

The Leading Engine for Innovation and Entrepreneurship in Sustainable Energy

Energy Union – The way ahead

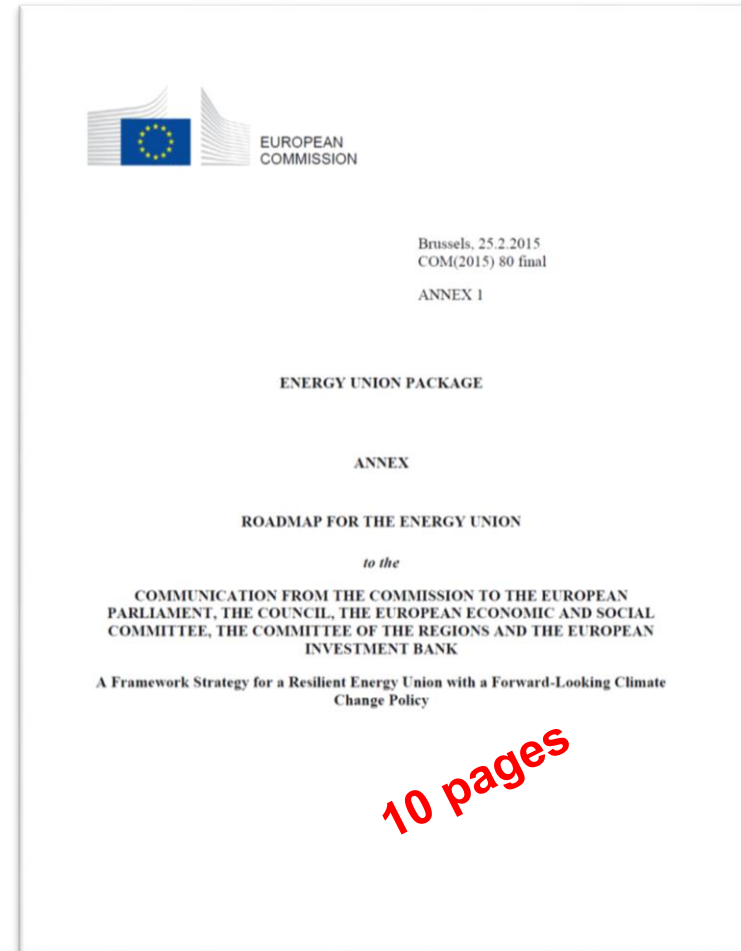
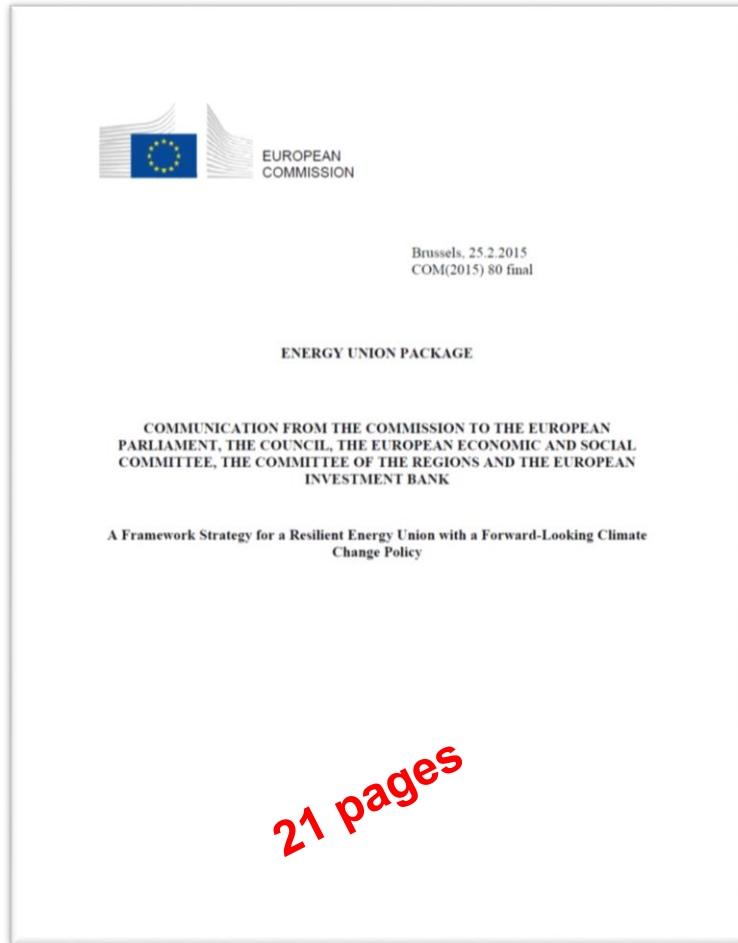
Diego Pavia

