

低压直流在山西农村的实践

Practice of Low Voltage Direct Current in Rural Areas of Shanxi Province

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C e n t e r



项目目的

Purpose of the project

- 验证农村在能源变革中的潜力

To verify the potential of rural areas in energy reform

- 验证低压直流在能源革命的技术优势

To verify the potential of rural areas in energy reform

- 打破能源生产和交易垄断，引入竞争

To break monopoly of energy production and trade and introduce competition

- 推进农村再电气化，提高百姓生活水平

To promote rural re electrification and improve people's living standards

- 保护生态环境，促进绿色发展

To protect ecological environment and promote green development

为什么选择在山西芮城县

Why in Ruicheng, Shanxi

- ❑ 山西是我国产煤大省，迫切需要能源转型
Shanxi is a major domestic coal province in China, which urgently needs energy transformation
- ❑ 山西政府争当我国的“能源革命排头兵”
Shanxi government strives to be the "leader of energy revolution" in China
- ❑ 芮城县是我国的光伏领跑基地，基础比较好
Ruicheng County is China's leading photovoltaic base with a relatively good foundation
- ❑ 芮城县政府重视，百姓支持
Ruicheng County Government attaches great importance to it, and the people support it



项目地理位置

Location of the project



为什么选择用直流

Why DC

□ 交流电网消纳分布式能源的压力与日俱增

The pressure of AC power grid to absorb distributed energy is increasing day by day

□ 新能源\储能\用电设备的都具备直流属性

New energy, energy storage and electric equipment all have DC property

□ 电力电子技术的发展消除了发展直流的障碍

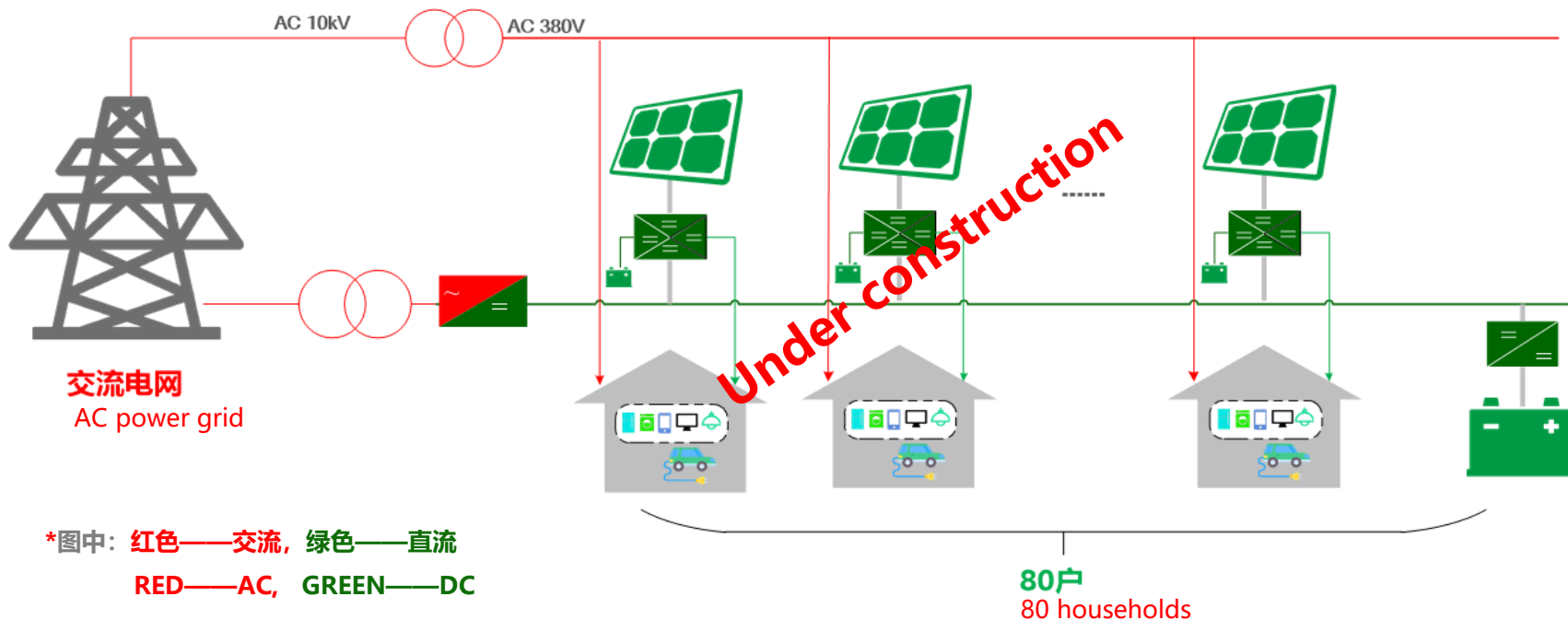
The development of power electronic technology has eliminated the obstacles to the development of DC

