References Used in the Guide

PART I. OVERVIEW OF CLEAN PRODUCTION

A.What Is Clean Production?

For more information on clean production policy development,visit the clean production site on the Greenpeace International website: http://www.greenpeace.org/~toxics/ Click the clean production button and look under "policy." Information on PVC toys is also available at this site.

B. Ten Reasons to Promote Clean Production

Background information on consumption is taken from:

Dr. David Pimentel et al.Natural Resources and an Optimum Human Population. Population and Environment: A Journal of Interdisciplinary Studies. Vol 15, Number 5, May 1994.

Alan Durning and Holly Brough. Taking Stock:Animal Farming and the Environment. Worldwatch Paper 103. July, 1991.

Alan B Durning. Cost of Beef for Health and Habitat. Los Angeles Times, Sept21,1986. quoted in Jeremy Rifkin, Beyond Beef. Plume Books, 1993.

C. Hall et al. The Environmental Consequences of Having a Baby in the United States. Population and Environment: A Journal of Interdisciplinary Studies. Vol 15, No. 6, July 1994.

Paul Hawken.Natural Capitalism. Mother Jones, March/April 1997.

James MacKenzie. The Keys to the Car. Worldwatch Institute,1994.
Website: http://www.worldwatch.org/ index.html

C.Similar Concepts and Initiatives

See the section on Ecological Engineers and Sustainable Product Design in the Clean Production Contact List.

The Zero Waste example is taken from Gunter Pauli, No Waste Economy. Resurgence,No. 182, Rocksea Farmhouse,St. Mabyn,Bodmin, Cornwall, PL30 3BR, U.K. ed@resurge.demon.co.uk
http://www.gn.apc.org/resurgence/

An update on national initiatives to implement Factor 4 is given in G. Gardner and P. Sampat. World Watch Paper 144. Mind over Matter: Recasting the Role of Materials in our Lives. Washington DC. Dec. 1998.
http://www.worldwatch.org/pubs/paper/144.html

PART II. STRATEGIES TO PROMOTE CLEAN PRODUCTION

A.Measuring and Reducing Resource Use

Mathis Wackernagel and W Rees. Our Ecological Footprint: Reducing Human Impact on the Earth. New Society Publishers, BC Canada,1996.

Background information on regulated chemicals can be found at:
http://www.epa.gov/opptintr/chemtest/ hazchem.htm
For a good overview of this EPA study on chemical regulation, see ENDS Report 282, July 1998. Environmental Data Services Ltd., Finsbury Business Centre, 40 Bowling Green Lane, London EC1R 0NE,United Kingdom. Telephone: +44 (0)171 814 5300; Fax: +44 (0)171 415 0106. post@ends.co.uk

Information on the toxic threat from products was taken from US Congress, Office of Technology Assessment,Green Products by Design: Choices for a Cleaner Environment, OTA-E-541. Washington,DC. October, 1992.

Chemical Bans: Both the Danish and Swedish government have come out with a new Chemicals Policy that would phase out the use of persistent and bioaccumulative compounds as well as increase consumer right to know. For more information (in English) visit the Danish Environmental Protection Agency website at http://www.mem.dk and the Swedish Ministry of Environment information website at http://www.kemi.se

See the section on Material Indices in the Clean Production Contact List. Information on how to order Friends of the Earth International's Sustainable Europe and other publications is given in that section.

Information on Ecological Rucksacks is taken from Wuppertal Paper Number 13. Friedrich Hinterberger et al.Increasing Resource Productivity through Eco-Efficient Services. Wuppertal Institute, May 1994.
Website: http://wupperinst.org/Sites/home1.html

For information on backcasting, the Dutch Sustainable Technology Development group produced a very informative brochure (in English): Philip Vergragt(ed) Looking Back from the Future. Programmabureau Interdepartementaal Onderzoekprogramma Duurzame Technologische Ontwikkeling, Postbus 6063, 2600JA Delft, The Netherlands. Tel +31 15 697543, also +31 15 2697543; fax: +31 15 697547.

See also: Philp Vergragt and Geert van Grootveld. Sustainable Technology Development in the Netherlands: The First Phase of the Dutch STD Programme. J. Cleaner Prod. Vol.2, Number 3-4. 133.

B. Exercising the Right to Know

See the Right To Know section of the Clean Production Contact List.

For more information on how to use the Toxic Release Inventory see in particular the Environmental Defense Fund's Scorecard at http://www.scorecard.org or go to their website at http://www.edf.org

Also visit http://www.mapcruzin.com/tri1997.htm for coverage of the TRI's 1997 data, complete with maps.

Initiatives on the Public Release and Transfer Register are progressing in many countries. For an update see the excellent overview put up by the Czech Friends of the Earth at
http://www.ecn.cz/PRTR/prtrwide/au-an.htm

For a copy of the PRTR government guidelines, order "Pollutant Release and Transfer Registers.Guidance Manual for Governments"from OECD, Head of Publications Service, 2 rue Andre-Pascal, 74774 Paris Cedex 16, France.
Website: http://www.oecd.org//ehs/prtr/pub.htm

The life cycle of PVC pipe was taken from: Controversial Type LCA Claims Concrete Is Better Than PVC.ENDS Report #262,November 1996.

For more information on commercialization of hemp, contact the Canadian Industrial Hemp Council (CIHC) at tel: +1 204 873 2454. Also the Canadian Auto Workers (hemp campaign), 581 St Pierre St., Tecumseh,Ontario N8N 1Z2 or fax: +1 519 251 1388, Website: http://www.caw.ca/eindex.html

Health Care without Harm can be reached at c/o Center for Health, Environment and Justice, PO Box 6806, Falls Church, Vermont,USA 22040;tel: +1 703 327 2249, fax: +1 703 237 8389 Website: http://www.noharm.org

For more information about the Clean Car Campaign, contact Kevin Mills at Environmental Defense Fund, Website: http://www.edf.org/greencar
Also Charles Griffith at the Ecology Center of Ann Arbor, email:ecaa@igc.org

The EPD of Electrolux was provided by Electrolux. http://wtest.electrolux.se/

For more information on genetic engineering, see Rachel's Environment and Health Weekly #649, available from Environmental Research Foundation, P.O. Box 5036,Annapolis, MD 21403. fax (410) 263-8944; erf@rachel.org; http://www.rachel.org

To find out who is working on genetic engineering, contact RAFI (USA) http://www.rafiusa.org/ Also, Council of Canadians, http://www.canadians.org/ and Genetic Concern, http://www.canadians.org/
Also: GM Food Scandal Puts Labour on Spot. Guardian Weekly, Feb 21, 1999; The Monsanto Files. The Ecologist. Vol 28 No 5, Sept,1998. Tel/Fax: +44 1403 782644; Genetic Engineering: Dream or Nightmare? By Mae-Wan Ho, Third World Network, 228 Macalister Rd, 10400 Penang, Malaysia; fax: +60 4 2264505 http://www.southside.org.sg/souths/twn/twnintro.htm

C. Holding Producers Responsible

Hewlett Packard information is available from its Procurement Program Manager, Hewlett Packard Company, 3000 Hanover St., Palo Alto, California,USA 94022. Website: http://www.hp.com/

Information about B&Q Retail Chain from ENDS Report 285. B&Q Seeks Greater Transparency in Supply Chain. Oct,1998. http://www.ends.co.uk/

The Clean Clothes Campaign can be reached at PO Box 11584, 1001 GN Amsterdam, NL Tel: +31 20 4122785, fax: +31 20 4122786 Email: ccc@xs4all.nl
Website: http://www.cleanclothes.org/index.htm

Social Accountability 8000. Contact Council on Economic Priorities, 30 Irving Place,New York, NY 10003, USA Tel: +1 212 420 1133; fax: +1 212 420 0988. Also Council on Economic Priorities, Windsor House, 83 Kingsway, London WC2B 6SD, tel: +44 171 831 9420; fax: +44 171 242 0503, email:leipzig123@aol.com
Website: http://www.cepnyc.org/index.htm

D. Extended Producer Responsibility

The Clean Computer Campaign can be reached at the International Campaign for Responsible Technology 760 N. FirstSt, San Jose, California,USA 95112, email: svtc@igc.org Website: http://www.svtc.org

More information on EPR available from the ANPED website at http://www.antenna.nl/anped/

Also see Gary Davis and Catherine Wilt. Extended Product Responsibility: A New Principle for Product-Oriented Pollution Prevention.University of Tennessee Center for Clean Products and Clean Technologies. Order by fax: +1 423 974 1838
Website: http://eerc.ra.utk.edu/clean/projects.html

Town ordinances on extended producer responsibility taken from the GrassRoots Recycling Network, PO Box 49283, Athens, GA 30604-9283, Tel (706) 613 7121; Fax (706) 613 7123; email: zerowaste@grrn.org
Website: http://www.grrn.org/

The OECD is holding a series of international meetings on EPR. Contact them for more information.
Website: http://www.oecd.org

For more information on the European Union's directive on Waste from Electronic and Electrical Equipment, contact Elena Lyberidi at the European Environment Bureau at email:ecoproducts@eeb.org. Also visit their website at www.eeb.org

E.Are There EPR Initiatives in the U.S.?

For information on the Clean Car Campaign, contact The Ecology Center of Ann Arbor, tel:734-663-2400; charlesg@ecocenter.org or the Environmental Defense Fund at tel:202-287-3500 Kevin_Mills@edf.org

For information on mercury campaigns, contact Michael Bender, The Mercury Policy Project, RR5, Box 230, Montpelier, VT 05602 USA. Tel:802-223-9000; fax:802-223-7914. MTBenderVT@aol.com

F. Financing Sustainability

The Ecological Tax Reform report prepared for Greenpeace Germany is available in summary form (in English) from:Stefan Bach et al.(1994) Economic Effects of an Ecological Tax Reform. Deutsches Institut fur Wirtshaftsforschung (DIW),D-14191,Berlin.Germany. Website: http://www.diw-berlin.de/welcome.html You can also order the full 280 page report (in German) from Greenpeace Germany, Grosse Elbstrasse 39, Hamburg D-22767, Germany. fax: +49 40 30618100

Public Subsidies, Public Accountability. Holding Corporations to Labor and Community Standards. Grassroots Policy Project,Sugar Law Center for Economic and Social Justice, and Sustainable America. 1998. Published and distributed by Grassroots Policy Project,2040 S St. NW, Suite 203, Washington,DC 20009. Tel (202) 387 2935

Citizens Guide to Environmental Tax Shifting. For A Cleaner Environment,Stronger Economy, Fairer Tax Code. Friends of the Earth USA. June 1998. Available free via the Internet. Visit http://www.foe.org or write Friends of the Earth, 1025 Vermont Avenue,NW, Suite 300, Washington,DC.20005

Green Scissors 99. Cutting Wasteful and Environmentally Harmful Spending. By Friends of the Earth (http://www.foe.org/), Taxpayers for Common Sense (http://www.taxpayer.net/), and U.S. Public Interest Research Group (http://www.pirg.org/). Contact Courtney Cuff, Gawain Kripke, or Erich Pica. Tel (202) 783 7400. Also Friends of the Earth,Dirty Little Secrets. 1998 Update. Polluters save while people pay.

On government procurement, see Barry Commoner., Making Peace with the Planet. Pantheon Books, NY and Gollancz Publishers, London.1990.

G. Can We Reduce Our Consumption?

Interface Sustainability Report available from Interface Inc., Atlanta,Georgia,USA 770-437-6800

Sixties Dream Rides Again in Amsterdam. The Guardian. Tuesday, May 26, 1998. London/Manchester. UK.

For more information on car sharing, contact the Canadian Car Sharing Alliance at tel: +1 416 340 7888. For a directory of car sharing schemes round the world see their website at http://www.carsharing.net

Center for a New American Dream. 6930 Carroll Ave, Suite 900, Takoma Park, MD 20912 USA
Tel: +1 301 891 3683; fax +1 301 891 3684;
website: http://www.newdream.org

Glossary of Clean Production Terms

The following glossary contains definitions for some common terms used in clean production and clean products.Where available, definitions were taken from literature sources on the subject. Terms are divided by the following categories:production process;products/materials; and policy/management tools.There is overlap in some of the terms.