30th October 2015



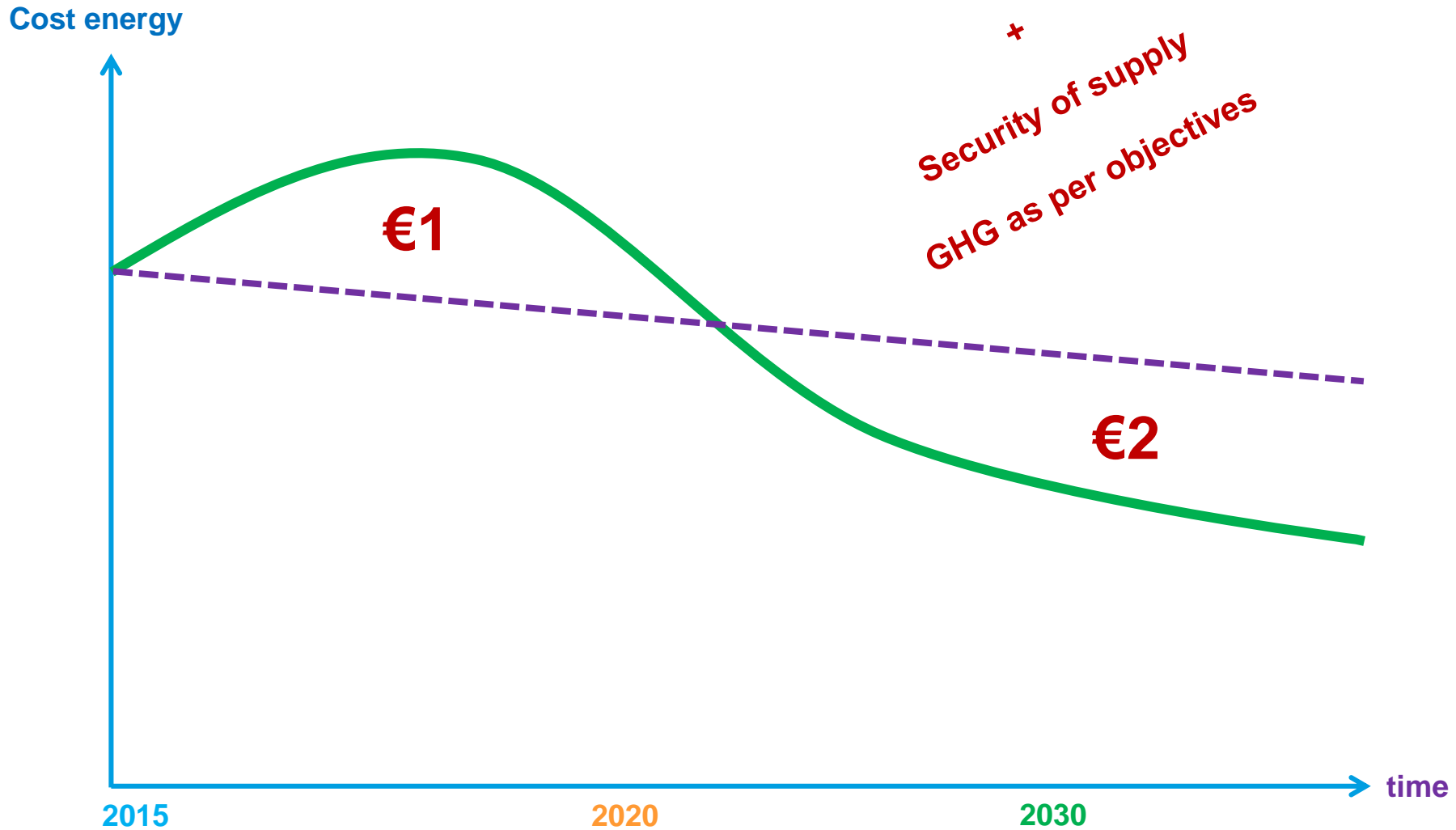
Energy Union. What? (1/2)

