

# Energy Transition and Bioenergy in the Netherlands

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# Emergence

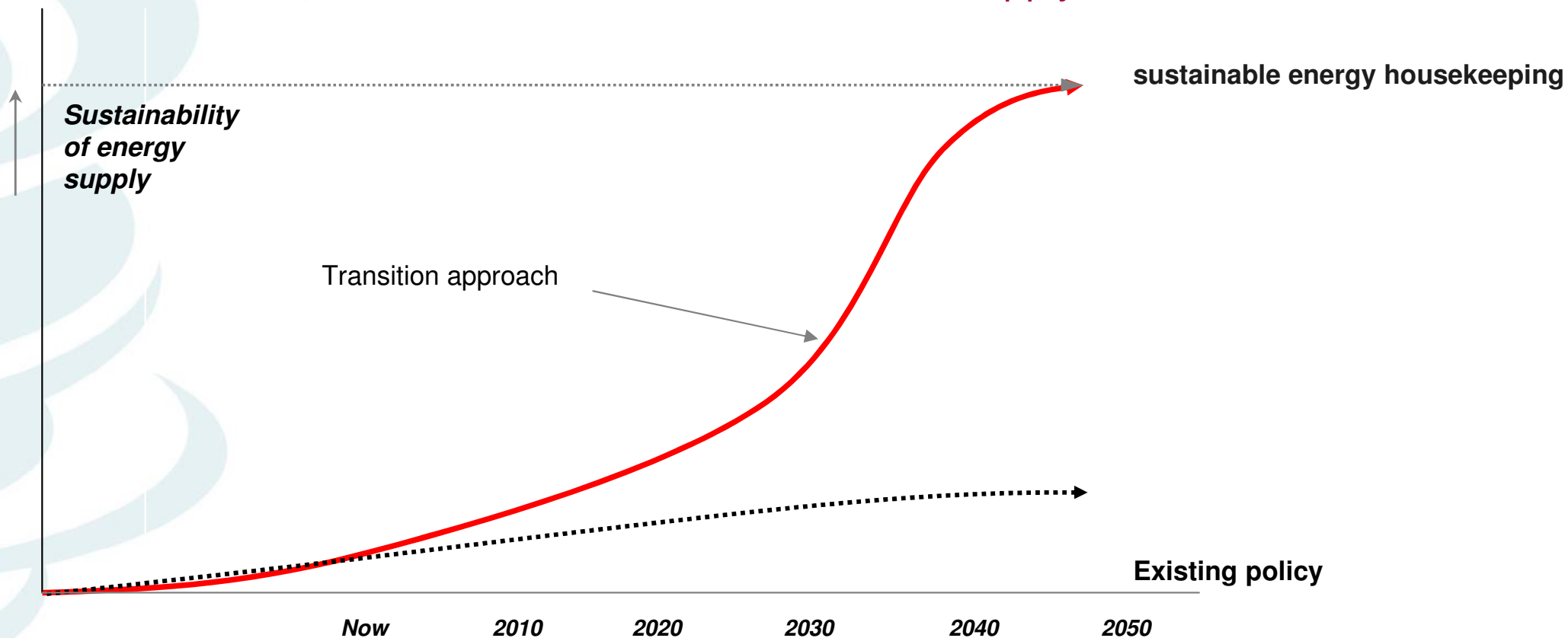
Dependence on fossil resources makes vulnerable

Rising energy costs

# Transition Needed

Damaging environmental effects

Without harm to the food supply



# 1. Ambition and Vision in the Energy Transition

- Transition from fossil-based fuels and raw materials to a sustainable energy housekeeping
- Clear Goal: 50% CO<sub>2</sub> emission reduction by 2050
- Long term strategy
- Significant changes in technology, infrastructure, socio-economic environment, government policy

## Methods :

- Public private approach
- Vision, goals, transition paths, experiments
- Interdepartemental collaboration

