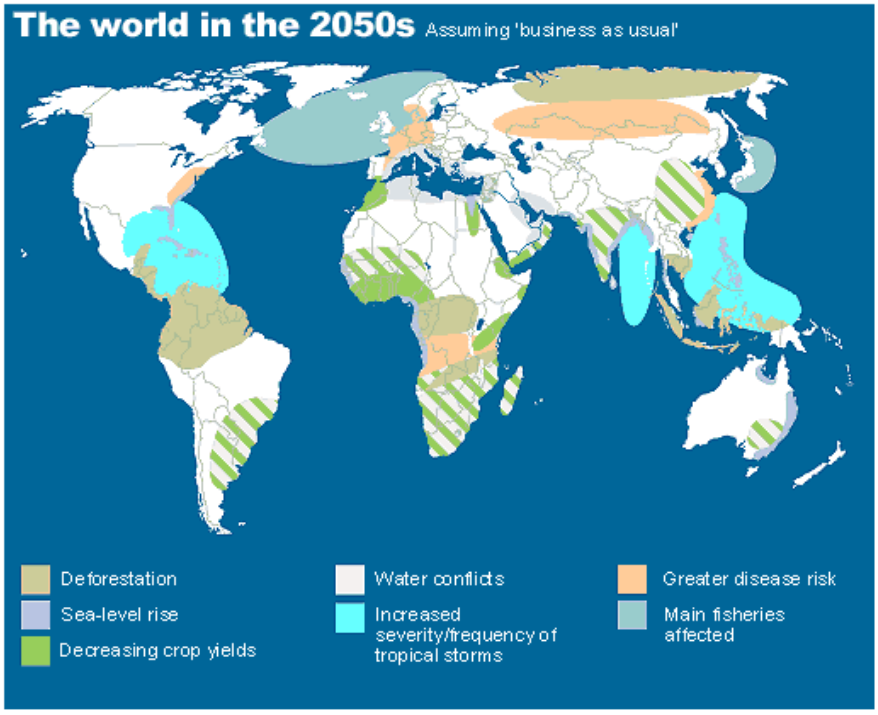
ECO-REGION NW

Update #6

January 2006



The Eco-Region NW project sets a new standard for analysis of waste and material flows at the regional scale. It provides a 'joined up' information system which measures environmental performance for the region, for industrial sectors and products, and for lifestyle options.

*The Eco-Region NW has now been linked to the larger national project **'Eco-Budget UK'**. This is developing new methods for material flow and eco-footprinting, including both direct and indirect effects. It is also building a comprehensive material flow database/model **'REAP'** for the UK regions.*

The regional sustainable consumption and production (SCP) agenda is the focus of this update, which draws on the Ecological Budget UK launch in March 2006. This agenda takes a deliberately global view, essential in an age when most of the UK's consumer goods come from overseas. The WWF world map above shows the likely pressures on the sources of most of our energy, materials and products.

Progress

The Eco-region NW has been used as the test-bed for the completion of the REAP modelling system (phase 1), including the "activity model" for key supply chains. This has now produced the first ever comprehensive 'mass balance' dataset in the SIC 123 economic classification.

Meanwhile the Environment Agency national survey on industrial & commercial waste (2003), just released, has been allocated to the NW region by regional industrial quotient analysis. The resulting table (extracts shown at the end) now completes the basic mass balance for each sector:

Production + imports = consumption + investment + exports + residuals + waste.

Meanwhile the Eco-region NW has been the test bed for a business benchmarking

A Biffaward project on Sustainable Resource Use

system, based on the resource flow principle. This is being linked into the Eco-Budget UK 'Strategy for a One Planet Economy', which sets out a long term market transformation path for all UK business sectors. It is also being tested on the construction sector in the NW. The overall framework contains three types of influence of businesses, seen as inter-dependent parts of a supply chain system:

- Direct effects
- Indirect effects
- Induced effects

These can be applied to three different stages in the resource flow cycle:

- Production – as classified by conventional SIC sectors, except that these often do not reflect the reality of business operations.
- Consumption – as represented by "final demand", but qualified in terms of physical flows and social value added.
- Operation of the products in use – generally disregarded by conventional analysis, but very important in the sense of the performance of buildings or vehicles.

