從歐盟的角度看生產者責任制

1. 大綱：

   1.背景

   - 歐盟 2020 年目標
   - 目標回顧

   2.生產者責任制

   - 為何對延長生產者責任(Extended Producer Responsibility, EPR)有新行動?
   - 主要課題
   - 新研究
   - 初步想法-主要原則和實施手段

2. 2020 歐盟目標
   - 廢棄物發電在下降，尤其是廚餘
   - 回收和再利用對經濟具吸引力，並在「最大合理的水平」
   - 能源回收侷限於非可回收材料
   - 逐步淘汰掩埋
   - 充分利用市場手段

3. 目標回顧

   目標-轉化路線圖及將第七環境行動計畫渴望達到的目標納入立法

   方法-兩階段(擴大範圍與深入評估)，支持締約與參考模型(歐洲環境署)

   擴大範圍-回顧 3 項指令條款

   時機-建議在 2014 年

4. 為何對 EPR 有新行動?

   最先進的微軟公司經驗：適當結合不可或缺的經濟/法律工具

   - 掩埋與焚燒課稅/禁令
   - 對市政當局激勵/懲罰
   - 按廢棄量收費制度

5. 主要課題

   1. EPR 計畫已獲准其經營所需資金以符合高回收/再生目標
   2. 在微軟以下方面之間有具大的差異：
      - 範圍和目標
      - 覆蓋廢物流
      - 系統的成本效益
      - 不勞而獲者的控制制度和水平
      - 市政當局/生產者的角色
      - 集中/多數參與

6. 額外的 EPR 研究

   目標：確定「黃金規則」和/或健全的 EPR 計畫最低要求

途徑：為現有 EPR 成果做比較，為 6 項廢棄物流深入分析 6 項計畫，及最佳做法的鑑定

時間：2014 年 9 月 18 日在布魯塞爾舉行研討會

7. 關鍵原則
   1. 初步方法研究，2014 年 3 月最後確定
   2. 藉由以下方面的確認，提升 EPR 計畫之成本效益/可接受度：
      - 所有參與者之間的長期對話：生產者/零售商/公民/廢棄物收集者/直轄市、私營運營商/分類者/回收者
      - 透明度
      - 適當的控制
      - 公平競爭
      - 全面和真實成本的應用
8. 實施原則
   1. 歐洲水準(立法、建議、指導綱要)
      - 達到的目標定義
      - 明確的 EPR 目標
      - 納入國家立法的最低要求
      - 激勵使用 EPR 計畫
      - 最佳實踐指導
9. 國家立法
   1. 明確定義所有相關者責任
   2. 可靠的認可制度
   3. 以歐盟最低目標漸進
   4. 集體計畫的認可程序
   5. 真正的成本原則-費用必須連結精確的產品成本/可回收性，並包括總價
10. 認可程序
    1. 藉高密度集合網路完全覆蓋範圍
    2. 與市政當局的關係
    3. 由第三方審核
    4. 公平對待生產者/進口商
    5. 指定營運商的明確程序(公開招標/標準成本補償)
    6. 特定廢棄物流/產品的具體規則
    7. 未獲利/獲利?
11. 組織有效控管
    1. 基於風險-結合公共與自動控管
    2. 足夠的公共資源
    3. 明確驗證和可使用的報告
    4. 採取有效行動對抗不勞而獲的行為

5. 專注在統計/質量/可靠性
6. 廢棄物出口

配套措施：掩埋/焚燒課稅/禁令，按廢棄量收費，獎勵/處罰

12. 結論-下一步驟
    1. 進行中的特定利益相關者諮詢
    2. 2014 年目標檢討
    3. 將額外納入協助使用經濟手段的倡議
        - 預警程序/事前條件
        - 藉由最佳實行的指導綱要完成 EPR 之最低條件

Producer Responsibility - EU perspective

Paris, OECD WP
12 November 2013

Michel SPONAR,
European Commission, DG Environment

Outline

1. Background
   - EU 2020 objectives
   - Target Review
2. Producer Responsibility
   - Why new action on EPR?
   - Main lessons
   - New study
   - Preliminary ideas- key principles and means of implementation

Conclusions – next steps

2020 EU objectives – 7th EAP

- Waste generation in decline with a focus on food waste
- Recycling and reuse are economically attractive and at 'max feasible level'
- Energy recovery limited to non-recyclable materials
- "Phasing out" landfilling (limited to non-recyclable and non-recoverable)
- Full use of market based instruments

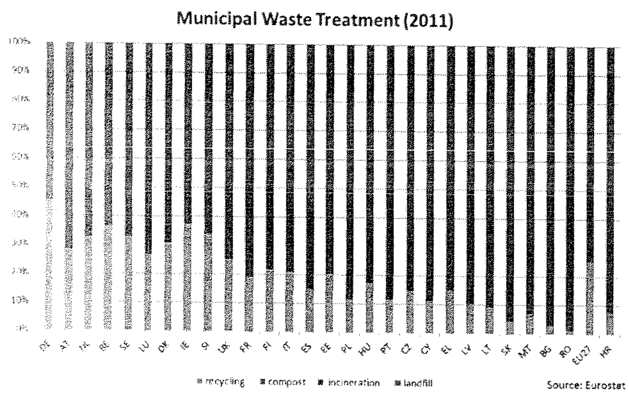
Target Review

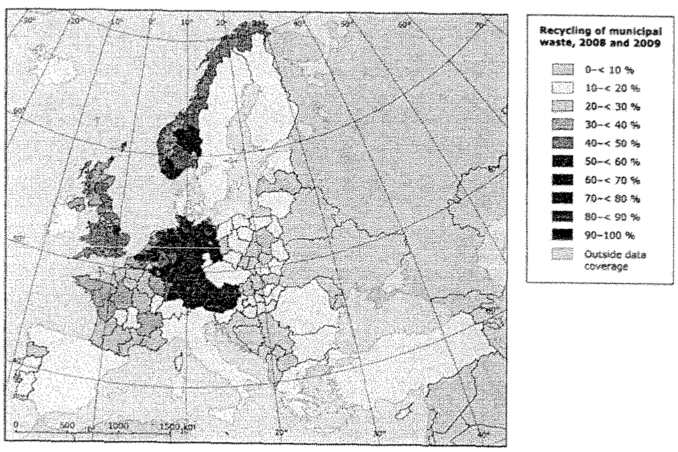
Objective 'translate' Roadmap and 7th EAP aspirational targets into legislation

Method "two phases" (scoping, in-depth assessment), supporting contract, new reference model (EEA)

Scope Review clauses in 3 Directives (Landfill, WFD and Packaging)

Timing Proposal by 2014 – stakeholder consultation in 2013 – IA by begin 2014





Sources: European Environment Agency, based on Eurostat 2010 data

Why new action on EPR?

Experience from the most advanced MS : appropriate combination of economic/legal instruments indispensable

- ✓ Landfill and incineration taxes/bans
- ✓ Incentives/penalties for municipalities
- ✓ Pay as you Throw Schemes

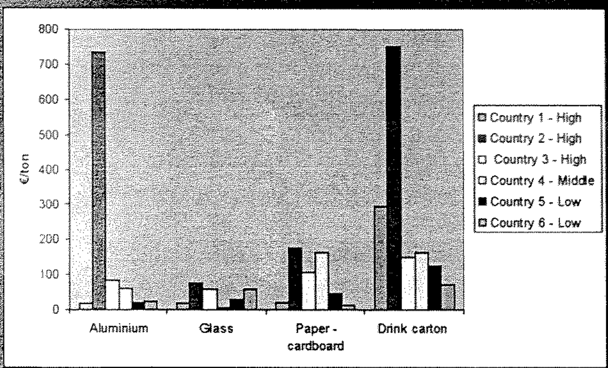
And...

- ✓ Extended Producer Responsibility Schemes

EPR –main lessons

1. EPR schemes have allowed to fund required operations to meet high recycling/recovery targets
2. Large differences between MS in terms of:
   - Scope and objectives
   - Waste streams covered
   - Cost efficiency of the systems
   - Control of the systems and level of free riders
   - Role of municipalities/producers
   - Concentration/multiple players

Producer Responsibility



Participation cost per material in 6 Member States vs recycling performances
Source: IEEP study, April 2011

Additional study on EPR

Objective
- Identify 'golden rules' and/or minimum requirements for sound EPR schemes

Approach
- Comparison of the performances of existing EPR's;
- For 6 waste streams in depth analysis of 6 schemes;
- Identification of the best practices

Timing
- March 2014, seminar on September 18th in Brussels, on-going public consultation

Batteries	ELV	Packaging	WEEE	Graphic Paper	Oils
Austria	Sweden	Germany	Ireland	Finland	Belgium
Switzerland	Netherlands	Belgium	United Kingdom	France	Finland
Belgium	Germany	Netherlands	Finland	Netherlands	Germany
Denmark	Slovak Republic	Austria	Latvia	Sweden	Spain
Netherlands	Austria	Czech Republic	France		Italy
France	Finland	France	Denmark		Portugal
		United Kingdom	Sweden		

11

Key principles

Preliminary approach – study to be finalised by March 2014 !

Improve cost effectiveness/acceptability of EPR schemes by ensuring :

- ➢ A **permanent dialogue** between all involved actors *producers - retailers - citizens – waste collectors – municipalities/private operators – sorters – recyclers*
- ➢ **Transparency**
- ➢ A proper **control**
- ➢ **Fair competition**
- ➢ Application of the **full and true cost**

Implementing the principles

European
- New requirements in the Directive
- Recommendations
- Guidance document

National/Regional
- National specific laws
- Recognition procedure
- Control
- Municipalities
- Additional tools

Local
- Coordination
- Operators
- Information
- Additional tools – Payt schemes, sorting obligations

Implementing the principles

European level *(legislation, recommendations, guidance)*

- Definition of the targets to be met
- Clarify the objectives of EPR
- Minimum requirements to be included into the National Legislations
- Incentives to use EPR schemes (context: *'early warning procedure'*)
- Guidance on best practices

Implementing the principles

National legislation

- Clear definition of the responsibilities *–precise requirements for the involved actors*
- Reliable system of sanctions - *€ per tons*
- Targets - *at minimum EU targets, progressive targets*
- Recognition procedure for collective schemes
- True cost principle *- fees have to be linked to exact costs/recyclability of the products and include the total price*

Implementing the principles

Recognition procedure
- Full coverage of the territory by an high density collection network (adapted to habitat)
- Relations with municipalities
- Audits by third parties, maximum level for overall costs, rules for reserves
- Non-discrimination for producer/importers
- Clear procedures to designate operators (open tenders/standard cost reimbursement)
- Specific rules for specific waste streams/products
- Not profit/profit ???

Implementing the principles

Organizing an efficient control
- Risk based - *combination of public and auto-control*
- Enough public resources
- Clear verified and accessible reporting
- Efficient actions against free riders
- Focus on statistics and quality/reliability
- Export of waste

Supporting measures
- Landfill/Incineration taxes/bans, pay as you thrown systems, incentives/penalties for municipalities

Conclusions – next steps

On-going specific stakeholder consultation (closed on December 2th)

Targets review in 2014

Will include additional initiative to support the use of economic instruments

- *Early warning procedure / ex ante conditions*
- *EPR minimum conditions completed by guidance on best practices*

Thank you for your attention !

Additional sources of information:

DG ENV "waste" website:
http://ec.europa.eu/environment//waste/index.htm

Study on Economic Instruments:
http://ec.europa.eu/environment/waste/use.htm

Additional study on EPR: http://epr.eu-smr.eu/

Target review: http://ec.europa.eu/environment/waste/target_review.htm

[redacted]

奈米廢棄物於污水處理廠及農業用途之風險

Dr Jean-Yves Bottero
Research Director at CNRS
Director of Labex SERENADE

INERIS：
為一公營之產業相關機構，其評估係以實驗方式，採取產業所有的模式及知識。

INERI 與奈米研究有關之部分包括：
長期風險部門；
意外風險部門；
驗證部門；
溝通部門；
科學部門等。

首個有關污水處理廠含有奈米物質之研究證據
美國環保署研究指出某中西部之污水廠污泥，其銀粒子含量達 856(mg/kg)

奈米物質於污水處理的轉變
主要係物理及化學之變化，較廣泛研究的包括：Ag_2S、ZnO、TiO_2、CeO、SiO_2及奈米碳等。

摘要
由於增加表面積的影響以使奈米物質引入一般產品，可能會讓化學物質其於污水處理程序中的轉換程序變慢，如此將使其氧化或還原的力量維持原樣，因而限制其與細菌接觸的能力。

奈米物質於農業應用之風險：
目前對此仍完全沒有知識，而相關研究正在啟動之中。

何種研究需要進行
使用足夠數量的模廠數據，以將相關階段都納入考量，如此才能將資料外延至實廠規模。
以可重覆實驗再生的模式，研究不同產品之殘留物，而這些產品為大量應用者如化粧品、塗料、農產品等。

Predicting risks associated with nanotechnologies via their fate in sewage treatment plants and agricultural applications: overview of current knowledge and research to be developed

Dr Jean-Yves Bottero
Research Director at CNRS
Director of Labex SERENADE
Director of the Groupement de Recherche International I-CEINT (France-USA)

Presentation made by :
Dr Emeric FREJAFON
Head of the INERIS TaskForce on Nanotechnology risk assessment
French National Institute for Industrial and Environmental Risk Assessment

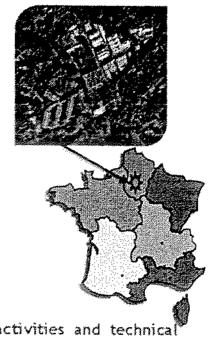
ENVIRONMENT DIRECTORATE
ENVIRONMENT POLICY COMMITEE

Working Party on Resource Productivity and Waste
12-13 November 2013
OECD Conference Paris

INERIS:

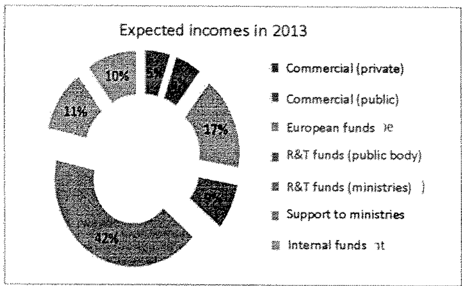
Public Body having industrial activities, delivering an assessment based on the experimental approach, the modeling and the knowledge of the industry

- Long-time experience of the industrial world (> 60 years)
- under the trusteeship of the Ministry in charge of Ecology
- Multidisciplinary teams : chemistry, physics, life science, economy, sociology, medicine...
- An annual budget of 70 M€ :
- A staff of 600, including 350 engineers and researchers
- Full scale tests facilities (animal facilities, mesocosm, physics, chemistry and biology labs, pyrotechnic zone, hazard bench...
- Headquarters extend to 50 ha
- 25 000 m² of laboratories
- More than 1 000 French and international customers/ year
- 50 PhD students & 15 post-doctoral fellowships



