

NEW DEVELOPMENT OF EV AND CHARGERS IN CHINA

PQSynergy Bangkok

May 8, 2018

Qianlu Yan

Beijing Joint Harvest S&T Co., Ltd.

CONTENTS

- EV now in China
- EV chargers
- Future EV chargers
 - Extended topic: LVDC distribution system
- DC Power Quality
 - Extended topic: DC PQ Standard & etc.



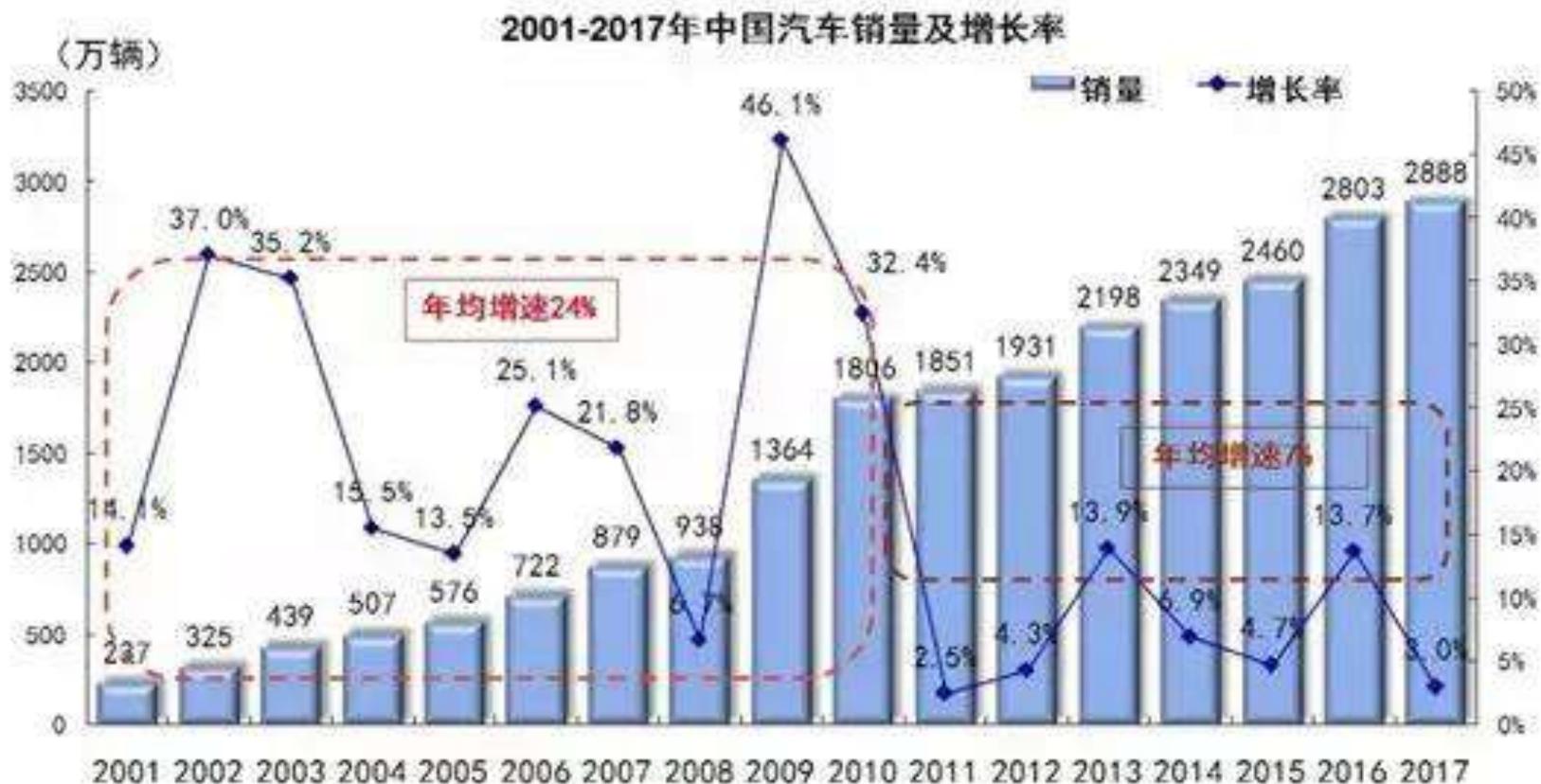
TOPIC OF ELECTRIC VEHICLE

- My 4th presentation at PQSynergy about EV
- Will be the largest electricity consuming load
- Impact of PQ & Efficiency to power grid
 - Power Quality due to charging
 - Battery storage of EV
 - Electricity demand management



