An introduction to Sustainable Materials Management

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to the OECD
Where does SMM begin and end

Sustainable Development is the overarching Goal and SMM is the means to get there.
Agreed to a working definition of SMM

"Sustainable Materials Management is an approach to promote sustainable materials use, integrating actions targeted at reducing negative environmental impacts and preserving natural capital throughout the life-cycle of materials, taking into account economic efficiency and social equity."

Where:

- “Life-cycle of materials” includes all activities related to materials such as extraction, transportation, production, consumption, material/product reuse, recovery and disposal
Front runners experience - Taking Stock

Concluded OECD should:
(a) examine framework conditions and principles for SMM;
(b) Carry out case studies on priority materials
(Specific materials with large negative environmental impacts, and critical phases of their respective life-cycle, should be singled out through appropriate methodologies)

Shift towards how we can use materials including waste in the most sustainable way, taking into account economic efficiency and social equity but also looking upstream at product design and underlying consumption patterns
Monday to Wednesday

OECD

GLOBAL FORUM ON ENVIRONMENT

Focusing on

SUSTAINABLE MATERIALS MANAGEMENT
Good SMM practices in priority materials
Material Case Study 1 = Critical Metals and Mobile Devices

- Stages in the life cycle of mobile phone are: (1) raw material extraction, (2) component manufacture and assembly, (3) use, and (4) end-of-life (EOL) comprised of (a) refurbishing/reuse, (b) material recovery – pyrometallurgy, (c) material recovery – informal, and (d) disposal

- Analysed using LCA, Substance Flow Analysis, eco-efficiency, and social aspects framework

- Over 1.2 billion Mobile Phones sold annually with a total weight of 84,000 tonnes (excl. batteries) of which: 84 tonnes of Antimony (Sb); 71 tonnes Beryllium (Be); 12.1 tonnes Palladium (Pd); 0.3 tonnes Platinum (Pt)

- Electronics broadly use: 5% of World's Pt; 16% of Pd; 7% Be; 50% Sb
Good SMM practices in priority materials
Material Case Study 1 = Critical Metals and Mobile Devices
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Material Case Study 1 = Critical Metals and Mobile Devices

• Technical 10 yr lifespan points to reuse

• Over 25 different initiatives on consumer electronics (MPPI; PACE; GeSi; StEP etc.,..) and national initiatives: Canada, Australia
  – Extended Producer Responsibility EPR
  – Individual Producer Responsibility IPR
  – Deposit Systems
  – Take-back
  – Disposal Bans

• Lack of recycling infrastructure - collection low - problems with informal sector
Good SMM practices in priority materials
Material Case Study 1 = Critical Metals and Mobile Devices
Good SMM practices in priority materials
Material Case Study 1 = Critical Metals and Mobile Devices

• By and large, critical metals are mined in a limited number of locations (or co-produced with base metals) though they may be found in many other places: when prices rise, mines open

• When scarcity drives prices of primary metals up, for example, markets will recycle much more metal and invest in appropriate technology as required

• Key questions:-
  – Are these metals a risk when discarded into the environment?
  – Are these metals worth recovering?
Good SMM practices in priority materials
Material Case Study 1 = Critical Metals and Mobile Devices

Example: China supplies 87% of World's Antimony (Sb)
Good SMM practices in priority materials
Material Case Study 2 = Global Flow of Aluminium 2006 - 2025

- Stages in the life cycle of aluminium are: (1) bauxite mining; (2) alumina refining; (3) aluminium smelting; (4) fabrication; (5) use, and (6) end-of-life (EOL) comprised of (a) material recycling (b) landfilling

- Primary Smelter production increases from 45.3 million tonnes in 2006 to 120 million tonnes in 2025

- Didn't cover policy measures and producer and consumer behaviour

- Flows of primary aluminium.