A synergy between services for private customers, research activities and technical support for regulators

INERIS activities related to nano



Budget : ~ 3 000 K€ excluding Investments
~ 26 000 working hours (~ 18 equivalent annual full time)
~ 10 PhD students
~ 15 European projects,, 10 public body programs, 30 privates studies

Ambitious investments plan
Nano-safety laboratory, Inhalation exposure system, Nano-Bench, metrology

Main contributors

Chronic Risk division
- Experimental Toxicology
- Predictive Toxicology
- Eco-Toxicology
- Metrology
- Recycling strategy

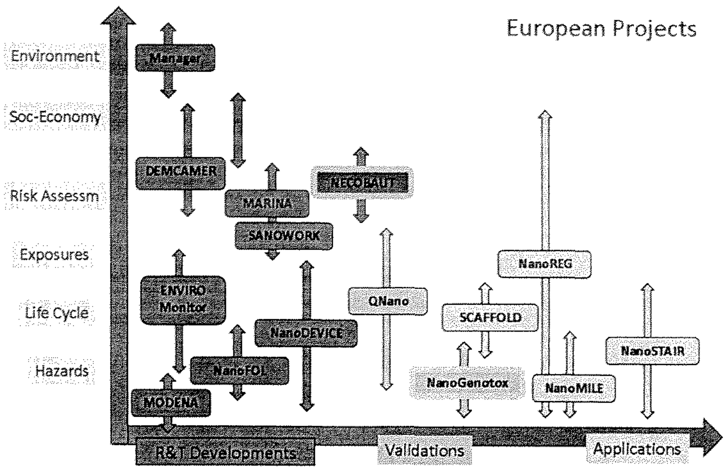
Accidental Risk division
- Physical parameters
- Hazard prediction
- Risk Assessment
- Phenomenology

Certification division
- Trainings
- Voluntary certificats

Communication division
- Links with society

Scientific division
- Sci & Tech survey

European Projects

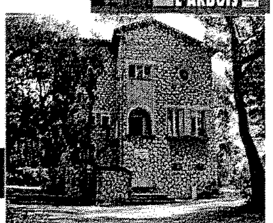


ARDEVIE

- Research & Expertise center
- Waste, Products, 2nd product
- *http://www.ardevie.eu*

Partners:

- Network (associating public, private) :
  - → Waste treatment and valorization, co-products...
  - → Life cycle studies on products and waste
  - Eg. ENM Paintings on building products
- Technical platform +300 m² :
  - sample preparation (physical, chemical)
  - Life cycle study (mechanical & env stre
  - large pilote-scale tools (Up to scale 1)
  - Phys-Chem characterisation tools
  - Access to Nano-Tomography X, Cryo-MET ....
  - Modelisation tools (transport in soil)



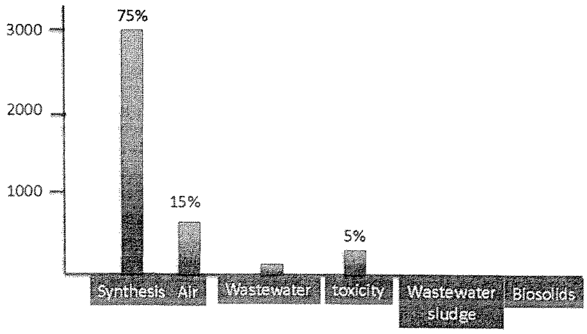
			Agricultural Application
Dry sludge T/year	Municipal sludges	887 755	524 290
	Industrial sludges	950 000	~600 000
Waste production T/year	Municipal sludges	8 10⁶ à 10 10⁶	5 à 6 10⁶
	Industrial sludges	3,5 10⁶ à 4 10⁶	1,9 à 2,3 10⁶

Tableau 1 : Production and Management of WWTP sludges in France during the period 2000-2004 (report from ADEME 2004)

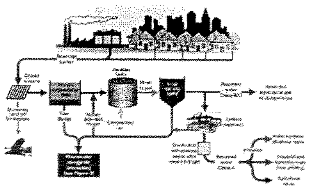
Origin	Nps types	Quantity T	Applications
Metaux et Terres rares	Ag	fort	Antimicrobiens,enduits
	Fe	«	Médecine, emballage de nourriture, traitement eau
	Pt	«	Catalyse
	Sn	?	Peintures
	Al	fort	Revêtement et placage
	Zn	«	Electronique
	Cu	?	
	Se	faible	Compléménts pharmaceutiques
	Ca	faible	«
	Mg	faible	«
Oxides métalliques	TiO_2	fort	Cosmétiques, revêtements, agro-alimentaire
	ZnO	faible	«
	CeO_2	fort	catalyseurs, revêtemnts
	SiO_2	fort	revêtements, peintures, agro-alimentaire
	Al_2O_3	faible	peintures, médicaments
Matériaux carbonés			
	Noir de C	fort	liants
	CNT	moyen-fort	Composites
	Fullerenes	«	Cosmétiques, médecine
Divers			
	Argiles	fort	emballages agro-alimentaires
	Cérmiques	fort	revêtemnts
	QD	faible	LED
	Nps organiques	«	vitamines....

Occurrence of products containing Nano-objects (Satinder K.Bar, Mausam Verma, R.D Tyagi, R .Y Surampalli. Engineered nanoparticles in wasterwater and wastewater sludge. Waste management 30 (2010) 504-520).

Publications associated to interactions with environment (from Satinder, K et al, Waste Management 2010)



First Evidence of the presence of Nms in WWTP and transformation: Case of AgNps

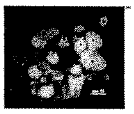


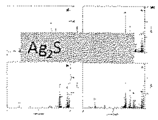
Targeted National Sewage sludge Survey Statistical Analysis Report (Released in Jan 2009)

- 74 plants across the States
- Total metal contents
- Pharmaceuticals, steroids, and hormones

Sludge ID 68349 (from Midwest region) Elemental Analysis

Element	(mg kg^{-1})	Mg	13500
Ag	856	Mn	1070
Al	57300	Na	6080
Ca	98900	P	57200
Cu	1720	Ti	4510
Fe	51000	Zn	1530





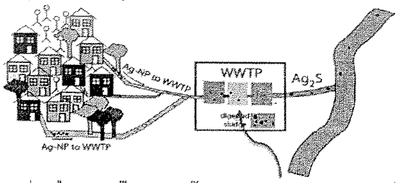
Bojeon Kim et al, Environ. Sci. Technol. 2010, 44, 7509–7514

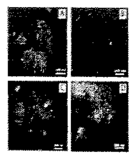
What transformations can nanoparticles undergo in sewage treatment plants and how does this affect reactor operation?

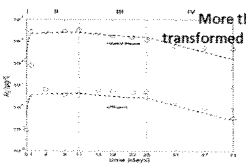
Mainly Physico-chemical transformations of nanomaterials

The most extensively studied nanomaterials include nanoparticles of <u>Ag°</u>, followed by **ZnO, TiO_2, <u>CeO_2</u>, SiO_2** and **carbon nanotubes**

example of Ag° Nps (strong biocid) which is transformed in Ag2S (less toxic)







More than 90% of Ag° is transformed in Ag2S in the aerated reactor

The bright dots are nanoscale Ag-particles

The light gray, (**µm-sized particles**) are indicative of a very light mainly carbon from the biosolids

From R. Kaegi et al, ES and T (2011)

What transformations can nanoparticles undergo in sewage treatment plants and how does this affect reactor operation?

<u>Summary</u>

Chemical transformations in sewage treatment plants, as for example solubilisation by reduction (e.g. CeO_2) or by oxidation (e.g. Ag°), are important parameters to be taken into consideration in material balances in nanometric form. These chemical transformations are accompanied by precipitation in the form of mineral species such as Ag_2S or $CePO_4$ which are thermodynamically stable and seemingly less toxic than the original materials. **Widespread surface functionalisation in order to introduce nanoparticles into common products may slow down these transformations and maintain the initial oxidation or reduction state for longer by limiting contact with bacterial aggregates.** We can say that similar behavior with ZnO will be encountered. TiO_2 is an insoluble mineral and will not be transformed by the biosolids.

Can we predict the retention and transformation of nanomaterials by activated sludge? Use of retention, aggregation and sedimentation models

The association of nanomaterials with the bio-solids of the WWTP sludge is a fundamental process which **combine the sorption of Nms with the bio-solids and the aggregation** of bio-solids.

The « **affinity** » of Nms with biosolids can be expressed with a very simple experiment which allows to measure the quantity γ = of Nms / g of biosolids at different mixing time

$$\gamma = \frac{\dfrac{\text{Mass of Nms associated with biosolids}}{C_B \text{ Mass of bio-solids}}}{\text{Mass of free Nms/m3}}$$

The « **efficiency** » of the aggregation of bio-solids due to the retention of Nms is the parameter α which determine the probability to stick Nms onto biosolids.

Knowing the parameters:

- **B** = Concentration number of Bio-solids
- The values of γ versus time of mixing

The ***evolution*** of α for various nanomaterials Nms can be evaluated as shown by the product $\alpha\gamma B$

NP	dp	Cp	Final Removal	αβB
	(nm)	(mg/L)	%	(-)
GA Ag	25	10	70	2.55E-4
		50	70	3.07E-4
	6	10	70	1.86E-4
		50	65	1.60E-4
PVP Ag	40	10	90	1.16E-3
		50	90	1.15E-3
	8	10	90	9.63E-4
		50	90	1.02E-3
CeO_2 Bare	8	10	90	1.61E-3
		50	98	1.78E-3
Citrate CeO_2	10	10	85	8.55E-4
		50	85	6.87E-4
TiO_2 TINE	20	10	90	1.53E-3
		50	98	1.80E-3
ZnO TINE	30	10	90	1.13E-3
		50	90	1.16E-3

We can see that the product $\alpha\gamma B$ varies of a factor 10 when different Nms are injected in the aerated reactor. The absence of coating seems to increase $\alpha\gamma B$

α is close to 1 when uncoated Nms are injected

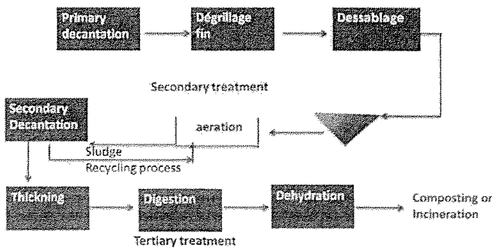
α is lower for coated negative Nms

→ WE CAN.....PREDICT

FROM L Barton et al (b): submitted to ES and T (2013)

Perspectives 1

WWTP: complex process which consists to treat the contamination through **Secondary and Tertiary treatments** allowing to oxidize, digest and absorb the contaminants by the bacteria



Work on the operation of the various treatment stages is still in its early stages and warrants a more systematic approach to the development of bacterial communities in aerobic and anaerobic reactors according to nanomaterials' doses and their surface formulation, insofar as these communities are the source of the above-mentioned reactions. Experiments involving high concentrations are not very credible.

What risks are involved in agricultural applications?

Totally unknown at this day but studies are developed :
Eg. ongoing collaboration between the Labex SERENADE and CEINT in US (DUKE Univ)

What research still needs to be carried out?

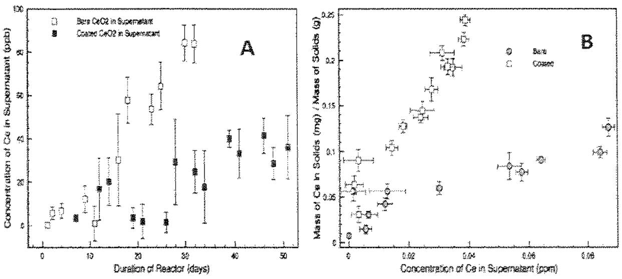
use sufficiently large pilot plants incorporating all the relevant stages so that data can be extrapolated to a full-scale plant

Work with the **residues of various products**, obtained in a reproducible manner (see the European NEPHH programme, for example) but which are widely used: cosmetics, paint, agri-foods, etc. under realistic conditions, which thus enable to monitor the changes in nanomaterials from the point at which they are discharged into water (well diluted) and at the different treatment stages in the plant up to its final use

Assess the impact of agricultural sludge application and **develop a similar test to the RHIZotest**, for example, which assesses the risks of metals being transferred to plants (www2.ademe.fr/servlet/getBin?name...tomcatlocal1327678028882.pdf). These experiments will need to be performed with transformed sludge under conditions close to real-life conditions and not with high concentrations of nanomaterials. The **use of isotope tracing** for nanomaterials would be extremely useful when monitoring the transfer process.