VEHICLE SALES 2001 – 2017

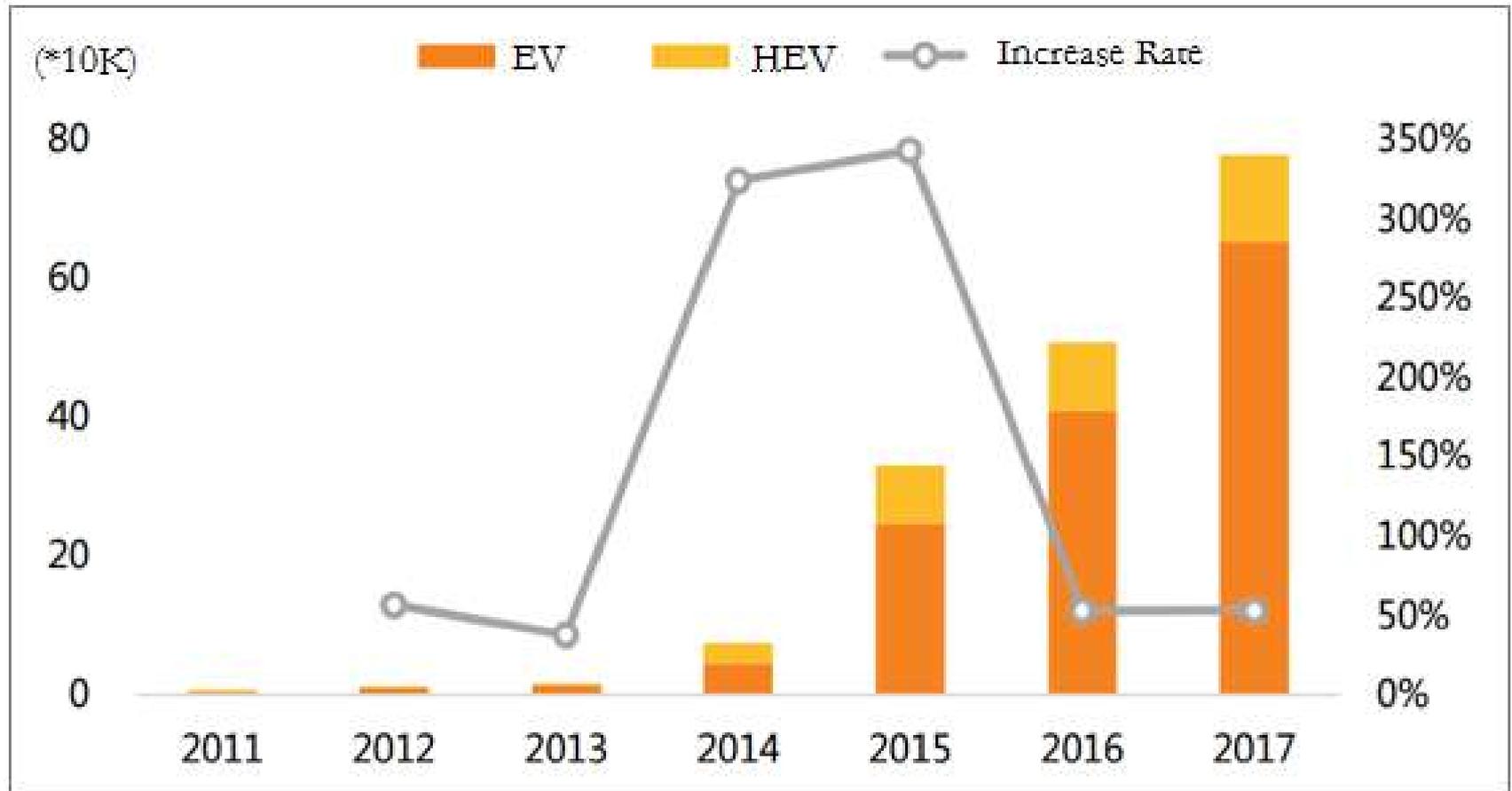
(UNIT: 10K)