- Flows of recycled aluminium from fabrication and post-consumer scrap
Good SMM practices in priority materials  
Material Case Study 2 = Global Flow of Aluminium 2006 - 2025

• Consumption differs in developed and developing countries  
Transport & Consumer goods -vs- Electrical power distribution

• Consumption per capita increases expected in China; Russia; Brazil; and India

• With Primary Smelter production increases from 45.3 million tonnes in 2006 to 120 million tonnes in 2025

• A reduction in Greenhouse Gas from production must then come from increased efficiency
Good SMM practices in priority materials
Material Case Study 3 = Wood Fibres (Pulp and Paper Products)

- Stages in the life cycle of wood fibres are: (1) Harvesting; (2) Pulping; (3) Papermaking; (4) Transporting; (5) use, and (6) end-of-life (EOL) comprised of (a) material recycling (b) Incineration with energy recovery; (c) land filling
- approx. 400 million tonnes of paper produced and used world-wide
- Substantial user of energy (4th largest industrial user) and of water and GHG emitter
- Findings:
  - 20 - 30% energy reduction possible
  - 25 - 50% reduction in water use possible
  - Biomass energy (carbon neutral) increase would mitigate GHG emissions
- Recycling saves 7 to 19 GJ per tonne of paper recycled proposes to use biomass as fuel for recycling to avoid fossil fuel
- Important to divert waste paper from landfill, also Large environmental footprint could be reduced by source reduction, light weighting, double sided printing and reuse
Good SMM practices in priority materials
Material Case Study 4 = Plastics

- Stages in the life cycle of plastic are: (1) Production; (2) Processing; (3) use, and (4) end-of-life (EOL) comprised of (a) mechanical recycling (b) feedstock recycling; (c) Incineration with energy recovery; (c) landfilling

- Global plastic production in 2007 was 260 million tonnes

- products generally save more than double the amount of energy used to manufacture them
  - insulating materials in house building - thermal insulation plastics pays for itself in energy-saving terms within the first year of use
  - Car light weighting saving 100 kg uses 0.2 litres less fuel per 100 km

- Study concentrated on potential of plastic waste other than separately collected packaging i.e. other plastics in household waste and in bulky waste collections and other plastics in commercial use
Good SMM practices in priority materials
Material Case Study 4 = Plastics

Conclusions

• Mechanical recycling is best if material is easily and cheaply:
  – Separated
  – Identifiable
  – and in sufficient quantity
  – and has a market

• If plastic waste is mixed or contaminated energy recovery is best or equivalent, or utilisation as a reducing agent in blast furnace; Landfill is the least preferred option

• Conclusions were that efficient waste management is the best possible mix of all recovery processes

• A good waste management structure leads to high recycling rates, a second best management structure leads to high energy recovery rates, worst option is landfill

• Landfill bans have been successful in Switzerland; Germany; Sweden and Denmark. Germany achieved a 96% diversion rate in 2007
Policies for implementing SMM

SMM Target Setting
What does a target include and how are they used

Hard Targets
• Short timeline - 5 yrs - Narrow scope - Clear accountability – Fixed recycling rates for a specific material or goods, e.g. Batteries; Cars; Electrical & Electronic goods

Soft Targets
• Longer timeline - Broader scope - flex in accountability - Example: Improved energy performance of new buildings

Voluntary Targets
• Voluntary industry initiatives - Similar to soft targets - Example: Dutch Chain-Oriented Policy; ISO14000; Fair Trade

Strategic objectives (goals):
• Much longer timeframes - 10 yrs - wider set of considerations

Strategic levers:
– available methods and influence an authority may have to change a system

• To be effective:
  – Government commitment and society support and will be based on sound research
  – Set at appropriate level
  – Regular review
  – effective monitoring
Policies for implementing SMM
SMM Policy Principles
Policies for implementing SMM

Conclusion for possible SMM Policies

SMM Policy should strive to achieve 4 key principles

Principle 1 – Preserve natural capital

- Improving information about material flows and environmental impacts;
- Increasing resource productivity and resource efficiency;
- Reducing material throughput, particularly of high impact materials;
- Increasing reuse/recycling of materials to preserve natural capital; and
- Advancing technologies for obtaining materials from natural resources that eliminate waste and toxics and support long-term ecosystem health (Eco-innovation).

