

# Energy Transition: Where is Valhalla and where is the Nifhlhel?

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- **Setting perspective: Energy Valhalla in 2008**
- The Energy Transition: trends in other regions
- The Energy Transition: trends in our region
- **Combining Trends: Valhalla & Niflhel in 2018**

Let's make money

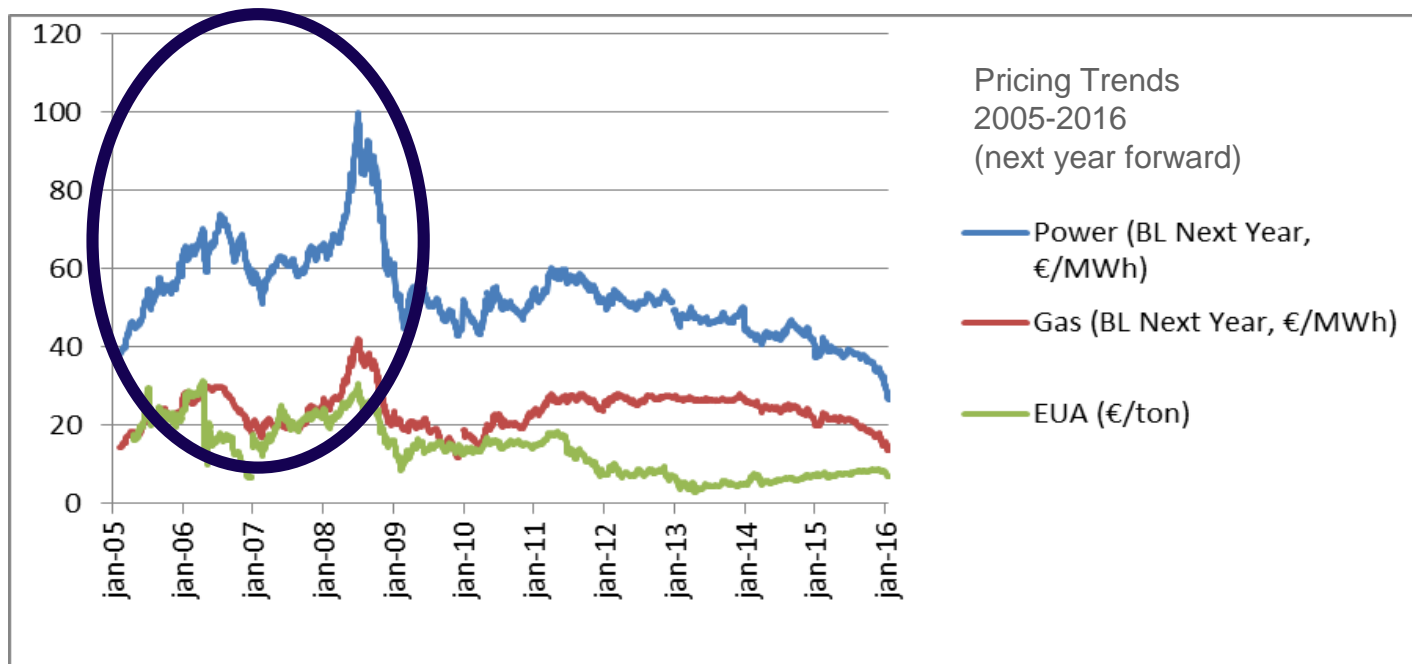
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Let's hope no one asks for the financials

Een harde wind of koude dag als sfeerbepaler op de handelsvloer



# 2008: Power Production & Gas storage are the place to be



Energy Transition had already started in 2008! And nuclear was still on..

