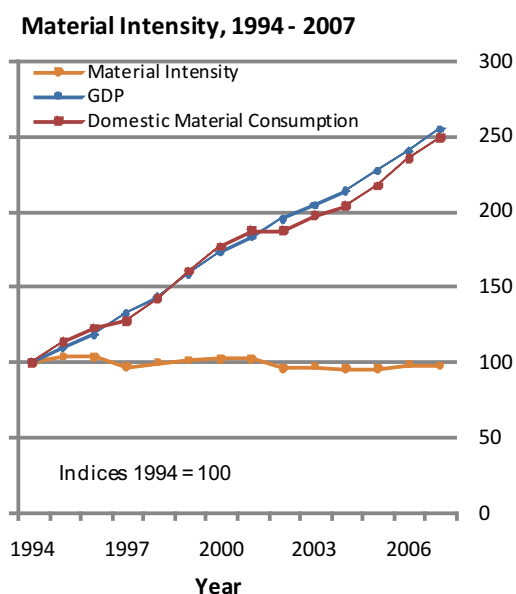


## Economy-wide Material Flow Accounts for Ireland, 1994-2007 – Pilot



The results of a pilot study in regard to Economy-wide Material Flow Accounts (MFA) are presented here. The [methodology](#) used is based on that recommended by Eurostat as part of the development of European MFA statistics.

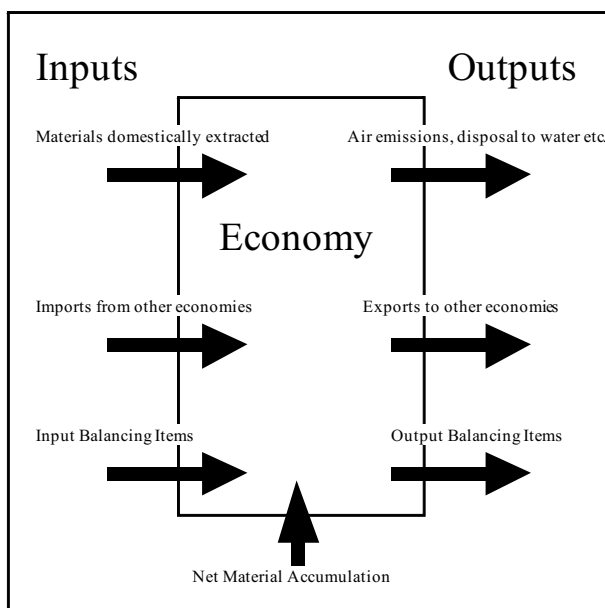
Economy-wide MFA provide an aggregate overview of annual material inputs and outputs of an economy. No detail at economic sector level is provided. In contrast to Gross Domestic Product (GDP), which measures production and consumption market activities in monetary terms, the MFA measures these activities in physical terms (tonnes).

The accounts attempt to be consistent compilations of the overall material inputs into the national economy, the changes of material accumulation within the economic system and the material outputs to other economies or to the environment. Another perspective is that the MFA shows the physical exchange process between society and the natural environment.

The focus therefore revolves around a number of key flows: mineral materials, biomass, fossil fuels, finished goods and waste arising. In short the MFA covers all solid, gaseous, and liquid material flows (except for bulk water) where the unit of measurement is tonnes per year.

The following diagram illustrates the conceptual approach.

**Figure 1: Scope of Economy-wide MFA**



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Balancing Items consist mainly of gases taken both from the environment and emitted to the environment. For example, oxygen is taken from the environment for combustion and respiration; carbon dioxide is expelled to the environment when humans and farm animals exhale. Balancing Items are taken into account to establish a global estimate of Net Material Accumulation in the economy.