Strategies include

Principle 2 – Design and manage materials, products and processes for safety and sustainability from a life cycle perspective

- Detoxification
- Dematerialisation
- Design for value recovery

Strategies include
Policies for implementing SMM
Conclusion for possible SMM Policies

SMM Policy should strive to achieve 4 key principles

Principle 3 – Use the full suite of policy instruments to stimulate and reinforce sustainable economic, environmental and social outcomes

- Regulations
- economic incentives and disincentives
- trade and innovation policies
- information sharing
- Partnerships

Principle 4 - Engage all parts of society to take active, ethically-based responsibility for achieving sustainable outcomes

- Multilateral stakeholder engagement
- responsibility and collaboration
- Open information flows
- An ethical perspective
## SMM in a broader perspective

### Comparing the scope of major policies

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Policies for implementing SMM
SMM Policy Instruments

Examples

- Japan's Sound Material-Cycle Society;
- UK Climate Change Act;
- California's Green Chemistry Initiative;
- Electronic Product Environmental Assessment Tool (EPEAT);
- EU Sustainable Consumption & Production;
- EU Green Public Procurement (GPP);
- Dutch Chain-Oriented Waste Policy; and
- UK's Clothing Product Roadmap
Policies for implementing SMM

SMM Policy Instruments

- The aim should be to address market failings, as far as possible, the benefits of policy should outweigh costs of its deployment

- Effects outside the originating country: due to global nature of most supply chains and market place

- Integration: concerns that SMM could become too integrated in the environmental agenda and so become marginalised, need to Integrate issue in mainstream agenda

- Need to engage across awkward departmental divides, engaging Ministries of:
  - Mining
  - Industry
  - Agriculture
  - Trade
  - Overseas Development
  - Research & Innovation
  - Taxation
  - Economic
  - Environment
Developing a path forward

National governments have a variety of alternative approaches to consider in SMM Policy Development

– Consideration of important policy objectives
– Consideration of the scope of application
– Consider available policy instruments

The interconnectivity of the global economy implies that individual nations cannot pursue SMM in isolation - inter-governmental and multi-stakeholder collaboration is needed
Developing a path forward

4 categories of policy instrument

- **Regulatory instruments**: Landfill bans; restriction on hazardous substances; EPR; IPR

- **Economic instruments**: subsidies or tax credits for eco-friendly products; waste disposal charges. Signals for material goods may achieve a broader impact
  - Pollution charges
  - Tradeable permits
  - Subsidy reduction

- **Information based instruments**: ecolabelling; energy ratings

- **Partnership Programmes**: voluntary collaboration; recycling partnerships; LCA database
Implications for recyclers

Despite progress, complete decoupling of material use from economic growth has not occurred in developed nations.

Moreover, based on current trends, developing nations will continue to increase their material throughput.

Therefore to mitigate material use and throughput...

SMM policies should result in greater volumes of recyclables of better quality and value.

But have to be vigilant of trade barriers between recyclers and their customers.
Notes following this presentation made to the BIR International Environment Council on Tuesday 26th October 2010:

- for brevity, the second half of this presentation recalling the **EU Presidency’s Summary of the Informal Environmental Council on Sustainable Materials Management, 12th and 13th July 2010** has been removed, instead the Summary may be read at:
  

- The **OECD GLOBAL FORUM ON ENVIRONMENT focusing on SUSTAINABLE MATERIALS MANAGEMENT** concluded the next day. Presentation from the Global Forum are available at:

  [http://www.oecd.org/document/29/0,3343,en_2649_34395_44403037_1_1_1_37465,00.html](http://www.oecd.org/document/29/0,3343,en_2649_34395_44403037_1_1_1_37465,00.html)

- The **BIAC** paper in support of SMM may be viewed at: