

Boussias Smart Factory Conference

Session 2

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**In energy, 'smart' = sustainable**

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**Natural Resources PC**

## Natural Resources PC

An international consulting company specialized in mining and energy  
Also acts as broker, brings together companies/projects and sources of capital

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‘Smart’ = sustainable...

## Three Pillars of Sustainability

1. Economic Development

how it will affect businesses & by extension, jobs and employability

2. Social Development

awareness of & legislation protection of the health of people from pollution & other harmful activities of business and other organizations

3. Environmental Protection

Environment, Health and Safety

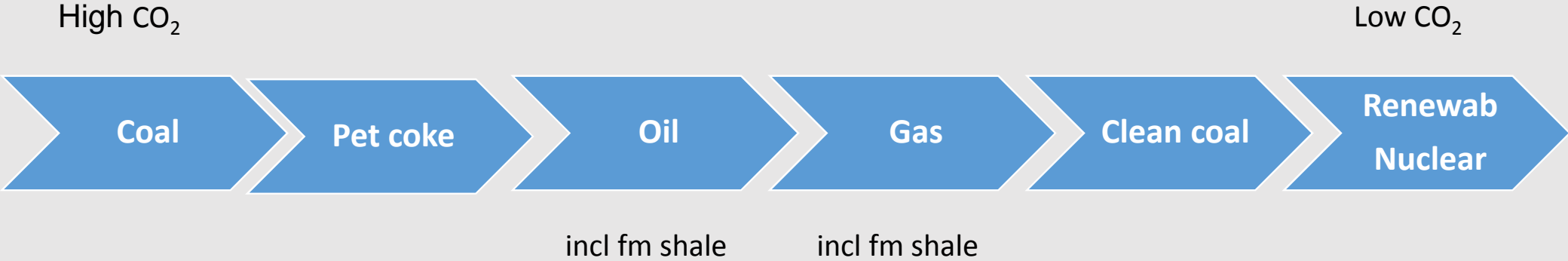
...‘Smart’ = sustainable...

### **Future of Energy → energy efficiency & new sources**

- Technology costs ↓ w/ solar panels & wind turbines → US Solar mkt up 95% in 2016, smashes records, Feb 14 '17. Also, rebalancing towards grid infrastructure [often decentralized microgrids] over ‘classic’ generating capacity.
- Instead of moving power from large, central generating stations, where energy flows in only one direction and about 5 pct vanishes in transit (more during peak times), more power will be generated and distributed locally..
- ...same way that cloud computing & smartphones revolutionized how consumers get/store information, smaller-scale generation & storage devices throughout the grid will make the system more efficient and resilient
- Finland, Japan good examples

...‘Smart’ = sustainable

### CO2 emissions as a function of fuel mix



# Energy efficiency

Using energy more efficiently, means

- lower energy bills
- less reliance on external oil/gas suppliers
- Environmental protection

EU Energy Efficiency Directive : EU rules/obligations to reach 2020 energy efficiency target

Financing energy efficiency: ~ €100 billion/yr needed to meet that target

Energy efficiency has to be increased at all stages of the energy chain [generation to final consumption]. Also, energy efficiency benefits must outweigh costs, eg those involved in renovations. → EU measures focus on sectors w/ greatest savings potential eg buildings.

# New Sources- Climate friendliness...

## Emissions trading schemes, cap-and-trade, carbon allowances

Feb 15 '17 EU ETS: Euro Parliament vote to strengthen Market Stability Reserve to faster reduce current oversupply of carbon market allowances.