For each of these there are 3 generic criteria of un / sustainability

- Capitals / assets / resource depletion
- Capacities / impacts
- Risk / hazard / equity

The eco-footprint is one universal measure which represents to some degree the first two of these. (We have recently run into stakeholder criticism on the footprints classification of renewable resource vs nonrenewable.) However there may be a case for introducing an 'environmental fate' 4th category to represent the various routes and end of life impacts of products, where this is significant. It is also significant that there are degrees of certainty or contention associated with each of these categories:

- Direct – in principle this would be measurable in terms of what physically leaves or enters the 'factory gate'
- Indirect – in principle this is calculable through the IO method and its spin-offs
- Induced – this is more debatable as to what is an induced effect. For instance how many estate agents will accept responsibility for the cement factory? Many businesses will naturally argue for their self-interest in externalizing the externalities.

The third category is arguably the most important, particularly in a service dominated economy. The way into this in business terms is not necessarily through the physical performance benchmarking, but through benchmarking against a range of business incentives:

- New markets
- Integrated supply chains
- Customer confidence
- Shareholder value

Also there is a range of business disincentives, although these are often less of a priority: direct cost, liability, credit rating, etc. The most important factor and often the most difficult to identify is that of innovation – i.e. what is best practice in production, waste minimization, process technology, product performance etc. There are various databases showing best practice e.g. IEA.

The Eco-region NW cannot hope to deal with the details of all 123 economic sectors: our approach is via the 'Eco-Benchmark' scheme. This comprises a standard template with a 'data envelope' for the material flow and resource productivity of each sector. Together with manuals, background, website etc, this will be supplied to a) industry associations b) policy and procurement bodies, c) intermediaries and facilitator agencies.

Issues & questions

The UK Regions

The UK contains a total of 9 English regions and 3 Devolved Administrations. These are at the upper level of a local government structure that includes counties and local authorities: rural districts, metropolitan boroughs and unitary authorities.

In terms of collecting resource-use data and policy analysis, dividing the UK up into regions and devolved administrations is a good starting point. In practical and functional terms, other boundaries may be more relevant and useful, and there is an

active debate at the present time on how best to organise and plan the 'UK space.' This applies to the questions highlighted by the Eco-region NW – resource flows, supply chains, total environmental impacts – and their policy implications for economic and urban development.

There is a current focus on 'city-regions', or conurbations plus hinterlands, as more natural functional units. In principle a city-region might be the best type of unit for integrated sustainable development – the question is that in the complex geography of the UK it is often unclear where one stops and another starts.[1]

Meanwhile there is continuing debate on the most effective unit for economic and spatial planning. Each of the regional strategies divides into sub-regions which are more related to local conditions. Recently the 'Core Cities' group argued for the case of the 8 largest provincial centres as the gateways and generators of activity for most of England (ODPM 2003). Other definitions include the 'travel to work' areas, based on 75% self containment of labour markets, or the 'functional urban regions' (ERN, 2005).

At a larger scale there are experiments with inter-regional collections of city-regions, particularly the 'Northern Way' and 'Midlands Way'. These may bring new opportunities for partnership and critical mass, but without major political or financial powers as yet. The national 'sustainable communities' plan was seen as a response to North-South housing imbalances, rather than an inter-regional strategy as such.

The ***'bio-region'*** concept applies clearly to more remote regions and to Scotland and Wales, where there is often a direct fit between river catchments, natural resources and landscape types. In the more urbanized parts of England the bio-regions are more obscured and may not fit directly to social or economic units. However with new patterns in rural enterprise and landscape management, such as community forests and local food markets, the bio-regions may emerge once more.

Generally, the UK regions / DAs can differ by up to 10-15% from the UK average in their levels of material consumption and production. In practice there is much greater variation between rich and poor within regions than between them.

