

# 基站铝燃料交流、直流电源方案简介

## Solution Introduction of Aluminum Fuel AC and DC Power for Base Station



北京天启金桥工程技术公司

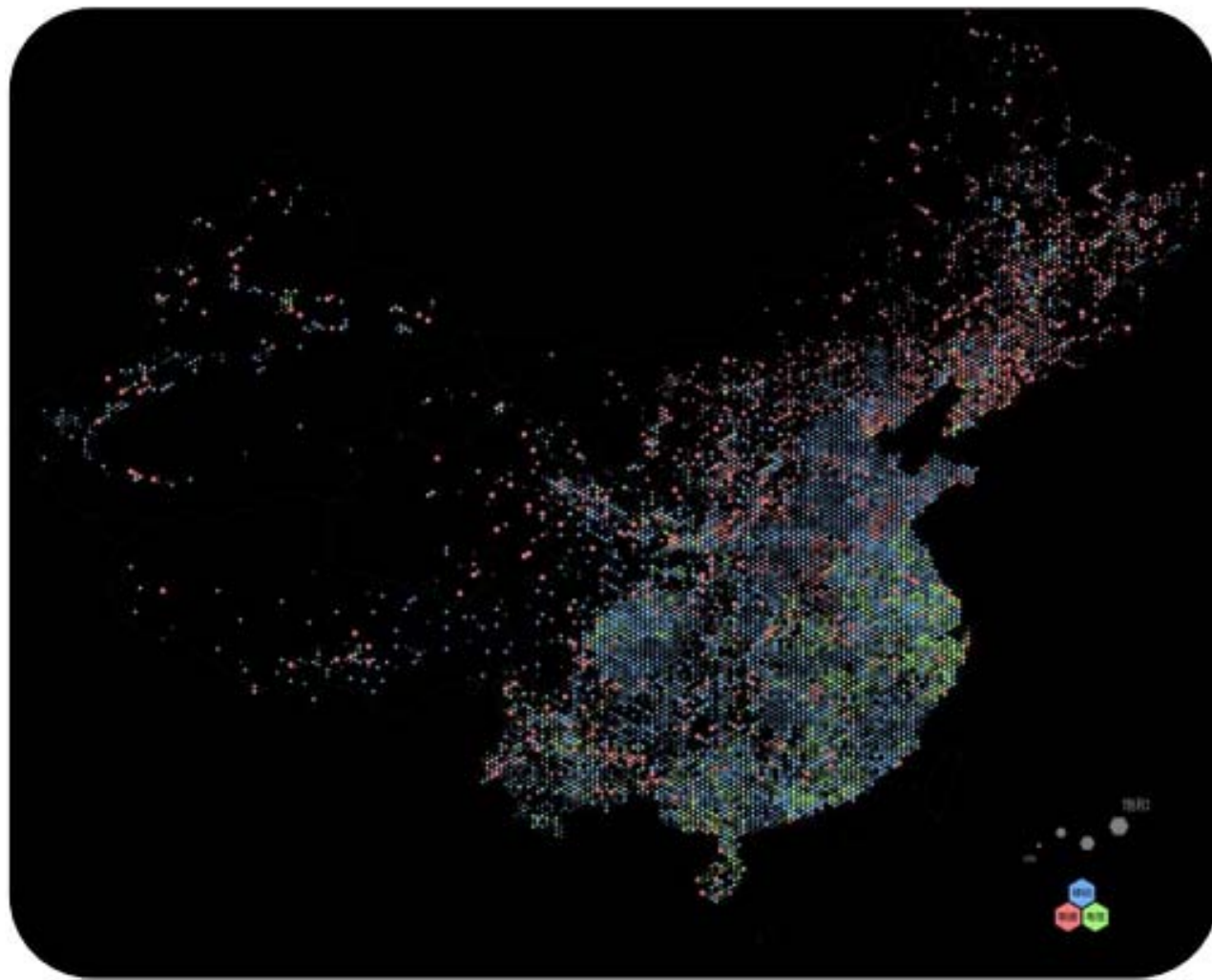
Beijing Golden Bridge Engineering Technology Co., Ltd.

