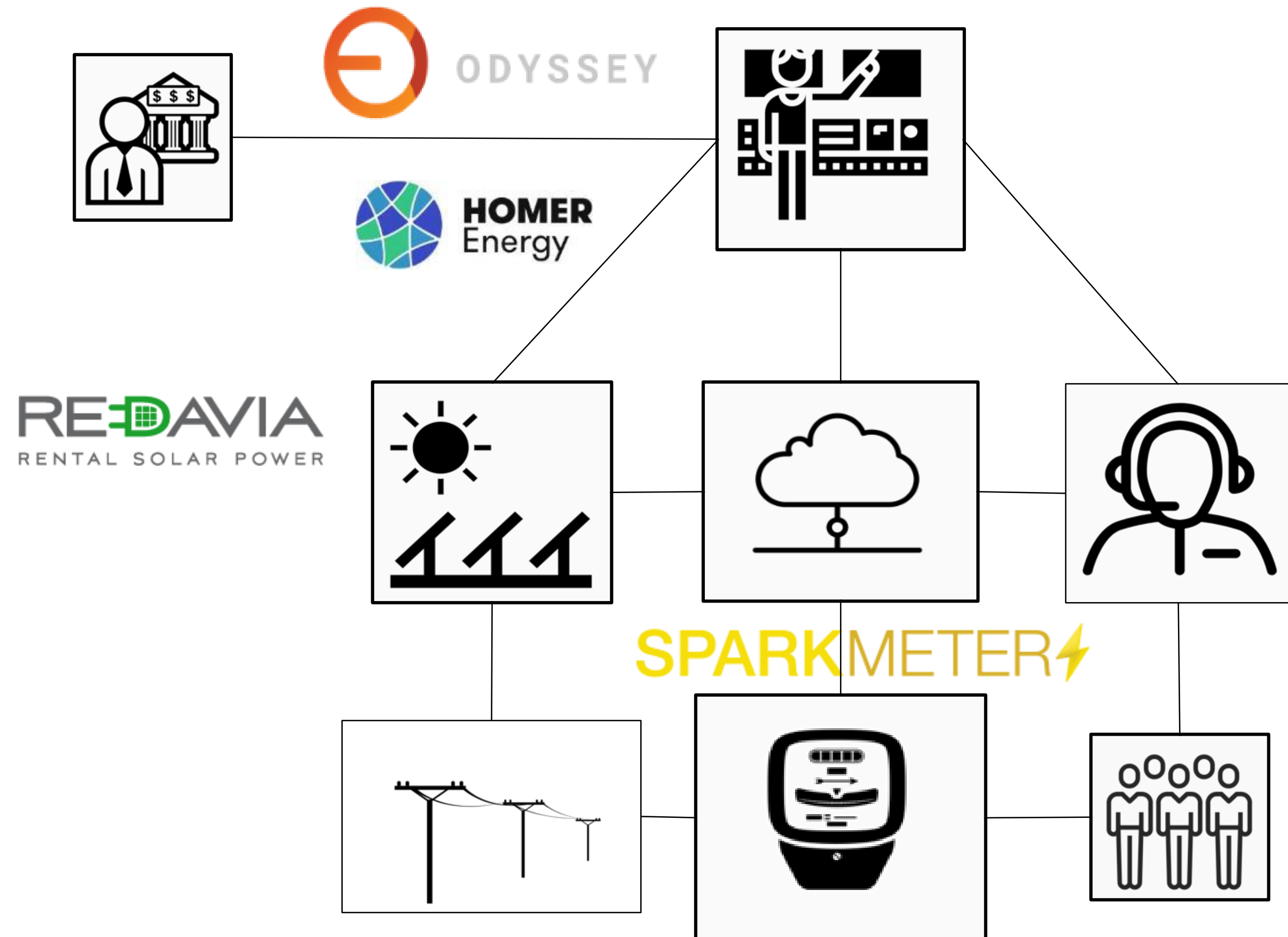
1) Purpose-Built, Plug-&-Play Hardware

- Smart Metering
- Closing the sensing & control loop
- Grid forming hardware

2) Reducing Soft Costs

3) Increasing Productive Consumption

4) OPEX scale & optimization



Technology Roadmap: Mini-Grids

Technological development, price reductions, and the piloting of smart grid technologies will enable reliable, efficient, microgrid systems *if* the market is supported through the transition period.

