比亚迪股份有限公司
BYD COMPANY LIMITED

Hybrid Energy DC Power System for Telecom Base Station

Build Your Dreams

Nov. 2008

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2 Hybrid Power Solutions for BTS

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General introduction





BYD General Profile

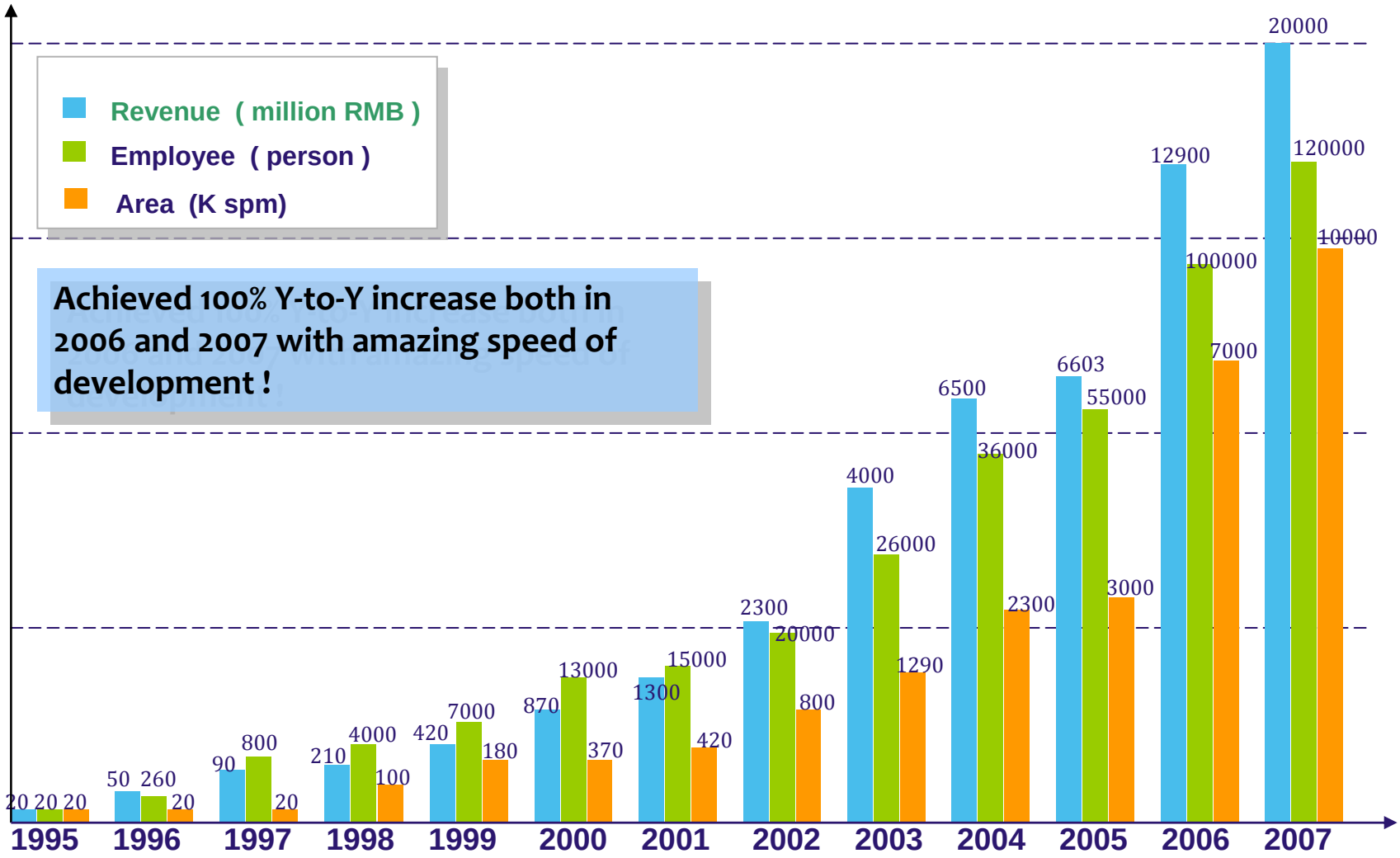


- Founded in 1995 by Mr. Wang Chuanfu
- A Hong Kong listed company since 2002
- Entered Auto business since 2003
- F3 hit the market since 2005
- BYD Electronic Co., Ltd was successfully listed on the Stock Exchange in Hong Kong in 2007
- Warren Buffett HK$1.8 billion to buy 10% stake in BYD in Sept 2008

- 7000k square meters
- 130,000 employees
- 16,000 R&D Engineers
- Three Main Businesses
  1. IT components and assembly：Batteries, Mechanical parts, LCD/LCM, FPC, Opto-electronics
  2. Auto design and manufacturing：F0, F3, F3R, F6, F8, F3e, F3DMF6DM, E6)
  3. New Energy (Power Battery, Solar energy, Wind energy, Wind and PV hybrid)

ISO14001 **ISO9001** **QS9000**

Growth Record

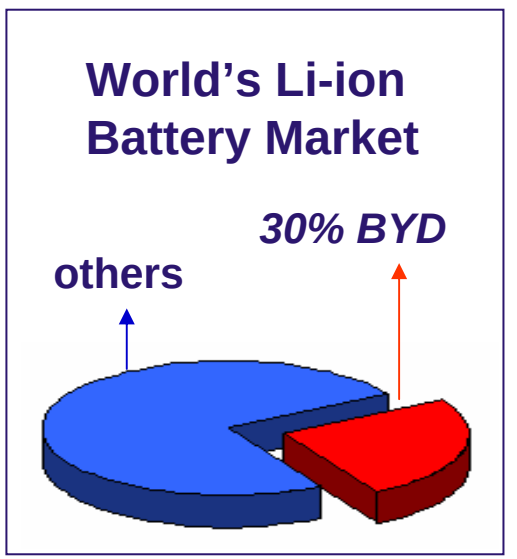


BYD Battery in the World



World Ranking (By ITT Japan)

