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Financing Sustainable Energy

Trends

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Impact of High Oil prices

- EU, generates 75GW from renewables (10% of electricity total)
- US, around 40GW (approx 3% of total)
- Western Denmark, 100% of peak power by wind during breezy conditions
- Currently solar power accounts for 1% of global total



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Examples

- Spain €23 billion in RE investments (2005 -2010)
- China US\$60 billion in RE 2007-2012
- India, Tamil Nadu, US\$2 billion investment from 2004-2006
- WB US\$10 billion between 2006 - 2008





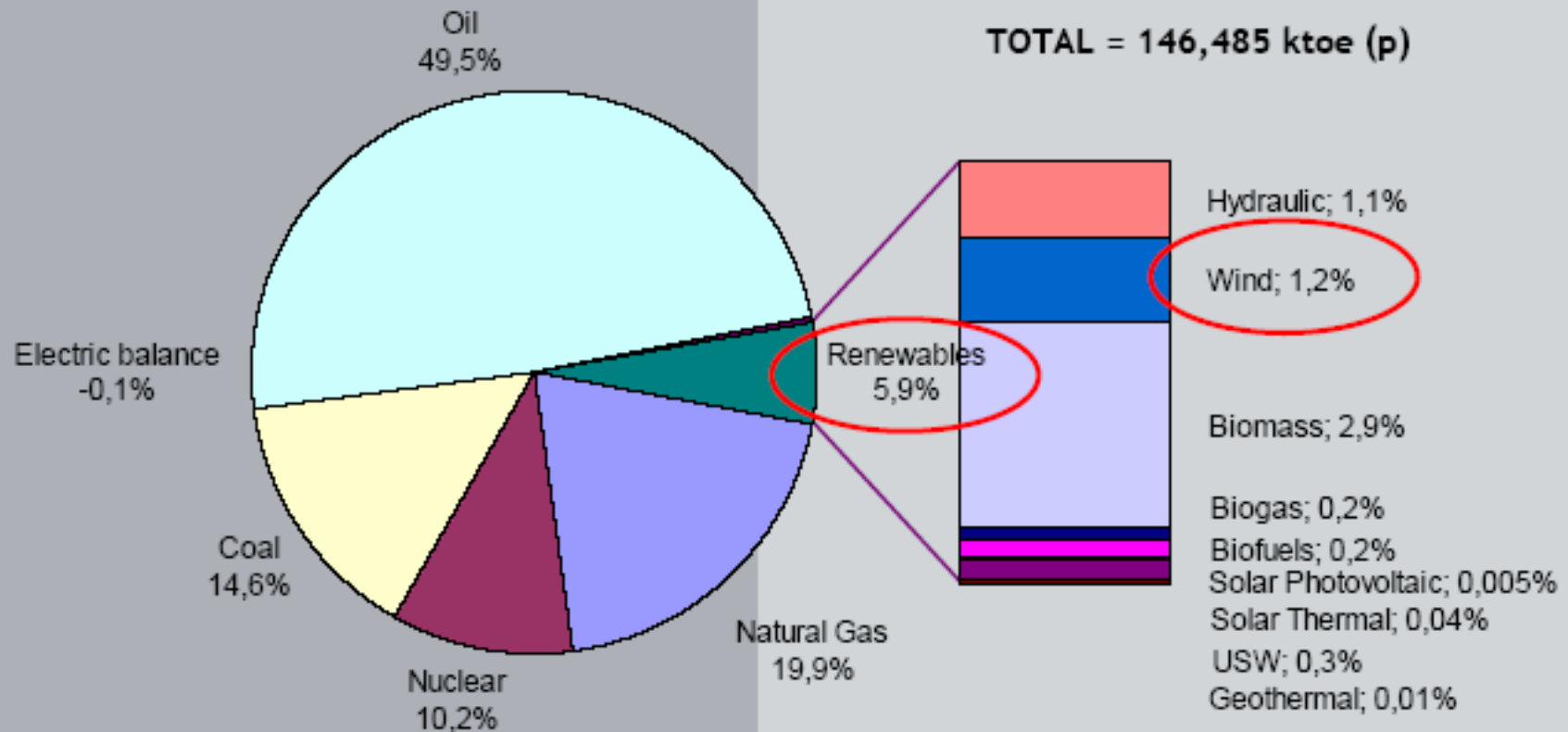
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Spain's Renewable Energy Program

