ECN

Energy research Centre of the Netherlands

“Going into Circles”

The Dutch experience in renewable energy policy

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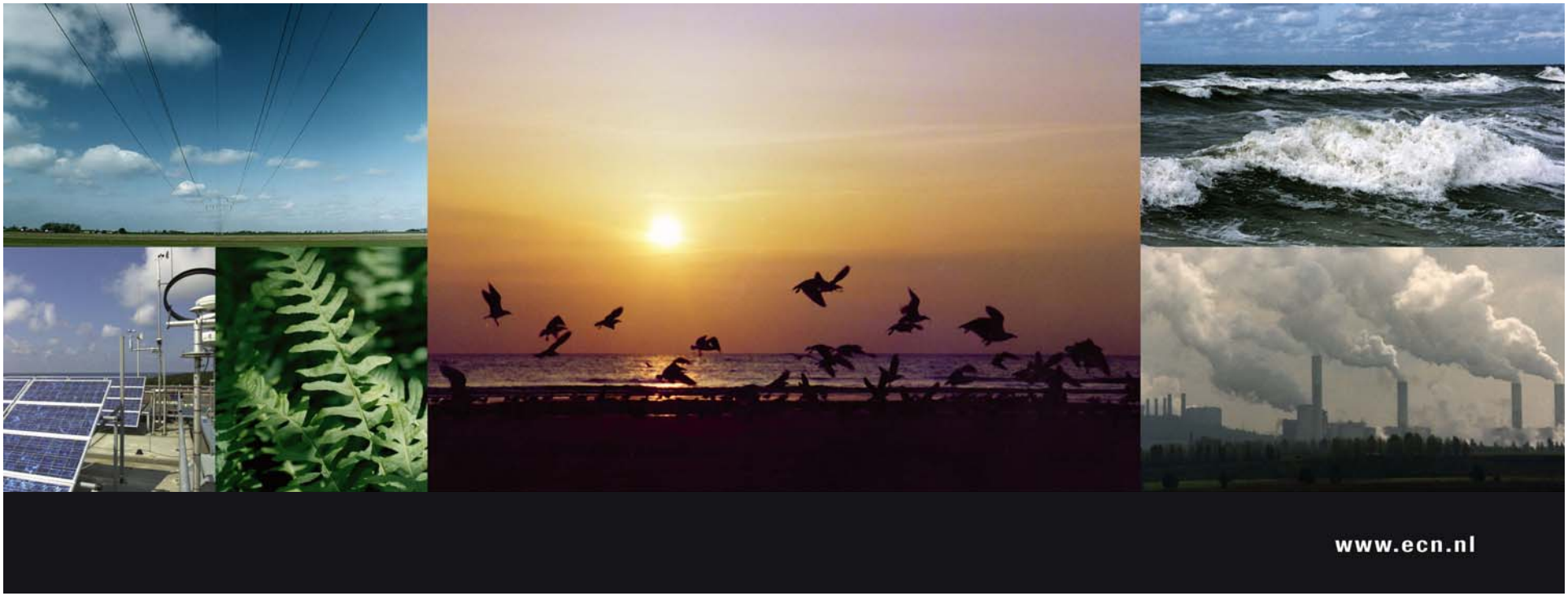
“More than Energy”, Mexico City, 2 February 2006



Topics

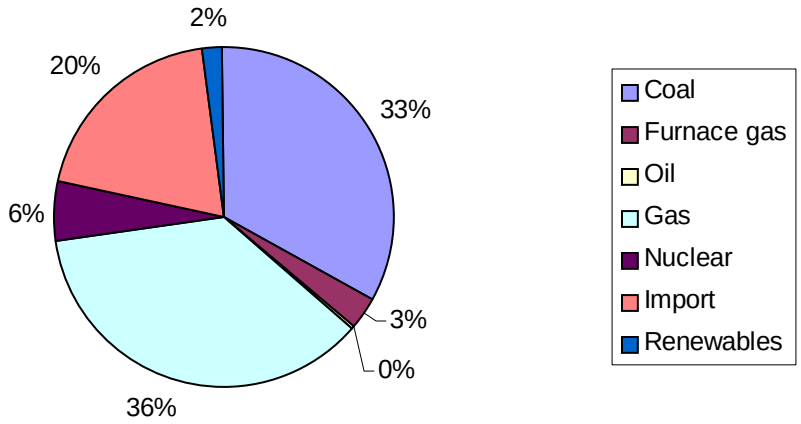
- Background
  - Status of renewables in Dutch energy mix
  - Development of grid-connected renewable energy in NL
  - Institutional developments (liberalisation)
- Policy experiences
  - The renewable energy policy matrix
  - Going into circles
    - From capital subsidies to renewables obligation
    - From renewables obligation to consumption tax credit
    - From consumption tax credit to feed-in system
    - From feed-in to a tender system
    - From tender to renewables obligation?
- Lessons?
- Integration of intermittent resources: the next step in innovation and policy