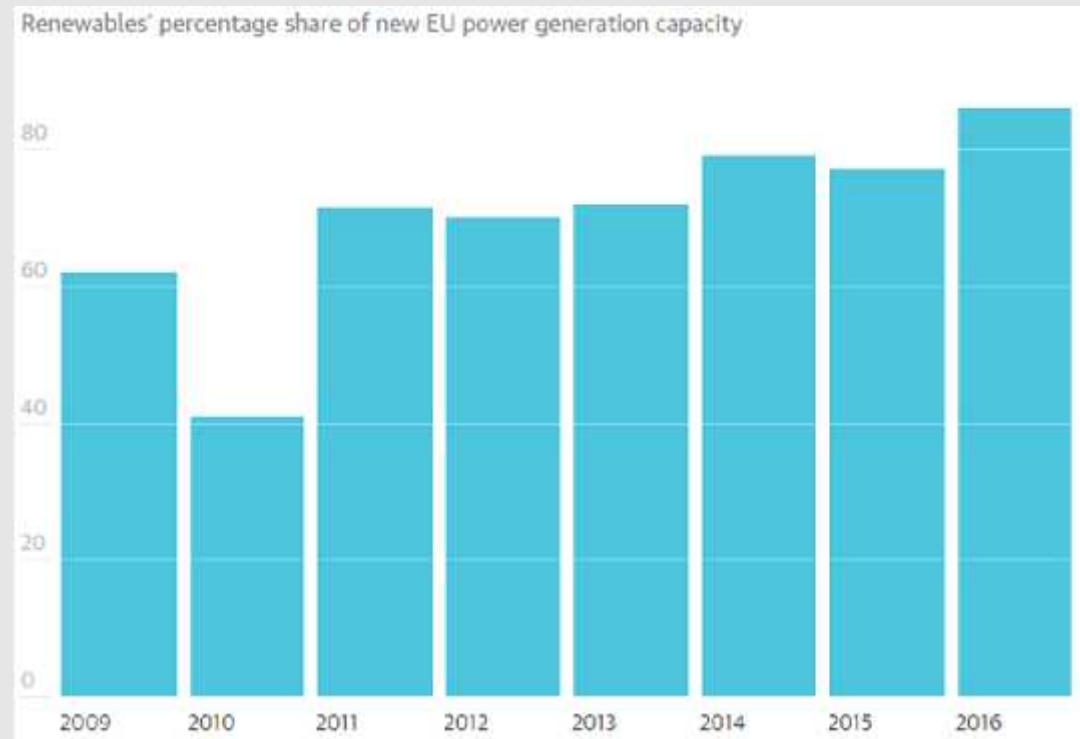
## Towards renewables:

- EC 2<sup>nd</sup> “State of the Energy Union” report: Feb 2 '17 EC 2020 energy & climate targets the 2020 final energy consumption target--achieved :
- EU GHG in 2015 22% below 1990 level. Renewables: 16 % of EU's gross final energy consumption
- 1990-2015: EU's combined GDP grew 50 %, while total emissions decreased 22 %
- Renewables in S.E. Europe: GR, TR, CY advanced in solar water heating, but less so in PV. PV slowly but steadily making entry into local markets with GR [auctions Law 4414/2016], BG, RO in the forefront. Wind also on the rise w/ GR, TR, RO, BG showing most activity. Hydro: almost all
- Developing countries urgently need finance to green power sectors, Feb 7 '17



## ...New Sources - Climate friendliness ...

- Feb 9 '17 : renewables 86% of new power added to Europe's grid in '16
- Of the 24.5GW of new capacity built across the EU in 2016, 86% fm wind, solar, biomass and hydro, eclipsing 2014 high-water mark of 79%
- Surge in offshore windfarms connected in Britain saw total Europe-wide investment hit record €27.5bn (£23bn)



## ...New Sources - Climate friendliness

### **Clean coal: ↓GHG & other emissions at power plant, CCS, etc**

Jan 10 '17 Petra Nova, TX, runs entirely on clean coal. 1st of its kind in the US to power the grid: CO<sub>2</sub>↓, capturing 90 pct of the gas, which is recycled & used at oil fields to pump up to 15,000 barrels of oil/day. NRG Energy & JX Nippon Oil & Gas Exploration Co.

High efficiency, low emission [HELE] coal-fired pp. Asia HELE: 725 coal-fired units in place

Deutsche Bank will not finance coal projects any longer, Jan 31 '17

Coal use in Europe on its way out — report Economist Intelligence Unit, Feb '17

Denmark's largest energy firm Dong Energy to ditch coal by 2020, Feb 2 '17

UK emissions have fallen 38% since 1990 on coal closures, Feb 7 '17

Australia's \$5 billion bet on clean coal, Feb 13 '17

### **2nd generation biomass**

### **Uranium mining**

## New Sources - Efficiency in use...

### Electricity storage

Battery technology [Li,...]: the ultimate disrupter

Feb 15 '17: DBL Partners: 2016 seminal year for energy storage

Longer-term: Feb 10 '17: Penn State battery turns waste CO2 into electricity

**Japan:** smart energy communities mushroom

### Net metering

HELAPCO Report '16: Hellenic Electricity Distribution Network Operator ΔΕΔΗΕ received 574 applications for net metering systems since this application to connect to *low* voltage grid commenced: 11.3 MW of PV capacity to be connected to mainland network, of which 17 systems [~3.16 MW] concern net metering systems to be connected directly to *medium* voltage grid

