Typical schemes for disseminating the use of renewable energy in rural areas
Content

- Characteristic of rural area in developing countries
- Energy issues in rural area
- Alternative solutions for irrigation
- Financial mechanisms for scaling up the alternative pumping
- Conclusion
Characteristic of rural area in developing countries

Large population

Share of rural population

Source: Countries, World Bank
Characteristic of rural area in developing countries

Particularities of the rural areas

Economic characteristics

- Low incomes
- Non stable incomes
- Low monetized economies
- Activities: mainly agriculture

Social characteristics

- High level of illiteracy
- Lack of formal organizations
Characteristic of rural area in developing countries

Particularities of rural areas

Geographical characteristics

- Scattered population with low density
- Difficulty of access

Energy consumption characteristics

- Households: mainly lighting and audio-visual appliances
- Agriculture: mainly pumping

----> Low consumption of conventional energy
Energy issues in rural area
Supply Barriers

- High distribution cost of energy:
  - Electricity (investment and O&M)
  - Fuel (commercial distribution costs)
- Low electricity and modern fuel penetration
- Difficulties of cross subsidies
- Large public subsidies to energy supply in rural area

Decentralized renewable energy can be more economically cost effective for energy supply in rural areas.

Ex: water pumping for irrigation
Energy issues in rural area

Consumption

Share of Energy consumption of the agriculture sector in total final energy

Pumping for irrigation: more than 70% of the sector consumption

No real energy issue, but socio-economic challenges for small farmers

Source: Countries, World Bank
Alternative solutions for irrigation
Technologies

Available technologies
- Electro-pumps using wind mills
- Mechanical pumps using directly wind mills
- Electro-pumps using photovoltaic panels

Application fields
- Low and medium depth
- Low water flows

→ Small farming (less than 2 hectares)
Alternative solutions for irrigation

Market barriers

1. Low profitability for the farmer
   - Energy tariff distortions
   - High investment cost

2. Investment access barriers
   - Low capacity investment of the farmer
   - Limited access to bank financing

3. Other barriers
   - Lack of information to farmer
   - Domination of the existing commercial motopumps networks
## Alternative solutions for irrigation

### Profitability factors for the farmer

<table>
<thead>
<tr>
<th></th>
<th>Direct Wind pumps</th>
<th>Indirect Wind pumps</th>
<th>PV pumps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Investment cost (KPEX)</strong></td>
<td>+</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td><strong>Operation cost (OPEX)</strong></td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td><strong>Productivity of the technology (energy substituted)</strong></td>
<td>Depends on the site (2000 to 3000 h/kW)</td>
<td>Depends on the site (2000 to 3000 h/kW)</td>
<td>1500 to 2000 h/kW</td>
</tr>
</tbody>
</table>

- KPEX
- OPEX

Productivity of the technology
Energy tariffs
+ Profitability
Financial mechanisms for scaling up the alternative pumping

Measures aiming at reducing the payback period for the farmer

Objective

- Reducing the payback period for the end-user: Improvement of RE solution attractiveness;
- Using the measure as a communication vector;
- Stimulating the offer by market initialization: progressive decrease of investment costs.

Types of measures

- Public investment subsidy;
- Indirect taxes advantage (VAT, customs duties, etc.);
- Reduction of direct taxes.
# Financial mechanisms for scaling up the alternative pumping

Measures aiming at reducing the payback period for the farmer

<table>
<thead>
<tr>
<th>Measures</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Applicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment public subsidy</td>
<td>- Clear effect on the cost reduction</td>
<td>- Pressure on the public finances</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>- Strong signal to the market</td>
<td>- Low sustainability</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Good vector for awareness</td>
<td>- High management cost</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Stimulation effect for supply side</td>
<td>- Inflation risk</td>
<td></td>
</tr>
<tr>
<td>Indirect taxes reduction</td>
<td>- Easy implementation</td>
<td>- Low visibility</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>- Low pressure on public finances</td>
<td>- Low efficiency in case of informal market</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Difficulty to apply on services cost</td>
<td></td>
</tr>
<tr>
<td>Reduction of Direct taxes</td>
<td>- Low pressure on public finances (only in case of taxes credit)</td>
<td>- Low efficiency in developing countries</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Complexity of implementation in developing countries</td>
<td></td>
</tr>
</tbody>
</table>
Objective

- Overcoming the initial investment barrier
- Using the measure as a communication vector
- Market transforming by involving the banking sector (leverage effect)

Types of measures

- Specific credit mechanisms
- Specific credit line
- Interest rate subsidy
- Credit guarantee systems
### Financial mechanisms for scaling up the alternative pumping

**Measures aiming at overcoming the investment barrier**

<table>
<thead>
<tr>
<th>Measures</th>
<th>Advantages</th>
<th>Disadvantages</th>
<th>Applicability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Specific credit mechanisms</strong></td>
<td>- Reduce the capacity constraint investment</td>
<td>- Exclusion of the unbanked population</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>- Mobilization of the banking sector</td>
<td>- Transaction costs and default payment risk</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Good communication vector</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Specific credit lines</strong></td>
<td>- Solve the problem of downstream resources</td>
<td>- High cost of loan distribution and management</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>- Involvement of banking sector</td>
<td>- Exclusion of non banked farmers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Good vector of awareness</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Interest rate subsidy</strong></td>
<td>- Good vector of awareness</td>
<td>- Currency risk coverage</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>- Improve the profitability for the farmer</td>
<td>- Sustainability of the interest subsidy</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Financial market distortion</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Pressure on public finance</td>
<td></td>
</tr>
<tr>
<td><strong>Credit guarantee systems</strong></td>
<td>- easy access to the credit</td>
<td>- Complexity of implementation in developing countries</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>- Incentive for the banking sector</td>
<td>- Risk of derive</td>
<td></td>
</tr>
</tbody>
</table>
Conclusion
Main constraints

Traditional constraints of emerging markets
- Low profitability
- Limited market
- Lack of competition
- High technology prices

Break the circle
- Sharing of gains between stakeholders
- Establishing a Win-Win situation
- Consumer protection

Energy subsidy
Low profitability

High technology prices
Low market development
Absence of scale effects and lack of visibility
Conclusion
Main features of supporting mechanism

Supporting mechanism modalities

- **A well seized** Investment public subsidy

- A specific loan system to farmers with easy access and adapted **reimbursement conditions** (alternative banks, micro-finance, etc.)

- Credit lines to financing institution with soft conditions to provide **stable appropriate financial resources**

- **A global service supply: energy and water optimization**

- Maintenance enterprises networks development

- Pilot programs on real scale to test and validate the mechanisms
Conclusion
Accompanying measures

Awareness
- Ministries in charge of agriculture, finance and development
- Farmers
- Banks, particularly agriculture banks
- Agriculture equipment suppliers

Capacity building
- Training of concerned public institutions
- Training of installers
- Training of the existing commercial networks of conventional pumps
Thank you