Energy research Center of the Netherlands ECN

- The energy research institute in the Netherlands
- About 600 employees, 9 programs
  - Wind, Solar, Biomass, Hydrogen and Clean Fossil Fuels, Energy Efficiency in the Industry, Energy in Buildings, Intelligent Energy Grids, Policy Studies, Environmental issues.
- Partly funded directly by government (40%)
- Funding from competitive national and international calls (EU)
- Third party direct contracts (10%-20%)

Status of Renewables in Dutch energy mix

- Population: about 16 million
- Large domestic natural gas reserves
- Primary energy consumption 2004: 3300 PJ
  - Would have been 60 PJ higher without renewables
- Electricity consumption in 2004: 115 TWh
- Primary energy consumption electricity sector 2003: 710 PJ

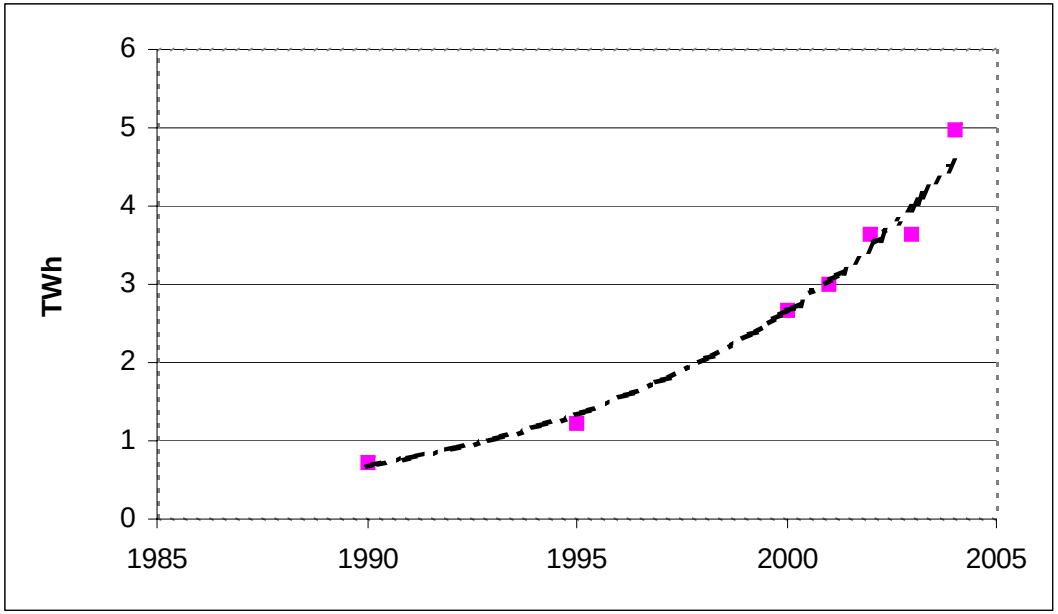


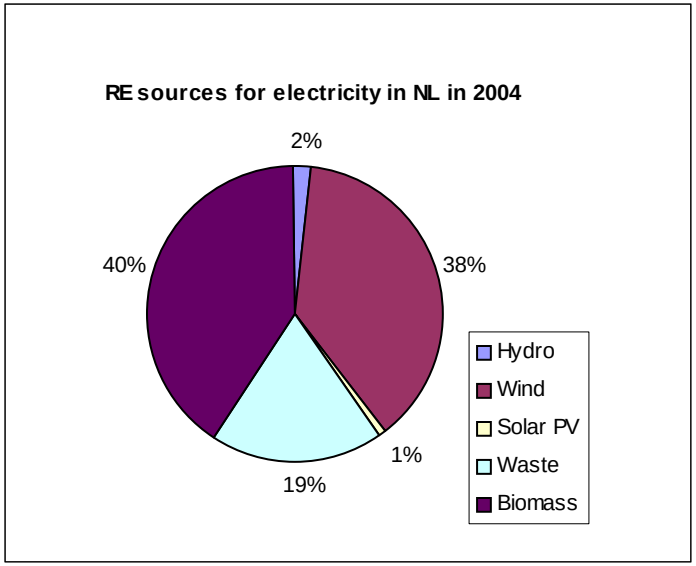
Primary energy input in Dutch electricity sector 2003