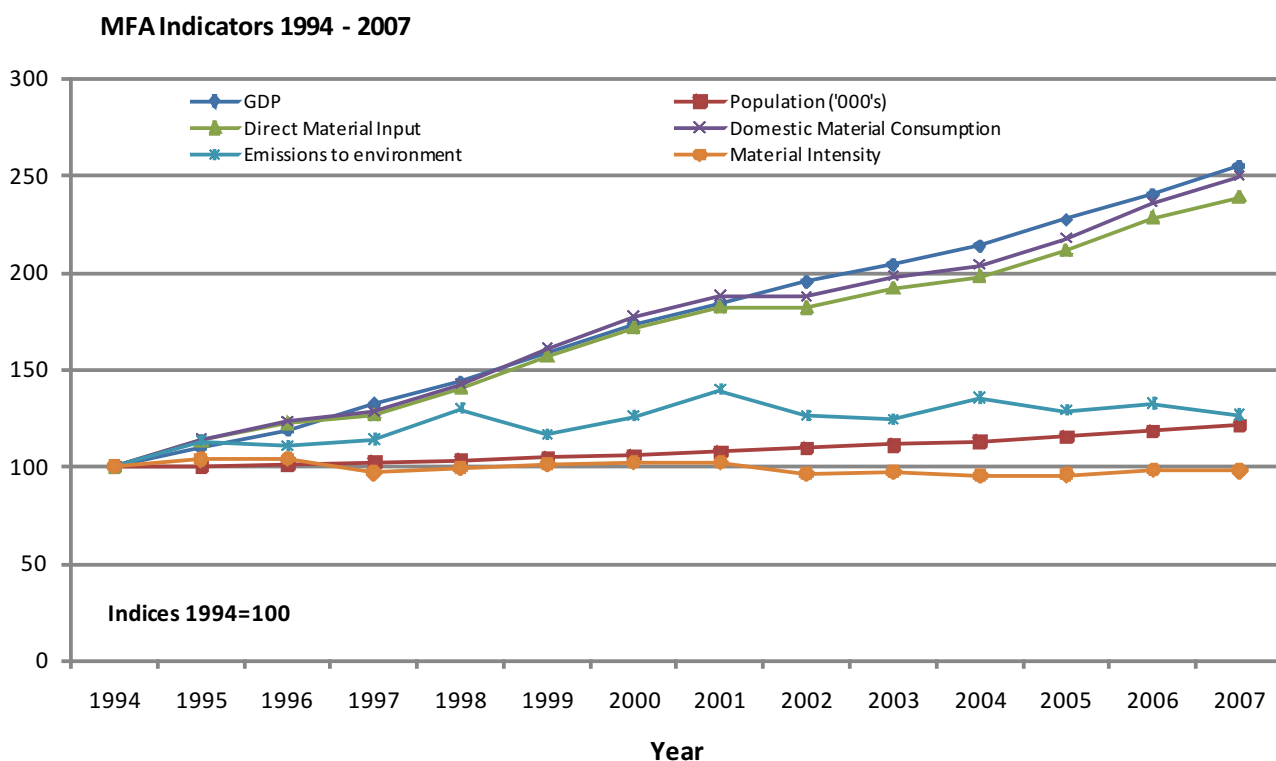
### Analytic Indicators

Various indicators can be derived from MFA to summarise the flows of materials. The current tables focus on the following:

- ◆ Physical Trade Balance i.e. imports minus exports.
- ◆ Direct Material Input (DMI) which measures the input of materials directly used by the economy i.e. all materials that form part of products made or are used in production and consumption activities (including goods made for export). DMI is equal to domestic extraction used plus imports.
- ◆ Domestic Material Consumption (DMC) which measures the total amount of material directly consumed by the economy i.e. it includes domestic extraction used and imports but excludes exports.
- ◆ Net Material Accumulation i.e. total inputs minus total outputs.
- ◆ Material Intensity i.e. Direct Material Consumption divided by Gross Domestic Product.