December 2016

- 中国基站分布图

Distribution map of Base Station in China

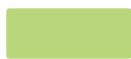
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2014年



Quantity of mobile communication base station



Quantity of 3G base station



Net-increased quantity of mobile communication base station

2015年

中国通信行业基站总数超过400万个；  
运营商基站每年新增基本维持在30万个；

The total quantity of communication industry base station is more than 4,000,000.

Annually, the operator base station increases 300,000.

2016年

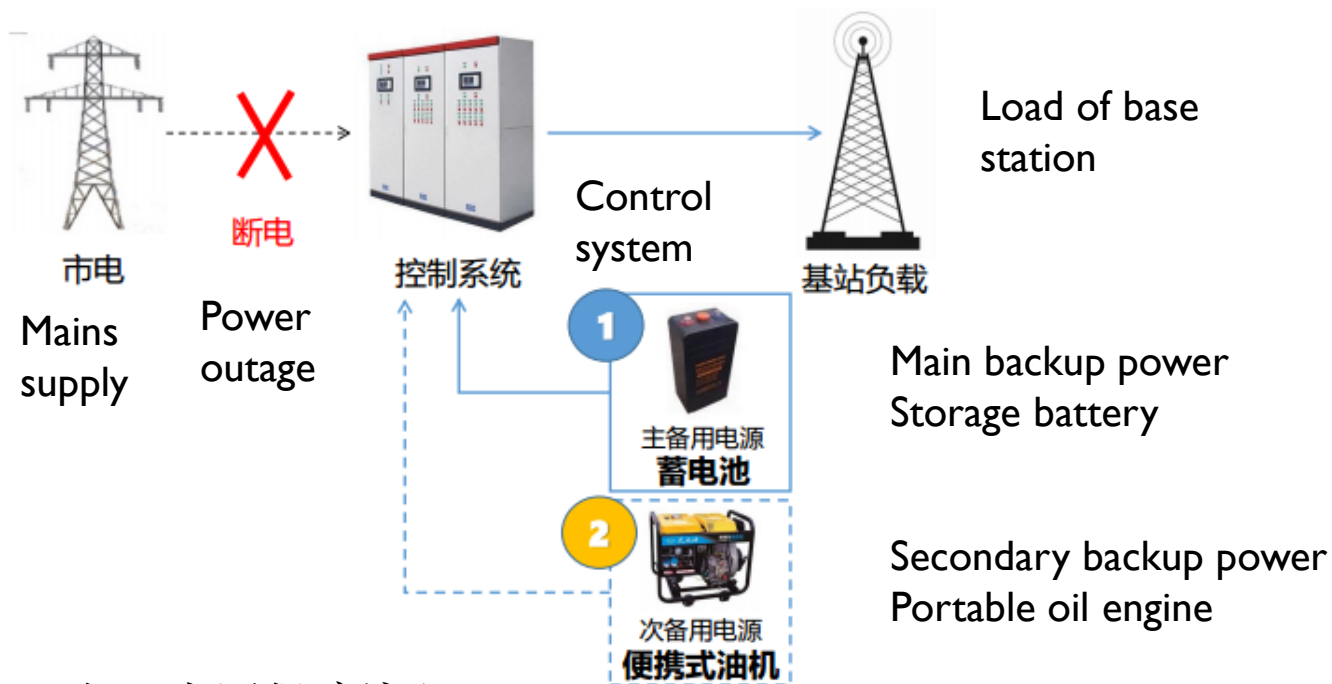
4G网络的快速发展，年新增基站超过100万个；  
5G时代即将到来.....

With rapidly develop of 4G network, base station increases 1,000,000 annually.

5G network is coming.....

- 基站备用电源传统方案

## Traditional solution of backup power for base station



市电断电后，备用电源保障流程：

The support process of backup power after outage of mains supply is as follows:

- 1** 前2~3小时，由蓄电池保障；  
Storage battery supplies 2~3 hours after outage.
- 2** 蓄电池耗尽后，由油机保障  
Portable oil engine supplies after run out of storage battery.