Institutional developments

- Until 1989: provincial and municipality owned vertically integrated utilities
- 1989-1998: Production separated from distribution/supply. IPPs possible
- 1999-2003: Gradual liberalisation of energy market
  - Separation grid functions from production/trade/supply
  - Foundation of TSO, 100% state-owned
  - Long-term planning replaced by market mechanisms
  - Freedom of choice introduced in steps
    - 1999 large consumers (1/3 of the market)
    - 1 July 2001 middle segment (second 1/3 of the market) + green electricity consumers at the domestic level
    - 1 July 2003 complete free market for electricity and gas
- Proposed: Splitting of the network companies from the energy company holdings. (Parliament votes on this issue this month).
  - Includes possibility of privatisation of non-grid energy companies
  - Grid companies should be owned (in majority) by public organisations

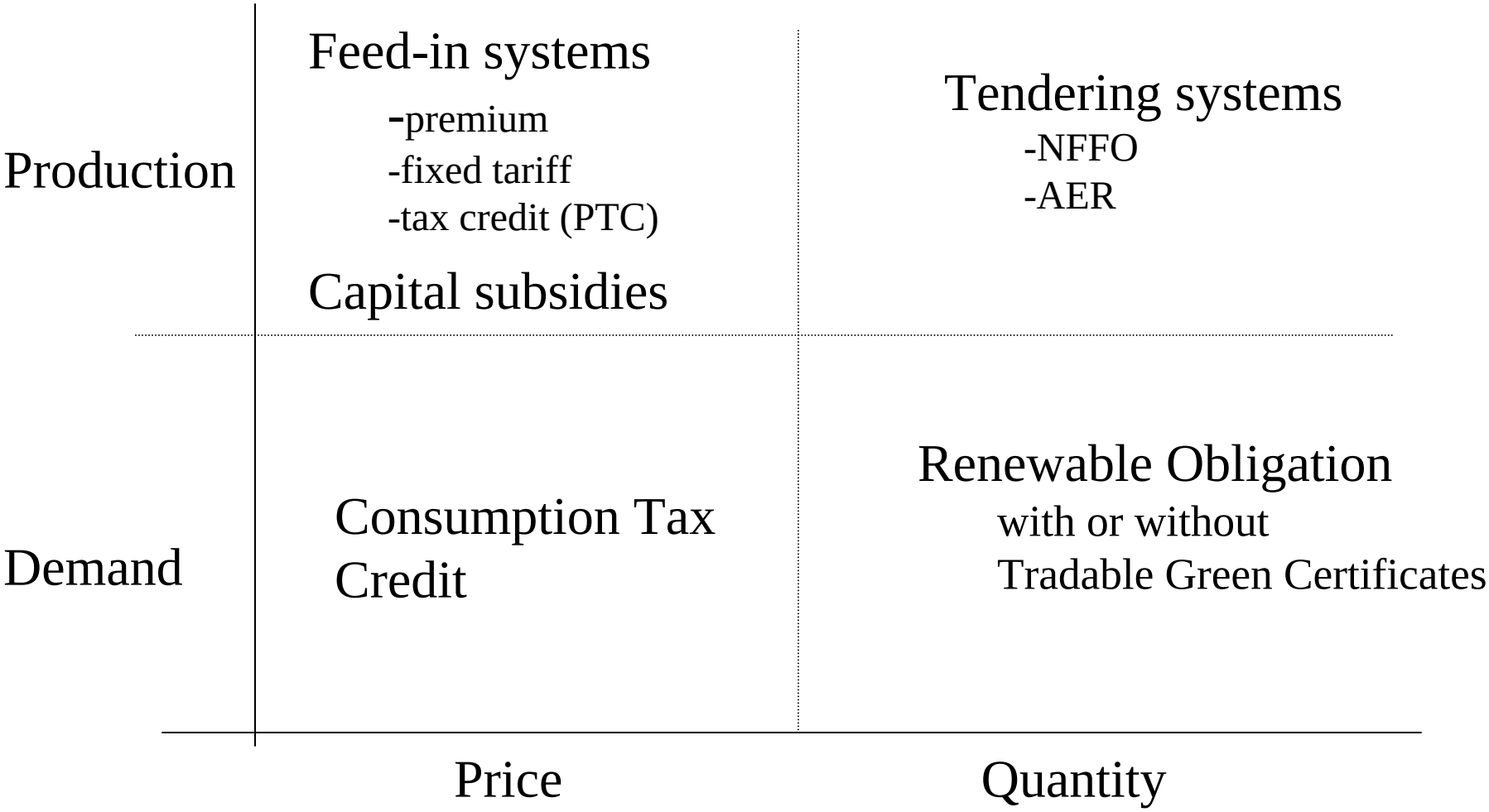
Development of grid-connected renewables in NL