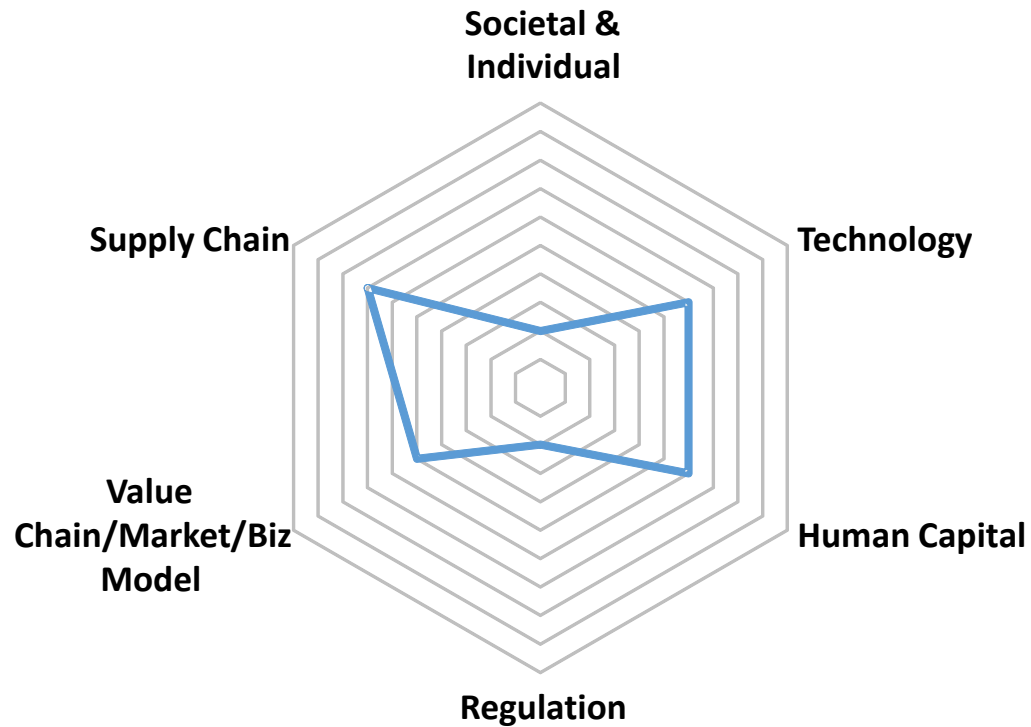
A clearly defined framework



Energy Union. What? (2/2)

Cheaper, cleaner, and secure

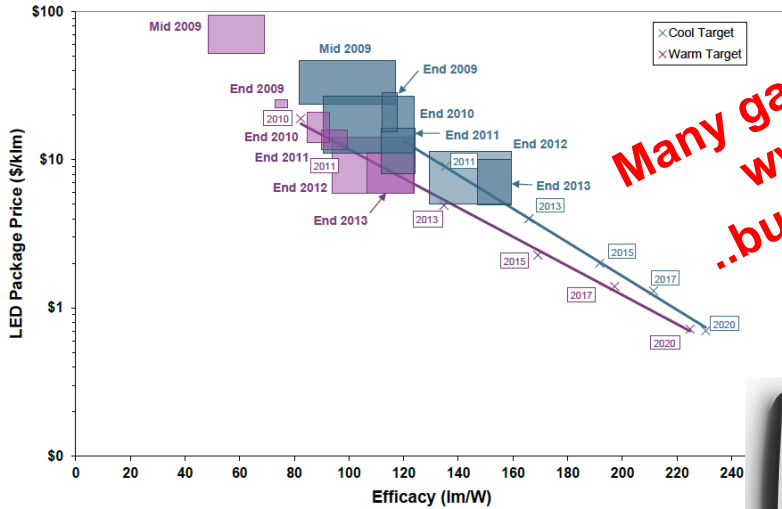
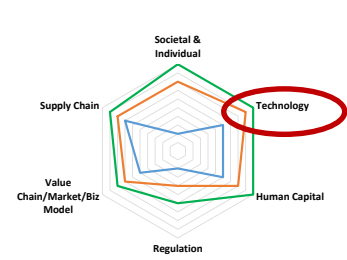