Li-ion	Ni-MH	Ni-CD
SANYO	SANYO	BYD
BYD	PANASONIC	SANYO
SONY	BYD	PANASONIC
SAMSUNG	GPI	GPI
PANASONIC	YUASA	
	SAFT	





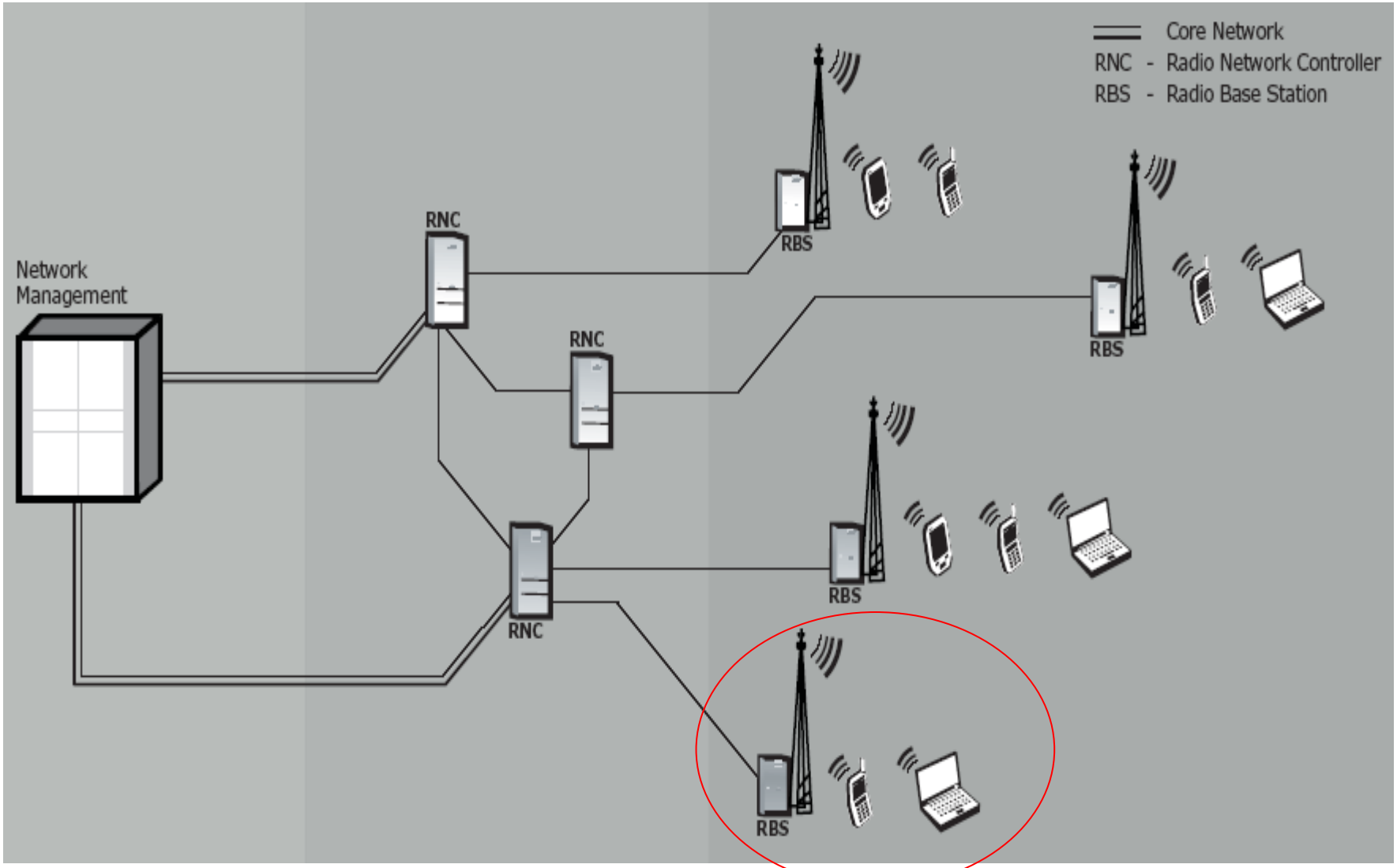
Hybrid Power Solutions for Telecom BTS



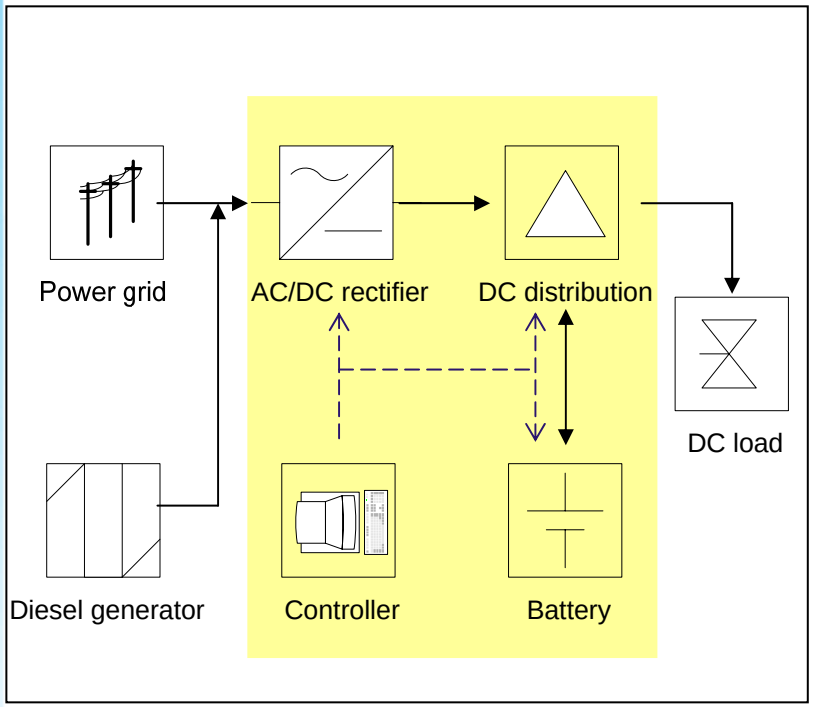


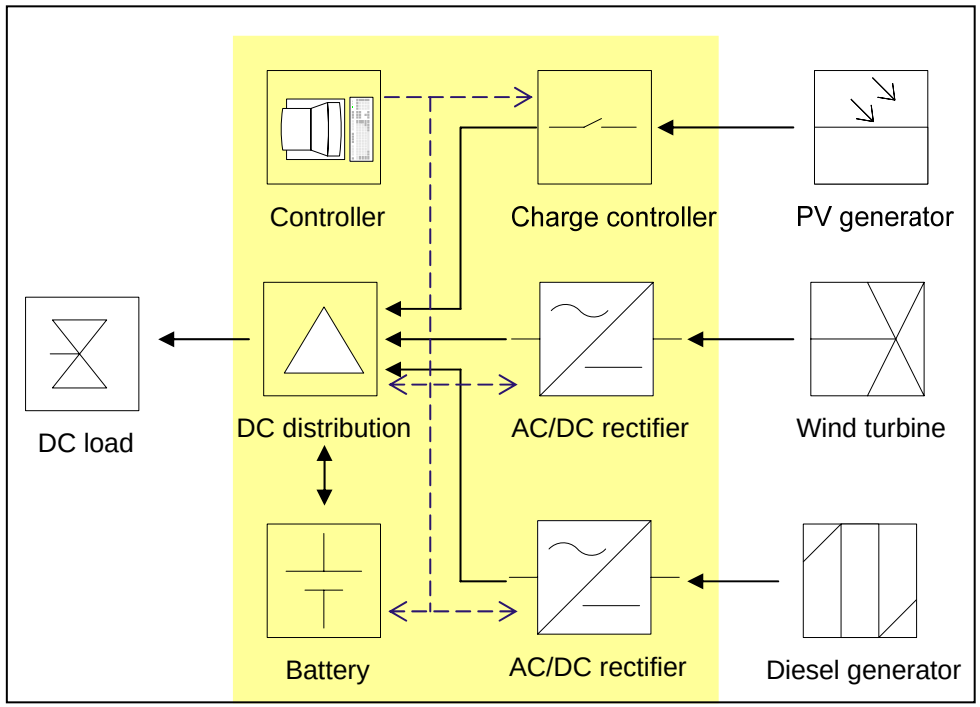
Build Your Dreams

Wireless Telecom BTS Application



Common BTS power system





Common BTS power system (on grid)

