

The Netherlands

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Background

- Declared independence from Spain in 1579
- Became known as “A kingdom of the Netherlands” in 1815
- 1830 Belgium Succeeds
- Founding member of NATO and the EU

Source: CIA World Factbook

Quick Facts

Official Language: Dutch

Currency: Euro

Population: 16,877,351 (July 2014)

83.2% of citizens live in urban areas

Major Cities: Amsterdam, Rotterdam, The Hague

Source: CIA World Factbook

Economy

6th largest in euro-zone

Food processing, chemicals, petroleum refining, and electrical machinery

Imports: \$511 billion

Exports: \$576.9 billion

Source: CIA World Factbook

Transportation

29 Airports

Pipelines

Roads

Waterways (boats weighing 50 tons)

Railways

Source: CIA World Factbook

Geography

- Size: slightly less than half the size of NJ
- Marine climate: cool summers, moderate winters
- Terrain: Mostly low lying coastal and reclaimed land

Source: CIA World Factbook

Current Environmental Issues

Water Pollution:

- Heavy Metals
- Organic compounds (phosphates and nitrates)

Source: CIA World Factbook

Environmental Issues (cont)

Air Pollution

- Vehicle emissions
- Refining processes
 - Acid rain

Source: CIA World Factbook

Government

- Constitutional Monarchy
 - Capital: Amsterdam
- 12 total provinces: Drenth, Flevoland, Fryslan, Groningen, Gelderland, Limburg, Noord-Brabant, Noord-Holland, Overijssel, Utrecht, Zeeland, Zuid-Holland
- Dependent Areas: Aruba, Curacao, Sint Maarten

Government cont.

- Constitution Ratified in 1815
 - Living Document: Last amended in 2010
- Legal System: Based on French model
- 3 Branch system:
 - Monarch: Willem Alexander
 - Legislative Branch: Elected
 - Judicial Branch: Appointed by monarch

Local Governments

- Divided into over 400 municipalities of varying sizes
- Municipal councils are elected every 4 years
 - Municipal executives serve similar role as electoral college
 - Mayor of municipality is appointed by the monarch
- Entire body represents the people

Local Government Responsibilities

- Local Taxes
- Local environmental issues
- economic and employment concerns
- transportation, construction, and community development

Source: VNG-Association of Netherlands Municipalities

Energy Profile

Key Facts:

- Not a major producer of oil based fuels, important transportation/refining hub
 - Rotterdam
- 2nd largest NG producer/exporter in Europe
 - Mainly offshore and Groningen

