

CREEA: MFA and waste accounts

- **Method:** Physical supply-use tables, and
 - **Case results:** waste tables
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Physical Material supply-use tables (PSUT)

- Defined in System of Environmental-Economic Accounts (SEEA2012)

System of Environmental-Economic Accounting

SUPPLY	Production and generation of residuals	Accumulation	Flows from the Rest of the World	Flows from the Environment	Total
	Production and generation of residuals by industries (incl. household production on own account) - classified by ISIC	Generation of residuals by households	Industries - classified by ISIC		
Natural inputs				A. Flows from environment (incl. natural resource residuals)	Total Supply of Natural Inputs (TSNI)
Products	C. Domestic production (incl. sale of recycled or reused products)				Total Supply of Products (TSP)
Residuals	I1. Residuals generated by industry (incl. natural resource residuals) I2. Residuals generated following treatment	J. Residuals generated by household final consumption	K1. Residuals from scrapping and demolition of produced assets K2. Emissions from controlled landfill sites	L. Residuals received from rest of the world	M. Residuals recovered from the environment
TOTAL SUPPLY					

Supply

USE	Intermediate consumption of products, use of natural inputs and collection of residuals	Final consumption *	Accumulation	Flows to the Rest of the World	Flows to the Environment	Total
	Industries - classified by ISIC	Households	Industries - classified by ISIC			
Natural inputs	B. Extraction of natural inputs					Total Use of Natural Inputs (TUNI)
Products	B1. Extraction used in production B2. Natural resour. resid.					Total Use of Products (TUP)
Residuals	E. Intermediate consum. (incl. purchase of recycled products)	of recycled and reused products)	O. Accumulation in controlled landfill sites	P. Residuals sent to the rest of the world	Q. Residual flows direct to environment Q1. Direct from industry and households (incl. natural resource residuals & landfill emissions) Q2. Following treatment	Total Use of Residuals (TUR)
TOTAL USE						

Use

White cover publication, pre-edited text subject to official editing

European Commission • Food and Agriculture Organization • International Monetary Fund
Organisation for Economic Cooperation and Development • United Nations • World Bank

PSUT:

- Consistent accounting framework:
 - Economic/Physical flows
 - Same concepts and classifications
 - Supply-use framework
- Types of flows:
 - Resources
 - Products
 - Residuals (emissions&waste)
- Types of activities:
 - Industries
 - Households
 - Accumulation
 - Import/export

Beyond SEEA2012 in the CREEA-project

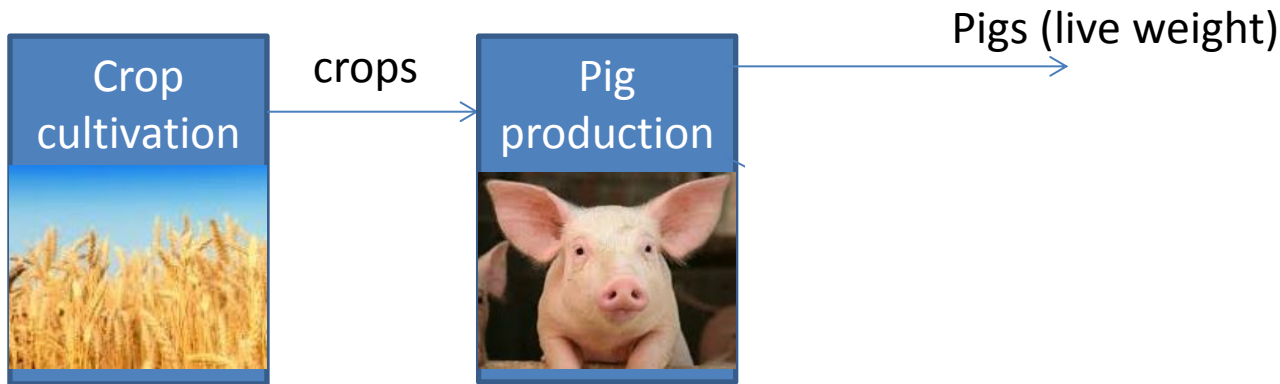
Terminology, concepts and classification