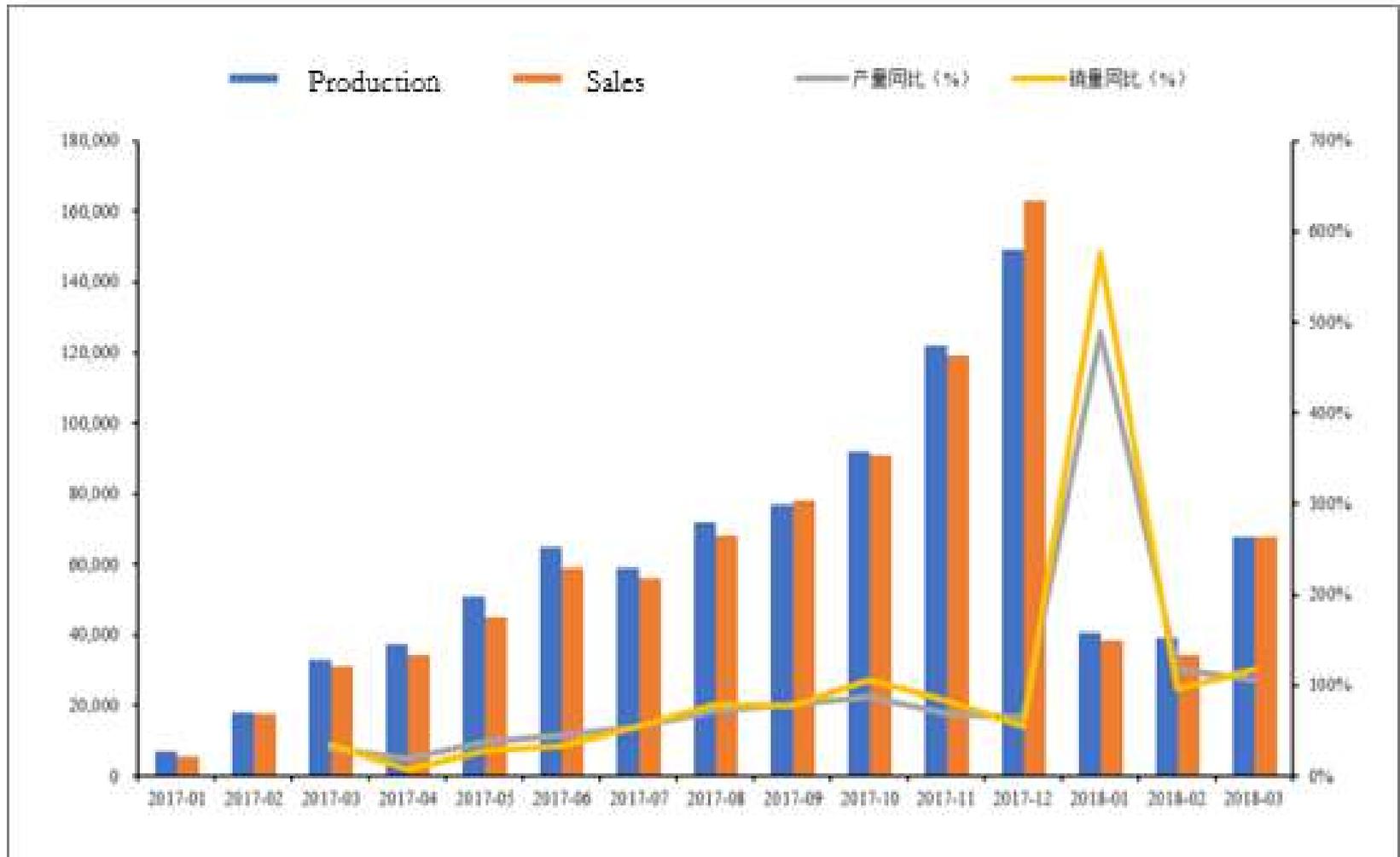
数据来源：中国汽车工业协会

EV IN CHINA