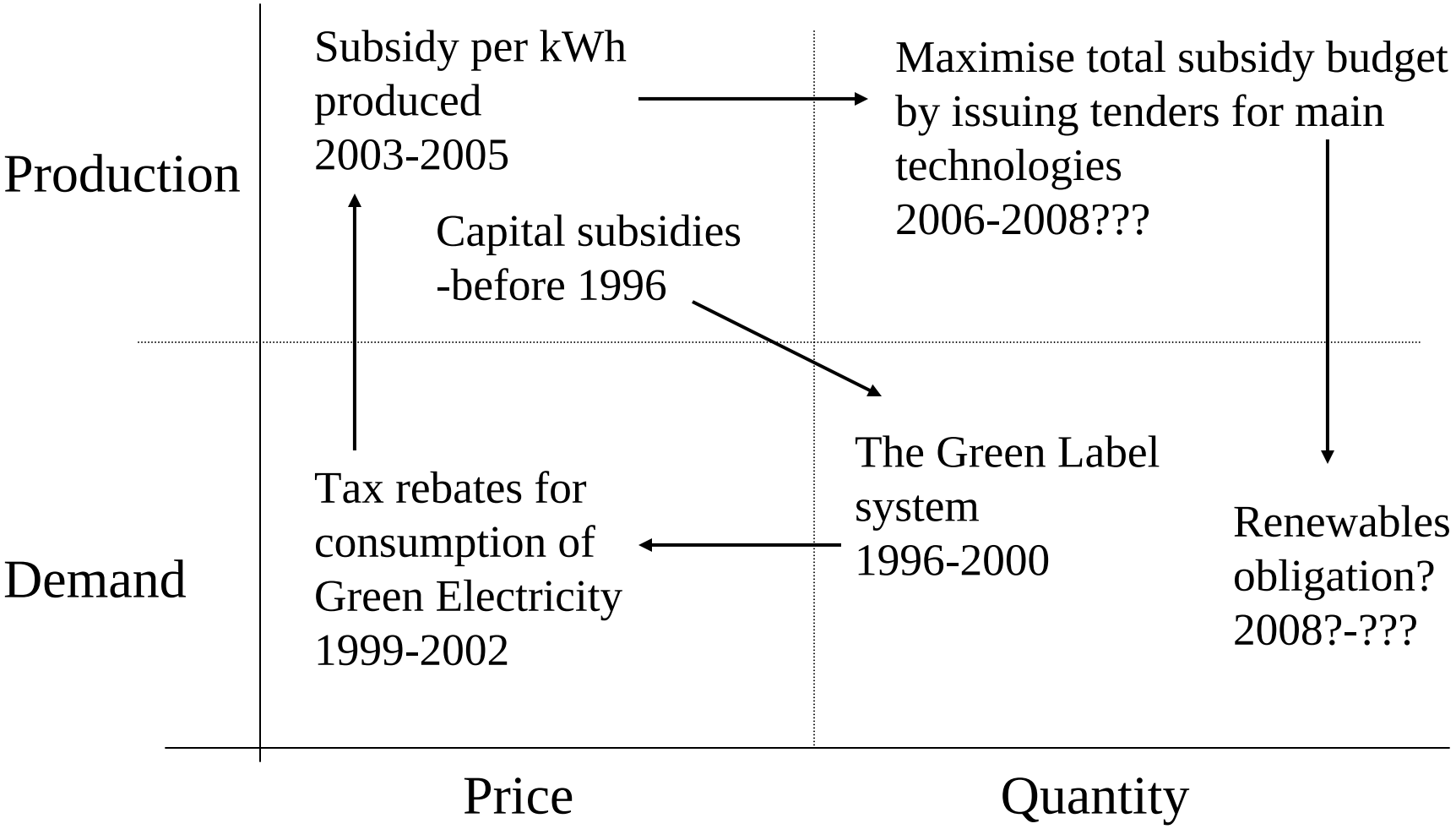


14%-15% average growth rate
(less than the 25+ global growth rate)

The Renewable Energy Policy Matrix



The Dutch journey in the RE Policy Matrix



Experiences

- Capital subsidies (until 1996)
  - Subsidy per kW installed
  - Limited budget each year
  - Projects selected (in principle) on first come basis
  - Effects
    - Manufacturers maximised kW, not kWh
    - kWh performance less important for operator
    - Budgets were used well before end of the year
    - Not always clear how projects were selected
- Green Label system (1996-2000)
  - Part of “gentlemen’s agreement” on environment between Government and Energy Utilities (in regulated situation)
  - Target: 3,2% of supply to final consumers to be renewable
  - Because of varying possibilities in different areas utilities set up a tradable system
    - Very innovative at that time, probably first “green certificate system” in the world
  - Evaluation
    - Target was not completely reached
    - Very complicated penalty system
    - Time horizon (5 years) was too short
    - It simply ended with start of liberalisation in 2001