Production Process

Clean(er) Production - Cleaner production means the continuous application of an integrated preventive environmental strategy to processes and products to reduce risks to humans and the environment. For production processes, cleaner production includes conserving raw materials and energy, eliminating toxic raw materials, and reducing the quantity and toxicity of all emissions and wastes before they leave a process. For products, the strategy focuses on reducing impacts along the entire life cycle of the product,from raw material extraction to the ultimate disposal of the product.

Clean(er) Technology/Environmentally Friendly Technology - Technologies that reduce the amounts of energy and raw materials based on natural resources needed to produce,market, and use products.

Ecological Technology - A technology or any manufacturing action that is embedded in the natural cycles of the ecosphere (with its capacities to produce renewable materials), is biodegradable, and uses the whole range of biodiversity in a holistic and non-invasive way with the aid of efficient engineering. Ecological technologies fit into sociocultural patterns and serve humankind. An example might be a biodegradable,low-input,plant-based plastic.

Industrial Ecology/Industrial Metabolism - The transformation of the traditional model of industrial activity, in which an individual manufacturing plant takes in raw materials and generates products to be sold plus wastes to be disposed of. Industrial ecology is more integrated. The consumption of energy and materials is optimized and the effluents of one process serve as the raw material for another. The concept requires that an industrial system be viewed not in isolation from its surrounding systems but in concert with them.

Sustainable Production - The creation of good and services using processes and systems that are:non-polluting; conserving of energy and natural resources;economically viable; safe and healthful for workers, communities and consumers; socially and creatively rewarding for all working people.

Products/Materials

Cascading - A way to extend the life of products through reuse and repair, where products or their components are used in different ways throughout their serviceable life. Products are first made with virgin materials.They can be reused with minimal additional inputs of material and energy. Then they will need more substantial repair, re-entering the system at a lower economic value. They may be reconditioned, returning them to almost original state. Eventually the value of a product lies only in the value of its components.

Design for Environment (DfE) - The application of systematic environmental criteria to product and process design aimed at the prevention of waste and emissions and the minimization of environmental impacts along the material life cycle of the product. It is an engineering design initiative that promotes environmentally sound decisions at every step of the production process. Design for environment takes into account:material selection;packaging design; energy use; disassembly; reuse; recycling; and remanufacturing.

Clean(er) Product - Products that reduce the amounts of waste, resources, energy, water, and toxic chemicals used throughout their life cycles. See also, design for environment and sustainable product design.

Demand-Side Management - Reducing the demand for raw materials or energy by improving efficiency of materials use.

Dematerialization - A technological shift away from economies based on enormous and increasing consumption of raw materials. Requires a reduction of the life cycle-wide material energy and resource inputs used for products, services, and infrastructure.

Design for Remanufacture/Design for Efficient Longevity - The development of products that last longer, whose life can easily be extended or whose use can be more efficient. The purpose is to conserve resources and reduce costs of solid waste measurement. Another goal is to reduce the volume of product manufactured and reduce the quantity of primary materials

Ecocycle Society - A society with cyclic management of goods, production, and materials. This is accomplished by reuse and reclamation. The objective is more efficient use of resources and reduced amounts of waste. In an ecocycle society, production becomes circular rather than linear as in current production systems.

Material Flows - The flow of resources, raw materials (steel,iron,petrochemicals),energy, and waste through an economy. This can be used to calculate total material requirements or total material flows through an economy, a measure of the total use of natural resources that national economic activity requires.

Materials Policy - The incorporation of environmental and health and safety considerations into choices about materials used in the production of goods and services.

A materials policy considers the environmental and health and safety impacts of a material throughoutits life cycle and attempts to identify less environmentally damaging and resource intensive materials to provide a specific function. A materials policy can be global, for a country or region, or developed on a company-specific basis.

Material Intensity - A measure of the amount of raw materials and energy used to produce a particular product.

Materials Accounting - There are two definitions for materials accounting:macro and micro. At the macro level,materials accounting systematically tracks the physical flows of natural resources and synthetic materials through extraction,production, fabrication,use and recycling, and final disposal, accounting for losses along the way for an entire economy. At the micro (firm) level,particularly regarding toxics use reduction or clean production planning, materials accounting assists the firm in measuring the flow of toxic materials through the firm, the amount of toxic materials generated as by-product (per unit of product), and the amount of toxic materials incorporated into products. This could also be extended to non-toxic materials, water, and energy.

Product Life Extension,Optimal Utilization - The aim of product life extension is to extend the period of time over which products fulfil useful functions in the industrial economy. Some key elements of product life extension include: reuse, repair and maintenance, reconditioning or remanufacturing, and recycling.

Sustainable Consumption - The provision of services and products which respond to basic needs and enable a good quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product. Sustainable consumption is accomplished by changing lifestyles, pricing products and services in a way that takes full account of the environmental cost, and implementing government policies to promote more sustainable resource use and safer, cleaner products.

Sustainable Product Development/Environmental Product Development/Eco-Design/Green Product Design - Goes beyond environmental optimization of products and services to include the following considerations: A greater focus on impacts at the early stages of a product (where impacts might be greatest); resource use policy, including the selection of resources;basic human needs, essential product functions; the systems in which products function; and the distribution of resources among nations and generations.Sustainable products and services are solutions that incorporate critical energy and material resource savings.They are contextsensitive,future oriented and designed to fulfil elementary human needs in an equitable and environmentally harmonious way.

Policy/Management Tools

Eco-Efficiency - According to the World Business Council on Sustainable Development it is reached by delivery of competitively priced goods and services and services that satisfy human needs and bring quality of life while progressively reducing ecological impacts and resource intensity through the life cycle to a level at least in line with the Earth's carrying capacity. Criteria for eco-efficiency include: minimization of the material and energy intensity of goods and services;minimizing toxic dispersion; and extended product durability and service intensity.

Eco-Labeling - Labeling of products as to their environmental impacts/benefits, resource or energy use. Labeling can either be company specific or centralized for all companies as part of a labelling organization or government agency. Eco-labeling has been a common way of providing information to consumers in Europe through programs such as the Green Dot and Nordic Swan. Some examples of eco-labelling programs in the U.S. include Green Seal and Energy Star.

Ecological Footprint/Ecological Rucksack - The total area of productive land and water required to produce on a continuous basis all the resources consumed and to assimilate all the wastes produced by a defined population. Calculating an ecological footprint (usually shown on a map) provides a rough measure of the natural capital requirements of any population in comparison with available supply.

Ecological Tax Reform (ETR)/Eco-Taxes/ECOnomic Tax Reform/Green Taxes - A shift of taxes away from value adding activities such as labor and capital onto value-depleting activities such as overuse of environmental resources. In shifting taxes, it attempts to achieve a wider use of labor and a wiser use of nature. It is one way to capture a portion of the externalities of production by recycling revenues from resource pollution taxes to finance lower taxes on employment and enterprise.. Types of ecological taxes include: carbon taxes, energy taxes, effluent charges.

Environmental Audit - A management tool comprising a systematic,documented, periodic and objective evaluation of the performance of the organization,management system, and process designed to protect the environment. Audits facilitate management control of processes, assess hazards and opportunities for hazard reduction and measure compliance with applicable laws and company policies.

Environmental Management Systems (EMS) - That part of the overall management system that includes the organizational structure, responsibilities, practices, procedures, processes and resources for determining and implementing the environmental policy. Itp rovides order and consistency for organizational efforts to address environmental concerns through the allocation of resources, assignment of responsibilities, and ongoing evaluation of practices, procedures, and processes.

Extended Producer Responsibility/Extended Product Responsibility/Product Take-Back - The principle that manufacturers of products bear a degree of responsibility for the environmental impacts of their products throughout their life cycles. This includes upstream impacts inherent in the selection of materials for the products, impacts from the manufacturer's production process itself, and downstream impacts from the use and disposal of the products. The aim of EPR is to encourage producers to prevent pollution and reduce resource and energy use in each stage of the product's life cycle through changes in product design and process technology. Waste management costs are

transferred away from the local government authorities and the general taxpayer toward the product manufacturer, distributor, marketer, and individual consumer.

Factor 4/Factor 10 - In order to achieve both economic and ecological progress in a sustainable way, it will be necessary to sharply reduce the material intensity per unit of service of products. For a 50% reduction of global material flows, future installations, products, and services would have to dematerialize by a factor of 10. In other words, in order to provide for future generations we must decrease the impact of economic activity on the environment.

Facility Planning - A process through which firms gain a detailed understanding of production processes, why specific chemicals are being used, and overall material flows.Through the planning process, firms identify, comprehensively analyze,implement, and measure alternatives that are technically and economically viable and that do not pose new environmental or health and safety risks.

Full-CostAccounting - An accounting method to integrate the full environmental and health and safety costs (including paperwork,liability, fines, and health costs) of a particular production process. Costs are attributed to the specific production process that uses a hazardous material rather than aggregated into corporate overhead.

Life Chain Management - Complementary to LCA ,i t i s the management and reduction of impacts throughout the life cycle of an activity, process or product.

Life Cycle Assessment (LCA) - A tool to evaluate the environmental consequences of a product or activity holistically, across its entire life. It can be used to support a decision about a purchase,innovation of production processes or product approval. LCA is a method to evaluate the environmental effects associated with any given activity from the initial gathering of raw material from the earth until the point at which all residuals are returned to the earth.There are three components to an LCA:inventory analysis;impact analysis;and improvement analysis.

MIPS (Material Input Per Unit Service) - An indicator of the environmental impact potential of goods over their life cycle. It describes the weighted material inputs per unit of service obtainable, measuring energy and waste (butnot toxicity).It reflects the environmental impact intensities and allows comparison of functionally equivalent economic outputs from an ecological point of view. The MIPS concept was developed by the Wuppertal Institute in Germany.

The Natural Step - A consensus process which started in Sweden with scientists agreeing on four fundamental system conditions for a sustainable society. According to them, these are the lowest common denominators of any conceivable sustainable economy and define where society is heading. These conditions include:substances from the Earth's crust mustnot systematically increase in nature;substances produced by society must not systematically increase in nature;the physical basis for the productivity and diversity of nature must not be systematically diminished; and fair and efficient use of resources to meet human needs. Companies around the world are now taking courses and signing onto these principles, which are voluntary and unmeasured.

Sustainability Indicators - Measures of the sustainability (the long term viability and resource use) of a product,production process, or society. Sustainability indicators can be purely environmental or include worker health and safety, overall economic sustainability, and societal impacts. Sustainability indicators may include: the type and rate of material and resource use; the amount and type of energy consumed; the amount and toxicity of waste and emissions, quality of work and economy of a region; and the amount of land used or reused.

Towards Clean Production: Contact List

The following groups and individuals contribute to implementing Clean Production. Although there are some duplications, this alphabetically listed guide has been divided into two main sections.

Some publications are given at the end of each section or mentioned at the end of an organization's name.

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CLEAN PRODUCTS 47
Those who work at the product design level to increase resource efficiency and safer material use.

- **Eco-design** 47
- **Life Cycle Assessment** 47
- **Alternative Materials, Materials Policy and Indices** 51

POLLUTION PREVENTION/CLEANER PRODUCTION 55
Those who work at minimizing toxic materials and improving resource efficiency in various manufacturing processes. Listed alphabetically by country.

Additional listings are given for the following types of categories which cover both products and processes.

PUBLIC ACCESS TO INFORMATION 60

ECOLOGICAL ECONOMICS AND FINANCING SUSTAINABILITY 61

LABOR AND TRANSITION PLANNING 62

BUSINESS POLICIES ON CLEANER PRODUCTION 63

EDUCATIONAL INSTITUTIONS PROMOTING CLEAN(ER) PRODUCTION 64

NETWORKS INVOLVED WITH CLEANER PRODUCTION 65

Note: While comprehensive, this listing is by no means complete. We encourage readers to send us information on new contacts, networks, and sources of information so as to continuously update this work.Also, while we have made every effort to verify the information contained in this resource guide, some addresses, emails, or web pages might be incorrect. Please let us know if there are any problems.

CLEAN PRODUCTS

• Eco-Design

Ecodesign is the integration of environmental criteria into product design. Such criteria cover choice of safer material,pursuit of resource and energy efficiency, and attention to material reuse at the end of the product's first consumer life.