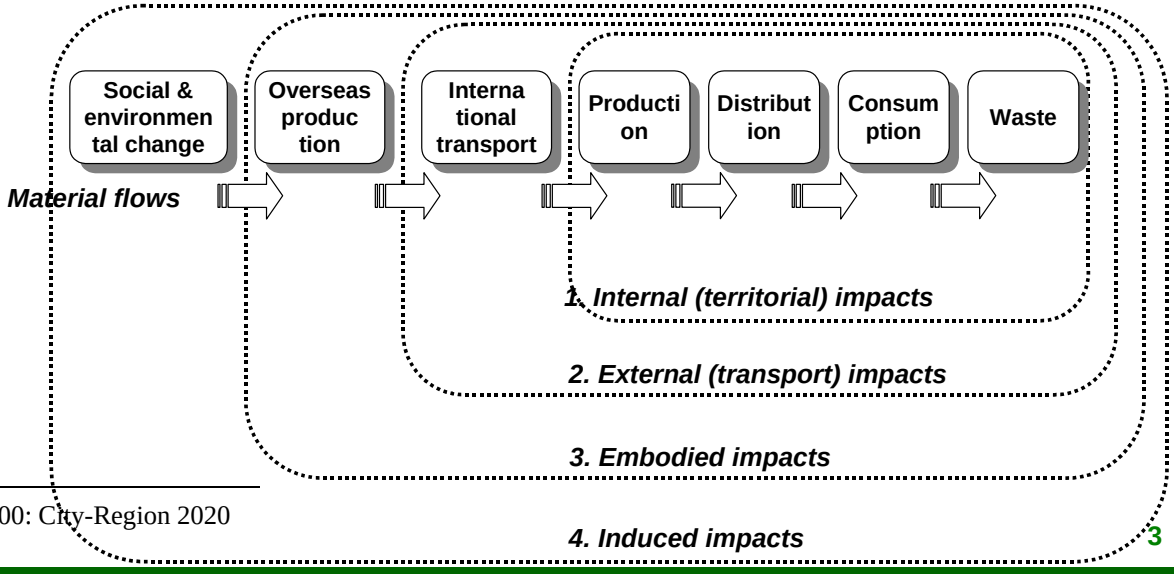
The external impacts of regions

The Footprint, CO2, and material flows analysis in the Eco-region NW demonstrate the global and national impacts of resource consumption. The REAP ("Resources and Energy Analysis Programme") system of resource accounting makes it more possible to comprehensively analyze a region's global impacts, both from production and consumption. The different layers of resource-use impact can be seen in the diagram below:

- ***'Internal'*** UK emissions accounts at present include only emissions from energy conversion within the UK borders (CO2 emissions from production), as

Material flows & indirect impacts –

"the resourceful artichoke"



[1] Ravetz 2000: City-Region 2020

specified by the Kyoto protocol and its accounting conventions.

- ***'Extended'*** accounts include measuring the CO2 emissions of aviation and international shipping to and from the UK, which are the fastest growing CO2 emissions sources. These appear in the Footprint and "CO2 from consumption" indicators.

- '***Embodied'*** resource accounts track the goods and products which are produced overseas and consumed in the UK, or, in the case of the regional accounts, produced in other regions or devolved administrations and consumed in another. This is the logic of the 'consumption' based approach of the Footprint accounts, and of measuring CO2 emissions that result from consumption.
- ***'Induced'*** resource accounts aim to measure the ultimate environmental and social impacts of resource consumption, in terms of deforestation, desertification etc. These effects are often more uncertain and more indirect, but no less important. The Footprint is increasingly popular as a measure of this; it has the potential to reflect more global impacts, even though its calculations are more complex.

If we apply this kind of analysis to a region such as the NW, we find that much needed data is missing and has to be assumed. Also that regions are open and interdependent, where it is not always significant to count inputs and outputs across the boundaries. There are many cross-overs, ie people work in one region, live in another and consume in a third. Therefore we have to take into account that the results presented in the Eco-region NW are a starting point, and that significant improvements are required in resource accounting across the UK.