Aug '16: Greece new renewable energy law provides feed-in premiums and virtual net-metering

## ...New Sources- Efficiency in use...

### Green buildings

EU Energy Performance of Buildings Directive:

- Energy performance certificates to be included in all ads for sale/rental of buildings
- EU countries to establish inspection schemes for heating & air conditioning systems or put in place equivalent measures
- all new buildings must be ~zero energy by 31 Dec 2020 (public buildings by 31 Dec 2018)
- EU countries to set min. energy performance requirements for new buildings, for major renovations and for replacement/retrofit of building elements [heating and cooling systems, roofs, walls, etc.]
- EU countries to draw up lists of national financial measures to improve energy efficiency of buildings

## ...New Sources- Efficiency in use...

### Transport

July 20 '16 EC proposals setting transport system firmly on the path towards zero-emissions

Sept 16 EEA Report: Electric vehicles charged w electricity fm renewable sources can reduce future emissions of GHG and air pollutants from road transport

Jan 31 '17, International Transport Forum: Current & foreseeable policies to mitigate CO<sub>2</sub> emissions fm global transport activity will not suffice to achieve the international community's climate ambitions

Feb 2 '17, EC: Vast majority of road transport fuels meet strict EU quality rules

Feb 2 '17, Grantham Institute: Electric cars and cheap solar 'could halt fossil fuel growth by 2020'

## ...New Sources- Efficiency in use...

### **Aviation and shipping**

EC, Feb 15 '17: aviation sector should receive 10% fewer allowances than 2014-2016 avg, to bring its efforts in line with other sectors, say MEPs. Revenues fm auctioning allowances in the aviation sector would be used for climate action in the EU & 3rd countries.

MEPs say that, in the absence of a comparable system operating under the International Maritime Organisation (IMO), CO<sub>2</sub> emissions in EU ports and during voyages to and from them should be accounted for. Propose setting up “maritime climate fund” to compensate for maritime emissions, improve energy efficiency, facilitate investment in innovative technologies and reduce CO<sub>2</sub> emissions fm the sector.

## ...New Sources- Efficiency in use

### Manufacturing

- Feb 14 '17: GE and Aluminium of Greece 10-year agreement to implement global first-of-their-kind digital smelter solutions to optimize productivity [raw mats consumption, pot leakages] and reduce power usage ie energy costs
- The digital solutions will operate in the cloud. Virtual sensors will facilitate ongoing evaluation of temperature and chemistry → timely monitoring reports on plant operations.
- Recreate an actual smelter using artificial intelligence and physics-based models

# Climate- Renewables, an industrial example

## Renewables at mining sites

- Landmark PV-Storage Hybrid Case Study for DeGrussa Mine, Jan '16
- Sept '16 'Energy & Mines' Renewables in Mining Awards and Rankings Report: results 1st global rankings of renewables use by mining cos identify top 21 mining cos using wind and solar to power their operations. Market size of wind and solar for mines: installed capacity at 943 MW comprising 352 MW solar PV; 39 MW solar thermal and 551 MW of wind.



# Health

Chinese smog, factories closed

Low coal prices mean heavy smog, Jan '17

Feb 7 '17: Beijing mulls 30 pct coal use cut this year

Feb 13 '17: China's steel capacity cuts obscured by smog

Jan '17 Smog in Tienjin



## Final remarks

- Businesses worldwide urged to embrace/accept *third party sustainability standards* to properly contribute towards Sustainable Development Goals [SDGs] agreed at COP22, Nov '16 in Morocco.
- New report by World Wildlife Foundation & sustainability alliance ISEAL, dubbed '**SDGs mean business**', lauded importance of private sector contribution towards achieving ambitious SDGs set out by each country in Paris in 2015.
- It places energy consumption as a central tenet to this standard with further importance stressed on businesses ensuring that supply chain consumption is also taking into account, **with energy efficiency and renewable energy supply particularly important**.

Thank you for your attention!

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