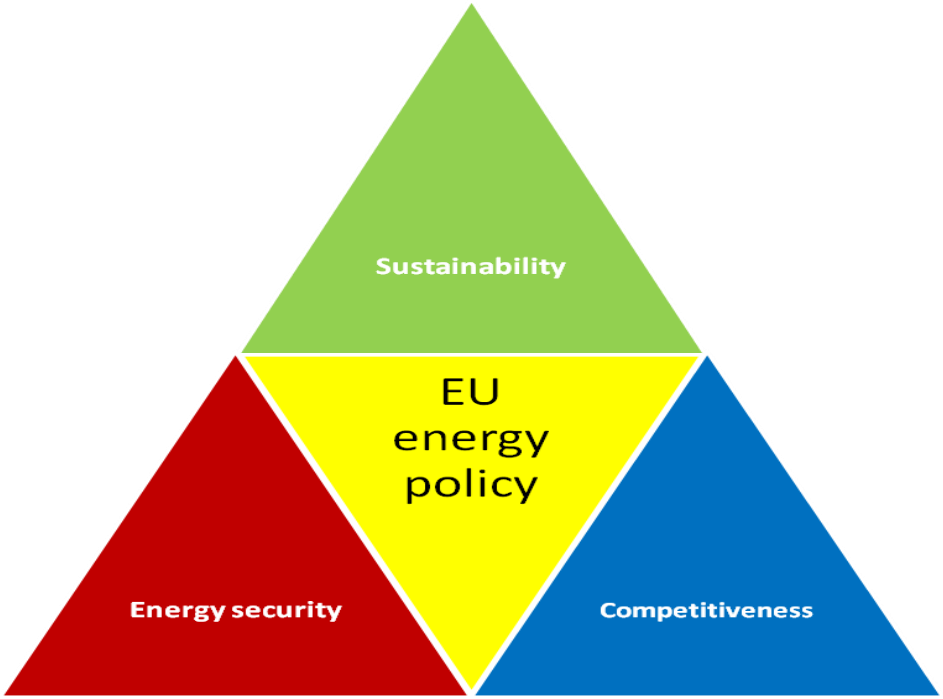
**Luigi Debarberis**

**European Union**
**Joint Research Centre**
**Institute for Energy & Transport**
**Energy Supply Security Unit**

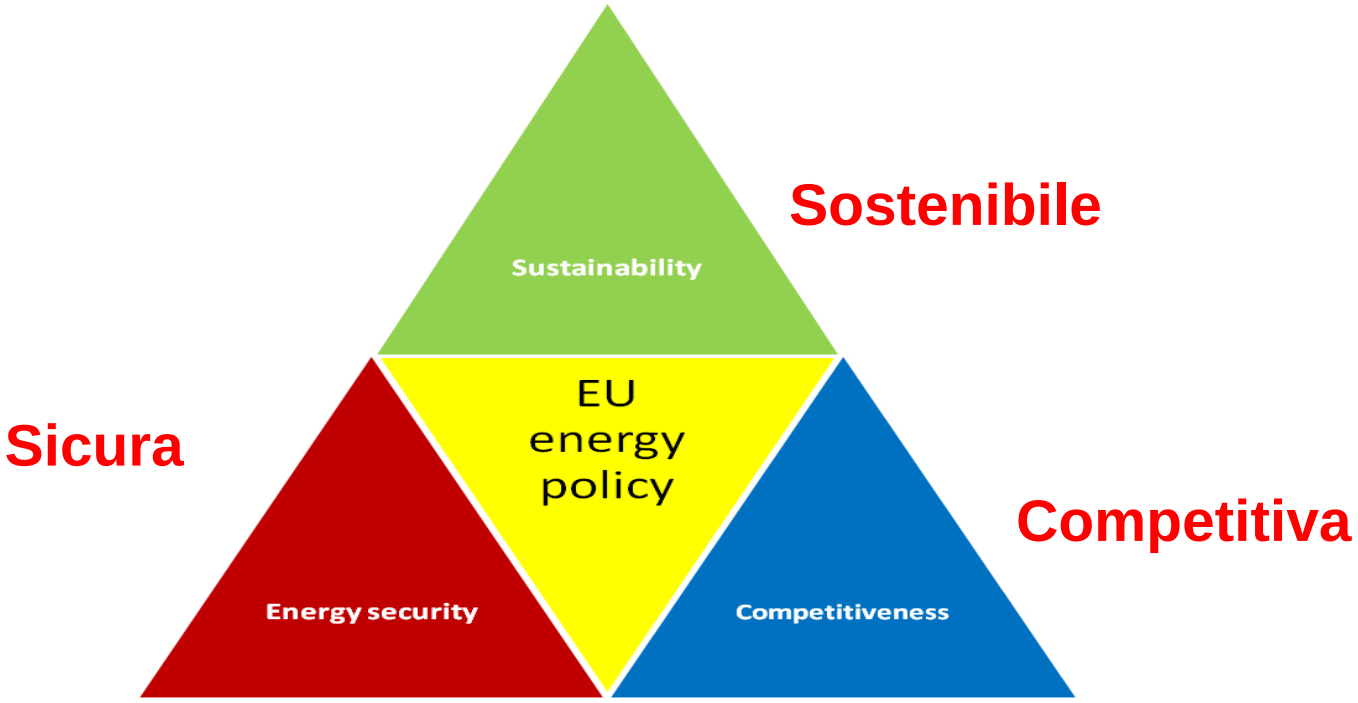





*Conferenza Organizzata dall Regione Autonoma Friuli Venezia Giulia*

***TRIESTE, 17 Dicembre 2013***

# Energia a livello UE;
# politiche comunitarie e opportunita regionali

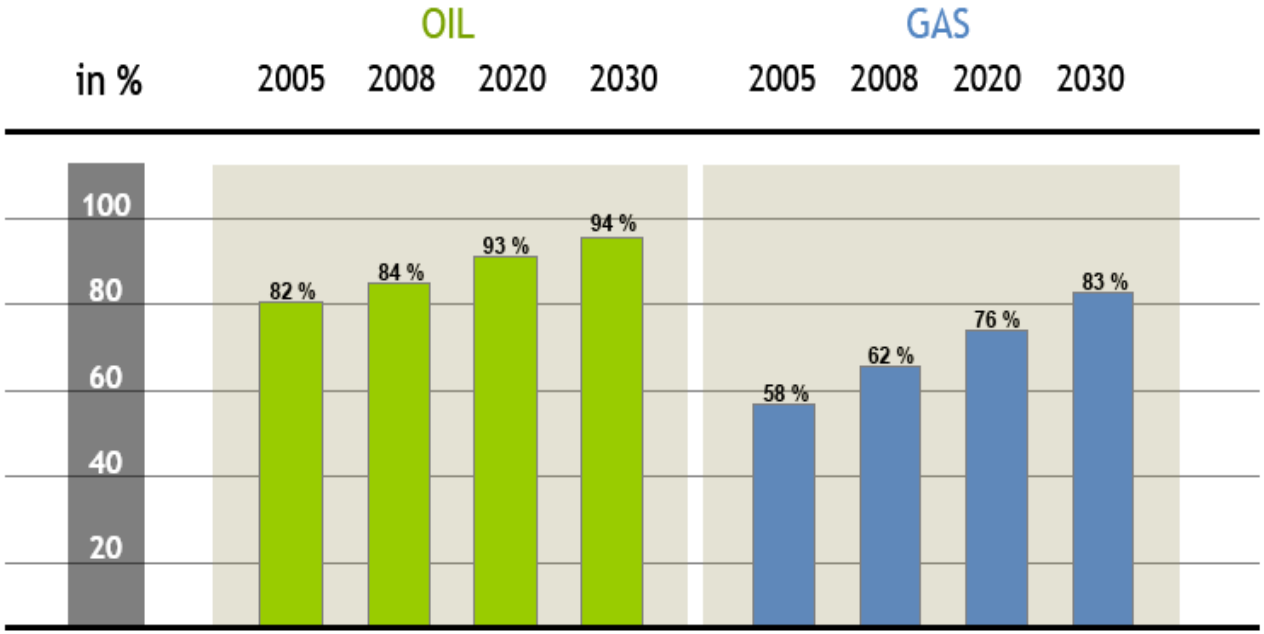



*Conferenza Organizzata dall Regione Autonoma Friuli Venezia Giulia*

***TRIESTE, 17 Dicembre 2013***

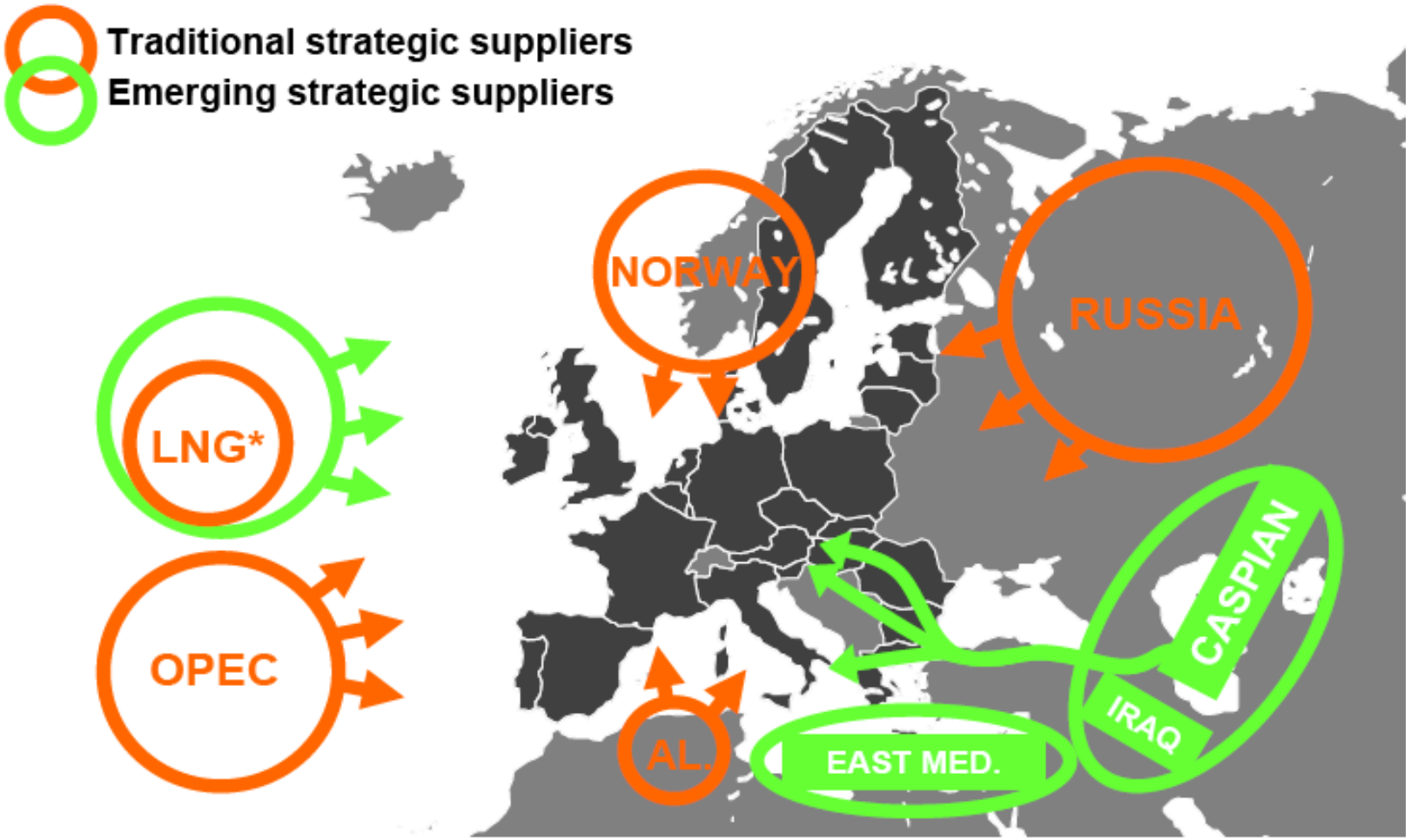
# Importanza delle Politiche Energetiche (EU e SM)

- **2.5% PIL import energetico (in costante crescita)**
- **270 b€ solo petrolio (~40 gas)**