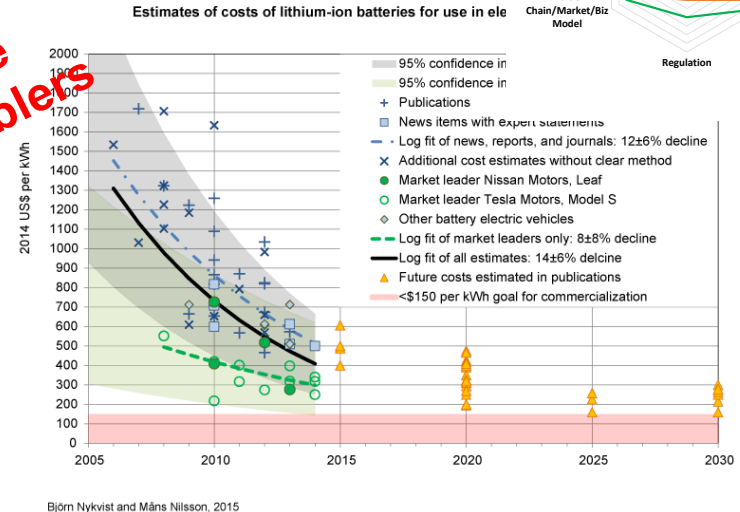
Situation today

Energy Union. How? (2/9)

Technology dimension



Many game changers..
..but only enablers



LAZARD'S LEVELIZED COST OF ENERGY ANALYSIS—VERSION 8.0

Levelized Cost of Energy—Wind/Solar PV (Historical)

Over the last five years, wind and solar PV have become increasingly cost-competitive with conventional generation technologies, on an unsubsidized basis, in light of material declines in the pricing of system components (e.g., panels, inverters, racking, turbines, etc.), and dramatic improvements in efficiency, among other factors



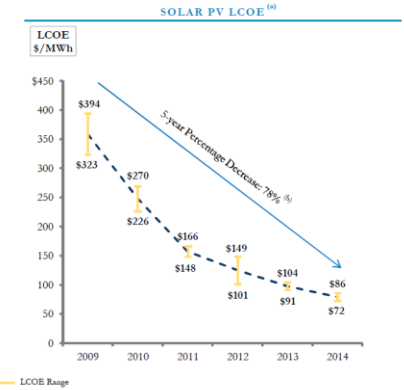
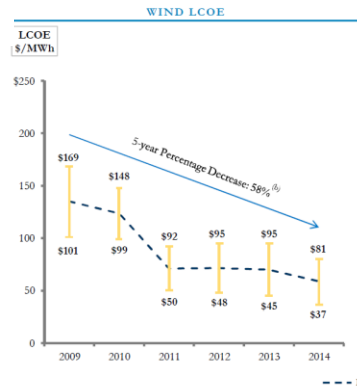
Think City 2009

Platser: 2
Längd: 314 cm
Max Hast: 113 km/h
0-100km/h: 16 s.
Räckvidd: 161 km
Effekt: 34kW (46hk)
Utrustning: Ej AC, Ej servo, direkt elvärme, ingen aktiv säkerhet...



VW e-Golf 2014

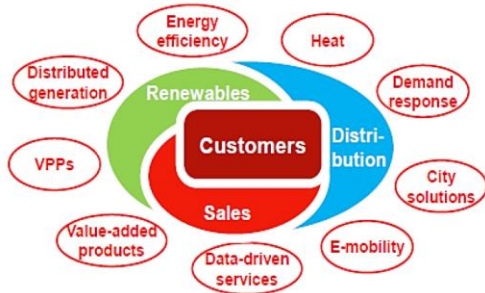
Platser: 5
Längd: 425 cm
Max Hast: 140 km/h
0-100km/h: 10,4 s.
Räckvidd: 190 km
Effekt: 85 kW (115hk)
Utrustning: ACC, servo, värmepump, aktiv säkerhet, LED-belysning...



Source: Lazard estimates.
(a) Represents LCOE range of utility-scale crystalline solar PV. High end represents fixed installation, while low end represents single-axis tracking in high insolation jurisdictions (e.g., Southern U.S.).
(b) Represents average percentage decrease of high and low of LCOE range.