Carnegie Mellon University
Green Design Initiative
5000 Forbes Avenue
Pittsburgh, PA 15213-3890
Tel: (1) 412-268-2299
Email:ncoy@andrew.cmu.edu
http://gdi.ce.cmu.edu/index.html

Promotes environmentally conscious engineering, product and process design, manufacturing, and architecture.

Center for Clean Products and Clean Technologies
University of Tennessee Knoxville
600 Henley Street, Suite 311
Knoxville, TN 37996-4134
Tel: (1) 423 974 8979
Fax: (1) 423 974 1838
Email: gadavis@utk.edu
http://www.utk.edu/ph/
Contact:Gary Davis

The center focuses on product chain and material flows and is one of the first centers in the United States to specialize in clean product development. It also raises awareness of European developments among North Americans.

Centre for Design at Royal Melbourne Institute of Technology (RMIT)
GPO Box 2476V
Melbourne Victoria 3001
Australia
Tel: (61) 3 9925 2362
Fax: (61) 3 9639 3412
Email: cfd@rmit.edu.au
http://www.cfd.rmit.edu.au

Develops and demonstrates new design methods, works with industry to design greener products, advises government on policies to reduce environmental impacts through design, and maintains a national and international network of research and information exchange.

The Centre for Sustainable Design
Faculty of Design
The Surrey Institute of Art and Design
Falkner Road
Farnham,Surrey GU9 7DS
United Kingdom
Tel: (44) 1252 732 229
Fax: (44) 1252 732 274
Email:spd@cfsd.org.uk
http://www.cfsd.org.uk
Contact:Martin Charter or Ann Chick

The Centre publishes *the Journal of Sustainable Product Design*, holds conferences, and operates a listserve.

The Consortium on Green Design and Manufacturing (CGDM)
Mechanical Engineering
5145 Etcheverry Hall
Berkeley, CA 94720-1740
Tel: (1) 510-642-9359
Fax: (1) 510-643-5599
http://greenmfg.me.berkeley.edu/green/Home/Index.html
Contact: Paul S. Sheng

The Consortium on Green Design and Manufacturing encourages multidisciplinary research and education on environmental management and pollution prevention issues in critical industries. Projects include end-of-life management,product design, and manufacturing design.

Delft University of Technology
Faculty of Industrial Design Engineering
Section for Environmental Product Development and Network of Innovation Centres in the Netherlands (ICNN)
EcoDesign project
Jaffalaan 9
2628 BX Delft
The Netherlands
Tel: (31) 15 278 2738
Fax: (31) 15 278 2956
Email:a.g.c.vanboeijen@io.tudelft.nl
http://www.io.tudelft.nl/research.mpo/index.html

Delft is at the forefront of material resource reduction projects and works internationally on indigenous product design as well as nationally with Dutch companies as part of the innovation network. The Centre has also published an EcoDesign Manual: *A Promising Approach to Sustainable Production and Consumption* (see Publications).

The Centre publishes the Green Product Design newsletter. Email:Lroos@IO.TUDelft.NL for more details

Demanufacturing Partnership Program
Rutgers University
Ackerson Hall, Room 300A
180 University Avenue
Newark, NJ 07102
Tel: (1) 201-648-5683
Fax: (1) 201-648-1175
Email:jmmahon@andromeda.rutgers.edu
http://newark.rutgers.edu/~jmmahon/dpp/
Contact: Joan Mahon

Encourages development of demanufacturing as an environmental initiative that produces economic development. Disseminates new information about demanufacturing to industry and academia through conferences;addresses key concerns of manufacturers and demanufacturers of computers, electronics and automobiles through conferences and newsletters;and informs urban municipalities about the benefits of demanufacturing as a means of providing jobs while reducing waste.

Ecodesign Website
Emails:edrs@infoserve.net
http://www.ecodesign.bc.ca
Contains links and information on sustainable design.

Eindhoven University of Technology
Reverse Logistics (Take-back technology)
Stan Ackermans Institute
Logistic Control System,
Pav.L17
P.O.Box 513
5600 MB Eindhoven
The Netherlands
Tel: (31) 40 247 44 04
Fax: (31) 40 246 20 83
http://www.tue.nl/ivo/lbs/main/index.htm

Reverse Logistics is the process of continuously taking back products and/or packaging materials to avoid further waste disposal in landfills or high energy consumption through the incineration process.

European PREPARE Working Group
Aries Environmental Innovation
University Business Centre Nijmegen
Toernooiveld 106
P.O. Box 31070
6503 CB Nijmegen
The Netherlands
Tel: (31) 24 3528804
Fax: (31) 24 3540090
Email:ariesenvi@wxs.nl
http://www.io.tudelft.nl/research/mpo/prepare/
Contact:Marcel Crul

PREPARE, a European initiative on pollution prevention, holds workshops and conferences for specific industrial sectors. One initiative, CARE 2000, examined the potential for cleaner electronic products and end-of-life waste reduction.

Industrial Ecology and Sustainable Product Design
Norwegian Academy of Technological Sciences
Lerchendal Gard
N-7034 Trondheim
Norway
Tel:(47) 73 59 54 63
Fax:(47) 73 59 14 10
Email: ntva@kjemi.unit.no
http://www.ntnu.no/ntva/index_en.htm

McDonough Braungart Design Chemistry
619 East High St.
Charlottesville, VA 22902
Tel (1) 804-295-1111
Fax (1) 804-295-1500
http://www.mbdc.com

MBDC partners with companies on in-depth,multifaceted analysis and synthesis of products and processes to comply with a series of protocols for "sustainable design." MBDC has developed its index of sustainability to measure ecocompatibility of processes and products and advocates a cradle-to-cradle life cycle optimization approach based on reuse of wastes.

Milan Polytechnic Institute
Research Unit on Design, Product,Environment
CIRIS – Centro Interdipartimentale Diricerca
Innovazione per la Sostenibilita Ambientale
Dipartimento DLTEC
Via Bonardi 3
20133 Milano
Italy
Tel/Fax: (39) 2 2399 5124
Email:manzini@cdc8g5.cdc.polimi.it
http://www.polimi.it/en_home.html
Contact: Ezio Manzini

The Open University Faculty of Technology (Design)
Design Innovation Group
Walton Hall
Milton Keynes MK7 6AA
United Kingdom
Tel: (44) 190 8653 970
Fax: (44) 190 8654 052
Email:R.Roy@open.ac.uk
http://www.unido.org/services/environment/envncpc/envncpc2.htmls
Contact:Dr. Robin Roy

Product-Life Institute
P.O. Box 3632
CH-1211 Geneva 3
Switzerland
Tel:(41) 22 346 3932
Fax:(41) 22 3472 078
Email: geneva.association@iprolink.ch
http://product-life.org/
Contact:Mr. Walter R. Stahel

Expert in material reuse, resource efficiency and the role of products as services.

Sustainable Technological Development (STD)
Duurzame Technologische Ontwikkeling (DTO)
Postbus 6063
2600 JA Delft
The Netherlands
Tel: (31) 15 2697 544
Fax: (31) 15 2697 547
Email: vergragt@wtm.tudelft.nl
http://www.io.tudelft.nl/research/mpo/dfs3und.htm
Contact:Prof. Philip Vergragt

The STD – an initiative and report of five Dutch government ministries - explores what is needed to achieve material sustainability using a backcasting approach from the year 2020. It concludes "technology will not save us" and that the factor 10 to 40 resource efficiencies that are necessary can only be achieved via radical material substitution and the adoption of service economies. *English summary available.*

Technical University of Denmark (TUD)
Institute for Product Development
DTH Bygning 423
DK-2800 Lyngby
Denmark
Tel: (45)45 93 2522
Fax: (45)45 93 2529
http://www.dtu.dk/index_e.htm

TU-Wien University of Technology Vienna
Institut fuer allgemeine Maschienenlehre,Abteilung Konstruktionslehre. (E321/2)
Information point on ECODESIGN
Getreidemarkt 9
1060 Wien
Austria
Tel: (43) 1 58801/ 4859
Fax: (43) 1 5865847
Email:wimmer@ft.tuwien.ac.at
http://www.ecodesign.at/ecodesign/
Contact:Mr. Wolfgang Wimmer

United Nations Environment Programme Working Group on Sustainable Product Development (UNEP-WG-SPD)
J.H. van 't Hoff Institute (B-315),
Nieuwe Achtergracht 166
1018 WV Amsterdam
The Netherlands
Tel: (31) 20 525 6268
Fax: (31) 20 625 8843
Email:unep@unep.frw.uva.nl
http://unep.frw.uva.nl/
Contacts: Hans van Weenen, Anne Elsen, and Yorick Benjamin

An excellent source of information on product design, resource efficiency and renewable materials, particularly from an indigenous design viewpoint. Provides international network directory, listserve and upcoming conference events. Web page contains useful information and contacts.

U.S. Environmental Protection Agency
Design for the Environment Program Office of Pollution Prevention & Toxics
401 M St., S.W. 3404
Washington DC 20460
Tel: (1) 202-260-1815
Fax: (1) 202-260-0178
http://www.epa.gov/opptintr/dfe/

The U.S. Environmental Protection Agency (EPA) Design for the Environment (DfE) Program helps businesses incorporate environmental considerations into the design and redesign of products, processes, and technical and management systems.Initiated by EPA's Office of Pollution Prevention and Toxics (OPPT) in 1992, DfE forms voluntary partnerships with industry, universities, research institutions, public interestgroups, and other government agencies. To date,most work has been on energy efficiency.

PUBLICATIONS

Clean Production Strategies: Developing Preventive Environmental Management in the Industrial Economy
Ed. Tim Jackson
Stockholm Environment Institute
Lewis Pub. 1994
http://www.calypso.net/sei/

An excellent academic overview of clean production focusing on both clean products and clean production.

Material Concerns: Pollution, Profit, and Quality of Life
Tim Jackson,
Routledge, 1997

The second in the series by the same author. A simple overview of clean production/product materials.

EcoDesign Manual: A Promising Approach to Sustainable Production and Consumption, 1997
Available from:
UNEP Industry and Environment Centre
39-43 Quai Andre Citroen
75739 Paris Cedex 15
France
Tel: (33) 1 44 37 14 50
Fax: (33) 1 44 37 14 74
Email:unepie@unep.fr
http://www.unepie.org/home.html

• Life Cycle Assessment

LCA is the qualitative or quantitative method of assessing the impact of products from 'cradle to grave: raw material extraction, manufacturing or processing, consumer use and disposal. LCAs were developed as a tool to improve product design but have become increasingly used to advertise the benefits of one product over another. LCAs are intrinsically based on value judgements and availability of data, hence all assumptions should be publicized if companies use LCAs as a tool for promotion.

Center for Sustainable Systems
School of Natural Resources and Environment
University of Michigan
Tel: (1) 734-764-3194
Fax: (1) 734-647-5841
Email:gregak@umich.edu
http://www.umich.edu/~nppcpub/
Contact:Gregory A. Keoleian

Provides information on life cycle assessment, product design, and case studies.

Ecosite – The World Wide Resource for LCA
Email:ecosite@ecosite.co.uk
http://www.ecosite.co.uk/

Contains detailed information, software, and links on life cycle assessment.

Environment Canada
Hazardous Waste Branch
Ottawa, Ontario
Canada K1A 0H3
Tel: (1) 819-997-3060
Fax: (1) 819-953-6881
Email:kbrady@synapse.net or
Apaynter@synapse.net
http://www.ec.gc.ca/ecocycle

Publishes an *Ecocycle Newsletter* on life cycle tools, management, and product policy.

The Global Ecolabeling Network (GEN)
GEN Secretariat
Swedish Standards Institution
Box 3295, S-103 82 Stockholm
Sweden
StEriksgatan 115
Tel:(46) 8-610-30-00
Fax:(46) 8-34-20-10
E-mail. gen.secretariat@sis.se
http://www.interchg.ubc.ca/ecolabel/gen.html

Non-profitassociation of ecolabeling organizations from around the world. These groups set criteria for and certify products and services with lower environmental burdens and impacts than comparable products with the same function.