Experiences

- Consumption tax credit for Green Electricity (1996-2002)
  - Green electricity was already introduced in 1994 by one of the utilities in anticipation on expected liberalisation
  - Was first sold at a premium
  - Since 1997 it was exempted from recently introduced energy consumption tax (1996)
  - Consumption tax level grew gradually over the years to more than 8 Eurocents/kWh in 2002
  - Since 2001 utilities didn't have to ask a premium anymore.
  - Effects:
    - Enormous growth of green electricity consumers to about 40% today (about 3 million people)
    - Green electricity was mainly sourced from cheap (often existing) renewables from other EU countries
    - Domestic production limited. PPA's incorparated political risk the consumption task credit would be abolished.
    - 100s of millions of Euros tax money exported to other countries, without being sure it led to additional renewable capacity.
  - Replaced during 2003 by production subsidy system.
  - In the meantime Green Certificates were introduced as an accounting system for renewable energy production

Experiences

- Fixed premium system (MEP):2003-2006
  - Subsidy per kWh (on top of market price which is outcome of negotiations)
  - Based on annual calculations by ECN and KEMA of the “non-economic part”
  - Example: Wind onshore: 6.5 Eurocents/kWh subsidy (assuming market value of 2.6 Eurocents/kWh, including a 0.5 cents/kWh intermittency penalty)
  - Wind offshore (proposed): 9,7 Eurocents/kWh
  - Solar PV: 9.7 Eurocents/kWh (maximum). This is not enough: barely solar PV installed
  - Financed by a annual levy of 35 Euro per connection point.
  - Effects:
    - Growth, especially of wind and biomass co-firing
    - Funds are not enough to cover expenses (deficit several 100s of millions of Euros)
  - Reaction of the government
    - Large biomass and wind offshore premiums for new projects abolished (May 2005)
    - Budget Cap of 700 million Euros per year introduced
    - At least large biomass and wind offshore will be transferred to a “tender regime”

Future?

- Tender mechanisms + learning experiences in UK (NFFO) are studied
- Opposition (mainly Labour and Greens) are preferring a RPS kind of system
  - Possibility has been introduced in 1998 law (period of the Green Label system)
  - Green certificate system is in place to sustain this
  - But how should it look like?

