



The Role and Economics of Renewables in Europe

The views of the European electricity industry

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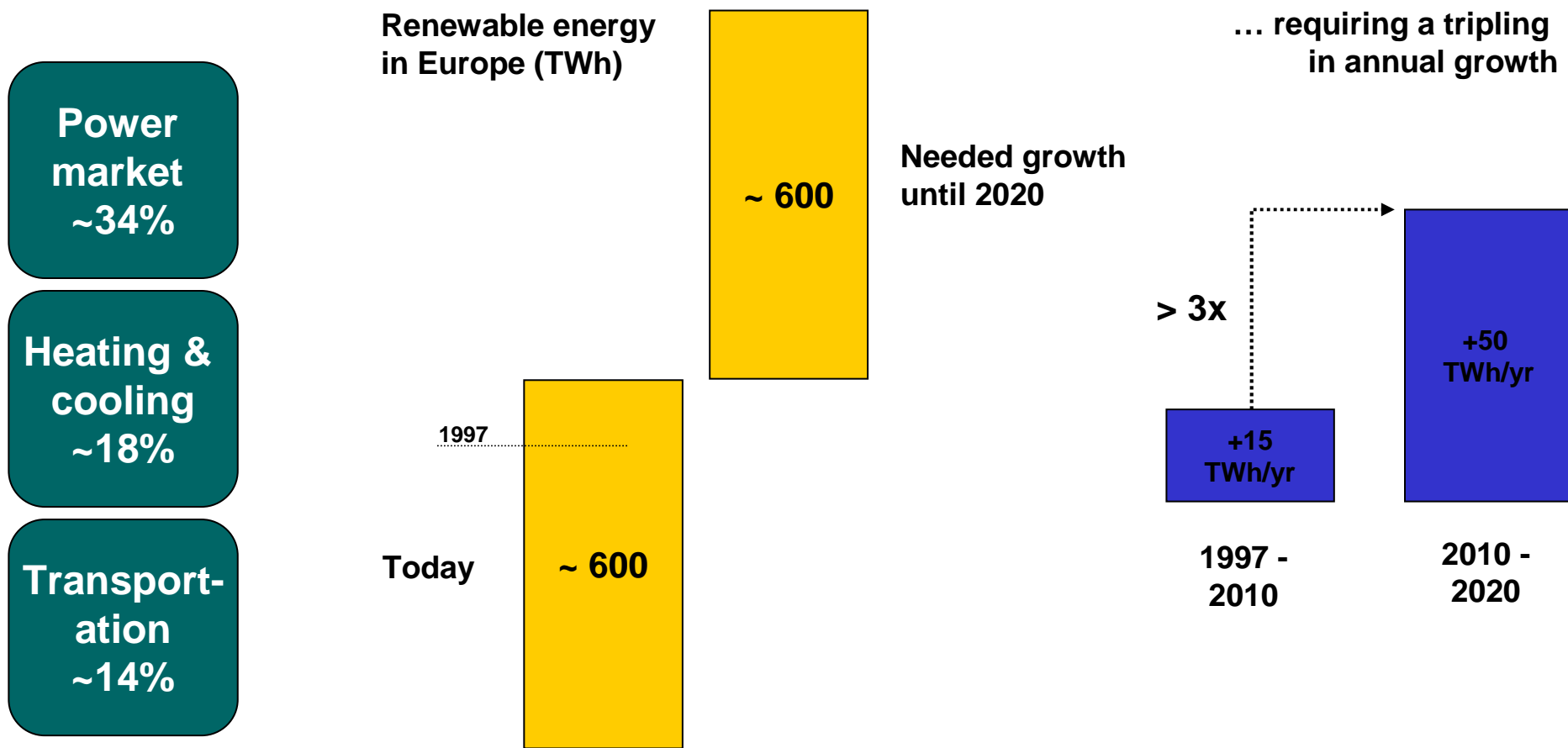
Statkraft AS

The 3rd Annual European Energy Policy Conference

Brussels, 22 November 2007






20% IN 2020 IS A HUGE CHALLENGE..

