

**SOVAMAT (SOCIAL VALUE OF MATERIALS),
AN IMPORTANT PROGRAM
OF THE EUROPEAN STEEL TECHNOLOGY PLATFORM (ESTEP)**

JP. Birat, JS. Thomas
Arcelor Research,
Maizières-lès-Metz, France

ABSTRACT

Materials have been an enduring part of society ever since the dawn of mankind. The welfare of humanity is as much related to materials today and in the future, as it has been continuously in the past.

A consortium of structural material producers in Europe, encompassing metals, ferrous and non-ferrous, plastics, concrete, wood, glass, paper/cardboard and composite materials, is presently launching a program to describe the complex relationship that materials have been entertaining with society.

The objective is to build on the rich base that methods such as MFA, LCA and LCIA provide and to reach out beyond these, in order to build a more balanced qualitative and quantitative metrics that will be capable of measuring the connection between materials and society in all its wealth and complexity. A more balanced description than what is usually meant by impact assessment is expected to come out of this endeavor.

This program is presently under construction among about 50 industry and university stakeholders. It is to be presented to the European Commission as part of the 7th Framework Program, most probably in early 2007.

INTRODUCTION

Materials have been used by mankind ever since humanity burst into History, after a long period of geological and pre-human biological evolution. They have been used to make artifacts since the dawns of prehistorical time, i.e. tools, weapons, pots, pans, clothes, shelters, etc. and, more contemporarily, buildings, vehicles, civil engineering behemoths, machines, robots (?), etc [1].

Modern society takes materials for granted and lacks a holistic view of their role in its inner functioning.

Indeed, materials are everywhere, especially in the urban landscape where most of humanity lives today, but it is fashionable to talk about dematerialization. Materials make modern life possible and constitute the "material" basis of the welfare of mankind, even though regulation is pointing at the burden that making materials forces on the planet (IPP). Materials help avoid pollution and poisoning, bring health to more people than ever before in history but are at the same time suspected of endangering people's life in their working or living environments (REACH). Materials are seen as *passé* and old-fashioned by the general public, while they actually progress quickly in offering new products and are produced by some of the most modern sections of the industry, making use of such engineering *tour-de-force* as the blast furnace or the cement kiln.

Materials are at the crossroad of past and future, of progress and continuity and such dichotomy and ubiquity lead to misunderstandings between important society stakeholders, because the views that they put forward are one-sided, unbalanced and often biased. Material producers may paint an idealized picture of their products, while regulators seem sometimes to project a demonized vision of industry. Neither is true! The scientific vocabulary to speak about the influence of materials on society (or human industrial activity in general) focuses heavily on impacts, footprints, etc.: the expression "impact assessment" underlines the negative contributions that industry, with the "help" of regulators, should minimize. The expression "footprint" is more balanced, but does not have easily lent itself to giving a hint of what could be a positive footprint.

SOVAMAT'S AMBITIONS

The present program, which is under construction to be presented as part of the European 7th Framework program early in 2007, aims to move away from limited and partisan viewpoints and tell a more balanced story of what role materials play in our society and our modern world.

Its name, Social Value of Materials (SOVAMAT), points to the fact that materials create value, not only for the material producer, its shareholders or its customers (economic value), but also for the world (ecological value) and society as a whole (social value). This is carrying out the analysis of value at the level of the holistic sustainable development concept, with its three pillars, the economy, the environment and society. It also stresses the fact that value can be positive or negative, which is true also in the case of social value: when materials increase the welfare of mankind, they create positive value, but they destroy value if they bring pollution or have an unacceptable ecological footprint (figure 1).

We have learned empirically that the various tools that are being used at the present time in this area are perfectible and would probably benefit from a more coherent approach. They call on scientific disciplines that are academically separate and do not ex-

change regularly on their epistemology and methodologies, being in the rather distinct areas of macro and micro-economics, life cycle analysis, impact assessment, material flow analysis, industrial ecology, economic geography, technological forecasting, management science, product design and eco-design, waste management, engineering technologies and even ethnology, sociology and anthropology.

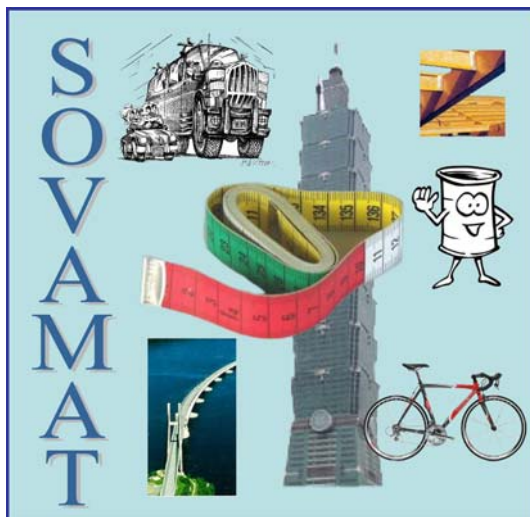


Figure 1: SOVAMAT's logo

The issue is quite important both for the future of our society, of the material industries - among which the steel industry itself, and of all industries that use materials. It is at the center of important political and strategic debates related to the availability of resources over the long term, to the management of waste and of recycling, to the more general issue of sustainability and to more modern concepts such as those of dematerialization and transmaterialization.