- New definitions: Distinction between **products** and **materials for treatment**
- **Waste**: Subset of **materials for treatment**
- **Materials for treatment**: High level of detail:
 - Most **Materials for treatment** can be disposed of by recycling/incineration/landfill
 - 35 waste treatment industries (reuse, recycling, incin. biogas, landfill...)
 - 18 different waste fractions

Beyond SEEA2012 in the CREEA-project

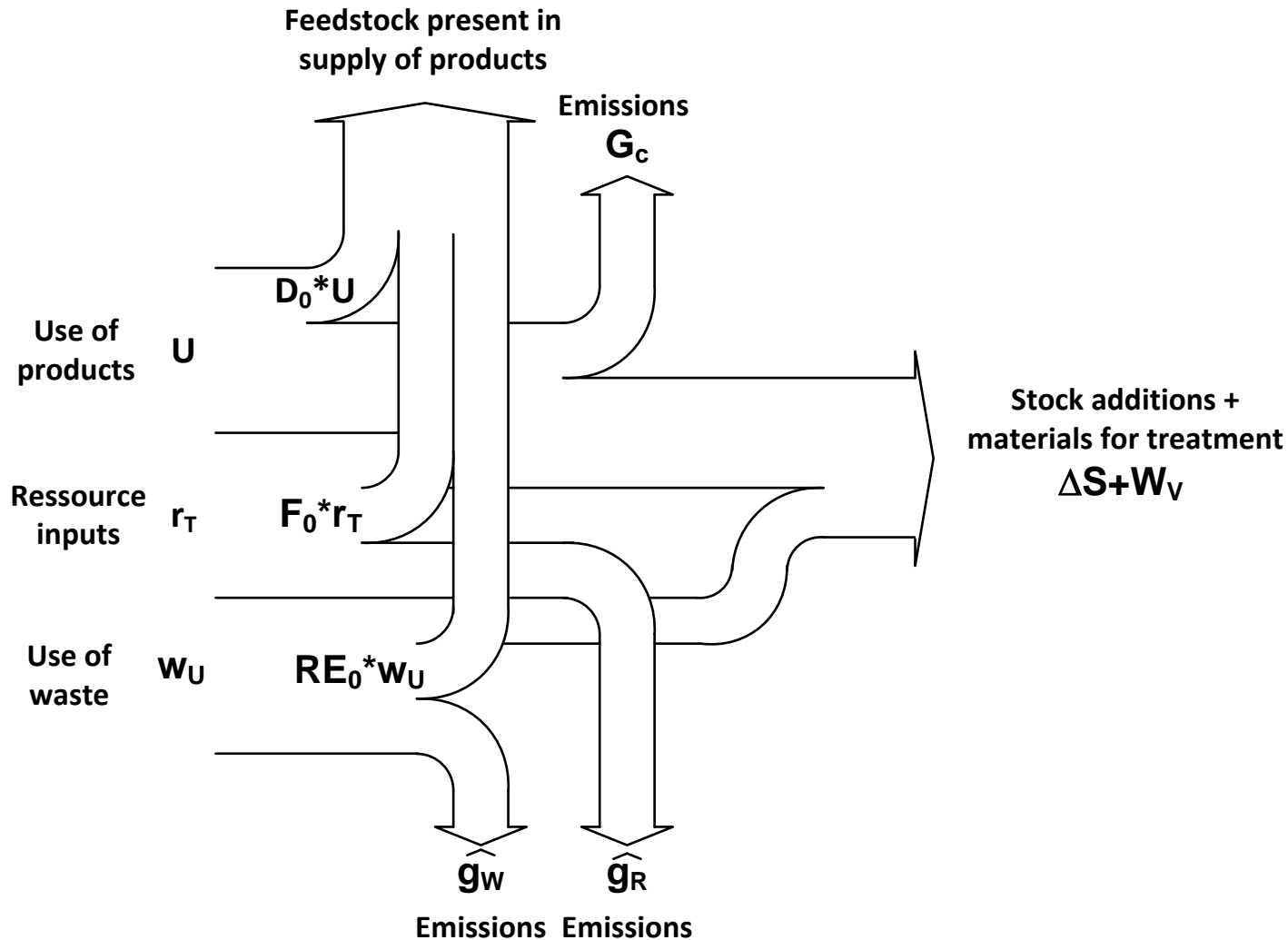
Model for accounting framework (SUT)