Common BTS power system (off grid)

BYD DPS could integrate the above power modules in yellow back color!

BYD Fuel-Solar-Wind Hybrid Power Solution



PV Panels



Wind Generator



Genset



Telco or Non-Telco loads



PV panels/ Wind Gen.

Regulator

Loads

Fe battery

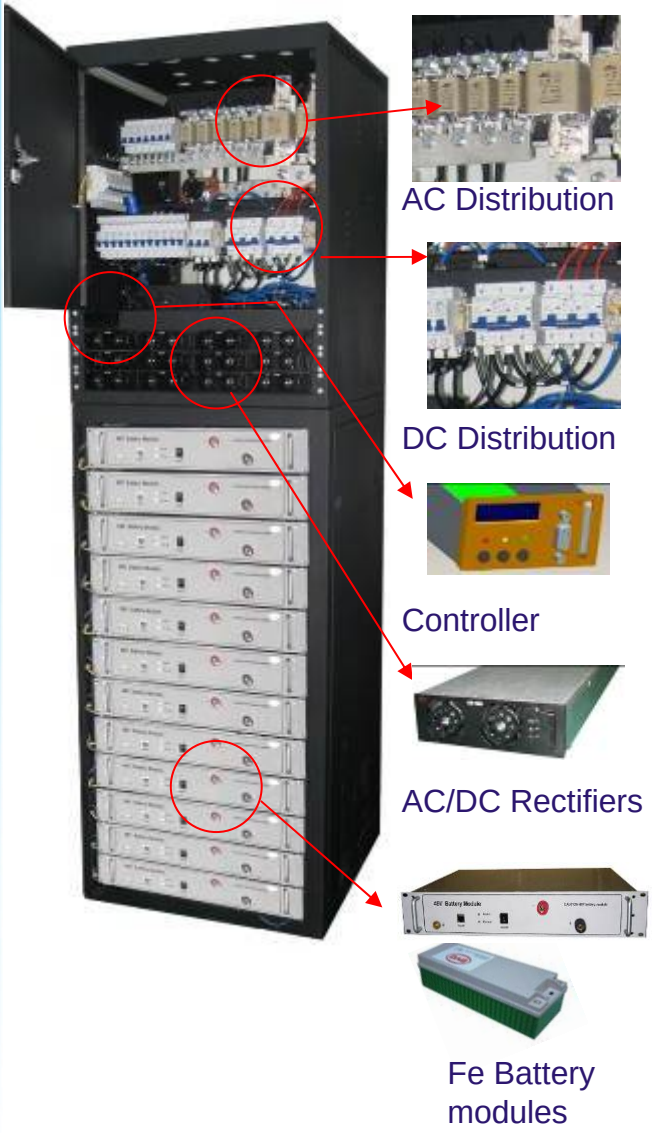
DC distribution

Genset

AC/DC rectifier

DPS
(DC Power System)