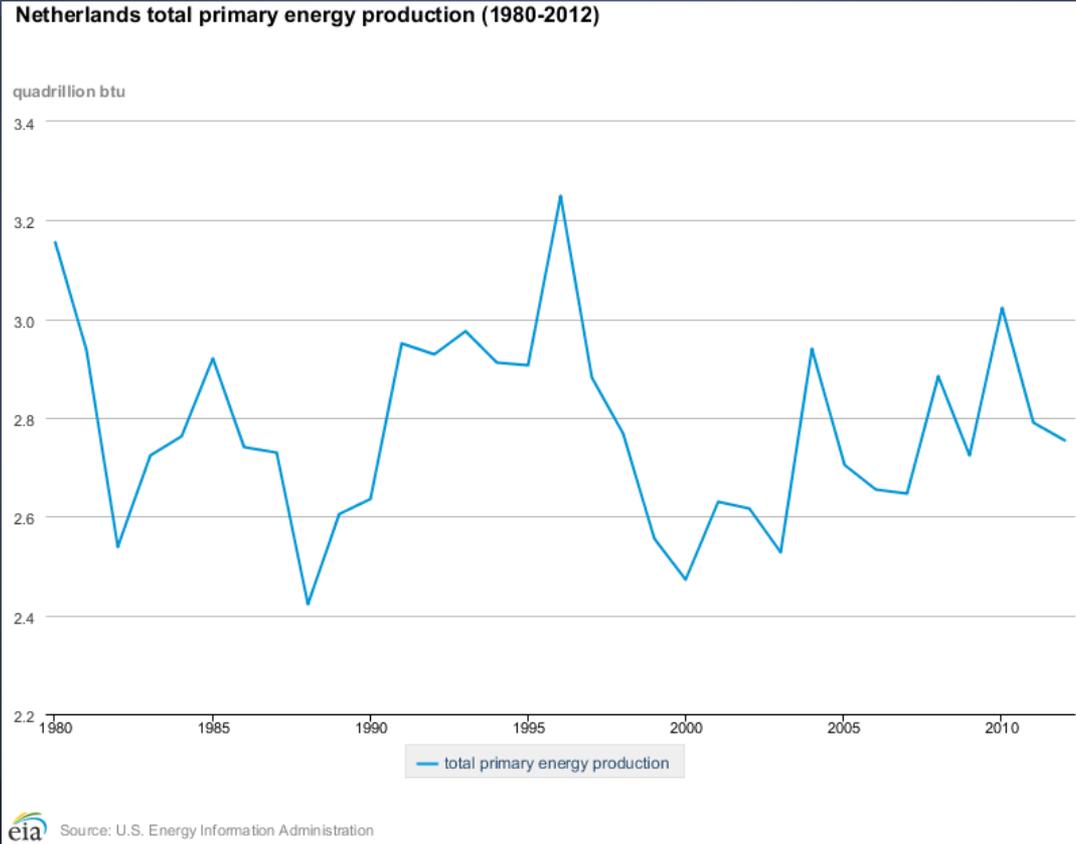
Source: EIA Netherlands Overview

Energy in the Netherlands

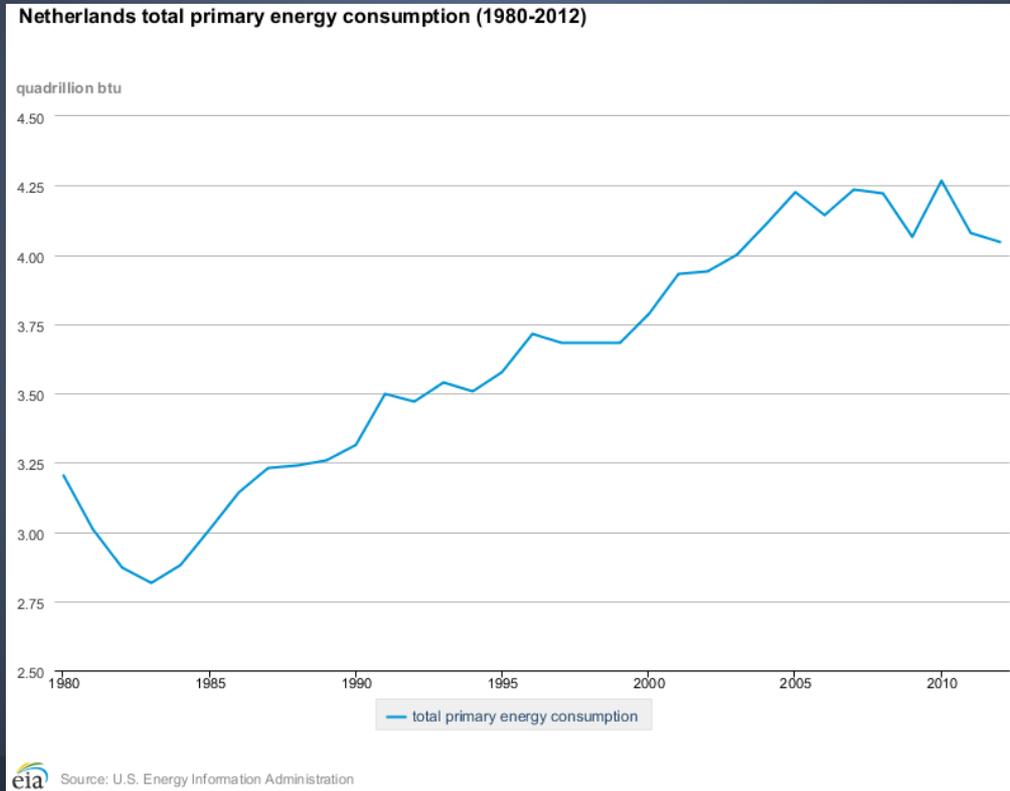
- Petroleum Provides $\frac{1}{2}$ of energy for consumption
- Only 15% of energy grid comes from renewable sources