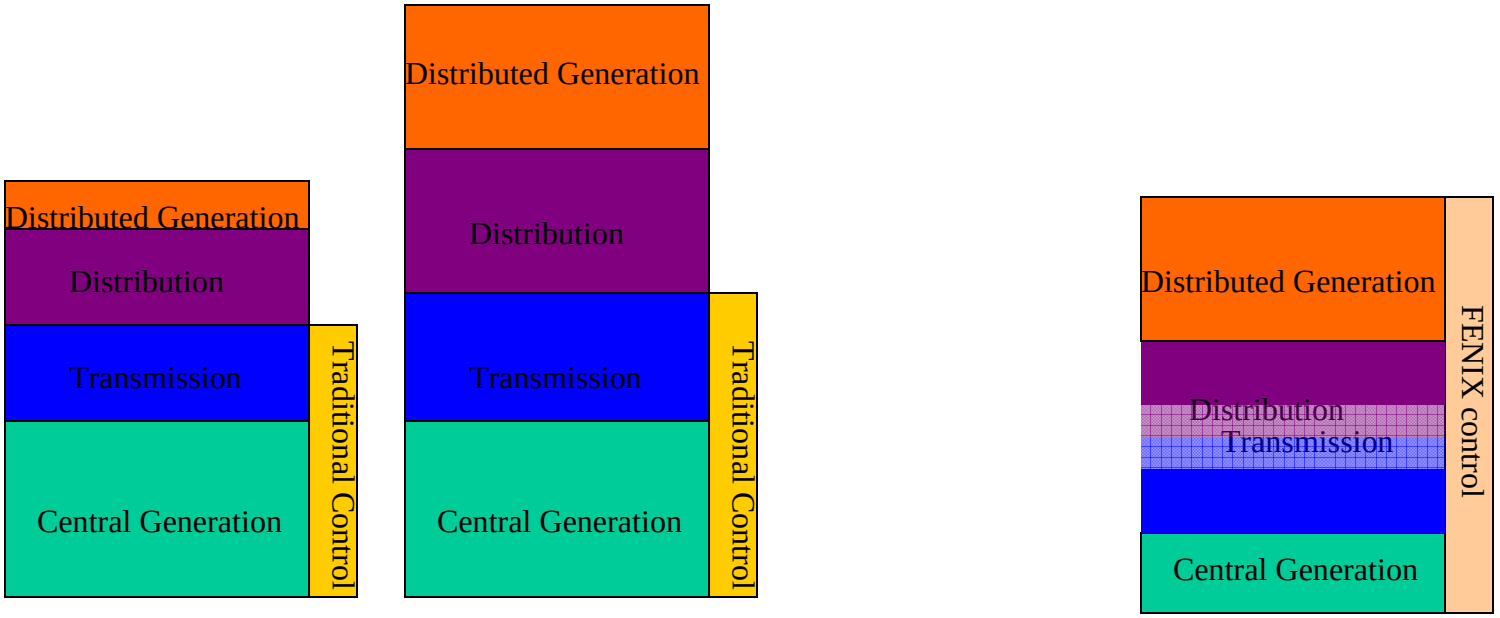
Overall lessons

- Netherlands renewables have not kept pace with world-wide developments
- Inconsistency of policy and bad policy design (not taking into account investor economic behaviour) are main issues
- Apart from that also permit procedures important (“Flanking policy needed”)
- Politicians have difficulties to understand complex dynamics of support mechanisms in liberalised markets
  - Often don’t really listen to (or understand) policy researcher’s advises
- Every policy approach has its consequences, and policy makers should be ready to accept them
- The devil is in the details of design!!!

Integration: the next policy issue

- Renewable generation is often intermittent and not 100% predictable (wind and solar)
- They are often produced at MV or LV level
- At the same time as renewables, other ‘distributed generation’ technologies come up, like (micro-)CHP
- The issue of integrating these resources in the electricity system will come up within the next 5-10 years
  - First in the countries that already started development of renewables (Denmark, Spain, Germany)
  - Because of double digit growth rates, also pretty soon in lots of other countries
  - The technologies, business models and policy/regulation has to developed now!!!

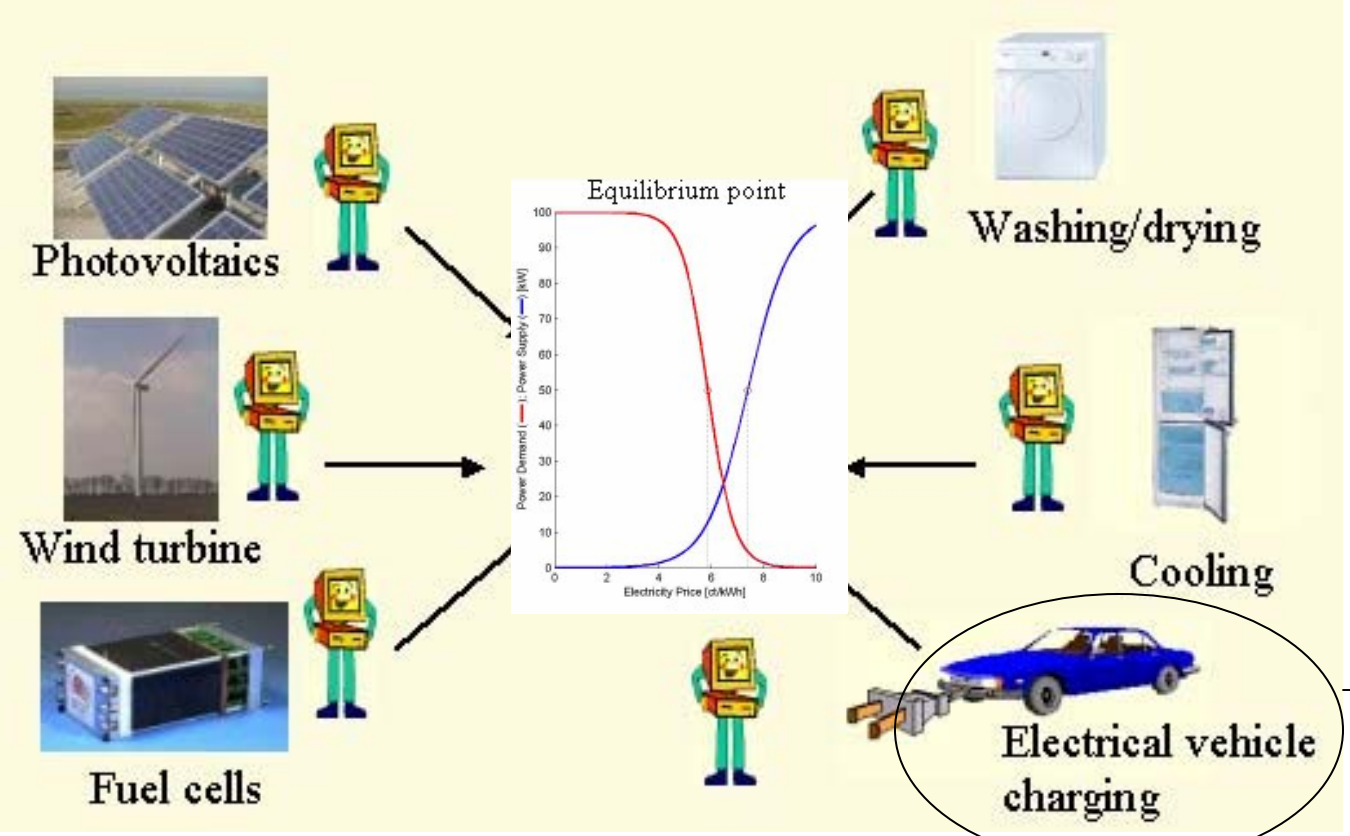
The challenge as sketched by the EU FENIX project