Energy Union. How? (3/9)

Business model dimension

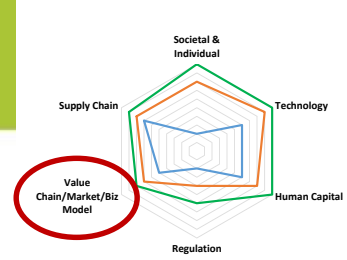


Conventional energy world

- System-centric
- Security of supply
- Global/regional perspective
- Large scale, central
- Conventional technologies

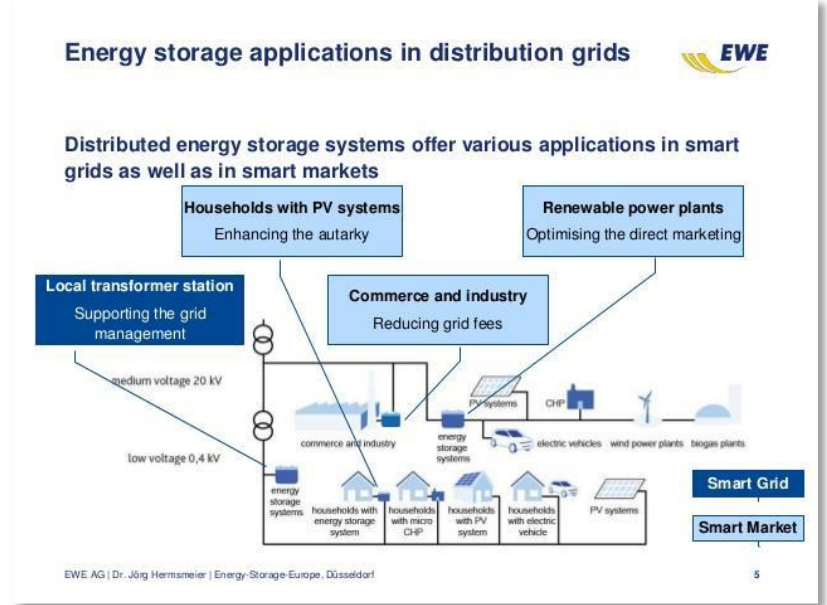
New energy world

- Customer-centric
- Sustainability
- Local proximity
- Small scale, distributed
- Clean technologies



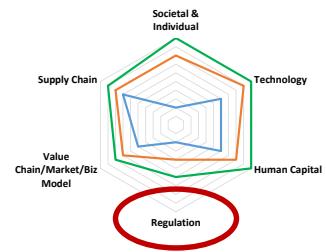
**Conventional model phasing out ...
New Buz. Models appear**

- **EDSO:** We will need storage « at whatever cost » with an increase of the share of RE.
- **RTE:** we should stop focussing on conventional economic analysis when it comes to storage (Tesla powerwall is maybe not economical, but it is sexy), and should consider the digital transformation
- **JRC:** We should not only consider storage for mitigation of Climate Change, but also for Adaptation to CC.
- **Eurelectric:** for a new market design, we should start from this rule: everyone going to the grid should be balanced. No more simple injection of electricity in the grid.
- Tesla has been mentioned 5 times. Tesla appears as a mind changer, enabling the blossoming of game changers.



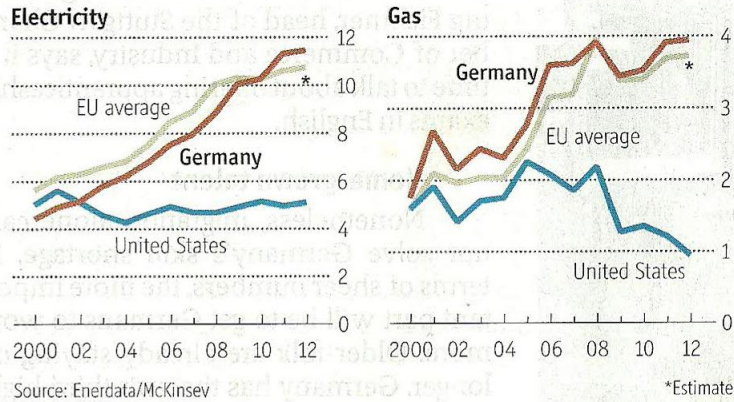
Energy Union. How? (4/9)

Regulation dimension

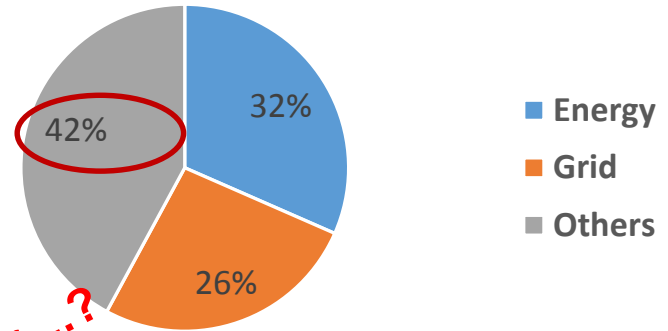


Europe's handicap

Industrial energy prices, € cents per kWh



John Europe energy bill



Regulation: Enabler or ...? *

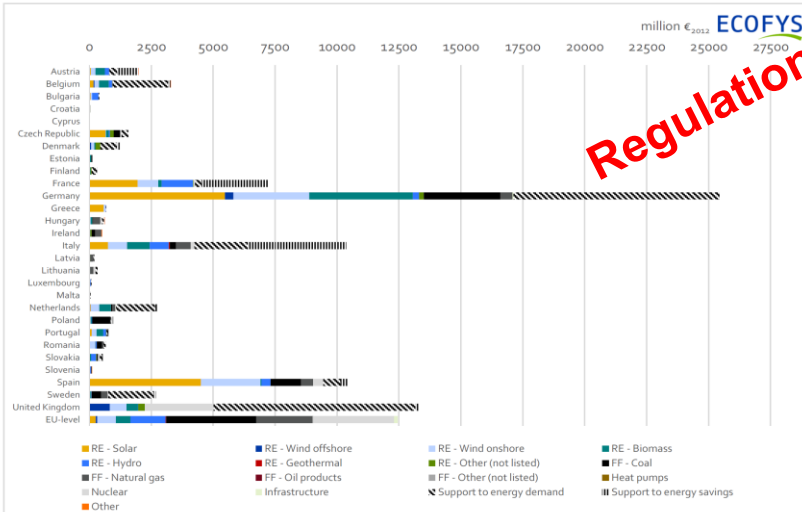


Figure S - 3 Interventions per Member State in 2012 (in million €₂₀₁₂)

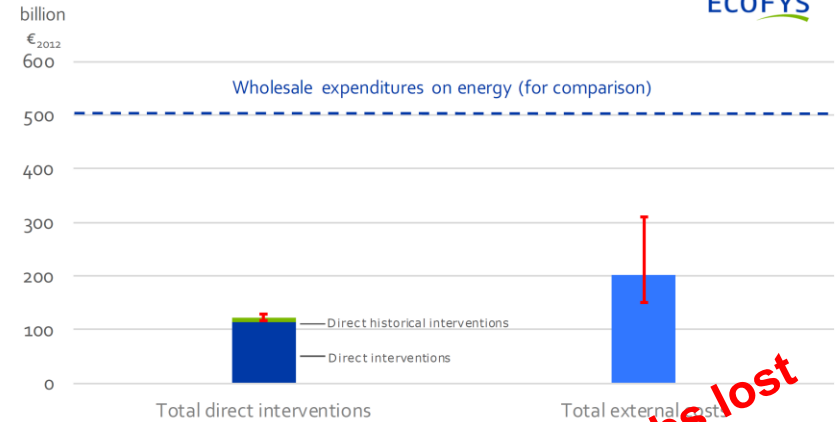


Figure S - 1 Total direct interventions, external costs and wholesale cost of energy in 2012 (in billion €₂₀₁₂)

3M jobs lost

Energy Union. How? (5/9)