Annexes

2- example of CeO_2 Nps (bare and coated) (genotoxic) which is transformed in Ce(III)-like-oxalate-molecule or/and $CePO_4$



Chronic addition of CeO2 (1.2 ppm after 1 month) (A) Supernatant phase Ce concentration (ppb) over the lifetime of the reactors (~5 weeks). (B) Solid phase concentration of Ce measured in ppb relative to the added concentration

= > 90% of bare and coated CeO2 are associated with bio-solids

SAMPLE	% Ce(IV)	% Ce(III)	R factor	SAMPLE	% Ce(IV)	% Ce(III)	R factor
1 hour solid spike Bare CeO_2	76	25	0.000254				
8 hour solid spike Bare CeO_2	70	30	0.000278	8 hour solid spike Coated CeO_2	84	13	0.000473
1 day solid spike Bare CeO_2	71	31	0.000299	1 day solid spike Coated CeO_2	85	12	0.000524
1 hour liquid spike Bare CeO_2	100	< 10					
8 hour liquid spike Bare CeO_2	100	< 10		8 hour liquid spike Coated CeO_2	100	< 10	
1 day liquid spike Bare CeO_2	100	< 10		1 day liquid spike Coated CeO_2	100	< 10	

In the aerated reactor , the transformation CeO_2 (oxidation state = 4) to $CePO_4$ (oxidation state = 3) of initial bare and coated CeO_2 after 1 day of contact with sludge is:

- ~30% for bare CeO_2
- < 10% for coated CeO_2

From L Barton et al, ES and T (2013) submitted

4 奈米物質製造的相關安全活動(OECD)

理事會推薦奈米物之研究

2013.9.20 經 OECD 理事會核定，建議

法制架構極為重要；

會員國於測試時，採取 OECD 的測試原則，並考量奈米物質的特性；

相互資料的接受；

相關資料並開放予非會員國。

OECD 奈米資料庫內容

計畫名稱、開始及結束日期

計畫狀態

國家或機構

預算資訊

計畫摘要、網址、相關連結

調查者資訊

依物質名稱、與安全相關性、研究主題、測試方法久分類

大致的成果

資料品管

資料上傳資料庫時，其係由資料提供者直接上傳

上傳資料並須經指定之聯絡窗口人員做核對

輪胎業於奈米科技的永續發展

此一計畫為 WPN 及 WPMN 聯合推動

並由 WBCSD 的 BIAC 計畫支持

首份報告草稿參考如 DSTI/STP/NANO(2013)5

計畫結構

WPN:	a.科技狀態
	b.社會衝擊
WPMN:	c.生命週期評估計算正負向之環境衝擊
	d.環境、健康及安全之風險及最佳技術
	e.知識及最佳的操作移轉。

計畫時間表

最終草稿於 12 月初提送供工作分組提供意見。

其並列入 WPMN 12 月議程

預期經 CSTP 及化學委員會確認後，於 2014 年 3 月公布。

ACTIVITIES FOR THE SAFETY OF MANUFACTURED NANOMATERIALS

OECD
BETTER POLICIES FOR BETTER LIVES

Contents

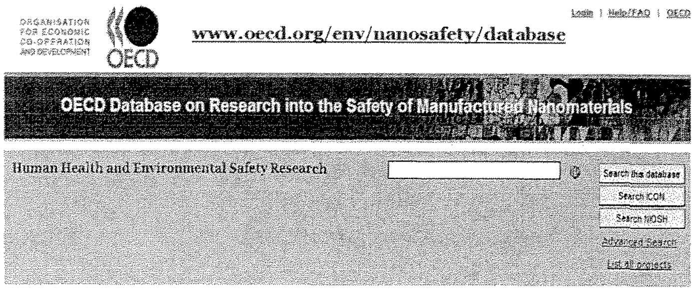
- **Council Recommendation of Manufactured nanomaterials**
- **OECD database on Manufactured nanomaterials**
- **Joint Tyres Project of WPMN and WPN of STI**

Council Recommendation of NMs

Endorsed by the OECD Council on 20th September 2013, recommends that:

- Regulatory Frameworks are valid (might need to be adapted)
- Members, in the testing of manufactured nanomaterials, apply the OECD Test Guidelines, adapted as appropriate to take into account the specific properties of manufactured nanomaterials; and
- The Mutual Acceptance of Data (MAD);
- It is open to non-members.

http://acts.oecd.org/Instruments/ShowInstrumentView.aspx?InstrumentID=298&InstrumentPID=314&Lang=en&Book=False



- Status
  - Database was publicly launched (April 2009);
  - And includes more than 800 records of research projects (Nov 2013)

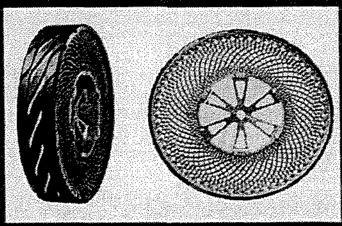
Contents of the DB

- Project Title; Start date; End date;
- Project Status (Current; planned; or completed);
- Country or organisation;
- Funding information (where available, on approximate total funding; approximate annual funding; and funding source);
- Project Summary; Project URL; Related web links;
- Investigator information: name, research affiliation, contact details;
- Categorisation by material name, relevance to the safety, research themes, test methods;
- Overall outcomes and outputs.

Securing a Data Quality

- Data to the database is provided by Data Provider (DP) or Designated Contact Points (DCPs).
  - The secretariat registers the DP and the DCPs.
- The data provided by the DP will be checked by the DCPs.
  - DCPs are responsible for a quality of all data in their countries/ organisations/ bodies.

NANOTECHNOLOGY FOR SUSTAINABLE DEVELOPMENT OF TYRES

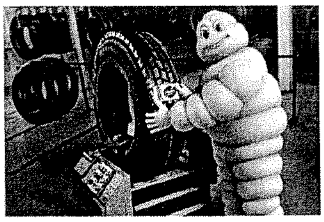


OECD

Nanotechnology for Sustainable Development of Tyres

- Joint project of the WPN and WPMN of the Environment Directorate
- Supported by BIAC through the Tyre Industry Project of the WBCSD
- First draft report available at DSTI/STP/NANO(2013)5

Project Aim: Looking at the Future of Manufacturing with the Use of Nanotechnology in one of the Biggest Market for Nanomaterials : Tyres Production



Nanotechnology for Sustainable Development of Tyres: Project Structure

Case study work areas:

WPN:
- a. Status of Technology
- b. Societal Impacts

WPMN:
- c. Positive and negative environmental impacts in the context of life cycle assessment
- d. Environmental health and safety risks and best practices
- e. Knowledge and best practice transfer

Project Timetable

- Final draft report to the Working Parties for comments in early December;
- Final draft report to be discussed at the WPMN meeting in December:
- Final draft report is expected to be sent for declassification by the CSTP and the Chemicals Committee in early March 2014.

4 含奈米物質製造的焚化

含奈米物質的廢棄物主要來源

家戶廢棄物(包括製造含奈米物質產品的廢料)

下水道污泥

奈米物質進入廢棄物處理系統的數量

Musee 等假設 95%含奈米級物質的化妝品，最後均進入廢物流中。

Kuhlbusch 及 Nickel 指當清洗含奈米物的衣料時，證實會釋出奈米銀。

Burkhardt 指 93-96%的奈米銀存在於下水道污泥及其合併物質

Roes et.al.計算都市垃圾焚化爐尾氣的奈米物質含量，其假設都市垃圾塑膠含量為 12%，其中 7%為含奈米物質者。

奈米物其在焚化廠之宿命及行為

Eth Zurich 研究，人為添加奈米物後，其分布於底碴(53-81%)、飛灰(19-45%)、水淬(0.02-1.7%)及尾氣(<0.0004%)

靜電集塵與濕式氣體清淨系統合併，可有效去除奈米級的氧化物。

Roes et.al 指出，如粒子超過 100 nm，其尾氣的去除效率極高。但對料子小於 100 nm 者，如以袋式集塵或濕式旋風集塵器處理可去除大部分，但仍有約 20%以上會通過這些處理設備。

歐盟委員會宣布，露天焚化含 CNT 的布料，可能釋放奈米物質。

一般均假設要在 850℃以上焚化者，才能去除 CNT。

摘要

含奈米物之產品將增加，故含奈米物之廢棄物也勢將增加。

有關奈米物其納入產品所產生的影響，相關資訊極為缺乏。

對於奈米物質經由焚化所產生的變化，其資訊極為欠缺。可既有的資料，有些甚至互相衝突。

為了避免奈米物焚化所產生對環境及健康的衝擊，所有廢棄物焚化廠均應設有尾氣處理設備(如歐盟 BREF 所述者)。

Umwelt Bundes Amt
Für Mensch und Umwelt

INCINERATION OF WASTE CONTAINING NANOMATERIALS

4th WPRPW Meeting OECD Conference Centre, Paris
12.-14. November 2013

Aim of the document

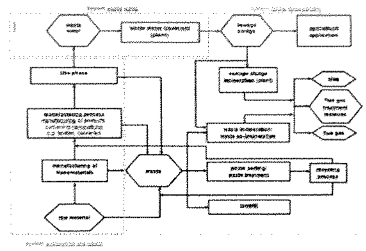
- Providing an overview of the first scientific findings on the behaviour and exposure of engineered nanomaterials (NM) during the waste incineration process and
- Indentify the current lack of knowledge regarding specific aspects of the disposal of waste containing nanomaterials.

The document include:

- a brief summary of the scientific information available on the behaviour of NM during the waste incineration process;
- an overview of the NM of highest relevance in municipal solid waste incinerators (MSWI) and some reasons why;
- a short description of the best available techniques (BAT) of waste incineration and the features meant to retain or destroy hazardous substances;
- a short discussion of the existing hypotheses and suspected ways that NM may pass through existing pollution control devices.

What are the main sources of waste containing nanomaterials?

- municipal solid waste (including some residues from manufacturing of NM containing products).
- Sewage sludge



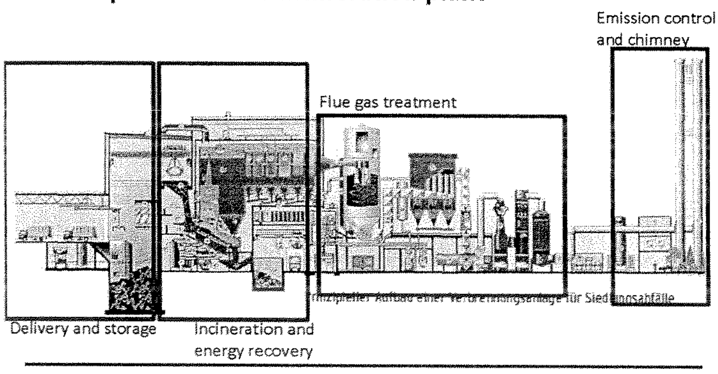
Amount of NM entering waste treatment system

- *Musee* assumened 95 % of all nanoscale materials contained in cosmetics end up in the wastewater stream.
- *Kuhlbusch* and *Nickel* mentioned that the release of nanosilver when washing clothes and textiles containing NM is verified.
- *Burkhardt* shows that 93 to 96 % of nanosilver is bound in sewage sludge and coalescence.

Amount of NM entering waste treatment system

- *Roes et. al.* calculated the amounts of NM released in MSWI off-gas treatment for 1 tonne of municipal waste, assuming that the content of NM in nanocomposites is between 1 wt-% and 10 wt-%. The assumed average content of plastics in municipal solid waste is 12 per cent, of which 7 per cent is nanocomposites.

Principle of a waste incineration plant



What is best avaiable technique (BAT) for waste incineration

- complex issue, because of the wide variety of plant constructions, and local and climate circumstances etc.
- the European Commission has established an information exchange to describe the BAT for various industrial sectors, including waste incineration.
- The result of this information exchange is the so-called BREF document (best available technique reference document).

opportunities for the (re-)formation or destruction of NM during incineration:

- NM are destroyed due to combustion (for example CNT to CO_2).
- NM are not destroyed or incinerated but captured by the flue gas treatment system (for example metal oxides). These NM can be detected afterwards in the fly ash or other residues.
- Certain types of NM may not get destroyed during combustion. However, the combustion products react with the other substances and form new particles.
- Bigger particles decompose and turn into new, smaller particles or even NM. *Roes et. al.* describes how NM can be destroyed, converted into other NM or left unchanged during incineration.

Fate and behaviour of NM in waste incineration plants

- In a ETH Zürich study: artificially introduced NM were found in slag (53-81%), in fly ash (19-45%), quench water (0,02-1,7%) and in clean gas (<0,0004%)
- One main conclusion of this study is that electrostatic precipitators, in combination with a wet flue gas purification system, can effectively remove nanosized oxides from the flue gas stream and thus no related nano-CeO_2 will be emitted from such waste incineration plants

Fate and behaviour of NM in waste incineration plants

- *Roes et. al.* found that, if the particles are larger than 100 nm, the removal efficiency from flue gas is very high. NM, smaller than 100 nm, are partially removed by fabric filters and wet scrubbers, but a significant amount (up to 20 per cent) can pass through such devices. The NM captured by the scrubbing system end up in the residues (bottom ash and fly ash).
- However, it should be mentioned that the efficiency depends on the filter technique as well as on the filter material and can vary from plant to plant.

Fate and behaviour of NM in waste incineration plants

- The *European Commission* declared that the open burning of textiles containing CNTs could emit such NM.
- It is assumed that only incineration above 850°C can eliminate CNTs. Therefore, incineration in modern and well-operating waste incineration plants is necessary, where such high temperatures can be reached

Summary and outlook

- The number of products containing NM will increase in the future. As a result, the amount of waste containing NM will also increase.
- Information is scarce about the influence of the NM embedded in products. As little is known at this time about the quantities of NM in waste, the availability of information on NM-containing products on the market is crucial

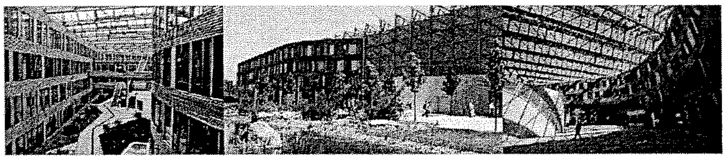
Summary and outlook

- Little knowledge is available about the influence and behaviour of NM size throughout the waste incineration process. The available literature and the findings on incineration of waste containing NM are mostly contradictory.
- To learn more about this issue and to improve the availability of data, a more detailed survey of NM in various waste incineration plants and co-incineration plants would be necessary. Such a study should include determining the conditions that would enable the efficient removal of NM from MSWI flue gas.

Summary and outlook

- To avoid adverse impacts on the environment and the human health , all waste incineration plants should be equipped with a flue gas treatment system (as described in the BREF document).
- It can be assumed that, if a plant is equipped with a BAT flue gas treatment system, the majority of engineered NM will be captured by the treatment system.