The aggregate indicators have many limitations. For example, the methodology involves summing and comparing tonnes of inert materials such as soil and rock with tonnes of highly toxic materials that occur in much smaller quantities. The indicators therefore should not be considered in isolation, but in association with the constituent disaggregated data, and how they vary over time.

**Figure 2: Selected Indicators, 1994-2007**



## Summary of Results

From 1994 to 2007, domestic extraction increased from 76% to 84% of total inputs, with non-metallic mineral materials accounting for the largest share. In the same period, biomass domestic extraction decreased from 41 million tonnes to 37 million tonnes. Non-renewable raw materials in 2007 (fossil fuels, mineral materials) amounted to 82% of the overall mass of material inputs indicating that only 18% of the material flows are classified as renewable raw materials (biomass and biomass products).

In 2007 there was a net accumulation of 179 million tonnes of material in the Irish economy compared with 41 million tonnes in 1994.

DMI increased by 138% over the period 1994 to 2007 (from 104 million tonnes to 249 million tonnes) and DMC increased by 149%. In the same period, gross domestic product rose by 155% (*see Detailed Tables, Summary*). Hence material intensity (DMC/GDP) fell by 2% i.e. one unit of GDP in 2007 was generated with 2% lower material consumption than in 1994.

## Acknowledgements

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**Economy-wide Material Flow Accounts Summary Table**
*Thousand tonnes*

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<b>INPUTS</b>														
<b>Domestic Extraction</b>														
Biomass	41,405	42,241	43,440	43,993	44,543	43,212	42,456	41,987	41,197	41,340	42,245	40,533	37,548	36,632
Fossil Fuels	7,317	10,039	7,604	5,021	4,912	6,626	5,653	4,941	3,468	5,772	5,002	4,363	4,058	3,098
Minerals	31,114	41,603	51,368	56,357	67,535	84,407	100,586	112,631	114,628	121,817	125,303	138,334	158,065	169,085
Total	79,835	93,883	102,412	105,371	116,991	134,245	148,695	159,558	159,294	168,929	172,549	183,230	199,670	208,815
<b>Trade imports</b>														
Biomass	5,731	5,723	5,448	5,438	6,424	6,460	6,253	6,405	6,816	6,850	6,839	7,465	8,150	8,081
Fossil Fuels	11,309	9,403	10,050	11,468	11,805	11,155	11,773	12,205	11,168	11,788	13,776	15,380	14,303	15,059
Minerals	6,787	8,403	8,779	8,899	10,192	10,558	10,981	10,667	10,910	10,980	12,280	12,890	14,149	15,375
Other products	823	888	873	1,058	1,023	1,031	1,103	1,143	1,321	1,184	1,144	1,218	1,551	1,508
Total	24,650	24,417	25,150	26,863	29,444	29,204	30,110	30,420	30,215	30,801	34,040	36,953	38,154	40,023
<b>OUTPUTS</b>														
<b>Trade exports**</b>														
Biomass	-3,818	-4,316	-4,195	-4,159	-4,242	-3,968	-4,077	-4,140	-4,272	-4,378	-4,590	-4,889	-4,895	-4,896
Fossil Fuels	-1,670	-1,809	-2,590	-2,046	-2,096	-2,235	-1,916	-2,172	-2,112	-1,612	-2,581	-2,818	-2,967	-2,640
Minerals	-3,849	-3,890	-3,662	-4,357	-4,833	-4,635	-4,762	-4,904	-4,549	-4,858	-5,045	-4,989	-5,065	-5,073
Other products	-745	-795	-822	-849	-919	-845	-887	-1,485	-1,710	-2,118	-2,140	-2,572	-2,564	-1,046
Total	-10,083	-10,810	-11,268	-11,411	-12,090	-11,682	-11,643	-12,702	-12,643	-12,966	-14,356	-15,267	-15,493	-13,655
<b>Emissions</b>														
Emissions to Air	36,651	37,625	39,439	40,887	42,710	44,220	46,943	49,288	47,665	46,676	47,678	49,354	48,865	48,607
Emissions to Land	356 *	5,053	1,968 *	2,052 *	7,563	2,325 *	2,500 *	6,976	2,303 *	2,278 *	6,671	2,096 *	4,469	2,238 *
Emissions to Water	n/a	218	n/a	n/a	143	n/a	n/a	14	n/a	n/a	17	n/a	16	n/a
Dissipative Use of Products	12,543	12,730	12,943	13,017	13,272	12,948	12,441	12,127	11,965	12,021	11,996	11,907	11,600	11,245
Total	49,550	55,626	54,351	55,957	63,688	59,493	61,884	68,405	61,934	60,974	66,362	63,356	64,950	62,090
<b>BALANCING GASES</b>														
Input	56,720	57,807	60,336	62,572	64,929	66,188	67,863	70,652	69,430	68,016	69,043	70,639	70,376	70,105
Output	60,349	60,964	63,192	65,296	66,927	66,090	64,364	65,496	65,493	64,858	65,276	65,391	65,098	64,382
<b>NET MATERIAL</b>														
<b>ACCUMULATION</b>	41,224	48,707	59,087	62,143	68,659	92,372	108,778	114,028	118,869	128,948	129,639	146,807	162,660	178,815

