

WORLD FEDERATION OF ENGINEERING ORGANIZATIONS

Committee on Capacity Building

• Committee on Energy

• Committee on Engineering and Environment

**Summary Report** 

May 4, 2010 UN-CSD 18 Side Event

Organized by the Scientific and Technological Major Group

Title: Capacity Building: Words Into Action 2010

## Transport Efficiency and Waste Avoidance – Input for Policy-Makers

### **Introduction**

This 90 minute event, which was jointly organized by the World Federation of Engineering Organizations and the International Council for Science (acronym ICSU), consisted of three excellent presentations from three prominent speakers, followed by questions and answers and finally with a general discussion. There were 30 participants from 11 countries and included government officials as well as representatives from non-government organizations, either at national or international levels. A partial list of attendees is provided in Appendix A.

The workshop was facilitated by Mr. Darrel Danyluk, P.Eng., who chairs the Committee on Engineering and the Environment within the World Federation of Engineering Organizations, one of four committees that support the World Federation of Engineering Organizations involvement in the UN-CSD process through the Scientific and Technological Major Group.

The focus of two of the presentations was on recent and upcoming developments and trends in motor transport, a key technology for public transport and the transport of people and materials. The third presentation focused on trends and developments in the transport and use of agricultural fertilizers, a key technology for increasing and optimizing agricultural food production. Copies of these presentations will be available as electronic files in pdf format (by permission of the presenters). The three presenters and their organizations were:

Mr. Alan Taub - Vice-President of Global Research and Development, General Motors;

Mr. Mahash Patankar - International Council of Scientific Unions;

Mr. William Tip O'Neill - President, International Raw Materials Inc.

The organizers wish to thank the presenters for making these available. The objective of the side event was to contribute to the current agenda of CSD-18 by presenting some of the transportation technologies and trends in sustainable transport in the context of sustainable development and the reduction of waste.

This event is part of a continuing strategy of the Scientific and Technological Major Group to build awareness and understanding of current CSD themes from a scientific, engineering and technology perspective. The Scientific and Technological Major Group intends to continue these workshops and interventions on the subject agendas of the CSD at the international and where feasible, regional meetings.

In the context of this work, WFEO defines capacity building as:

"The building of human, institutional and infrastructure capacity to help societies develop secure, stable and sustainable economies, governments and other institutions through mentoring, training, education, physical projects, the infusion of financial and other resources, and most importantly, the motivation and inspiration of people to improve their lives."

The educational objectives of the event were:

- Greater awareness of the importance of modes of transport and their infrastructures in addressing losses during transport
- Identification of opportunities to improve transport to reduce losses Increased understanding of physical, economic and social infrastructures

### **Summary of Presentations**

### Alan Taub - Vice-President, Research and Development - General Motors

### The Reinvention of the Automobile: Driving to a Sustainable Future

The major points of this presentation were as follows:

- More than 1 billion people will own cars before 2020 and the way cars are built and supplied today will not work for this projection;
- The challenges for the manufacture of cars now and going forward include energy sourcing and availability, reducing emissions to "no tailpipe environmental impact, and, increasing the safety of vehicles to reduce deaths;
- The world continues to urbanize which presents two additional challenges congestion and affordability;
- Vehicles typically use only 5% of the BTUs for propulsion 50-65% of BTUs are lost by the internal combustion process much room for improvement
- The hybrid process in use today is an intermediate state towards fully electric vehicles where energy is stored in batteries or use fuel cells to convert to hydrogen energy
- General Motors is working on an individualized urban transport vehicle referred to as En-V that is totally electric
- Impact of electric vehicles on electricity grid is projected to be less than 1% of the total capacity – also could charge at night when there is less load on the grid and excess capacity

#### Mahash Patankar – International Council for Science

#### Adopting Alternate Fuels in Transport – From Policy to Implementation

The major points of this presentation were as follows:

- This presentation focused on the end-to-end process (policy to implementation) of transiting vehicles to alternate fuels, using a case study of converting public transport vehicles from gasoline to compressed natural gas in two Indian cities (Mumbai and New Delhi) with 100% compliance in less than four years;
- The adoption of the policy framework to achieve the goal, which is in this case means switching to alternate fuels, requires setting the policy (Stage 1) which enables but by itself is not sufficient followed by a use stage (Stage 2) both of which provide a sufficient condition for implementation;
- The sufficiency conditions for implementation include the users decision to change e.g. use alternate fuel as well as the need for ancillary infrastructure and greater availability of improved technology;
- For public transport vehicle conversion to CNG was driven by the recognition of deteriorating air quality, advocacy by non-government organizations and key rulings in the court system;
- The implementation challenges included the availability of CNG infrastructure, the appropriate diesel-fuel engine technologies, testing procedures and infrastructure;
- The biggest issues for users were socio-economic and particularly the hit on net monthly income of the public service and workers
- The lessons learned through this example include setting policy goals early with firm timelines for response and the process, ways to ensure compliance with the policy framework, availability of infrastructure and proper stakeholder consultation;
- There is a need to foster and promote technology development as well as capacity building and training of people to service these vehicles and to develop a market for these services through enterprise development;
- For implementation focussing on technology development, transfer and adaptation processes for users and other stakeholder sis important as will as local retrofitting and development of sufficient maintenance capacity (facilities and service)
- The results of this case study are presently being used to adapt public transit vehicles to CNG in six other Indian cities. For the most part, it is believed that this approach could be adapted in other countries