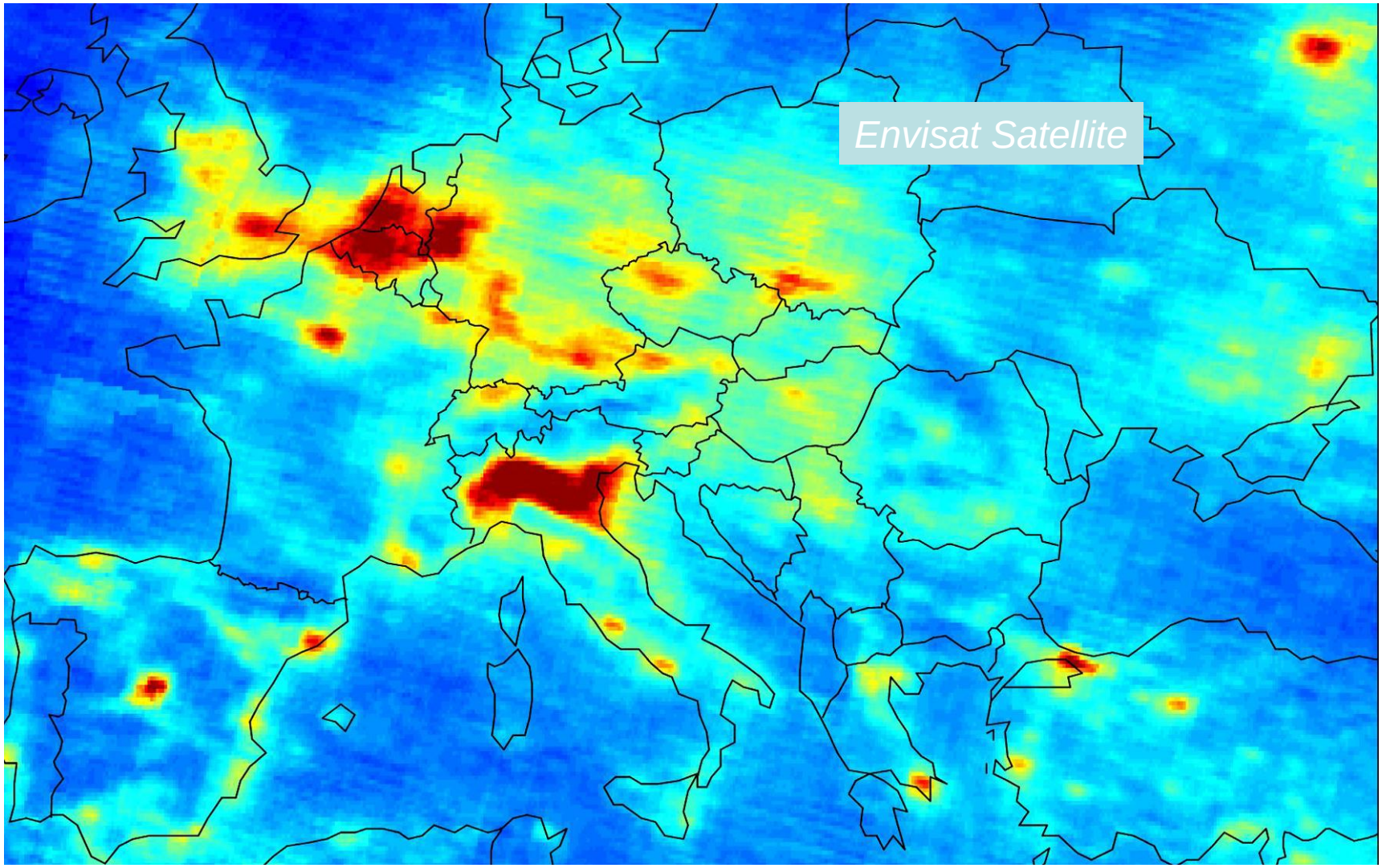



*« Business as usual » scenario based on 2009 figures*

# - 80% emissions of EU GHG from energy sector

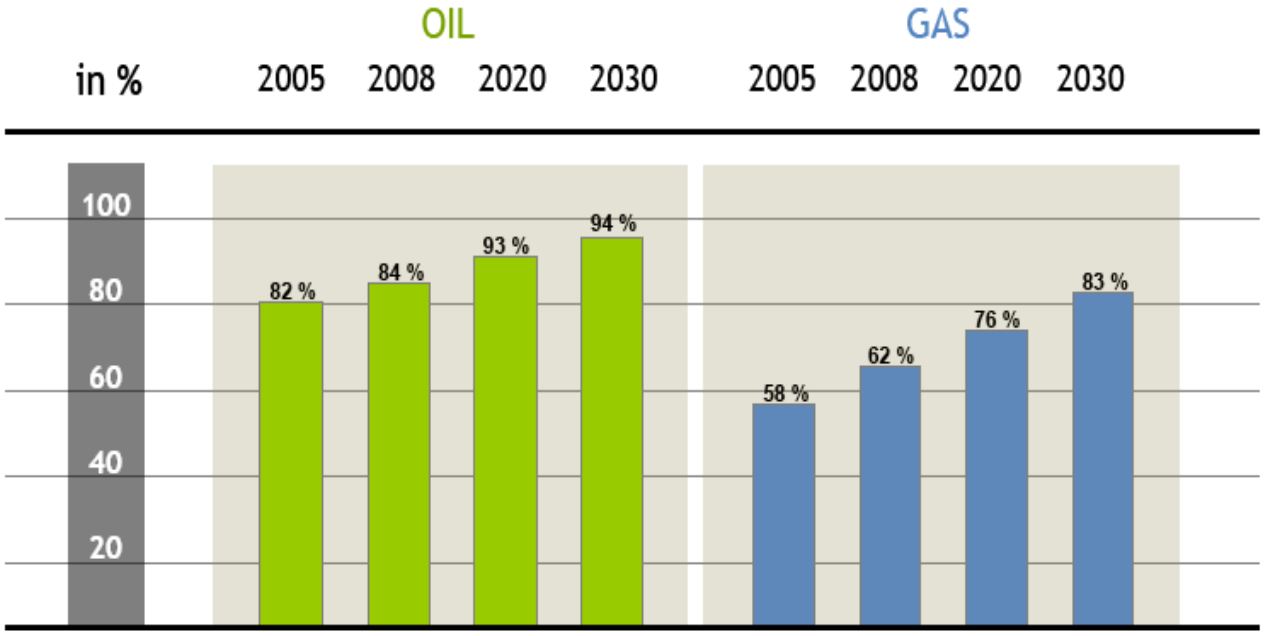


# Sviluppo sostenibile ? Ambiente ?



# Importanza delle Politiche Energetiche (EU e SM)

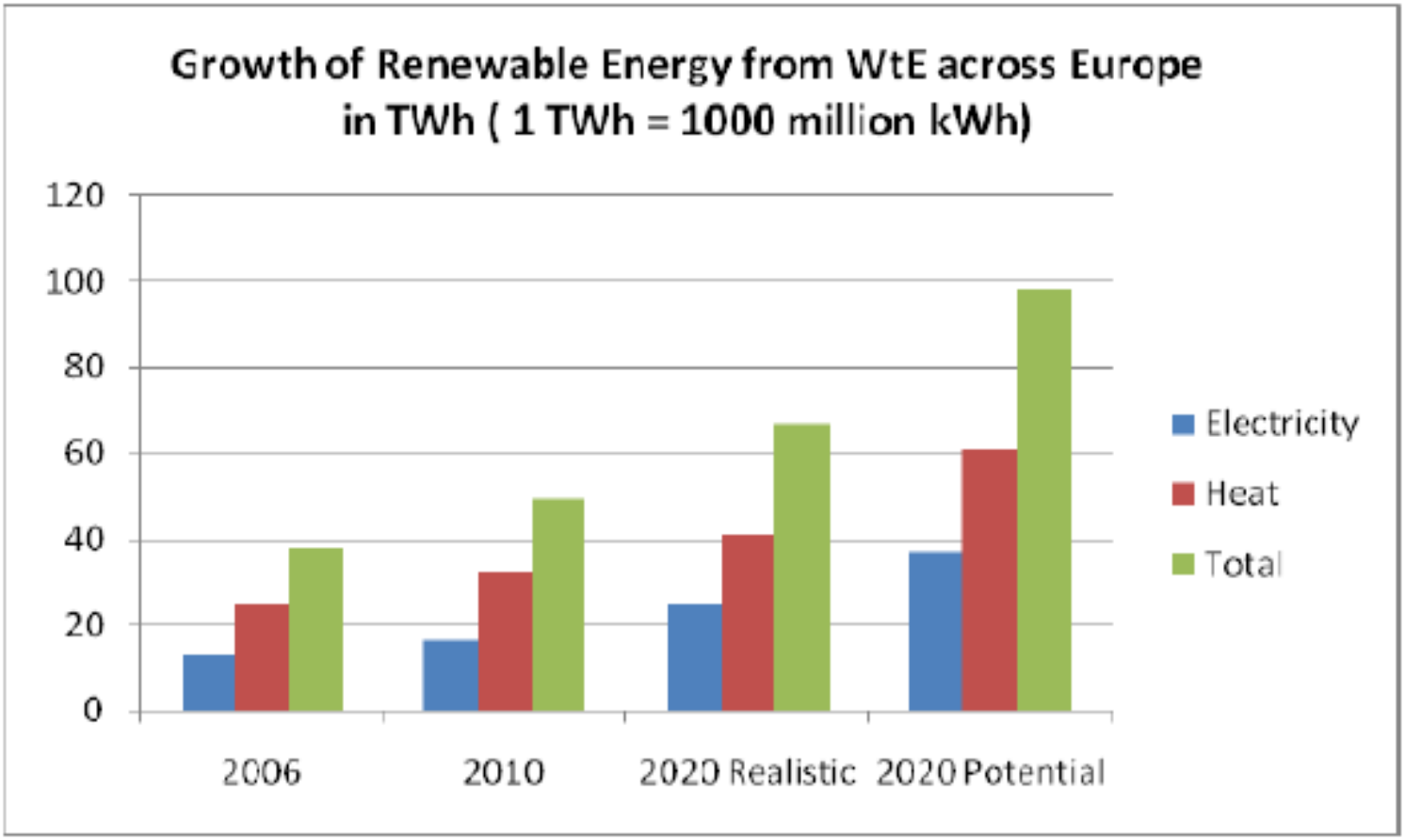
- **2.5% PIL import energetico (in costante crescita)**
