



FEDERCHIMICA
CONFINDUSTRIA

The chemistry of renewable sources and its contribution to solving the problem of climate change

Dr. Walter R. Mirabella

President Renewable Energy Sources
Federchimica

Renewable sources: the contribution of chemistry to sustainability

Pretoria, 24 July 2012

FEDERCHIMICA is:



17 Sector Associations

40 Product Groups

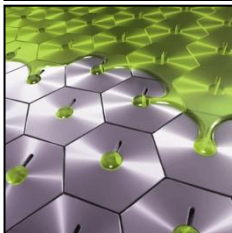
Chemistry as a tool to counteract the climate change



Using Renewable Energy



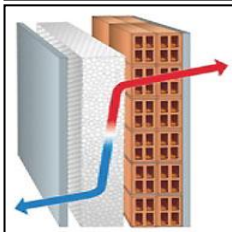
Production of Biofuels



Renewable products for Industry



Materials from renewable raw materials



Innovative solutions for energy saving



Using Renewable Energy



BIOMASS



WIND



GEOTHERMAL



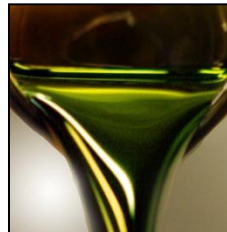
HYDRO



WASTE



SOLAR



**(BIO)
FUELS**



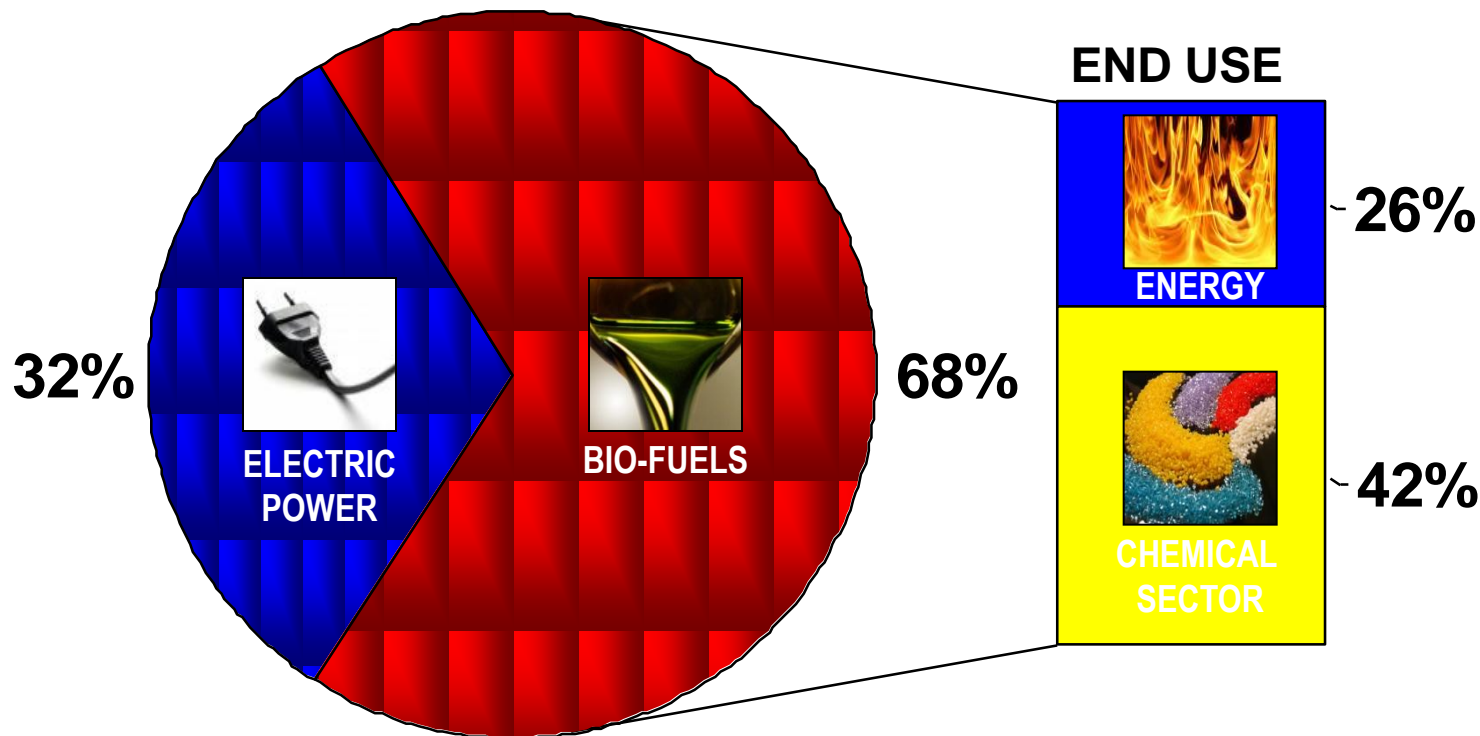
**ELECTRIC
POWER (RES)**



**CHEMICAL
INDUSTRY**



Energy Consumption in the Chemical Industry (*Italy-2007*)