- 基站备用电源方案遇到的挑战

## The challenges of backup power for base station

### 1 蓄电池 Storage Battery

能量密度低: 38.5Wh/kg, 重量大, 体积大

Low energy density: 38.5Wh/kg, heavy, large size

使用寿命短: 3~6年

Short service life: 3~6 year

对环境要求苛刻: 最佳工作温度在25°C (需配备空调)

Rigorous environment condition: optimum working temperature is 25°C (with air conditioning)

维护难: 单只故障, 则整组供电中断; 电池真实电量很难掌握

Difficult maintenance: The whole group power supply interrupts when single unit is broken. It is difficult to master actual power of the battery.

环保问题: 铅, 硫酸等容易造成环境污染

Environmental issues: lead, sulfuric acid and others pollute environment.



- 基站备用电源方案遇到的挑战

## The challenges of backup power for base station

2

### 便携式油机 Portable oil engine



安全性差：汽柴油挥发性强，易燃易爆

Bad safety: high volatility, flammable and explosive gasoline and diesel oil

维护使用成本高：每次发电需要配备专业人员和车辆

High costs of maintenance and use: It is necessary to provide specialized persons and vehicle for each power generation.

噪音扰民：发电噪音大，市区基本无法配备

Noise disturbing: big noise of power generation is not suit for city center.

效率不足：10KW油机容量小，发电时只能分级保障

Low efficiency: low capacity of 10KW oil engine due to supply by levels.

搬运问题：油机和柴油的运输

Problem of transportation: transportation of oil engine and diesel oil

- 基站备用电源方案遇到的挑战

## The challenges of backup power for base station

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网络的全覆盖是几大运营商的竞争焦点  
Full coverage of network is focused by  
leading operators

4G、5G宽带和设备耗能巨大  
Huge energy consumption of 4G, 5G  
broadband and equipments

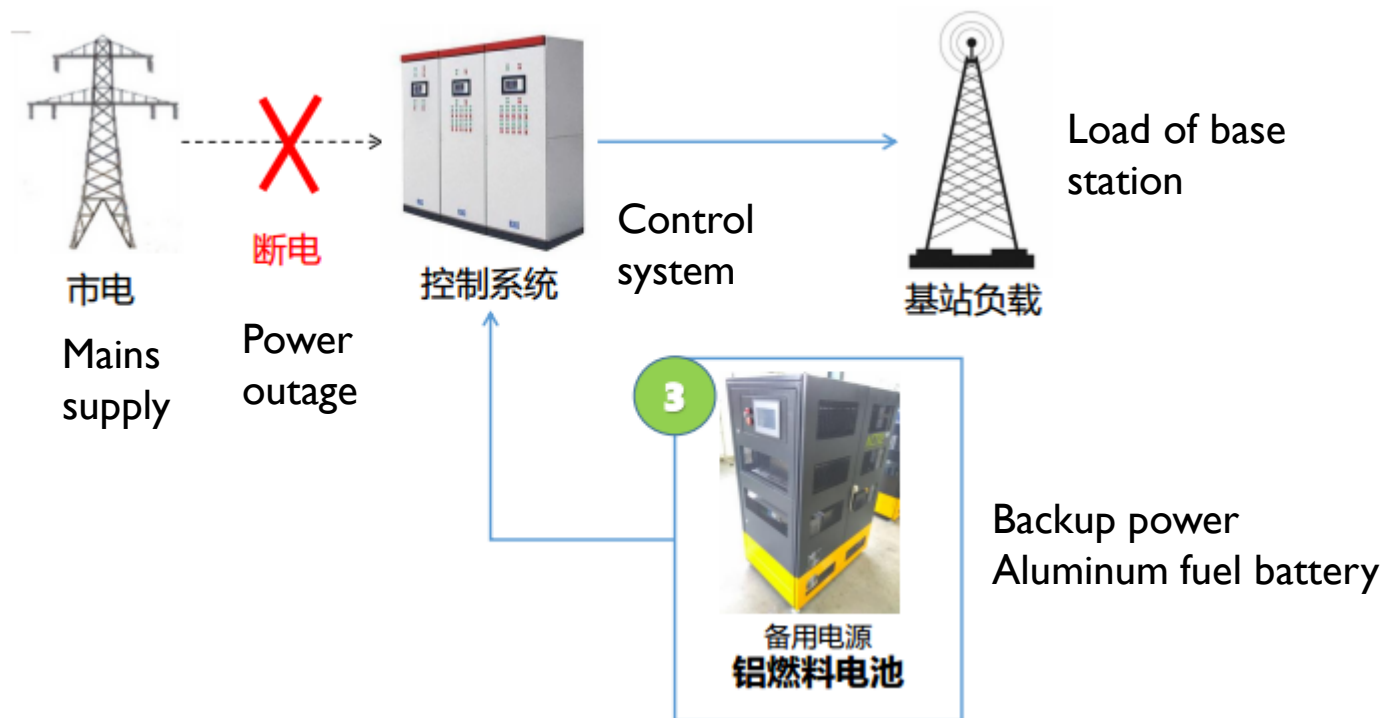
导致运维成本节节攀升  
Steadily rise costs of  
operation and  
maintenance





