Renewable Energy Technology and Markets in Germany
Is German model applicable in developing countries?

Kira Bubnova
International Responsibility

- Over 2 milliard people live without electricity
- Hundreds million people live in desert regions.
- Developing possibilities for developing countries are needed.
“By 2030, we expect that around half the world’s wind farms will be located in developing countries and emerging economies.”

Klaus Rave, GWEC’s Chairman
Developing Countires

...
• There is no established convention for the designation of "developed" and "developing" countries or areas.

• The designations "developed" and "developing" are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process.
Map of developing countries, without least advanced countries, and failed countries
India – extensive using of the wind energy. The large part of the wind power plants was local produced.

China – is a leader in the wind energy production and technology in Asia.

http://www2.allgaeu.org/windkraft/fragen.htm#anchor204411
Goals of Germany in the international framework

**Kyoto-Protokoll**
- Reduktion der Treibhausgasemissionen bis 2012 um 5% unter das Niveau von 1990.
  (Deutschland 21%)

**Europäische Union**
- Richtlinie zur Förderung der Stromerzeugung aus erneuerbare Energiequellen im Elektrizitätsinnenmarkt
  Erhöhung des Anteils der erneuerbaren Energien am europäischen Stromverbrauch auf 22%.

**Deutschland**
- Verdopplung des Anteils EE an der Stromerzeugung bis 2010.
- Deckung von 50% des Primärenergiebedarfs aus EE bis 2050.
Technic: 500 times more energy production than in the 1980s.
Installed Windpower in Germany

Stand: 1/2010

Gesamt TOTAL : 25.777,01 Megawatt
Neubau 2009 : 1.916,80 Megawatt

Quelle: DEWI/BWE, 2010
High society acceptance

95 Prozent der Deutschen unterstützen den verstärkten Ausbau Erneuerbarer Energien

„Nutzung und Ausbau Erneuerbarer Energien sind ...“

Quelle: Forsa; Stand: 12/2009

Very important

80 %

Important

15 %

Less important

weniger oder überhaupt nicht wichtig 3 %

weiß nicht 2 %

Others
GLOBAL
Energy consumption in develop and developing countries

<table>
<thead>
<tr>
<th>Land</th>
<th>Energieverbrauch</th>
<th>CO₂-Emission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indien</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>China</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Japan</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>Deutschland</td>
<td>17</td>
<td>14</td>
</tr>
<tr>
<td>USA</td>
<td>33</td>
<td>26</td>
</tr>
</tbody>
</table>

Quelle: UNICEF, 1993

[Map showing world energy consumption and CO₂ emissions.]

Wind energy world wide, in new construction and market share, 2009

<table>
<thead>
<tr>
<th>Land</th>
<th>Neubau</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>13.000 MW</td>
</tr>
<tr>
<td>US</td>
<td>9.922 MW</td>
</tr>
<tr>
<td>Spain</td>
<td>2.459 MW</td>
</tr>
<tr>
<td><strong>Germany</strong></td>
<td>1.917 MW</td>
</tr>
<tr>
<td>India</td>
<td>1.271 MW</td>
</tr>
<tr>
<td>Italy</td>
<td>1.114 MW</td>
</tr>
<tr>
<td>France</td>
<td>1.088 MW</td>
</tr>
<tr>
<td>UK</td>
<td>1.077 MW</td>
</tr>
<tr>
<td>Canada</td>
<td>950 MW</td>
</tr>
<tr>
<td>Portugal</td>
<td>673 MW</td>
</tr>
<tr>
<td><strong>World total</strong></td>
<td><strong>37.466 MW</strong></td>
</tr>
</tbody>
</table>

GWEC, 2010
GERMANY
• The electricity supply structure in Germany, 2010

• 2020- The electricity supply – 47% RE
Specificity of the German Model

1. Just a good idea is not enough.
2. Always enough liquidity: financial balance is very important for a company to stay on the market.
RE Law Evaluation

Installation of new power plants capacity, MW

- April 2000: Das Gesetz für den Vorrang Erneuerbarer Energien (EEG) tritt in Kraft.