Chemistry and Production of Biofuels



BIOMASS



**CHEMICAL
INDUSTRY**



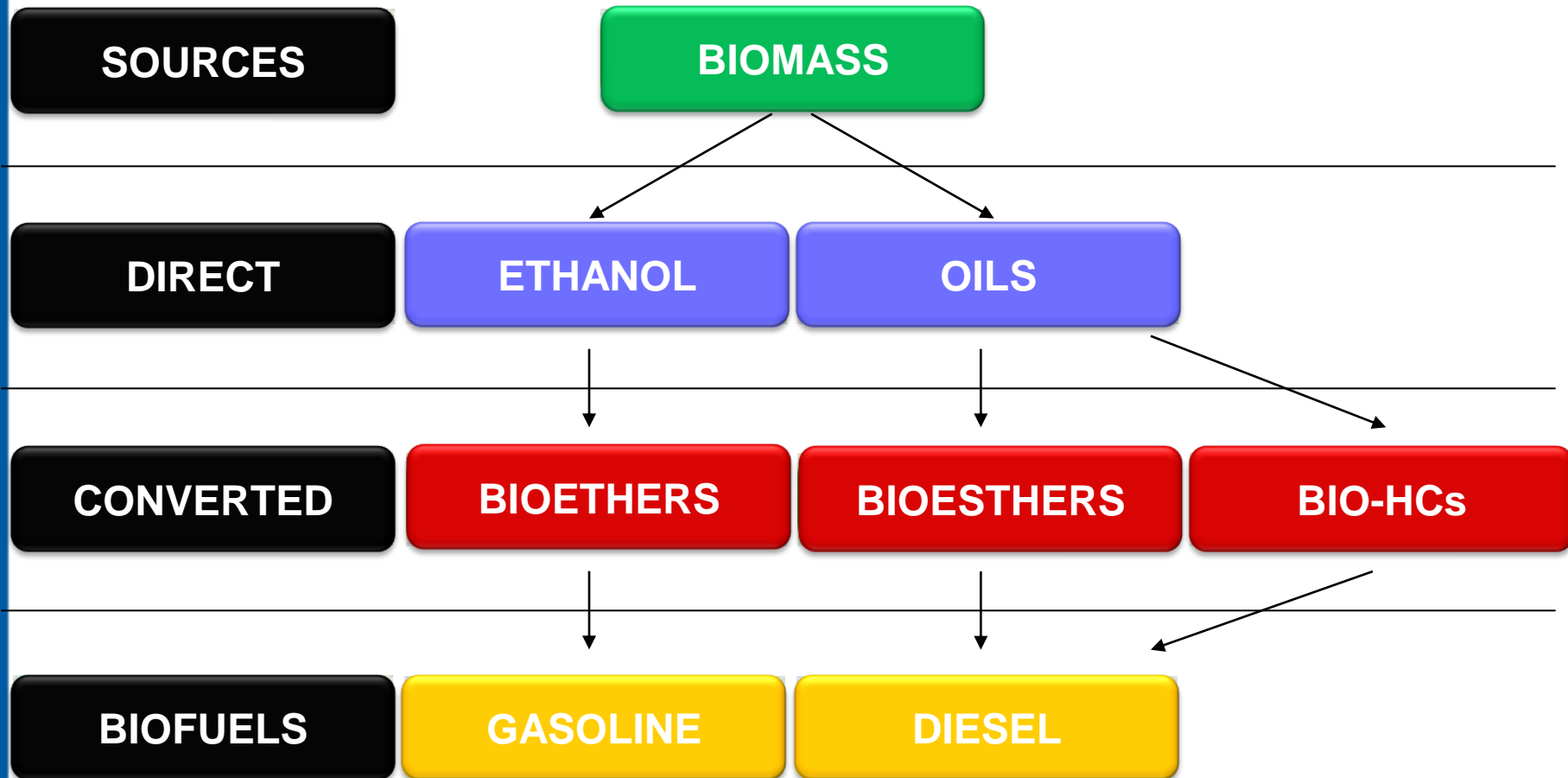
**ALCOHOLS, ETHERS
ESTERS**

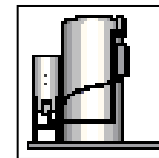