Technical Capability

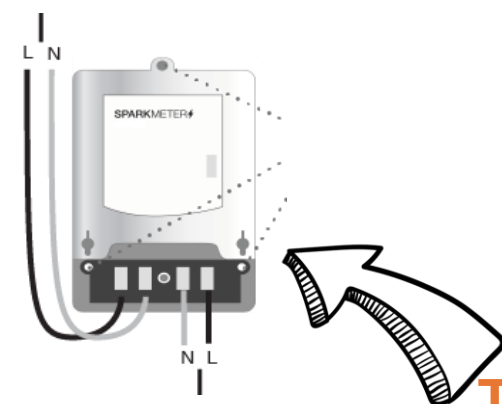
Gen 1: "Pilot"
Repurposed solar + storage



Gen 2: "Transition"
Fit-for-purpose hardware, basic software & data tools



- Smart metering
- Lower cost hardware
- Mini-grid in-a-box
- Micro-inverters
- Advanced Batteries
- SCADA Hardware
- Optimized Control
- Reducing Soft Costs
- Monitoring



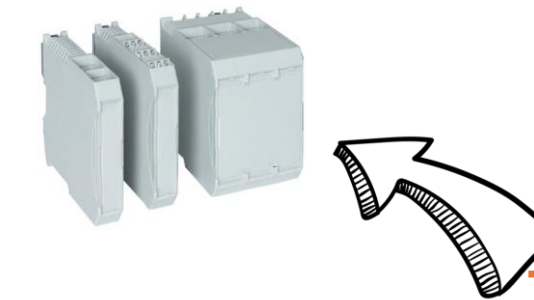
Transition Technology
Smart Metering

Gen 3: "True Smart Microgrids"

Advanced software enables analytics & fleet management



- Demand Response
- Dispatch-able Loads
- Predictive Analytics
- Optimized O&M
- Self Healing
- Automation
- Grid Integration / VPP
- Fleet Management
- Security



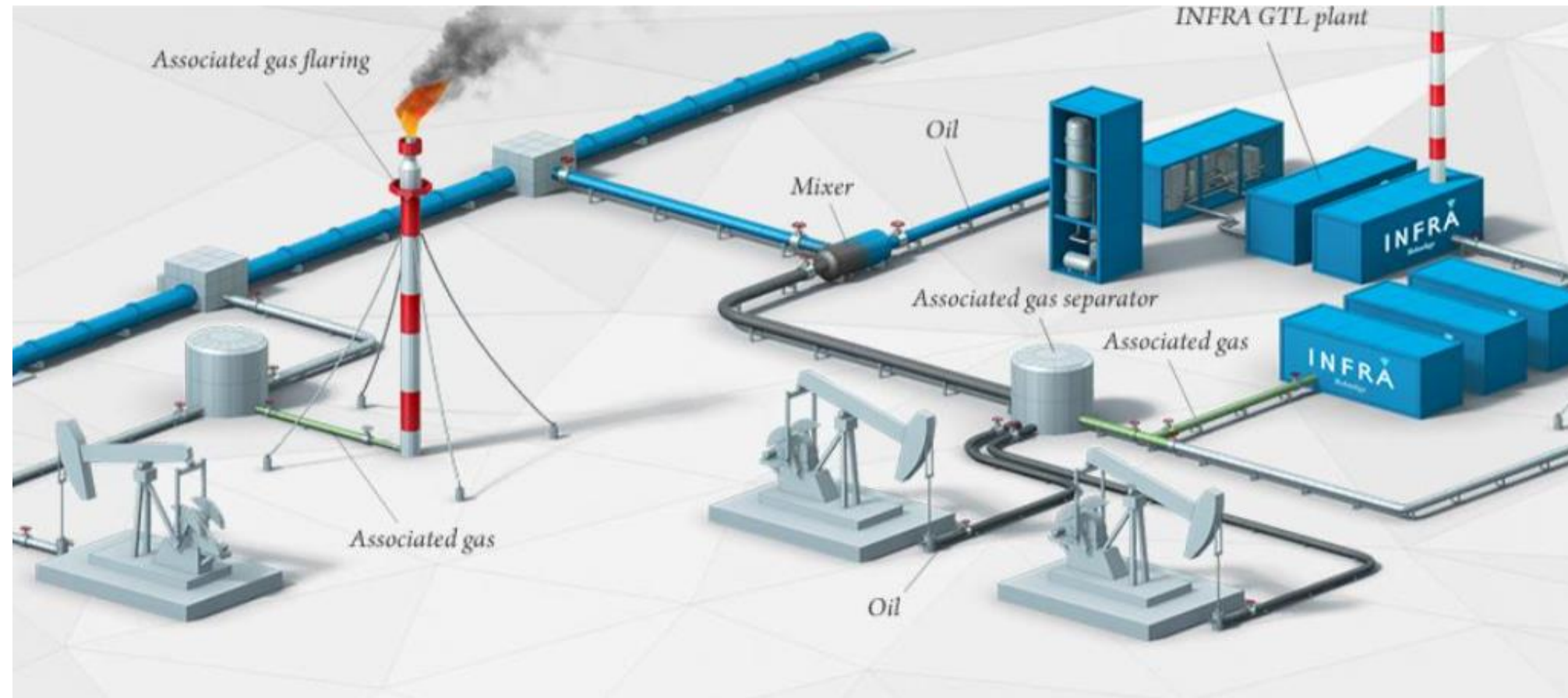
Transition Technology
Monitoring & Control