- **270 b€ solo petrolio (~40 gas)**




*« Business as usual » scenario based on 2009 figures*

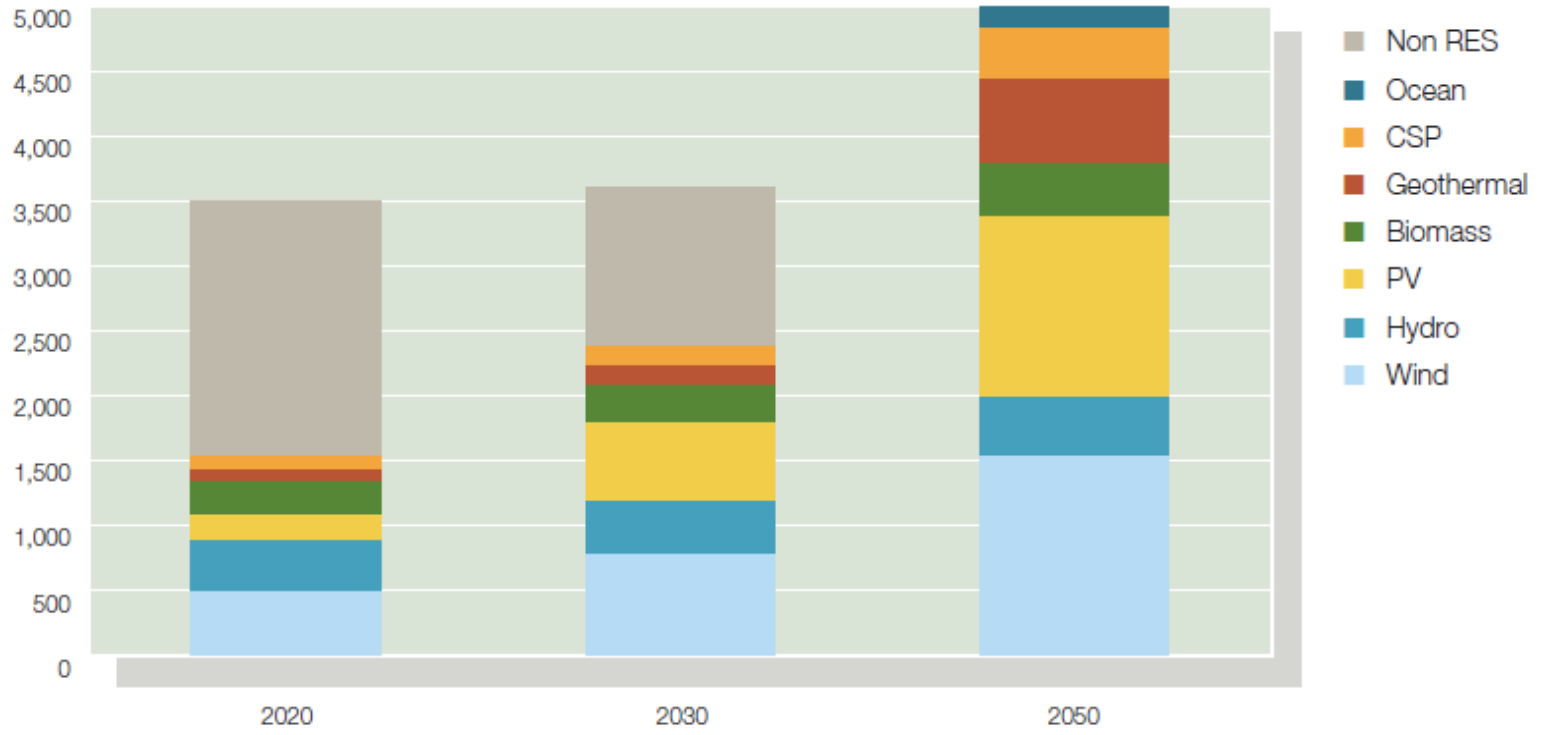
- **mercato che offre alto potenziale (se integrato):**
- **Investimenti ~ € 1000 b€ solo per 2020 (settore privato)**
- **5.000.000 di 'jobs' in piu per il 2020**
- **0.6%- 0.8% aumento PIL**
- **Risparmi anche per utenti (switching supplier/tariff)**