BIO-FUELS

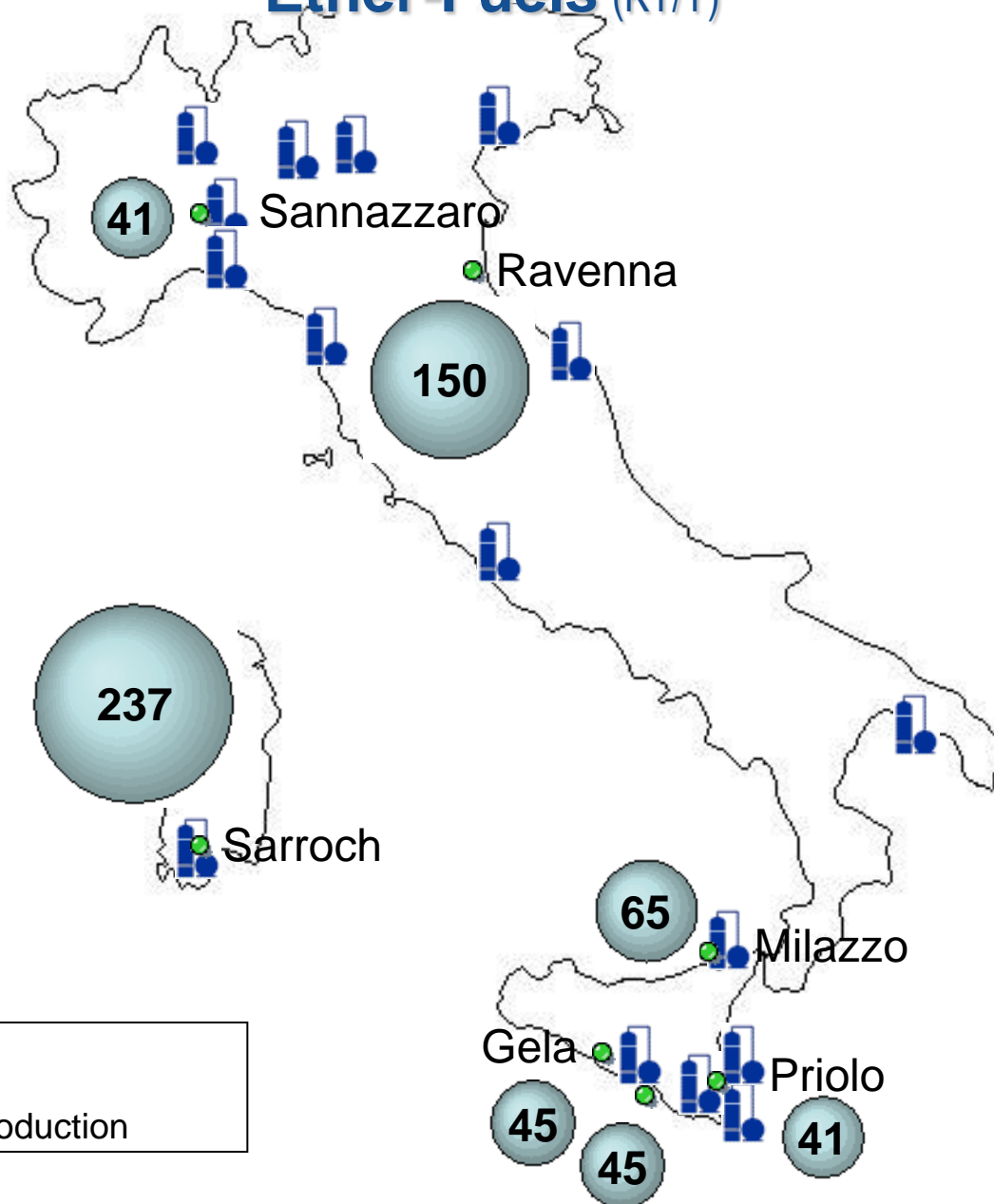


The chains for Bio-Components and Biofuels production





Italian Production Capacity Ether-Fuels (KT/Y)