Pre-2015

2020

2025

Disruptive Technologies



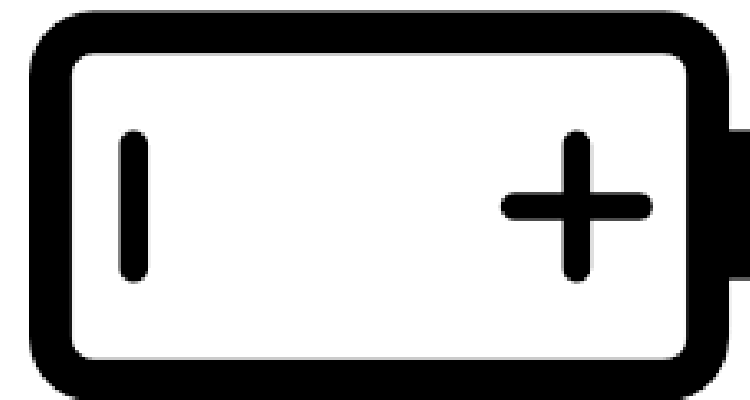
Gas (methane) to Liquids



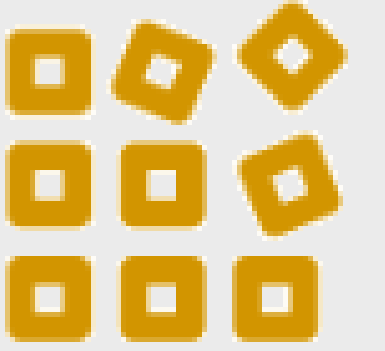
Hybrid Generation



Thermal to Electrical Conversion



Storage



BBOXX

**Pulse:
Data Driven Business**

Pulse: Data Driven Business



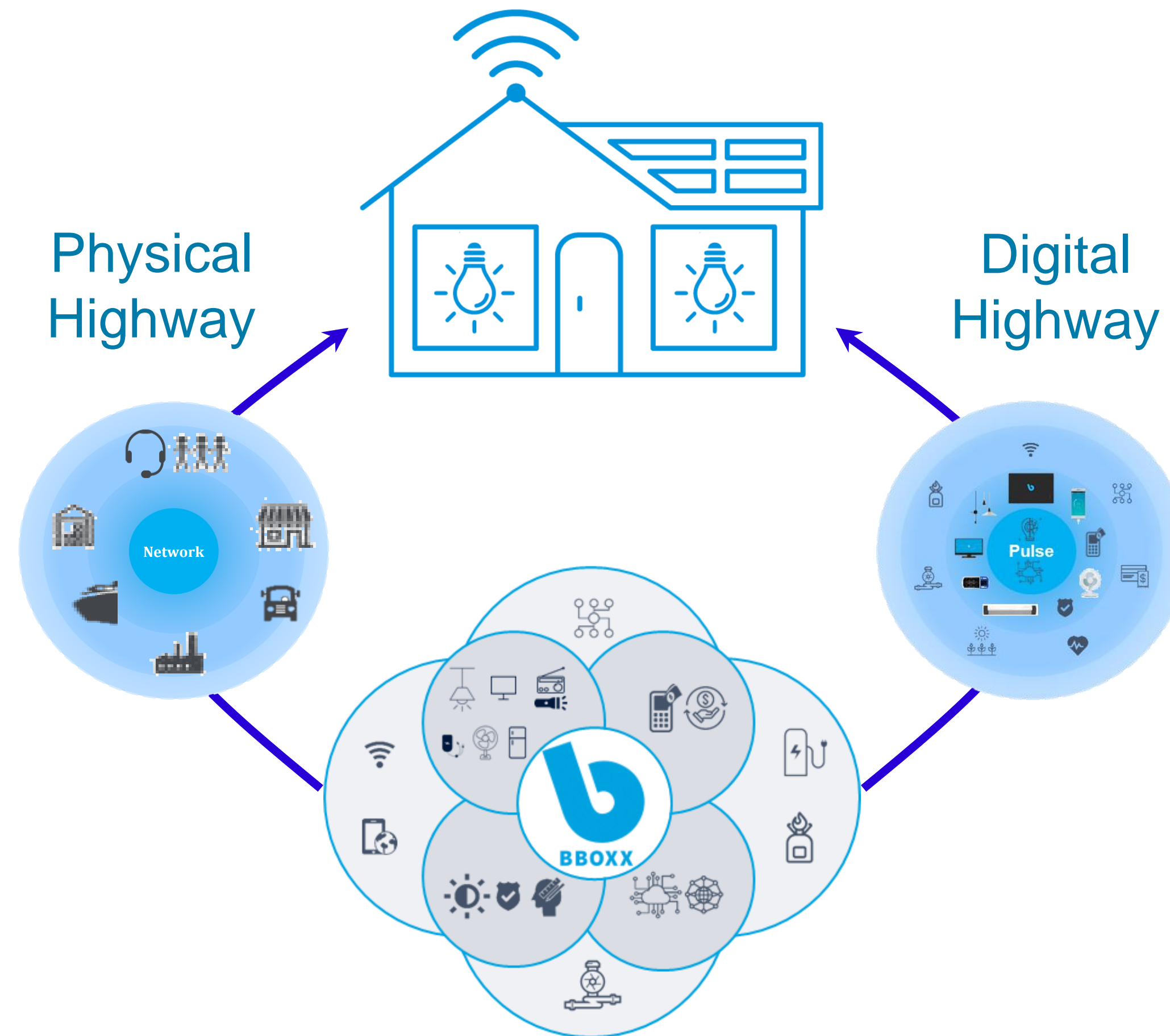
Anshul Patel
Chief Commercial Officer | BBOXX
SF Partner Event, 10-2018



Our Business: Delivering a range of basic services

Accessing customers

A large and flexible network together with an efficient logistics are key to reach customers.



...and creating proximity

Smart technology enabling long term relations through data.