• 基站铝燃料备用电源方案

Solution of aluminum fuel backup power for base station



市电断电后，备用电源保障流程：

The support process of backup power after outage of mains supply is as follows:

- 3 提供6小时X (N+1) 备用供电方案  
Provide backup supply solution 6 hours X (N+1)

- 基站铝燃料备用电源方案

## Solution of aluminum fuel backup power for base station



1 公司企业标准

Enterprise standard



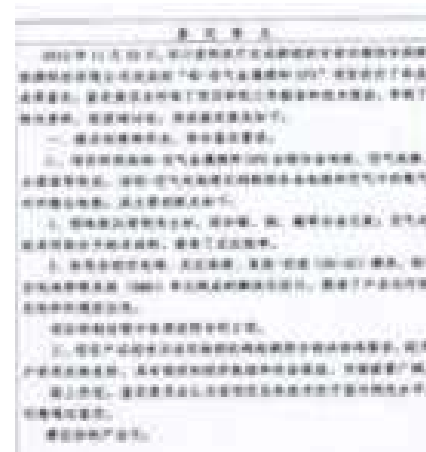
2 通信基站技术规范

Technical specification of communication base station



3 检验报告

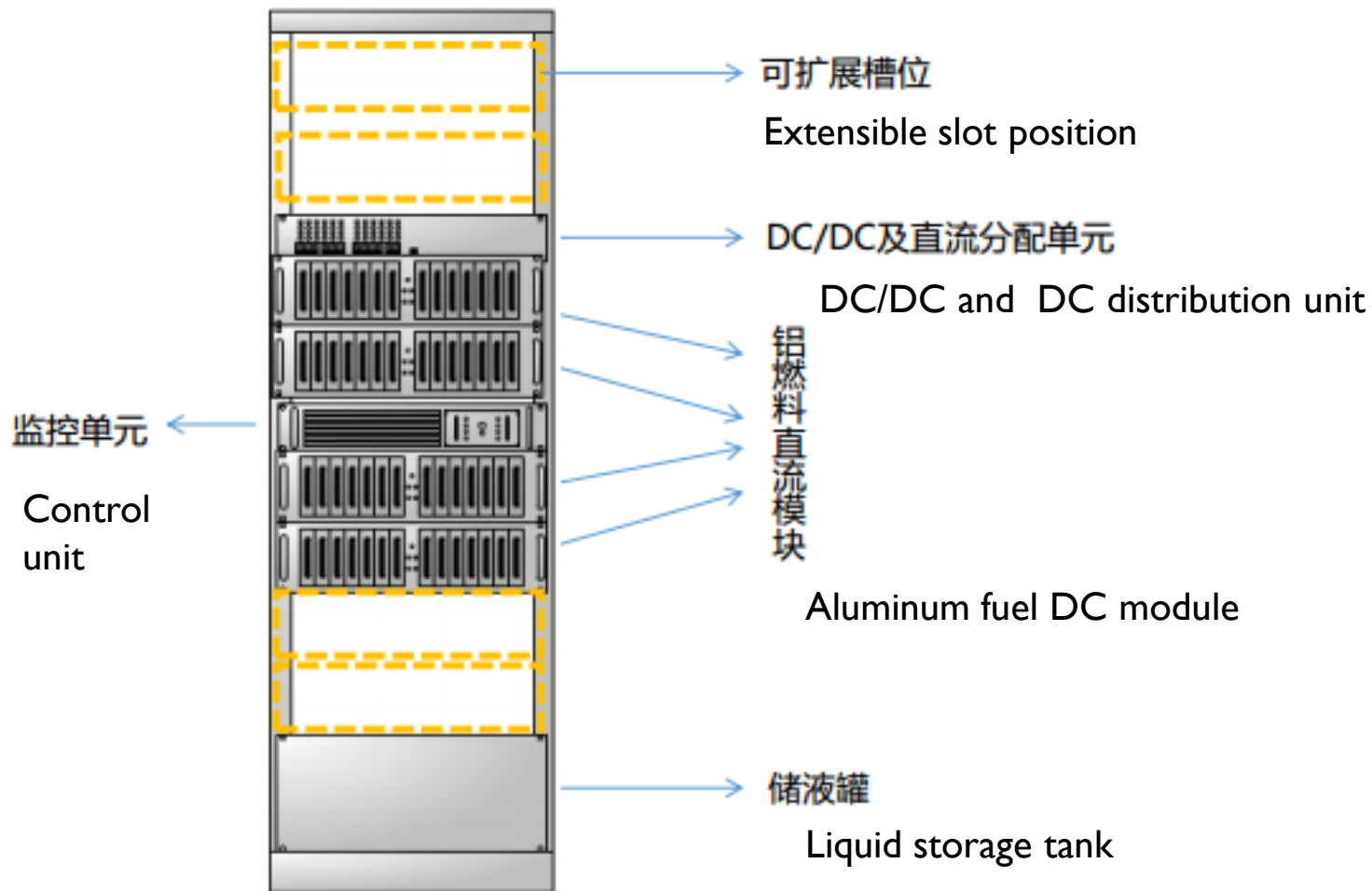
Test report



4 省经信委组织专家组意见

Advice from expert group of Province Municipal Commission of Economy and Information Technology

- 模块化- 6 X (N+1)方案  
Modulation 6 X (N+1) solution



- 模块化- 6 X (N+1)方案  
Modulation 6 X (N+1) solution

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铝燃料直流电源系列为例：

Take aluminum fuel DC power for example:

- 以最小6小时为基本保证时长

It supplies 6 hours at least.

- 无需改变现有机房电源系统机构

It uses exiting power system of machine room.

- 电源模块可以热插拔

Power module accepts hot plug.

- 维护简便

Maintenance is simple and convenient.