Thank you for your attention!



contact:
Benjamin.Wiechmann@uba.de

4 廢棄物含奈米物的回收

在都市垃圾中常見的人工奈米物質

- 碳奈米管
- 富勒烯
- 奈米銀
- 碳黑
- 奈米二氧化鈦
- 奈米二氧化矽
- 奈米氧化鋅
- 奈米氧化鐵
- 奈米氧化鈰
- 奈米磷酸鹽
- 奈米銅粒子

回收含奈米物質之廢棄物的挑戰

- 奈米科技及奈米應用的快速發展
- 含奈米物質產品的快速增加
- 產品中含奈米物質之多樣性
- 回收程序的多樣性
- 回收含奈米物之廢棄物其可能的暴露風險
- 無標準的回收作業所生的風險

回收作業的知識差距及問題

- 產品及廢棄物中的奈米物種類及數量，及其相應的曝露風險
- 在回收過程中，奈米物的變化
- 在回收時，是否有已知的排放控制或人體保護的技術
- 奈米物質的鑑定及量測
- 含奈米物質的交互污染效應
- 從廢棄物流中回收奈米物質的可能性

既有法規及指引

- 法規：歐盟的 REACH 及各國有關職業安全之規定
- 相關指引：不同國家、產業組織，主要針對製造及加工過程，對健康、安全及環境等做指引。
- 非奈米有關之 BAT/BET

結論

遵行環境效善管理(ESM)的一般原則
當在回收程序中做暴露控制時，應採取個案處理的原則。
在回收程序中，將非標準的程序，改變為 BAT/BET 之標準
更多研究已填補現得知識之欠缺

OECD Working Party on Resource Productivity and Waste

Recycling of Waste Containing Nanomaterials (WCNM)

Draft Reflection Paper

Paris, 12 Nov 2013

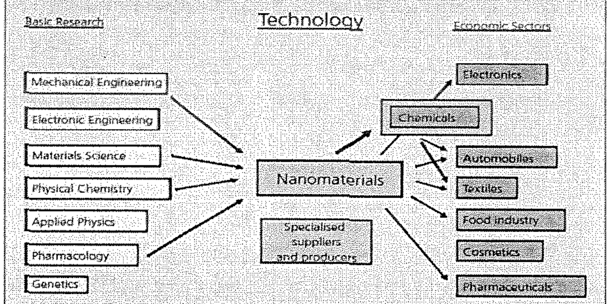
Mathias Tellenbach

Importance of Recycling in Waste Management

- Recycling is a priority path for environmentally sound waste management ESM
- Proportion of MSW recycled in OECD countries: mean value c. 1/3 of MSW , max. up to 2/3 per country
- Positive impact on resource productivity (secondary raw material for the industry, energy and resources saving)
- Recycling of many different waste streams:
  Bio waste / Food Waste /Glass (bottles) /Metal / Paper and cardboard / Plastic (PET and various other plastics) / Leather and Textiles / Waste of Electronic and Electrical Equipment WEEE / Batteries / Wood / Construction and Demolition Wastes / End of Life Vehicles ELV / Tires / Recycling of residues from waste incineration plants

Products containing Engineered Nanomaterials

FIGURE 2-VI
Schematic representation of the diversity of scientific disciplines and economic sectors of the nanomaterials innovation system[37]



Source: Novel Materials in the Environment: The case of nanotechnology, UK Commission on Environmental Pollution 2008

Engineered Nanomaterials in Municipal and Industrial Waste

- Carbon Nanotubes CNT
- Fullerene
- nano-Silver (nAg)
- Carbon Black (CB)
- nano Titanium dioxide ($nTiO_2$)
- nano Silicium dioxide (amorphous and crystalline ($nSiO_2$)
- nano Zinc oxide (nZnO)
- nano Titanium nitride (nTiN)
- nano Iron oxides (n FeO/Fe_2O_3)
- Nano Ceriumoxide ($nCeO_2$)
- Nano Phosphate ®
- Nano Copper particles (nCu)

Different recycling procedures for recycled waste streams

Examples:

- Metal waste (Scrap): Shredding, smelting
- Waste paper: Milling, pulping, de-inking
- WEEE: Dismantling, shredding, sieving, magnetic separation
- Batteries: Mechanical (shredding, crushing); thermal (pyrolysis, smelting); wet-chemical (dissolution of electrolyte, neutralization, filtration)

Challenges when dealing with recycling of Waste containing nanomaterials

- Fast development of Nanotechnologies and Nano-Applications
- Growing number of products with ENMs
- Diversity of ENMs in products
- Diversity of recycling procedures
- Possible exposure to free nanoobjects when recycling waste containing nanomaterials
- Possible risks associated with exposure
- Bad risk management with non-standard waste treatment

Risk potential depends on many variables

Type of ENM?

Exposure of man or the environment to free nanoobjects (ultrafine dust, aerosols, liquid suspensions with ENM)

Nanospecific chemical and biological properties of ENMs?

Method of treatment and potential of ' induced' release of single nanoobjects?

Speciation: single nanoobjects or agglomerates?

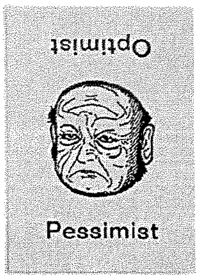
Are nanoobjects loosely or tightly connected to their matrix material?

Knowledge gaps and open questions

- Types and quantities of nanomaterials in products and waste, and associated exposure potentials
- What happens to the nanomaterials in products during the recycling process ?
- Are known technologies suitable for emission control and for protection of humans and the environment when recycling WCNM?
- Measurement and identification of ENM in products and waste streams
- Effects of cross-contamination of recycled materials with nanomaterials from WCNM
- Possibility of recovery of nanomaterials from a waste stream

How to reduce potential risks?

The pessimist's view: before we can take action, we must close the knowledge gaps



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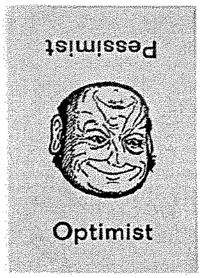
How to reduce potential risks?

The optimist's view: let's use existing rules and guidance for necessary action now; in the longer term let's close the knowledge gaps to take better action.



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Existing Regulations and Guidance

- Regulations: e.g. REACH for chemicals in the EU, various regulations on work place safety in many countries
- Nanospecific Guidelines: from various countries and industrial organizations, focused on protection of health, safety and environment during production and processing operations; may give guidance also for the recycling industry
- Non-nanospecific guidance for BAT/BEP (e.g. by OECD or EU): Emission and release control for thermal, mechanical and wet processes

- We can suppose that the application of known techniques for workers and environment protection would also in a general way decrease the risk, when there are nanomaterials in the waste stream
- By applying appropriate BAT procedures for waste treatment, emissions in general will be lowered, and it can be expected that possible exposure to ENM will also be lowered.

Conclusion

- Apply the general Principles for Environmentally Sound Management (ESM) of Waste
- Use a Case-by-Case Approach when implementing measures for exposure control in recycling processes
- Change from non-standard recycling procedures to BAT/BEP principles in recycling

and:

- Support further work for closing the essential knowledge gaps

Thank you for your attention!

Mathias Tellenbach
Consultant, Terra Consult Berne

Comments, contributions or questions:

mtellenbach@bluewin.ch

比利時法蘭德省二手輪胎之 EPR

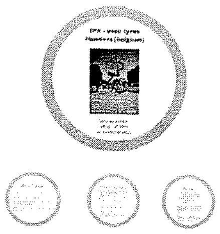
1. 法蘭德省之延長生產者責任(Extended Producer Responsibility, EPR)
   - 自 1994 年將驗收責任做為廢棄物政策工具
   - 擴大生產者責任
   - 更多廢棄物以無害環境的方式單獨收集與處理
   - 從廢棄物管理轉向永續物質管理
2. 二手輪胎之 EPR
   - 該行業整體的環境協議
   - 透明的制度：繪製二手輪胎市場地圖
   - 角色：
     - 廢棄物管理責任組織
     - 消費者
     - 仲介及販售者
     - 回收業者
     - 市政當局
3. 成果

   二手輪胎之 EPR 成功執行
   - 88%廢輪胎被收集
   - 85%材質被再利用
   - 15%能源再利用
   - 零掩埋

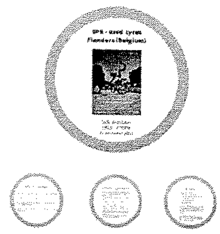
   回收多發生在國外
   - 因二手輪胎的品質、數量、可利用性，比利時需求量大增

   由於二手輪胎的完善管理，故成立了一個輪胎及其材質回收市場

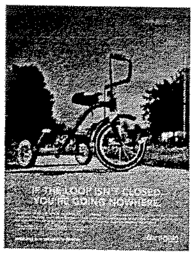
Together we make tomorrow more beautiful



Together we make tomorrow more beautiful



EPR - used tyres
Flanders (Belgium)



Sofie Bouteligier
OECD - WPRPW
13 november 2013

EPR in Flanders

- Acceptance Duty as waste policy instrument since 1994
- Producers have greater responsibility
- More waste is collected separately & processed in an environmentally sound way
- Shift from waste management to sustainable materials management

EPR for used tyres

- Environmental agreement for the sector as a whole: Replaced tyres (1999) and tyres from original equipment (2009)
- Transparent system: used tyres market is mapped
- Actors
  - Recytyre: responsible waste management organization
  - Consumers: pay fee per tyre
  - Intermediaries and vendors: charge fee; collect and store; organize transport; awareness raising
  - Collectors of tyres
  - Municipalities: agreement with Recytyre for free collection
  - OVAM: evaluating, controlling, reporting to government and parliament

Results

EPR for used tyres is successful
- 88% of all waste tyres is collected
- 85% material recovery (mostly use of granulated rubber)
- 15% energy recovery
- No landfilling

Recycling mostly takes place abroad
– High demand for Belgian used tyres due to their quality, availability and quantity

Due to well-managed flow of used tyres, there is a market for recycling tyres and tyre materials

永續利用營建廢棄物

計畫

第一階段(目前計畫)

研究技術及科學本質，以確認營建物質及其於生命週期階段的環境衝擊。

第二階段

以分析及政策有關的方向，基於第一階段的研究成果，研擬指引以改善現有的法制架構，能對建築業者提供誘因以促其永續使用營建物質。

第一階段工作

工作 1:確認研究之營建物質範圍

工作 2:評估營建物質生命週期之環境衝擊

工作 3:選擇營建物質的決定因子

工作 4:基本的政策經驗

計畫焦點:建築

低樓層住宅

高樓層住宅

辦公室

實驗室/檢測室

產業

零售

交通

其他

營建物質流

全世界每年生產 250 億 Mg 水泥砂漿及 37 億 Mg 水泥。

2010 年全美共使用的物質量達 25.7 億 Mg，其中有 73%為營建物質。

全美能源消耗中的 54%直接或間接與建築物或其興建有關。

25%的原始木材消耗與建築有關

既有設計方法

建築設計的決定主要考量安全、功能性及成本等

環境問題通常僅定性地及簡單地予以考量

整體研究發現

營建階段之環境效應約佔整個產品生命週期的 1-11%

一般而言，在營建階段，鋼骨建築的環境衝擊遠低於混凝土建築。但在製做階

段其衝擊則較高。

但整體而言，鋼骨建築其生命週期效應與混凝土建築類似。

選用建材可能基於本地建材的排放因子。

營建物質的文獻研究-確認限度-

僅有加拿大、芬蘭、法國、紐西蘭、瑞典及美國等國的 10 個研究

沒有研究比較差過 5 項以上的物質

多數研究比較木材、鋼鐵及混凝土

多數缺乏物質的規格

生命週期的選項不清楚

缺乏不確定性的評估

少有經濟比較

營建物質的文獻研究-效益及機會-

利益及教育的比較指出應完成整體的評估

目前以生命週期評估的方法做整體的分析其技術已可行

研究也指出環境資料的來源

在所有的比較中，就能源消耗及溫室氣體排放而言，木材都是最佳的選擇

營建物質的資料來源

一般的生命週期分析軟體

特殊的資料及工具

- 歐盟: European reference Life-Cycle Database (ELCD)
- 美國. Life Cycle Inventory Database
- BEES (U.S. National Institute for Standards and Technology
- ATHENA Impact Estimator for Buildings
- Carbon Calculator from WoodWorks
- The U.S. National Ready Mix Concrete Association:

環境產品宣告(EPD)

影響營建物質環境效應的主要因子

物質的隱含能耗

能量輸入的矩陣

能源排放強度

地點

交通

營建流程

使用年限

廢棄後之使用方法及管理

工作 2 之成果摘要

生命週期分析經長期發展，已能提供決策者綜合性的評估依據

文獻研究可對如何進行生命週期評估提供教育指引，但其對日常決策則無幫助

資料來源，特別是 EPDs 及物質別的生命週期研究，在某些國家中正快速增加中，故可做為設計的參考。

生命週期評估應做為設計者及相關利害關係人的參考依據，而非僅限於學者。

低隱含能耗、全生命週期的低耗能、低能量使用之排放、有效率的營建程序、告知使用年限的設計、廢棄後之使用方法及管理、預防非碳污染對人體的曝露等，是永續使用營建物質的關鍵因素。

未來工作

工作 3:決定選用營建物質的因子摘要

工作 4:說明從中學到的政策經驗

Sustainable Use of Construction Materials

Arpad Horvath
Berkeley, California

November 12, 2013

Outline of Presentation

- The two main phases of the project "Sustainable Use of Construction Materials"
- The four tasks of Phase 1, the current project
- Task 1 approach and decision
- Life-cycle Assessment (LCA) as the framework of the current study
- Characteristics of buildings of importance to environmental assessment
- Task 2: Literature survey and synthesis
- Data sources
- Key factors contributing to the life-cycle environmental effects of construction materials
- Next steps: Task 3 and Task 4

"Sustainable Use of Construction Materials" Project

- Phase 1, the current project:
  - » is a scoping study of technical and scientific nature that aims to identify construction materials and their environmental impacts that are generated throughout their life cycles.
- Phase 2:
  - » will be analytical and policy-related, and build upon the findings of Phase 1 to draw up guidance to improve existing policy frameworks and deliver incentives to the stakeholders of the building sector to use construction materials sustainably.

Phase 1 Tasks

- Task 1. Identification of construction materials for the study
- Task 2. Assessment of environmental impacts of construction material life cycles
- Task 3. Factors determining the choice of construction materials
- Task 4. Preliminary policy lessons

Sustainability Concerns Associated with Construction Materials

- Scale is significant on all levels
- Number of construction material types is large; number of specific materials is very large
- Social
  - Growth in primarily urban (and also "middle class") population
  - Longer life span, but aging population
- Resource inputs
  - Enormous stock of materials, and large flows of materials
  - Use of nonrenewable instead of renewable materials
  - Depletion of resources
  - Energy input
- Emissions, wastes, and other impacts
  - Overwhelmed waste management systems
  - Insufficient reuse and recycling
  - Land use
- Economics
  - Inefficiencies

Task 1: Identification of Construction Materials to Study

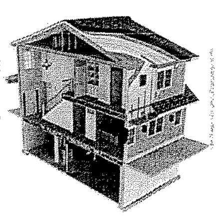
- Focus on construction materials that
  - » are used widely
  - » are used in large quantities
  - » are considered to have significant associated environmental impacts
  - » have the greatest potential in terms of energy and resource efficiency and environmental improvements
  - » are likely to have significant amount of environmental data available

Focus of Project: Buildings

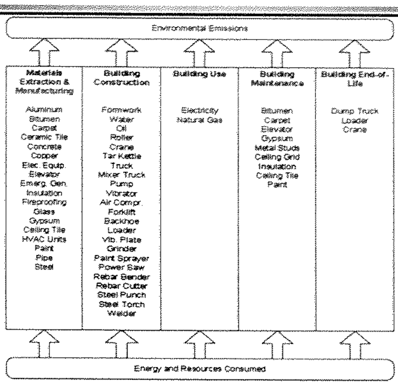
- Low-rise residential
- High-rise residential
- Office
- Laboratory/testing
- Industrial
- Retail
- Transportation
- Other service: government, entertainment, ...
- Many combinations of above types exist!

Characteristics of Buildings for Environmental Assessment Purposes

- Buildings are complicated products
- The number of construction material types is large, the number of specific materials is very large
- People spend the majority of their lives indoors
- Understanding the environmental impacts associated with buildings is critical to global and local environmental and human health
- Buildings tend to be designed to be unique
- Manufacturing is "local" and in low series
- Decision making about buildings is complex



Commercial Building LCA Components



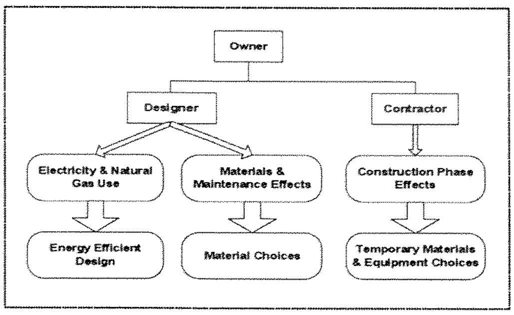
Guggemos, A. and Horvath, A. (2005), "Comparison of Environmental Effects of Steel- and Concrete-Framed Buildings." *J. of Infrastructure Systems*, ASCE, 11(2), 93-101

Construction Material Flows

- 25 billion Mg of concrete and 3.7 billion Mg of cement manufactured annually worldwide
  - Cement industry responsible for 10% of global annual man-made CO_2 emissions
- A total of 2.57 billion Mg of different materials used in the U.S. in 2010
  - 73% by weight were construction materials, mostly stone, sand and gravel
- 54% of U.S. energy consumption is directly or indirectly related to buildings and their construction
- In the U.S., buildings account for
  - 65% of electricity consumption
  - 30% of GHG emissions
  - 30% of raw material use
  - 30% of waste output
  - 12% of potable water consumption
- 25% of virgin wood demand by construction (World Watch Institute, 1995)
- **Apparent flows are substantial**
- **Non-apparent flows are even larger**

Who has Influence on Building Design?

Codes, laws, regulations, etc.



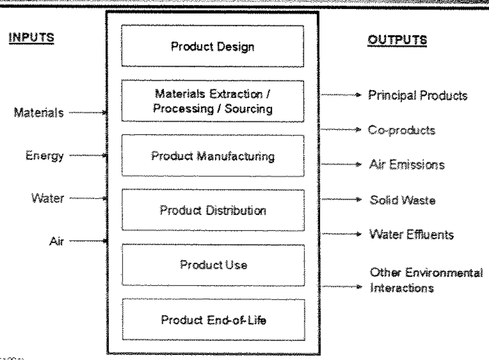
Current Design Method

- Building design decisions are mainly based on:
- Safety
- Functionality
- Cost
- Environmental issues are often only addressed *qualitatively* or *simplistically* (e.g., using recycled-content flooring or lead-free paint)

Task 1 Options

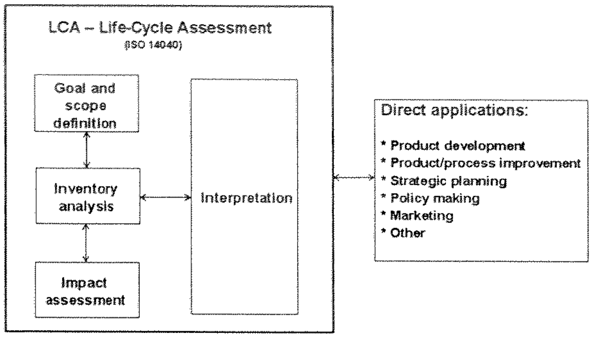
- Set 1. Materials for high-rise commercial buildings
  - steel and steel-reinforced concrete
- **Set 2. Materials for low-rise residential or commercial buildings**
  - **steel, steel-reinforced concrete, wood (dimensional lumber, engineered lumber), clay brick, concrete masonry unit (CMU)**
- Set 3. Materials for interior partition walls
  - clay brick, concrete masonry unit, wood, light-gauge steel, gypsum board
- Set 4. Materials for commercial building envelopes

LCA Framework



Source: Adapted from SETAC (1991)

LCA Methodology - ISO 14040



Steps of LCA - ISO 14040

1) Goal of the LCA study – ISO 14041
- intended applications
- reasons for carrying out the study
- intended audience

2) Scope of the study – ISO 14041
- function of the system
- functional unit
- description of the system
- system boundaries
- allocation procedures
- impact categories and the impact model
- requirements for data
- data assumptions
- limitations
- data quality requirements
- peer review
- type of reporting

3) Life Cycle Inventory (LCI) – ISO 14041
- data collection
- description of the inventory

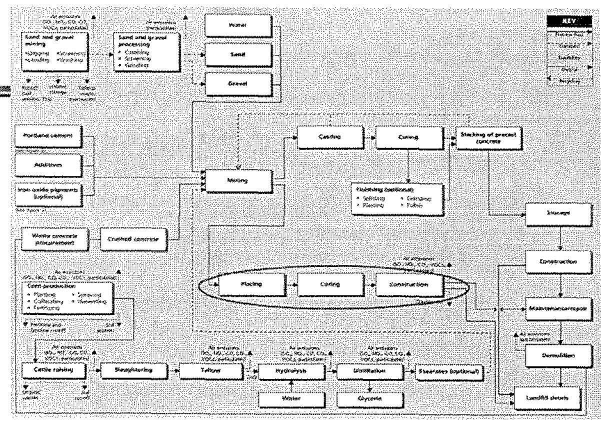
4) Life Cycle Impact Assessment (LCIA) – ISO 14042
- classification
- characterization
- normalization

5) Interpretation – ISO 14043
- evaluation and discussion

6) Report
- disclosed to the public?

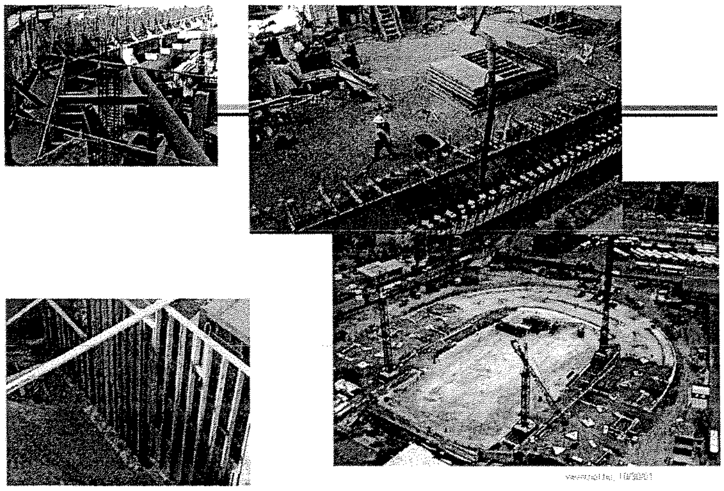
Sustainability Metrics of Interest

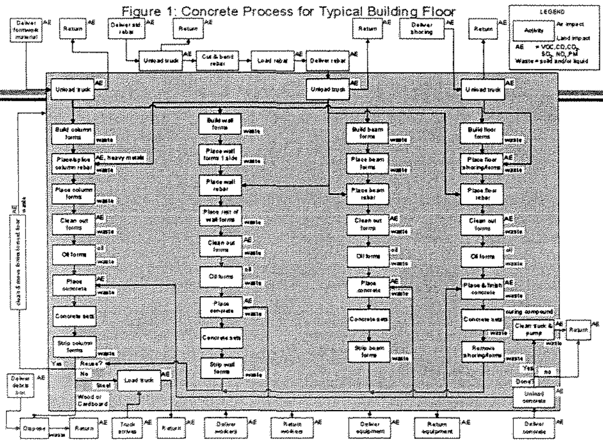
- Environmental
  - Inventory (direct and indirect/supply chain) assessment
    - Total primary energy use
    - Carbon dioxide equivalent emissions/uptake
    - Ozone depleting substance emissions
    - Criteria air pollutant emissions
    - Toxic substance emissions
    - Water consumption and degradation
    - Hazardous and non-hazardous waste generation
  - Impact assessment
    - Global warming potential
    - Ozone depletion potential
    - Acidification potential
    - Eutrophication potential
    - Photochemical ozone (smog) creation potential
    - Human health effects (intake fractions and DALYs)
    - Eco-toxicity
    - Material and energy resource depletion potential
    - Land use
    - Water resource depletion
- Economic
- Social



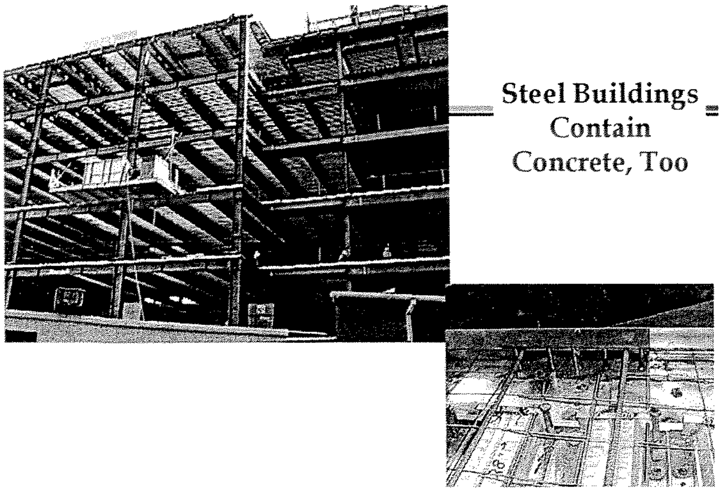
Life-cycle Summary of Concrete

Source: American Institute of Architects (1999). *Environmental Resource Guide*. John Wiley & Sons, New York, NY.



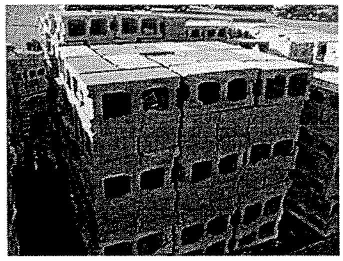


Source: Guggemos, A. A. (2003). "Environmental Impacts of On-site Construction Processes: Focus on Structural Frames." Unpublished Ph.D. Dissertation, Department of Civil and Environmental Engineering, University of California, Berkeley.

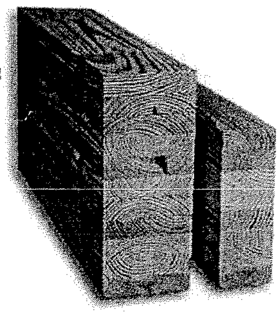


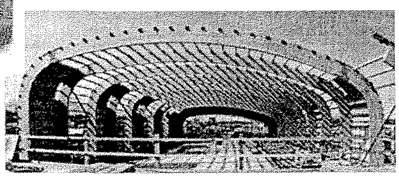
Steel Buildings Contain Concrete, Too

Clay Brick and Concrete Masonry Unit

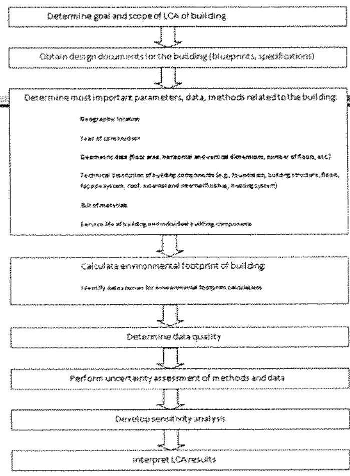


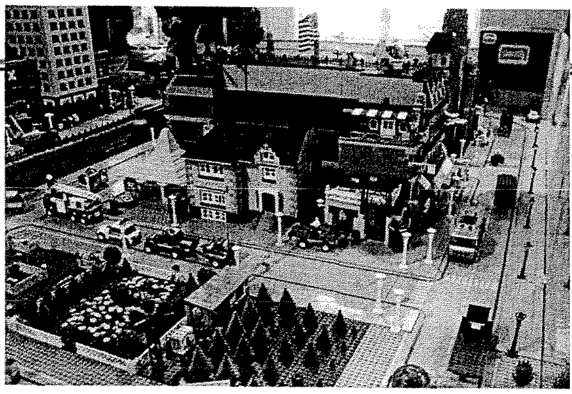
www.wikipedia.org

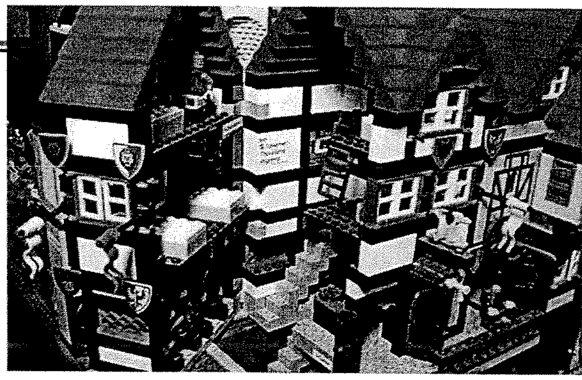


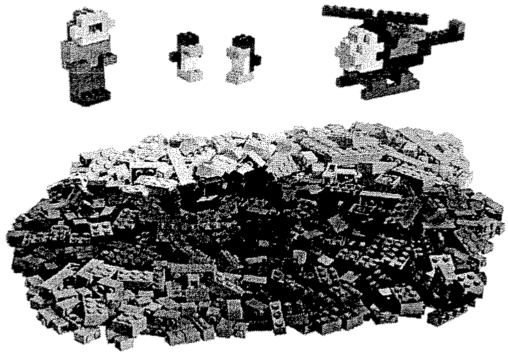


Steps of LCA of Buildings







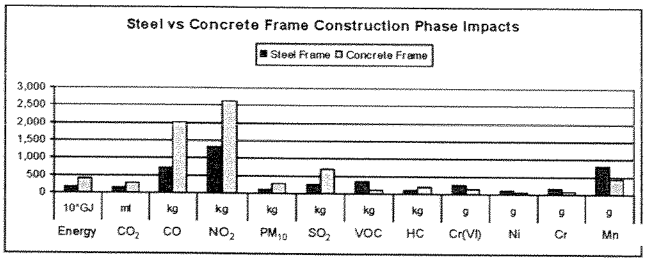


Case Study: Steel- vs. Concrete-Framed Buildings

- 4,400 m² (47,360 ft²), five-story building
- Located in Minnesota
- 50-year use phase
- Aluminum-framed, glass panel curtain wall
- Built-up roofing
- Interior finishes: painted partition walls, acoustical drop ceilings, and carpet or ceramic tile flooring
- Mechanical system provides both heating and cooling (natural gas and electricity)

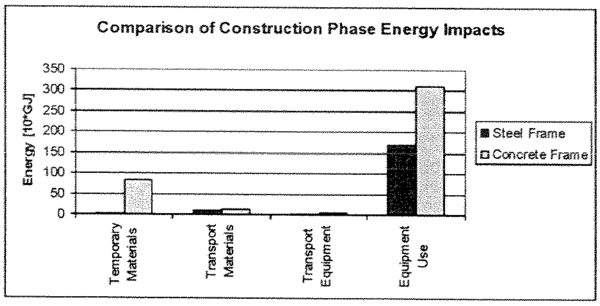
Guggemos, A. and Horvath, A. (2005). "Comparison of Environmental Effects of Steel- and Concrete-Framed Buildings." *J. of Infrastructure Systems*, ASCE, 11(2), 93-101

Steel v. Concrete Frame: Construction Phase Effects (Frame Only)