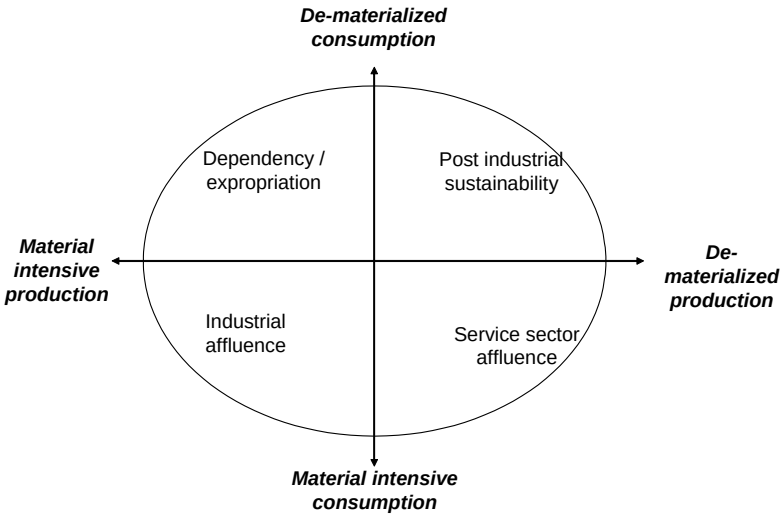
The regional balance of production & consumption

Regional and sub-regional economies vary as to their material intensity in production or consumption. For instance, Greater London is a high material consumer; however, much of its economic activity is in the service sector, far along the supply chain from the material-intensive manufacturing of other industrial regions.

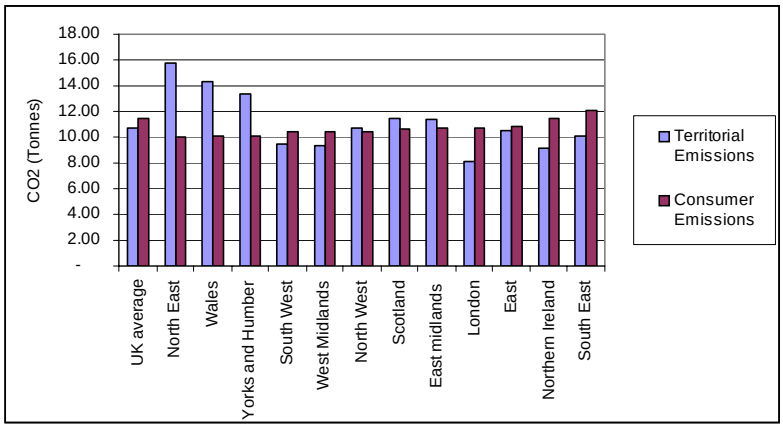
In terms of material-intensity, there are three general types of production and consumption:

1) A conventional model of industrial affluence is generally based on the expectation of continuous increases in the material flow of both production and consumption.
2) If production is material-intensive but consumption is not, this often indicates a heavy dependency on production systems with a high rate of embedded resource-use, such as mining or intensive agriculture, where household incomes are often lower.
3) Low material-intensity for both production and consumption – as shown in the top right corner of the diagram below – is a post-industrial model of sustainability, the goal of the Sustainable Consumption and Production concept.

Regional types - material balance



The interaction of both production and consumption is complicated by the fact that they usually interact within long supply chains. The Ecological Budget UK data can identify supply chain effects. For instance, the service sectors may induce higher material flows for primary and manufacturing activity – for instance, the financial service sector demands resources from a long supply chain that includes manufacturing of goods like paper and electronics, and extraction of resources to make those products. In the UK's regional and devolved material supply chain, the northern UK produces more and consume less, while the Southern UK consumes more and produces less.



Production and consumption in regional types

As reflected in the above diagram of CO2 emissions, different regions have different balances of production and consumption. Similar types of regions share similar patterns and challenges to sustainable development.

Industrial or post-industrial regions:
This regional type, represented by most of the urbanized North West, is more centred on manufacturing, processing and distribution, although local services and public services still form the majority of employment. In large mixed conurbations, housing is often smaller and in poorer condition, with lower distances travelled. In peri-urban and rural areas, travel distances are higher and there is new affluence overlaid on historic poverty. Although there are generally higher proportions of dependants, material consumption continues to grow and retail and leisure services continues to emerge.

