

## *Regional paper 1:*

# **NORTH WEST MATERIAL FLOW IN PRODUCTION & CONSUMPTION**

draft results for discussion  
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### **Summary**

In the first half of 2005 Stockholm Environment Institute York have undertaken a detailed Material Flow Analysis of the construction sector in the North West region. Three specific areas of interest have been investigated.

Firstly, a the hybrid analysis of MFA-IOA<sup>1</sup> was applied on a national level to establish the flow of materials triggered by consumption activities that are related to construction.

Secondly, the flows of construction materials with respect to both production and consumption in the North West region have been estimated.

Thirdly, material flows of production, imports and exports in the North West have been established for for all 46 material producing sectors.

The work has contributed significantly to the development of the material flow analysis module in REAP, with an emphasis on construction material analysis.

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<sup>1</sup> Hybrid MFA-IOA = combination of material flow and (monetary) input-output analysis

## Methodological background

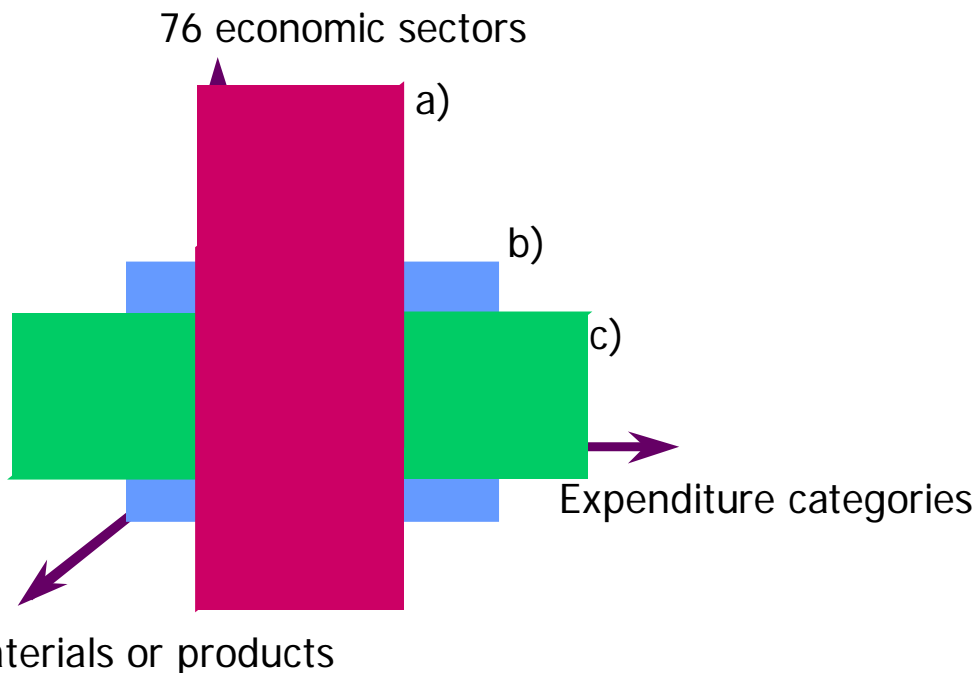


Figure 1: The three dimensions of hybrid MFA-IOA<sup>1</sup> (see text for details)

The following steps were undertaken in the hybrid MFA-IOA to investigate the flows of (construction) materials triggered by consumption in the North West region:

Step 1: Volume data (tonnes) from the national PRODCOM database were compiled in a 76 economic sector framework of which 46 sectors actually produce a material output. These span from sector 1, “Agriculture” to sector 81-84, “Furniture” (123 IO coding) (x-axis in Figure 1). (This shows national production. **Regional** production in the NW was estimated by using a model for the interregional transport of goods, based on DfT transport statistics (CSGRT, 2003). For more details see REAP Report No. 3; revised version forthcoming.)

Step 2: The national material outputs per sector were then allocated to final demand using a monetary IOA. In Figure 1 ‘final demand’ is represented by the y-axis ‘expenditure categories’. The result of the allocation is a table with all 76 sectors vertically and all final demand / expenditure (COICOP) categories horizontally (= surface **b** in Figure 1). For details see REAP Report No. 2.

Step 3: This analysis has been undertaken for all 46 materials, resulting in 46 ‘surfaces **b**’.

Step 4: From these 46 materials, 13 materials were extracted that are related to construction. Four of these can only be used for construction, like e.g. bricks, cement, concrete etc.; the other nine materials can be used for various purposes including construction (e.g. wood, plastic, steel etc.).

Step 5: Material flows for these 13 materials were allocated to consumption categories, with a special emphasis on construction related consumption activities, such as “Maintenance and repair of the dwelling” or “Construction of roads” for example (= surface **c** in Figure 1 reduced to 13 materials and 6 expenditure categories directly related to construction).

Step 6: Detailed analyses of material flows are possible if one follows the flow of materials through the various economic sectors (cross-cutting sections of surfaces **a**, **b** and **c** in Figure 1). For example, the amount of plastic that is consumed “through” or “via” the sector construction is likely to be used for construction purposes whereas the plastic that comes “through” the food sector is likely to be packaging.

## ***Results for the NW***

Examples for results are shown below. For full details please refer to detailed spreadsheets available on the website.

Table 1: Production, imports and exports of materials in/to/from the NW region.