**PULSE IS THE
BACKBONE**

Driving Efficiency through Data



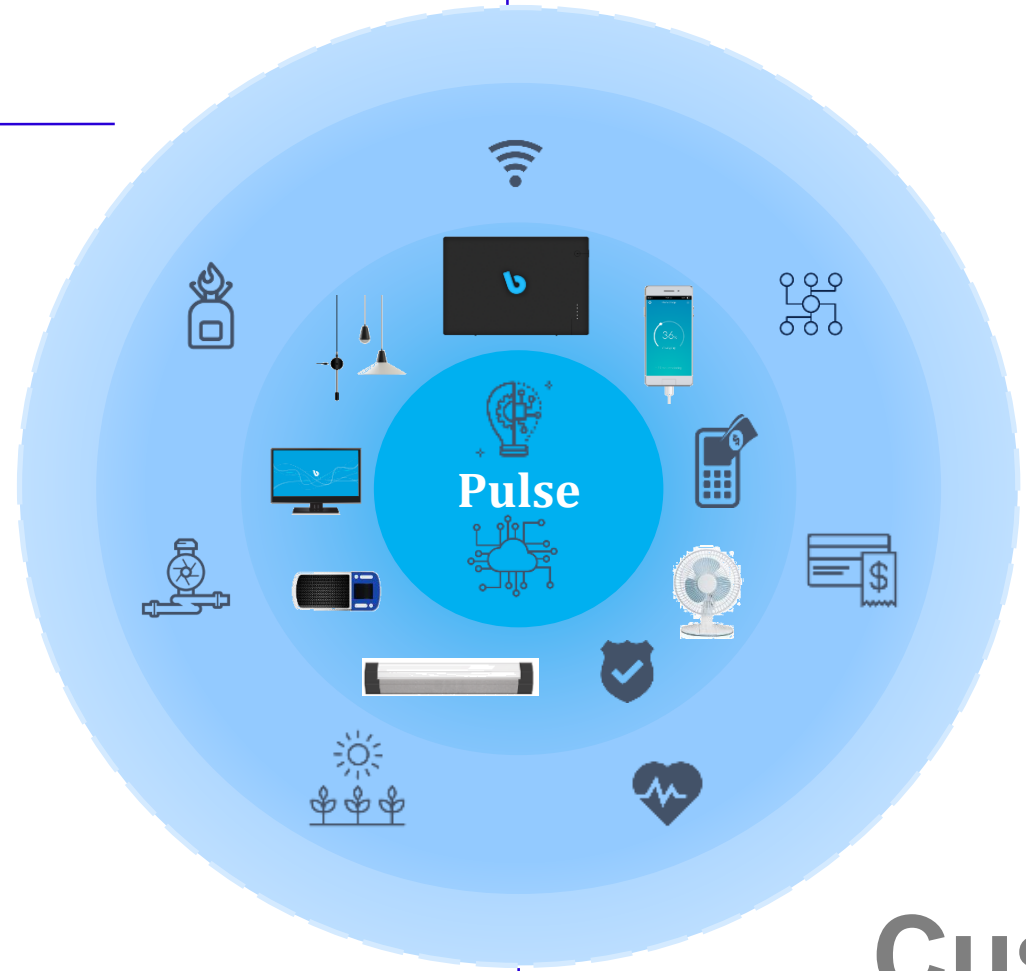
Product Management

GSM Enabled
Dynamic Alerts
Scaling across distribution Mix

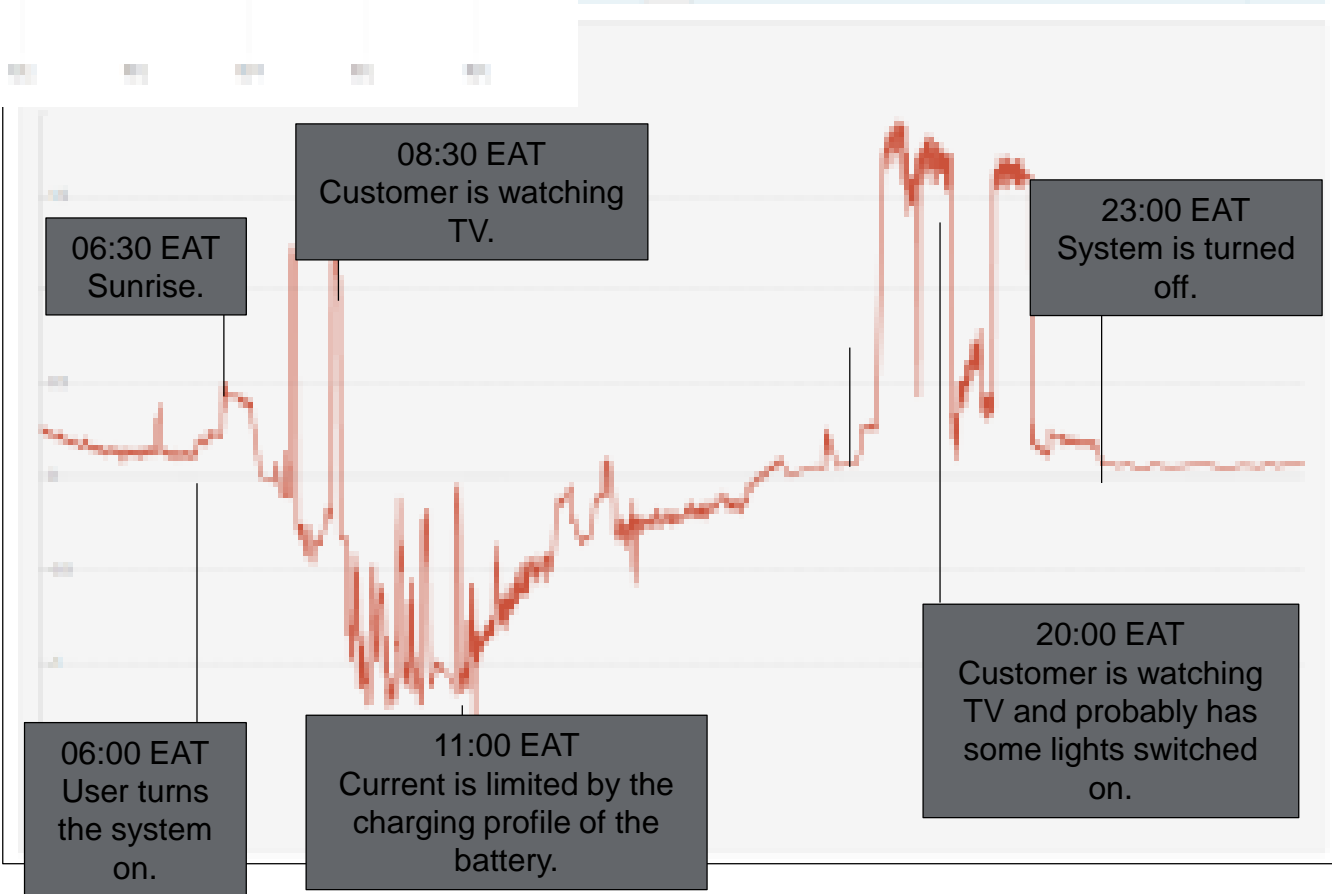
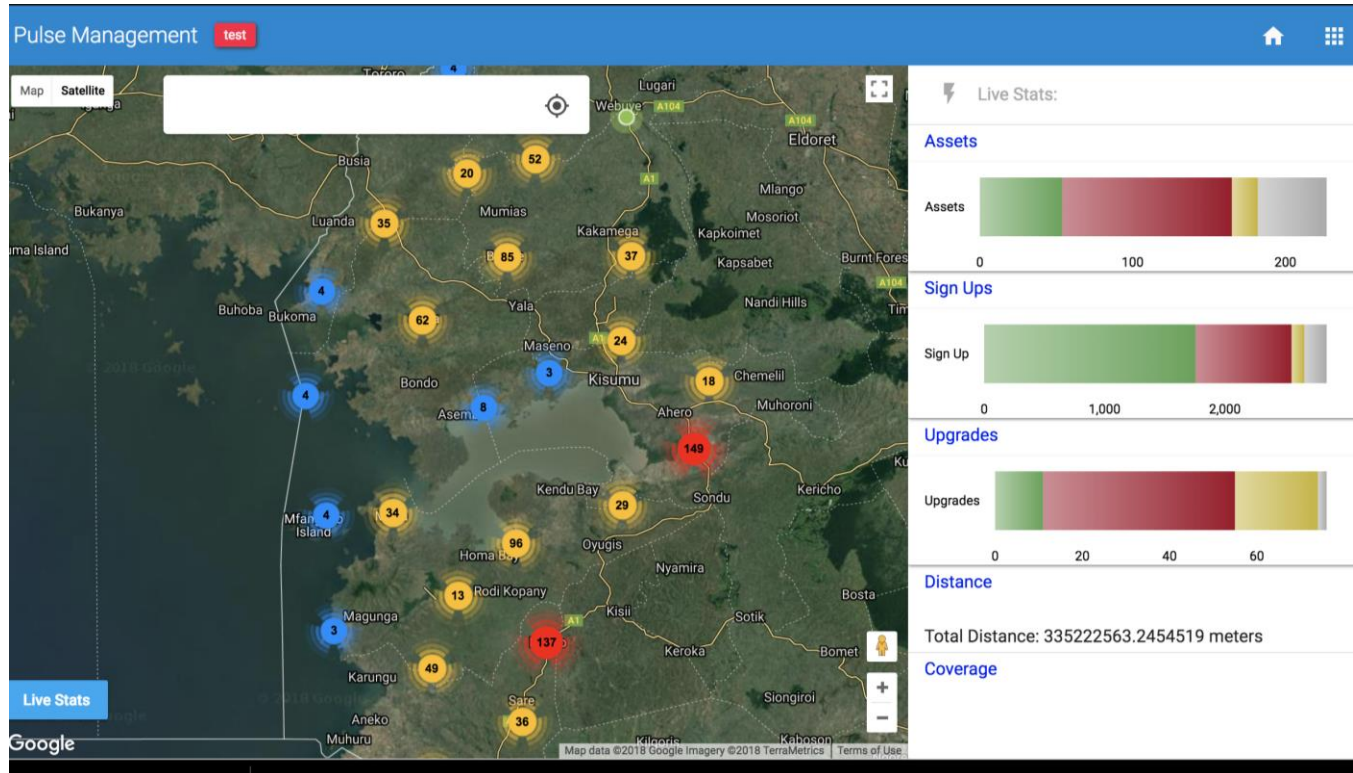


Dynamic Alerts

Low battery (20% of full)
Asset status
System health
System alerts (SMS, Email, App)
System history (including maintenance, repair, system status)

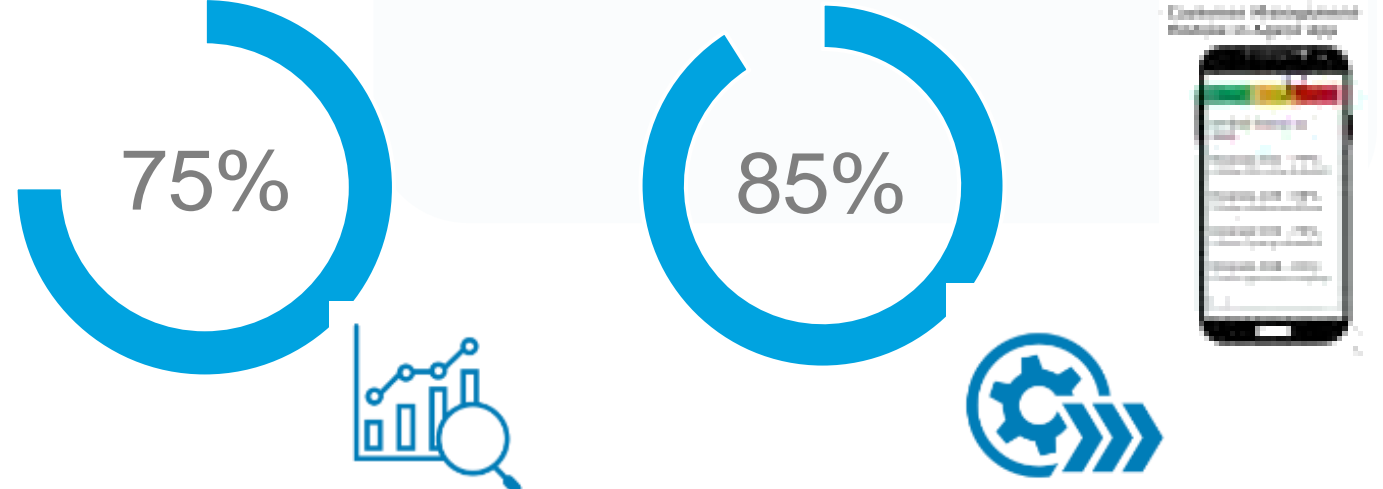


Automating actions
Scheduling
Agent management



Customer Prediction

Driving interventions and incentives



Pulse Today:



