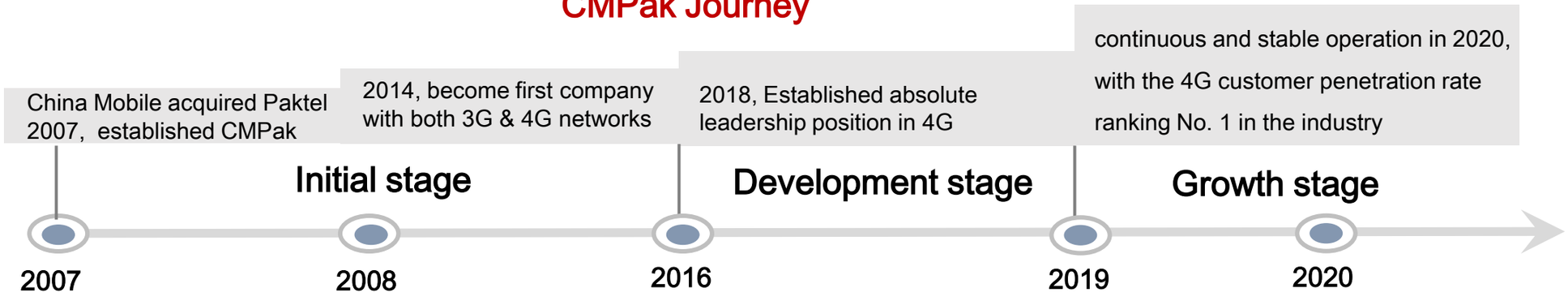
Energy-efficient Operation in EM Market

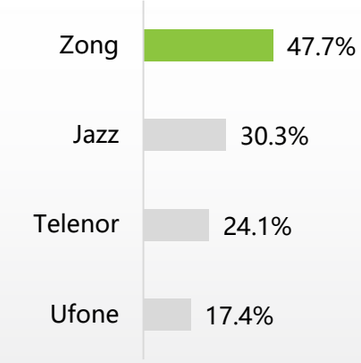
Efficient, Digital & Intelligent Energy Network

China Mobile Pakistan : Continuous 4G development & optimization, Power supply ready for future network

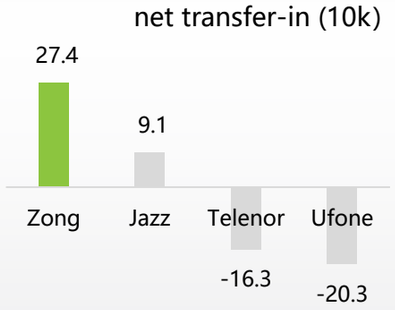
CMPak Journey



Market Operation



4G customer penetration rate No. 1 in the industry



Accumulated net transfer-in of MNP No.1 in the industry

Network Planning

Focus on 4G network :

- Continuous 4G network Development and optimization
- Network capacity expansion and upgradation

Power solution as the foundation of the network :

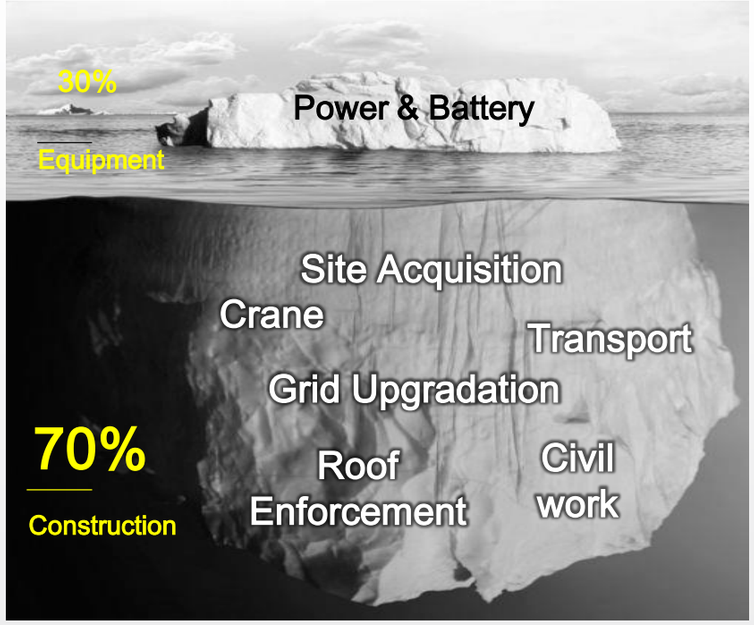
- Resolve bottlenecks of power supply
- Site modernization for power supply in advance for 5G

Not only future evolution, but also more challenges for Energy in EM Market

ZONG 4G
A CHINA MOBILE COMPANY

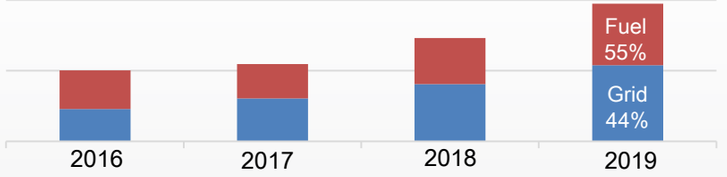
Stay Strong growth in 4G, Network ready for 5G in 2023