Source: EIA Netherlands Overview

Total Production vs Consumption



Total Consumption

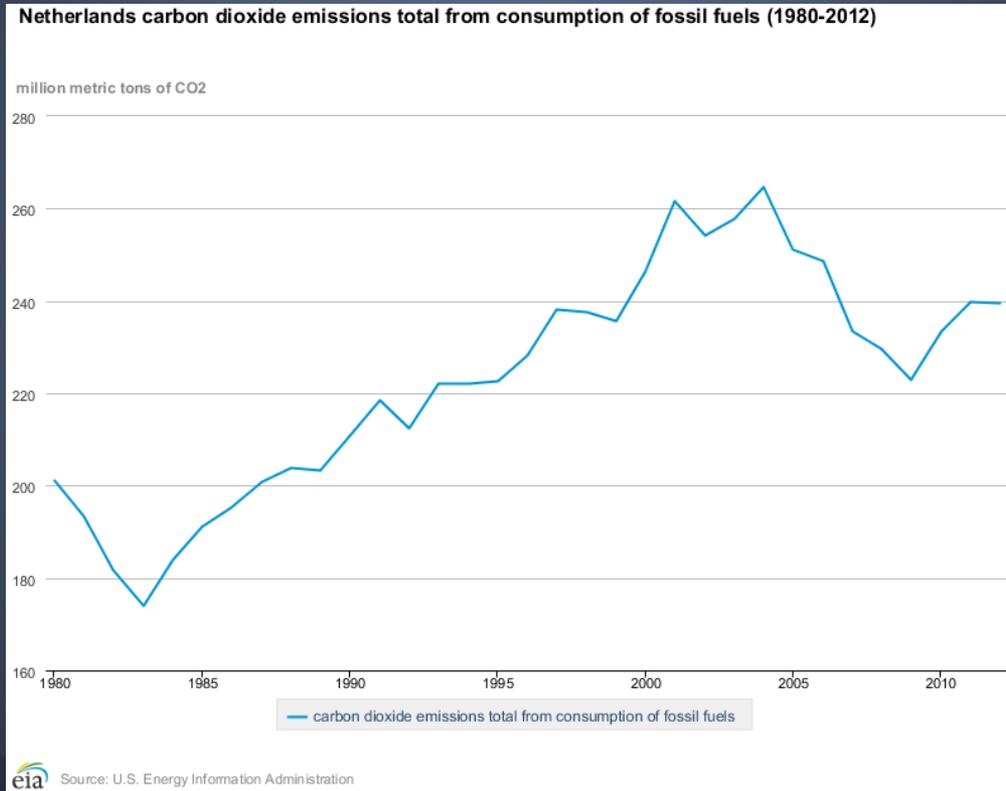


Carbon Tax in the Netherlands

- Implemented in 1990
- Approximately \$20.00 USD per metric ton CO₂
- 4.89 Billion in annual revenue (redistributed)
 - other tax reductions
 - funding for climate mitigation programs

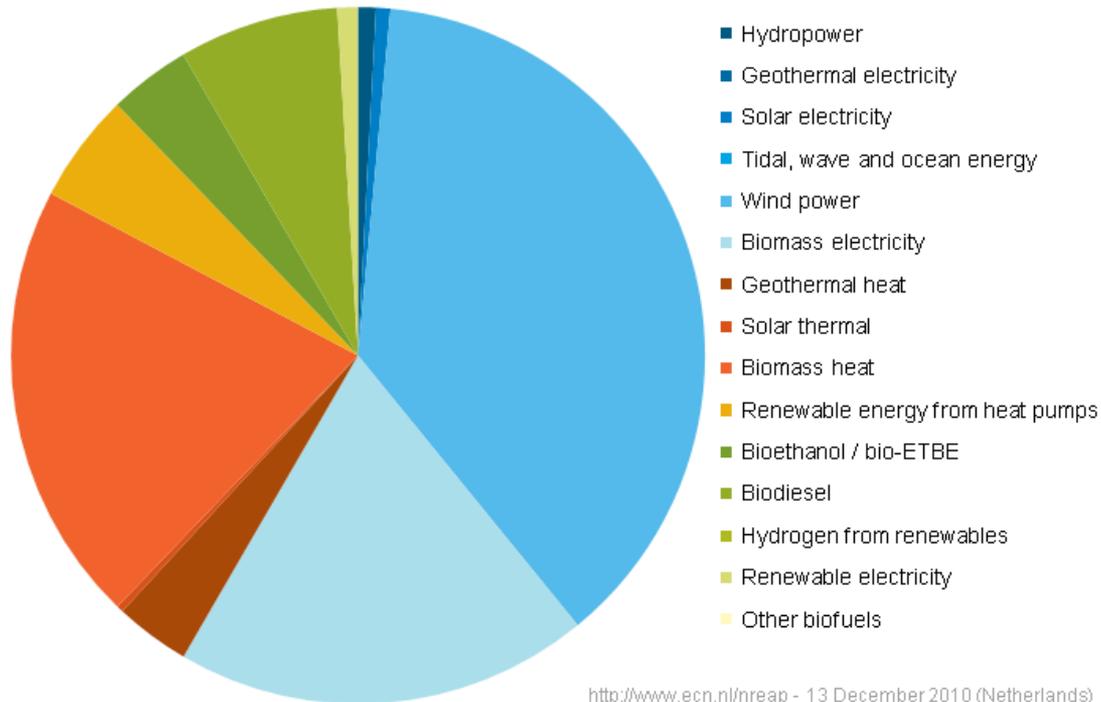
Source: Center For Climate and Energy Solutions

Carbon Dioxide Emissions from FF



The Future of Renewables

Renewable energy share in 2020: 14.5% (target 2020: 14%)