Capacity

Current Situation in Spain

Contribution of RES to primary energy consumption, 2005





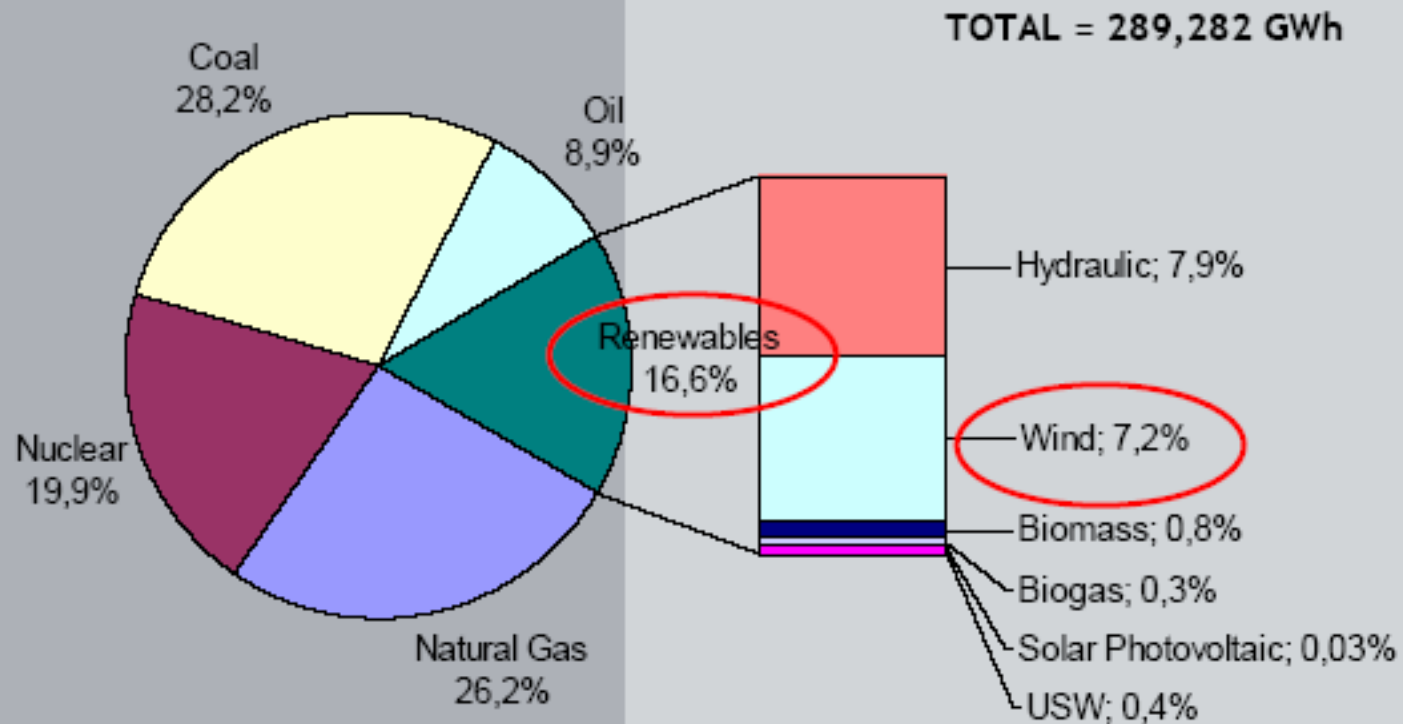
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Spain's Renewable Energy Program

Usage

Current Situation in Spain

Contribution of RES to electricity production, 2005





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Renewable Energy Investments Already Identified in Spain

Renewable Energy Plan (2005-2010)