## William Tip O'Neill, President – International Raw Materials Inc.

#### Sustainable Global Fertilizer Transportation

The major points of this presentation were as follows:

• One of the UN Millennium Development Goals (MDGs) is to eradicate extreme poverty and hunger – agricultural production is a key strategy for poverty reduction

- Over 1 billion people out of our current population of 6.8 billon is undernourished and our population is projected to grow to 9 billion by 2050;
- Example China has 20% of the world's population, but only 9.1% of its arable land need for higher production which involves fertilizers;
- It requires thousands of miles of transport to move nutrients (fertilizers) to farms for production, then we have to move production to the consumers through transport;
- Over 180 million tons of fertilizer are shipped worldwide through multi-modal transport (ship, rail and vehicles) the presentation included a graphic of the relative movements between suppliers and consumer countries;
- There is overuse of fertilizers in East Asia and severe underuse in Africa;
- In the United States there is a flat-line demand for fertilizer use but food production is increasing exponentially due to improved efficiencies and practices;
- Some of the practices to ensure sustainability include recycled fertilizer production, high analysis fertilizer, use of backhaul freight in transport, dust suppression, reduced use of packaging and zero carbon emissions handling systems, increased fertilizer efficiency and best fertilizer management practices;
- A case study for agricultural production in Madagascar was presented.

#### **Questions and Answers**

The questions and responses presented below are grouped by presentation rather than the order in which they were tabled. Note that responses and discussion are paraphrased and the result of back-and-forth conservation so should not be considered verbatim responses from the presenters.

### **Sustainable Automobiles**

How much improvement in aerodynamics of vehicles to increase efficiency and is there room for further improvement?

- GM sells what is demanded by the marketplace so it undertakes an active management of aerodynamics strategy and this is considered when needed;
- Since the 1970s there has been roughly a 30-40% reduction in drag on vehicles;
- Still room for small improvements but need a technology breakthrough that is not yet apparent.

Is the En-V mini-car a sustainable strategy for the movement of people in the future?

- The En-V has 1/5 the physical footprint of a regular car. This vehicle is addressing the problems related to congestion where there is less and less space for parking in downtown urban centers.
- Studies have shown that these vehicles can be as efficient as a bus in moving people in a controlled environment.
- It was noted that despite the use of different and lighter materials e.g. plastic versus steel, in general the weight of cars has increased due to increased safety features that are required by law

There is a UN resolution that creates a ten year decade for improved road safety to reduce deaths – is GM planning to support this and if so, how?

- The majority of road deaths (not damage) are from intoxication of the driver;
- It is generally felt that driver behaviour dives the problem rather than the technology;

## **Alternate Fuels**

Has the India success been repeated in other southeast Asian countries and what is the role of the science and technology community?

- There are six more Indian cities that are implementing CNG conversions;
- There is a new policy from the Department of Energy that all new gas finds shall a portion of their production allocated to the public transport sector
- There is a technical agreement between India and Thailand for CNG conversion;
- There is increasing awareness in the ASEAN countries
- The key contribution of the science and engineering community would be standard-setting and expediting the adoption of the technology

## **Fertilizer Transport**

What is done with the empty containers after product is delivered?

- It was noted that in many places food is not grown near where there is delivery of fertilizer thus transport more inefficient
- They are trying to optimize container movements through computer models;
- Trying to reduce transport costs by 1/3 through carefully planned backhauling.

Are there ways to mitigate the transport and more effective use of fertilizer now?

- There is not enough education in developing world for both farmers and policy-makers;
- Considerable uninformed thinking and application e.g. overuse of fertilizer, use of inappropriate fertilizers etc.
- We need an educated farmer sand to do that we need to provide information;

How many nutrients are washed away into our oceans, lakes and rivers and any ways to recover these effluents?

- Challenges include effective and efficient collection of the run-off broadly applied at the farm lever;
- Food consumed in 2000, proportionally uses only 40% of the nutrients that were applied in 1900 –also the mix of nutrient is different and site-specific;
- We need to develop and provide a database on nutrients
- University of British Columbia (Canada) has developed a process to extract phosphorous from wastewater and solid waste;

• The technology is coming but the challenge is to get municipalities to fund it.

## **Closing Remarks**

D. Danyluk provided some closing comments:

- It is apparent that new technologies and methodologies for sustainable transport are evolving, but change takes time and this applies to the whole transport question
- The presentations today amply demonstrate the importance of policy frameworks and policy statements as enablers of action. It emphasizes the continuing importance of the involvement of the scientific and engineering communities in the discussion and development of policies for sustainable development that can be implemented and sustained in close cooperation with our community.

He thanked the speakers for their fascinating presentations and to all who attended. The presentations will be posted on the WFEO-CEE webpage as pdf files.

# Appendix A UN-CSD18 SIDE EVENT Transport Efficiency and Water Avoidance – Input for Policy-Makers May 4, 2010: 1:15-2:45 p.m.

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