- FORWAST-model (EU FP6-project)
- Automated calculation of **materials for treatment** (waste flows)
- **Materials for treatment** flows are integrated in product supply and use tables

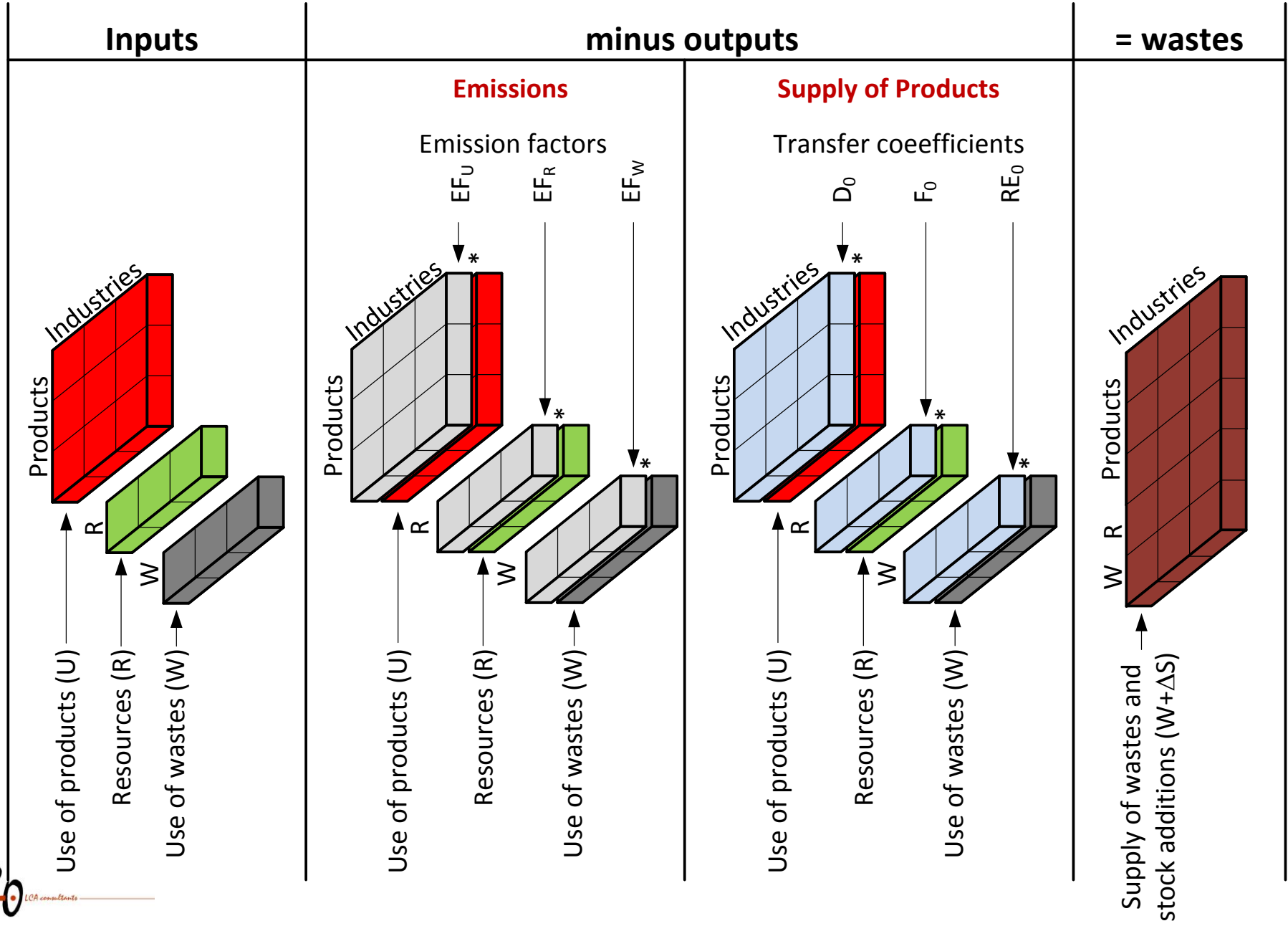


Mass balance and waste calculation

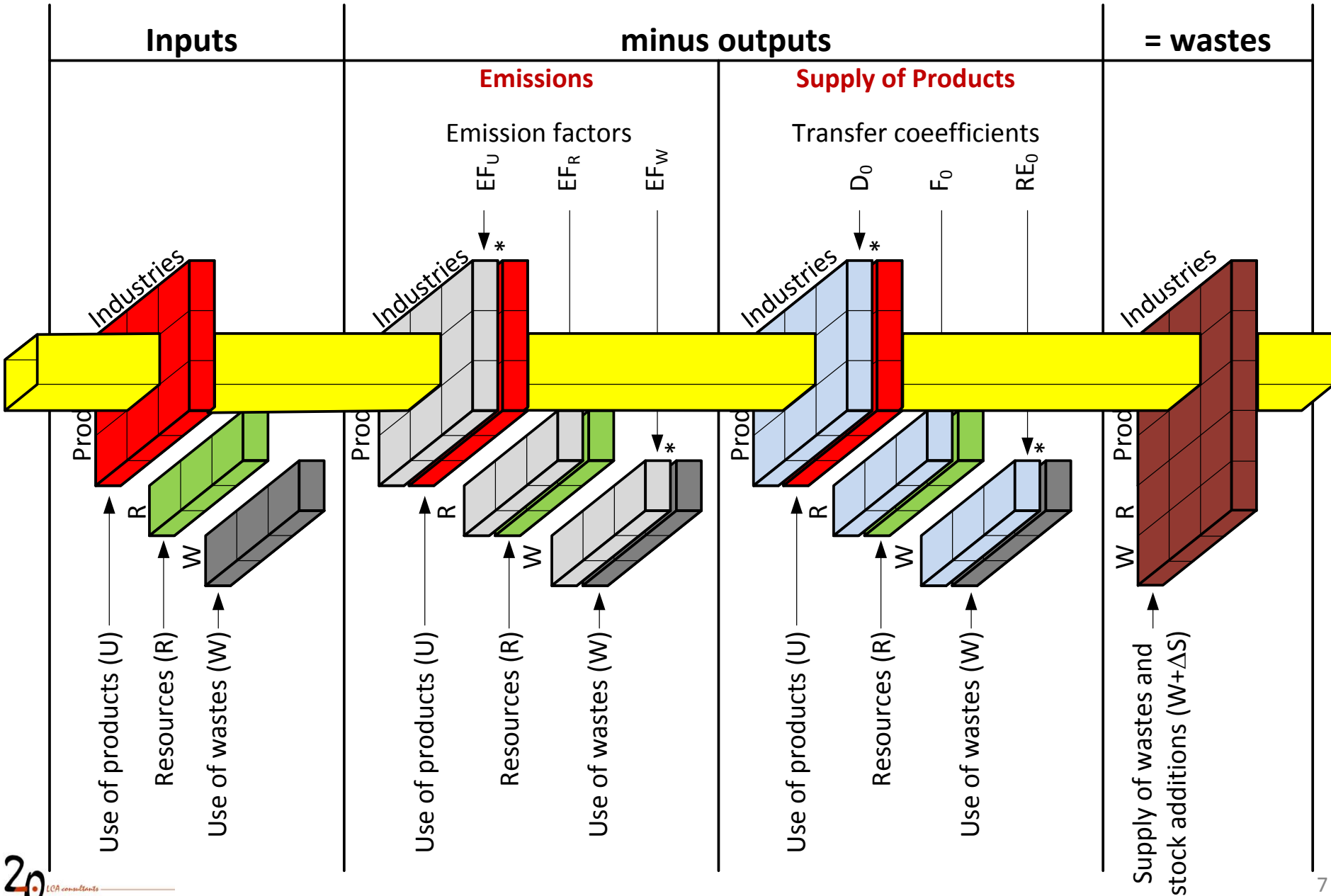
- How to calculate waste generation



Organization of mass balance

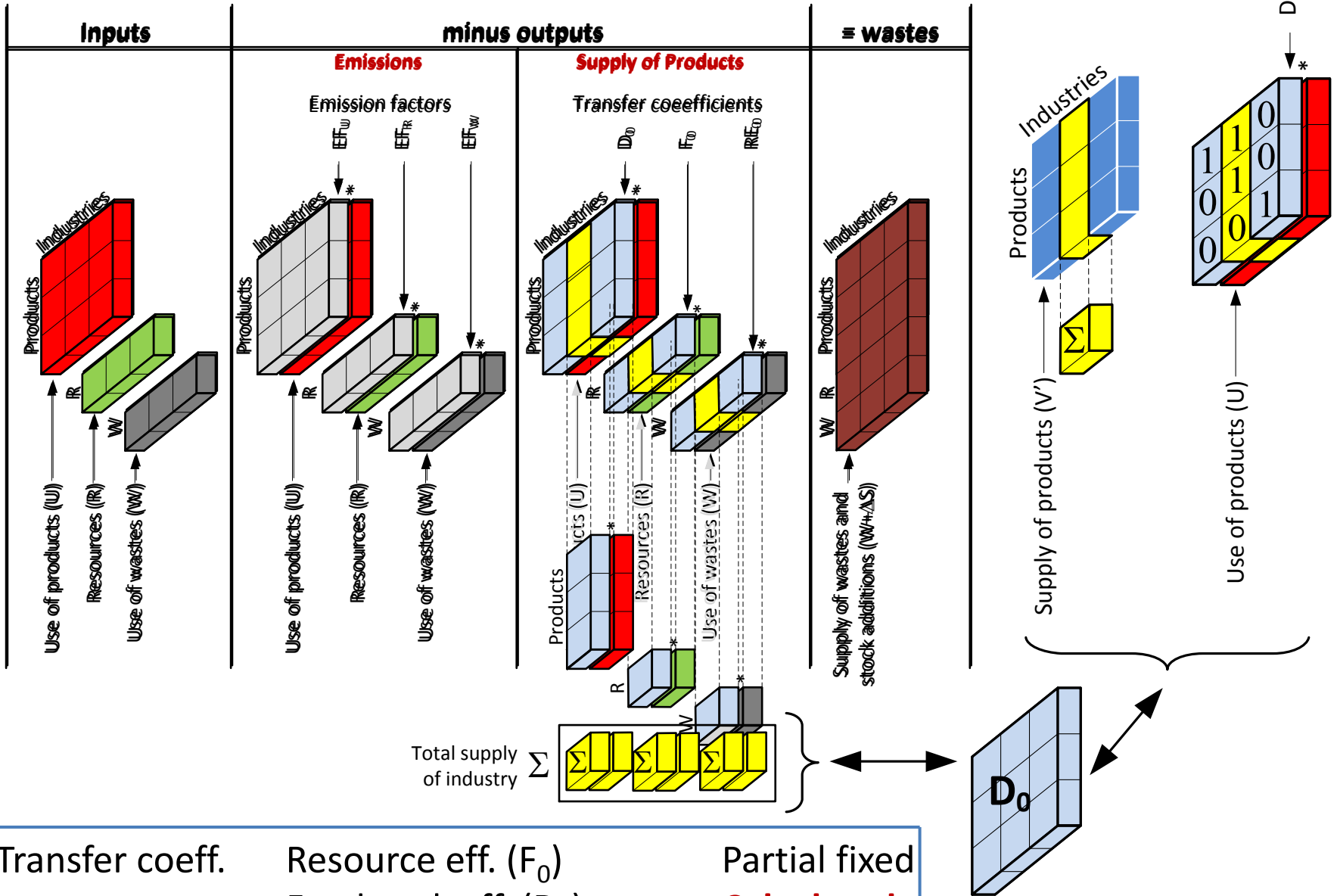


Tracability of each element; origin of waste



Automated balance

Specification of feedstock
 D_1



Transfer coeff. Resource eff. (F_0) Partial fixed