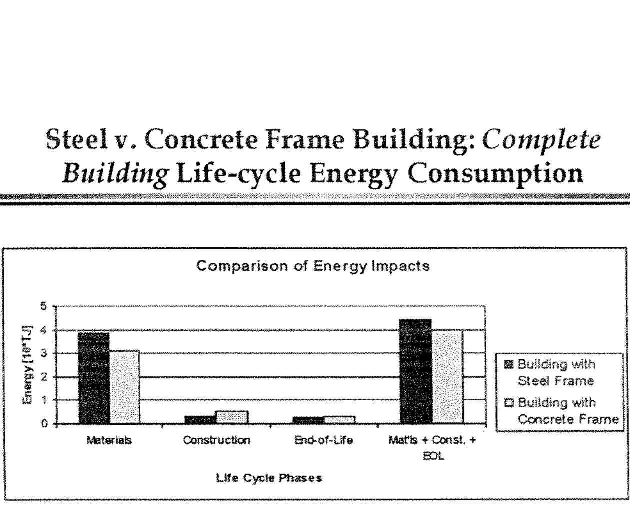
Guggemos, A. and Horvath, A. (2005). "Comparison of Environmental Effects of Steel- and Concrete-Framed Buildings." *J. of Infrastructure Systems*, ASCE, 11(2), pp. 93-101

Steel v. Concrete Frame: Construction Phase Energy Consumption (Frame Only)



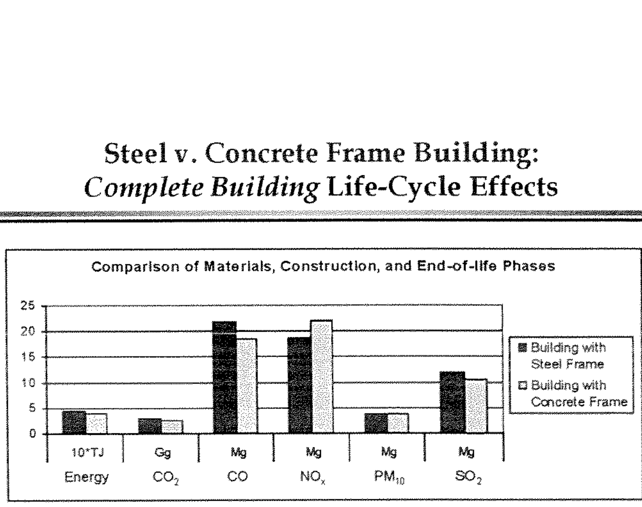
Guggemos, A. and Horvath, A. (2005). "Comparison of Environmental Effects of Steel- and Concrete-Framed Buildings." *J. of Infrastructure Systems*, ASCE, 11(2), pp. 93-101

Steel v. Concrete Frame Building: *Complete Building* Life-cycle Energy Consumption



Guggemos, A. and Horvath, A. (2005), "Comparison of Environmental Effects of Steel- and Concrete-Framed Buildings." *J. of Infrastructure Systems*, ASCE, 11(2), pp. 93-101

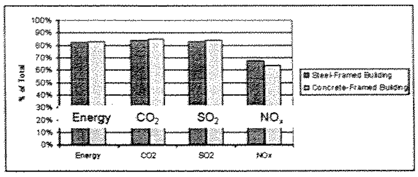
Steel v. Concrete Frame Building: *Complete Building* Life-Cycle Effects



Guggemos, A. and Horvath, A. (2005), "Comparison of Environmental Effects of Steel- and Concrete-Framed Buildings." *J. of Infrastructure Systems*, ASCE, 11(2), pp. 93-101

Emissions Analysis

- 50-year *use* phase dominates the environmental effects:



- Overall, *construction* is 1–11% of life-cycle environmental effects
- As the *use* phase becomes more efficient, the *materials* and *construction* phases are expected to increase in significance
- *Maintenance* phase emissions (over 50 years) are similar in magnitude to the construction phase
- The *end-of-life* phase is comparably small

Overall Findings

- Construction phase effects are approximately 1–11% of overall life cycle impacts
- In general, steel structural frames have significantly less effects than concrete frames in the construction phase, but significantly more effects in the materials creation phase
- But overall, steel-framed buildings have similar life-cycle effects to concrete-framed buildings
- Choice of structural frame may be based on concern for local construction phase emissions:
  - Choose a concrete frame if VOC and heavy metal emissions are of concern
  - Choose a steel frame if energy use or CO_2, CO, NO_2, PM_{10}, SO_2, and HC emissions are of concern

Literature Survey of Construction Materials - Identified Limitations -

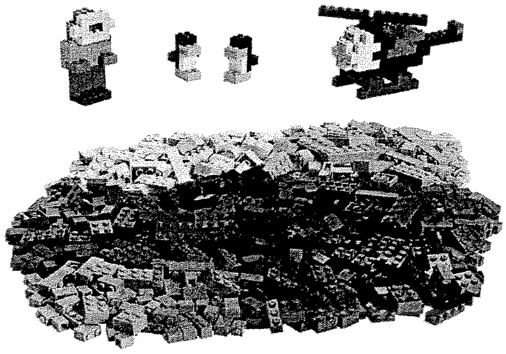
- Only 10 studies from Canada, Finland, France, New Zealand, Sweden, United States
- No study compared all 5 materials
- Several comparisons of wood, steel, and concrete
- One comparison of brick or CMU to an alternative
- Structural systems are often not analyzed separately from complete building
- Materials specifications tend to be missing
- Data are often not well detailed
- End-of-life options not detailed
- Analyses mostly focused on energy use and GHG emissions
- Uncertainty assessment lacking
- Economic comparisons rare

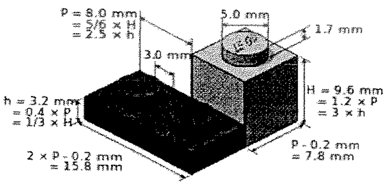
Literature Survey of Construction Materials - Benefits and Opportunities -

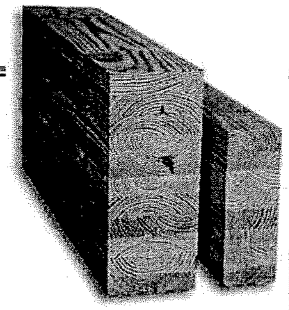
- Interesting and educational comparisons were found that show the way how comprehensive assessments should be done.
- Comprehensive assessments (using LCA) of construction materials are feasible to be performed nowadays.
- Studies show where environmental data could be sourced from.
- In all comparisons wood was the best choice from energy and GHG perspectives.

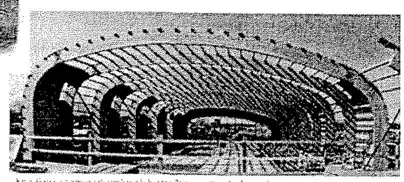
Data Sources for Construction Materials

- General LCA software: e.g., GaBi, SimaPro
- Specialized Data and Tools:
  - EU: European reference Life-Cycle Database (ELCD)
  - U.S. Life Cycle Inventory Database
  - BEES (U.S. National Institute for Standards and Technology
  - ATHENA Impact Estimator for Buildings
  - Carbon Calculator from WoodWorks
  - The U.S. National Ready Mix Concrete Association: http://www.nrmca.org/sustainability/Certification/PlantCertification.asp
- Environmental Product Declarations (EPD)



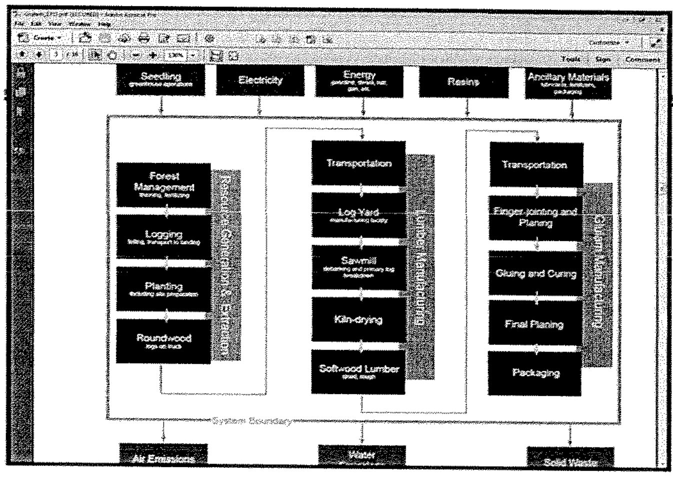




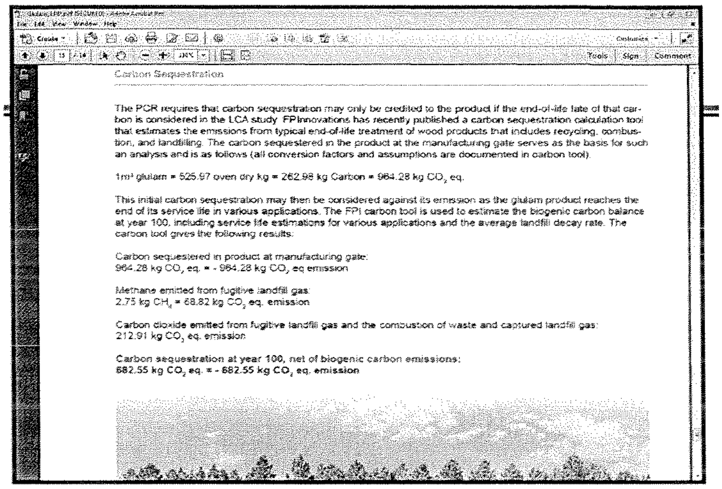


EPD for Glulam

http://www.awc.org/greenbuilding/epd.php



American Wood Council, Canadian Wood Council (2013), "North American Glued Laminated Timbers (Glulam) – Environmental Product Declaration," http://www.awc.org/pdf/EPDs/Glulam_EPD.pdf (accessed August 1, 2013)



Carbon Sequestration

The PCR requires that carbon sequestration may only be credited to the product if the end-of-life fate of that carbon is considered in the LCA study. FPInnovations has recently published a carbon sequestration calculation tool that estimates the emissions from typical end-of-life treatment of wood products that includes recycling, combustion, and landfilling. The carbon sequestered in the product at the manufacturing gate serves as the basis for such an analysis and is as follows (all conversion factors and assumptions are documented in carbon tool).

1m³ glulam = 525.97 oven dry kg = 262.98 kg Carbon = 964.28 kg CO_2 eq.

This initial carbon sequestration may then be considered against its emission as the glulam product reaches the end of its service life in various applications. The FPI carbon tool is used to estimate the biogenic carbon balance at year 100, including service life estimations for various applications and the average landfill decay rate. The carbon tool gives the following results:

Carbon sequestered in product at manufacturing gate:
964.28 kg CO_2 eq. = - 964.28 kg CO_2 eq emission

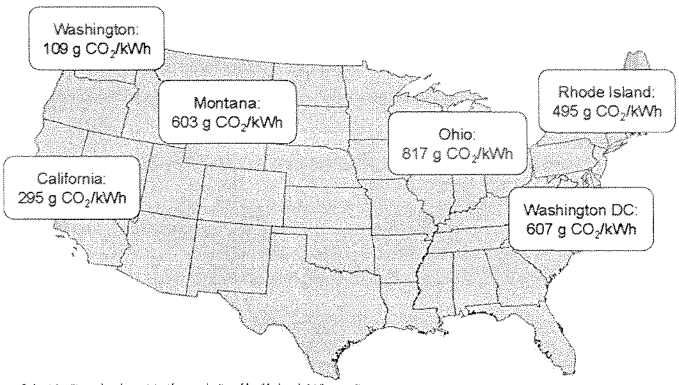
Methane emitted from fugitive landfill gas:
2.75 kg CH_4 = 68.82 kg CO_2 eq. emission

Carbon dioxide emitted from fugitive landfill gas and the combustion of waste and captured landfill gas:
212.91 kg CO_2 eq. emission

Carbon sequestration at year 100, net of biogenic carbon emissions:
682.55 kg CO_2 eq. = - 682.55 kg CO_2 eq. emission

Key Factors Contributing to the Life-cycle Environmental Effects of Construction Materials

- Embedded energy of materials
- Energy input mix
- Emissions intensities of energy
- Location, (e.g., proximity to people)
- Transportation
- Construction processes
- Service life (functional obsolescence)
- End-of-life fate and management



Carbon intensities are based on emissions from combustion of fossil fuels in electricity generation.
Emission factors source: U.S. Environmental Protection Agency. (2010). AP 42, Fifth Edition, Volume 1, Chapter 1: External Combustion Sources. U.S. Environmental Protection Agency, Washington, DC.
Electricity mix source: U.S. Environmental Protection Agency. (2011). eGRID2010 Version 1.1 Year 2007 Summary Tables. U.S. Environmental Protection Agency, Washington, DC.

EPA Combustion Emission Factors

	Coal	Natural Gas	Petroleum
g CO_2/kWh	931.2	506.1	606.9

Life-cycle Emission Factors

	Coal	Natural Gas	Oil	Nuclear	Hydro	Biomass	PV	Wind
g $CO_{2(eq)}$ /kWh	1057	951	680	63	25	57	139	9

Combustion emission factors source: U.S. Environmental Protection Agency. (2010). AP 42, Fifth Editions, Volume 1, Chapter 1: External Combustion Sources. U.S. Environmental Protection Agency, Washington, DC.
LCA emission factors source: Horvath, A., Stokes, J. "Life-cycle Energy Assessment of Alternative Water Supply Systems in California." California Energy Commission, 2011.

LCA Emission Factors for Electricity Generation

	Coal	Natural Gas	Oil	Nuclear	Hydropower	Biomass	PV	Wind
MJ/kWh	12.50	8.10	11.00	N/A	0.12	0.36	1.77	0.12
g $CO_{2(eq)}$/kWh	1056.50	950.50	679.50	63.25	24.75	57.25	139.00	9.00
g NO_x/kWh	2.75	1.80	1.80	N/A	0.02	1.09	0.34	0.03
g PM/kWh	2.33	0.55	0.13	N/A	0.02	0.15	0.10	0.01
g SO_x/kWh	16.01	5.15	5.15	N/A	0.01	0.32	0.31	0.02
g VOC/kWh	1.38	0.02	0.02	N/A	0.01	0.08	0.01	0.02
g CO/kWh	0.29	4.79	0.14	N/A	0.07	0.48	0.07	N/A

Source: Horvath, A., Stokes, J. "Life-cycle Energy Assessment of Alternative Water Supply Systems in California." California Energy Commission, 2011.

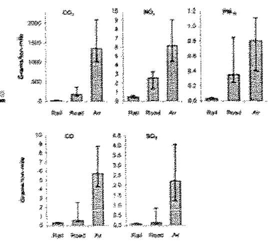


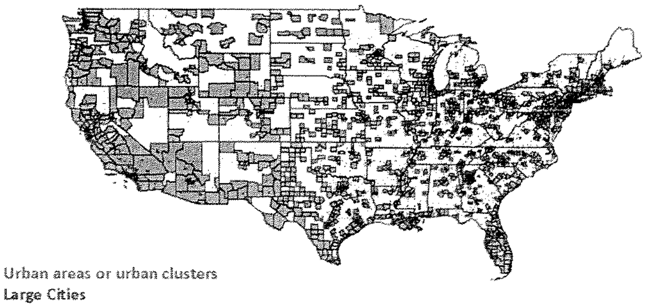
FIGURE 1. Mode comparison.