Technological solutions: “Smart energy systems”

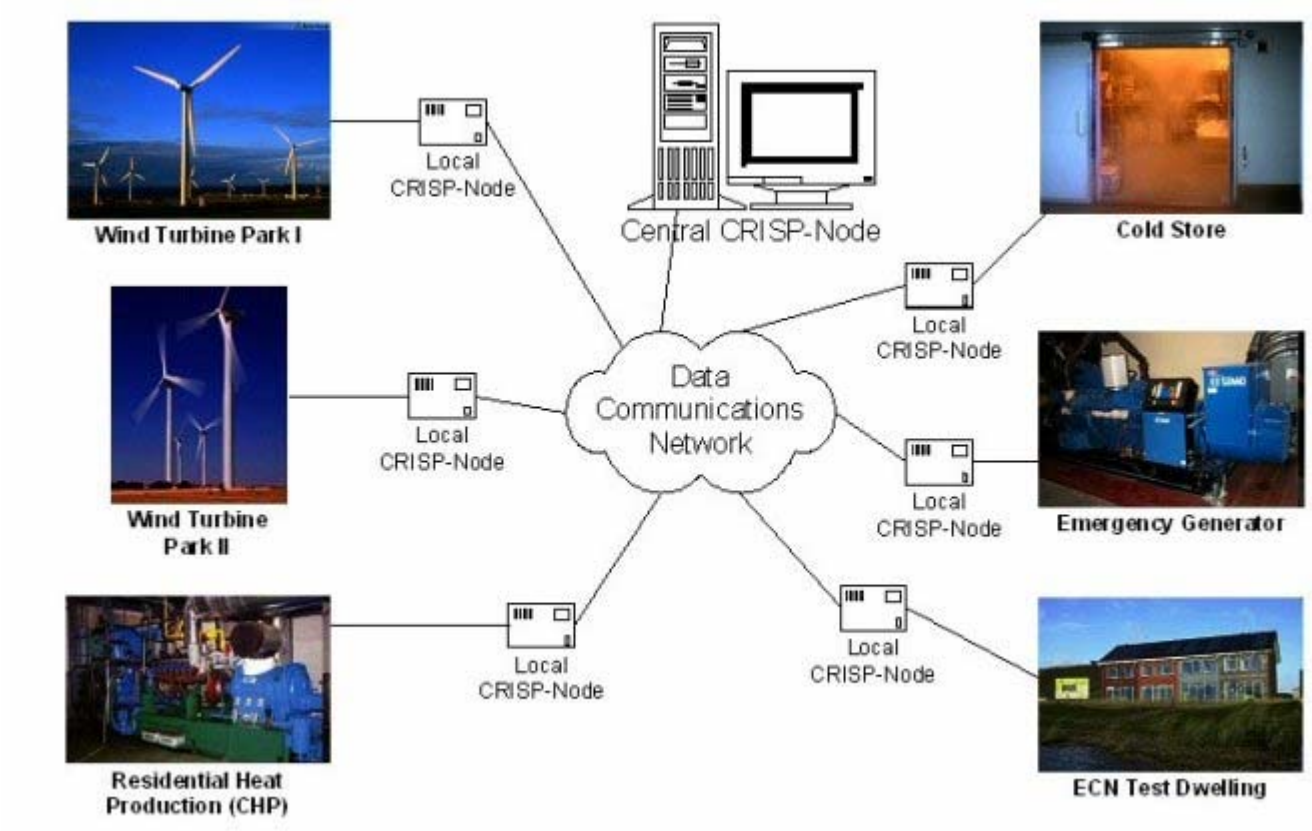
Multi-agent technology combined with electronic markets