 Feedstock eff. (D_0) **Calculated**
 Recycling eff. (RE_0) Fixed

How to create PSUTs & ESUTs

- 3 steps

■ Starting point

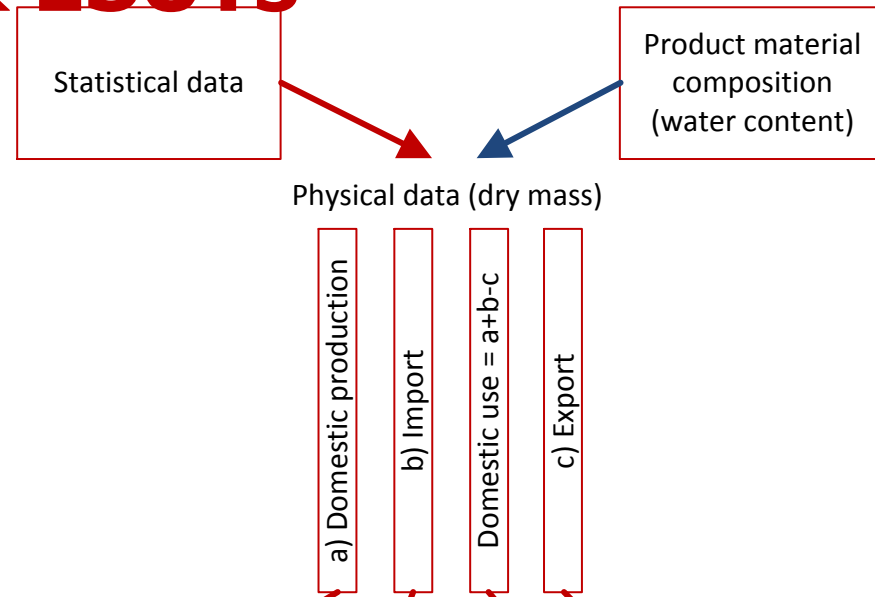
- Dom. production
- Import/export
- Emission /resource factors
- Auxiliary tables

■ Draft PSUT

- Supply and use based on MSUT
- Parameterised emissions/resources
- Calculated wastes and transfer coeff.

■ Re-balanced PSUT

- Optimization script
- Negative waste and feedstock efficiencies]0;1[not allowed
- Redistribution of use table while respecting input coefficients



PSUT conclusion (1 of 2)