GreenSeal
1400 16th St., NW, Suite 300
Washington, DC 20036
Tel: (1) 202-588-8400
Fax: (1) 202-588-8465
http://www.greenseal.org/

Independent organization that promotes the manufacture and sale of environmentally responsible consumer products. It sets environmental standards and awards a "Green Seal of Approval" to products that cause less harm to the environment than other similar products.

PRé
Product Ecology Consultants
Plotterweg 12
3821 BB Amersfoort
The Netherlands
Tel: (31) 33 4555022
Fax: (31) 33 4555024
Email:info@pre.nl
http://www.pre.nl

PRé markets a popular life cycle assessment software tool available on CD ROM for personal use.

The Society of Environmental Toxicology and Chemistry (SETAC)
1010 North 12th Avenue
Pensacola, FL 32501-3367
Tel: (1) 850-469-1500
Fax: (1) 850-469-9778
Email:setac@setac.org
http://www.setac.org

An independent, professional organization, SETAC is the lead organization for guidance on life cycle assessment.

Sophus Berendsen A/S
Klausdalsbrovej 1
DK-2860 Soborg
Denmark
Tel: (45) 3 969 8500
Fax: (45) 3 969 7300
Email:kim.christiansen@SBI.BERENDSEN.COM
http://www.berendsen.dk/default1.htm
Contact: Kim Christiansen

Expert in life cycle assessment development and safer product substitution.

Dr. Steven B. Young
154 Glasgow StreetNorth
Guelph,Ontario
Canada N1H 4W8
Tel: (1) 519-822-1660
Fax: (1) 519-822-0796
http://www.io.org/~lca
http://www.trentu.ca/lca

Consultant on LCA and maintains a website that explains the methodology.

• Alternative Materials, Materials Policy and Incices

The following groups research the sustainability of resource availability, the speed of material flow through societies, and materials use by industrial sectors and consumers.Indices have been developed to quantify resource depletion by industrial production and consumer product use. Some organizations research safer material development based on ecological criteria.Others research and publicize the level of increased efficiencies that industrialized societies mustachieve to haltour current unsustainable level of material depletion.

ALTERNATIVE MATERIALS AND MATERIAL POLICIES

ACTIN (Alternative Crops Technology Interaction Network)
Tel: (44) 1243 53 88 96
Fax: (44) 1243 53 88 97
Email:info@actin.co.uk
http://www.actin.co.uk

ACTIN is the national industry-led initiative to promote crop-derived oil, fiber, starch and specialty chemical products as renewable raw materials for industry, in place of petrochemical sources. ACTIN is the UK representative in IENICA (Interactive European Network for Industrial Crops and their Applications) and ERMA (European Renewable Raw Materials Association).

Agricultural Research Department (DLO-NL)
Agrotechnological Research Institute (ATO-DLO)
Bornsesteeg 59
PO Box 17
NL – 6700 AA Wageningen
The Netherlands
Tel: (31) 317 47 50 13
Fax: (31) 317 47 53 47
Email: J.T.P.DERKSEN@ATO>DLO.NL
http://www.cpro.dlo.nl/root/gencond.htm

Expertise in product design from renewable materials.

Agricultural University of Norway
Department of Engineering
Box 5065 1432 Aas
Norway
Tel:(47) 6494 8666
Fax:(47) 6494 8810
http://www.nlh.no/sevunlh /kortekurs/98306.htm

Expertise in ecological engineering such as biological systems for water reuse

Center for Environmentally Appropriate Materials
University of Massachusetts Lowell
One University Avenue
Lowell, MA 01854-2881
Tel: (1) 978-934-3275
Fax: (1) 978-934-3050
http://www.uml.edu/res/misc/envappro.html
Contact: Charlie Pace

The Center has produced a *Reader on Bio-Based Materials* and sponsors research on green chemistry, sustainable materials and technology. See also, Toxics Use Reduction Institute, University of Massachusetts, Lowell.

The Industrial Hemp Network
P.O. Box 1716
Sebastopol, CA 95473
Tel: (1) 707-823-2800
Fax: (1) 707-823-2424
E-mail:info@hemptech.com
http://hemptech.com/

One example of the growing network to revitalize an ecological and renewable resource.

Institute for Local Self-Reliance
National Office
2425 18th Street,NW
Washington, DC 20009-2096
Tel: (1) 202-232-4108
Fax: (1) 202-332-0463
http://www.ilsr.org/
Contact:David Morris

Midwest Office
1313 Fifth Street SE
Minneapolis, MN 55414-1546
Tel: (1) 612-379-3815
Fax: (1) 612-379-3920

The Institute (ILSR) works on local solutions and material flows and helped to revitalize the Carbohydrate Economy. ILSR has an excellent web site with information on plant-based materials and links.They also have an extensive publications list.

International Ecological Engineering Society
Centre for Applied Ecology
Bahnhofstrasse 2
CH-6110 Wolhusen
Switzerland
Tel/Fax:(41) 41 490 40 74
http://www.iees.ch/
Contact:Dr. Johannes Heeb

An interesting international network of water and waste engineers that work according to eco-criteria. Expertise in plant purification and other biological

techniques for sewage and wastewater as well as consumer waste. The society holds conferences and produces a technical journal.

International Institute for Environment and Development (IIED)
3 Endsleigh Street
London WC1H ODD
United Kingdom
Tel: (44) 171 388 2117
Fax: (44) 171 388 2826
Email:nick.robins@iied.org
http://www.iied.org/
Contact:Mr. Nick Robins

Conducts research on business and sustainability

International Institute for Sustainable Development (IISD)
161 Portage Avenue E., 6th FL
Winnipeg, Manitoba
Canada R3B 0Y4
Tel: (1) 204-958-7700
Fax: (1) 204-958-7710
Email:info@iisd.ca
http://iisd.ca/susprod/default.htm

IISD's mission is to promote sustainable development in decision making internationally and within Canada. IISD has the following areas of activity: business strategies, trade and sustainable development,sustainable communities, and measurement and indicators. IISD's papers and email conference on sustainable production and consumption are available on the website.

KIEM/Proterra
109 Rapanburgerstraat
Amsterdam
The Netherlands
Tel: (31) 20 638 5678
Fax: (31) 20 683 4905
Email:proterra@aglink.nl

Expertise in product design from renewable materials.

The National Center for Remanufacturing and Resource Recovery
Rochester Institute of Technology
One Lomb Memorial Drive
Rochester, NY 14623
Tel: (1) 716-475-2411
http://www.reman.rit.edu/index.htm

Provides technical assistance and applied research and development to the remanufacturing industry and manufacturers interested in remanufacturing and resource recovery techniques.

Oko-Institut e.V.
Institute for Applied Ecology Product and Chemistry Division
Postfach 6226
79 038 Freiburg
Germany
Tel: (49) 761 452 950
Fax: (49) 761 475 437
http://www.oeko.de/english/depart.htm
Contact:Dr. Rainer Griesshammer

Expertise on material flows.

Ökopol,
Nernstweg 32-34,
22765 Hamburg
Germany
Tel: (49) 40 39 16 28;
Fax: (49) 40 399 006 33
Email:info@oekopol.de
http://www.oekopol.de/index.htm
Contact: Joachim Lohse

Expertise on extended producer responsibility and material flows.

The Rockefeller University
Program on the Human Environment
1230 York Ave,Box 234
New York, NY 10021-6399
Tel: (1) 212-327-7842
Fax: (1) 212-327-7519
Email:phe@rockvax.rockefeller.edu
http://phe.rockefeller.edu

Examines how long-run technical change relates to productivity and efficiency of energy, materials, land, and other resources, and the consequences for human populations.Elaborates the technical vision of a "micro-emissions society."

Rocky Mountain Institute
1739 Snowmass Creek Road
Snowmass, CO 81654-9199
Tel: (1) 970-927-3851
Fax: (1) 970-927-3420
http://www.rmi.org/

Innovative solutions on materials, water, and energy efficiency.

Swedish Ecocyle Commission
Ministry of the Environment
S-103 33 Stockholm
Sweden
Tel:(46) 8 405 10 00
Fax:(46) 8 20 46 66
Email:siv.naslund@environment.ministry.se
http://www.agenda21.se/kretsloppsd/english.htm

The Ecocycle Commission was established by the Swedish Government in 1993 in order to pursue and coordinate work on ecocycle issues. The Commission spearheads the adaptation of society to ecocycle principles and bears the overall responsibility for promoting the development of new methods for managing resources, materials, and goods (including work on extended producer responsibility). The Ecocycle Commission has published several reports, mostin Swedish.

Technical University Graz
Institute of Biotechnology
A-8010 Petersgasse
Austria
Tel: (43) 316 873 8405
Fax: (43) 316 873 8434
Email:moser@biote.tu-graz.ac.at
http://www.tu-graz.ac.at
Contact:Anton Moser

Researches and promotes eco-criteria for decision making. Coordinates International Society for Ecological Engineering.

University of Manchester and UMIST
Material Science Centre
Grosvenor St
Manchester M2 7HS
United Kingdom
Tel: (44) 161 200 3574
Fax: (44) 161 200
http://www.man.ac.uk/

Conducts extensive research on biopolymers.

The University of Reading
Centre for Biomimetics TOB 1
Earley Gate
Reading RG6 2AT
United Kingdom
Tel: (44) 1734 318 418
Fax: (44) 1734 352 421
http://www.rdg.ac.uk/Biomim/

Researches new materials based on the properties of natural materials.

U.S. Environmental Protection Agency
Green Chemistry Initiative
Office of Pollution Prevention & Toxics
401 M St., S.W. 3404
Washington DC 20460
Tel: (1) 202-260-1815
Fax: (1) 202-260-0178
http://www.epa.gov/opptintr/dfe/greenchem/index.html

Green Chemistry is described as the design, manufacture, and use of environmentally benign chemical products and processes that prevent pollution and reduce environmental and human health risks. The Green Chemistry Program supports fundamental and innovative chemical technologies that are cost-effective,and useful to industry. BEWARE: The web site cites the more efficient production of the herbicide, Roundup, as an example of producing benign intermediates for toxic products.

MATERIALS INDICES

Wuppertal Institut für Klima Umwelt und Energie
Div. for Material Flows and Structural Change
Postfach 100480
D-42004 Wuppertal
Germany
Tel: (49) 202 2492 163
Fax: (49) 202 2492 138
Email:fritz_hinterberger@wupperinst.org
http://www.wupperinst.org
Contact:Dr. Fritz Hinterberger

Wuppertal has an on-line newsletter, listserve,and extensive publications on resource efficiency. Italso publishes a newsletter on ecological economics, including ecological tax reform and resource efficiency/reductions.It has many departments dealing with various aspects of product life cycle as well as sustainability indices (see publications).

Yale School of Forestry and Environmental Studies
Program on Solid Waste Policy
205 Prospect Street
New Haven, CT 06511-2189
Tel: (1) 203 432 3253
Fax: (1) 203 432 5912
Email: reid.lifset@yale.edu
http://www.yale.edu/pswp/
Contact: Reid Lifset

Expertise on extended producer responsibility. Also editor of *Journal of Industrial Ecology* (see publications).

The following are three ways of quantifying the ecological burden of product resource use. They can be used to assess substitute technology and products as well as provide an important educational tool.