- Germany 2008: 24 GW Wind (now 40 GW)
- Germany 2008: 6 GW Solar (now 40 GW)

### Trends in 2008

- Fossil Power Production cornerstone portfolio
  - Fossil fuel generation will be price setting
  - Fossil fuel will remain much cheaper than renewables
- Industry suffering from high prices (international comparison)
  - Carbon, power and gas make Europe (and Japan) high price regions
  - Energy intensive industry has little future in Europe
- Households in NL pay 100 euro per year renewables support costs
  - Solar panels on roof top make little sense
  - Taxes are only small part of energy bill
- Unbundling: low margin low risk GridCo's don't belong in one portfolio with high margin medium risk trading & generation companies
- Energy is like the Internet: everyone makes money (but Industry)
  - Free Carbon Credits (2000 mln credits @ 20 e/ton per year)
  - Cheap Russian gas
  - No depreciation but revaluation on assets

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# China: Energy Transition well underway

- 5500 TWh consumption (Germany: 600 TWh, USA 4000 TWh, EU 3000 TWh)
- 1500 GW installed Capacity
  - ~1000 GW Thermal (mainly coal)
  - 320 GW Hydro
  - 140 GW Wind (+25 GW in 2015, in 2008 it was 12 GW)
  - 43 GW Solar (+15 GW in 2015; in 2008 it was 0.14 GW)
  - 23 GW nuclear
- Coal plants are suffering
  - Power demand grows slower than new build renewables
  - New coal stations recently came on-line (like NL 😊)
- Carbon Trading planned from 2017 onwards (some delay however seems likely)

# China: Dispatching based on environmental impact

- China has various power dispatching systems (like EU and USA)
- A typical example
  - Centralized Dispatch (per region)
    - Hydro gets 40 (~ euro per MWh)
    - Thermal (coal) gets 55 (~ euro per MWh)
    - Wind gets 85 (~ euro per MWh)
  - Renewables/Must Run go first
  - Coal stations get sweet price, IF they are scheduled
    - Demand stagnating: running hours for modern coal stations are going down
  - How to select the coal station which can run?
    - “based on lowest environmental impact”
      - Coal station with DeNox/DeSulfarization gets scheduled first
        - Incentive to install DeNox/DeSulfarization
      - Coal station who sell heat/steam get priority as well
  - Net Result: Coal stations have incentive to re-use heat and to install DeNox/DeSulphur.
    - Coal stations become aware of risk of low scheduling
      - No more new build (compare to NW Europe 😊)
  - Net Result: Power prices >> 55 e/MWh



# China: No competitive advantage in power & gas prices

- China wholesale power prices are  $\gg 55$  e/MWh (for Industry)
  - No “AdeI” law for transmission costs
  - No “EEG exemption” for Major industrials
  - Renewable uplift costs are included (at least 50%) in wholesale price
  - (various other subsidy are outside scope of this presentation)
- China coal prices are world market (China imports coal)
- China gas is mostly LNG (world market prices)
- China wants to bring down power prices
  - Dispatching is shifting from ‘minimal environmental impact’ to ‘lower prices’
- Conclusion
  - China energy prices are premium over Europe
  - China is joining the energy transition
  - Industry and coal stations seem to pick up the bill