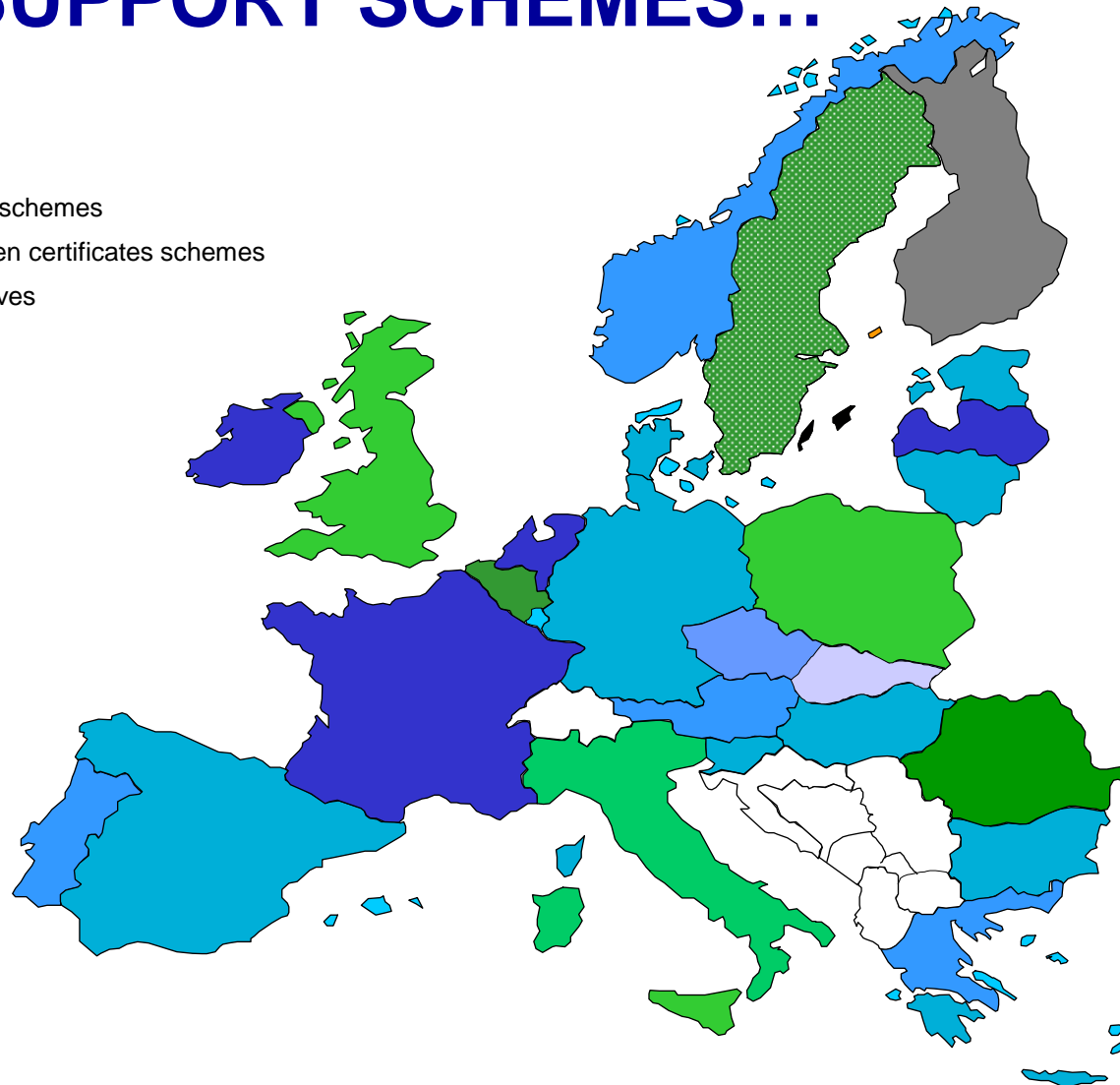




MANEUVERING IN THE LABYRINTH OF SUPPORT SCHEMES...