Ecological Footprints
University of British Columbia
School of Community and Regional Planing
6333 Memorial Road
Vancouver, BC
Canada V6T 1ZU
Tel: (1) 604 822 3276
Fax: (1) 604-822-3787
Email:wrees@unixg.ubc.ca
mathiswa@dinocoacade.uv.mx
http://www.edg.net.mx/'mathiswa
Contact: William Rees or Mathias Wackernagel

Ecological Rucksack/Material Intensity per Unit of Service (MIPS)
Wuppertal Institut für Klima Umwelt und Energie
Div. for Material Flows and Structural Change
Contact:Dr. Fritz Hinterberger
(See further description in previous section)

Sustainable Process Index
Institute of Chemical Engineering
Graz University of Technology
A-8010 Graz
Inffeldgasse 25
Austria
Tel: (43) 316 873 7464
Fax: (43) 316 873 7469
Email:kro@glvt.tu-graz.ac.at
http://www.tu-graz.ac.at
Contact: Christian Krotscheck or Mikail Narodoslawsky

EcoCal
Going for Green
Elizabeth House,
The Pier, Wigan, WN3 4EX.
United Kingdom
Tel:01942 612621.
Fax:01942 824778.
email:gfg@dircon.co.uk
http://www.gfg.iclnet.co.uk/

PUBLICATIONS

A Fair Share:Environmental Space as a Tool for Changing Consumption Patterns.
Oivind, Fjelstad
http://www.iisd.ca/linkages/consume/fjeld.html
Concept of Sustainable Islands:
A Network of Sustainable Regions
STENUM GmbH
Sparbersbachgasse 22
A-8010 Graz
Austria
http://stenum.co.at/home.htm
Contact:Heize Peter Wanner

Ecological Footprints: Making Tracks toward Sustainable Cities.
Rees, William E.
University of British Columbia
http://www.iisd.ca/linkages/consume/brfoot.html

Ecological Footprints of Nations: How Much Nature Do They Use? How Much Nature Do They Have?
Mathis Wackernagel, et. al.
paper commissioned and funded by the Earth Council for Rio +5, 13-19 March, 1997.
Center for Sustainability Studies, Xalapa, Mexico, 1997.
http://www.iisd.ca/linkages/consume/mwfoot.html

The Future Of The Global Environment: A Model-Based Analysis Supporting UNEP's First Global Environment Outlook.
Jan Bakkes and Jaap van Woerden et al (eds.).
Netherlands Institute for Public Health and the Environment, Bilthoven, Netherlands: 1997.

Factor Four: Doubling Wealth, Halving Resource Use - The New Report to the Club of Rome
Ernst von Weizacker, Amory B Lovins and Hunter Lovins
Earthscan, 1997
http://www.eco-ops.com/eco-ops/EQE/books/welcome.html

"The purpose of this book is practical change," the authors note, and go on to chronicle 50 examples of quadrupling resource productivity — 20 each for energy and material productivity, and 10 for transportation productivity.

Factor Ten: The Carnoules Declaration
Development Alternatives, 4(12): p. 1-4.

Factor 10
Karl Hansen
Developing Ideas 1, January 1996: p4.
http://192.197.196.1/didigest/jan96/3jan96.htm

The Fossil Makers: Factor 10 and More
Friedrich Schmidt-Bleek and Wuppertal Institute for Climate, Environment, and Energy.
Birkhauser Basel, Germany 1994.
http://wupperinst.org/Sites/home1.html

The Greening of Industrial Ecosystems.
Braden R. Allenby and Deanna J. Rickards, (eds.).
National Academy Press, Washington, DC: 1994.

Genetic Engineering: Dreams or Nightmares? The Brave New World of Bad Science and Big Business
Dr. Mae Wan Ho
Third World Network
A-60 Hauz Khas, New Delhi 110 016
India
Tel: (91) 11 696 8077
Fax: (91) 11 685 6795, 462 6699
Email: vandana@twn.unv.ernet.in

The revitalization of renewable materials use has led to the growth of genetically engineered crops. This book gives a detailed overview of why genetic engineering is a global threat to biodiversity and ecosystem stability.

How Much Is Enough?: The Consumer Society and the Future of the Earth.
Alan Thein Durning.
Worldwatch Environmental Alert Series.
W.W. Norton, New York: 1992.

How to Measure Sustainability?
Christian Krotscheck and M. Narodoslawsky
Order from Graz University (See above)

Comparison of flow based (mass and/or energy) highly aggregated indicators for eco-compatibility.

Journal of Industrial Ecology
MIT Press.
Five Cambridge Center,
Cambridge MA 02142
Tel: (1) 617 253 2889
Fax: (1) 617 577 1545
http://mitpress.mit.edu/JIE

Describes a range of policies that spring from industrial ecological principles such as LCA and extended producer responsibility.

Material World: A Global Family Portrait
Peter Menzel
Sierra Club Books
San Francisco, CA, 1995.
http://www.sierraclub.org/books/index.html

MIPS Re-Visited
Fredrich Schmidt-Bleek, and Wuppertal Institute.
Fresenius Environment Bulletin, vol. 2: 407-412, 1993.

Population and Consumption Issues for Environmentalists
A literature search and bibliography prepared by the Population Reference Bureau for the Pew Charitable Trusts' Global Stewardship Initiative.
Washington, DC: 1993.

Product Policy in Europe: New Environmental Perspectives
Frans Oosterhuis, F. Rubik, G.Scholl
IOW
Bergheimer Strasse 95
D-69115 Heidelberg
Tel: (49) 6221 167954
Fax: (49) 6221 27060

The Product Side of Pollution Prevention: Evaluating the Potential for Safe Substitutes
US EPA and University of Tennessee
Center for Clean Products and Clean Technologies
Knoxville, TN 37996-0710, 1994.
Available through the US Government Printing Office
http://eerc.ra.utk.edu/clean/

Redefining The American Dream: The Search For Sustainable Consumption Conference Report
Takoma Park, MD
Merck Family Fund 1995.
http://www.iisd.ca/linkages/consume/merck.html

Resource Flows: The Material Basis of Industrial Economies
World Resources Institute
1709 New York Avenue, NW
Washington DC 20006 USA, 1997.
http://www.wri.org/wri/

Re-Thinking the Materials We Use
Ken Geiser, Fran Irwin
World Wildlife Fund Publications, 1993.
Tel: (1) 410-516-6951
http://www.wwf.org/

Sustainable Water and Waste Management in Urban Areas
Otterpolh Wasserkonzepte,
Kanalstrasse 52,
D 23552 Lubeck,
Germany
Tel: (49) 451 70 200 51
Fax: (49) 451 70 200 52
Email: OTTERWASSER@T-online.de

Towards Sustainable Europe
Available from Friends of the Earth Netherlands
Sustainable Europe Campaign
PO Box 19199, 1000 D Amsterdam
The Netherlands
Tel: (31) 20 625 6547
Fax: (31) 20 627 5602
Email:susteur@foenl.antenna.nl
http://www.xs4all.nl/foeint/suseur.html

An excellent report on how to reduce resource consumption within Europe based on using Wuppertal Institute's material indices.

The Unmanageable Consumer: Contemporary Consumption and its Fragmentation
Yiannis Gabriel and Tim Lang.
Sage Publications
London, UK 1995.

Yearning For Balance: Views of Americans on Consumption,Materialism,and the Environment
The Harwood Group
Merck Family Fund,1995.
http://www.iisd.ca/linkage/consume/harwood.html

Organizations with many publications on materials indices

International Institute for Sustainable Development
For an extensive library of documents on Sustainable Consumption and Production, see IISD's links at
http://www.iisd.ca/linkage/consume/consume.html

Wuppertal Institute
some examples:
Increasing Resource Productivity through Eco-Efficient Services;
How to Reach a Sustainable Economy;
Greening the North
http://www.wupperinst.org/Sites/publications.html
(complete address information above)

CLEANER PRODUCTION

Note: Not all information on pollution prevention and cleaner production on the sites of these organizations is necessarily cleaner production. Some of the case studies described within may contain traditional end-of-pipe approaches.

INTERNATIONAL

Organization for Economic Cooperation and Development (OECD)
Environment Program
2, rue André-Pascal
75775 Paris CEDEX 16
France
Tel: (33) 01 45 24 82 00
Fax: (33) 01 45 24 85 00
http://www.oecd.org/env

The OECD has conducted various projects in recent years to promote Clean Production,particularly in Central and Eastern Europe. OECD is also the lead international organization in Extended Producer Responsibility. It has an extensive document collection on sustainable production and consumption,eco-efficiency, and clean production.

United Nations Cleaner Production Programme
Industry and Environment Office 39-43 Quai Andre Citroen
75739 Paris Cedex 15
FRANCE
Tel: (33) 1 44 37 14 50
Fax: (33) 1 44 37 14 74
Email:unepie@unep.fr
http://www.unepie.org/home.html

The Cleaner Production Programme of UNEP (United Nations Environment Programme) publishes a newsletter, provides information on case studies via a diskette, convenes a bi-yearly international conference,and maintains a variety of workgroups. The Programme maintains the International Cleaner Production Information Clearinghouse (ICPIC) which is available on diskette containing:

- 350 technical case studies
- 20 policy case studies
- 550 publications abstracts
- list of 110 institutions

Users can pose questions about cleaner production at: icpic@unep.fr

UNEP coordinates cleaner production centers in various countries in conjunction with the UN Industrial Development Organization (UNIDO). This program has established National Cleaner Production Centres in nine countries:Brazil,China, Czech Republic,India,Mexico, Slovak Republic, Tanzania, Tunisia, Zimbabwe. Forty-three other national cleaner production centers or organizations operate in 37 countries.

UNEP CLEANER PRODUCTION WORKGROUPS

These workgroups develop policies and collect case studies of cleaner production either within specific industrial sectors or by subject matter. Contact them for more details on members and projects.

1. Biotechnology for Cleaner Production

Chair: Prof. Carlos Rolz,Dean
Universidad del Valle de Guatemala
18 avenida 11-95 zona 15
Vista Hermosa III,01015
Apto Postal No. 82,01901
Guatemala

Tel:(502) 364 0336/40
Fax:(502) 364 0212
Email:crolz@uvg.edu.gt
http://uvg.edu.gt/EV/uvg.html

Co-chair: Mr Ferd Schelleman
Institute for Applied Environmental Economics
Grote Marktstraat 24
25 11 BJ Den Haag
The Netherlands
Tel: (31) 70 3464 422
Fax: (31) 70 3623 469
Email:tria@knoware.nl

2. Textiles Production

Chair: Dr Prasad Modak
Environmental Management Center
105 Hanuman Industrial Estate
42 GD Ambekar Road
Wadala, Mumbai 400 031
India
Tel: (91) 22 416 8217
Fax: (91) 22 413 9125
Email:pmodak@giasbm01.vsnl.net.in

3. Food Industry

Chair: Mr Bob Pagan
Technology Management Centre
The University of Queensland
Brisbane, QLD 4072
Australia
Tel: (61) 7 33651594
Fax: (61) 7 33656977
Email:R.Pagan@mailbox.uq.edu.au
http://www.techman.uq.edu.au/UNEP_CFP/techman.htm#top

4. Leather Tanning

Chair: Mr Martin van Vliet
Mr Jan-Willem Scheigrond
BLC The Leather Technology Centre
Kings Park Road
Northampton NN3 6JD
United Kingdom
Tel: (44) 1604 679 999
Fax: (44) 1604 679 998
Email:info@blcleathertech.com
jan@blcleathertech.com
http://www.blcleathertech.com

Co-Chair: Mr. Nick J. Cory
Leather Industries Research Laboratory
University of Cincinnati
PO Box 21004
Cincinnati OH 45221-0014
Tel: (1) 513 556 1200
Fax: (1) 513 556 2377.
Email: corynj@ucunix.san.uc.edu
http://www.uc.edu/

5. Metal Finishing

Chair: Mr. Darrell Reeve
Cleaner Production Australia
PO Box 978
Eltham, Victoria 3095
Australia
Tel: (61) 3 94310730
Fax: (61) 3 94312821
Email:cpaust@link.net.au
http://www.businesseast.com.au/cleaner/serv.htm

6. Pulp and Paper

Chair: Prof. Allan Johansson
Technical Research Center of Finland
PO Box 205, SF-02151 ESPOO
Finland
Tel: (358) 9 4561
Fax: (358) 9 460 493
Email:allan.johansson@vtt.fi
http://www.vtt.fi/

7. Sustainable Product Development

Chair: Dr. J. C. van Weenen
UNEP-WG-SPD
Nieuwe Achtergracht 166
1018 WV Amsterdam
The Netherlands
Tel: (31) 20 525 6268/6237
Fax: (31) 20 625 8843
Email:unep@unep.frw.uva.nl
http://unep.frw.uva.nl/

8. Education and Training

Chair: Dr. Donald Huisingh
International Institute for Industrial Environmental Economics
Lund University
P.O. Box 196
SE-22100
Sweden
Tel:(46) 46 222 0200
Fax:(46) 46 222 0210
Email:donh@lu-iiee.envecon.lu.se
http://www.lu.se/IIIEE/hp/

Co-Chair: Mr. Michael Joergensen
Technical University of Denmark
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Denmark
Tel: (45) 45 93 6677
Fax: (45) 45 88 1291
Email: msj@its.dtu.dk
http://www.dtu.dk/index_e.htm

9. Policies, Strategies and Instruments

Chair: Mikael Backman and Thomas Lindhqvist
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Fax.:(46) 46 222 0210
Email:thomas.lindhqvist@iiiee.lu.se
http://www.lu.se/IIIEE/hp

Co-Chair: Jerry Kotas
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UNIDO
Vienna International Centre
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A-1400 Vienna
Austria
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Fax: (43) 1 2092669
Email:unido-pinfo@unido.org
http://www.unido.org

UNIDO is the United Nations Industrial Development Organization that facilitates technology and information transfer to less or newly industrializing countries. This joint project with UNEP is their main initiative on pollution prevention for industrial sectors. Their web site contains useful clean production information and links.