# Introduzione progressiva delle rinnovabii (RES) DIRETTIVA 2020



# Post 2020, targets emissioni GHGs (non su % RES)

**Figure 8 Contribution of Renewable Electricity Technologies to Electricity Consumption (TWh)**

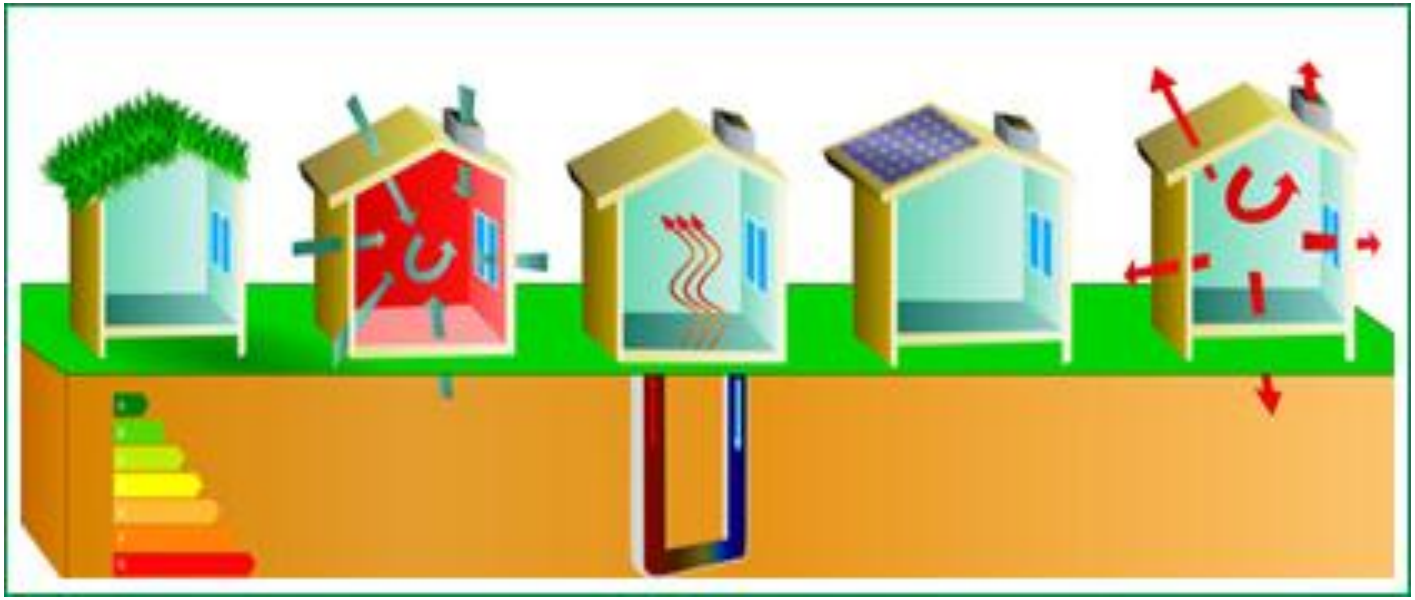



EREC report breakdown of EU energy production in 2020, 2030, and 2050

Source: EREC

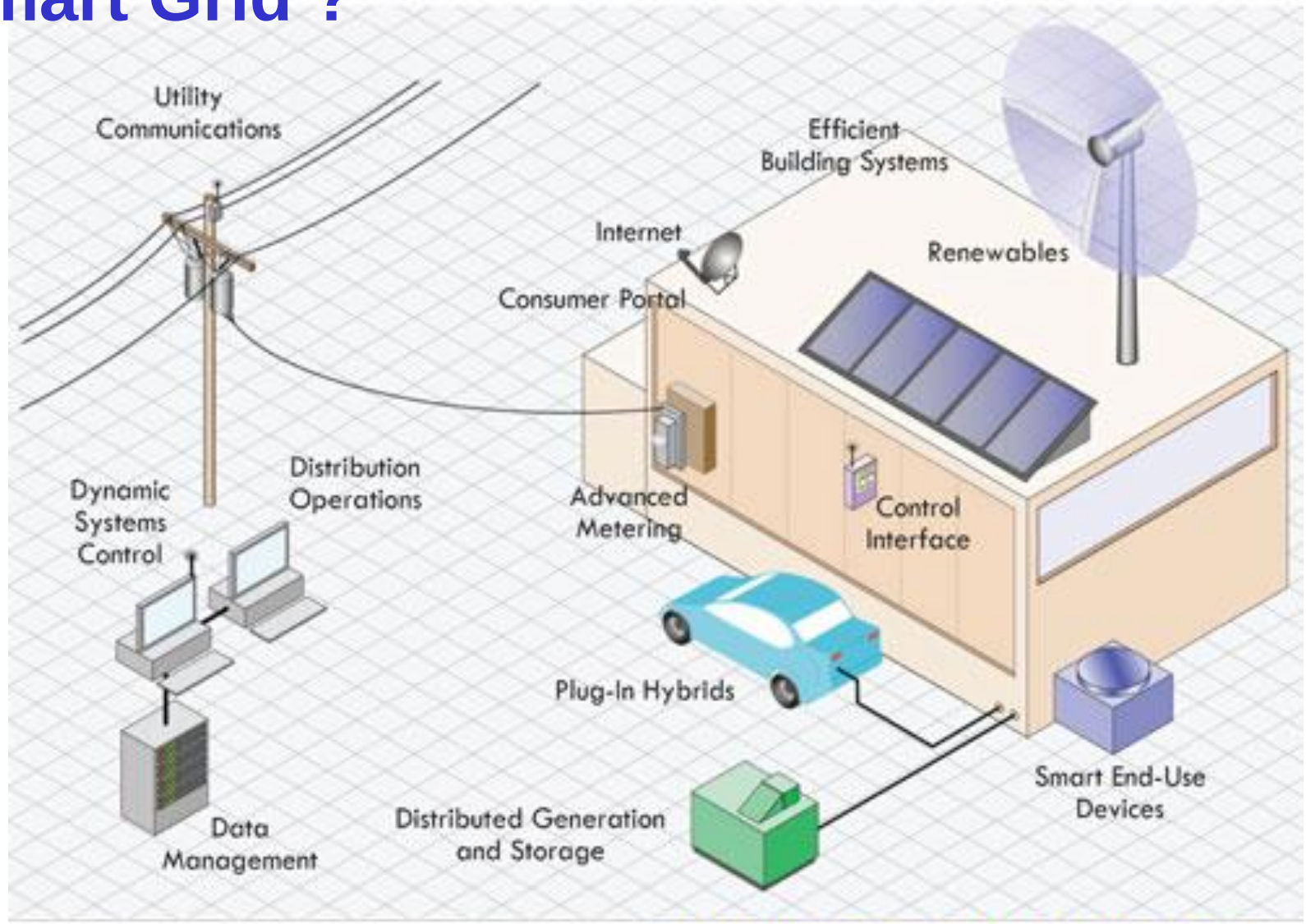
# Aumento efficenza energetica

- Edifici
- Rinnovabili, co-generazione, SG, accumulo
- Cruciale lavorare sul parco edifici esistenti
- Consumer / Prosumer