# Opportunities for the Netherlands

## 3 main lines

Savings

Sustainability

Clean fossil fuels

## Platforms

Biobased raw materials

Sustainable mobility

Chain efficiency

New gas, clean fossil fuels

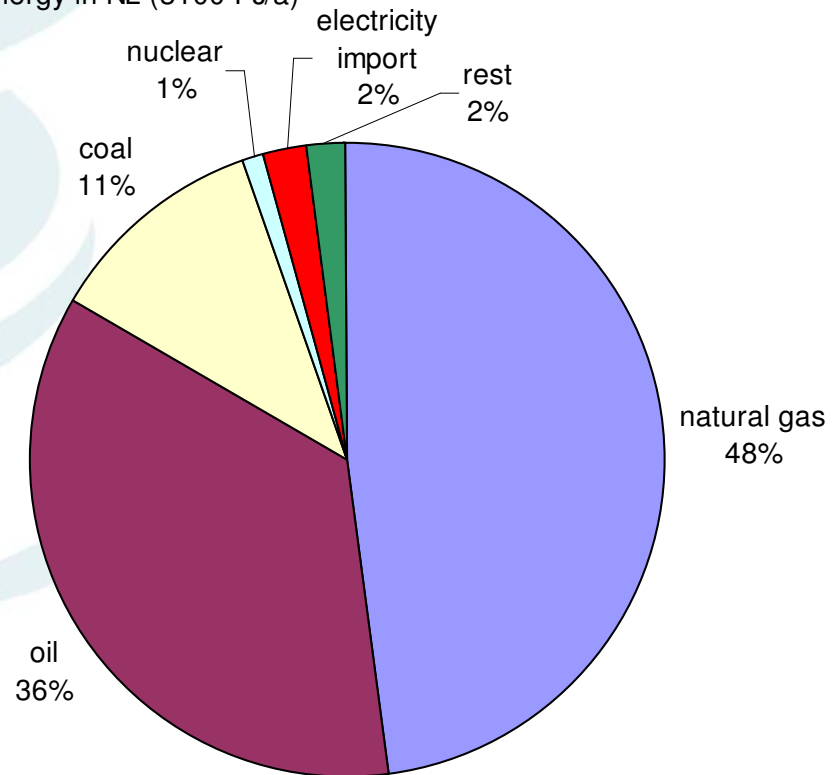
Sustainable electricity supply

Built environment

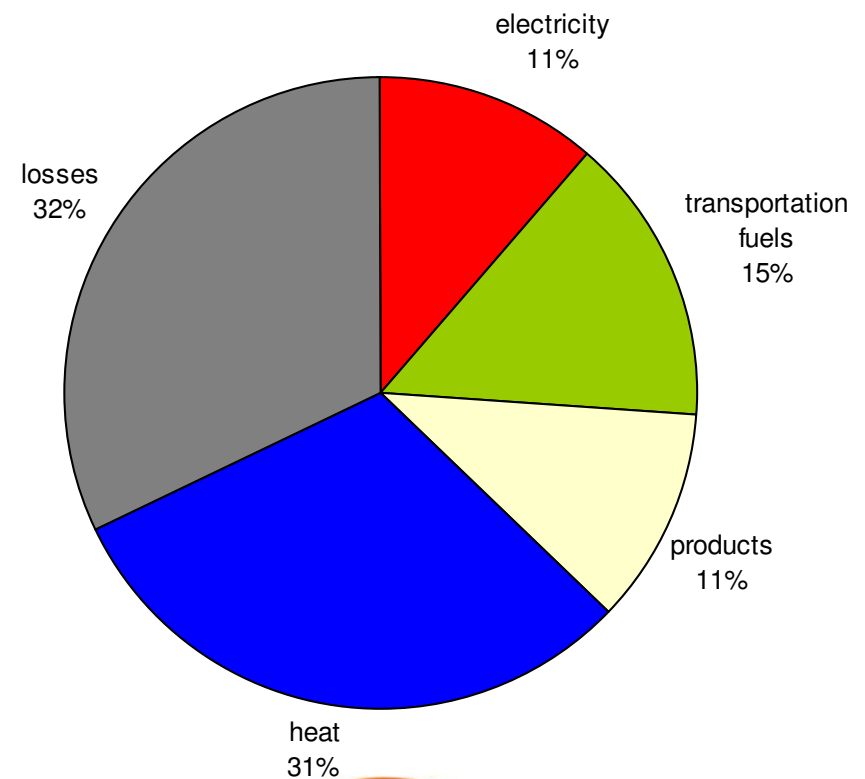


# Energy situation in the Netherlands

primary energy in NL (3100 PJ/a)