- 可与现有铅酸组成并行供电模式，也可单独使用

It is parallel operation with existing plumbic acid or used alone.

- 智能化-实时远程监控功能  
Intelligent - real-time remote monitor function



远程生成实时表单

时间	电压	电流	功率	温度	湿度	光照	PM2.5	PM10	CO2	噪声
2023-10-27 10:00	220V	5A	1100W	25°C	60%	1000 lux	35 μg/m³	70 μg/m³	400 ppm	55 dB
2023-10-27 10:05	220V	5A	1100W	25°C	60%	1000 lux	35 μg/m³	70 μg/m³	400 ppm	55 dB
2023-10-27 10:10	220V	5A	1100W	25°C	60%	1000 lux	35 μg/m³	70 μg/m³	400 ppm	55 dB

table of real-time remote

- 铝燃料电源方案带来的改变

## Changes of aluminum fuel power solution

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安全性好：不存在由短路引起的起火爆炸等隐患

Good safety: no fire and explosion caused by short circuit

比能量大：500Kw.h

Large specific energy: 500Kw.h

绿色环保：无毒，无污染

Green environmental protection: non poisonous and pollution

模块化：6 X (N+1)模式

Module: 6 X (N+1)

智能化：远程监控

Intelligent: remote monitor

运行成本低：每千瓦电费与汽柴油价格相当，采用循环经济模式后运行成本更低

Low operating cost: the electric charge of each kilowatt is similar with gasoline and diesel oil. The operating cost is cheaper when open circular economy modes.