We will therefore bring together experts and specialists in the areas of general macro-economic modeling, raw materials and energy resources economics, material flow analysis, life cycle analysis, industrial ecology, health and safety science, impact assessment and policy planning from the academic side as well as material producers and users from the industrial side, who have a vision of what they can contribute over the next 10 years to shape the tools that society will need to project a clear picture of the social value of materials in our present and future society.

This will mean further developing the existing and separate models that exist in these disciplines, in order to integrate time into them with a long-term perspective extending to 2030 and beyond and to accept more complexity.

A few examples:

- general economic projections for the long term need to be explained in terms of major accepted scenarios and translated into a language that speaks to all stakeholders, especially in the framework of materials use. The scene is Europe and the context is heavily related to a post-Kyoto world facing the challenge of Global Warming and meeting the first restrictions due to the oil peak. Citizens will also have to position themselves with respect to their expectations in terms of living standards and choices of an ecological model for society;
- economic sectorial models of raw material and energy resource will need to integrate long-term projections of technology shifts in the various economic sectors, which

are more than likely in the context of Climate Change and resource depletion, that will prevail at that horizon;

- material flow analysis will need to be complemented with more details than are presently available to describe the European scene and its relationship with the rest of the world in terms of raw materials, primary and secondary, and of material flows in manufactured goods;

- recycling will also need to be integrated into the economic modeling (similar to the scrap-based steel sector in the Steel Industry) and into life-cycle analysis, not simply as an option, but as a necessary part of the description of the way that society will work more and more in the future

- projection of expectations in terms of impact assessment in the long term;

- proposals for transparent methodologies to integrate impact assessment with life-cycle analysis, going much beyond the interesting but rather controversial tools published until today, especially in the area of end-point indicators;

- new approaches to the design of products and especially to eco-design, taking on board bottom-up but also top-down approaches that give a chance for a broad enough optimization that can be enduring and sustainable.

- etc.

There will also be a need to establish bridges between these different approaches, in the form of tools but also of discussions on the complementarity and the necessary distance of the various theoretical bases.

To anchor these developments into the reality of the present and future economic world, large databases will need to be created, complete with a system to collect the elementary data, estimate their precision and trustworthiness, store and maintain them and make them available to all stakeholders in a transparent, critical, non-partisan and non-proprietary way.

The output of this ambitious work would be a compendium of complementary and coherent modeling tools, including the databases that are needed to run them, and a number of case studies demonstrating how they can be used for policy making in the industrial sectors but also at a higher political and societal level. This would involve studies related to various materials, but also to transmaterialization and dematerialization, with a measure of their social impact and projections according to several long-term scenarios.

SOVAMAT'S PRESENT STATUS

The program is being constructed today, among a consortium of about 50 organizations comprising both material producers (steel, non-ferrous metals, concrete, wood, glass, polymers, paper/cardboard, composites) and researchers engaged in the various academic fields mentioned above:

1. the objective of the SOVAMAT program is to develop methodologies meant to improve the description of the role of structural materials (metals, plastics, glass, wood, concrete, paper and composites) in our modern society.
2. it is directed towards the major stakeholders in this area, i.e. on the one hand the representatives of society, citizens, consumers, regulating agencies, government

bodies and NGO's, and, on the other hand, materials users and especially their design departments (SP16).

3. the time horizon is the present, but also the future, as a number of important material issues are overarching over long periods of time because of the long life of materials, which may be produced one day and recycled over and over again after lifetimes of use in goods that can be as long as 50/100 years.
4. the SOVAMAT program aims at demonstrating on a number of significant case studies that the improved methodologies bring about a better understanding of the role of materials in society (SP1 & SP21-23).
5. the role of materials in society is what we call the social value of materials.
6. the basic tools used today to measure the impact of materials on society are LCA (SP14), LCIA (SP15) and MFA (SP13). They have been developed to meet different targets that mix various reference systems and aim at describing various impacts. LCA is concerned with environmental issues. LCIA is concerned with health and environmental issues. MFA is concerned with material balances at the scale of countries, regions or the world, as described in a kind of geographical context. These tools measure the "footprint" of materials. They see health and environmental issues as externalities to the market economy and therefore address the issue from a "negative" viewpoint.
7. on the other hand, materials are central to our modern society and to our present well-being. In the past, they have been a powerful instrument in raising our developed countries out of the poverty trap and issuing them into our affluent societies. A world without modern materials would simply not be capable of ensuring the quality of life that we enjoy today. Tools to measure this positive connection are neither common nor numerous (SP4).