Challenges for Future Evolution



Challenges for existing power supply

1. Energy Cost Increasing Fast
35% DG sites consume 55% Cost



2. Power Availability

Unstable Grid
35% sites Grid outage
> 4h/day

Lead-acid battery
~60% site down due to old battery backup

DG
~35% site down due to DG failure

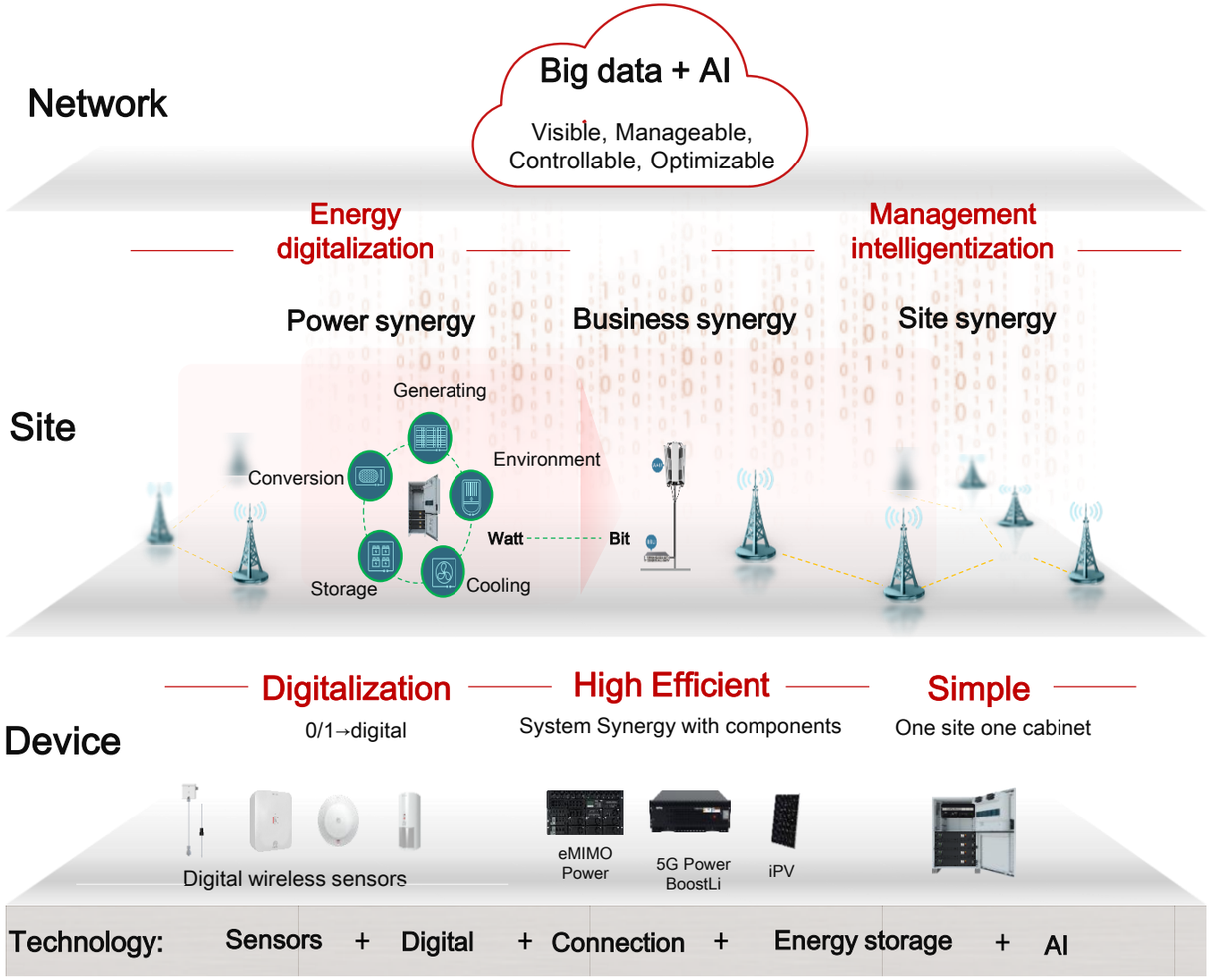
3. Network invisible

Low energy efficiency Energy wasted	Invalid site visit high O&M cost	Manual control Low reliability

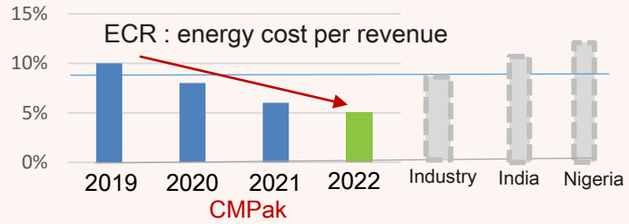
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CMPak Strives to Efficient, Digital & Intelligent Energy Network