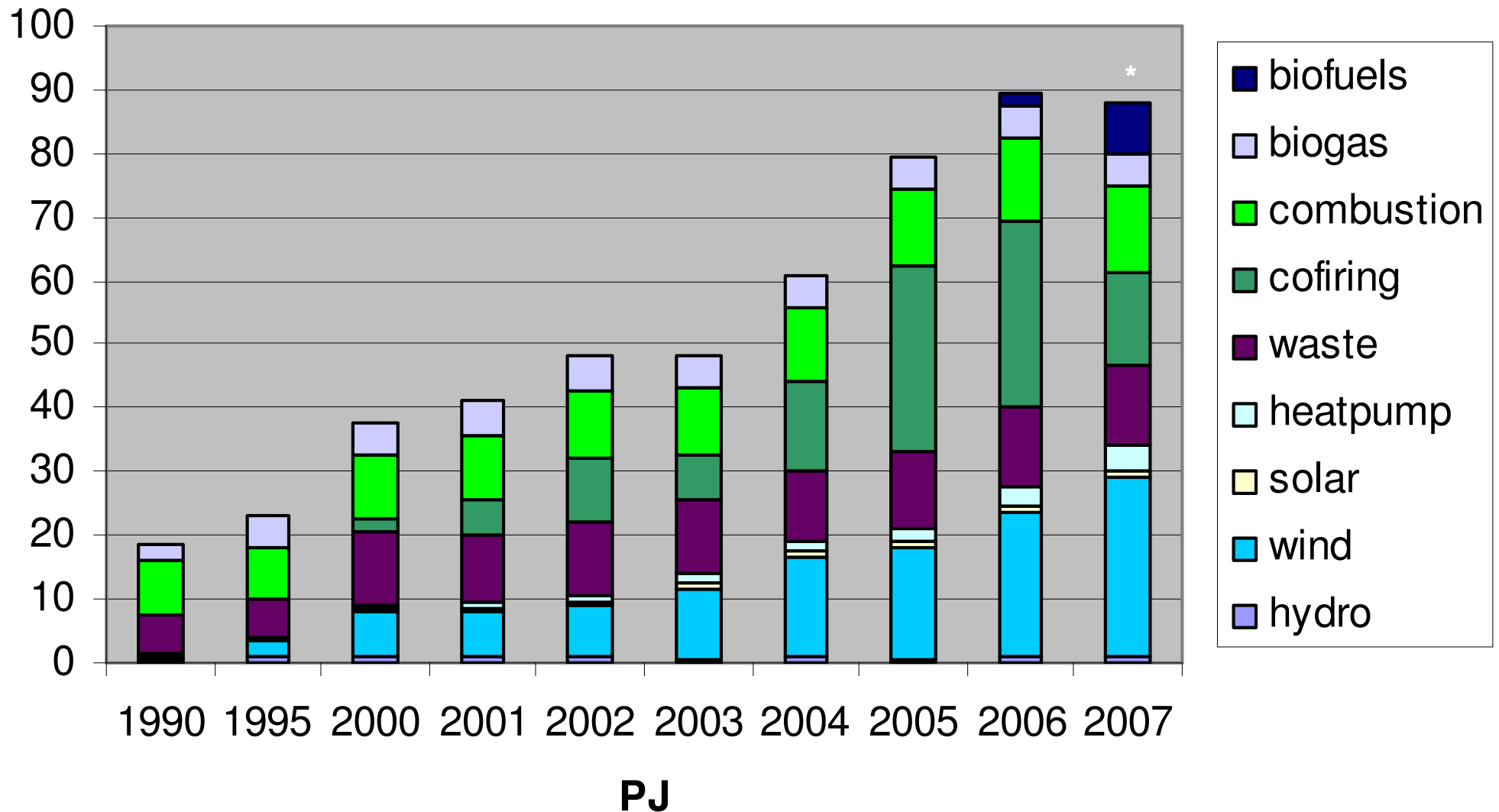
secondary energy in NL (3100 PJ/a)





# Status Renewable Energy Development

## 2007: 2.5% , and 5.6 % Renewable Electricity



## Vision:

### 30% replacement of fossil raw materials by renewable raw materials in 2030

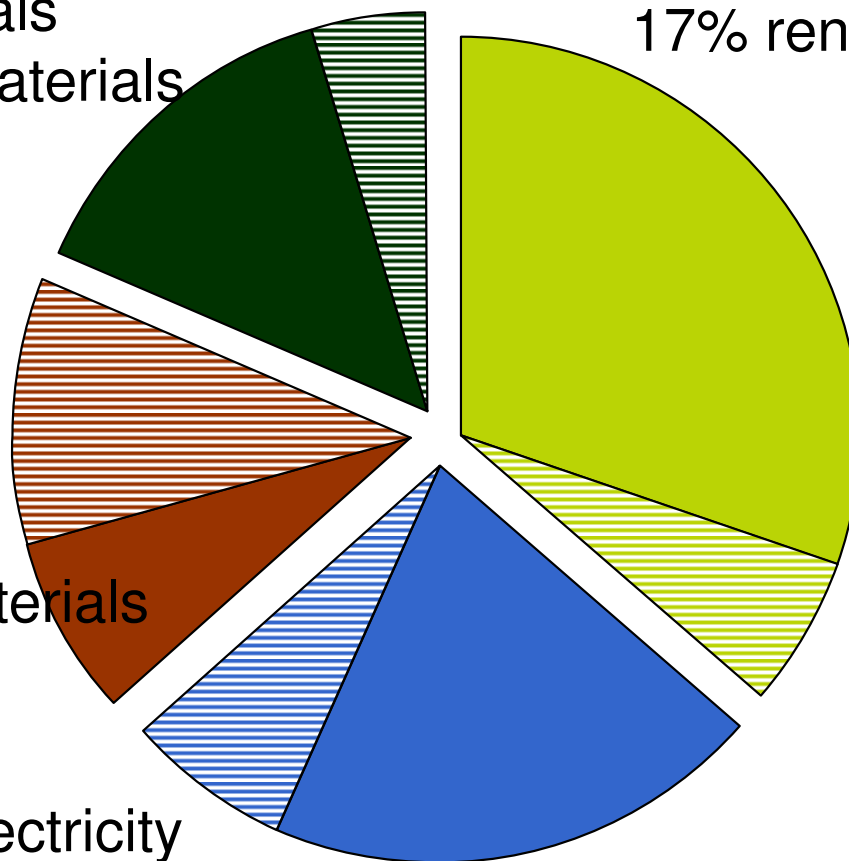
Chemicals and materials  
25% renewable raw materials