Graph showing the years and power plant capacities with key events:
- 1990 - 22,000 MW
- 1991 - 20,000 MW
- 1992 - 18,000 MW
- 1993 - 16,000 MW
- 1994 - 14,000 MW
- 1995 - 12,000 MW
- 1996 - 10,000 MW
- 1997 - 8,000 MW
- 1998 - 6,000 MW
- 1999 - 4,000 MW
- 2000 - 2,000 MW
SUBSIDIES
Comparison of the external costs and subsidies

- Förderung durch StrEG
- Vermiedene Externe Kosten
- Förderung durch EEG
- Vermiedene Externe Kosten

Euro im Jahr

1999: 260
2000: 311

Krewitt/Nietsch, Energiewirtschaftliche Tagesfragen, Heft 7/2002
RE = Covering of the Energy Deficit

100% RE Consumption

EU Commission

Who will make estimations of the deficit? Government? Mining industry? Geology research agency? Öl industry?

The typical situation

Eigene erarbeitung
www.bmi.bund.de
www.bwi.de
He is so big!!

Cut each grow possibility immediately!
• Also in Germany is necessary political commitment
• ”Wind power can make a massive contribution to global electricity production and to decarbonising the power sector
• Wind power technology provides governments with a viable option for truly tackling the challenges of our time and for being part of the energy revolution our planet needs.”

Greenpeace International
MARKET
• In 2003-2007 preferences were given to Bioenergy. But after 2007 the bioenergy went to the last position.
• In 2005-2010 the PV electricity has got a boom.
• In 2009-2010 there were a risk for a PV Energy production do not to play leader role on the market, because wind energy took the best position.
RE MARKET

PRIVATE SECTOR

Industry SECTOR
Tendency of the German Market

A. Grunwald, 2004
JOB
In addition to environmental benefits, wind energy is becoming a substantial factor in economic development, providing more than 600,000 ‘green collar’ jobs today both in direct and indirect employment. By 2030, the number of jobs is projected to increase to over 3 million.

http://www.gwec.net/
COST:
- Production costs
- Costs of power plants
- Installation cost
- Transportation
- Servicing
- Ensurance
Reduction of costs during the production

Reduzierung der Kosten durch:
- Massenproduktion
- Serienfertigung
- Lernkurven

Reduktion auf unter 50% der Herstellungskosten von 1990

FINANCE
Financial institutions
“can be seen as facilitators of industrial activity which causes environmental damage hence there is the need for them to change their attitudes towards the way credit is issued to industries, companies or organizations.”

“Without existing support regimes, few investors would place turbines in water depths of 20 and 40 metres, not accessible for dozens of days each year and connected to land based substations by expensive sea cables.”

Dr. Weller, “Securing the future requires a giant leap forward”, Windpower Monthly, June 2005
http://www.fair-energy.de/
The model in Germany works successfully thanks to the small interest rates of banks and well structured financial support.
German Model

+ German Technology

= German Possibilities for developing countries

Eine 5 MW Anlage

pro Jahr 17 Mio. Kilowattstunden sauberen Strom. Das entspricht dem Verbrauch von:

4.800 Haushalte
oder
19.200 Personen

Eine 1,5 MW Anlage

pro Jahr 3-5 Mio. Kilowattstunden sauberen Strom. Das entspricht dem Verbrauch von:

1.000 Haushalte
oder
4.000 Personen

BWE
The complexity of acceptance of the German model and there implementation is shown on the picture.

Therefore the German model should be consider at the special conditions depending on the developing country.
Specifities - Developing Countries

Will the same model work in developing countries?

- Standards
- Finance
- Ensurance
- Politic
- Environment
- Culture
- Society
- Investor interest
- Economical structure
- Law
Developing countries
(compare to developed countries)
Higher costs for transport, installation, service, adoption to climate conditions
Decision making in developing countries: central? local level?
BARRIERS

• lack of information on foreign markets
• lack of knowledge of the energy-sector framework conditions and support mechanisms
• insufficient wind energy legal framework (technical and economical conditions for feeding wind-generated electricity into power grids, permit procedure, ...)
• lack of qualified staff, especially in the field of service/maintenance
ADVANTAGES
- CDM
- Independence
- Cooperation
- Innovation
- Eco
- Independence from fossil fuel
- Renewable
• Independence from the international politic and situation
• Transport of Energy
• Independence from foreign markets
• Sustainable
• Reduction of the extra costs
• Environment and Climate friendly
• 2/3 Hazard emissions in the World come from Energy production. It could be reduced thanks to EE.
Conclusion

• Germany has a successful experience in the photovoltaic and wind power generation, using own technologies.

• German lessons are a grate start-up platform to achieve high industrial level with a low carbon emission level and green technology for developing countries.
Conclusion

• German lessons are applicable and profitable for developing countries only by special conditions: no corruption, political interest and cheaper technology, increased volume of the renewable technologies production and lower prices.
THANK YOU!

TERIMA KASIH!