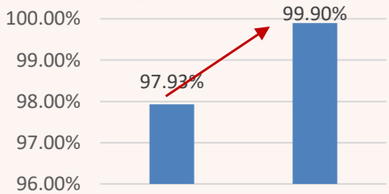
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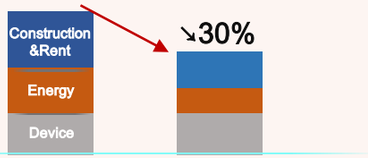
ECR
To be Benchmark in EM market



High Reliability



Optimal Site TCO



4 Steps for Energy Target Network: D.G. Removal, Digital Network, ↑PAV & Green

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2018~2019 | 2020 | 2021 | 2022 | 2023

- 1st scale deployment with Lithium battery
- 1st scale deployment for Site digitalization
- 1st DG removal energy innovation

1 30% D.G. Removal
- Fuel saving
- Diesel Hybrid
  Grid Hybrid

2 70% Digital network
- Visible Mgmt.
- NetEco
  Sensor

3 ↑ 99.9% PAV
- Reliability
- Mobile PowerCube
  Smart O&M

4 50% Green Energy
- Innovation
- Solar access

	2020	2021	2022	2023
Solar Access				50%
Mobile PowerCube			10%	20%
Digital Network	50%	70%	100%	100%
BoostLi	30%	70%	90%	100%
D.G. Removal	30%	50%	70%	95%

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CMPak Practice 2020: Large scale modernized 2000+ Sites, OPEX Saving 25%, PAV improved 2.03%

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Intelligent DG removal solution： “0” D.G., 100% new Lithium battery, higher PAV



Before: D.G. backup



After: Grid Hybrid solution



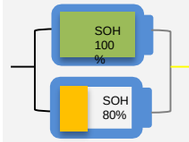
Lead-acid



BoostLi

Leading solution

- Smooth 5G evolution
- iGrid: AI study grid off model
- Software lock: digital anti-thief
- Battery Hybrid use



OPEX saving for DG Removal: reduce 69%, saving 7k$/site/year

D.G. running (hour/day)		Fuel consumption (L/year)		D.G. Maintenance	
5.36	0	5869	0	2500	0
Before	After	Before	After	Before	After

Revenue Increased: 1.2k$/site/year

Site PAV (%/year)

Before		After
96.32	2.03%	98.35

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CMPak Energy Innovation Dashboard：Set up ECR Benchmark, explore new way for Energy Management

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Energy Innovation Dashboard Purpose

- Build a visible, manageable & optimizable digital energy network, support the improvement of market operation, smart decision-making & precise operation capabilities
- Set up global ECR energy efficiency management benchmark

Energy Innovation Dashboard Capability：



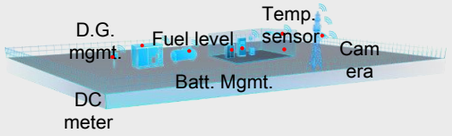
Huawei Neteco

Energy digitalization：

Grid, BoostLi, DG、

PAV，site outage etc.





Dashboard

KPI:

1. ECR comparison
2. Grid & DG running status & trend
3. DG removal target & status
4. PAV comparison

…

Big data from other systems：

- ECR : Integrate revenue data
- OPEX Analysis: Diesel, grid & maintenance cost
- Integrate diesel refueling data

…

PAV：Power Availability Value

ECR：Energy Cost per Revenue

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CMPak ECR reduced from 6.77% to 6.19% , aim to be benchmark in EM market

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Energy Innovation Benchmark

July 2020

ECR of All Innovation Site: 6.77% ➡ 6.19%

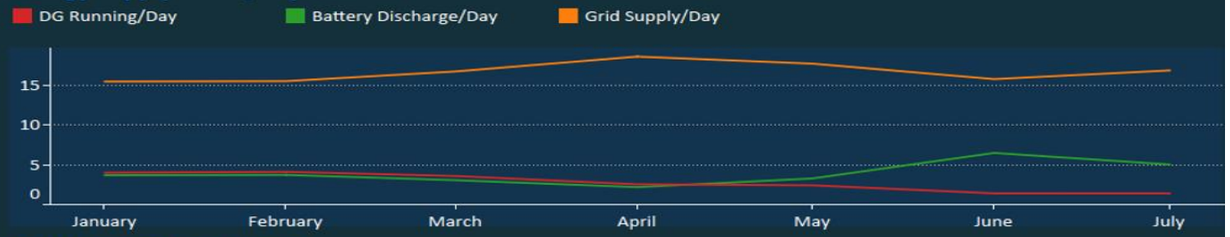
ECR of DG Innovation Site: 9.15% ➡ 6.27%

Energy Innovation Progress



Energy Supply Hours/Day

Multiple values



DG 0 Running Site Number



PAV% Trend



ECR(Energy Cost/Revenue) Trend



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THANK YOU!

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