



Monitoring the Bioeconomy

Material Flow Monitor

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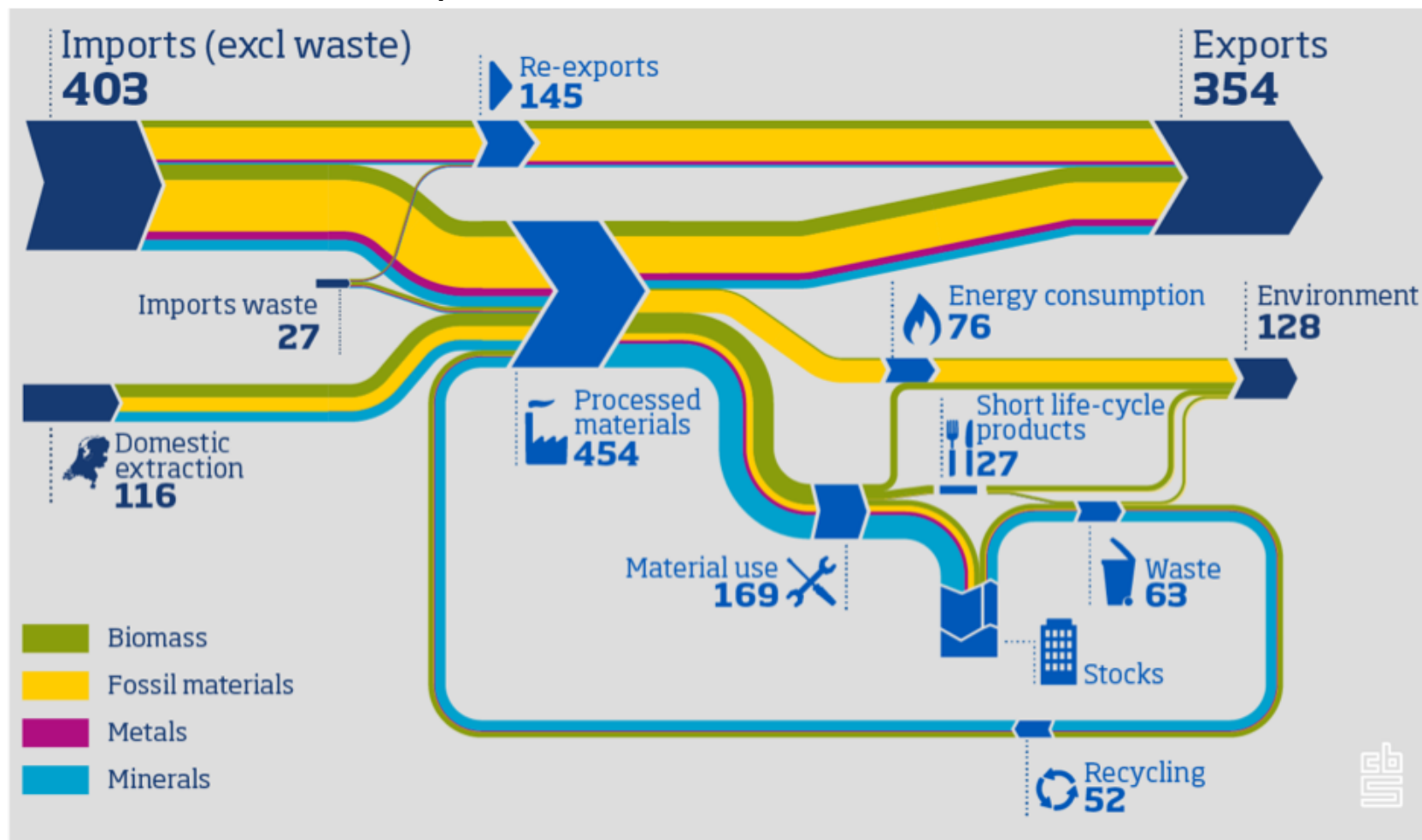
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- **Overall objective BioMonitor**
 - Establish a robust framework to measure and monitor the bioeconomy in the EU and its Member states
 - Address data gaps and modeling gaps
- **Objective of CBS**
 - Material flows between economy and environment, within economy
 - Physical supply and use tables, flows of biomass
 - Provide details on bio-based products and industries

- MFM describes **physical** material flows (including biomass) to, from and within the economy.
- **Integrated system** based on statistics/accounts reported to Eurostat according to international standards
- MFM recorded as supply and use tables (NL: 400 products, 130 sectors)
- Interaction between economy and environment
- Based and linked to the monetary SUTs of National Accounts

- The Netherlands, 2016 (in billion kilos)



