The Netherlands

TJ Stephens & Mike Spiessbach
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

Source: CIA World Factbook
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
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

Netherlands total primary energy consumption (1980-2012)

Source: U.S. Energy Information Administration
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

Netherlands carbon dioxide emissions total from consumption of fossil fuels (1980-2012)

Source: U.S. Energy Information Administration
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 km\(^2\)
- Estimated 2800 billion ft\(^3\) gas available

Source: NAM
Groningen Gas Field

- 300 wells drilled
- Estimated 2020 billion $ft^3$ of gas already produced
- Estimated future production of 780 billion $ft^3$
- Current production 49 billion $ft^3$ per year
- Used for gas storage

Source: NAM
Carbon Capture and Storage

-CATO-2 Program
-CATO (CO$_2$ Afvang, Transport en Opslag)
-CO$_2$ Capture, Transport and Storage
-Made Netherlands an international leader in CCS research

Source: CATO
CCS Research

5 Sectors of research
- CO$_2$ Capture
- Transport and CCS chain integration
- Subsurface storage of CO$_2$ 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

Source: Kay Damen, Utrecht University, 2007
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