TABLE 2. Emission Factors (grams/ton-mile)

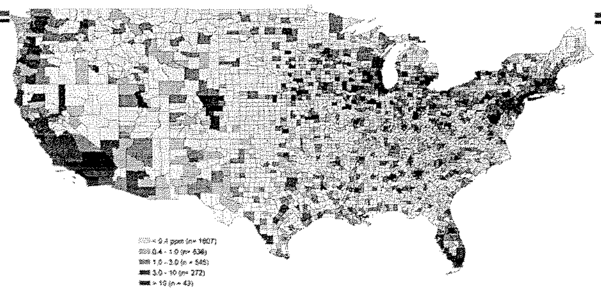
		payload (tons)	CO_2	NO_x	PM_{10}	CO	SO_2
road	Class 8b	12.5	187	2.57	0.35	0.60	0.15
			76%	93%	18%	39%	29%
	Class 5	3.1	230	1.63	0.47	1.30	0.30
			58%	84%	33%	34%	36%
	Class 2b	1.6	289	1.77	0.59	1.84	0.45
			62%	80%	42%	29%	35%
rail	Intermodal Rail	2,093	40	0.74	0.05	0.42	0.12
			80%	98%	86%	92%	89%
air	Boeing 747-400	70	1,358	6.18	0.81	6.87	2.21
			70%	69%	4%	14%	14%
	DC 10	52	1,473	7.02	0.78	6.70	2.27
			72%	72%	0%	24%	15%
	Boeing 757	22	1,577	5.74	0.81	6.21	2.34
			73%	65%	3%	16%	16%

Facanha, C. and Horvath, A. (2007). "Evaluation of Life-cycle Air Emission Factors of Freight Transportation." *Environmental Science & Technology*, 41(20), pp. 7138-7144, http://dx.doi.org/10.1021/es070989q

What level of resolution is necessary?



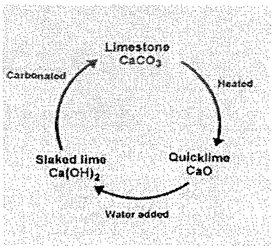
County-level Variation in Intake Fraction



- Mean population iF ~ 2 orders of magnitude greater for urban than rural counties
- On average, 86% of the intake occurs in the same county as emissions

End-of-life Management Opportunities

- **Wood:** Source of biogenic carbon that can be permanently sequestered in a landfill
- **Steel**
  - Worldwide recycling saves about 15% of energy and 25% of CO2 equiv. emissions [worldsteel 2011]
- **Brick and CMU** reuse and recycling
- **Cement** can be substituted with fly ash and other pozzolanic materials
  - Every 1% of fly ash replacement lowers embedded energy by of concrete by 0.7%
- **Concrete** recycling, and carbonation that can permanently sequester carbon
  - ➢ CO_2 emissions from cement clinker manufacturing and CO_2 uptake
    - ➢ Calcination: $CaCO_3 + heat \rightarrow CaO + CO_2$
    - ➢ $CaO + H_2O \rightarrow Ca(OH)_2$
    - ➢ Carbonation: $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$



Summary of Task 2 Findings

- LCA has been developed long enough that it is now ready to provide comprehensive answers for decision makers
  - It is ready to be required as part of policy
- Literature studies provide educational guidance on how LCA should be done, but are less useful for "everyday" decision making
  - Wood was found to be the best alternative from embedded energy and GHG emissions perspectives
- Data sources, especially EPDs and material-focused LCA studies, are rapidly appearing in some countries, and enabling design decisions
- LCA should become part of the practice of designers and other stakeholders, not just researchers
- Low embedded energy, low energy use throughout the life cycle (including transportation), low-emission energy use, efficient construction processes, service life-informed design, end-of-life fate and management, and keeping non-carbon pollution away from human intake are key to sustainable use of construction materials

Next Steps

- Task 3. Summarize factors determining the choice of construction materials
- Task 4. Draw preliminary policy lessons

環保標章與產品環境資訊系統之特性分析

重點摘要

1. 環保標章與產品環境資訊系統(ELIS)之用意皆在於向外在使用者揭露產品或服務之一項或多項環境特性。
2. ELIS 就架構而言，主要包含 ELIS 提供者(如標章組織)、ELIS 使用者(如消費者)，此外尚需要政策制定者(如政府)、技術協助者(如學界)等，配合法規政策工具與產品評估規格等配套措施方能成事。
3. 一個完整的 ELIS 系統，可能包含許多種類的資訊溝通管道(B2B OR B2C)、方式(標章或數量化資訊)、範圍(林業 or 食品業....)、與議題內容(回收? 有機?...)，在 ELIS 標準與驗證部分，可能有不同之標準制訂者(驗證機構? 公會?...)、運作角色(公營、民營)、驗證方式(第三者 or 自我)、範圍(國家級 or 區域級)、議題焦點等(nprppm 議題)。
4. ELIS 系統之數量由 1980 年中期起快速增加，然近年有逐漸飽和之態勢。
5. 1990 年代以有機議題為主之 ELIS 最多，佔 43%，然至 2012 年，其他單一議題(如公平貿易、林業保護等)之 ELIS 佔 40%。
6. 就 ELIS 之本質分類，最主要的是非營利之自願性系統。而以數量化 LCA 為標準制定基礎者僅占約 18%。
7. 整體而言，目前各類 ELIS 系統之數量甚多，應考慮相互之間的整合可能。
8. 各類 ELIS 之牽涉議題廣度持續增加，傳統議題之 ELIS 間競爭強度提高，而新興議題之 ELIS 亦持續增加，但仍有部分議題尚待開發。

OECD 對於環保標章與產品環境資訊系統之努力

重點摘要

1. 已執行環保標章與產品環境資訊系統之特性分析。
2. 2014 將完成之作業
    a. 環保標章造成之貿易衝擊分析
    b. 環保標章造成之環境效益分析
    c. 回顧與環保標章相關之政策
3. 研析未來政策可能扮演之角色，包含未來可能用以規範民營標章訴求之國際指導綱要。
4. 因應標章議題更趨廣泛，對國際貿易之衝擊與機會。
5. 對里程標章、碳足跡標章、與水足跡標章之研析。
6. 針對產品項目進行貿易關聯性評估之可行性研究
7. 對環境效益與衝擊之文獻收集，及其對市場衝擊之評估，該評估並著重於不同 ELIS 系統間之差異性。
8. 各國環保標章政策之差異分析。
9. 分析是否可以政策方式消除或降低誤導性議題(如 green washing)。
10. 可能對未來如何以政策工具管制管理民營 ELIS 提出建議。
11. 可能發展用以規範民營標章訴求之國際指導綱要。

A CHARACTERISATION OF ENVIRONMENTAL LABELLING AND INFORMATION SCHEMES

Guillaume GRUERE

Environment Division,
Trade and Agricultural Directorate

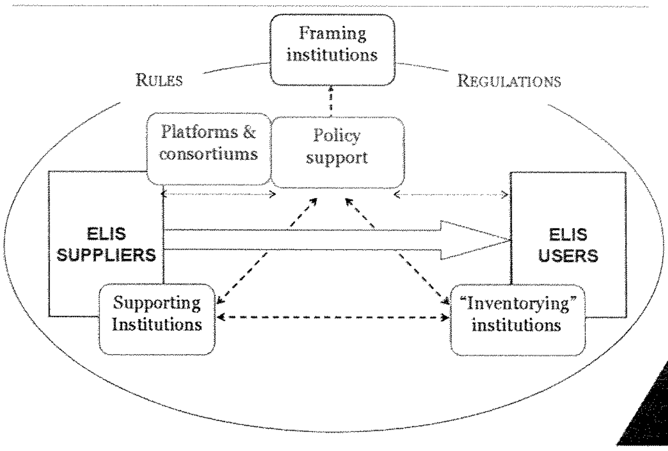
WPRPW Meeting November 13 2013

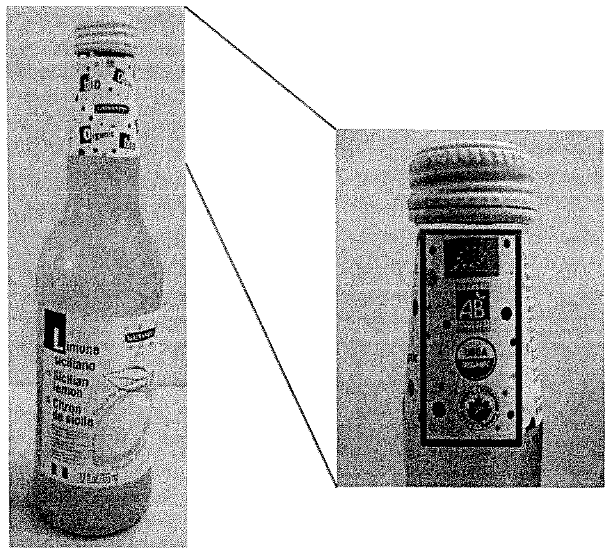
OCDE
DES POLITIQUES MEILLEURES POUR UNE VIE MEILLEURE

1. Environmental Labelling and Information Schemes (ELIS)

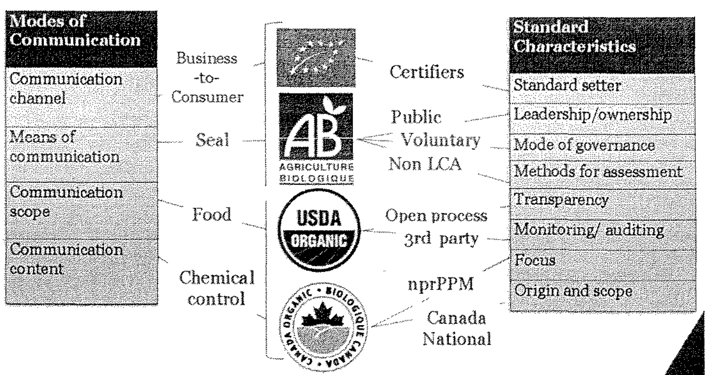
"Policies and initiatives that aim to provide information to external users about one or more aspects of the environmental performance of a product or service."

2. Mapping institutional actors





3b. Towards a comprehensive characterisation of ELIS

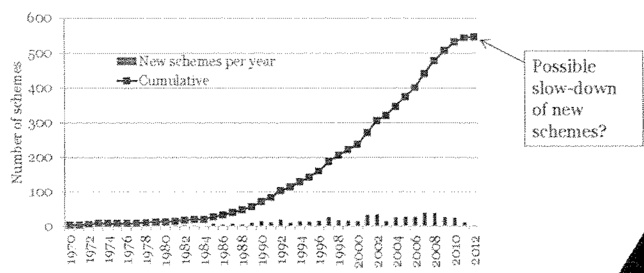


4. Analysis of ELIS growth trends

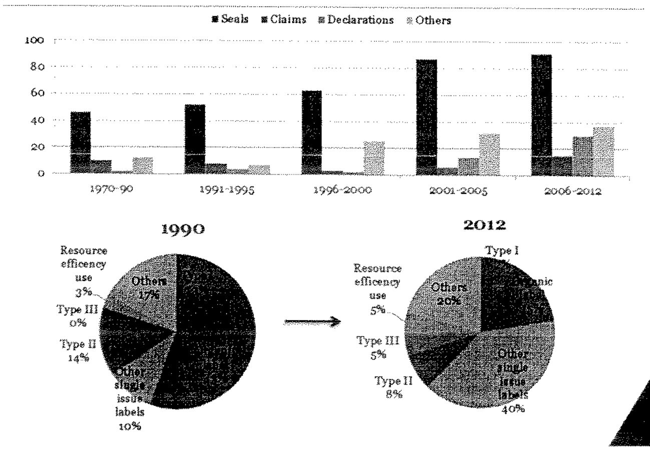
Dataset: 544 ELIS introduced in 1970-2012, covering 197 countries from:

- EcoLabel Index (BigRoom Inc.)
- OECD and other publications.

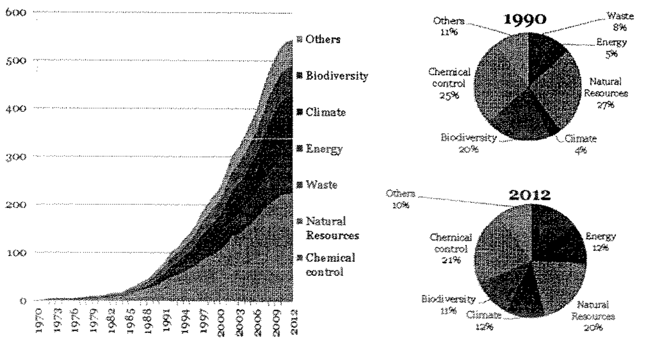
ECOLABEL INDEX



From organic labels to other seals

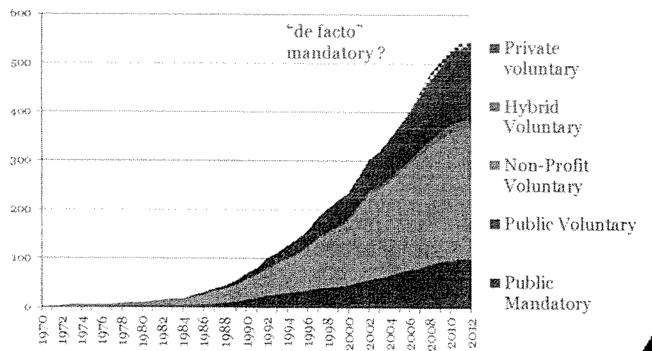


A diversification of attributes

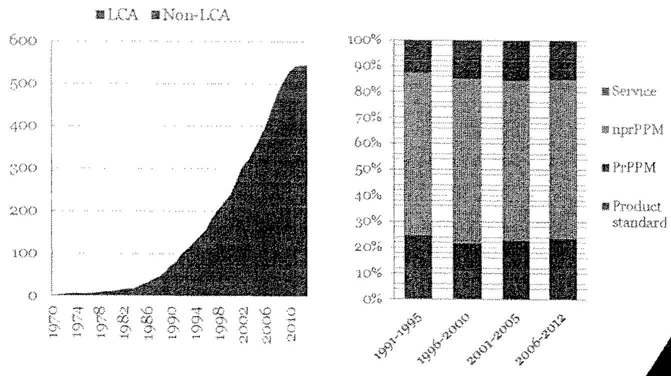


Waste related schemes increased from 8% in 1990 to 14% in 2012

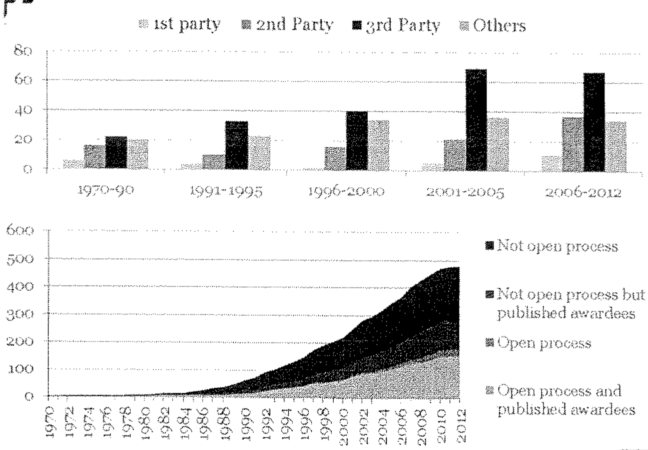
Mostly non-profit and private voluntary schemes



