

UNITED NATIONS DEVELOPMENT PROGRAMME

联合国开发项目



CAPACITY BUILDING FOR THE RAPID COMMERCIALIZATION OF RENEWABLE ENERGY

加速中国可再生能源商业化能力建设

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中国村级互补系统发展的挑战与机遇

Challenges and Opportunities for Village Power Development in China

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Village Power Sustainability Workshop

村级电力持续发展研讨会

Beijing, China

中国，北京

December 6-7, 2002

2002年12月6日—7日

Before the National Program

乡乡通工程之前



After the National Program 乡乡通项目完成以后



Challenges and Opportunities

挑战与机遇

- **Challenges 挑战**

- Front end funding, no reserves 前期资金投入高
- Coordination for training 培训的协调工作
- Lack of established management system 缺乏已经制定的管理机制
- Revenue, ownership, responsibilities issues 税务、所有权、责任等问题

- **Opportunities 机遇**

- Critical mass for economic development 经济发展的关键点
- Platform for testing business models 测试商业模式的平台
- Regional development framework 区域发展的框架

Bei Long Dao 北龙岛



Kezhou Xinjiang 新疆喀什



Community Power Project Development

社会电力项目开发

System Management 系统管理

Business Development 商业
开发

Project Financing 项目融资

Monitoring 监测

Marketing 销售

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Productive Loads 生产负荷

Village Enterprise 村级企业

Education, Health, and Advanced
Communications 教育、健康以及先
进的通信

Cost Recovery 成本回收

Hybrid Village Power Survey

村级风光互补系统调查



Management Systems in China

中国的管理机制

- **Utility management**
- 电力部门的管理
- **Community cooperatives or companies**
- 社区、团体合作、合作或者公司
- **Issues**
- 问题
 - Ownership and responsibilities 所有权和责任
 - Financial and technical capacity 经济和技术上的能力
 - Revenue stream ownership 税收部分的所有权
 - Framework for resolving issues 问题的决定性框架
 - Contract system 合同体制

Business Management Model

商业管理模式

- **Critical mass of systems** 系统的界限
- **Private company or service company operates system** 由私营的公司或者是服务公司运营系统
- **Can be subsidiary of system integration company** 可以作为系统一体化公司的补充
- **Manage several systems to reduce costs** 利用同时管理多个系统来降低成本
- **Local operator, routine professional maintenance** 当地的操作员，日常专业维护
- **Technical backup for emergencies** 对紧急状况的技术后援
- **Financial incentives** 经济上的激励
- **May have additional business interests** 具有其它的商业利益的可能

Business Management Issues

商业管理问题

- **Ownership of systems and revenue stream** 系统的所有权和税收
- **Resistance based on perception** 在理解的基础上的抵触
- **Insufficient revenue base** 税收基础的不足
- **Limited liability** 有限的的能力
- **Critical mass opportunities** 机遇界限
 - Extended warranties 更长更大范围的担保
 - Management cost reduction 管理成本的减少
 - Increased quality of system management 系统管理质量上的提升
 - Expansion of economic development options 经济发展选择面的拓展

Pricing Considerations

价格问题

- **Electricity tariffs must cover staff salaries, O&M costs, replacement costs, and emergency contingency**
- 电力税包括了员工的薪水，运行和维护成本，更换成本以及突发事件的成本
- **Revenues determined by wind/solar resource, system performance, and load consumption**
- 税收由风/光资源系统的运行和消费量负荷决定
- **Recommendation: Establish an initial tariff and adjust after one year based on economic analysis**
- 建议：建立一个初步的税收标准并在一年以后的经济分析的基础上做出调整
- **Recommendation: Separate escrow bank account for system replacements from operating bank account**
- 建议：将用于系统更换的银行帐户和系统运行银行帐户分开管理，为系统更换的资金特设一个帐户并限制使用资金的权限以保证其在更换系统时可用。（可以是一个银行的两个帐户或者在两个不同的银行）

Community Discussions

各团体讨论



**Xinjiang Kezhou Management
Coordination 新疆管理协调会**



**Bei Long Dao Community System
北龙岛社会系统**

Global Village Energy Partnership

全球村级能源合作伙伴

NGOs

Private Sector

Developing & Industrialized Country Governments

Financial Institutions



GVEP:
70
partners



Consumers

Multilateral Organizations



GVEP Support

GVEP 的支持

- **Regional workshops and conferences** 区域研讨会
- **Training** 培训
 - **Practitioners, business development** 从业人员, 商业开发
 - **Microcredit and enterprise**
- **Investment sources** 投资来源
- **Information databases and exchanges** 信息库和信息交换

Project Monitoring 项目监测



- Wind/solar resource 风、光资源
- Energy production 能源生产
- Village load 村级负荷
- Operation/maintenance 运行/维护
- Replacement costs 更新费用
- Energy cost/price 能源成本/价格
- Economic impact analysis 经济影响分析