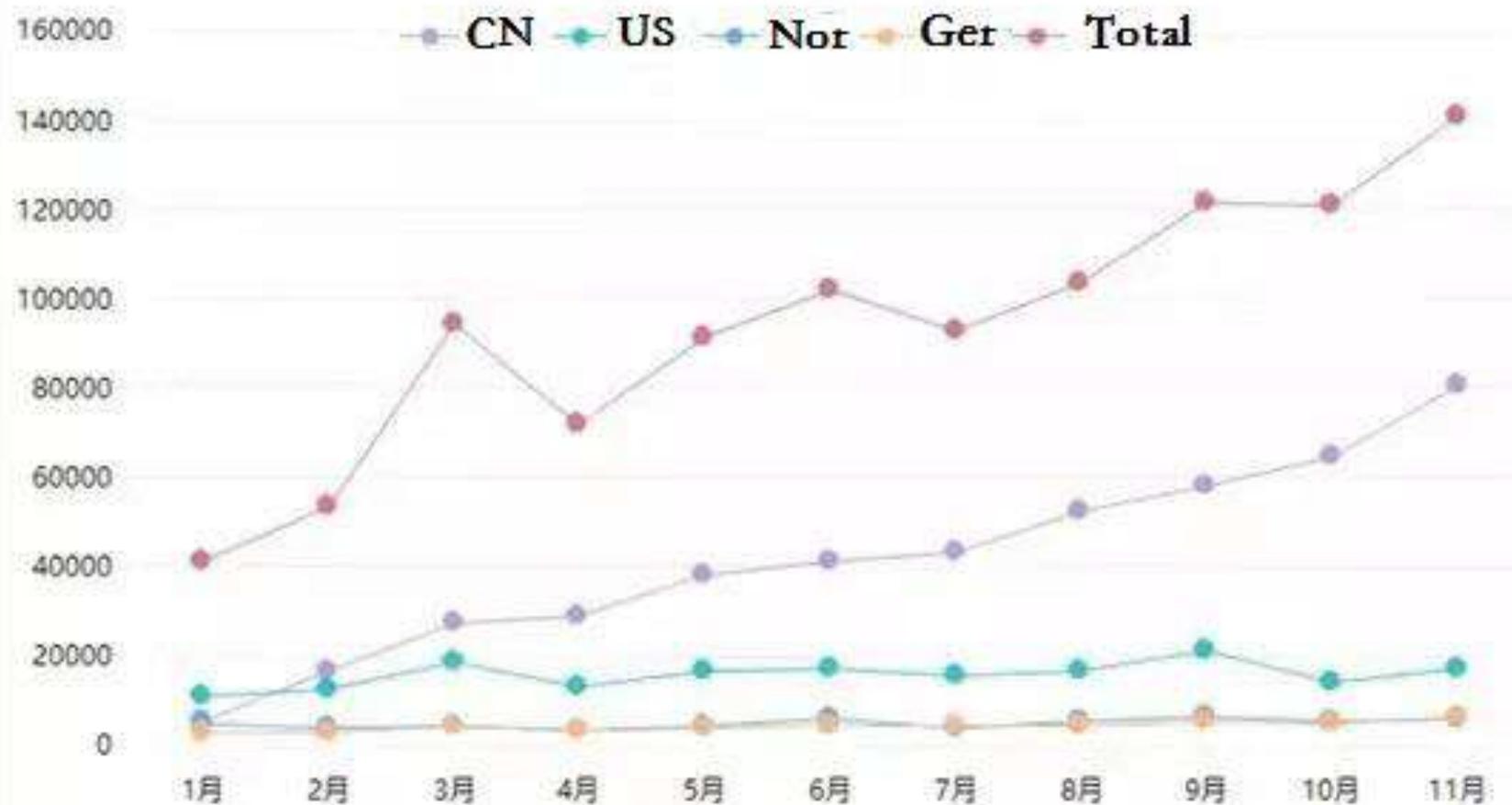
- EV with green plate often seen in Beijing.