World Cleaner Production Society
Federation of Chartered Engineers
Postboks 2312
Solli
0201 Oslo
Norway
Tel:(47) 22 53 77 05
Fax:(47) 22 94 75 01
Contact:Mr. Olav Nedenes

AUSTRALIA

Australia Centre for Cleaner Production
Building 251
RMIT Bundoora East
Plenty Road,Bundoora
Victoria 3083
Australia
Tel: (61) 3 9407 6060
Fax: (61) 3 9407 6061
http://www.rmit.edu.au/
Contact: Allen Morley

Cleaner Production Australia
PO Box 978
Eltham
Victoria 3095
Australia
Tel: (61) 3 9431 0730
Fax: (61) 3 9431 2821
Email:cpaust@link.net.au
http://www.businesseast.com.au/cleaner/serv.htm
Contact:Darrell Reeve

Expertise in international cleaner production.

BRAZIL

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Brazil
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Email:ncpc@nutecnet.com.br

CANADA

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100 Charlotte St
Sarnia,Ontario
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Fax: (1) 519-337-3486
Email:c2p2@sarnia.com
http://c2p2.sarnia.com/

The publication *At the Source* is available in hardcopy or by listserve. Maintains various documents and listserves, both technical and policy oriented.

National Office of Pollution Prevention
Environment Canada
Ottawa,Ontario
Canada K1A 0H3
Tel: (1) 819 953 1112
Fax: (1) 819 953 7970
Email:kbrady@pobox.com
http://www.ec.gc.ca/envhome.html

Now examining sustainable consumption and production. Publication: *Ecocycle*

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Politicych veznu 13
111 21 Prague 1
Czech Republic
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Contact: Vladimir Dobes

DENMARK

Danish Technological Institute (DTI)
Gregersensvej
PO Box 141
DK-2630 Taastrup
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Tel: (45) 43 50 43 50
Fax: (45) 43 50 70 50
Email:john.kryger@dti.dk
http://www.teknologisk.dk/
Contact: John Kryger
Expertise in international cleaner production.

Technical University of Denmark
Institute of Manufacturing Engineering
Building 425
2800 Lyngby
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Tel: (45) 45 882522
Fax: (45) 45 933435
Email:pila@unidhp.uni-c.dk
http://www.dtu.dk/index_e.htm

ESTONIA

Estonian Management Institute – Pollution Prevention Centre
21 Sutiste Street
EE0034 Tallinn
Estonia
Tel:(372) 2521629
Fax:(372) 6542112
Email:anne@emi.estnet.ee
http://www.online.ee/~emi/
Contact: Anne Randmer

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Føvam ter 8
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Tel: (36) 1 217 9588
Fax: (36) 1 218 8076
Email:skerekes@Pegasus.bke.hu
Contact: Sandor Kerekes

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Fax: (91) 11 4625013
Email:ncpc@de12.vsnl.net.in
Contact: S.P. Chandak

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Clean Technology Centre (CTC) Cork
Regional Technical College
Bishopstown, Cork City
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Tel: (353) 21 344 864
Fax: (353) 21 344 865
Email:cleantechnology@cleansun.rtc-cork.ie
http://cleantechnology.rtc-cork.ie

Contact:Mr. Dermot Cunningham

LATVIA

Latvian Pollution Prevention Center
Perses Street 2-518
Riga LV 1011
Latvia
Tel:(371) 782 8250/2227623
Fax:(371) 7828251
http://vip.latnet.lv/lppc/
Contact:Ms.Natalia Ladutko

MALTA

Malta University Services Ltd.Malta
Cleaner Technology Centre (CTC)
University Campus
Msida
Malta
Tel:(356) 331 734
Fax:(356) 344 879
Email:pizzuto@waldonet.net.mt
http://www.cis.um.edu.mt/~mus/
Contact:Mr. Anton Pizzuto

MEXICO

UNEP-NCPC Mexico
Avenida Politecnico
s/n Edificio 9 de Laboratorios Pesados
Unidad Profesional Adolfo Lopez Mateos
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Tel: (525) 729 6202
Fax: (525) 729 6201
Email:Shurtado@vmredipn.ipn.mx
Contact: Susana Hurtado Baker

NETHERLANDS

Innovation Centre Amsterdam-Haarlem
Postbus 19408
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The Netherlands
Tel: (31) 20 6207 081
Fax: (31) 20 6207 839
Email:harrietbottcher.icnn@notes.compuserve.com
Contact:Dr. H. Böttcher

POLAND

Polish Cleaner Production Centre
NIF-NOT CP Center
Ul.Krasinskiego 13
40-019 Katowice
Poland
Tel/Fax: (48) 32 156 55 07
Contact:Prof. Zygfryd Nowak

PORTUGAL

Instituto Nacional de Engenharia e Technologia Industrial – INETI
Estrado do Paco de Lumiar
1699 Lisboa
Portugal
Tel: (351) 1 716 51 41
Fax: (351) 1 715 40 84
Email: constanca.peneda@mail.ineti.pt
http://www.ineti.pt/ingles/index.htm

ROMANIA

Romanian Pollution Prevention Centre
Bd Constructorilor 20
Bucaresti 6
77766
Romania
Tel: (40) 1 22 12050/2211948
Fax: (40) 1 22 11899

SLOVAK REPUBLIC

UNEP-NCPC Slovak
Pionierska 15, 831 02
Bratislava

Slovak Republic
Tel/Fax: (421) 7 259 015
Email:scpc@chtf.stuba.sk
www.ic1.chft.stuba.sk/CPC/
Contact: Viera Feckova

SPAIN

Centre d/Iniciatives per a la Produccio Neta
Travessera de Gracia, 56
08006 Barcelona
Spain
Tel: (34) 93 4147090
Fax: (34) 93 4144582
Email:prodneta@cipn.es
http://www.junres.es/cipn/angles/apneta_i.htm
Contact: Victor Macia

TANZANIA

NCPC Tanzania
Tanzania Industrial
Research & Development Organization
PO Box 23235
Dar-es-Salaam
United Republic of Tanzania
Tel: (255) 51 668105/668979
Fax: (255) 51 668 147
Email:cpct@udsm.ac.tz
Contact:C.L.C.Migiro

TUNISIA

UNEP-NCPC Tunisia
Centre de Production Plus Propre
Colisee Soula,
Escalier D 2e etage
2092 El Manar II
Tunisia
Tel: (216) 1 872 688
Fax: (216) 1 872 688
Email:cp3@cp3.com.tn
http://www.inem.org/inem/members/inem_cp3.html
Contact:Mr. Rachid Nafti

UNITED STATES

Note: most U.S. states have government or university-based pollution prevention technical assistance programs. Only a few are mentioned here.

Center for Clean Products and Clean Technologies
University of Tennessee Knoxville
(see under Ecodesign section)

EP3 Program
US Agency for International Development
R&D/ENR. SA 18
Room 503
Washington, DC 20523-1812
Tel: (1) 703 875 4518
Fax: (1) 703 875 4639
http://www.info.usaid.gov/
Contact: James Gallup

EP3 conducts pollution prevention projects in developing countries.

Inform Inc
120 Wall St
New York, NY 10005
Tel: (1) 212-361 2400
Fax: (1) 212-361 2412
http://www.informinc.org
Contact: Mark Dorfman

Expertise on right to know, pollution prevention,and product design and take-back.Many industry case studies and excellent publications.

Lowell Center for Sustainable Production
University of Massachusetts Lowell
One University Ave.
Lowell, MA 01854
Tel: (1) 978 934 2980
Fax: (1) 978 452 5711
Email:lcsp@uml.edu
http://www.uml.edu/centers/lcsp
Contact: Cathy Crumbley

Conducts research and projects that link occupational and environmental health with economic and social well-being. Serves as the technical clearinghouse for the Health Care without Harm Campaign and provides technical assistance to the Clean Production Network.

Massachusetts Toxic Use Reduction Institute (TURI)
University of Massachusetts at Lowell
One University Avenue
Lowell, MA 01854-2881
Tel: (1) 978 934 3275
Fax: (1) 978 934 3050
Email:clarkjan@turi.org
http://www.turi.org/
Contact:JanetClark

TURI is an excellent source of technical information on pollution prevention within companies as well as occupational health information. TURI maintains a technology library, conducts training, and has a technical web page with numerous links.

P2CP Consulting
423 12th StreetSE
Washington, DC 20003
Tel: (1) 202 546 8542
Email:kirsi@worldnet.att.net
Contact: Kirsten Oldenburg

Expertise in international cleaner production.

United States Environmental Protection Agency
Office of Pollution Prevention and Toxics
Washington, DC 20460
US EPA (MC7409)
401 M Street SW
Washington, DC 20460
Fax: (1) 202 260 2219
Email:eichelberger.maureen@epamail.epa.gov
http://www.epa.gov

An extensive overview of pollution prevention initiatives at state and national level is available from:
http://www.epa.gov/opptintr/ChemLibPPN

This is a comprehensive resource on pollution prevention case studies:
http://www.epa.gov/envirosense/index.html

US National Pollution Prevention Roundtable
2000 P Street,NW
Suite 708

Washington, DC 20036
Tel: (1) 202 466 P2P2
Fax: (1) 202 466 7964
http://www.p2.org/

The roundtable is the main pollution prevention network for US state and local officials.It provides expertise and information exchange on pollution prevention, process change, and clean production policy. The roundtable conducts a yearly conference, and has listings of all pollution prevention programs in the U.S. Several publications are available on the web page.

ZIMBABWE

Zimbabwe NCPC
c/o UNIDO Office
67-69 Union Avenue
PO Box BW 1635
Borrowdale,Harare
Zimbabwe
Tel: (263) 4 731779
Fax: (263) 4 7311779
Email:cpczim@harare.iafrica.com
Contact: Lewin Mombemuriwo

PUBLICATIONS

Industrial Pollution Prevention Handbook
Harry Freeman
McGraw Hill, Inc. 1995.

Journal of Cleaner Production
Elsevier Sciences
The Boulevard
Langford Lane
Kidlington
Oxford OX5 1GB
Tel: (44) 1865 843000
Fax: (44) 1865 843010
http://www.elsevier.nl

OECD Proceedings:Cleaner Production and Waste Minimization in OECD and Dynamic Non-Member Economies, 1997.
Tel: (1) 202-785-6323
Fax: (1) 202-785-0350
This and other OECD publications available from http://www.oecd.org/

Pollution Prevention Review
John Wiley & Sons Inc
605 Third Avenue
New York, NY 10158
Tel: (1) 212 850 8776

A US-based journal, focusing on legislation,process changes.

Pollution Prevention:A Practical Guide for State and Local Government
Ed. D. Wigglesworth
Lewis Publishers, 1993.
CRC Press Inc.
2000 Corporate Blvd NW
Boca Raton, Florida 33431

Prosperity without Pollution:The Prevention Strategy for Industry and Consumers
Hirschhorn and Oldenburg
Van Nostrand Reinhold,1991.

Toxics Watch,1995.
and *Profits Through Pollution Prevention*
Inform Inc. (see above)

UNEP Cleaner Production Programme Publications:
Government Strategies and Policies for CleanerProduction (1994);
Cleaner Production Worldwide I (1993) *and II* (1995);
Cleaner Production in the Asia Pacific Economic Cooperation Region (1994);
Cleaner Production in the Mediterranean Region;
Cleaner Production in China (1996);
Life Cycle Asessment:What It Is and How to do it:
Ecodesign Manual: A Promising Approach
http://www.unep.org

Poland, The Green Tiger - Clean Production, The Only Way Forward
October 1994.
Greenpeace International
Keizersgracht 176
1016 DW Amsterdam
The Netherlands
Tel: (31) 20 523 6222
Fax: (31) 20 523 6200
http://www.greenpeace.org

Also, many other documents on clean production,chlorine, and PVC available.