Heat  
17% renewable raw materials

Transport Fuels  
60% renewable raw materials

Electricity  
25% renewable raw materials

Total 3000 PJ  
2030 = 2000





## 2. Sustainable Biomass

### CRITERIA AND INDICATORS

- Greenhouse gas balance
- Competition with food, local energy supply, medicines and construction materials
- Biodiversity
- Prosperity
- Welfare
- Environment

### 3. Transition Paths:

1. Sustainable development and production of biomass
2. Sustainable import chains
3. Co-production of chemicals, transport fuels, electricity and heat
4. Production of SNG (synthetic natural gas) for the natural gas infrastructure
5. Innovative use of biobased raw materials and increased sustainability of processes and products in the chemical industry

# Sustainable Import

- **Implement all Sustainability criteria**
- **by Standards and Certification**
- **Develop Pilots for schemes with developing countries**
  - **Support scheme from Min. Foreign Affairs**
- **dialogue with local stakeholders**
- **verify the criteria**
- **develop improved crops and production methods.**



## Biorefinery approach

- Yields highest economic benefit for the country
  - Biotechnology and fermentation
  - Thermal treatment
- Extract functionalised chemicals
- Use oils for endproducts and fuels
- Combine fuel production with power and heat from the residues
- example: Magnum of Nuon, Gasification fo Power en Heat,
  - could combine with syngas for biofuels
- From R&D to Pilot to Demo

# What to do ?

1. Development and application of certification systems for sustainable biomass, in international cooperation
2. International cooperation with countries producing biomass for import of biomass produced and used sustainably
3. Level playing field for biomass applications proportional to the CO<sub>2</sub>-reduction
4. R&D and implementation of:
  - biomass production
  - biomass gasification
  - large and small scale bio-refining
5. Demonstration and implementation of projects such as:
  - production of synthesis gas from biomass
  - bio refining of waste streams from the ethanol-, biodiesel- and soja- consuming industry

# Governmental Opinion Biobased Economy, October 2007

## -Positive but Careful & Sustainable

-Should contribute to GHG savings

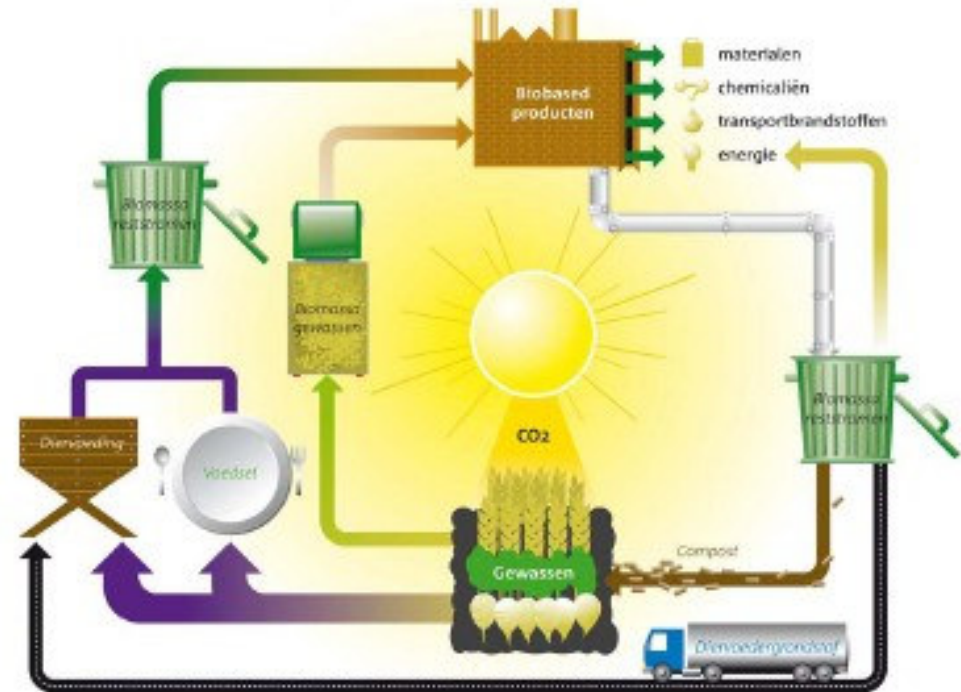
-Match Economic strength :

chemicals, logistics, food, research

## -Cooperate internationally

## -No-Regret Policy Agenda:

- Biorefinery: more efficient use of biomass
- Worldwide sustainable production
- Encourage green power & gas
- Develop Market