Europe 2007

-  Feed-in tariff schemes
-  Tradable green certificates schemes
-  Fiscal incentives



... looking for the best subsidies or the best energy projects?



A EUROPEAN RENEWABLES CERTIFICATE SCHEME..



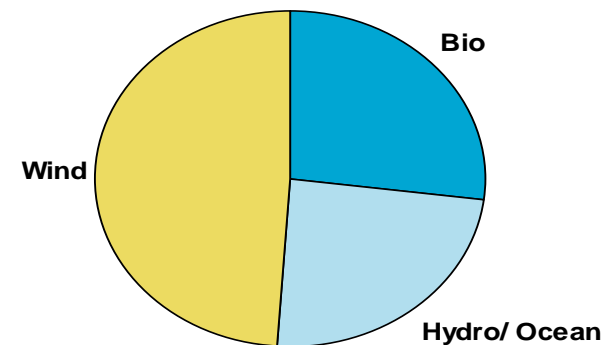
**Certificates issued to producers
of new renewable energy**

*Investments independent of
geography or technology, with a
common European certificate price*

**Consumers to buy certain share
of consumption in renewable energy**

*Burden sharing between Member
States (and customer segments)
can be result of political process*

- 600 TWh in new generation equals a long term marginal cost of ~ € 90/MWh
- The aggregate cost of renewable support in a harmonised market based mechanism would be substantially lower

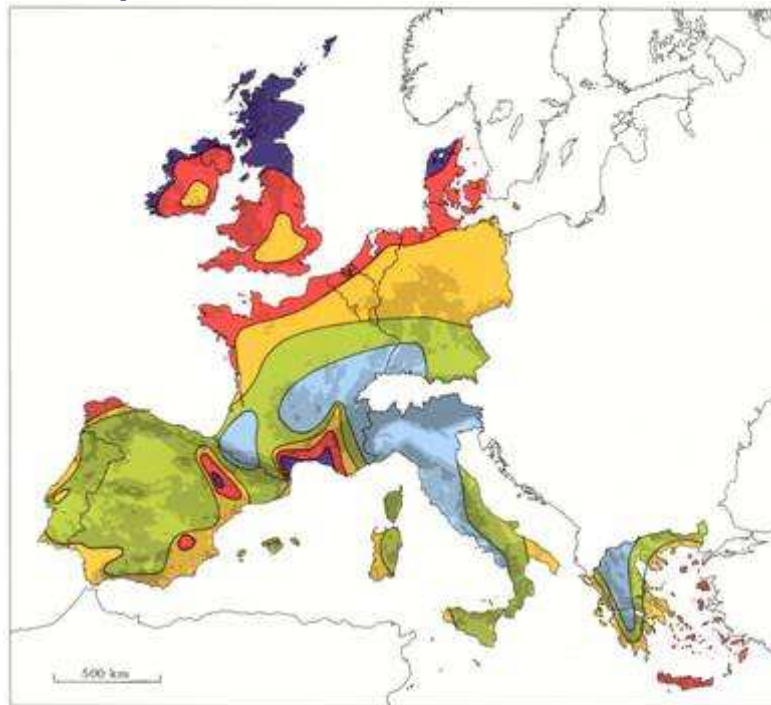


A European portfolio of renewable power in 2020 with a long term marginal cost below € 90/MWh