PUBLIC ACCESS TO INFORMATION

Public access to information has been a proven factor in reducing company emissions of hazardous substances, yet few countries have an operational reporting system. There is currently minimal informative labeling on product contents or their life cycle impacts except for food and cosmetic products in some countries.

Inform Inc
(see previous section)

Public information on Material Safety Data Sheets (MSDS) information.
http://research.nwfsc.noaa.gov/msds.html

The Northwest Fisheries Science Center provides this information on line. These sheets provide concise information on the occupational health risks from exposure to individual chemicals/ products.

Right to Know Network
OMB Watch/Unison Institution
1742 Connecticut Avenue,NW
Washington, DC 20009
Tel: (1) 202-234-8494
Fax: (1) 202-234-8584
http://www.rtk.net

Excellent source of databases on environmental impacts by firm or region.

US EPA Office of Pollution Prevention and Toxics
Toxics Release Inventory (TRI)
Tel: (1) 202 260 1531
(address above)
http://www.epa.gov/opptintr/tri/
TRI User Support Service to help the public obtain/understand TRI data.

Working Group on Community Right to Know
US PIRG Education Fund
218 D St. SE
Washington, DC 20003
Tel: (1) 202 544 9586
Fax: (1) 202 546 2461
Email:orump@rtk.net
Contact: Paul Orum

PUBLICATIONS

A Benchmark for Reporting on Chemicals at Industrial Facilities;
also, *The Right to Know: The Promise of Low-Cost Public Inventories of Toxic Chemicals*
Fran Irwin, *et al.*
World Wildlife Fund, Washington,1995.
WWF Publications
PO Box 4866
Hampden Post Office
Baltimore, MD 21211
Tel: (1) 410 516 6951
http://www.wwf.org/

OECD Pollutant Release and Transfer Registers (PRTR) Guidance Manual for Governments, 1996.
Available from OECD (see above)
http://irptc.unep.ch/prtr/
Contact: Claudia Fenerol

This is the final report of a series of 5 international workshops to establish the Right to Know in all countries. The guidebook shows governments how to establish a public reporting system in their countries.

ECOLOGICAL ECONOMICS AND FINANCING SUSTAINABILITY

Ecological economics is based on environmental reality. It recognizes the need to move toward a more sustainable economy. This includes ecological tax reforms, removing subsidies for resource intensive and ecologically damaging enterprises, and promoting socially equitable labor.

Center for Renewable Energy and Sustainable Technology (CREST)
1200 18th St NW #900
Washington, DC 20036
Tel: (1) 202-530-2202
Fax: (1) 202-887-0497
http://solstice.crest.org/index.shtml
CREST produces educational multimedia CD-ROMs and operates an internetservice for the sustainable energy field.It also has extensive resources on ecological tax reform.

Gil Friend and Associates
48 Shattuck Square - Suite 103
Berkeley, CA 94704
Tel: (1) 510-548-7904
Fax: (1) 510-849-1341
Email:gfriend@eco-ops.com
http://www.igc.apc.org/eco-ops/welcome.html

Helps companies and communities gain competitive advantage and breakthrough economic performance by building the laws of nature into their business operating systems. Publishes the *New Bottom Line Newsletter* on sustainable business.

Grassroots Policy Project
2040 S St. NW, Suite 203
Washington, DC 20009
202-387-2935

Institut fur Okologische Wirtschaftsforschung (IOW)
(Ecological Economics Research Institute)
Regional Office Baden-Wurttemberg
Bergheimer Strasse 95
D-69115 Heidelberg
Germany
Tel: (49) 6221 167954
Fax: (49) 6221 27060
http://www.ioew.de/

A public research institute specializing in ecological tax reform and resource efficiencies

Maurice and Jane Sugar Law Center for Economic and Social Justice
645 Griswald St., Suite 1800
Detroit, MI 48226
(1) 313-962-6540

Sustainable America
42 Broadway, Suite 1740
New York, NY 10004-1617
(1) 212-269-9550
sustainer@suanetwork.org
http://www.sanetwork.org/

Wuppertal Institut für Klima Umwelt und Energie
(see above section on alternative materials)
http://www.wupperinst.org
Contact: Friedrich Schmidt-Bleek

Newsletter and leading books on ecological tax reform.

PUBLICATIONS

Beyond Growth: The Economics of Sustainable Development
Herman Daly
Beacon Publishers
Boston, MA 1996.

Beyond the Year 2000: The Transition to Sustainable Consumption
Document for the conference and seminar "Sustainable Consumption" held in The Hague, 1993.
International Organization of Consumers Unions. The Hague:1993.

Caring for the Future: Making the Decades Provide a Life Worth Living
Report of the Independent Commission on Population and Quality of Life.
Oxford University Press, Oxford, UK 1996.
http://www.oup.co.uk/

Citizens Guide to Environmental Tax Shifting. For a Cleaner Environment, Stronger Economy, Fairer Tax Code.
June 1998
Friends of the Earth USA
Available free via the internet: http://www.foe.org

Environmental Accounting:Energy and Environmental Decision Making.
Howard T. Odum
John Wiley & Sons
New York,1996. 370 p.

Environmental Taxes:Implementation and Environmental Effectiveness
European Environment Agency, 1996
Kongens Vytov 6
DK-1050 Kobenhavn K
Denmark
Tel: (45) 33 36 71 00
Fax: (45) 33 36 71 99
Email:EEA@EEA.DK
http://www.eea.eu.int/frseain.htm

The European Environment Agency is the lead environmental information source for European countries.It does not regulate or legislate,but facilitates public access to European environmental information.EEA currently is undertaking projects on life cycle assessment, clean production, and risk assessment.

Fine Tuning Taxes for Energy Eco-Efficiency
Stephanie Cairns, Barbara Campbell and Rob Macintosh
A study commissioned for the National Roundtable on the Environment and the Economy-Greening the Budget Workshop, October 17, 1995.
Drayton Valley, Alberta, Canada
The Pembina Institute for Appropriate Development,
http://www.pembina.org/

The Genuine Progress Indicators:Summary of Data and Methodology
Clifford Cobb, Ted Halstead, and Jonathan Rowe 1995.
Redefining Progress
One Kearny St., Fourth Floor
San Francisco, CA 94108
http://www.rprogress.org

Getting down to Earth:Practical Applications of Ecological Economics
Robert Costanza, Olman Segura and Juan Martinez-Alier, (eds.),1996.
Island Press, Washington,DC

The Growth Illusion
Richard Douthwaite
Green Books, Ford House, Hartland
Bideford,Devon EX 29 6EE
United Kingdom, 1998.
http://www.greenbooks.co.uk/

Moving towards Sustainable Consumption and Production:Building a Community of Concern and Commitment.
Environment Canada Conference May 26-27, 1997.
Chateau Cartier Hotel, Aylmer, Quebec Canada
Various authors/papers
email for information:c2p2@sarnia.com

The North, the South, and the Environment: Ecological Constraints and the Global Economy.
V. Bhaskar and Andrew Glyn.
Earthscan Publications Ltd.,
London:1995.

Organization for Economic Cooperation and Development Expert Seminar on Sustainable Consumption and Production Patterns
Summary report. December 18 - 20, 1994.
Massachusetts Institute of Technology: Cambridge, MA
http://www.iisd.ca/linkages/consume/mit.html

Oslo Roundtable Conference on Sustainable Production and Consumption Norway.
Ministry of Environment 1995.
http://www.iisd.ca/linkages/consume/
http://odin.dep.no/html/nofovalt/depter/md/publ/sustain/

Paradigms in Progress:Life beyond Economics
Hazel Henderson
Knowledge Systems:Indianapolis, IN,1991.

Pricing the Planet: Economic Analysis for Sustainable Development
Peter H. May and Ronaldo Seroa da Motta, (eds.),1996.
Columbia University Press:New York
http://www.columbia.edu/cu/cup/pages/idx_search.html

Public Subsidies, Public Accountability: Holding Corporations to Labor and Community Standards.
Published and distributed by the Grassroots Policy Project, Sustainable America, and the Sugar Law Center. See above for contact information.

For information on how to research corporations, see the section "Researching Corporate Subsidies" by Rachel Weber.

Whole Life Economics:Revaluing Daily Life
Barbara Brandt
New Society: Philadelphia, PA 1995.
http://www.newsociety.com/ttl.html

LABOR/JUST TRANSITION

Canadian Labour Congress
2841 prom.Riverside Dr.
Ottawa,ONT
Canada K1V 8X7
Tel: (1) 613 521-3400, ext 418
Fax: (1) 613-521-4655
http://www.union-label.com/national/directory/index.html
Contact:Dave Bennett

Comisiones Obreras
Departamento de Medio Ambiente
Fernandez de la Hoz 12
28010 Madrid
Spain
Tel: (34) 1-319-7653
Fax: (34) 1-310-4804
Email:eblount@ccoo.es
http://www.ccoo.es/internacional/ingles.html
Contact: Estefania Blount

Comisiones is the largest trade union in Spain and their Environment Department is very active on cleaner production initiatives.They hold conferences and workshops, produced a video, and publish a newsletter, Daphnia (in Spanish)

The Labor Institute
853 Broadway
New York, NY 10003
Tel: (1) 212-674-3322
email:lesleopold@aol.com
Contact: Les Leopold

The Labor Institute has worked for several years with the Oil Chemical and Atomic Workers Union (OCAW) to develop policy regarding chemical (particularly chlorine) phase-outs and just transition.

Trade Union Advisory Council to the OECD
52B Penshurst Rd
London E9 7DT
United Kingdom
Tel: (44) 171 2196259
Fax: (44) 171 2194866
http://www.tuac.org/
Contact: Paul Hackett

OECD has published several documents on benchmarking for labor involvement in Clean Production activities.

University of Amsterdam Research and Consultancy Centre on Chemistry, Labour, and the Environment (Chemiewinkel)
Postbus 20242
1000 HE Amsterdam
The Netherlands
Tel: (31) 20 5255 607
Fax: (31) 20 5255 615
Email: p.v.broekhuizen@chem.uva.nl
http://www.chem.uva.nl/cw/
Contact:Dr. Pieter van Broekhuizen

PUBLICATIONS

Clean Production: From Industrial Dinosaur to Eco-Efficiency
David Gee, 1994
Manufacturing Science Finance Union
64-66 Wandsworth Common North Side
London, SW18 2SH
United Kingdom
Tel: (44) 181 871-2000
Fax: (44) 181 877-1160
http://www.msf.org.uk/pages/frames40.htm

Evaluation of the Relevance for Worker Health and Safety of Existing Environmental Technology Databases for Cleaner and Inherently Safer Technologies
Eronomia, LTD, Athens, April,1996
Contact:Dr. Nicholas Ashford
Tel: (1) 617-253-1664
Fax: (1) 617-253-7140
Email:nashford@mit.edu

The Labor Institute
(see above)
Jobs and Environment Workbook
Chlorine Just Transition Workbook
other speeches and summaries.

BUSINESS POLICIES ON CLEANER PRODUCTION

Note: while many of the documents produced by these business coalitions have excellent language about the need for clean production,actions by the coalitions or their individual members may be far from clean production

Coalition for Environmentally Responsible Economies (CERES)
711 Atlantic Avenue
Boston, MA 02111
Tel: (1) 617-451-0927
Fax: (1) 617-482-2028
http://www.ceres.org/

Mr. Claude Fussler
Dow Europe, S.A.
Bachtobelstrasse 3
CH-8810 Horgen
Switzerland
Tel:(41) 1 728 2403
Fax:(41) 1 728 2097

A proponent of eco-efficiency and removal of subsidies from unsustainable businesses. Wrote book titled Driving Eco-Innovation.

