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# Rural Electrification by means of Renewable Energies

## Approach and Experiences from the Chinese Brightness Programme

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## CONTENT

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- **Financing and Tariffs**
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- **Socio-Economic Impact Monitoring**
- **Challenges and Lessons Learnt**



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## MAP OF CHINA



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## BACKGROUND

- Total Population of China: 1.3 billion
- 50 to 70 million still living below the poverty limit (< 65 €/head,year)
- Electrification rate: 97%
- 30 millionen people without access to electricity
- Development program for the Western Provinces is part of the 10th 5-Year-Plan 2001-2005
- Brightness-Programme is part of this development programme

## THE BRIGHTNESS PROGRAMME

- Target and Plan: Decentralized electricity supply for 23 millionen people by means of renewable sources of energy until 2010
- Total costs: US\$ 3 billion
- Pilot phase (1999-2001): US\$ 2.5 mil
- Township Electrification Program
- Village Electrification Program
- Technical Assistance from Germany

## TOWNSHIP ELECTRIFICATION PROGRAMME

- Part of the Brightness Programme
- Aim: Electrification of 1065 Townships
- Total Investment: 340 Mio US\$
- Size of plants: 5 – 200 kW
- Type of systems: Small Hydro, PV- and PV/Wind-Hybrid
- Installed Capacity: 18.6 MW PV,  
0.84 MW Wind  
264 MW Hydro



# TECHNICAL ASSISTANCE FROM GERMANY

## Components

- Capacity Building (Training on National and Provincial Level)
- Improvement of Technical Quality (Technical System Monitoring, Transfer of Knowledge)
- Socio-Economic Impact Monitoring





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## SYSTEM OWNERSHIP AND MANAGEMENT

### Options

- Technical Indicators
- Economic Indicators
- Social Indicators
- Ecological Indicators



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## FINANCING AND TARIFFS

### Components

- Initial Investment
- Battery Replacement
- Operation and Maintenance Costs
- Cross Subsidies



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## SYSTEM MONITORING AND QUALITY CONTROL

- **Technical System Monitoring**
  - Global Monitoring
  - Small Data Logging System
  - Detailed Data Logging System
  - Mobile Monitoring System
- **Technical Baseline Survey**
  - Questionnaires



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## SOCIO-ECONOMIC IMPACT MONITORING

### Indicators

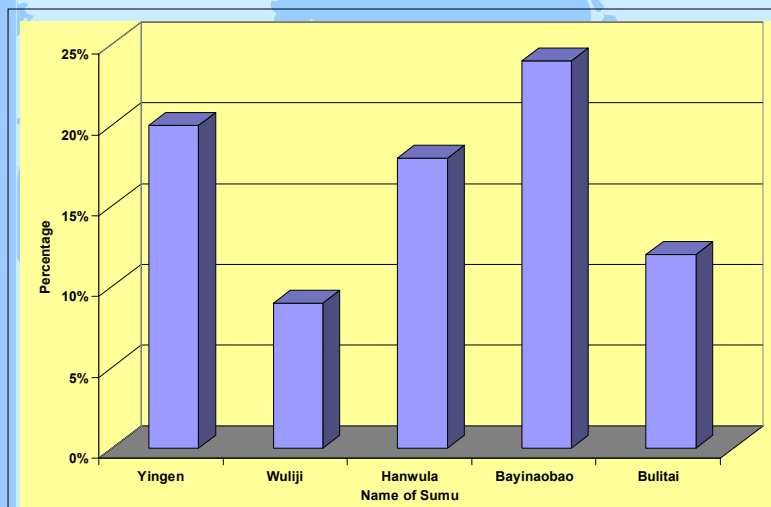
- Technical Indicators
- Economic Indicators
- Social Indicators
- Ecological Indicators



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## SOCIO-ECONOMIC IMPACT MONITORING

Example: Income Increase in Sumus in Inner Mongolia

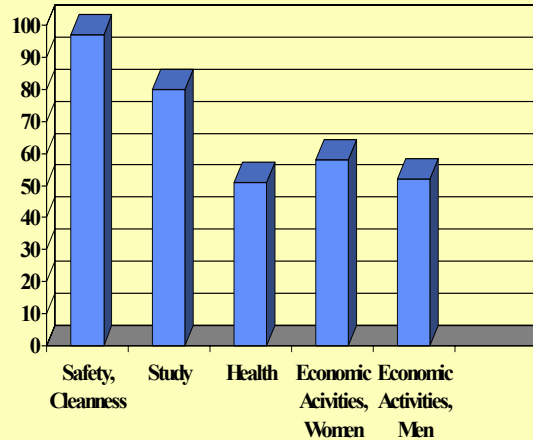




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## SOCIO-ECONOMIC IMPACT MONITORING

Example: Increase of Welfare in Namibia



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## CHALLENGES AND LESSONS LEARNT

- **Institutional Issues**
  - Service Standards
  - Service Providers
  - System Integrators and -Operators
  - Ownership
  - User Tariffs



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## CHALLENGES AND LESSONS LEARNT

- **Financial Issues**
  - User Tariffs
  - Metering and Billing
  - Fee Collection
  - Incentive Programs
  - Replacement of Batteries



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## CHALLENGES AND LESSONS LEARNT

### **Technical Issues:**

- Reliability of Components
- Monitoring of System Performance
- Robustness and Service Lifetime of Systems
- Technical Measures to Limit Electricity Consumption



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## CHALLENGES AND LESSONS LEARNT

- **Economic Issues:**
  - Tariff Structure
  - Job Creation
  - Productive Use of Electricity



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## Renewable Energies and the Millennium Development Goals

- Poverty Alleviation
- Gender Equality
- Environmental Sustainability
- Access to Education and Health Services
- Security of Food Supply
- Income Generation