Hydro

2004 - 1.75 GW

2010 - 2.2 GW

Biomass

2004 - 0.34 GW

2010 - 2 GW

Wind

2004 - 8 GW

2010 - 20 GW

TARGETS OF THE SPANISH RENEWABLE ENERGIES PLAN - 2005 - 2010

	Situation in 2004			Target situation in 2010		
	Capacity (MW)	Production (Gwh)	Producción (ktep)	Capacity (MW)	Production (Gwh)	Production (ktep)
Electricity generation						
Hydro-electric (> 50 MW)	13.521	25.014	1.979	13.521	25.014	1.979
Hydro-electric (10 MW to 50 MW)	2.897	5.794	498	3.257	6.480	557
Hydro-electric (< 10 MW)	1.749	5.421	466	2.199	6.692	575
Biomass						
biomass power plants	344	2.193	680	2.039	14.015	5.138
co-firing in coal plants	0	0	0	722	5.036	1.352
Municipal solid waste	189	1.223	395	189	1.223	395
Solar						
Solar photovoltaic	37	56	5	400	609	52
Biomass	141	825	267	235	1.417	455
Solar thermoelectric	-	-	-	500	1.298	509
TOTAL ELECTRICITY GENERATION	27.033	60.097	5.973	42.495	102.259	13.574
Thermal uses						
Biomass			3.487			4.070
Low temperature solar thermal			51			376
TOTAL THERMAL AREAS			3.538			4.446
TOTAL LIQUID BIOFUELS (transport)			228			2.200
TOTAL RENEWABLE ENERGIES			9.739			20.220
CONSUMPTION OF PRIMARY ENERGY (ktep) (Energy scenario: Tendency/REP)			141.567			167.100
Renewable energies / Primary energy (%)			6,9%			12,1%



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To Achieve 24GW capacity in Renewables , Spain has identified €23 billion = THB 966 billion in project

Other Key Numbers

RENEWABLE ENERGY PLAN (2005 - 2010)	
PARAMETERS	ALL RENEWABLE AREAS
Public support	8,492.24 million €
Investment	23,598.64 million €
Total Energy Production	90,480,526 toe
Jobs Created	94,925 Jobs
Avoided Emissions as compared to NG Combined Cycle	2005 - 2010 Period : 76,983,254 tons CO ₂



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Key Power Sector Facts China

- **Large installed base growing rapidly**
 - 622 GW in 2006 – added 102 GW of capacity in 2006 alone, more than the total capacity in the UK
 - Averaged 1,280 MW new capacity per week from 2003-2006 – compared to 1000 MW/year in SS Africa
 - 40% of world's incremental electricity generation from 2000-2005
 - Hydropower capacity is about 18% and generates about 14% of electricity
 - Thermal efficiency is low – ranging from 25% for small plants, to 32% for larger plants
 - Largest contributor to CO₂ emissions in China - second largest emitter of CO₂ after the US



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China Government Energy Priorities

- **Scale-up Renewable Energy Development**
 - By 2020 – 300 GW hydro; 30 GW of Wind; and 30GW of Biomass fueled generation. **Borrowed US\$350 million from IBRD to facilitate over US\$10 billion for RE investments up to 2010**
- **Principal National Goal – Reduce energy intensity (energy consumption per unit of GDP) by 20% from 2006-2010**
 - Efficiency improvement in industry, buildings and power sector central to these goals. **Will borrow over US\$200 million from IBRD to facilitate 7 billion in Energy Efficiency investments**
- **Increasing efficiency of thermal power sector – currently 20% lower than best practice. Will borrow US\$100 million from IBRD to achieve**
- **Legislative Agenda**
 - Energy Law to establish a new institutional framework to oversee energy policy and regulation, Revision to the Electricity Law and Coal Law –



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Tamil Nadu: India 2002-2005

- **New Federal Electricity Law:**
- Federal Government passed law that private providers have the right to produce power and to connect to the grid.
- Conditions to be negotiated with local utilities (State Electricity Boards) within 2 years of passing the law.
- Only three states did, with dramatic explosion of private sector participation in Energy Supply.



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Case study: Tamil Nadu

Tamil Nadu India

- Total Installed Capacity 2004: 6,000MW (conventional (coal+diesel) + renewable)
 - Total Installed Capacity for Renewables 1,600MW Renewables (26% of total) and 95% privately owned!
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How was this possible ?



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Vesta's MD's Views





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Barriers

- Resistance from Local Utility
- Initial Requirements to power up to 11KvA lines, high investment costs for transformer
- Tariff directions from Centre for tariffs from wind (2.75 kWh) would force Utility in Bankruptcy !!!
- Tariff adjustment every year. No tariff security



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Case study: Tamil Nadu

- **Solution:**
- Dialogue between private entrepreneurs and local utility.
- Utility agreed on cost sharing to install transformers and meters
- Utility agreed on five year fixed tariff (Five year long enough for wind to repay investment)
- Entrepreneurs agreed on lower tariff (Rs. 2 kWh, but with agreement to get carbon credits!)