<http://www.ecn.nl/nreap> - 13 December 2010 (Netherlands)

Destinations for our Trip

Netherlands Emission Authority

Netherlands Environmental Assessment Agency

Westereems Wind Farm

Netherlands Emission Authority

- Supervisors of emissions trading
- Emissions licensing
- Collect and review emission reports
- Policy and implementation

Source: Netherlands Emission Authority

Netherlands Environmental Assessment Agency

- Called PBL (Planbureau voor de Leefomgeving)
- Research on nature and environment
- 4 core tasks

Source: PBL

Westereems Wind Farm

- Located in Eemshaven
- 170 MW generating capacity
- Super wind turbines (177 m)

Source: Essent

Groningen Gas Field

- Located in Groningen province
- 10th largest gas field in the world
- Discovered in 1959
- Start of production in 1963
- Surface area 900 km²
- Estimated 2800 billion ft³ gas available

Source: NAM

Groningen Gas Field

- 300 wells drilled
- Estimated 2020 billion ft³ of gas already produced
- Estimated future production of 780 billion ft³
- Current production 49 billion ft³ per year
- Used for gas storage

Source: NAM

Carbon Capture and Storage

- CATO-2 Program
- CATO (CO₂ Afvang, Transport en Opslag)
 - CO₂ Capture, Transport and Storage
- Made Netherlands an international leader in CCS research

CCS Research

5 Sectors of research

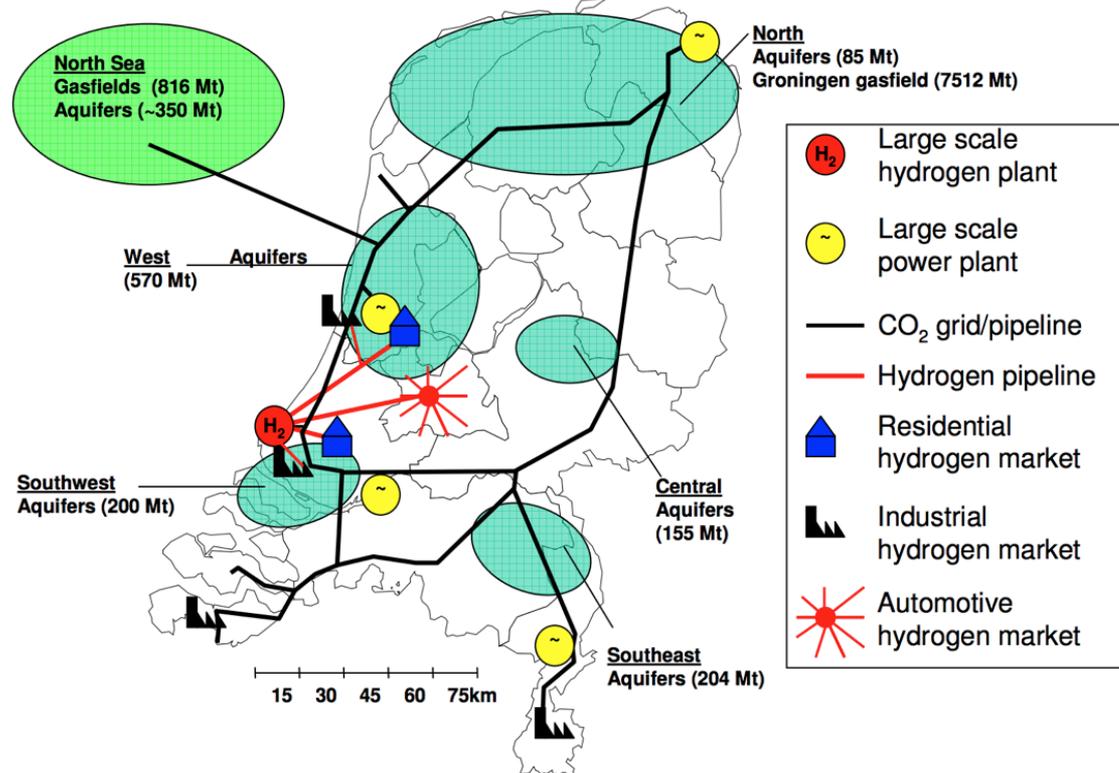
- CO₂ Capture
- Transport and CCS chain integration
- Subsurface storage of CO₂ and monitoring storage
- Regulation and Safety
- Public Perception

Research priorities are determined by government and industrial partners

Source: CATO



A system analysis for the Netherlands



Our research in the Netherlands

- Comparing emissions data resulting from space heating
- Amount of fuel per person (Btu)/square ft
- Amsterdam vs. Reykjavik or Seattle, Boston
- Progressive Scandinavian city vs. progressive U.S. city

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