The Greening of Industry Network
Twente Centre for Studies of Science
Technology & Society
TWr.RD 319 P.O. Box 217
7500 AE Enschede
The Netherlands
Tel: (31) 53 489 4132
Fax: (31) 53 489 4775
Email: e.m.l.brand@cstm.utwente.nl
Also:
Clark University
The George Perkins Marsh Institute
950 Main Street
Worcester, MA 01610-1477
Tel: (1) 508 751 4607
Fax: (1) 508 7514 600
Email:kfischer@vax.clarku.edu
http://www.greeningofindustry.org/
Contact: Kurt Fischer

International Chamber of Commerce
38 Cours Albert 1er
75008 Paris
France
Tel: (33) 1 49532828
Fax: (33) 1 49532859
http://www.iccwbo.org/

The ICC promotes international trade,investment,and the marketeconomy system worldwide. Itmakes rules that govern the conduct of business across borders and published the Voluntary Business Charter for Sustainable Development which includes the precautionary principle and clean products among its articles.

Keidanren (Japan Federation of Economic Organizations)
1-9-4 Othe-machi
Chiyoda-ku
Tokyo 100
Japan
Fax: (81) 3 5255 6231
http://www.envirolink.org/sbn/

World Business Council for Sustainable Development (WBCSD)
160 Route de Florissant

CH 1231 Conches, Geneva
Switzerland
Tel:(41) 22 8393 100
Fax:(41) 22 8393 131
Email:100277.2732@compuserve.com
http://www.wbcsd.ch/
Contact:Mr. Jan Olaf Willums

The WBCSD is a coalition of 125 international companies united by a shared commitment to the environment and to the principles of economic growth and sustainable development. It has developed and published widely on the concept of eco-efficiency.

PUBLICATIONS

Changing Course: A Global Business Perspective on Development and the Environment.
Stephan Schmidheiny, 1992.
MIT Press,
Cambridge, MA

Green Business: Hope or Hoax?
Green Books
Foxhole,Dartington,
Totnes, Devon TQ9 6EB
United Kingdom
Tel: (44) 01803 863260 & 863843
Fax: (44) 01803 863843
greenbooks@gn.apc.org
http://www.greenbooks.co.uk/

ISO 14001 Guidance Manual
Raymond Martin
National Center for Environmental Decision-Making Research (NCEDR),1998.
314 University of Tennessee Conference Center
Knoxville, TN 37996-4138
(423) 974-3939
http://www.ncedr.org/guides/iso.htm

An ISO 14001 audit is used to develop a systematic management approach to the environmental concerns of an organization. The goal of this approach is continual improvement in environmental management but there is no specific goal regarding measurable goals in toxic use reduction or resource efficiencies.

The OECD Guidelines for Multinational Enterprises OECD, 1996.
Head of Publications Service
2 rue Andre-Pascal
74774 Paris Cedex 16
France
http://www.oecd.org//ehs/prtr/pub.htm

Sustainable Production and Consumption: A Business Perspective
World Business Council for Sustainable Development. 1996.
Geneva, Switzerland: WBCSD

Trust Us. Don't Track Us: An Investigation of the Chemical Industry's "Responsible Care" Program
Allison LaPlante,1998.
US Public Interest Research Group Education Fund
218 D St.,SE
Washington, DC 20003
202-546-9707
http://www.pirg.org/

EDUCATIONAL INSTITUTIONS

The following give degree courses in cleaner production and/or organize conferences.

Agricultural University of Norway
Department of Engineering
Box 5065
1432 Aas
Norway
Tel:(47) 6494 8666
Fax:(47) 6494 8810
http://www.nlh.no/nlh_english.htm

Offers courses on ecological engineering. More information available from Prof. Petter D. Jenssen,
Institute of Agricultural Engineering
Tel:(47) 64 94 86 85,
Fax:(47) 64 94 8810,
Email:petter.jenssen@itf.nlh.no

Dalhousie University
School for Resource and Environmental Studies
Halifax,Nova Scotia
Canada B3H 3E2
Tel: (1) 902-494-3632
Email: rcote@is.dal.ca
http://www.mgmt.dal.ca/sres/research/
Contact: Ray Cote

Involved in industrial ecology projects.

Delft University of Technology
Faculty of Industrial Design Engineering
Jaffalaan 9,
2628 BX Delft
The Netherlands
Tel: (31) 15 2782738
Fax: (31) 15 2782956
Email: J.A.M.Remmerswaal@io.tudelft.nl
http://www.tudelft.nl

Erasmus University
Erasmus Centre for Environmental Studies
PO Box 1738
Burgemeester Oudlaan 50
3000 dr Rotterdam
The Netherlands
Tel: (31) 10 4082381
Fax: (31) 10 2120834
Email:baas@mil.fsw.eur.nl
http://www.eur.nl/eur-uk/

Offers doctoral program in Clean Production as well as training and projects in various disciplines.

Pollution Prevention Education and Research Center (PPERC)
Occidental College
1600 Campus Road
Los Angeles, CA 90041
Tel: (1) 213-259-2566
Fax: (1) 213-259-2734
Email:pperc@oxy.edu
http://www.oxy.edu/departments/pperc/
Contact: Robert Gottlieb

PPERC is based at Occidental College and the University of California, Los Angeles.It offers project-based research as well as pollution prevention internships,

course work, and training. It has several associated centers and sponsors pollution prevention fora and collaborative activities.

University of Lund
The International Institute for Industrial Environmental Economics
P.O. Box 196
S-22100 Lund
Sweden
Tel:(46) 46 2220 200
Fax:(46) 46 2220 210
Email:Thomas.Lindhqvist@iiiee.lu.se
http://www.lu.se/IIIEE/hp
Contact: Thomas Lindhqvist

Offers a Masters course (with free tuition) in Cleaner Production. Expertise in extended producer responsibility, cleaner production,product design, and source reduction.

University of Massachusetts at Lowell
Work Environment Program
One University Avenue
Lowell, MA 01854-2881
Tel: (1) 978-934-3250
Fax: (1) 978-452-5711
http://www.uml.edu/Dept/WE/
Contact: Ken Geiser

Offers a masters and doctoral degree in Clean Production and Pollution Prevention integrated with worker health and safety issues.

University of Michigan National Pollution Prevention Center for Higher Education
Dana Building 430 E University
Ann Arbor, MI 48109-1115
Tel: (1) 734 936 8386
Fax: (1) 734 647 5841
Email:nppc@umich.edu
http://www.snre.umich.edu/nppc/
Contact:Mr. Greg Keoleian
A clearinghouse for information on university-based pollution prevention programs, the Center sponsors courses and publishes guidebooks and other documents.

Universiteit van Amsterdam
Milieukunde
Interfaculty Department of Environmental Science
Nieuwe Prinsengracht 130
108 VZ Amsterdam
The Netherlands
Tel: (31) 20 525 6206
Fax: (31) 20 525 6272
Email: B.Hertz@frw.uva.nl
http://www.uva.nl/english/index.html
Contact: Brigitte Hertz

Clean Production summer courses.

PUBLICATIONS

Inventory on Cleaner Production Education and Training
Ed by M.S. Jorgensen,et al
Published by UNEP, UETP-EEE (University-Enterprise Training Partnership in Environmental Engineering Education) IACEE (International Association of Continuing Engineering Education), Finnish Association of Graduate Engineers, and Technical University of Denmark,1995.
Tel: (358) 9 229 121
Fax: (358) 9 2291 2911
Email:Riitta.Karki@tek.fi

This is an overview of institutions around the world that incorporate some aspects of cleaner production in their courses.

NETWORKS

Campaign for Responsible Technology
Silicon Valley Toxics Coalition
760 N. First St.
San Jose, CA 95112
Tel: (1) 408-287-6707
Fax: (1) 408-287-6771
Email: svtc@igc.apc.org
http://www.igc.org/svtc/crt.htm

The Campaign for Responsible Technology (CRT) was established in 1991 to increase grassroots participation in national and international technology policy development. CRT consists of over 80 representatives from organizations throughout the U.S., and about 20 representatives from organizations in 11 other countries.

Clean Production Action
PO Box 12201
London SW17 9ZL
United Kingdom
Tel/Fax: (44) 181 672 3454
Email:bthorpe@web.net (Canada)
Joel_Tickner@student.uml.edu (USA)
iza@cpa-iza.u-net.com (UK)
beckros@ebox.tninet.se (Sweden)
uugluszy@otzo.most.org.pl (Poland)
http://www.rec.hu/poland/wpa/cpa.htm

CPA is a network and consultancy for public advocacy groups. CPA's mission is to train advocacy and labor groups in clean production implementation strategies, serve as a technical clearinghouse for public interest groups on clean production, and help integrate clean production into campaigns.

Clean Production Network
C/o Charles Griffith
Ecology Center of Ann Arbor
117 North Division
Ann Arbor, MI 48104
734-663-2400 x116
734-663-2414
Charlesg@ecocenter.org

This newly-formed network advocates for policies that support clean production,provides technical assistance, and links environmental,environmental justice,labor, community organizations, and academics around clean production.

Consumer's International
24 Highbury Crescent,
London N5 1RX
United Kingdom
Tel: (44) 171 226 6663
Fax: (44) 171 354 0607
Email: consint@consint.org
http://www.consumersinternational.org/

A non-profit federation of consumer organizations, dedicated to the protection and promotion of consumer interest. CI has two goals: to strengthen member organizations and the consumer movement in general,and to fight for policies at the international level that respect consumer concerns. CI program areas include trade,environment,agriculture and consumer legislation.

Environmental Defense Fund
Pollution Prevention Alliance
1875 Connecticut Ave.,NW
Washington DC 20009
Tel:202-387-3500
Fax:202-234-6049
Email:benjamin_smith@edf.org
http://www.edf.org
Contact: Benjamin Smith

Coordinates a network of community and labor groups working on pollution prevention in the US/Canada Great Lakes region.Maintains an excellent web site on waste and chemical information at: www.scorecard.org

European Roundtable on Cleaner Production
Chairman:Prof. Dr Hans Schnitzer
Institute for Process Engineering
Graz University of Technology
A-8010 Graz
Inffeldgasse
Austria
Tel: (43) 316 873/7461
Fax: (43) 316 873/7469
Email:schnitzer@glvt.tu-graz.ac.at
http://www.tu-graz.ac.at
http://www.ineti.pt/ita/conferencia/ercp98.html

The Roundtable is a European platform to foster sustainable development with the prime focus on cleaner production of products, processes and provision of services.

Friends of the Earth International
Friends of the Earth International Secretariat:
P.O. Box 19199
1000 GD Amsterdam
The Netherlands
Tel: (31) 20-6221369
Fax: (31) 20-6392181
Email: foeinti@antenna.nl
http://www.xs4all.nl/~foeint/ssp.html

Friends of the Earth (FoE) International is a federation of autonomous environmental organizations from all over the world with members in more than 50 countries. FoE's sustainable societies campaign has generated much information on carrying capacity for sustainable consumption,most notably the studies done for Sustainable Europe.

Global Eco-Village Network
G.E.N.
Ginsterweg 5
D-31595 Steyerberg
Germany
Tel: (49) 57 64 9 30 40
Fax: (49) 57 64 23 68
Email: even@lebensgarten.gaia.org
http://www.gaia.org/

A network of communities that exchange information on sustainable development via listserve and conferences.

Northern Alliance for Sustainability (ANPED)
P.O. Box 12111
3501 AC Utrecht
The Netherlands
Tel: (31) 30-2310300
Fax: (31) 30-2340878
Email:anped@antenna.nl
http://www.antenna.nl/anped/

ANPED is a network of European groups working on sustainable production and consumption campaigns. They publish a newsletter and host various workshops throughoutEurope.

UNEP Cleaner Production Programme Network
The Cleaner Production Programme of UNEP publishes newsletter, convenes a bi-yearly international conference and maintains a variety of workgroups and cleaner production centres. See under Cleaner Production.
http://www.unepie.org/Cp2/home.html

Waste Prevention Association (OTZO)
ul.Slawkowska 12,
31-014 Krakow,
Poland
Tel/Fax: (48) 12 222 264/147
Fax: (48) 12 212 107
Email: office@otzo.most.org.pl
http://www.rec.org/poland/wpa/wpa.htm
Contact: Pawel Gluszynski

WPA is non-governmental environmental organization supplying clean production information to a network mostly based in central and eastern Europe. WPA's mission is to promote Clean Production methodology, waste reduction at source, and environmentally friendly waste management,segregation and recycling, as well as rational utilization of waste.