## 4. Renewable Energy Policy in the Netherlands

Objectives in The Netherlands:

9% renewable **electricity** in 2010. (EU directive)

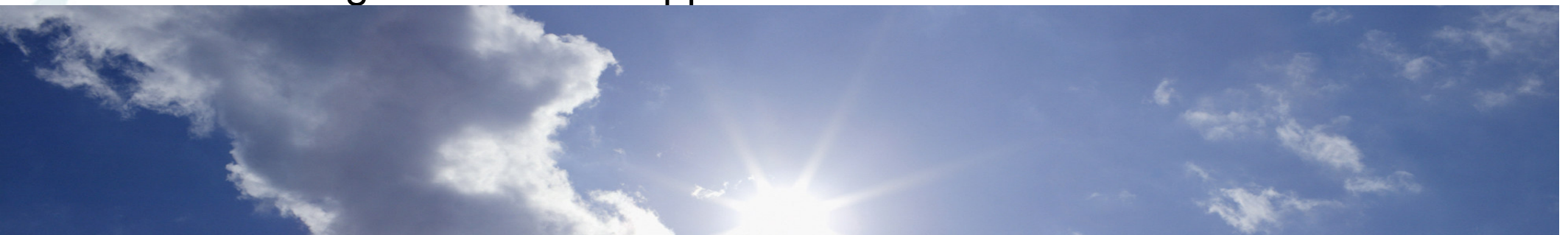
20% Energy efficiency improvement in 2020

20% renewable Energy in 2020 (Government)

14% Proposed EC directive (17% following RE NL protocol)

Liquid Biofuels: replacement of gasoline and diesel

- 2% obligation in 2007
- 3.5 % in 2008
- 4 % in 2010 (original 5.75%)
  - obligation on fuel suppliers