BYD DPS



Standard BYD DPS Feature:

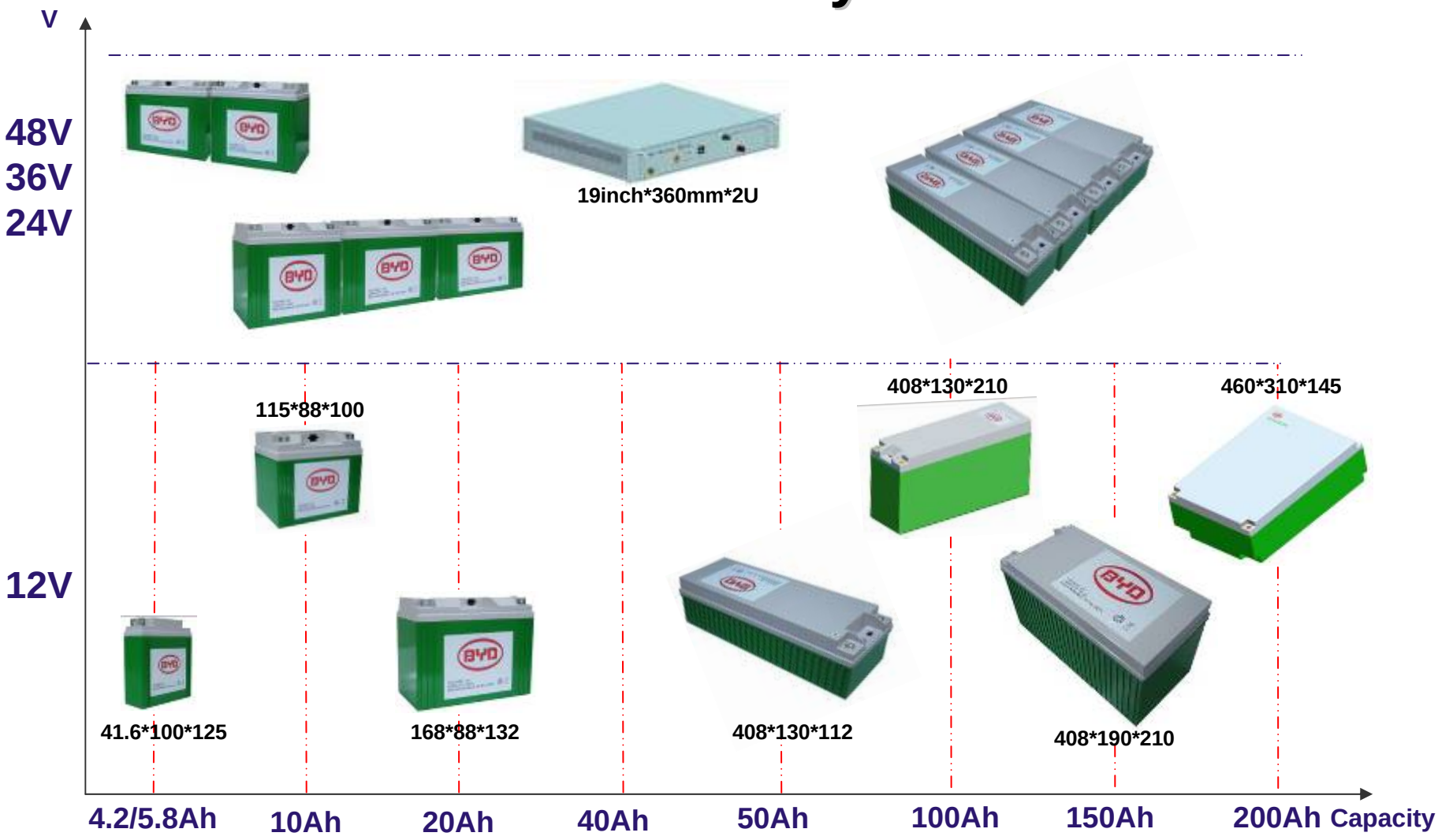
- External dimension:
  - Power Cabinet: 600(W)*600(D)*800(H)mm
  - Fe Battery Cabinet: 600(W)*600(D)*1200(H)mm
- Input: 90~290Vac, 3 phase, 45~65Hz;
- Output: 53.5Vdc(rated), output voltage range 42.3~57.6Vdc, accuracy of±0.3V;
- Up to 12 rectifiers parallel connected, each output power of 2900W
- Controller could keep monitoring the performance of PV panels, wind turbine, each rectifier and voltage of every cell in each battery module, easy maintenance.
- Up to 60 rectifiers and battery modules in total could be managed by one controller;
- Both 12V and 48V standard Fe battery module could be used
- Less volume by higher energy density of Fe battery than lead acid battery.
- 48V 40Ah Fe battery modules, up to 12 parallel connected in one battery cabinet, maximum battery capacity of 480Ah, 48Vdc(rated)
- 12V 150Ah Fe battery modules, up to 5 parallel and 4 series connected in one battery cabinet, maximum battery capacity of 750Ah, 48Vdc(rated)