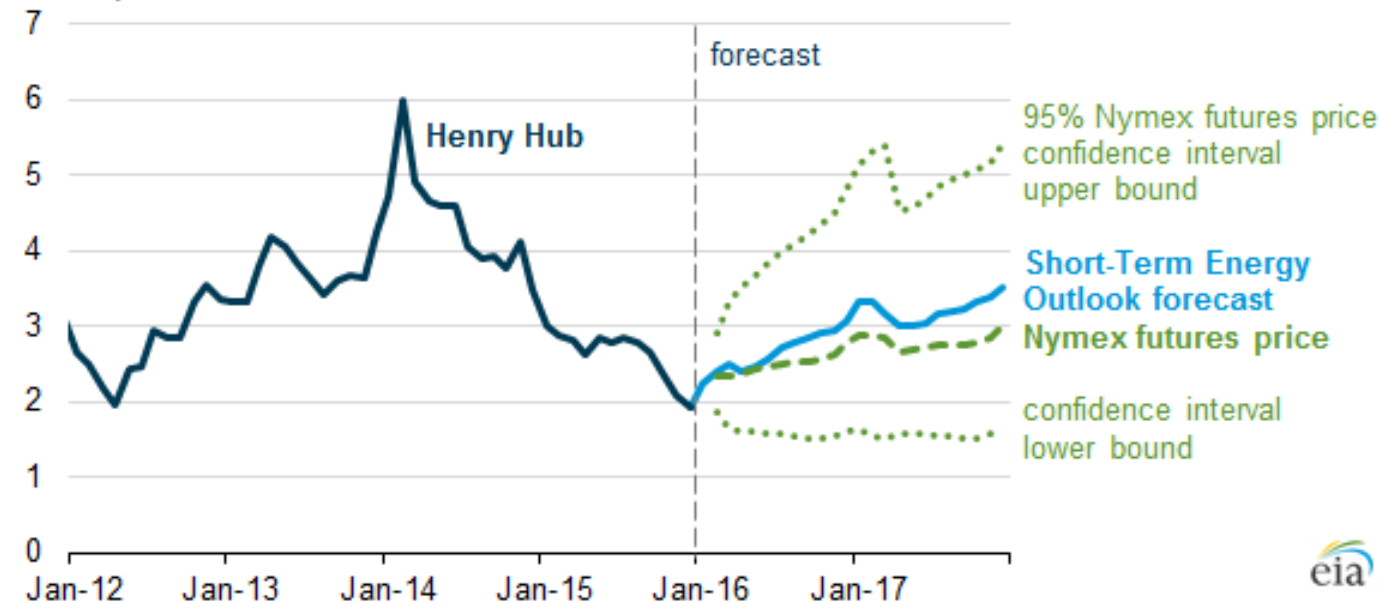
# USA has many different market models

- For power, often capacity tariffs (in addition to wholesale prices)
- In general:
  - power prices (“all in”) premium over Europe
  - Gas prices: discount to Europe
- Energy Transition
  - Wind: 75 GW (plus 5-7 GW yoy)
  - Solar: 25 GW
    - Mostly in large scale solar plants
  - Ball park: USA has ~ wind and solar as Germany, but market is 6 times larger
  - Many states: RPS (Renewable Portfolio Standards; a certain percentage of every supplier has to be coming from renewables)
  - Some States: Carbon Trading (RGGI, California)
- Power still cheap (low tax), hence little incentive for roof top solar
- Many companies have integrated grid and retail business (unbundling is on the whole sale level)
  - Potential to play large role in energy transition

## USA cheap gas (but higher power prices)

Monthly average spot price at the Henry Hub (2012–17)

dollars per million Btu



Price: 2.2 \$/mmbt = ~7 euro/MWh (compared to Europe 14 euro/MWh)

### Do you need the grid at all?

- Australia: relative high power prices, including high uplifts for households (“Energy Tax/Renewable certificates”)
  - High on Management Agenda Distribution Companies: Disconnecting customers
    - (Roof top) Solar grows fast
    - Remote areas are used to lower reliability than NW-Europe
    - Tesla Power Wall plus Solar panels plus small diesel generator: for 25 kEuro one off you have nothing to do with your GridCo anymore...
  - Over capacity in fossil generation (like NW-Europe)
  - Carbon Pricing is on/off on a 4 year basis (elections)
    - Lignite plants shifted from ‘money maker’ to ‘should be closed’ to ‘money maker’ in a 5 year period
      - Carbon prices varied between none and highest in the world
- South Europe:
  - see Australia
  - For GridCo’s: Power component in tariff is bringing in less revenue (due to roof top solar)
- Russia (1000 TWh market):
  - < 50 MW windmills, < 50 MW solar, 180 TWh hydro
  - Energy Transition not on management agenda
  - Industry pays more than households