NEW ENERGY VEHICLE MONTHLY PRODUCTION AND SALES IN CHINA



2017 Worldwide Sales of Electric Cars



制图：电动汽车资源网

史晨星

Jan - Nov 2017 Worldwide Sales Top 10 New Energy Vehicles



MANY NEW EV MAKERS IN CHINA

- Huawei
- Baidu
- Tencent
- Gree
- HK Motors
- WM Motor
-



PRICE OF EV

- Significant reduced
 - EV200 in Jan 2015; RMB 136900 (after subsidiary)
 - 200 km per charging
 - EX360 in April 2018; RMB 88900 (after subsidiary)
 - 360 km per charging
 - Performance much improved
 - EV >500km per charging
 - RMB 140k after subsidiary, expected going down 20% by the year end



MY EV200 AFTER 3 YEARS



**200Km/new vs 195km/now
– 2.5% mileage loss after
33000 km**



COST OF CHARGING & MAINTENANCE

- Electricity cost:
 - Private charger; 1 yuan/10 km
 - Public Chargers; avg 2.5 yuan/10km
 - Vs gasoline >5 yuan/10 km
- Maintenance:
 - EV; Very little
 - Vs gasoline car; RMB 1000 / 5000km



BEIJING AUTO EX360



EV CHARGERS

- Q'ty of public chargers significant increased
 - No need to line up for charging
 - Available in 5km range
 - Replace 37.5kw chargers with 60kw
 - Charging time reduced
 - 30kwh battery for EV200
 - Replace 60kw chargers in highway service area with 120kw