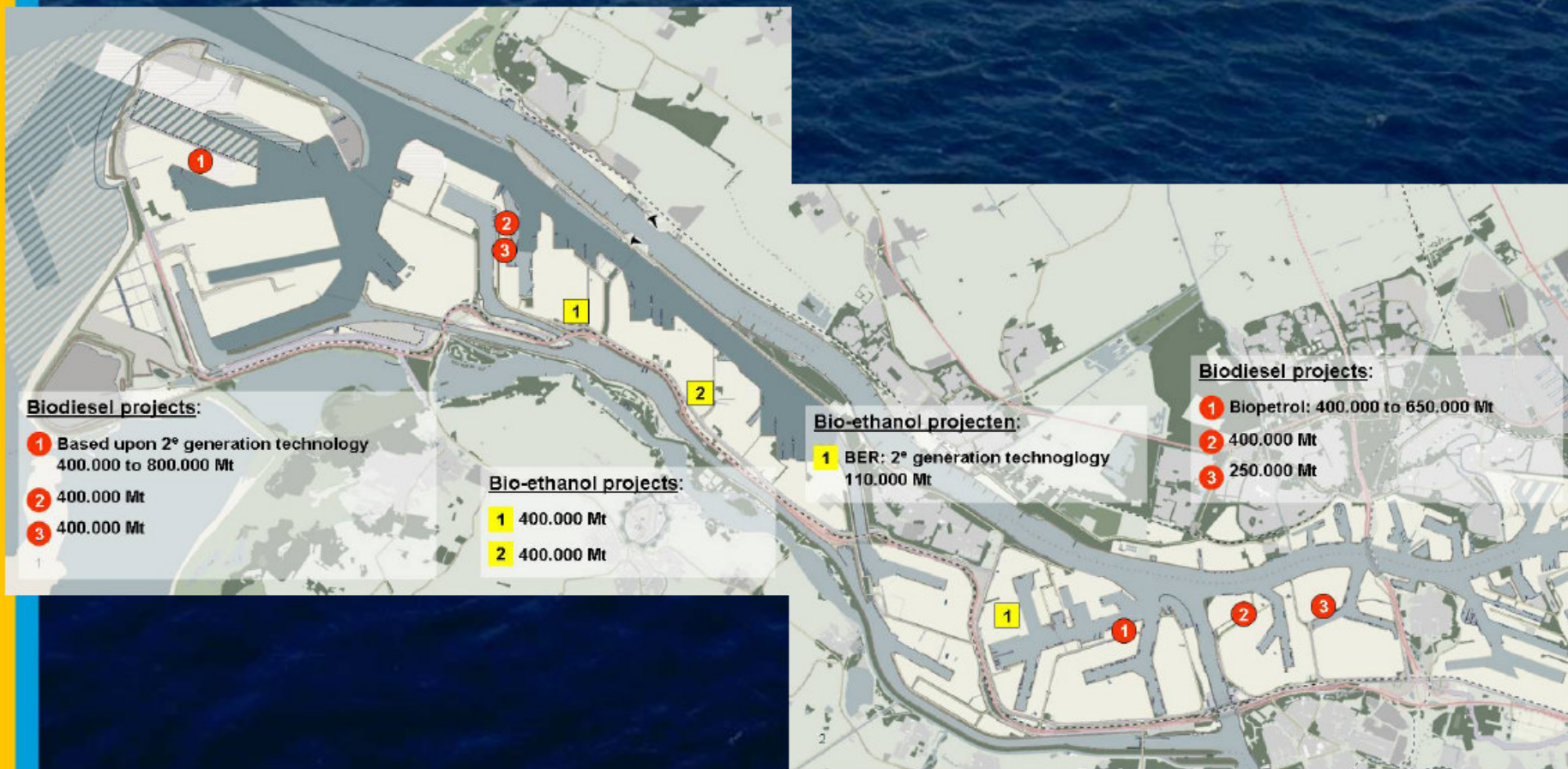




# Rotterdam as a Biohub

## Biofuels: initiatives in Rotterdam

2007



## 5. Subsidy for Renewable Electricity (MEP -> SDE)

2000 – 2003: Green consumer support

2003 MEP subsidy per kWh

10 yr contract

Only support of additional cost

Budget: 2006: 370 MEuro

Budget: 2007: 550 MEuro

Tariff change at 1 July 2006

MEP stopped in August 2006

New Support Ren. En. (SDE) includes green gas

| MEP<br>€ct/kWh                        | Jul<br>2004 | Jan<br>2005 | Jul<br>2005 | Jul<br>2006 |
|---------------------------------------|-------------|-------------|-------------|-------------|
| Biomassa > 50MW<br>(3yr) wood pellets | 5.5         | 7.0         | 0<br>new    | 2.5<br>6.1  |
| Mixed flows                           | 2.9         | 2.9         | 3.6         | 3.6         |
| Biomass <50 MW                        | 8.2         | 9.7         | 9.7         | 9.7         |
| Olieen >10MW                          | 8.2         | 9.7         | 6.0         | 6.0         |
| Wind on shore                         | 6.4         | 7.8         | 7.8         | 7.8         |



# Growth of Manure Digestion through Co-digestion

Since 2003 Ministry of Agriculture announced a Positive List for co-digestion (max 50%) while digestaat remains legally a manure

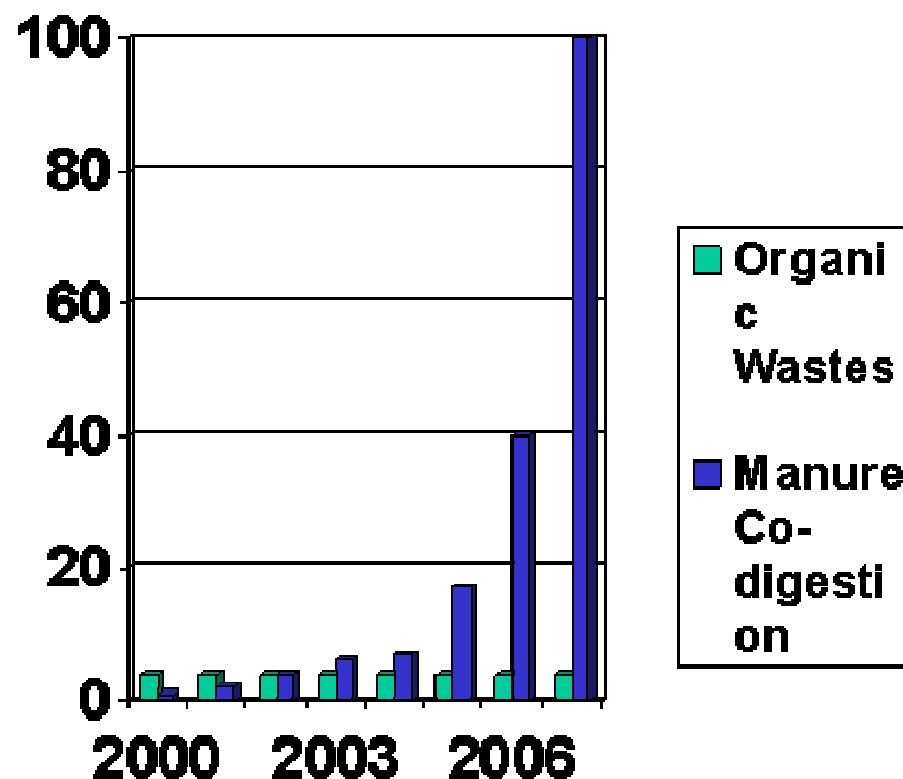
Only: Fresh Organic material (leaves, etc. )