NA= Not Available

\* Industrial Waste NOT included in these years

\*\*Outflows classified as negative

**SELECTED INDICATORS**
*Thousand tonnes*

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<b>Physical Trade Balance</b>														
Biomass	1,912	1,408	1,253	1,279	2,182	2,492	2,176	2,264	2,544	2,472	2,249	2,576	3,255	3,185
Fossil Fuels	9,639	7,593	7,460	9,422	9,709	8,920	9,857	10,033	9,056	10,176	11,195	12,562	11,336	12,419
Minerals	2,938	4,514	5,117	4,542	5,359	5,923	6,218	5,763	6,361	6,122	7,236	7,901	9,084	10,302
Other products	78	92	51	209	104	187	216	-342	-389	-935	-996	-1,353	-1,014	462
Total	14,567	13,607	13,882	15,452	17,354	17,522	18,468	17,718	17,573	17,835	19,684	21,686	22,661	26,368
<b>Direct Material Input (DMI)</b>														
Biomass	47,136	47,964	48,888	49,431	50,967	49,672	48,710	48,391	48,013	48,190	49,084	47,998	45,698	44,713
Fossil Fuels	18,626	19,441	17,653	16,489	16,717	17,781	17,426	17,146	14,636	17,560	18,778	19,743	18,361	18,157
Minerals	37,901	50,007	60,148	65,256	77,728	94,965	111,567	123,298	125,539	132,797	137,583	151,224	172,214	184,460
Other products	823	888	873	1,058	1,023	1,031	1,103	1,143	1,321	1,184	1,144	1,218	1,551	1,508
Total	104,486	118,300	127,562	132,234	146,435	163,449	178,805	189,978	189,509	199,730	206,589	220,183	237,824	248,838
<b>Domestic Material Consumption (DMC)</b>														
Biomass	43,317	43,649	44,693	45,272	46,725	45,704	44,633	44,251	43,741	43,812	44,494	43,109	40,802	39,817
Fossil Fuels	16,956	17,632	15,064	14,443	14,621	15,546	15,510	14,974	12,525	15,948	16,197	16,925	15,394	15,517
Minerals	34,052	46,117	56,486	60,899	72,894	90,330	106,804	118,393	120,990	127,939	132,539	146,235	167,149	179,387
Other products	78	92	51	209	104	187	216	-342	-389	-935	-996	-1,353	-1,014	462
Total	94,403	107,490	116,294	120,823	134,345	151,767	167,163	177,276	176,867	186,764	192,233	204,916	222,331	235,183

[Detailed Tables](#)
[Sankey Diagram](#)