# What happens in other parts of the world

- Fossil fuel generation is struggling everywhere
- Power Prices for Industry are higher in other regions
- Gas prices for Industry are lower in USA, and equal/higher in other regions
- Roof top solar in sunny countries starts impacting GridCompanies
- Additional costs of renewables are sometimes shifted to retail customers (South Europe, Australia), but sometimes included in wholesale price (China)
  
- Wind and solar require support
  - Direct feed in tariffs for wind and solar, charged via Certificates and Energy Tax
  - Avoiding costs (roof top solar)
  - But roof top solar plus battery wall can be a game changer
    - A 12 year pay back time for a 25 k house investment in the current low interest rate environment & doing something good for the environment
  
- GridCompanies in other regions want to shift to capacity tariff...

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## Making Money



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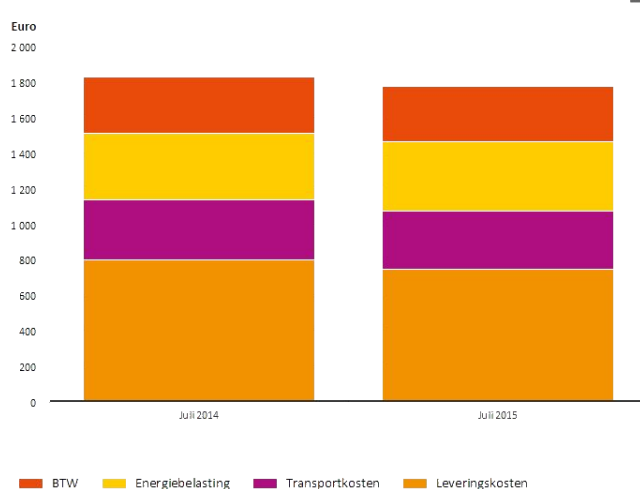


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# 2016: Profitable companies in the Energy Sector... ? ....Ah, you mean grid companies

Energierkening juli 2014-2015 in euro

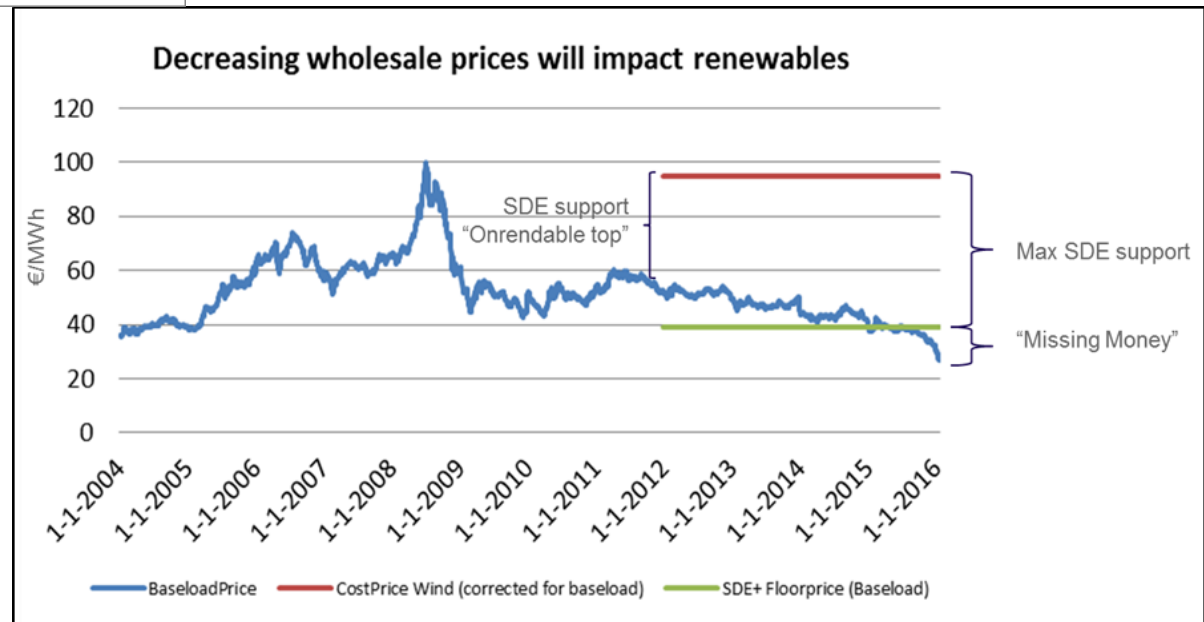


[www.energievergelijk.nl](http://www.energievergelijk.nl)