Rural regions:
Also found in the NW are the more rural and remote territories. While there is more farming and forestry, land-based activity is giving way to tourism as the main employer. There exist production sectors such as forestry and mineral extraction, but even these are small parts of the rural economy. Settlements are more in market town and village patterns, and the resulting more extended travel distances rely on private transport. There are problems with second home ownership and housing poverty traps, so more of the local housing is unimproved and inefficient.

Sustainable consumption / production & regional policy

There is at present a growing aspiration towards, but a huge disconnection between, the ideals of the One Planet Economy and the reality of regional development policy. Most of the regional strategy documents now quote "sustainability" on every page, but on closer inspection, the main agenda still revolves around "growth."[2] For the UK's Regional Economic Strategies (RES) this often means economic growth *per se*, tempered with some social inclusion, while for the Regional Spatial Strategies it means enabling, managing and coping with the effects of "growth."

From the viewpoint of the Ecological Budget UK project, it is not the ***quantity*** but the ***quality*** of such growth that is most important – what kind of growth, for whom and at what cost. Here we present a very simplistic ***growth agenda*** for the NW region, in terms of 3 categories.

- ***Environmental resource efficiency***– rapid increase, measurable via the Footprint at a net rate of 3% per year.
- ***Economic growth***, as measured by monetary activity – a rate which appears to be self-sustaining for the UK within the global economy, currently about 2.25% long term (including variations between regions).

[2] Sustainable Development Commission 2005

- ***Social welfare*** (quality of life, equity and inclusion): high growth, although this can be difficult to measure.

This basic development triangle questions many of the basic assumptions about regional development, and helps clarify the basic policy options;

- ***Production:*** 1) further growth in high-impact industries and distribution systems, OR - 2) more resource efficient industries, compatible with a 'One-Planet Economy'.
- ***Consumption***: 1) assumption of high growth in material consumption, OR - 2) a sustainable consumption agenda. This underlies the success or failure of many regional policies: urban renaissance, public transport, local food markets, and social inclusion, to name a few.
- ***Housing:*** 1) further growth in conventional construction and household energy use, OR - 2) more sustainable building patterns.
- ***Transport:*** 1) further growth in traffic and road construction, OR - 2) lower impact modes of transportation, with better integration between supply and demand.
- ***Energy, water, waste etc***: more power stations, dams and landfills, OR - 2) alternative ways of managing demand with less cost and environmental impact.

These and many more policy options are long and complex issues, and even small policy changes can require massive amounts of work and planning. However, the aims of growth and development are basic principles that need to be debated, analysed and then put into regional targets. Many policy makers have done so. For instance, the South East England Regional Assembly has declared its aim to ***"stabilise the growth in the South East ecological footprint by 2016."***[3] This shows the start of a new kind of thinking about the power and responsibility of regional and devolved government.

Regional economic development

Regional economic issues

While there are great expectations from regional development, the UK economy has long running tensions and conflicts which play out on the level of regional policy.[4]

- The large differential in productivity (GVA/employed person) between the South and the North and Midlands shows no signs of reducing.
- There are signs that the major cities are beginning to lead GVA growth now that office-based service activities are increasingly important.
- Manufacturing employment will continue to fall as a result of static output and productivity improvements, with the largest direct impacts on the Midlands and parts of the North.
- London, West Yorkshire and Manchester benefit from established clusters of financial and business services.
- Employment in public services has grown faster in the North than its population change alone would warrant, particularly since 1997.
- The highest formation rate for high technology companies is in the South, along with the UK's main concentration of research and development activity.
- Hidden unemployment (including long term sickness, training and other government schemes) is higher in the North than in the stronger economies surrounding London.

Regional economic options

Valuing the quality of growth more than the quantity of growth questions many development paths and policy options. Is a RES focused on economic growth alone, or more on growth in quality of life and reduced environmental impacts? Is the shift towards services dependent on increasing imports of material goods from overseas, which increases environmental impacts? How can a low-impact high-quality plan for the future be compared to the alternatives and implemented?