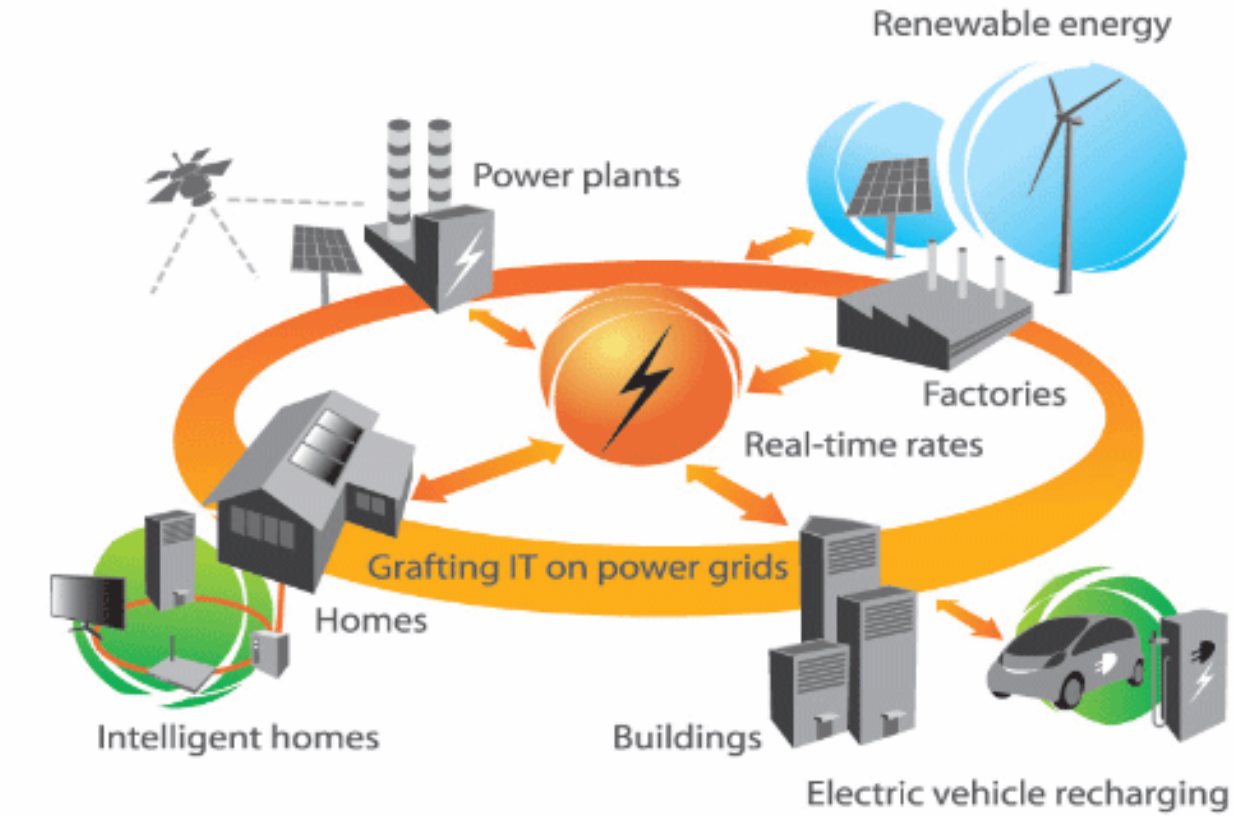


*Future home*

# Smart Grid ?


Utility Communications
Efficient Building Systems
Internet
Renewables
Consumer Portal
Dynamic Systems Control
Distribution Operations
Advanced Metering
Control Interface
Plug-In Hybrids
Smart End-Use Devices
Data Management
Distributed Generation and Storage
CAPABILITIES OF A SMART MICROGRID
This revolutionary system design meets U.S. energy challenges and maximizes consumer and business value.

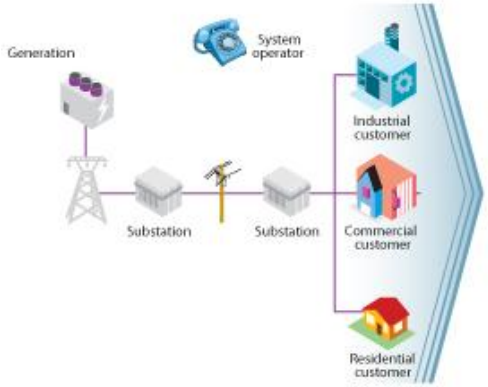
# Smart Grid ?