Benefit of BYD DPS

- Integrated DC power system
- Be able to directly connect to and manage the PV panels or wind turbine
- High energy density of power and battery modules
- Modularized design for power and battery modules, easy to expansion of system
- Independent application for either power cabinet or battery cabinet
- Compatibility to various type of Fe battery
- Compatibility to lead acid battery
- Advantages of Fe battery
  (be introduced in Page 13 – 19)



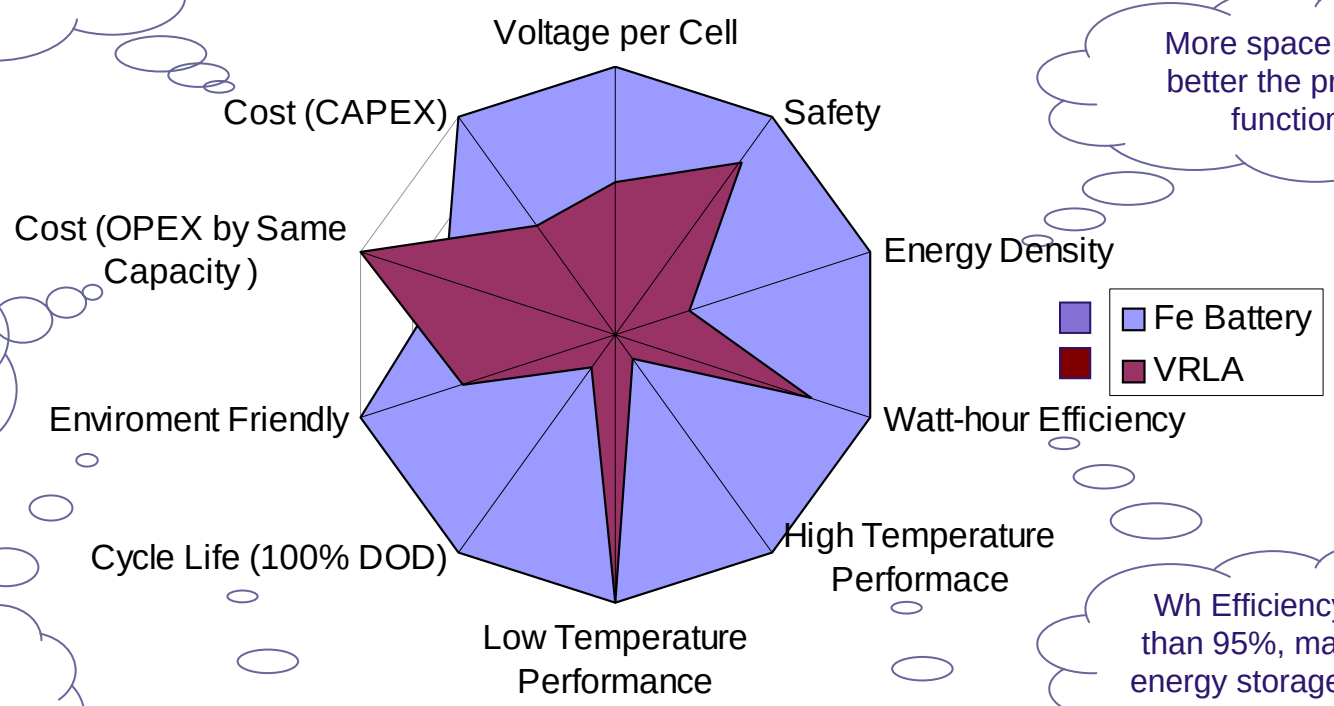
Standard Fe Battery Module



12V Fe Battery module support the use of any series and parallel.

Benefit of Fe Battery

Less battery capacity, Longer service life, Lower maintenance cost.



More space left to better the product function.

1.5 times cost than VRLA by same capacity, will cost down quickly.