20,000
automated
actions daily



13.5 MWhrs
of distributed solar
monitored



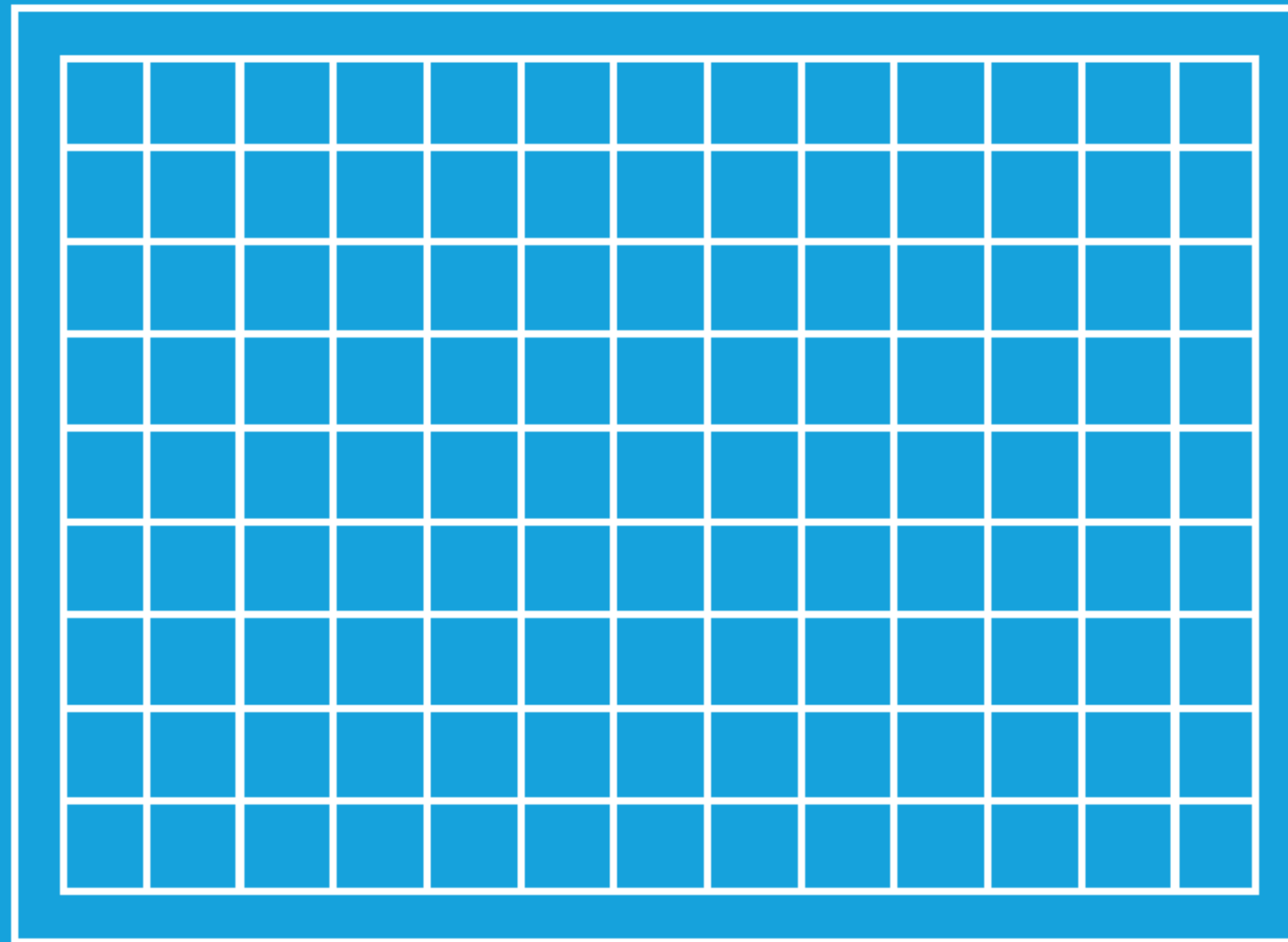
1,000,000+
mobile payments
processed



\$70,000,000+
managed
contract
value

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Discussion and Q&A