The RES theme of ***resource productivity*** is central to this, and can be defined in various ways – output per investment, per employee, or per tonne of waste or emissions. Energy efficiency and CO2 emissions rates will improve through a combination of regulatory power, financial

[3] SEERA, 2005

[4] English Regions Network, 2005

investment, market development, and technology innovation. It is fair to say that Regional Development Agencies have indirect leverage on most of these. An overall agenda for consumption is hardly mentioned in the average RES, it being taken for granted that rising affluence contributes to a healthy retail sector.

The typical RES contains a mixture of supply-side (production) and demand-side (consumption) actions, each of which has some scope of influence on a region's material flows and Ecological Footprint:

- ***Promoting business clusters:*** these have the opportunity for environmental technology innovation, low impact infrastructures such as waste or sewage treatment, employers' green travel planning, and other features of an 'eco-industrial park.'
- ***Enhancing competitiveness & productivity***: this involves energy and material efficiency in industry. It may also extend towards a ***market transformation*** of both supply and demand sides – meeting consumer needs in new ways.
- ***Mobilising the knowledge base***: this reflects the shift towards knowledge-based innovation, high technology and use of advanced information and communications technology. Each of these can be a catalyst in new low impact patterns of production and consumption.
- ***Economic inclusion*** and mobilizing the labour market: this works at the human scale of training and career support, incentives for graduates and entrepreneurs, and intermediate labour markets. The latter is particularly relevant where it revitalizes the social economy, increasing social welfare while reducing material impacts.
- ***Sites and premises:*** this traditional core of economic development is still hugely relevant to land use, construction rates, transport demand and other services.
- ***Urban and rural renaissance***: these agendas contain the economic and employment sides of the spatial strategies. In each, there is an urge for policy integration, so that economy, housing, transport, and services all reinforce each other.
- ***Image and environment***: in many RESes the environmental agenda might be seen as an add on, although it can be argued that image and quality of life factors are essential in a globalizing economy. An important question raised by resource accounting is to what degree local environmental goals are achieved by displacing the impacts – for instance if a local steel mill closes and the same amount of steel is imported from Taiwan.

Regional physical development

Across each of the regions and devolved administrations there are tensions and conflicts on managing growth and mitigating decline. As the main framework for the physical functioning of the region, the RSS s have a bearing on its material flows and Footprint. However, their scope is limited by policy pressures and industry norms, and often RSS debate is about the levels and locations of growth, rather than the quality and purpose of growth. These are the key issues that many RSS address:

- ***Housing planning options:*** The location of housing influences transport demand and accessibility to employment and services.
- ***Transport supply options:*** Regional policy options include development of new infrastructure, such as trams or new motorways, or constraint measures, such as parking charges or road pricing schemes.
- ***Housing construction options:*** this is an economic sector with potential for increased efficiency in energy and waste. Household demand dictates how much energy must be produced, how much water supplied, and which utilities must be provided.
- ***Energy supply options***: The development of renewable energy changes how land is used. The use of fossil fuels in the UK is changing, with a shift to more use of gas. There is also a resurgence of nuclear power, with various risks and liabilities.
- ***Waste management options:*** RSS waste management options are driven by the EU Directives on phasing out landfills. The amount of waste a region produces results from rates of material flows and consumption.

The project

Websites

Interim reports, spreadsheet data and working papers are available on the CURE website. Due to the merger of UMIST and Manchester this is still temporary:
http://www.art.man.ac.uk/PLANNING/cure/Eco.htm

A full project website is in development, to be launched shortly.

Material on the REAP modelling tool can be found on www.ecologicalbudget.org.uk

Dates

Provisional dates to be confirmed:

Steering group 6: Thurs 9th Feb 2006: 10.30

Steering group 7: Thurs April 27th: 10.30

Project launch: Thurs 25th May: 2.00 – 5.00

With thanks to…

Biffaward for their commitment to research on the physical metabolism of the UK and its regions. Also, to other sponsors including the Merseyside Waste Disposal Authority, Environment Agency, McGrath Environmental Consultants, and Research Methods Consultancy.