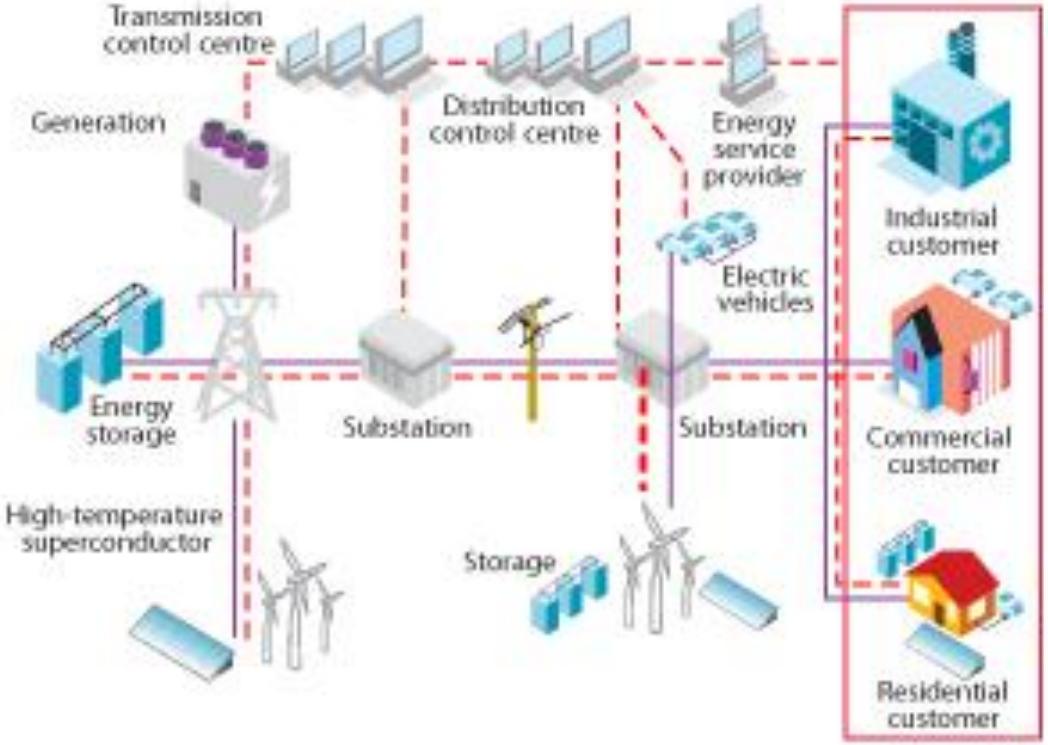



〈 The definition of Smart grid 〉

# Smart Grid (end state)

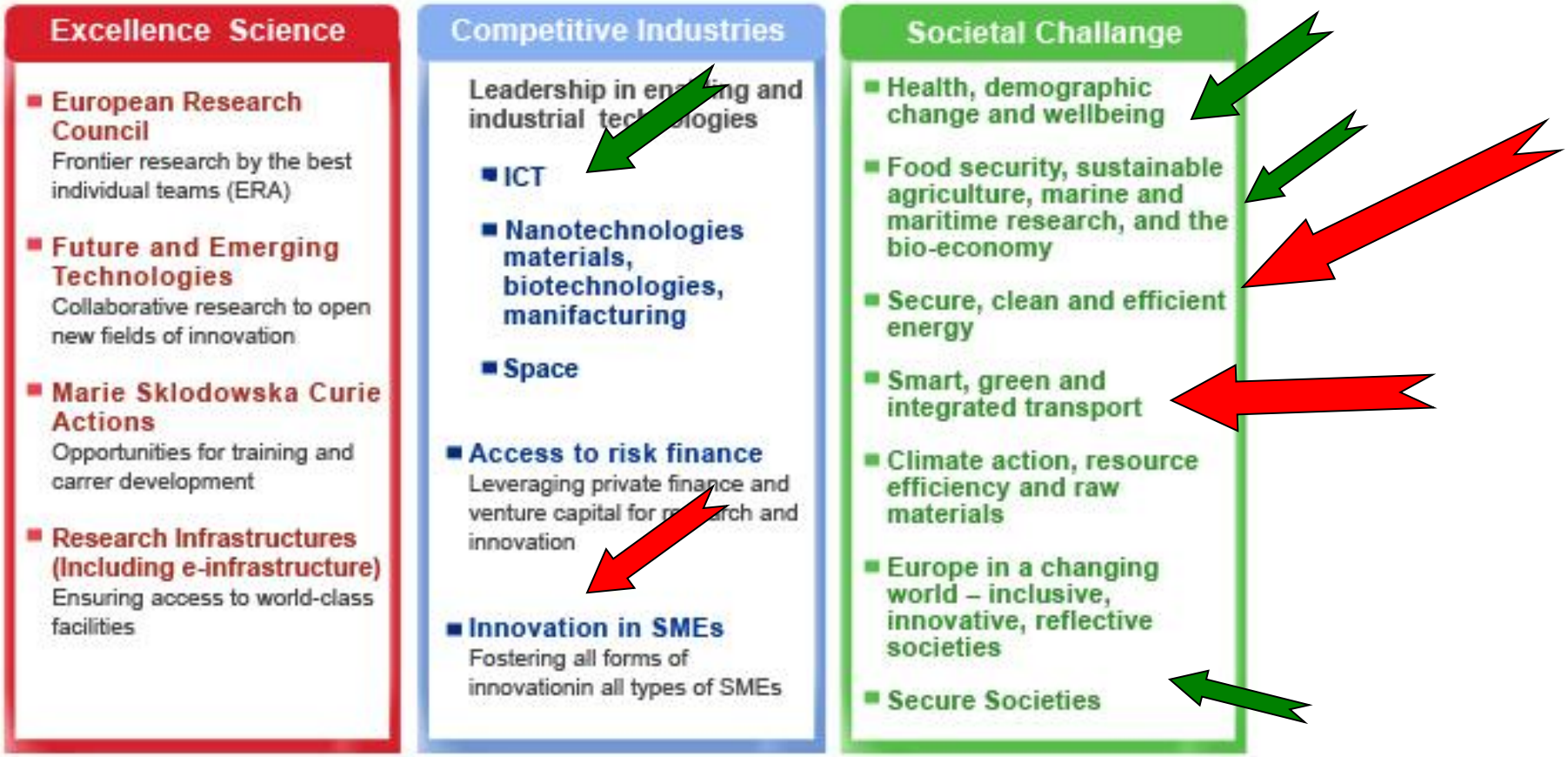
## Traditional Grid



# HORIZON 2020

– **Finanziamenti 2014-2020**
– **Il piu grande programma quadro EU di finanziamento mai v**
– **~80 miliardi di euro**



# Energia sicura, pulita ed efficiente

## Obiettivi specifici

**Ridurre il consumo e emissioni grazie all'uso intelligente e sostenibile**.

…sperimentazione su larga scala … socialmente accettabili … intelligenza integrata
dati in tempo reale … edifici con emissioni prossime allo zero …
energie rinnovabili …riscaldamento e raffreddamento …imprese, cittadini, le comunità e le città

**Energia elettrica a basso costo e a basse emissioni**

…..dimostrazione su scala reale … tecnologie innovative …. cattura e lo stoccaggio del carbonio …

**Fonti energetiche mobili e combustibili alternativi**

…. Bioenergia al fine d…idrogeno e le celle a combustibile …

**Un'unica rete elettrica europea intelligente**

**Nuove conoscenze e tecnologie**

**Processo decisionale e impegno pubblico di rilievo**.

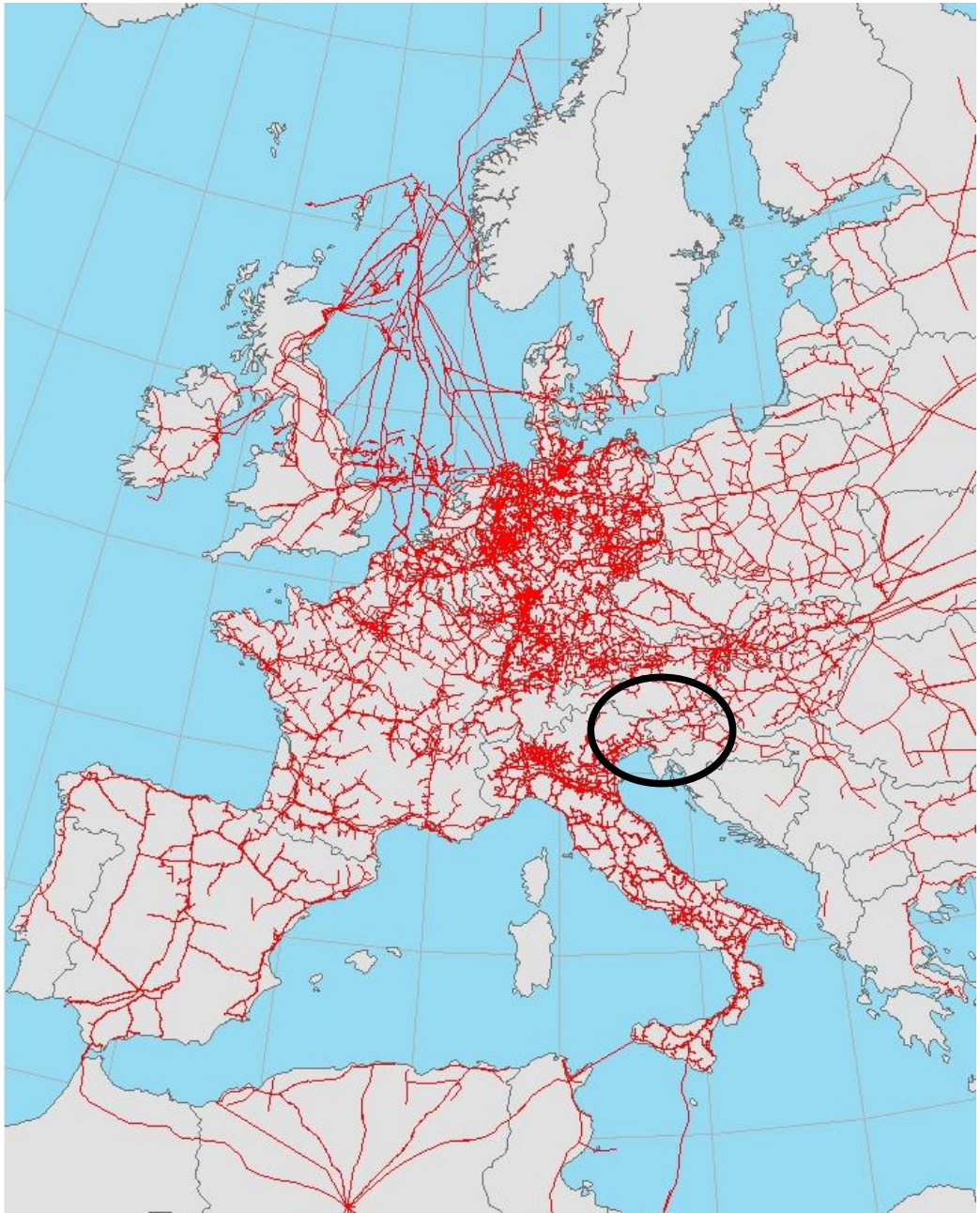
**Adozione delle innovazioni in campo energetico**

