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High-Speed rail: misleading assessments and false solutions.

Life Cycle Assessment and Energy Analysis

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Hidden costs

The hidden environmental, energy and social costs of high-speed transport modalities have been recently assessed by the scientific community (Federici et al., 2008, 2009; Chester and Horvat, 2009a,b; Chester et al, 2009; http://www.sustainable-transportation.com/), shedding light on misleading assessments that only account for direct, operational energy costs and disregard all the indirect, upstream and downstream impact categories.

When a technological device is analysed, a reliable impact assessment must be performed according to accepted international Environmental Management standards ISO 14040/2006 and ISO 14044/2006 (http://www.iso.org/, ISO-International Organization for Standardization). Outside of the ISO criteria and standards, it is very doubtful that an assessment is reliable and can be accepted.

It is therefore urgent and mandatory that a full LCA of the high-speed rail modality is performed, by preliminarly inviting a panel of well known experts in the LCA and transport fields to release a reliable and transparent study in the shortest possible time, and then by opening a dialogue with all affected communities.

Misleading assessments

The importance of decreasing atmospheric CO_2 emissions cannot be denied, in accordance with IPCC (Intergovernmental Panel on Climate Change) findings and international commitments within the Kyoto Protocol. However, **only focusing on and over-emphasizing a unique impact category (Global Warming Potential) is misleading**, in that it disregards other impacts related to resource withdrawal from the environment (mining for construction materials; large energy investments for infrastructure construction; threat to biodiversity; eco-toxicological potential from particulate matter; not to talk about social costs related to land use change and diverted investments from other sustainable transport modalities), **and sends a false message to policy makers and the public opinion**.

Moreover, when focus is placed on CO_2 emissions, estimates must include not only the emissions related to the actual operational phase (i.e., a comparison between saved emissions from less car traffic and released emissions from train transport), but must take into proper account the huge environmental load placed by the infrastructures. Although the latter can be optimistically credited a sufficiently long turnover time, their annual environmental cost and global warming potential is huge for high-speed modalities, due to the life-time energy costs of concrete, metals and machinery used for construction and maintenance. Comparison about feasibility and environmental impacts must account for both direct and indirect costs.

Disregarding or not properly accounting for such indirect costs makes any assessment unreliable and actually opens the way to “solutions” that are much worse than the problem to be solved.

Whole process has to be considered

For long time (since the '80 when the concept of Sustainable development has been conceived) the improvement of efficiency in a system has been searched for, concentrating the attention on the single component and not on the whole process.

It is now clear that a single product can be obtained in a more efficient way (or in a cleaner way) simply transferring the pollution in another space or in a different time, neglecting the consequences of this transfer. On the global scale the benefits obtained locally can be counteracted by problems generated elsewhere (side effects) with a negative overall balance. In a complex process constituted by more than one component (with typical feed-back mechanisms among components) the approach to improve efficiency has to take into account the whole (systemic) nature of the process. This is a characteristic peculiarity of the transport systems.

A further point to be considered is the very innovative approach necessary to apply LCA analysis to industrial processes. It not anymore allowed to divide industrial systems in sectors (like it has be done for long time by economists: mechanics, chemistry, textile etc).

In the new LCA approach all the functions should be considered for ex. in transport system it would be misleading to consider greenhouse emissions at the tailpipe, ignoring vehicle production, infrastructure provision, and fuel production required for support. The total life-cycle energy inputs and greenhouse gas emissions contribute an additional 155% for rail over vehicle tailpipe operation. Inventorying criteria air pollutants shows that vehicle non-operational components often dominate total emissions. Life-cycle criteria air pollutant emissions can be between 1.1 and 800 times larger than vehicle operation and ranges in passenger

occupancy can easily change the relative performance of modes (as shown also by Chester & Horwath 2009). Decision makers should exercise caution in comparing alternatives for warranty mobility of persons and materials as clean energy doesn't exist, and the only clean energy is the one never used i.e. saved, according to the second thermodynamics principle.

Participatory decision-making and planning

Once further and more reliable information is made available, the usual process of top-down decision-making must be converted into a participatory procedure that involves all the stake-holders and the affected communities. In particular, when "facts are uncertain, values in dispute, stakes high and decisions urgent" (Funtowicz and Ravetz, 1991), the concept itself of “feasibility” must be converted from “technical and economical feasibility” into a more complex framework that includes aspects of “post-normal” science, namely the shift from the expert community to an "extended peer community" consisting of all those affected by an issue who are prepared to enter into dialogue on it. They bring their "extended facts", that will include local knowledge and materials not generally accounted for in normal scientific reports.

Is a “Plan B” available?

Investing huge financial capitals without a clear assessment of the environmental, economic and social impacts puts the investment at high risk, mainly linked to the additional time needed to perform the assessment as well as to the possibility that results of the assessment procedure point out the unfeasibility of the project.

Unexpected problems generated by inaccurate assessments may also require additional investments later on, thus making the cost of the whole project much higher than planned, and diverting resources from environmental and social targets.

Should an innovative and participatory procedure be implemented as requested, a plan B for comparison of low-speed transport alternatives is urgently needed, capable to take the maximum advantage of the investment already decided, of the contracts already signed as well as of the further investment that is potentially available. In fact, the goal of a national transport modality within the framework of a sustainable European transport system can be reached by means of different and integrated transport modalities at local, regional and national levels as well as by means of an improved management pattern that ensures comfortable, effective and environmentally sound mobility of people and commodities.

Matching of transport modalities with the local mobility needs. Identify advantages of alternative investment patterns

A Call for and discussion of ideas and projects that are potentially alternative to the high-speed transport modality is urgently needed. In particular, what is important is the matching of the transport modalities designed and offered with the local mobility needs. An innovative design should take the maximum advantage of the existing transportation network and enhance its ability to meet the local needs without losing the connection with the international network. The concept itself of “high-speed” needs to be explored in relation to concepts of quality of life and social and environmental integrity.

It is of paramount importance to highlight that the **local transportation modalities are presently being displaced by high-speed modalities, in so decreasing the offer for local and low-cost alternatives. Moreover, lack of suitable investments is turning local transport into a very bad and unsafe state, that discourages its use in favor of private car modalities and high-cost train (for those who can afford it).**

Once again, focus should not be on speed, but instead on effectiveness, namely the fit of the tool to the target, without losing track of the need for environmental and social community integrity.

A plan B should highlight:

a) how to make better use of the available funding, according to agreed upon and clearly identified mobility targets.

b) what are the advantages/disadvantages of an alternative project compared to the High-Speed project

c) LCA results for plan B implementation

d) social benefits in terms of permanent jobs, community and environmental integrity, creation of additional wealth locally.

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