Supply & value chain dimension

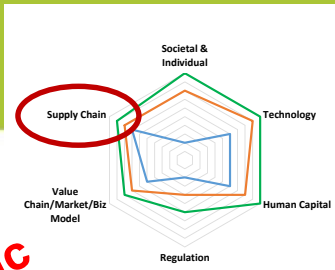
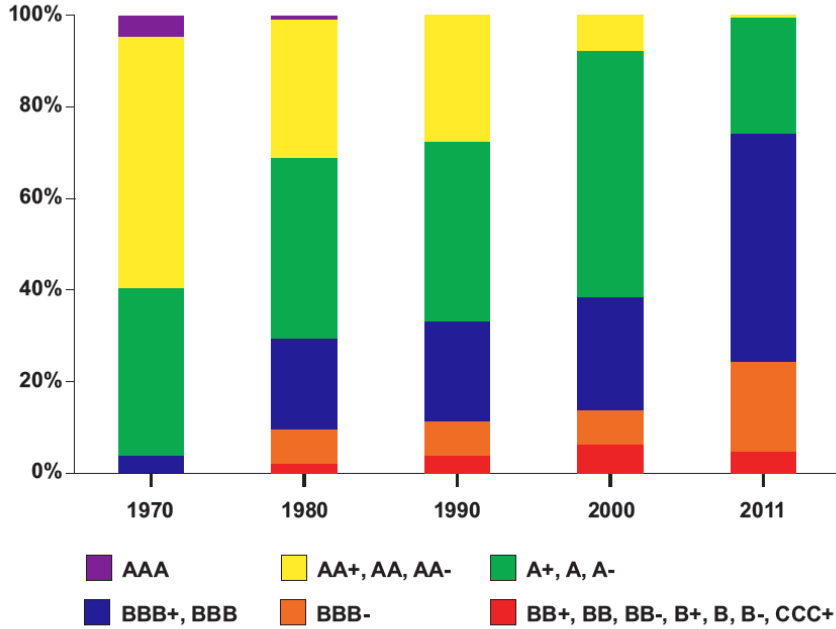


Exhibit 2

Electric utility industry credit ratings distribution evolution

(S&P Credit Ratings Distribution, U.S. Shareholder-Owned Electric Utilities)

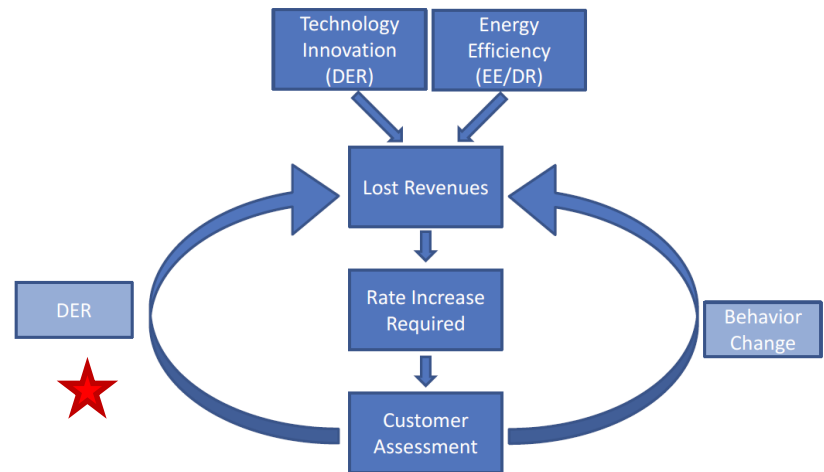


Source: Standard & Poor's, Macquarie Capital

Who will be investing?

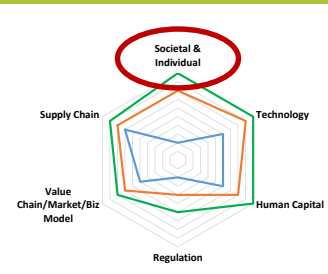
*Are we keeping the economic value –supply chain- in Europe?
Let's not make same mistake again*

Vicious Cycle from Disruptive Forces

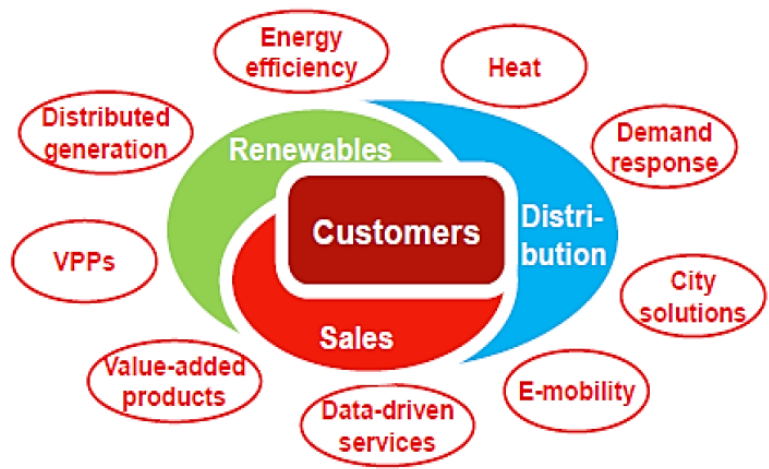


Energy Union. How? (6/9)

Society and individual dimension



Societal appropriation?