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Appendix: NW regional material flow accounts (selected)

source: REAP accounts, SEI with CURE.

North West
kilotonnes [kt]
2001

Industry	SUPPLY: Total Supply	Regional production (2001)	Imports from ROW	Imports from other regions in the UK
Agriculture, hunting and related service activities	12,432	7,361	1,537	3,534
Forestry, logging and related service activities	1,949	621	42	1,286
Fishing, operation of fish hatcheries and fish farms; s	50	6	38	7
Mining of coal and lignite; extraction of peat	1,236	872	7	357
Extraction of crude petroleum and natural gas; servic	6,645	4,401	2,196	48
Mining of metal ores	567	0	42	524
Minerals w/o ores	32,121	22,276	489	9,355
Production, processing and preserving of meat and m	479	265	174	40
Processing and preserving of fish and fish products; fi	3,591	305	286	3,001
Vegetable and animal oils and fats	971	45	299	626
Dairy products	1,503	1,397	39	67
Grain mill products, starches and starch products	652	391	147	113
Prepared animal feeds	4,364	3,284	121	959
Bread, rusks and biscuits; manufacture of pastry good	156	52	70	34
Sugar	249	1	248	0
Cocoa; chocolate and sugar confectionery	610	76	34	500
Other food products	7,698	201	41	7,456
Alcoholic beverages	2,314	664	80	1,570
Production of mineral waters and soft drinks	1,567	538	31	998
Tobacco products	76	14	1	61
Preparation and spinning of textile fibres	93	45	46	3
Textile weaving	119	49	66	3
Finishing of textiles	97	91	-	6
Made-up textile articles, except apparel	103	67	32	4
Carpets and rugs	139	23	114	2
Other textiles	103	44	57	3
Knitted and crocheted fabrics and articles	123	82	35	5
Wearing apparel; dressing and dying of fur	998	45	204	749
Tanning and dressing of leather; manufacture of lugg	158	4	65	90
Footwear	130	4	47	80
Wood and wood products, except furniture	2,616	709	611	1,297
Pulp, paper and paperboard	4,868	740	691	3,438
Articles of paper and paperboard	1,408	947	88	372
Publishing, printing and reproduction of recorded me	7,095	74	45	6,976
Coke, refined petroleum products and nuclear fuel	1,816	-	717	1,099
Industrial gases, dyes and pigments	382	154	167	60
Other inorganic basic chemicals	1,715	978	353	384
Other organic basic chemicals	3,130	1,715	742	673
Fertilisers and nitrogen compounds	1,652	854	366	432
Plastics and synthetic rubber in primary forms	2,443	1,153	838	452
Pesticides and other agro-chemical products	43	21	14	8
Paints, varnishes and similar coatings, printing ink an	568	373	49	146
Pharmaceuticals, medicinal chemicals and botanical	65	6	57	2
Soap and detergents, cleaning and polishing preparat	515	205	230	81
Other chemical products	2,839	537	160	2,142
Man-made fibres	287	110	134	43
Rubber products	642	134	34	474
Plastic products	3,405	697	243	2,465
Glass and glass products	1,094	504	187	403
Ceramic goods	390	124	167	99
Bricks, tiles and construction products, baked in clay	1,407	1,087	30	290
Cement, lime and plaster	2,395	2,004	107	285
Articles of concrete, plaster and cement; cutting, sha	15,605	10,995	114	4,496
Basic iron and steel and of ferro-alloys; manufacture	4,604	2,083	432	2,089
Basic precious and non-ferrous metals	857	212	294	351
Casting of metals	179	66	-	113
Structural metal products	1,970	321	24	1,624
Tanks, reservoirs and containers of metal; manufactu	175	27	14	135
Forging, pressing, stamping and roll forming of metal	181	30	-	151
Cutlery, tools and general hardware	178	21	50	107
Other fabricated metal products	1,738	160	113	1,465