www.powermatcher.net



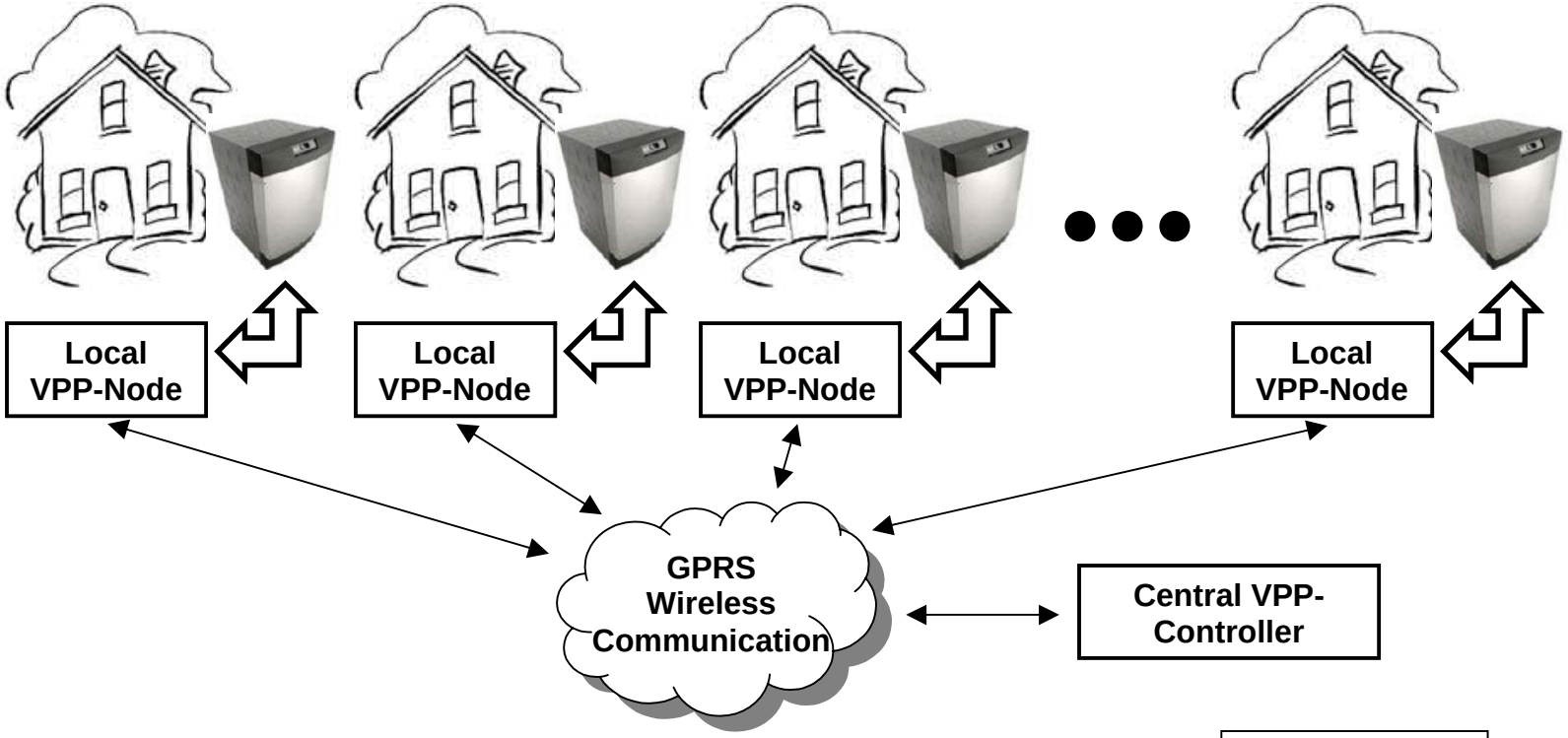
First pilot using this technology

Reducing imbalance of cluster of users and producers including wind



Second pilot

Clustering micro-CHPs together as a 'virtual power plant'



GPRS Supplier:

What are the implications for renewable energy policy?

- Concept requires real time metering
  - Intelligent meters get more and more attention. We should be sure a real-time connection to communication networks can be established.
  - First applications can be with already metered customers
- Concept requires time-dependent and location dependent pricing/tariffs
  - Time dependent can be handled in trading markets (imbalance markets). Operators can cluster together and act as one party towards the TSO
    - *Makes only sense if in renewable support system 'green value' is separated from electricity value (see UK and Spain systems, (only?) flaw of German system).*
  - Location-dependent means that grid companies open up the possibility to purchase 'ancillary grid services' (voltage stability, reactive power, even frequency stability) from distributed energy resources (instead of only paying for this services provided now by the TSO, or acquired by own actions).
- This requires regulations and policies that allows these kind of business models. This is not obvious!!!!

Thank you all for your attention