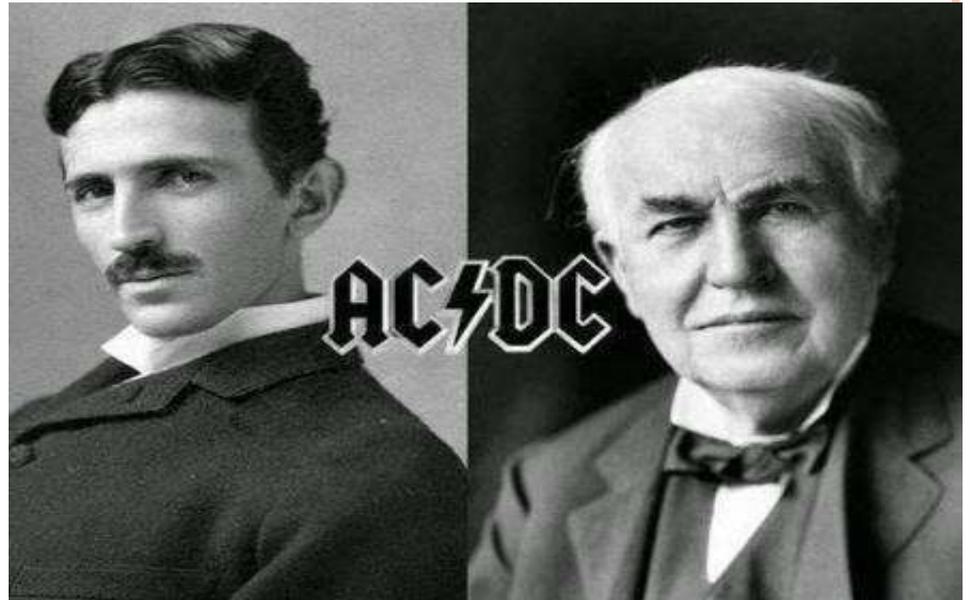
PRIVATE CHARGERS

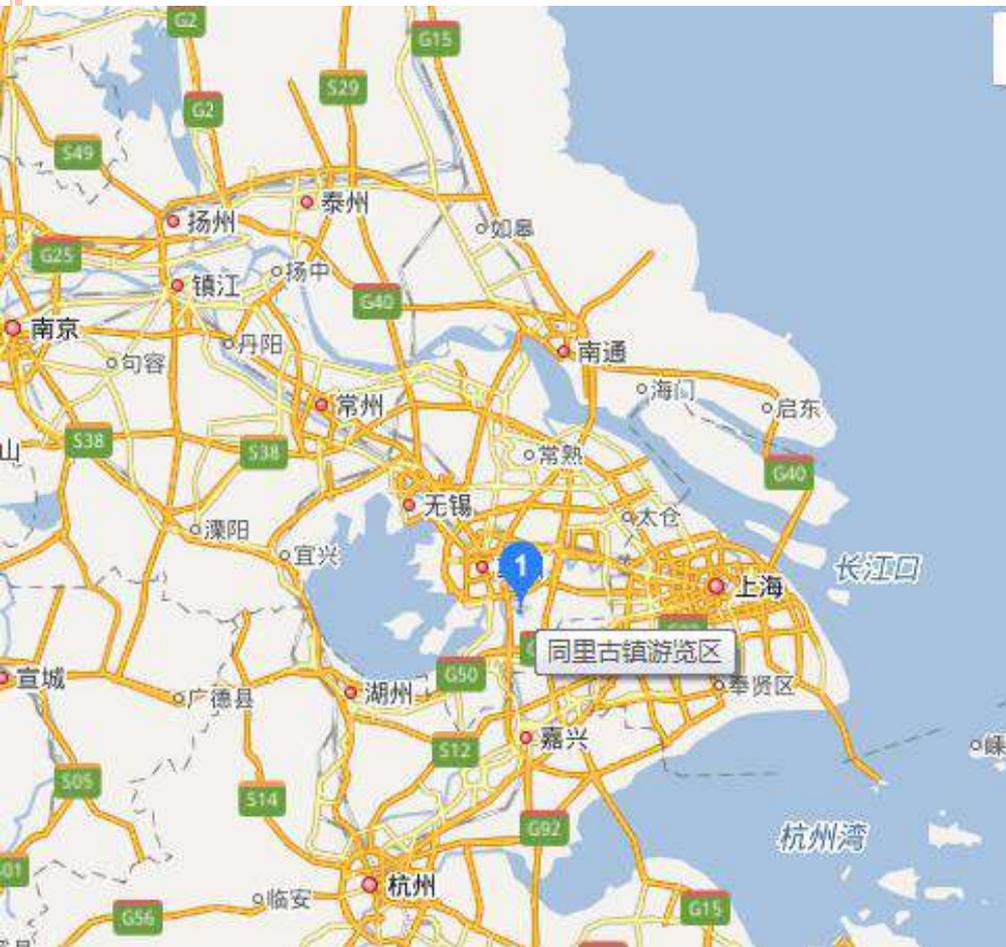
- Private chargers/residential chargers are encouraged installed by government regulation
- Chargers are free provided with EV
- Low electricity cost 0.49 yuan/kwh



LVDC PILOT PROJECT

- Located in Tongli town, suburb of Suzhou city, Jiangsu Province
- About 150km away from Shanghai
- Tourist attraction for China traditional village
- Population; 55000





CORNING FACTORY

- CORNING Glass Factory Nearby
- Dranetz 61000 Datanode installed
- PQView installed in US Corning Head Quater



TONGLI LVDC PILOT PROJECT

- From 10KV to 750V/375V (split phase) DC power supply
- Supported and Supervised directly by top management of China State Power Grid
- Final Goal to replace all AC electrical power system
 - DC Generation > DC Transmission > DC Distribution
- Revolution to China Electrical Power System
 - Ambitious (Crazy?) plan with huge investment
- Payback evaluated
 - Make up mind
 - New infrastructure costly replaced



TONGLI LVDC PILOT PROJECT

- All home appliances, commercial equipment, industrial equipment, etc will use DC power
- PV Generation integrated
- Good news for EV owners
 - No AC chargers required, what needed is a only plug!



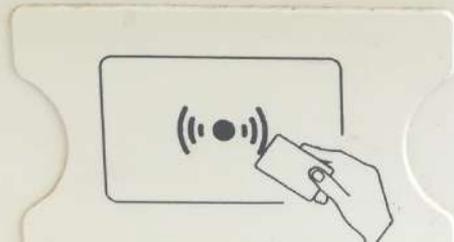


国家电网 STATE GRID 09:59

充电电量 8.22 kWh	充电费用 12.06 元	充电时长 00:40:46
充电电流 35.80 A	充电电压 369.50 V	76%

停止充电

电表监控 费用信息 设备信息 电池信息



ANOTHER PILOT PROJECT IN ZHANGJIAKOU

- Zhangjiakou city, Hebei Province, is co-host of Beijing for 2022 Winter Olympic Game
- Appx. 300km from Beijing