- **Bioeconomy** → biomass flows to, from within economy
- **Economic importance** → value added (resource efficiency) and employment per sector
- **Self-sufficiency** → import versus domestic extraction
 - NL, all materials: 60% extraction (low compared to EU-28)
- **Circular economy** → use of primary versus secondary flows
 - 13% secondary use
- **Substitution** → use biotic versus a-biotic materials
 - Energy: 92% fossil and 8% biomass
- **Climate change** → Greenhouse gas emissions per sector

- Short term methodology
 - Existing statistics: biomass shares and production statistics
- **Medium term methodology**
 - Fill data gaps with regard to biomass use by:
 - Applying biomass shares to supply and use in MFM
 - Adding supply and use of 100% biomass flows
 - Balancing input and output of biomass per sector
- Long term methodology
 - Recording of biobased products (CPA) and sectors (NACE)

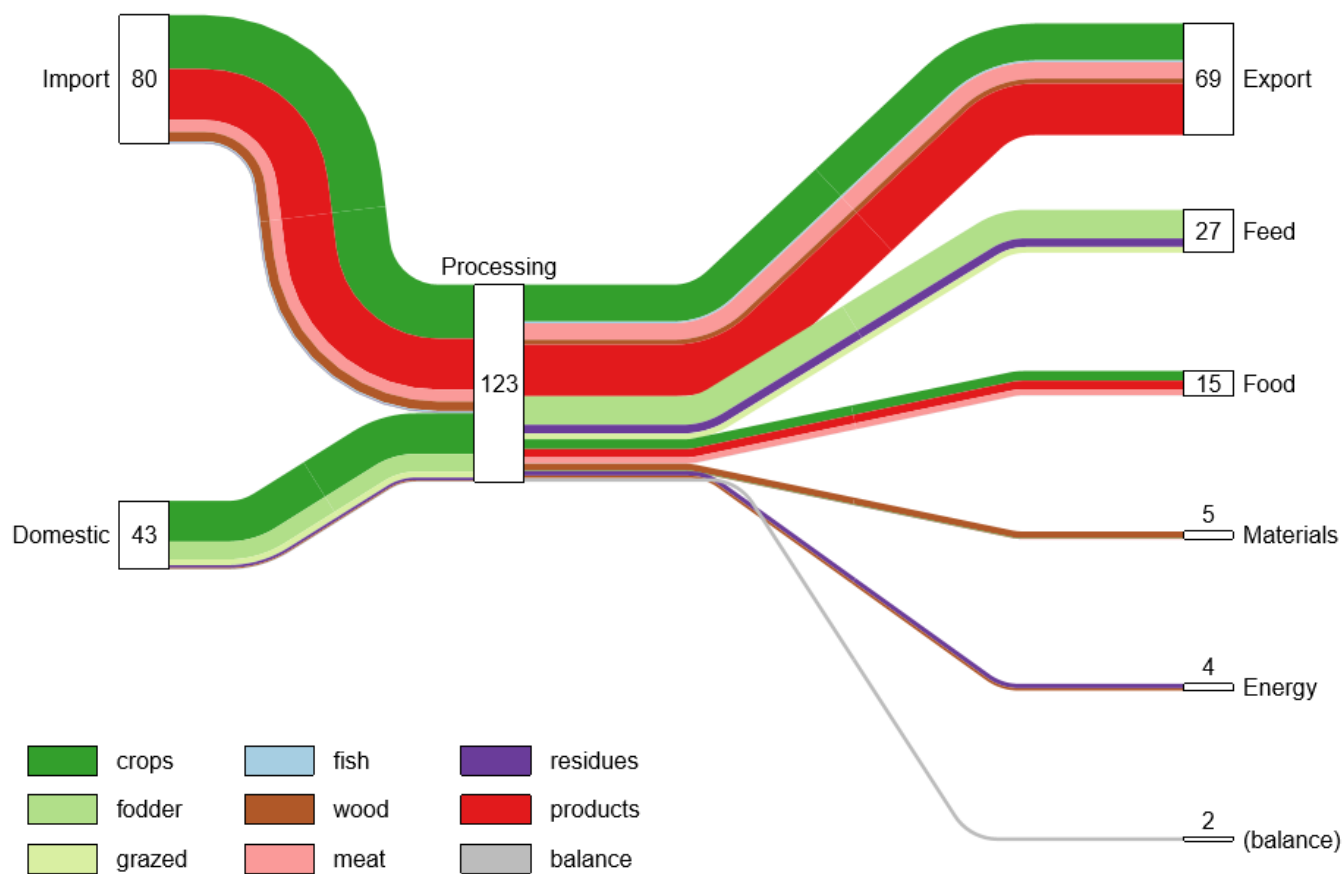
Material Flow Monitor (MFM)