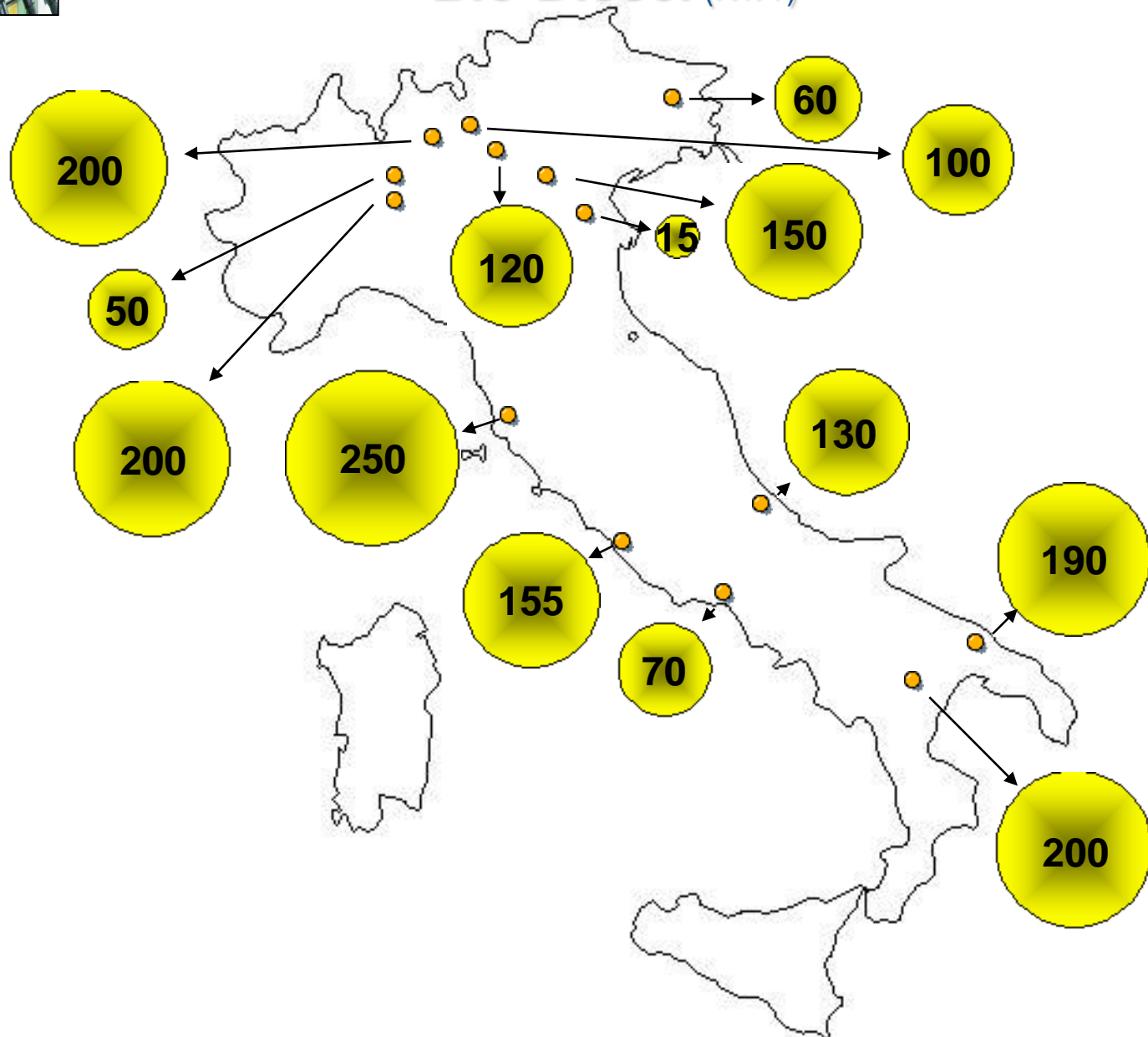
Refinery

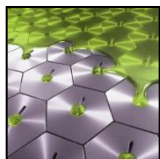


Ether-Fuels Production

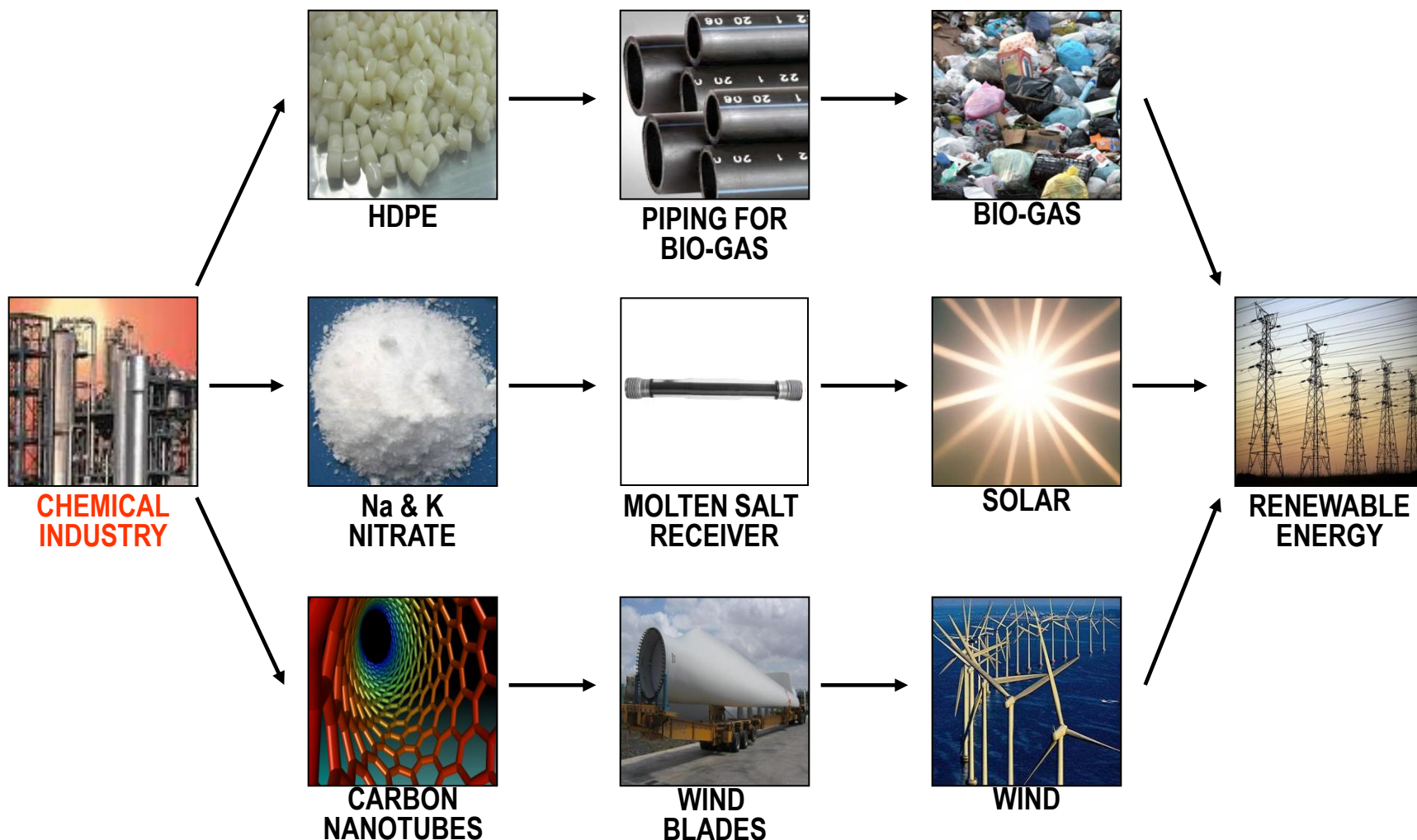


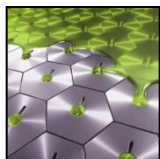
Italian Production Capacity Bio-Diesel (KT/Y)





Chemicals (examples) for a Renewable Generation Industry





Chemistry at the Center of Energy Challenge



CONVERSION

WIND (Carbon Nano-Tubes for Blades, ...)

SOLAR (Polymer Films, ..)

FUEL CELLS (Polymer Electrolyte Membranes, ..)

BIOMASS (Biochemistry, Thermochemistry, Oleochemistry, ..)

HYDROGEN (Semipermeable membranes, chemical bond CO_2 , ...)

STORAGE

BATTERIES (Li-Ion, ...)

SUPER-COPACITOR (NTC, Metal Oxides, ...)

HYDROGEN (Hydrides, composites x tanks, ..)

TRANSPORT

SUPER-CONDUCTORS (Nb-Sn , $\text{Mg}(\text{BH}_4)_2$, Oxopnictides, ...)

INSULATON (Polyurethane, Polystyrene, ...)