***Budget disponibile:*** *€ 5.405,40 milioni, 7,70% del budget destinato al terzo pillar "Societal Challenges"*

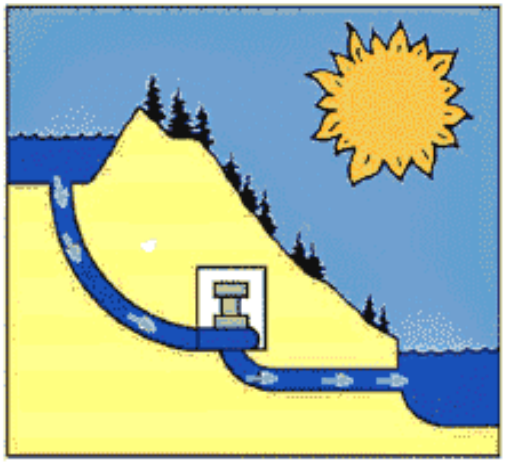
# Adattamento infrastrutture, RES e SMARTizzazione

- Trasmissione
- Distribuzione

– regioni di confine
– 2 Stati Membri confinanti
– futuri corridoi energetici

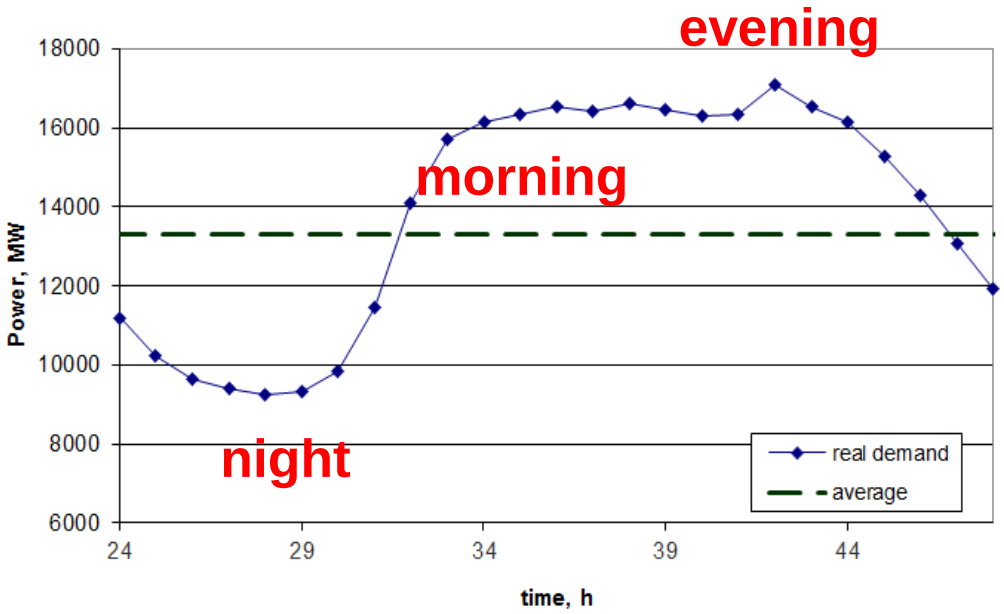


# Stoccaggio Energia: lusso oggi, necessita domani!

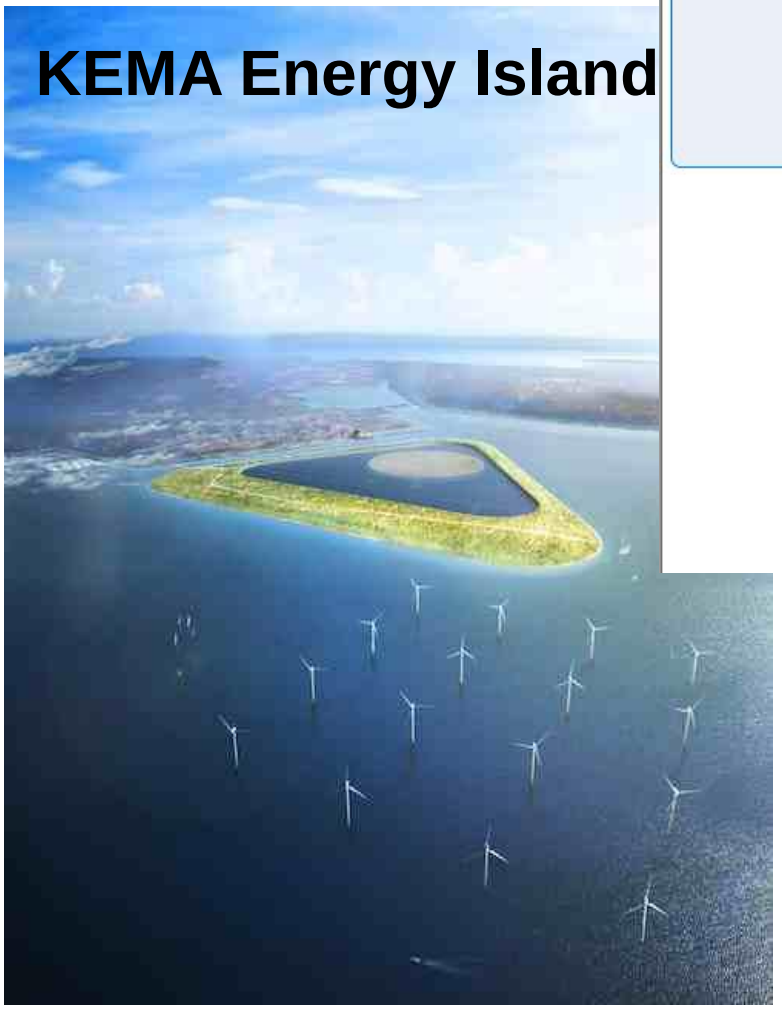


Daytime: Water flows downhill through turbines, producing electricity

Nightime: Water pumped uphill to reservoir for tomorrow's use




# KEMA Energy Island



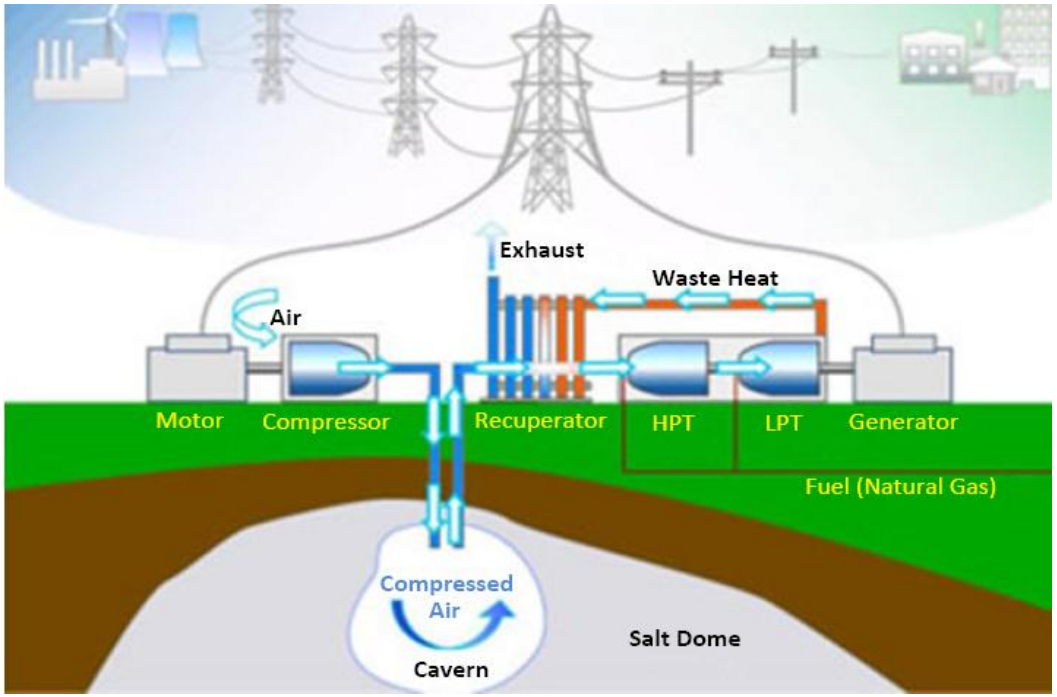
De Pers.nl van 13 September 2011 blz 10

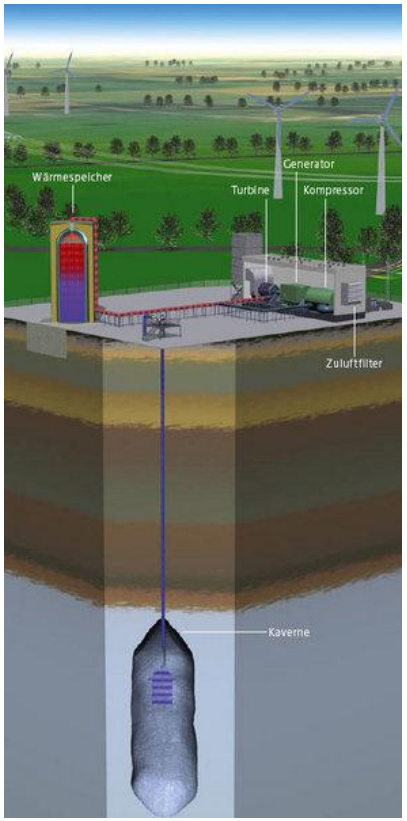


## Vaak is de verkrijgbaarheid van water een probleem, hier niet.

Luigi Debarberis Institute for Energy and Transport

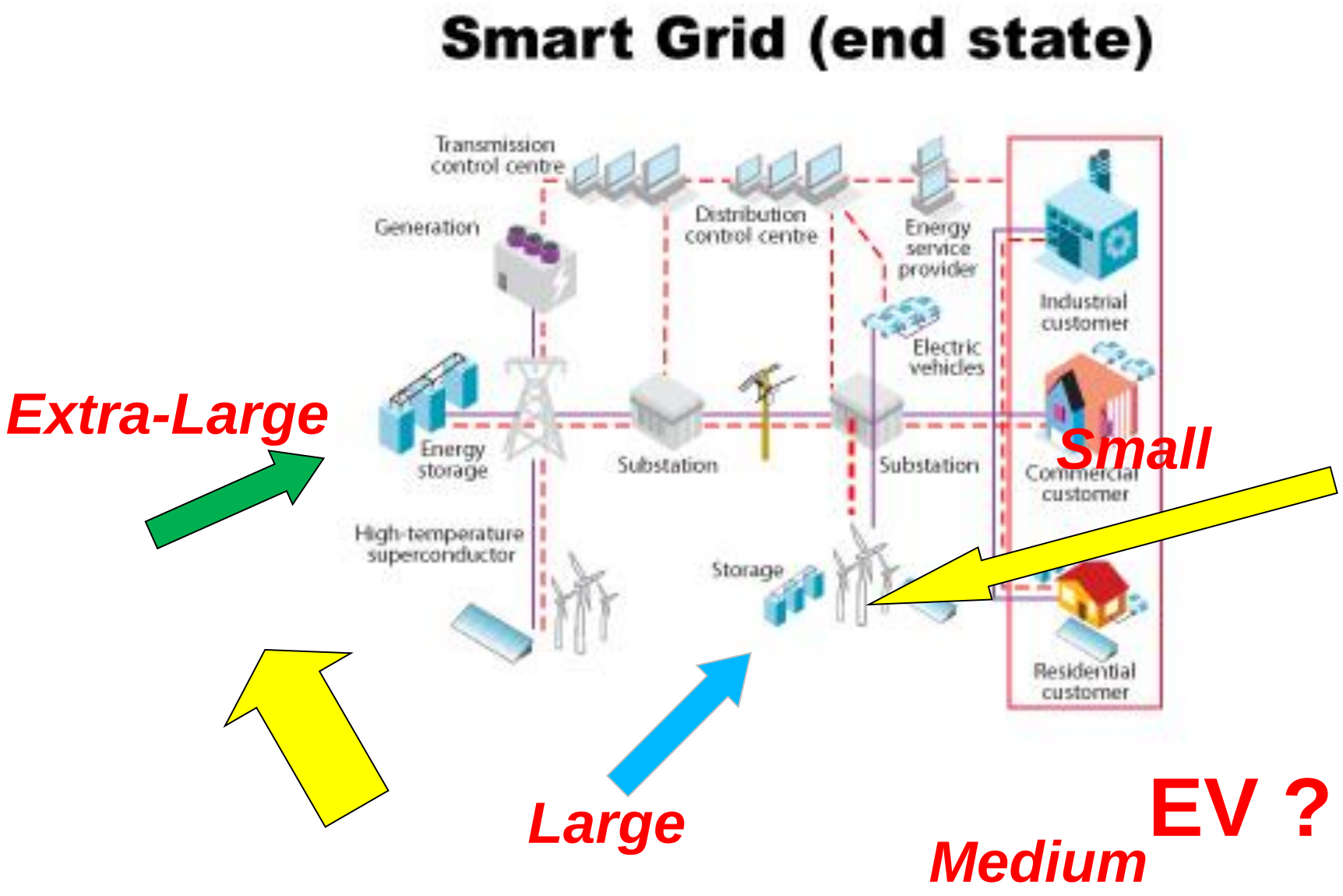
# RWE Power: ADELE - Adiabatic compressed-air energy storage (CAES) for electricity supply




http://www.youtube.com/watch?v=K4yJx5yTzO4

# STORAGE – Multi-scale



# POWER TO GAS – P2G

HYDROGENICS
Advanced Hydrogen Solutions

## Largest European Hydrogen Filling Station
## Hamburg, Germany, 1.2 MW HySTAT™

# IEEE Spectrum

Energy / The Smarter Grid

FEATURE

## A Battery as Big as the Grid

2012 could mark the arrival of utility-scale battery storage

BY JEAN KUMAGAI / JANUARY 2012

Photo: AES Energy Storage

**POWERHOUSE** This lithium-ion battery installation can smooth out variability in the adjacent wind farm near Elkins, W.Va

Utilities have long avoided batteries, because the technology was too expensive and not robust enough to last for tens of thousands of charging cycles. At present, the world's biggest grid-scale battery [PDF] is a bank of nickel cadmium cells in Fairbanks, Alaska, which can produce up to 52 MW of emergency backup power for about 15 minutes. Some electric utilities store energy