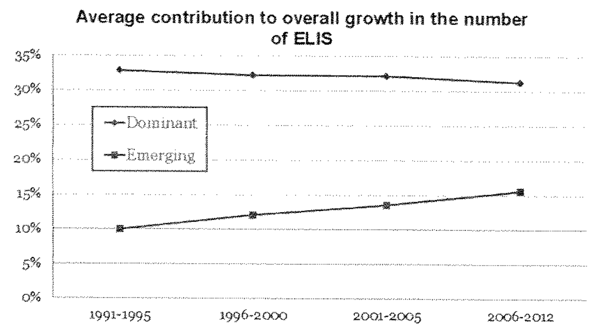
Methodologies and focus of schemes: stable over time



More third-party audited, but still not transparent



"Intensification" versus "extensification"

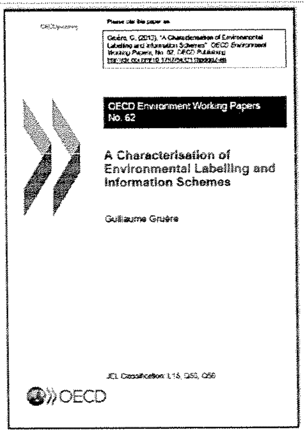


Dominant: B2C, Food and agriculture and multiple, Chemicals and Natural Resources, Non-profit, Non-open, nprPPM, Europe and North America, national scope.
Emerging: B2B, Energy, transportation and biofuel, climate, private, open, product standards and services, non-OECD, regional scope.

5a. Conclusions: A complex landscape

1. Multiple actors interacting
   – Old and new: “fragmented harmonization”?
2. Expanding diversity of schemes
   – 12 characterisation criteria divide into >55 categories
3. On-going multiplication of schemes (albeit with slower rate since 2010)
   – Dominant traditional schemes : ↑ competition
   – Emerging schemes: Exploiting new areas, filling gaps
   – Some areas still not covered

Thank You!



Paper available at: www.oecd.org/env/workingpapers.htm

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NEXT STEPS: OECD WORK ON ENVIRONMENTAL LABELLING AND INFORMATION SCHEMES

Andrew Prag

OECD Environment Directorate

WPRPW
November 13th 2013

OCDE
DES POLITIQUES MEILLEURES POUR UNE VIE MEILLEURE

Overview of JWPTE / WPIEEP work on environmental labelling

1. Characterisation of Environmental Labelling and Information Schemes — ✓ Published Sep 2013
2. a) Trade impacts of environmental labelling
   b) Environmental effectiveness of labelling
   c) Review of public policies relating to labelling
   — … Drafts due Feb/June 2014
3. Potential role for further policies, including possible international guidelines for policies regulating private labelling claims — ? End 2014 / into 2015

2a. Impacts of labels on international trade draft by Secretariat June 2014

- Impacts and opportunities for international trade arising from the increasing diversity of labelling schemes
- Examining *access to market* and *competitiveness* issues
  – Access issues if schemes are “de facto” mandatory
  – Competitiveness if labelling biased towards domestic products: “greenwashing” vs “greenbashing”
- Case studies on distance labels, carbon footprint and water footprint
- Possibility to take a product category approach to assessing trade implications

2b. Environmental effectiveness: draft by consultant, June 2014

- Environmental and market impacts from a predominantly domestic perspective
- Summarising and building on previous literature (including 2012 *State of Knowledge* assessment)
- Particular focus on effects of multiplication and diversity of schemes: consumer/retailer confusion, overlap of effects, self vs 3rd party certification, etc
- Proxy indicators for environmental effectiveness

2c. Review of public policies draft by consultant, Feb 2014

- Comparative analysis of national policies regulating environmental labelling
- Comparing definitions, standards, labelling requirements (placement etc), policy monitoring and enforcement
- Assess evidence of whether policies have been effective in rejecting or reducing misleading claims

3. Policy advice / international guidelines end 2014 (or into next PWB)

- Final stage to be discussed at future JWPTE meetings, based on work in progress
- Potential recommendations on role of public policies in regulating private claims
- Possible development of international guidelines concerning private claims

Thank You!

OECD

BETTER POLICIES FOR BETTER LIVES

Andrew.Prag@oecd.org
Guillaume.Gruere@oecd.org

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Potential competitiveness impacts of labelling

Signal / Environmental Quality	Negative	None	Green
Poor	✓ Match	Avoiding signal	"Greenwashing"
Conventional	Misleading & confusing	✓ Match	Misleading & confusing
High	"Greenbashing"	Under-reporting	✓ Match

建立食物廢棄物與特定廢棄物流的里程碑目標

OECD, WPRPW
瑞典環境保護署

任務：

-提出減少食物廢棄物、回收及再使用家戶廢棄物與紡織廢棄物之新里程碑目標

-提出目標後，也須提出可能措施與政策的建議、成本效益分析以及社經影響評估。

-將於 2014 年 1 月發表

反覆的工作流程：

問題分析　目標形成 → 措施-效果及成本 → 成本與環境利益比較 → 為達目標所需政策之擬定與分析 → 社經影響分析

食物廢棄物目標(草案)：

-食物廢棄物至 2020 年前須減少 20%(與 2010 年相比，可避免與非可避免)。此目標是涵蓋除了初級生產以外的整個食物鏈。

-初級生產過程中的廢棄物也須以可量測的方式減少。

食物廢棄物減量-可能措施

	措施	目標
家戶	改變行為 降低冰箱溫度	7%食物廢棄物 20%可避免食物廢棄物
餐廳	更妥善計算 移除沙拉盤 食物份量變小 捐獻食物 外帶袋 更多廚房自己煮食部分	17%食物廢棄物 35%可避免食物廢棄物
零售與大盤商	不再推銷 捐獻食物 電腦化訂貨系統 於最佳使用期限到的前一天冷凍食物賣給餐飲業者	31%食物廢棄物 35%可避免食物廢棄物

工業	找出廢棄物或分析 測量廢棄物量 找出措施並執行	50%可避免食物廢棄物

家戶廢棄物之回收與再使用-提議的里程碑目標(2020 年)

-家戶廢棄物與企業的同類廢棄物之 60%須被整理用來再使用或回收(不只是收集,而是真的循環利用)

-家戶與企業要置放產品給再使用或給整理以再使用皆很方便

-地方議會或其他有可能更佳處理廢棄物的分支機構須已擬定具體廢棄物產業之目標。

里程碑目標-紡織品

2020 年前紡織品的流通須儘可能具高資源效率及不含危險物質

-2018 年前紡織品收集系統已經存在，以確保紡織品能被再使用

-2020 年前，40%上市的紡織品須被再使用。

-2020 年前，25%上市的紡織品須被回收(主要用作新紡織品)

-2020 年前，紡織品的流通變得更簡易因為危險物質與其他具不佳特性的物質不會存在新生產的紡織品中。

Establishing milestone targets for food waste and selected waste streams

OECD, WPRPW

13 November 2013

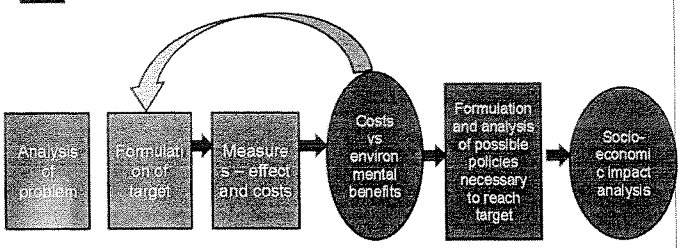
Elisabet Kock

Swedish Environmental Protection Agency

Assignment

- Propose new milestone targets for reducing food waste, recycling and reuse of household waste and textile waste.
- The proposed targets should be followed by suggestions on possible measures, policies and an analysis of the cost effectiveness and a socio-economic impact assessment.
- To be presented in January 2014

Iterative work process



Amount of food waste in Sweden

Food industry	171 000 tonnes
Retailers/wholesalers	39 000 tonnes
School kitchens	26 000 tonnes
Restaurants	99 000 tonnes
Households	674 000 tonnes
In total:	**1 010 000 tonnes**

Households account for the majority (72 kg/cap), of which 25 kg/cap are unnecessary food waste.

Food waste target

Draft

- Food waste shall be reduced with 20% until 2020 compared to the year 2010 (avoidable and unavoidable). The target comprises the whole food chain except primary production.
- Production waste in the primary production shall be reduced in a measurable way.

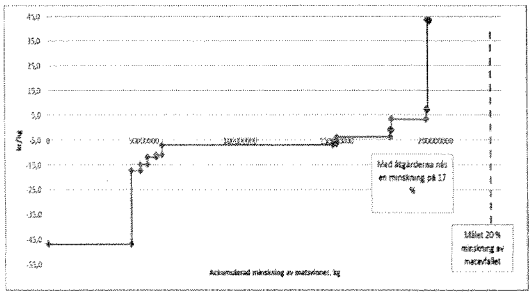
Food waste reduction – possible measures

	Measures	Targets
Household	Change of behaviour Reduced fridge temperature	7% of food waste 20 of avoidable food waste
Restaurants	Better planning Remove sallad plate Smaller portion sizes Donate food Doggybags More kitchens preparing their own food	17 of food waste 35% of avoidable food waste

Measures cont.

	Measures	Target
Retail and wholesale	No more campaigns Donate food Computerised ordering systems Freezing food the day before the best before date and sell on to catering firms	31% of food waste 35% of avoidable waste
Industry	Identification of the analysis of waste Measuring the waste Identification of measures and implementation of measures	50% of avoidable waste

Food waste cost effectiveness analysis



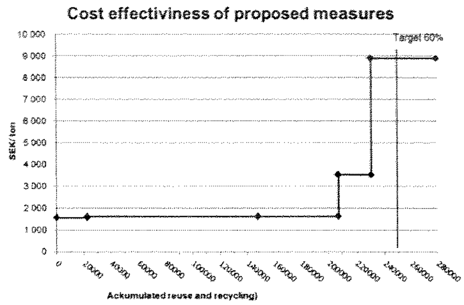
Recycling and reuse of household waste – proposed milestone target

Draft

By the year 2020 the waste material from housheholds and similar waste from companies will be taken care of as far as possible and the impacts and risks for health and environment is minimized.

- At least 60 per cent of the waste from households and similar waste from companies is prepared for reuse or is recycled (not only collected but actually recycled).
- It is easy for households and companies to leave products for reuse and for the preparation of reuse.
- County councils and other branchorganisations with an important potential to better take care of the wastematerial have developed specific waste sector objectives.

Cost and effects or proposed measures



Milestone targets - Textiles

Draft

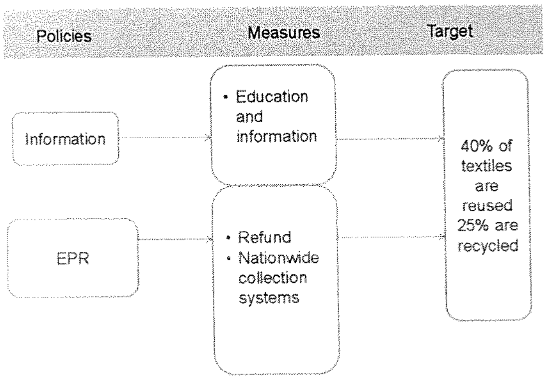
By the year 2020 the circulation of textiles are as far as possible resource efficient and free from hazardous substances.

- By the year 2018 there exist easily available collection systems for textiles which ensures that textiles first of all are reused.
- By the year 2020, 40% of the textiles put on the market will be resued.

Textiles cont.

Draft

- By the year 2020, 25% of the textiles put on the market will be recycled (primarily to new textiles)
- By 2020 the circulation of textiles will be easier as hazardous substances and other substances with undesirable characteristics will not be present in newly produced textiles..



Policies
Measures
Target
Information
EPR
• Education and information
• Refund
• Nationwide collection systems
40% of textiles are reused 25% are recycled

Thank you!

加拿大廢棄物管理發展(精選)報告

圓桌討論

2010 年廢棄物管理業調查：企業部門及公部門

-由加拿大統計局於 2013 年發表

-此報告呈現企業、地方政府與公共廢棄物管理機關財務特性與廢棄物管理活動資訊。

-調查問卷共寄至 1,353 個企業與地方政府，回覆率：企業部門 75%，公部門 87%。

重點：

-2008 年至 2010 年送至私營與公營的廢棄物處置設施的非危險廢棄物量減少 4%。

-轉移至回收與有機處理設施的廢棄物量減少 3%(自 2008 年)至 2010 年的 810 萬噸(236 公斤/人)

-2010 年政府提供廢棄物管理服務的營運收入達 23 億美元

-加拿大企業提供廢棄物管理服務的收入增加 2%(自 2008 年)至 2010 年的近 60 億美元

WEEE 報告：2013 年加拿大廢電機電子設備再使用與回收報告

-2013 年 9 月公布

-敍述加拿大壽命終期電子的管理並提供未來規劃的重要考量點

-描述加拿大各省 WEEE 計畫之特定細節，包括計畫成本、成效測量、與責任

電子檔可於此網站下載：

http://www.cmconsultinginc.com/2013/09/cm-consulting-releases-canadian-weee-report-2013-waste-electrical-electronic-equipment-reuse-recycling-canada/

環境合作委員會(CEC)加拿大電子修整業者與回收業者環境無害管理(ESM)研討會

- 2013 年由加拿大舉辦

-CEC 是由加拿大、墨西哥、美國聯合組成

-討論的議題包括 ESM 的重要性與利益、ESM 之執行、評估與管理風險等

-中小企業線上訓練教材：

http://www.cec.org/Page.asp?PageID=1226&SiteNodeID=1282

-2014 年 1 月 CEC 網站將提供線上訓練模組。

城市固體廢棄物有機物處理技術文件

-2013 年由加拿大環境部公布