- 铝燃料电源方案带来的改变  
Changes of aluminum fuel power solution
- 

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大幅度降低综合成本  
Sharply decrease  
composite cost



- 案例——国内某基站

基站状况：该基站3个月停电4次，最短30分钟，最长7小时

Case – A base station in China

Condition: 4 times power outage in 3 months with 30 minutes minimum and 7 hours maximum

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### 原方案—铅酸电池

Previous solution – lead-acid battery

- 电池容量 battery capacity : 200Ah/48V
- 保障时长 time of power supply :3小时 hours
- 负载电流 load current: 30A

结果 Result:

无法完全保障，采用油机作为二次保障

Can not supply completely;

Need oil engine as secondary supply



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升级方案——铝燃料直流电源

New solution- aluminum fuel DC power

- 单次装电量 once charge quantity : 48kwh
- 保障时长约 time of supply about: 16小时 hours
- 额定放电功率 rated discharge power: 1.5kw

结果 Result:

4次供电后仍然保有28kwh电量，剩余保障时长约8小时。

There is 28kwh after 4 times supply and supplies about 8 hours.

安装铝燃料直流电源后不需要油机作为二次保障，大大节省人力成本。

The aluminum fuel DC power does not need oil engine to save labor cost.

- A2XGPZ-I500B/48——系统参数

System parameter



### 输出 Output

额定输出的电压 Rated output voltage	DC 48V
电压可调范围 Adjustable range of voltage	43.2-57.6V
额定输出电流 Rated output current	20A/30A/50A
额定输出功率 Rated output power	额定 rated 1KW/1.5KW/2.5KW
过载 Overload	150%:10s; 110%:5min

- A2XGPZ-I500B/48——系统参数

System parameter



控制及运行特性

Characteristic of control and operating

控制模式 Control mode	手动（发电机模式）/自动（UPS模式） /远程控制 Manual operation (electric generator mode) / Automatic (UPS mode)/ Remote control
额定功率运行时长 Operating time of rated power	单次添加燃料运行4-32小时 Running 4~32 hours each underfeed
噪音 Noise	离机柜1M时 < 45db Noise less than 45db at one meter away from machine

- A2XGPZ-I500B/48——系统参数

## System parameter


**外观 Appearance**

尺寸 size (长 L*宽 W*高H, mm)	950*670*1380
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**环境条件 Environmental condition**

运行湿度 Operating humidity	< 90% RH
防尘 Dust prevention	无爆炸性气体/无导电尘埃 No explosive gases No conductive dust
工作环境温度 Working temperature	-10℃~40℃
允许倾斜度 Allow inclination	水平安装 Horizontal installation
海拔 elevation	< 4000m

- 基站用备用电源方案对比  
Comparison of backup power for base station



	铅酸电池 Lead acid battery
使用寿命 Service life	3-6 年 year
备用时间 Time of supply	2~3小时 hour
备份能力 Back up capacity	单只故障，则整组供电中断 The whole group power supply interrupts when single unit is broken.
抗灾能力 Capacity for resisting disaster	弱，长时间断电永久损坏 Bad irremediable damage by long time outage
日常维护 Routine maintenance	测试困难，监控复杂 Difficult test and complex monitor
环境适应 Environmental adaption	25℃（配空调保持室温） ( need air conditioning to control room temperature)
污染 Pollution	铅，硫酸等容易造成环境污染 lead, sulfuric acid and others pollute environment.

- 基站用备用电源方案对比  
Comparison of backup power for base station



	铝燃料电源 Aluminum fuel power
使用寿命 Service life	15年 year
备用时间 Time of supply	30~50小时 hour
备份能力 Back up capacity	模块化，热插拔 modularity, hot plug
抗灾能力 Capacity for resisting disaster	断电易恢复 Easy to recover when outage
日常维护 Routine maintenance	简单，可远程监控 Easy, remote monitor
环境适应 Environmental adaption	-20~60℃，不受环境温度影响 Can not influence by environmental temperature
污染 Pollution	无污染，副产物可循环利用 No pollution Cyclic utilization of by-product



- 基站用备用电源方案对比

## Comparison of backup power for base station

	油机 oil engine
使用寿命 Service life	/
备用时间 Time of supply	根据携带油量 according to quantity of oil
备份能力 Back up capacity	较强 strong
抗灾能力 Capacity for resisting disaster	较强 strong
日常维护 Routine maintenance	维护较复杂，监控复杂 Complex maintenance and monitor
环境适应 Environmental adaption	最佳工作温度80℃ Optimum working temperature
污染 Pollution	废气，噪音 waste gas and noise

THE END



**Beijing Golden Bridge Engineering Technology Co., Ltd.**