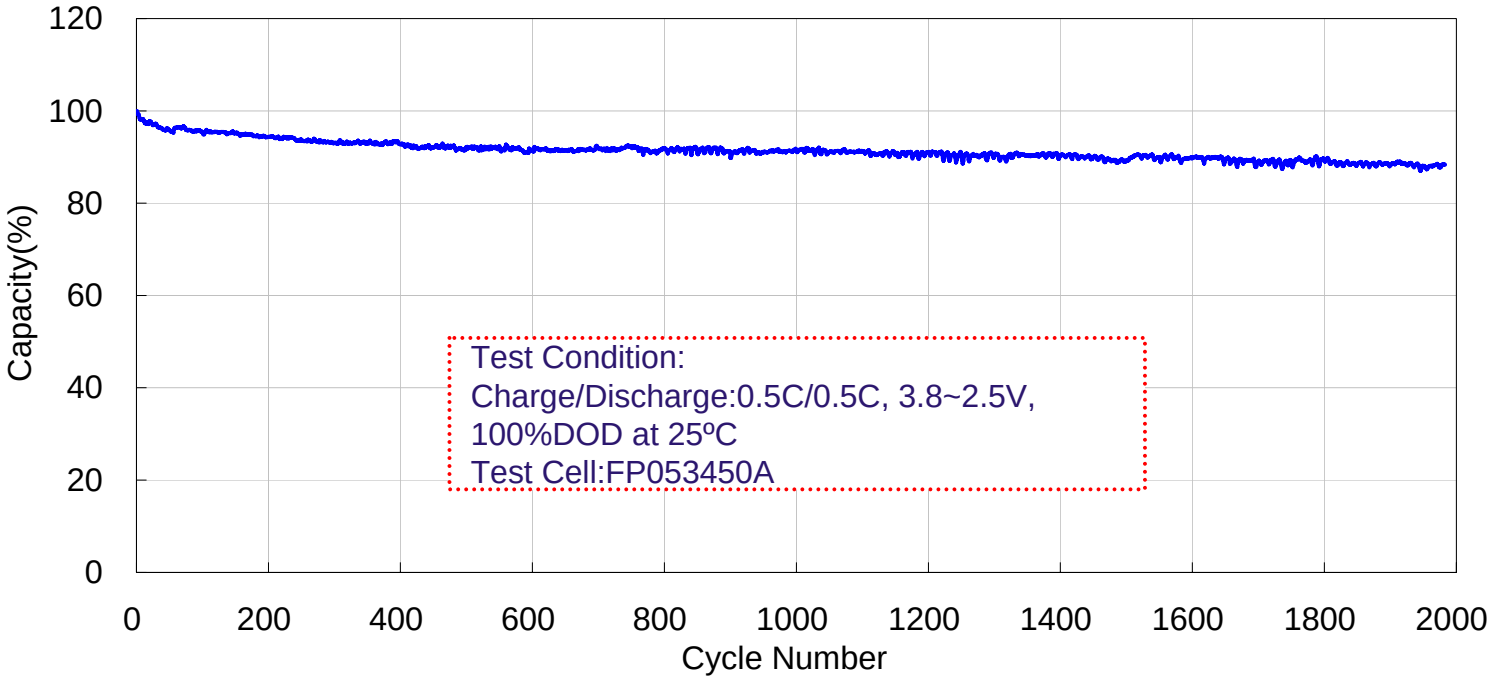
Green battery accumulator for green energy

Wh Efficiency more than 95%, makes the energy storage system more efficient.

Longer service time to reduce the maintenance cost.

To fit the high ambient temperature even up to 60 ℃

Fe battery: long cycle life



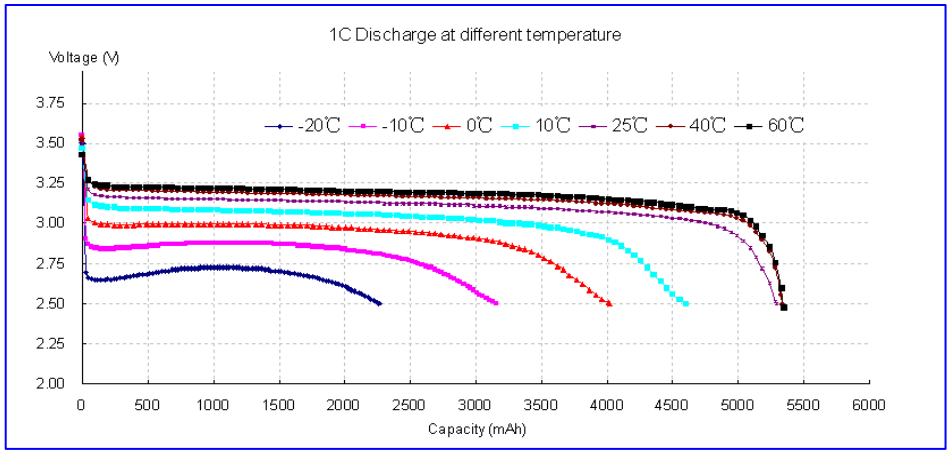
The same crystal lattice between $LiFe_{1-x}Co_xPO_4$ and $Fe_{1-x}Co_xPO_4$ and small volume change is in favor of cell cycle life.

Fe battery: high temperature performance

Delithiate compound with low oxidation ability: $Fe_{1-x}Co_xPO_4$.
Electrolyte is difficult to be oxidized at cathode surface in full charged cell.

Storage Condition		$LiFe_{1-x}Co_xPO_4$
60ºC/ 7days	Capacity Maintain Ratio	97.0%
	Capacity Recovery Ratio	95.4%
85ºC/ 48hours	Capacity Maintain Ratio	85.7%
	Capacity Recovery Ratio	85.1%

$LiFe_{1-x}Co_xPO_4$ based Fe cell could be used at -20~60ºC



$LiFe_{1-x}Co_xPO_4$ based Fe cell has good performance at different temperature:

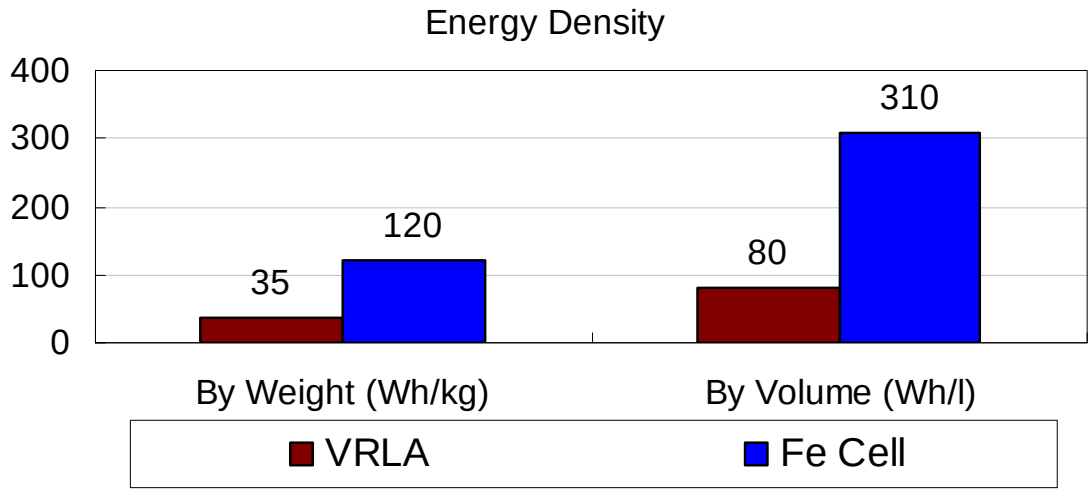
Low Temperature:

The ratio of -20ºC/25ºC is greater than 45%;

High Temperature:

The ratio of 60ºC/25ºC is greater than 105%;

Fe battery: high energy density



	VRLA	Fe Battery
Energy Density (By Weight)	★ 35Wh/kg	★★★☆ 120Wh/kg
Energy Density (By Volume)	★ 80Wh/l	★★★☆ 310Wh/l

- Four times energy density than VRLA!
- Much less weight and volume of accumulator;
- More space left for other equipment;
- Less location rent expenditure.

Fe battery: Environment Friendly

VRLA: Main Substance ⟶ Lead (Oxide, Sulphate), Sulphuric acid

1.The most material of VRLA is toxic chemicals to human, the manufacture process inevitably produces a lot of sources to pollute the environment.

2. When VRLA is in application, users should be well protected to avoid the toxicity.

3. Any treatment like recycling or rejecting will conduct to secondary pollution

Environment pollution & Toxicity!

Fe Battery: Main Substance ⟶ Fe

Fe is one element of most abundant resource and most commonly using in our life.

Fe battery is friendly to environment!

What BYD could do in power filed now?



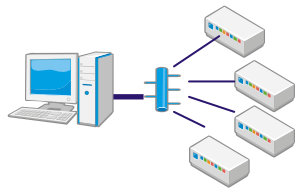


BYD Power Products



DPS (DC Power System)

Distributed Control System





UPS/ DC-AC Inverter

BYD Netpower

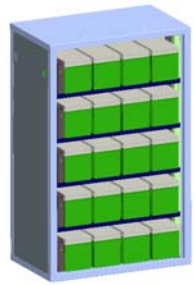
Solar Power System





Fe Battery Module

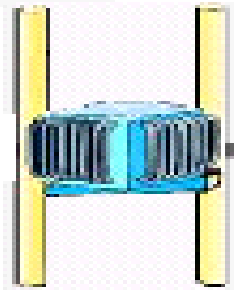
Fe Battery Accumulator System



Integrated BTS power solution



Commercial Power



(AC 380V)



DC 48V/24V



BTS



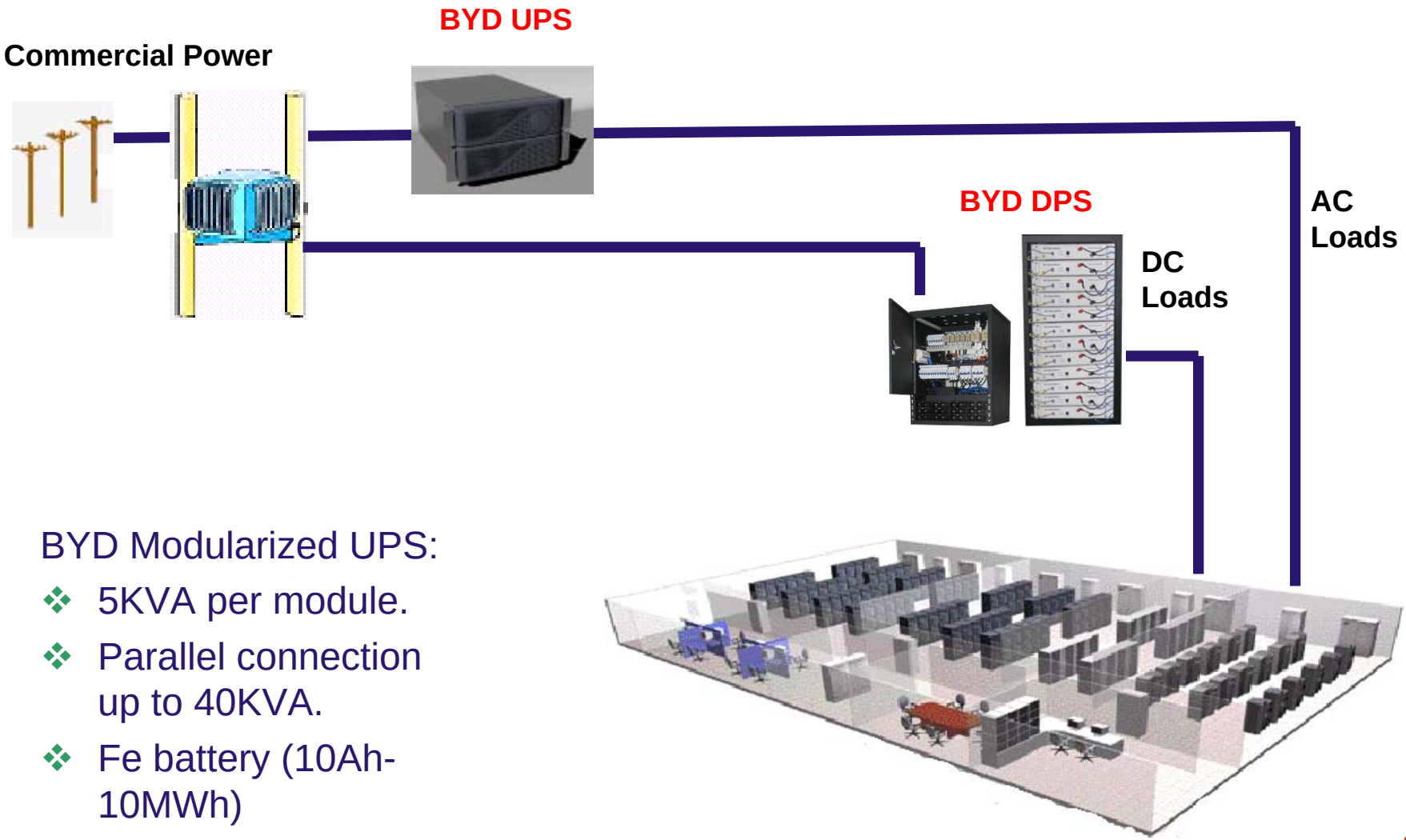
PV Panels



Wind Generator

BYD DPS

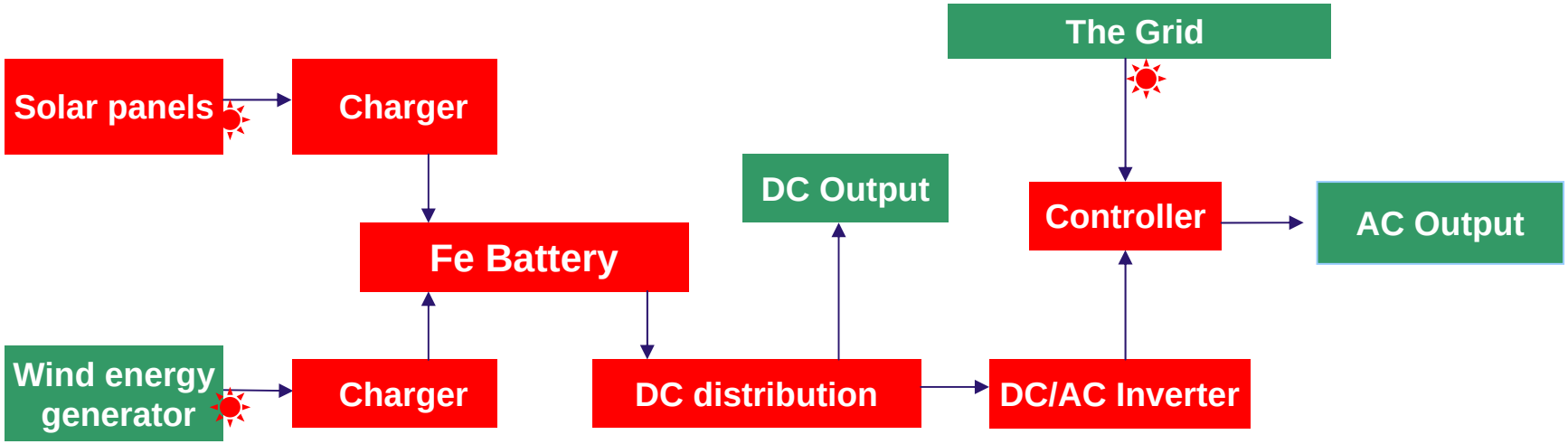
Data Center Power Solution



BYD Modularized UPS:

- 5KVA per module.
- Parallel connection up to 40KVA.
- Fe battery (10Ah-10MWh)

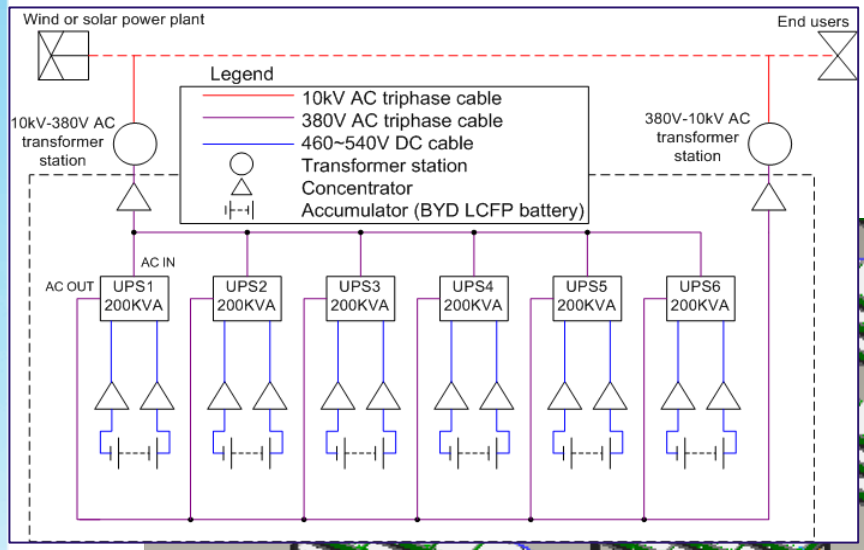
Solar/Wind Power Generation Solution







10MWh Energy Storage System Solution



HEV & EV

F3DM parameters:

- Range: 250km without gasoline
- Power: 50KW
- Electricity consumption: ⩽16kwh per 100km
- Fuel consumption: 6L/100km



E6 parameters:

- Range: 400Km per charge
- Power: 200KW
- Electricity consumption: 18kwh per 100km
- Quick charge: 50% capacity in 10min.
- Normal charge: 100% in 1h.



Further question & discussion



Thank you!

We are looking forward to our close cooperation in the near future.