Now also 100% maize digestion

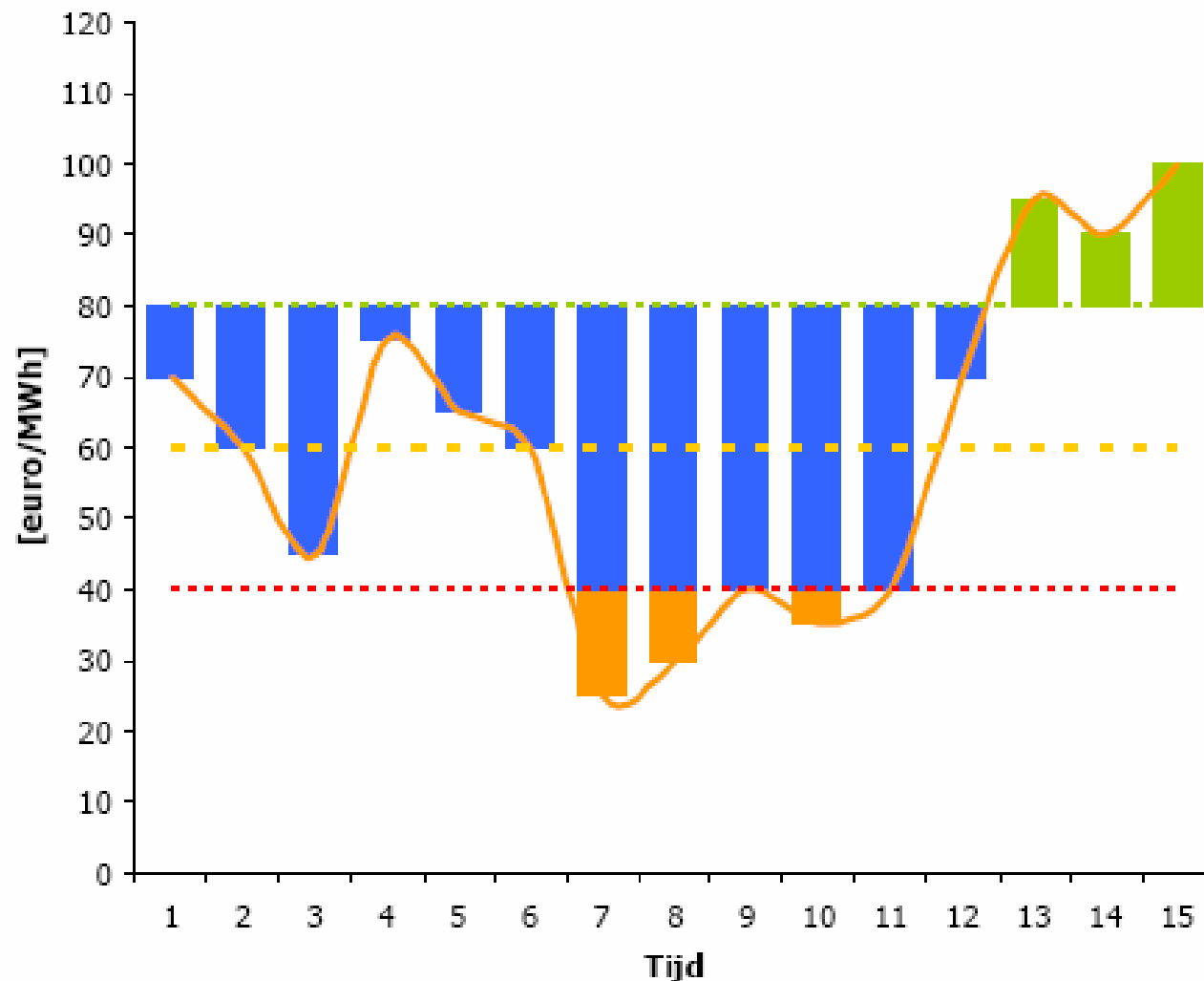
End 2006: 40 installations, 20 MWe

2007, additional call: 32 M€/yr (10yr contracts) for 40 MWe

2008: ... 12 cts/kWhe



**SDE Support, only on top of sales price:**  
**basic cost price 80 €/MWh**  
**basicelectricity price 40 €/MWh**



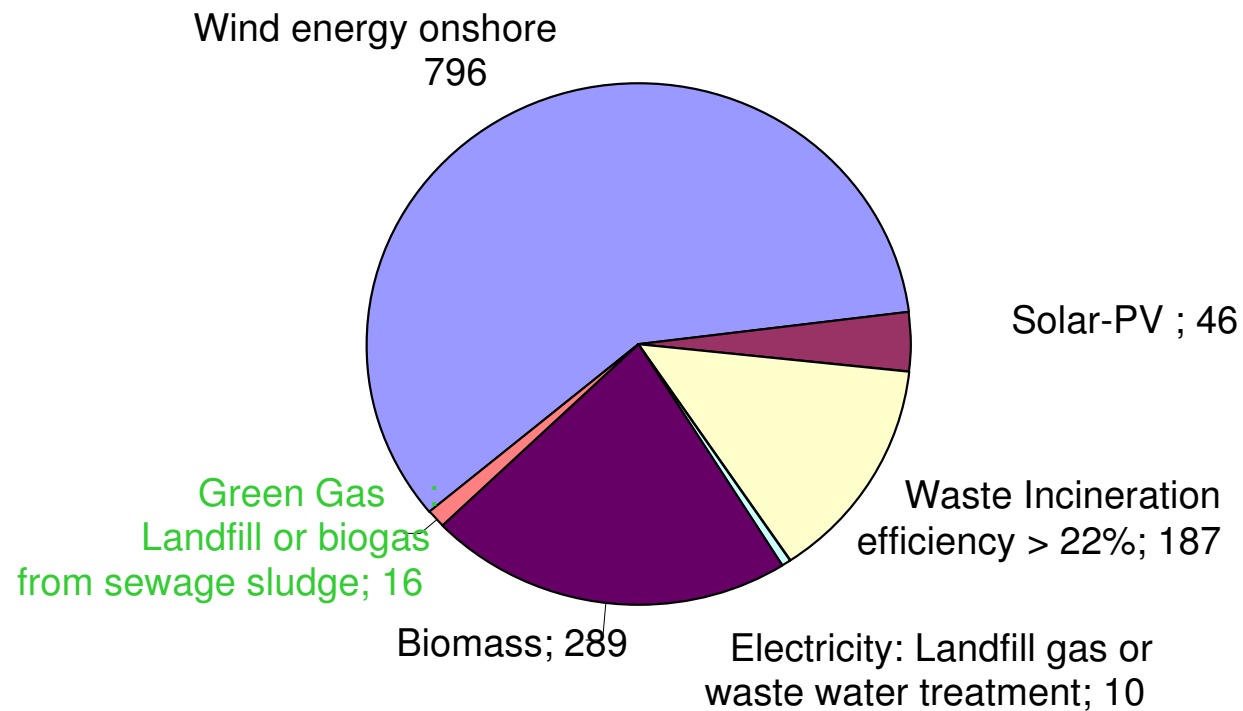
# Subsidy SDE 2008 for several categories

|   | Categorie                                     | Basic price                                                                   | correction                     | Subsidy 2008                    | Subsidie periode | hrs  | Vermogen 2008 (MW) |
|---|-----------------------------------------------|-------------------------------------------------------------------------------|--------------------------------|---------------------------------|------------------|------|--------------------|
| 1 | Wind                                          | € 0,110 per kWh                                                               | €0,065 per kWh                 | € 0,045 per kWh                 | 15 jaar          | 1760 | 500                |
| 2 | Power from wastewater/LFG                     | € 0,058 per kWh                                                               | €0,058 per kWh                 | € 0 per kWh                     | 12 jaar          | 8000 | 8                  |
| 3 | Green gas from wastewater/LFG                 | € 0,277 per Nm <sup>3</sup> gas                                               | €0,198 per Nm <sup>3</sup> gas | € 0,079 per Nm <sup>3</sup> gas | 12 jaar          | 8000 | 5                  |