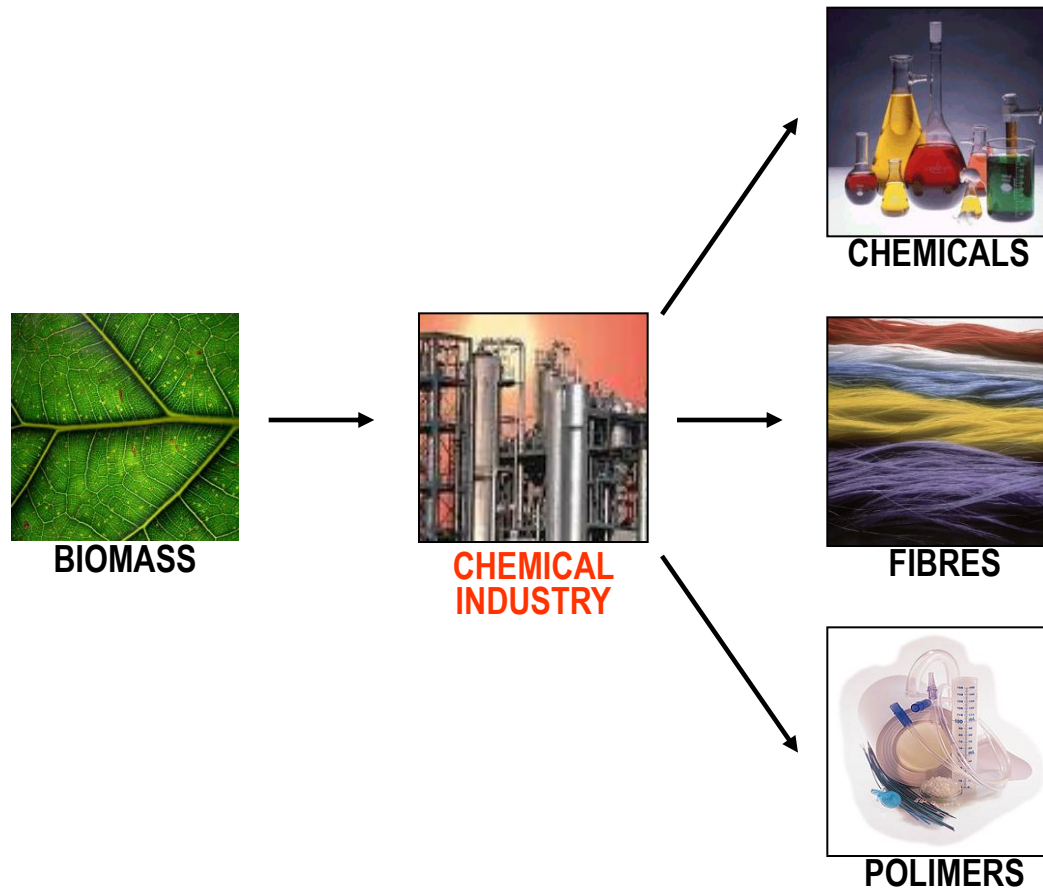
EFFICIENT USE

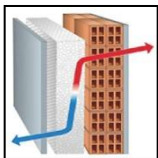
LIGHT MATERIALS (Polymers for the automotive sector, ...)

RESISTANCE AND FRICTION RIDUCTION (Additives, Lubricants, ...)



Materials from renewables raw materials

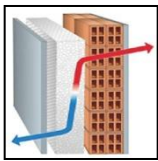




Chemistry: an Indirect Virtuous Role



“Life cycle analysis of CO_2 proves that the chemical industry makes possible significant net reduction in the GHGs emissions, and therefore that the use of its products allows a higher reduction of gas emissions compared to those related to production processes”