□ 直流的优势不断被挖掘：安全、可靠、绿色、高效、智慧

The advantages of DC have been continuously exploited: safe, reliable, green, efficient and intelligent

农村低压直流电网的结构

Structure of rural low voltage DC power grid



光储直柔的可行性

The feasibility of PV energy storage DC flexible system

- 直流家电—负荷的电压等级选取及直流化技术
DC Home Appliances-Load Voltage Level Selection and DC Technology
- 直流保护—模拟式向数字化的转变
DC protection-the transition from analog to digital
- 直流入户—户用能量路由器
DC power distribution to house-household energy router
- 安全防护—接地形式、漏电保护、主动灭弧
Safety protection-grounding form, leakage protection, active arc extinguishing
- 协调控制—电压带与功率平衡
Coordinated control-voltage band and power balance

农村低压直流系统关键产品

Key products of rural low voltage DC system



household energy router



Grid connected inverter



DC branches protection



Insulation and leakage protection



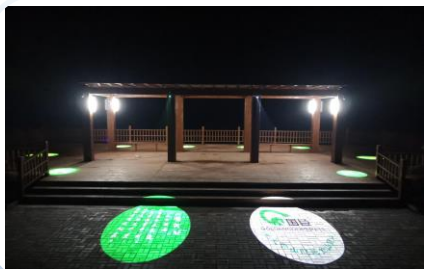
Management system

项目怎么落地

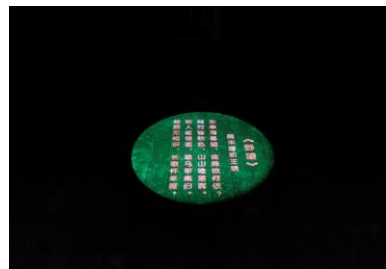
How to implement the project

□解决沿黄公路“无电场景”的用电需求

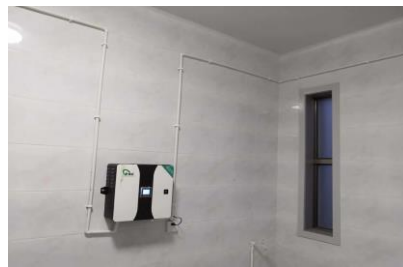
Solve the power demand of "no electricity scenario" along the Yellow River Highway



Viewing platform



Public toilets



项目怎么落地

How to implement the project

- 跟当地“文化保护”结合
Combined with local "cultural protection"



项目怎么落地

How to implement the project

□跟当地“清洁取暖”“农村再电气化”结合
Combined with local "clean heating" and "rural re electrification"



项目预期

Project expectations



□ 预期2020年10月底完工30户左右的联网运行

It is expected to complete the LVDC grid interconnection operation of about 30 households by the end of October 2020

□ 全县推广后的效益预期

Benefit expectation after promotion in the whole county

1) 形成装机容量220MW

Installed capacity will be increased by 220MW

2) 年新增发电量3.3亿度

The annual new power generation is 330 million kWh

3) 年CO2减排量25.4万吨

The annual CO2 emission reduction is 254,000 tons

项目预期

Project expectations



□ 全省推广后的效益预期

Expected benefits after promotion in the whole province

1) 形成装机容量约20GW

Installed capacity will be increased by 20GW

2) 年新增发电量300亿度

The annual new power generation is 30 billion kWh

3) 年CO2减排量2300万吨

The annual CO2 emission reduction is 23 million tons



Thanks

感谢关注和支持