Wind/Solar Resource Assessment

风、光系统评估



UNDP Project Assistance

UNDP 项目的援助

- **Project Development Guidebook and other sources of information** 项目开发指导手册和其它信息来源
- **Training and workshops** 培训和研讨会
 - Xinjiang workshop on productive uses 以生产使用作为新疆研讨会的主题
 - Village power regional workshop in Zhejiang 浙江的村级电力系统区域研讨会
 - Input for training assistance for NTEP 作为对培训的援助 NTEP将参与

Conclusions

结论

- **National Township Electrification Program is a bold initiative by the Chinese government – opportunities and challenges** 乡乡通电项目是中国政府的一个大胆的激励政策——意味着机会和挑战
- **Represents a major capital investment program for village power** 为村级电力系统提出了一个主要的投资项目
- **Needs assistance in several support areas** 在多个支持领域都需要援助
- **Creates opportunities and challenges for the international community** 为国际团体创造了机遇与挑战

Proposed Implementation Plan-CY2003

2003年建议执行方案

<p>Action Plans 行动计划</p>	<p>-Regional Workshops and Conferences: -- Africa Workshops: East 10/22-24; West 1/03 -- LAC Reg Conf (6/03);Asia/APEC Conf (9/03) -- COP 9 Meeting (10/28-11/9) - 3-5 action plans completed; 3-5 in process</p>
<p>Capacity Development 能力建设</p>	<p>-Practitioner workshops (5) -Training courses (5) -Business toolkits (3) - Advisory services (entrepreneurs/consumer orgs) - Project opportunities and ID support</p>
<p>Financing Facilitation 经济增长</p>	<p>- Microcredit organizations trained (>25) - Seed capital fund structured & capitalized (\$5M) - Business incubation services provided (50 firms)</p>

Proposed Action Plan-CY2003

2003年的行动计划方案

Financing Facilitation (Cont)	<ul style="list-style-type: none">-Investments for village energy projects/programs by MDBs/local financial institutions-Innovative guarantee and risk reduction facilities-Catalogue/leverage investment sources-Develop financing portal- Local banker training & train-the-trainers program (over 2500 bankers trained)
Knowledge Management	<ul style="list-style-type: none">- Catalogue partner roles/interest (70 partners)- Best practices guides (3)- Monthly E-mail Newsletters- Professional Registry Operational- Project profiles established- 3-5 radio/local media campaigns

Proposed Action Plan-CY2003

Monitoring & Evaluation	<ul style="list-style-type: none">- With partners, develop set of global indicators (max 10)- With partners, develop set of project indicators- Collect baseline data- Publish results (December 2003)
Technical Secretariat	<ul style="list-style-type: none">- Secure partners and funding- Develop work plan & budget- Conduct core activities (KM, M&E, planning, service coordination)- Oversee implementation- Support Executive Board- Organized Biennial Meeting (2003 planning;2004 event)

Extended Objectives

- **Additional training for economic development applications and business development**
- **Result: Economic impact on villages from project**
- **Work with health clinics and schools**
- **Result: Project development for health and education services**
- **System monitoring and project promotion**
- **Result: Good understanding of system performance and impacts and creation of a market development campaign**

Objectives for Kezhou Project

- Core for regional village power project development in Kezhou District
- Demonstration of cost effective, commercial, and state-of-the-art hybrid village power system
- Demonstration of best practices for grid network, customer connections, and load management

Objectives for Kezhou Project

- Demonstration of effective management system for the village power system including business development
- Demonstration of economic development with hybrid village power system
- Broad information dissemination

Standards and Quality Assurance

- Village power system
 - Housing for control system, batteries, diesels (local construction codes)
 - Wind/PV/battery/diesel system (international best practices)
 - Equipment inventories and control (UNDP audit procedures)
 - Wiring up to distribution panel

Standards and Quality Assurance

- Village and customer grid system
 - Transmission and distribution feeders, transformers, etc. (utility codes)
 - Customer connection (international best practices); conduits to meters, use fuse box/circuit panel, safe internal wiring
 - Load management (international best practices); no resistive heating loads, qualify motors, energy efficient lighting and appliances