- Includes biomass flows: defined as a materials/products that consist for the main part of biomass
- Recorded in pure weight

Biomass Flow Monitor (BFM):

- Biomass in composite products are estimated based on biomass shares NOVA
- Ambiguous products that can be made from either biomass or other materials (like plastics) are separated in a biotic and a-biotic products
- Recording in dry mass

The Netherlands, 2016 (dry matter, billion kilo)



Textile industry (NACE 13)

- In MFM recorded in pure weight including all kinds of material (fossil, biomass, metal, mineral). Supply:

Physical supply table (million kilos)
the Netherlands, 2016

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	Agriculture, forestry and fishing				Mining industry				Manufacture of food products, beverages and tobacco products				Manufacture of textiles, wearing apparel and leather products				Manufacture of wood and paper products				Manufacture of coke and refined petroleum products				Manufacture of chemicals and pharmaceutical products				Manufacture of rubber and plastics products				Manufacture of other non-metallic mineral products				Manufacture of basic metals				Manufacture of metal products, except machinery and equipment				Manufacture of computer, electronic and optical products				Manufacture of electrical equipment				Manufacture of machinery and equipment n.e.c.				Manufacture of transport equipment				Manufacture of furniture and other manufacturing a				Electricity, gas and steam supply				Water treatment and supply; sewerage; waste treatment				Construction				Services				Total column 1-20				Consumption households				Accumulation				Import				Flows from the environment				Total																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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Textile industry (NACE 13)

- Use

Physical use table (million kilos)
the Netherlands, 2016

the Netherlands, 2016																											
	Agriculture, forestry and fishing		Mining industry	Manufacture of food products, beverages and tobacco products	Manufacture of textiles, wearing apparel and leather products	Manufacture of wood and paper products	Manufacture of coke and refined petroleum products	Manufacture of chemicals and pharmaceutical products	Manufacture of rubber and plastics products	Manufacture of other non-metallic mineral products	Manufacture of basic metals	Manufacture of metal products, except machinery and equipment	Manufacture of computer, electronic and optical products	Manufacture of electrical equipment	Manufacture of machinery and equipment n.e.c.	Manufacture of transport equipment	Manufacture of furniture and other manufacturing a	Electricity, gas and steam supply	Water treatment and supply; sewerage; waste treatment	Construction	Services	Total column 1-20	Consumption households	Accumulation & other final demand	Export	Flow to the environment	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1 Products of agriculture, forestry and fishing	3 876		30 076	27	543		11	37												11	1 219	35 800	3 842	- 725	17 945	56 862	
2 Products of cattle breeding	485		17 945	4																84	18 518	147	100	1 684		20 506	
3 Energy carriers	3 970	696	1 836	66	869	60 067	11 006	98	521	5 222	140	13	206	63	49	20	20 630	536	155	3 589	109 714	8 823	-1 290	65 493		182 740	
4 Other mining products	748	4 734	112	75	130		1 841	155	13 331	10 081	134	4		5		107			25 712	2 254	99 433	159	835	14 877		75 304	
5 Fish and meat products			1 447	42																504	1 993	1 346	2	4 554		7 895	
6 Potato, vegetable and fruit products	5		640				2													715	1 362	2 042	6	4 607		8 017	
7 Dairy products	5		2 524				239													697	3 465	2 052	69	3 109		8 695	
8 Grain mill and starch products	87		3 490		49		44	1												22	3 916	873	69	2 416		7 274	
9 Other food products	12 521		8 168		13	297	412	22										15	2	1 062	22 512	4 099	194	13 264		40 069	
10 Beverages and tobacco products	4		428				4				4	3				6				6	2 628	3 083	2 327		3 571		8 981
11 Textiles, wearing apparel and leather products	5		4	255	32		1	19	2		3	6	13	11	3	28		1	8	126	517	475	82	1 352		2 436	
12 Wood products, except furniture	92	3	300	41	342	2	147	117	66	64	128	22	8	106	78	452	6	1	1 367	1 367	5 739	308	166	2 486		8 679	
13 Printing and paper products	20	2	1 143	8	634		189	94	38	8	43	31	10	131	39	79	2		12	1 214	6 697	348	83	4 685		11 793	
14 Coke and refined petroleum products	634	7	51	3	36	25 344	13 631	8	47	2 484	24	3	11	19	67	823	58	1 049	10 740	55 039	6 153	- 480	109 512		170 218		
15 Chemical and pharmaceutical products	1 856	97	722	214	388	833	25 977	2 152	134	88	115	481	65	45	40	349	10	390	482	1 871	36 289	505	429	48 065		85 288	
16 Rubber and plastic products	69	3	372	7	131	3	123	233	96	11	75	8	86	97	115	62	4	5	561	569	2 630	263	114	2 305		5 312	
17 Other non-metallic mineral products	67		825		72		71	9	4 497	299	96	13	67	19	29	72	83	27	18 004	2 067	26 317	522	202	5 500		32 541	
18 Basic metals	5			4	24		83	130	154	1 280	4 480	50	121	1 405	784	332		4	734	257	9 857		288	12 904		23 049	
19 Metal products, except machinery	4	1	200		37	2	66	9	5	2	571	23	2	454	270	335	28	1	1 505	360	3 941	97	435	2 298		6 771	
20 Machinery and equipment		24	18								76	114	190	895	324	160	1	5	558	472	2 837	309	2 903	5 790		11 839	
21 Transport equipment											2			5	1 007				8	299	1 321	363	718	4 085		6 487	
22 Furniture and other manufactured goods	2	1	38	3	4		15	4	1	4	6	12	7	10	18	74	6		89	1 260	1 554	1 270	571	1 203		4 598	
23 Total row 1-22	24 455	5 568	70 401	749	304	86 548	53 862	3 088	18 892	19 543	5 907	780	838	3 257	2 781	2 147	21 508	1 032	50 263	33 991	412 534	36 323	4 811	301 685		785 353	
24 Waste and recycled products	8 910	62	5 933	39	950		1 367	748	2 966	2 732	32			500			1 740	26 830	30 719		85 528		1 142	22 367		109 037	
25 Extraction	41 131	65 377					5 080		4 143												116 331					116 331	
26 Balancing item	43 099	2 718	10 352	254	506	15 019	25 084	410	2 157	1 835	653	49	426	350	271	563	59 830	8 197	3 483	48 247	226 203	32 580	101 551		363 552	723 896	
27 Total	117 595	73 725	86 726	1 042	820	101 567	86 593	4 246	28 158	24 110	6 592	829	1 264	4 107	3 052	2 710	83 078	36 059	84 485	81 838	840 596	68 913	107 504	354 052	363 552	1 734 617	