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Case study: Wind Energy

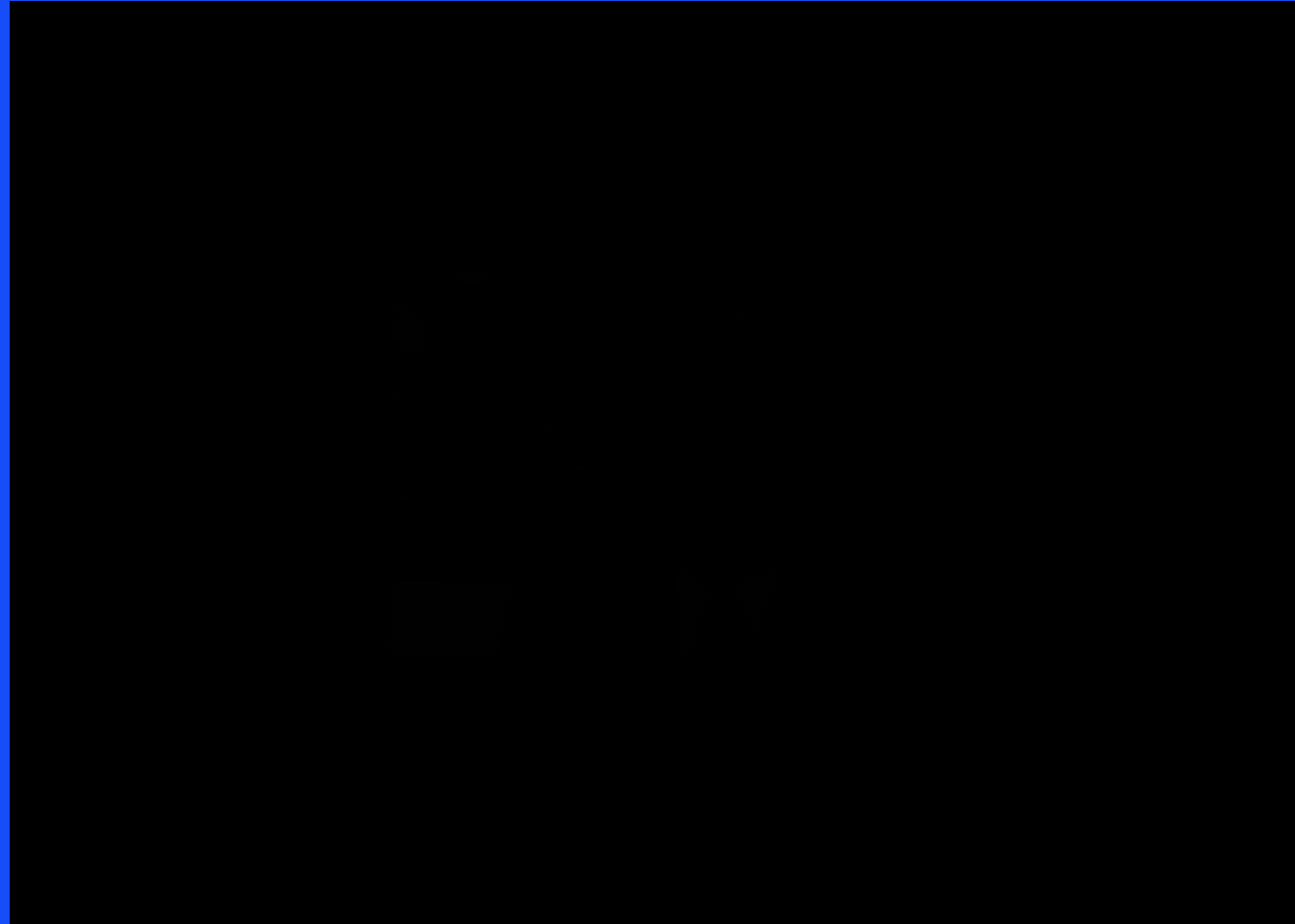
Hidden and actual incentives:

- Government provided 5% Capital Investment for textile industry to deal with competition from China
- Companies allowed 80% depreciation in Year 1.
- Long term tariff allows entrepreneurs to get Bank Financing.



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Private Sector Experience in Karnataka with Renewable Energy





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Challenges and Barriers

- Thailand targets an additional 1.1 -1.2 GW RE capacity by 2011. (Is it enough to compensate for fossil fuel price fluctuations?)
- How to realize investments in over 1.1-1.2 GW renewable energy generation
- How to realize investments of over US\$1.2 -1.5 billion in the coming 1-3 years (THB50 billion)