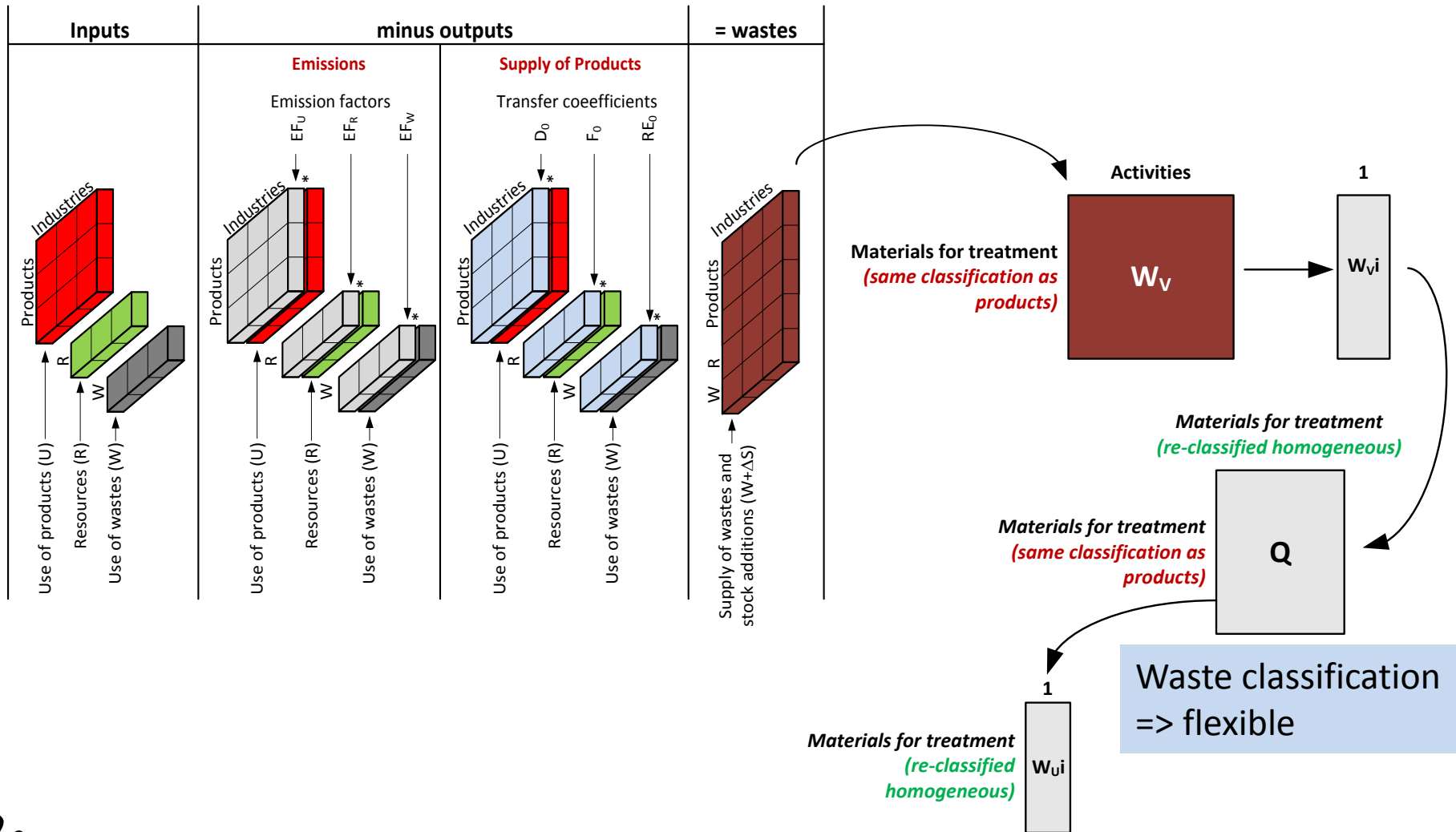
- Scope
 - PSUTs & ESUTs for 43 countries + 4 RoW regions
 - 198 products x 161 industries
 - 18 waste fractions and 35 different waste treatment activities
- Novel integration of waste flows in accounts
 - Waste = balancing item
 - Virgin production vs. recycling of materials for treatment
 - All generated waste is treated in waste treatment activity(ies)

PSUT conclusion (2 of 2)

- PSUTs can be used for
 - Resource efficiency indicators; global, national, industry and product levels
 - Analysis of Unused extraction and Recycling
- New insights
 - Reveals ‘errors’ in MSUT; mass balances have a strong relationship to how real world works
- Integration of MSUT, PSUT and ESUT
 - HIOT database for:
 - Product life cycle assessment (LCA)
 - National / global production&consumption LCA
 - Allows for analysis at many levels: global, national, industry and product levels
 - Can be combined with LCA databases, e.g. ecoinvent => hybrid LCA

Case results – waste tables

- How to produce waste tables from the PSUTs?



