Climate Change and Energy: Beyond the Myths

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TT30

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Is there an infinite source of energy?

Myth: Human welfare and development will continue through the development of unlimited, infinite sources of energy.

Truth: Laws of thermodynamics

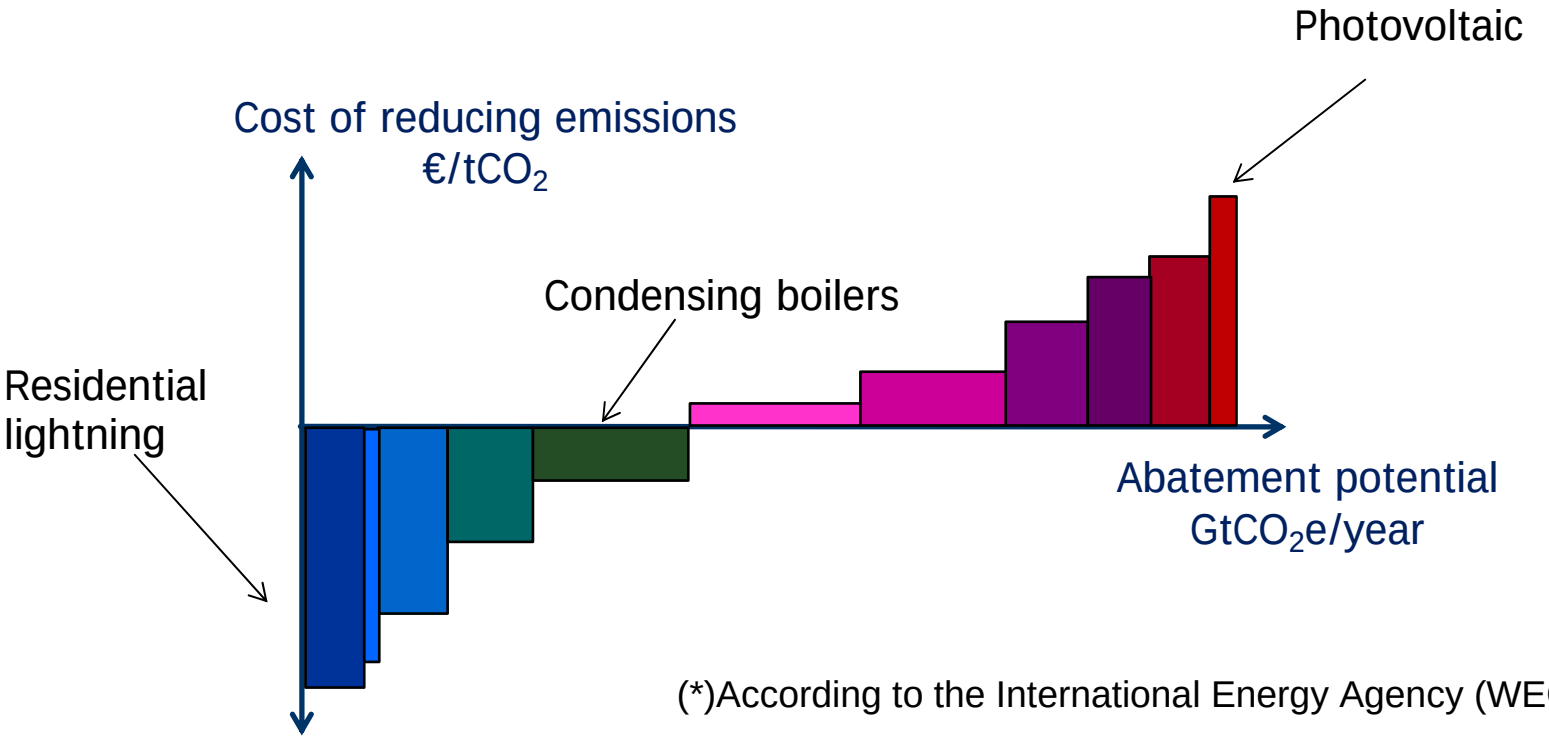
1st Law) Energy cannot be created; it can only be transformed from one state to another.

2nd Law) Some energy is always lost when energy is converted.

The increase of human welfare and development can only be achieved through the development of less energy-intensive models, energy savings (using less energy) and energy efficiency (through a set of technological, economic and cultural decisions)

Is there an infinite source of energy?

Investment in energy efficiency is far more useful and cheaper than investment in renewable energy sources. 1 USD invested in energy efficiency avoids 2 USD investment in electricity generation*.



(*)According to the International Energy Agency (WEO 2006)

Is distributed generation efficient?

Myth: Distributed, small-scale generation is more efficient and yields less environmental impact than large energetic plants.