Societal acceptance?

Government.no

The Government Pension Fund:
New climate criterion for the exclusion of companies from the Government Pension Fund Global (GPF)

Press release | Published: 2015-04-10 | No: 09/2015

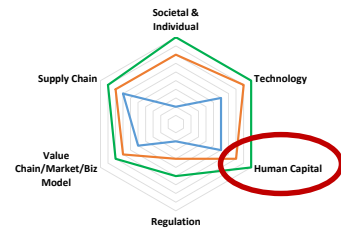
The Government will introduce a new criterion to exclude companies whose conduct to an unacceptable degree entail greenhouse gas emissions. Together with a strengthening of active ownership, this represents a responsible investment practice that pays due heed to both the ethical and the financial aspects of climate change, within the role of the Fund as a financial investor, says the Minister of Finance, Siv Jensen.

Energy Union. How? (7/9)

Human capital dimension (both sides)



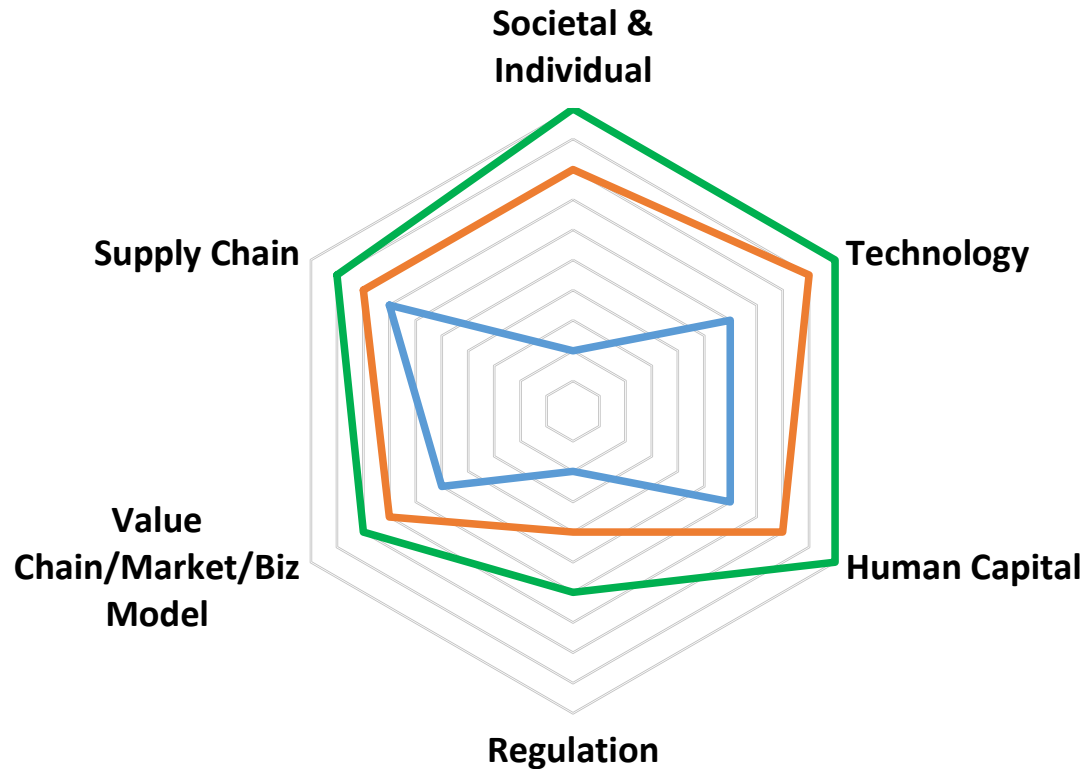
It is all about "game changers"
.. starting early

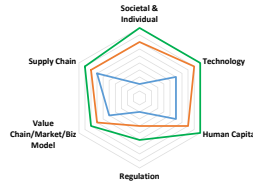


Pedagogy



3 timelines (2015-2020-2030) / 2 dimensions lagging





1. It is a systemic problem => requires systemic solutions
2. It is a multidimensional problem => requires multidisciplinary solutions
3. It is a global problem => requires European solutions

Fortunately in Europe we are specially well prepared for complex challenges

Let's lead again