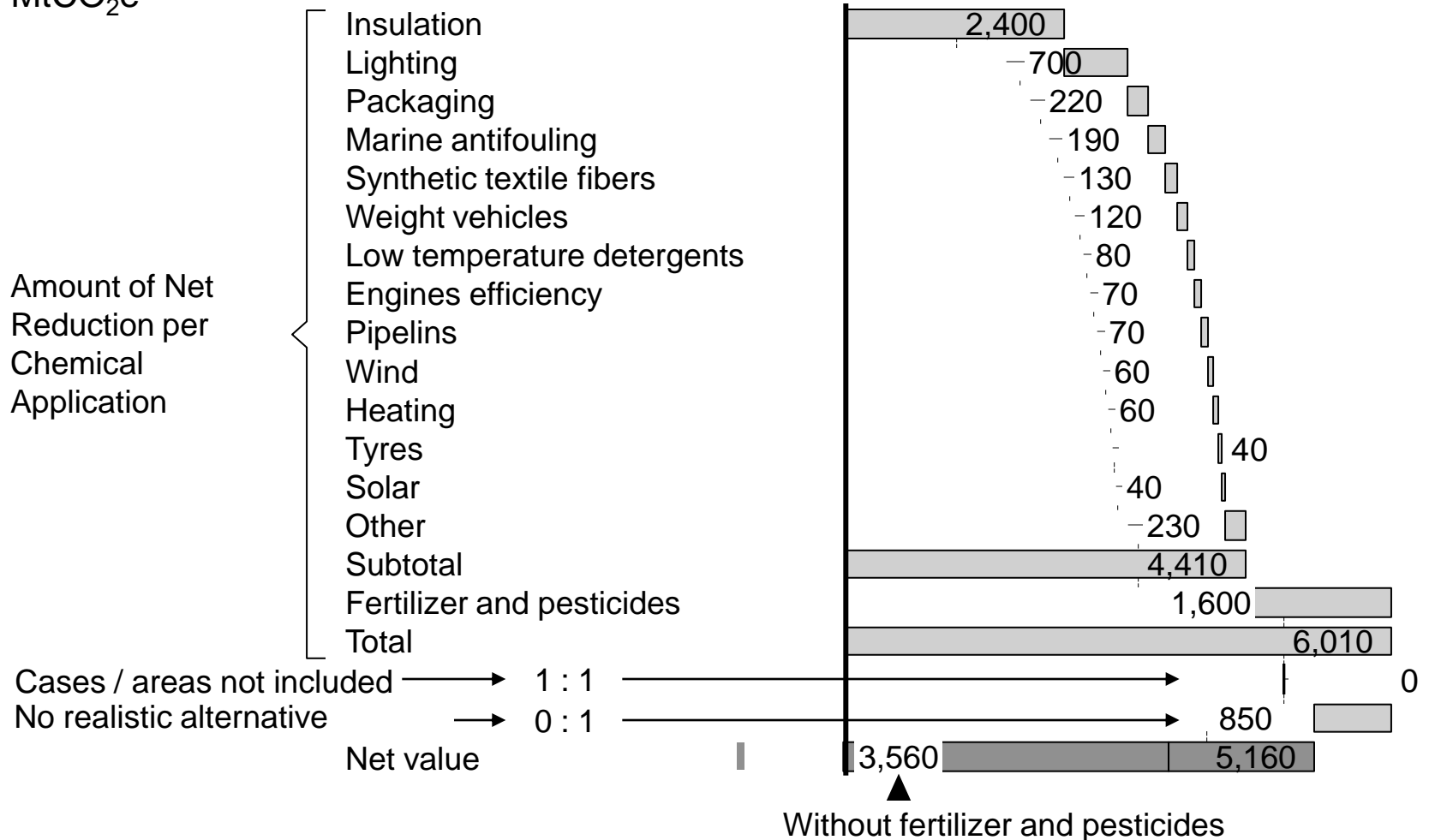


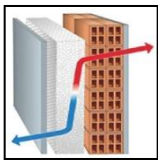
CO₂ Impact in Chemical Applications: Significant Net Reduction!