Balancing supply and use

13450 TextileConfectionLeather

Million Kilo	Total MFM			Biotic unbalanced			Biotic balanced	
			3) % biobased			6) % biobased		
	1) Supply	2) Use		4) Supply	5) Use		7) Supply	8) Use
Plant/animal products	0	77	100%	-	77	100%	-	77
Energy carriers	0	58	0%	-	-	0%	-	-
Minerals	0	73	0%	-	-	0%	-	-
Textile products	683	260	9%	61	23	23%	157	60
Wood/paper products	16	55	100%	16	55	97%	16	53
Chemical products	3	233	1%	0	2	1%	0	2
Other products	12	11	37%	4	4	37%	4	4
Biomass waste	8	0	100%	8	-	100%	8	-
Textile waste	11	56	25%	3	14	15%	2	8
Other waste	30	0	31%	9	-	60%	18	-
Balancing items	284	224	0%	-	-	0%	-	-
Total	1.047	1.047		102	176		205	205

The Netherlands, 2016 (million kilo dry matter)



- **Bio-economy** → supply and use of biomass by sector
- **Economic importance** → value added (resource efficiency) and employment biotic sectors relative to a-biotic sectors
- **Self-sufficiency** → import versus domestic extraction
 - NL, biomass: 80% extraction
- **Losses and waste** → input biomass resource versus output biomass product (or biomass waste output)

- MFM available for the Netherlands
- Goal project is to monitor bio-economy in Europe → develop MFM and BFM in more countries
- Implementation other countries
- Pilot in Slovakia, Latvia and Spain
- Methodology: handbook
- Data availability



- Split sectors in biobased and non-biobased
- Provide data on bio-based indicators
- Input for modeling
- MFM in carbon content (with distinction between biobased and non-biobased carbon)
- Further implementation of methodology in other countries and develop alternatives methods (together with WEcR)

- MFM provides insight in material flows, also between economy and environment and the users
- BFM differentiates the biomass flows
- Indicators on bio-economy can be derived
- Implementation other countries
- Challenge implementation is data availability
 - Data is usually available in Statistical offices, but publication is aggregated (details are confidential)
 - Possible solution:
 - Use aggregated tables as a start and disaggregated them
 - Compile Prodcum (fill gaps using RAS)



Thank you.



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