Zhangjiakou

Beijing

京

渤海



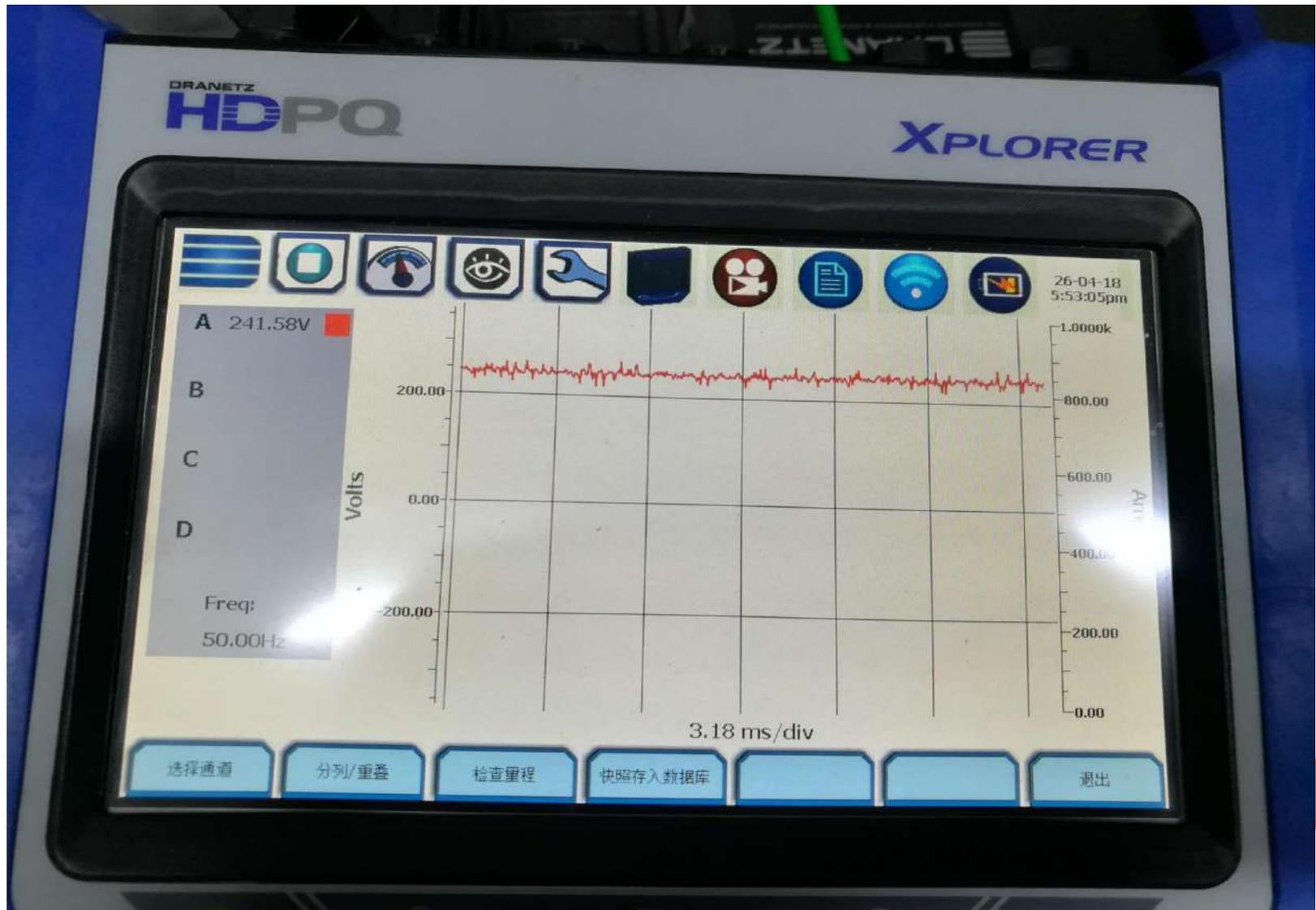
ZHANGJIAKOU PILOT PROJECT

- Supported and supervised by China State Power Grid, too.
- Power supply to a large data center (data harbour) and chillers
- PV generation integrated
- Battery storage
- Test with load bank before commissioning