| 4 | Power from waste when efficiency > 22%        | Basisbedrag oplopend naar rato v/h energie rendement<br>€ 0,115-0,137 per kWh | €0,121 per kWh                 | € 0,00-€ 0,016 per kWh          | 15 jaar          | 3880 | 70                 |
| 5 | Combustion solid biomass, Co-digestion manure | € 0,12 per kWh                                                                | €0,058 per kWh                 | € 0,062 per kWh                 | 12 jaar          | 8000 | 40                 |
| 6 | Solar PV (0,6 kWp – 3,5 kWp)                  | € 0,564 per kWh                                                               | €0,234 per kWh                 | € 0,33 per kWh                  | 15 jaar          | 850  | 10                 |



## New subsidy programm for renewable energy: SDE 2008

Budget for 12 years: EUR 1.328 miljoen



## 6. Conclusion

Renewable Electricity and Biofuels develops

Need for switch to biomass application in chemicals, heat and biofuels in the Energy Transition

Need for Sustainable Production and Application

Supportive governmental intentions in Netherlands

- Target 20% in 2020
- Support for Energy Transition
  - innovative sustainable energy systems: Green Gas and Heat
  - Focus on Small Medium Enterprises & Biobased Economy

International Cooperation

**Thank you for your attention**

**Like to know more?**

[www.creatieve-energie.nl](http://www.creatieve-energie.nl)

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