by pumping water uphill and then recapture the stored energy by allowing the water to flow back downhill through turbines. Worldwide, pumped hydro facilities can produce about 127 gigawatts this way. Compressed air is also used as a storage medium, a strategy that yields just a few hundred megawatts in total, about as much as battery-based energy-storage facilities can now produce.

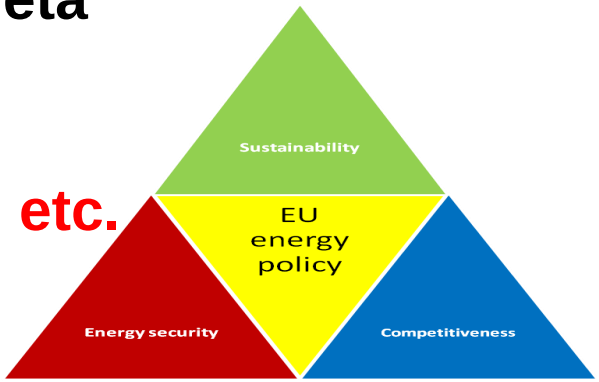
But thanks to investments made by the consumer-electronics and electric-vehicle industries, battery technology has advanced enormously in just the past decade. "Today you've got two or three batteries on your person at all times," notes Haresh Kamath, program manager for energy-storage research at the Electric Power Research Institute (EPRI). "The research applied to those industries is now being applied to batteries for the grid."

The potential market for grid-scale storage is substantial. Rubenius estimates it at **US $30 billion per year,** "plus or minus $5 billion." Nielsen says. "Of course, that's not going to materialize tomorrow. But as the technology matures and utilities gain experience, we'll get to that market status in the next 10 years. I'm quite optimistic."

*http://spectrum.ieee.org/energy/the-smarter-grid/a-battery-as-big-as-the-grid*

# Energia a livello UE;
# politiche comunitarie e opportunita regionali

- **Sfida sociale - tecnologia supporta societa**
- **Energia, trasporto, smartizzazione, etc.**
- **EU, SM, Regioni, Comuni, Cittadini**
- **Aggregatori, marco-regioni, prosumers, etc.**
- **Nuovi mercati e approci innovativi**
- **Modelli innovativi di governance**
- **Horizon 2020 – sfide sociali**
- **Abbassare costi e creare nuovi posti lavoro**
- **RES, distribuite, storage, edifici, governance energetica, etc**
- **Una sfida da non perdere**




*Conferenza Organizzata dall Regione Autonoma Friuli Venezia Giulia*
***TRIESTE, 17 Dicembre 2013***