- Financing for GridCo's is cheap (low interest rate environment)
- Dutch Grid Companies have capacity tariff (so no energy component)
  - They are the envy of every other GridCo in the world
    - Less sensitive for roof top solar
  - All thing equal, you invest in a Dutch Gridco rather than a Belgium or German GridCo
- Do you still need dual fuel connection with your GridCo ?
- Depreciation: up to 40 years
- Short/Mid term: Valhalla; long term it may shift to Nifhlhel...



## 2016: The Turning Year for Wind & Solar profitability in NL, as Floor Price Risk is becoming a fact



# Power Intensive Industry should grow in NW-Europe

- For Aluminium, Zinc, Copper: no exposure to CO<sub>2</sub>, gas & coal, but exposure to power prices
  - Power prices in NW Europe belong to the lowest in the World
  - Most base metals can adept to power prices: Valhalla+
  - Transmission tariffs in NL & Germany are low whereas reliability is high
- For Base Chemicals: exposure to power and gas
  - Low baseload power rices give a competitive advantage
  - In case you can adept your process to wind & solar generation: even more advantage
  - If you have more exposure to gas than to power (fertilizer company for example): competitive disadvantage to USA (but not to China, Australia)
- For Steel production
  - Many steel factories produce own power (blast furnace gas), made from coal
  - Competitive disadvantage for steel companies, as coal is world market and Co<sub>2</sub> prices are yet only applicable in Europe
    - Assure you remain a net buyer of power to reap at least some benefits of energy transition

## Market is being replaced by Subsidy

	<b>Production &amp; import (TWh)</b> (2006/2016/2026)	<b>Marketprice (€/MWh)</b> (2006/2016/2026)	<b>2006 (bln€)</b>	<b>2016 (bln€)</b>	<b>2026 (bln€)</b>
Turnover Fossil Gen.	120/113/80	70/30/30	8.4	3.4	2.4
Turnover Green Gen (market)	5/12/45	60/25/25	0.3	0.3	1.1
Turnover Green subsidy (heat, power, gas)			0.6	1.2 (kamerbrief)	6-7

Most turnover will be in Green subsidies & paid by retail & taxpayer (currently 500 e/MWh)

# Electric cars will increase power consumption by 30%

- If all cars are electric in NL, the electricity demand would rise 25% (30 TWh).
  - 0.25 kWh/km
- Provision of charging infrastructure is still a marginal business



Fastned revenue,  
Energeia, 20-1-16

- Value of fossil fuels plants:
  - Rijnmond Energy (800 MW CCGT): 8.4 mln
  - Langerlo (Coal, 550 MW): 20 mln
- “It’s cheap for a reason” (old trader expression 😊)
- Matching/Shaping Energy & Supply for retail: only 10-20 €/MWh difference, so with average household consumptions of 3.5 MWh/y, this seems to be a very marginal business

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# Valhalla and Nifhlhel exchange clients on a regular basis



2008	Fossil Fuel Gas Storage Wind Trading	GridCo Retail	Roof top solar Industry Electric Car
2016	Industry GridCo Roof top Solar	Wind Electric Car Large Scale Solar Trading Retail clients	Fossil Fuel Gas storage
2018 ?	Industry Electric Car Rooftop solar	GridCo	Fossil Fuel & gas storage Trading Wind Large Scale Solar Retail clients

**It Is Not the Strongest of the Species that Survives But the Most Adaptable  
(Charles Darwin)**

Thank you for your attention !

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