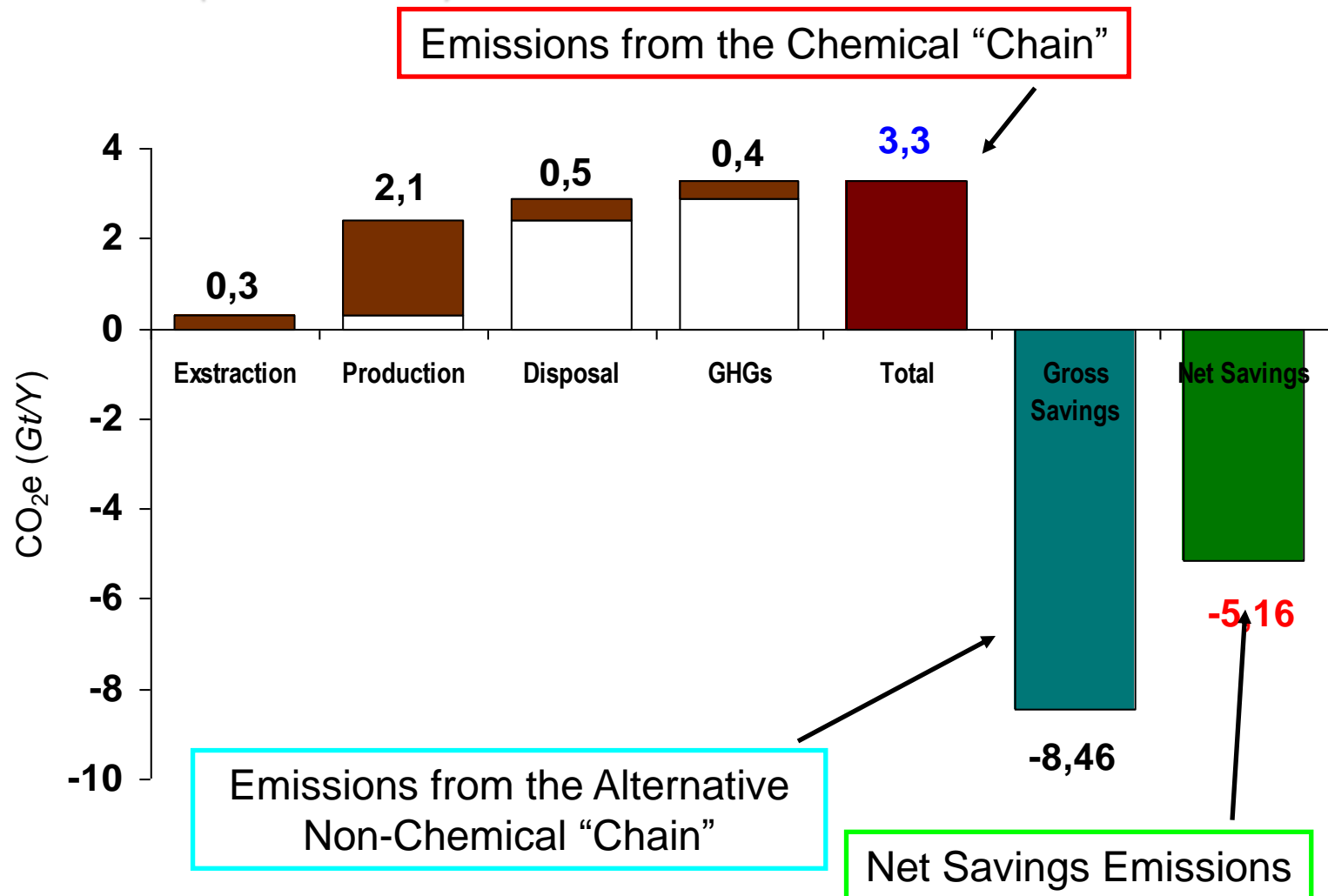
Net reduction in 2005 (World)

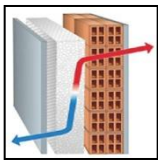
MtCO₂e





LCA Emissions: Contribution from the Chemical Industry (World-2005)





...Some Figures... (Italy)



- In the face of increased production by almost 10%, the chemical industry has **reduced emissions of greenhouse gases in the atmosphere of 50.3%**, amounting to 14.5 million tonnes, representing over 43% of Italy required target under the Kyoto Protocol.
- **For every ton of CO₂ emitted** by the chemical industry, downstream sectors that use chemicals can **save up to three tons of emissions**.

New entry in FEDERCHIMICA:



17 Sector Associations —



40 Product Groups



**Renewable
Sources**



Represented Activities



Renewable Sources		
Energy use	Non-energy use	
Biofuels Production (and bio-components for biofuels)	Conversion of renewables raw materials	Chemicals for the Industry of Renewables
[bio-alcohols (ethanol, butanol)]	- Additives, Chemical intermediates	- Biomass
[bio-ethers (ETBE, TAEE)]	- Starch and derivatives	- Wind
[bio-esters (FAME, FAEE)]	- Biorefineries	- Geothermal
[BTL (Biomass to Liquid)]	- Oleochemical industry	- Hydroelectric
	- Polymers	- Wave
Complementary production of Energy Renewable Sources	- Bio-cosmetic products	- Solar
Vegetable oils		
Biogas		

CONCLUSIONS



- The chemical industry is absolutely essential to all aspects and all areas of renewable energy.
- Chemistry is fundamental to reducing emissions of GHGs and the fight against climate change
- Federchimica decided to structurally represent this key industry in the indispensable renewable energy sector