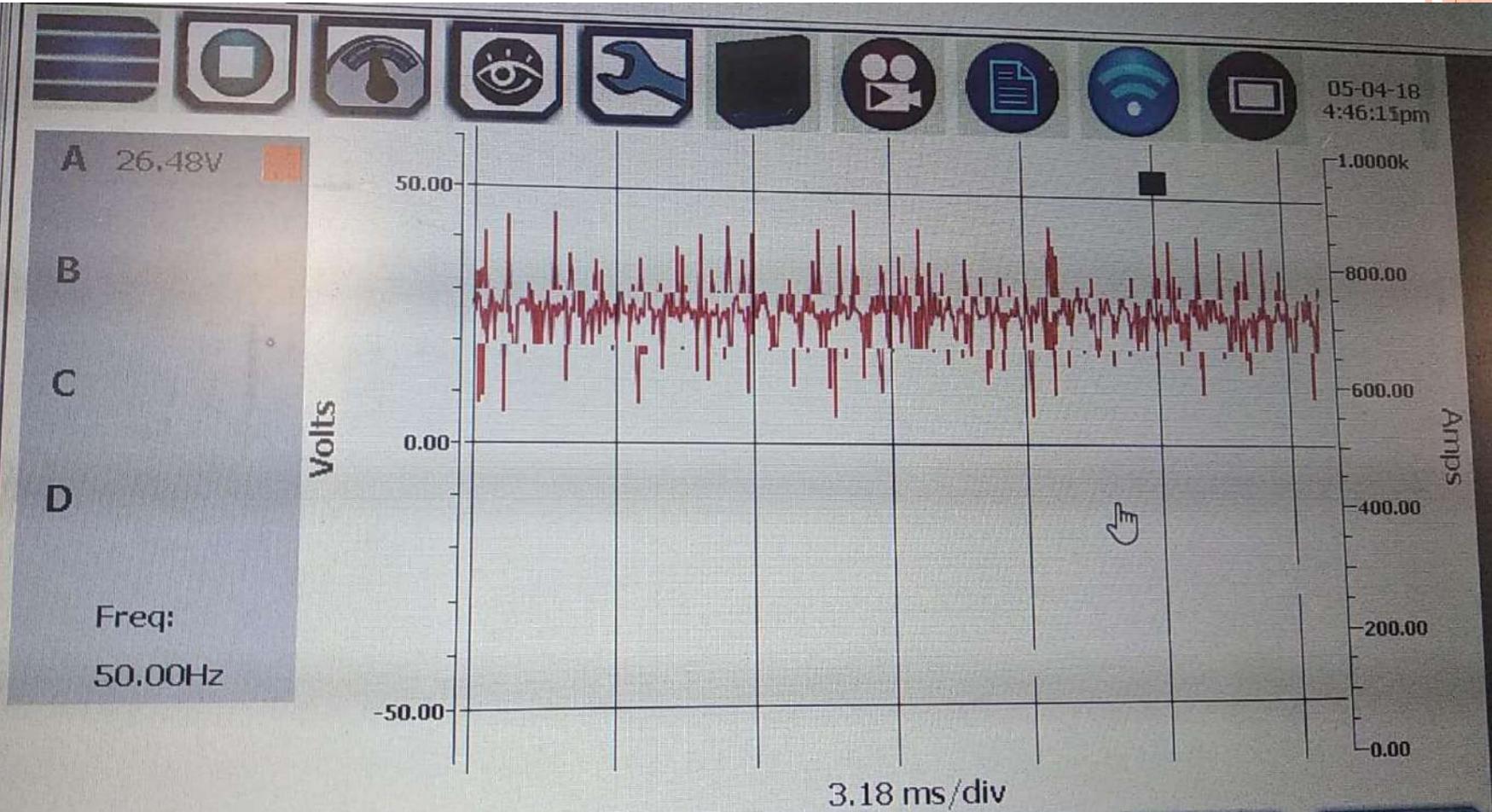
DC POWER QUALITY

- Voltage Ripple – hook up at 240V



DC POWER QUALITY

- Voltage Noise



CHALLENGE TO DC POWER QUALITY

- New standards;
 - A work group in China for DC PQ standards has been set up
 - Different views from utilities, equipment manufacturers, testing instruments, electric consuming loads, new energy generation,...
 - Government regulation
 - New ITIC, SEMI F47, etc for DC PQ?



CHALLENGE TO DC POWER QUALITY

- Testing instruments
 - Ripple Generator/Noise Generator
 - DC Voltage Sag Generator
 - DC EMI/Immunity testing/Compatibility level
 - ...
- DC PQ Mitigation Equipment
 - ...



Thank you!