<b>NORTH WEST SUMMARY of TRANSPORT MODEL</b>						
PRODUCTS	INDUSTRIES	TRANSPORT MODEL!	TRANSPORT MODEL!	TRANSPORT MODEL!	TRANSPORT MODEL!	TRANSPORT MODEL!
123 code		PRODUCTION	NW share of IMPORTS to the UK!	USE	NW share of EXPORTS from the UK!	APPARENT CONSUMPTION = P + I - E
1	Agriculture	6,631,259	5,518,072	12,149,331	3,432,702	8,716,629
2	Forestry	677,381	113,108	790,489	47,248	743,241
3	Fishing	220,820	98,690	319,510	100,753	218,758
4	Coal extraction	1,908,907	1,929,234	3,838,141	3,437,802	400,339
5	Oil and gas extraction	82,895,964	6,872,588	89,768,551	0	89,768,551
6	Metal ores extraction	194	0	194	0	194
7	Other mining and quarrying	34,969,584	22,291,246	57,260,831	3,669,862	53,590,969
8-19	Food processing	10,661,331	2,794,328	13,455,658	1,031,449	12,424,209
20	Tobacco products	54,338	3,813	58,150	17,968	40,182
21-27	Textile fibres	195,113	213,293	408,406	33,496	374,910
28	Wearing apparel and fur products	92,012	149,179	241,191	50,629	190,562
29-30	Leather goods	35,348	233,588	268,936	19,141	249,795
31	Wood and wood products	722,250	1,563,206	2,285,456	159,374	2,126,082
32-33	Pulp, paper and paperboard	2,084,900	1,593,909	3,678,809	368,722	3,310,087
34	Printing and publishing	413,256	91,011	504,267	45,826	458,442
35	Coke ovens, refined petroleum & nu	0	0	0	0	0
36	Industrial gases and dyes	281,331	96,321	377,652	86,839	290,813
37	Inorganic chemicals	1,431,630	467,672	1,899,302	263,641	1,635,661
38	Organic chemicals	2,857,336	696,738	3,554,074	1,252,552	2,301,521
39	Fertilisers	1,464,301	383,060	1,847,361	152,101	1,695,260
40	Plastics & synthetic resins etc	1,453,969	701,075	2,155,043	383,778	1,771,265
41	Pesticides	1,168,995	14,752	1,183,747	34,212	1,149,536
42	Paints, varnishes, printing ink etc	783,636	53,825	837,461	94,536	742,925
43	Pharmaceuticals	66,847	66,173	133,020	55,112	77,908
44	Soap and toilet preparations	641,187	203,430	844,616	273,157	571,459
45	Other chemical products	785,321	332,778	1,118,100	328,054	790,046
46	Man-made fibres	160,910	129,068	289,979	37,624	252,355
47	Rubber products	156,904	88,380	245,284	56,661	188,622
48	Plastic products	771,400	370,072	1,141,472	206,995	934,477
49	Glass and glass products	684,642	211,222	895,865	204,435	691,429
50	Ceramic goods	275,023	228,012	503,035	155,553	347,482
51	Structural clay products	882,609	33,833	916,442	10,738	905,704
52	Cement, lime and plaster	1,989,420	183,010	2,172,430	130,177	2,042,253
53	Articles of concrete, stone etc	10,156,209	213,260	10,369,469	297,839	10,071,631
54	Iron and steel	1,878,933	361,763	2,240,695	232,846	2,007,849
55	Non-ferrous metals	439,511	552,267	991,778	137,955	853,823
56	Metal castings	87,077	0	87,077	0	87,077
57-61	Structural metal products	963,321	256,072	1,219,393	227,194	992,199
62-68	Mechanical power equipment	2,760,371	555,435	3,315,806	1,611,136	1,704,670
69	Office machinery & computers	29,316	64,220	93,536	27,761	65,776
70-72	Electric motors and generators etc	994,707	154,277	1,148,984	67,207	1,081,777
73-75	Electronic components	894,896	90,597	985,493	112,587	872,906
76	Medical and precision instruments	269,067	221,465	490,532	129,360	361,172
77	Motor vehicles	515,244	461,954	977,198	242,284	734,914
78-80	Shipbuilding and repair	586,330	31,349	617,679	4,749	612,930
81-84	Furniture	317,551	257,770	575,321	74,519	500,802

**Table 2: Materials used for construction purposes, North West region (year 2000)**

**100% construction materials (i.e. these materials can only be used for construction purposes)**

EA code	123 code		Construction related to actual rentals for housing	Construction related to imputed rentals for housing	Maintenance and repair of the dwelling	Construction for real estate activities	Constructing roads	Constructing dwellings
7	7	Other mining and quarrying	242,127	553,005	536,422	581,070	178,500	2,517,418
34	51	Structural clay products	15,032	34,409	27,010	37,731	11,582	358,615
35	52	Cement, lime and plaster	21,701	49,042	143,794	44,231	13,594	275,062
36	53	Articles of concrete, stone etc	161,780	369,374	435,761	400,022	122,824	1,935,771

**Multiple use materials (i.e. these materials can be used for other purposes than construction as well)**

EA code	123 code		Construction related to actual rentals for housing	Construction related to imputed rentals for housing	Maintenance and repair of the dwelling	of which construction for real estate activities	of which constructing roads	of which constructing dwellings
13	31	Wood and wood products	16,180	36,851	142,196	30,266	9,309	143,054
25	42	Paints, varnishes, printing ink etc	2,403	5,419	15,058	2,814	876	12,715
30	47	Rubber products	908	2,050	3,205	440	140	1,993
31	48	Plastic products	5,883	13,370	42,917	8,603	2,658	38,451
32	49	Glass and glass products	2,454	5,500	7,952	4,192	1,293	18,175
33	50	Ceramic goods	1,548	3,490	4,413	3,178	977	13,835
37	54	Iron and steel	8,546	19,145	21,950	7,810	2,423	46,183
41	57-61	Structural metal products	4,018	9,026	13,981	18,208	1,658	36,572
44	70-72	Electric motors and generators etc	3,800	8,478	7,990	7,093	1,247	17,217