Installation of Power Systems



Transmission Line in Gansu



Transmission Line on Bei Long Dao



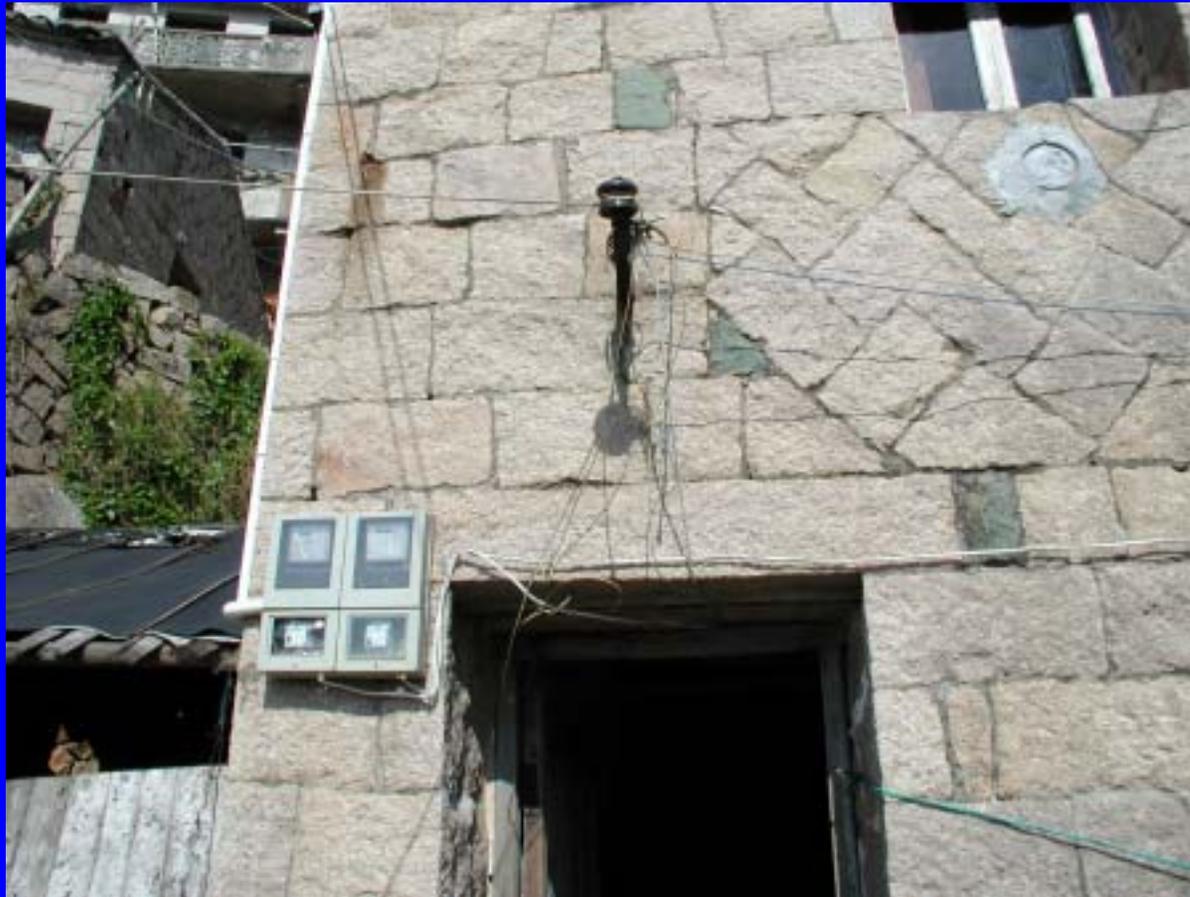
Distribution Network



Customer Connection



Customer Wiring/Appliances



Management Issues



Management Issues



Management System Objectives

- **Sustainable operation of the village power system**
- **Clearly define ownership and responsibilities**
- **Smooth communications between all parties**
 - Village customers
 - Provincial, district, county, and township governments
 - Technicians, company management, experts
- **Framework for resolving issues**

Management System Functions

- **Establish a company to manage system**
- **Maintain and operate system**
- **Repair system and replace parts**
- **Collect revenues, electricity tariffs**
- **Financial management, bank accounts, pay taxes, etc.**
- **Advisory or arbitration board**

Management System Functions

- **Set standards for system operation and use**
 - Includes performance and safety standards
 - Includes customer wiring and load management
- **Customer service agreements**
 - Define responsibilities of system owner/manager
 - Define responsibilities of customer
 - Define remedies in case of default

Management System Functions

- **Maximize system benefits**
 - Identify economic development applications
 - Fair pricing: system requirements vs. customer benefits
- **Future project decisions (e.g. expansion)**
- **Project promotion**

Management System Components

- **System owner, must be clear**
- **Power company**
- **Community advisory or arbitration board**
- **Government co-investors**
- **Customers: residential, business, industrial**
- **Expert contractors**
- **Other (utility company?, etc.)**

Management System Agreements

- **Contract, lease, or other from owner to power company**
- **Customer service agreements from power company to customers**
- **MOU or agreement between power company and advisory board**
- **Contract between system supplier and owner**
- **Technical support contract between power company and expert**
- **Implementation agreement**

Power Company and Owner Agreement

- **Define power company technical and financial obligations for O&M, repairs, etc. with RMB limits**
- **Define owner technical and financial responsibilities and liabilities**
- **Establish power company revenue sources**
- **Establish tariff collection mechanism and regulations**
- **Define financial system of bank accounts, accounting procedures**
- **Establish record keeping obligations and company regulations**
- **Safety procedures and customer service**
- **Dispute resolution mechanism**

Power Company Issues

- **System operators are local staff**
- **Good training program enforced**
- **Involve system operators from installation stage**
- **Power company should be managed by experts or have expert consultants**
- **Routine technical backup for local operators essential**
- **Power company must have clear written procedures at all levels**

Customer Service Agreements

- **What the power company must do**
 - Provide power at given reliability
 - Provide various forms of customer service
- **What the customer must do**
 - Make payments on time
 - Follow rules for using system
- **Dispute procedures and remedies**
- **Short customer survey (load use, etc.)**
- **Recommended load guide**