Truth: The laws of thermodynamics, monetary and energetic economies of scale and the possibility of a better environmental control make large energetic plants more efficient.

When electricity is generated from fossil fuels, the following rules apply:

- Big is better than small.
- Static is better than mobile.
- Few is better than many.

Transition toward a low carbon emissions economy will require large on-shore and off-shore wind power plants, large thermo solar plants, combined cycle gas turbine and co-generation and tri-generation (CHP) plants.

Is distributed generation efficient?

Is it impossible to change the energetic behavior of the population?

Myth: People are educated and informed enough about energy but it is very difficult to change their ways.

Truth: Most people don’t have enough information. Their behavior is then motivated by prejudice. Critical situations, however, do trigger remarkable changes in consumer behavior.

During the draught period in Catalonia between September 2007 and May 2008, urban consumption of drinking water in Barcelona went down to 104 l/person/day, the lowest in western countries and close to the World Health Organization's “subsistence” level (100 l/person/day)

Is it impossible to change the energetic behavior of the population?

Investment in energy efficiency depends mainly on individual consumers. Energy being limited, consumers need to adapt their behavior. Public policies to reduce energy demand need to address all levels, through:

- Legislation changes. False premises, like the guaranteeing zero cost energy consumption, must be avoided.
- Taxes, incentives and financial instruments: progressive fares, schedule-based fare schemes, etc.
- Education: saving water is possible, saving energy too.
- Providing only rigorous, contrasted information.

Is hydrogen the carrier of the future?

Myth: The future of energy will be based on hydrogen.

Truth: A new fuel would require building a generation and distribution network from scratch; the electric network is already in place.

Production, storage and transportation of hydrogen are not efficient:

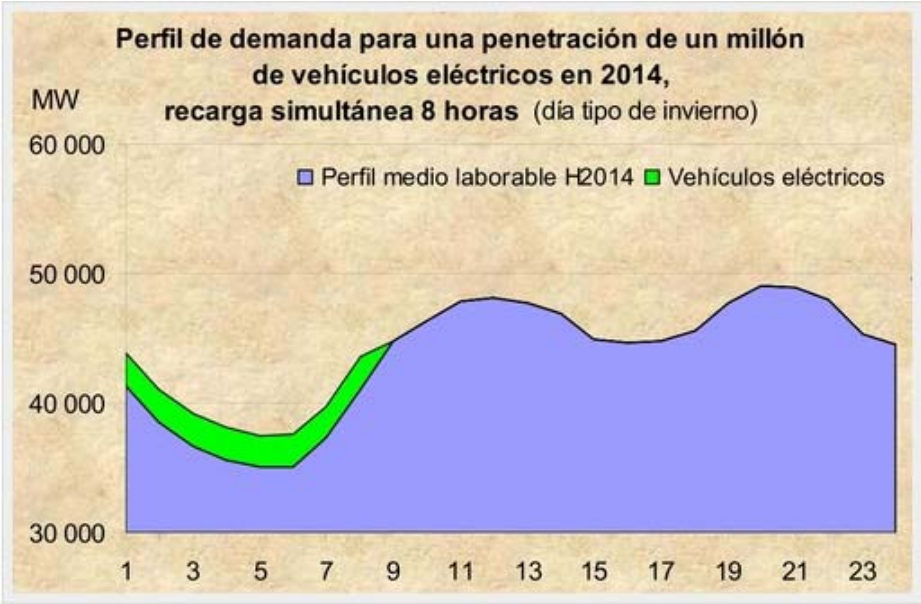
- Average energy recovered for transportation:
  - through H2: 20%
  - through DC battery charging: 60%

Electricity is an efficient energy carrier and it has a network already in place.

Can existing electric grids support the switch to electric cars?

Myth: Private transportation by electric vehicles will need a massive upgrade of the grids.

Truth: Most developed countries' grids would support overnight charge of a significant share of the car base with few upgrades.



Are villa residential areas more sustainable?

Myth: A garden-city model, small and green, is sustainable and consumes little energy.

Truth: A compact city saves energy in transportation, heating and cooling.

The economies of scale of a compact city with tall buildings save energy.

- There is a minimum density of population threshold below which public transport is not efficient.
- Houses, however well isolated, lose energy through walls and roof, while apartment blocks heat each other through energy losses.
- Vertical displacement is more efficient than horizontal.

Is there enough investment in energy efficiency and renewable energy?

Myth: Energy efficiency and renewable energy are priorities for all developed countries, who make large investments in R+D.

Truth: Investment in energetic R+D has decreased over time and it has been concentrated in nuclear fusion. Efficiency improvements are left to chance.

John F. Kennedy had a vision year 1961: to put a man on the Moon by 1970. To achieve this goal 150.000 engineers were hired.

What are we doing now???