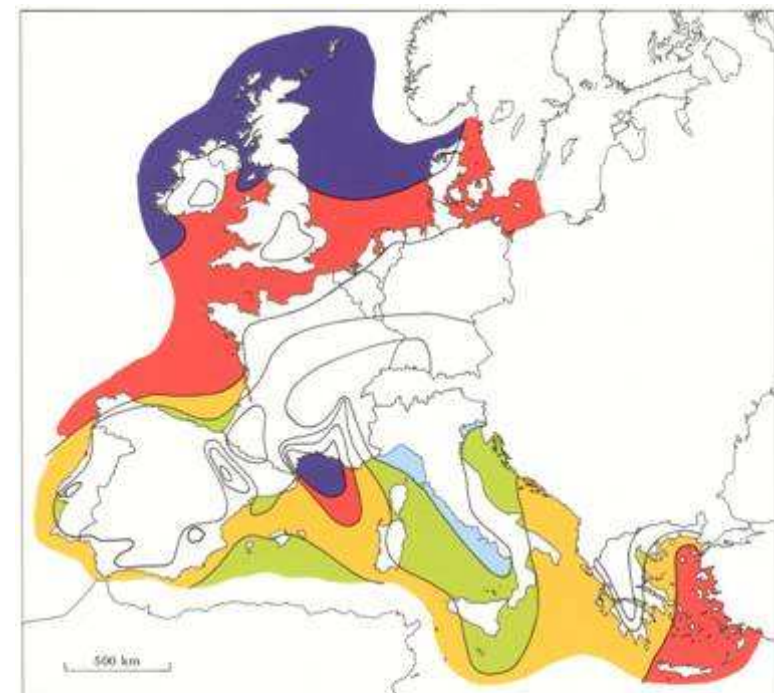


..USING AN ABUNDANCE OF RENEWABLE RESOURCES

Wind potential – On-Shore and Off-Shore



| Wind resources ¹ at 50 metres above ground level for five different topographic conditions | | | | | | | | | |
|---|-----------|-------------------------|-----------|-----------------------------|-----------|-----------------------|-----------|-------------------------------|-----------|
| Sheltered terrain ² | | Open plain ¹ | | At a sea coast ⁴ | | Open sea ³ | | Hills and ridges ⁵ | |
| $m s^{-1}$ | Wm^{-2} | $m s^{-1}$ | Wm^{-2} | $m s^{-1}$ | Wm^{-2} | $m s^{-1}$ | Wm^{-2} | $m s^{-1}$ | Wm^{-2} |
| > 6.0 | > 250 | > 7.5 | > 500 | > 8.5 | > 700 | > 9.0 | > 800 | > 11.5 | > 1800 |
| 5.0-6.0 | 150-250 | 6.5-7.5 | 300-500 | 7.0-8.5 | 400-700 | 8.0-9.0 | 600-800 | 10.0-11.5 | 1200-1800 |
| 4.5-5.0 | 100-150 | 5.5-6.5 | 200-300 | 6.0-7.0 | 250-400 | 7.0-8.0 | 400-600 | 8.5-10.0 | 700-1200 |
| 3.5-4.5 | 50-100 | 4.5-5.5 | 100-200 | 5.0-6.0 | 150-250 | 5.5-7.0 | 200-400 | 7.0-8.5 | 400-700 |
| < 3.5 | < 50 | < 4.5 | < 100 | < 5.0 | < 150 | < 5.5 | < 200 | < 7.0 | < 400 |



| Wind resources over open sea (more than 10 km offshore) for five standard heights | | | | | | | | | |
|---|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-----------|
| 10 m | | 25 m | | 50 m | | 100 m | | 200 m | |
| $m s^{-1}$ | Wm^{-2} | $m s^{-1}$ | Wm^{-2} | $m s^{-1}$ | Wm^{-2} | $m s^{-1}$ | Wm^{-2} | $m s^{-1}$ | Wm^{-2} |
| > 8.0 | > 600 | > 8.5 | > 700 | > 9.0 | > 800 | > 10.0 | > 1100 | > 11.0 | > 1500 |
| 7.0-8.0 | 350-600 | 7.5-8.5 | 450-700 | 8.0-9.0 | 600-800 | 8.5-10.0 | 850-1100 | 9.5-11.0 | 900-1500 |
| 6.0-7.0 | 250-300 | 6.5-7.5 | 300-450 | 7.0-8.0 | 400-600 | 7.5-8.5 | 450-650 | 8.0-9.5 | 600-900 |
| 4.5-6.0 | 100-250 | 5.0-6.5 | 150-300 | 5.5-7.0 | 200-400 | 6.0-7.5 | 250-450 | 6.5-8.0 | 300-600 |
| < 4.5 | < 100 | < 5.0 | < 150 | < 5.5 | < 200 | < 6.0 | < 350 | < 6.5 | < 300 |

Source: VGB PowerTech



RENEWABLES SUPPORT IN THE INTERNAL MARKET

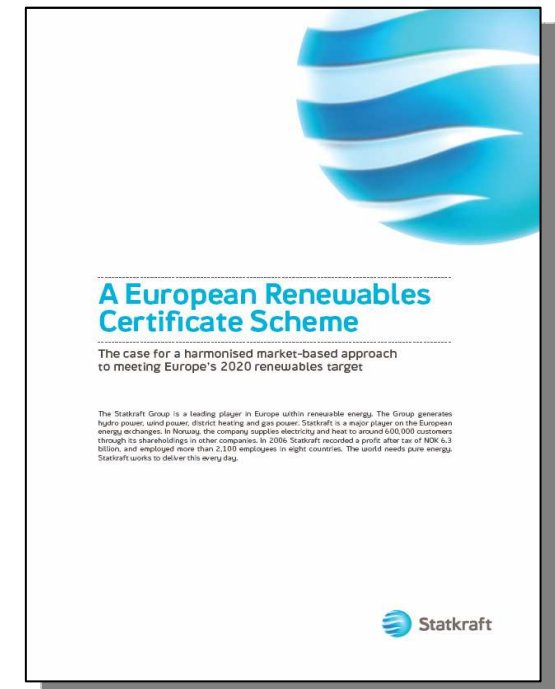
- **With renewables potentially representing 30%-40% of the power market, ~30 different policies on RES will slow down further development of the Internal Energy Market**
- **Harmonised policies will stimulate competition across borders and will reduce costs and improve the global competitiveness of the supplier industries**
- **Support system needs to be robust towards changes in power and carbon markets, technology developments and supplier markets**
- **An active R&D policy for frontier technologies is vital, but should be handled outside the support schemes.**
- **Grid development, investment and management will be key to meeting renewable targets – and will not succeed without continued strong drive for one internal energy market**



STRONG CASE FOR A HARMONISED MARKET-BASED APPROACH..

A European Renewables Certificate Scheme

- **Significantly less expensive and more robust than other policy options**
- **Reduced environmental impact of new power generation**
- **Supports the further development of the Internal Energy Market through integration and interaction with power and carbon markets**
- **Creates European arena for innovation and technology development**
- **Improves the investment incentives for investors in renewable energy across Europe**





...WITH RES-TRADE ACROSS BORDERS AS AN IMPORTANT BRIDGE

Common position from Eurelectric, EFET
and RECS International:

- Full implementation of standardised Guarantees of Origin
- Certified imports to count in national targets
- Harmonised support system as next step



NEW RES POLICIES: ATTRACTIVE GROWTH POTENTIAL TO THE INDUSTRY

- 1. EUROPE NEEDS MORE ENERGY**
- 2. RENEWABLES AS KEY TO REDUCING CLIMATE EMISSIONS**
- 3. LONG TERM PERSPECTIVE - AVOID BOOM AND BUST**
- 4. COST-EFFICIENCY MEANS LOW COST TECHNOLOGIES FIRST**
- 5. SUCCESSFUL RES POLICIES WILL DEPEND ON CLOSE INTEGRATION WITH INTERNAL ENERGY AND CARBON MARKET**