SP Structure proposition

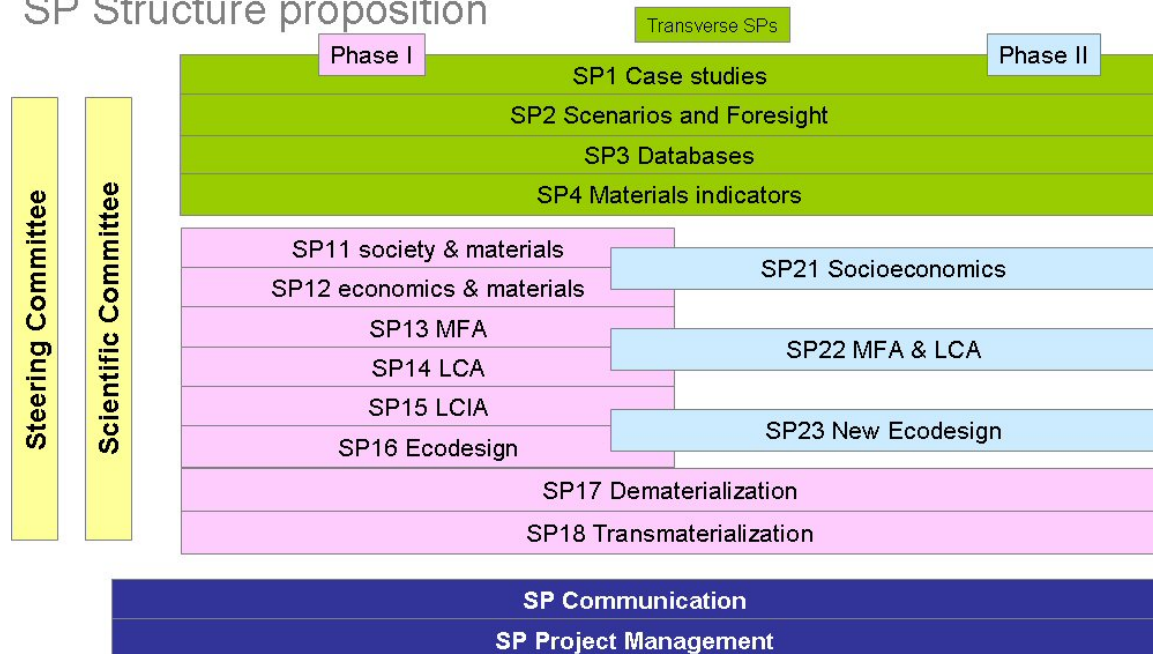


Figure 2: SOVAMAT's preliminary program structure

8. the improved methodologies that we plan to develop within this SOVAMAT program should both improve existing tools and develop new ones, especially tools that would exemplify the positive side of materials.
9. in order to capture the time dynamics of materials, future studies methodology based on economic modeling will be called for. The objective of this work will be to determine the demand for material in the future in response to the long term challenges such as future energy and raw material resources, carbon constraints related to global warming, population growth and economic growth (SP2-SP12).
10. the results of this modeling will be connected on the one hand with MFA projections and, on the other hand, with the evolution of material use, especially with dematerialization and transmaterialization (SP17 & SP18).
11. materials demand is related to the social demand for goods, which can be analyzed by social sciences approaches, from sociology to ethnology, marketing, etc (SP11).
12. the program will be framed around these complementary approaches and will look towards bridging across methodologies to obtain a global picture.
13. to ensure the sustainability and the robustness of the proposed work, we shall also create data conservatories for MFA, LCA and LCIA of the main materials (SP3).

The program structure is shown in figure 2.

NEXT STEPS

The partners have the ambition to present their program to the EU at the end of 2006 or the beginning of 2007, depending on the date when the Call is published. They have already established connections with international participants, beyond the border of Europe. A twin program is presently being launched in Japan as a National program [2] and it is expected to run the two programs in close contact and cooperation.

SOVAMAT is planned to be integrated in several European technology platforms [3], an instrument developed to let the stakeholders in each particular economic sector project their view of their future until 2030 or beyond. SOVAMAT is already a key component of the Steel Platform, ESTEP [4], (figure 3).



Figure 3: ESTEP's logo

ACKNOWLEDGEMENTS

The authors would like to acknowledge the contribution of all the members of the future SOVAMAT consortium, whose names and organizations will become clear in a near future.

REFERENCES

- 1 JP. Birat, *Alternative ways of making steel: retrospective and prospective...* La Revue de Métallurgie-CIT, Novembre 2004, 937-955
- 2 A. Inaba, this workshop
- 3 http://cordis.europa.eu/technology-platforms/home_en.html
- 4 <http://cordis.europa.eu/estep/>