Case results – NL waste accounts

- Waste supply use tables (aggregated)

Calculated from mass balance

Based on waste statistics

The rest (non-registered / accumulation)

Waste fraction	Supply	Use - registered	Use - non-registered
Food	7,392,666	7,392,666	0
Manure	2,903,341	2,903,341	0
Textile	968,083	387,413	580,670
Wood	3,458,295	1,592,592	1,865,703
Paper	6,850,103	4,170,366	2,679,737
Plastics	2,115,184	699,153	1,416,030
Glass	1,339,102	1,339,102	148,363
Ashes	2,904,213	1,262,575	1,641,638
Steel	2,037,483	1,625,015	412,467
Precious metals	130,294	53,417	76,877
Aluminium	1,204,076	493,639	710,437
Lead	105,078	53,006	52,071
Copper	198,520	81,388	117,132
Non ferrous	223,148	91,485	131,663
Construction	31,382,437	31,382,437	0
Oil_haz	12,623,235	2,711,527	9,911,708
Sewage	6,505,546	4,491,491	1,771,738

Sum is gross (incl. waste of waste)

Case results – NL waste accounts

- Waste supply table: Who generates waste?

Waste fraction	Agriculture, fishery	Extraction	Manufacturing industries	Construction	Electricity, gas, heat and water	Services and waste treatment	Household/ government	Import
Food	1%	0%	32%	0%	0%	11%	56%	0%
Manure	100%	0%	0%	0%	0%	0%	0%	0%
Textile	1%	0%	5%	0%	0%	8%	86%	0%
Wood	4%	0%	19%	9%	1%	24%	43%	0%
Paper	0%	0%	31%	1%	0%	39%	29%	0%
Plastics	2%	0%	15%	6%	1%	25%	51%	0%
Glass	5%	0%	19%	3%	0%	23%	50%	0%
Ashes	0%	0%	2%	0%	25%	71%	2%	0%
Steel	1%	1%	54%	10%	1%	16%	17%	0%
Precious metals	0%	0%	40%	5%	0%	11%	42%	0%
Aluminium	2%	1%	50%	7%	1%	15%	24%	0%
Lead	0%	0%	88%	1%	0%	5%	5%	0%
Copper	1%	1%	50%	10%	1%	16%	22%	0%
Non ferrous	1%	1%	56%	7%	2%	13%	20%	0%
Construction	1%	3%	13%	8%	0%	16%	59%	0%
Oil_haz	7%	0%	55%	1%	3%	11%	23%	0%
Sewage	1%	0%	5%	0%	0%	60%	33%	0%

Case results – NL waste accounts

Non-registered /
Accumulation



- Waste use table: How is waste treated?

Waste fraction	Manure treatment	Recycling	Incineration	Landfill	Composting	Biogasification	Waste water	Export	Non-registered
Food			17%	2%	58%	1%	3%		20%
Manure	100%								
Textile			29%	3%					68%
Wood		26%	14%	3%		0%			58%
Paper		32%	21%	2%					45%
Plastics		14%	11%	4%					71%
Glass		100%							0%
Ashes		34%		7%					58%
Steel		66%	7%	4%					23%
Precious metals			22%	11%					67%
Aluminium			22%	11%					67%
Lead		16%	18%	9%					56%
Copper			22%	11%					67%
Non ferrous			22%	11%					67%
Construction		100%							0%
Oil_haz			7%	10%					83%
Sewage			10%	5%		3%	37%		45%

CREEA waste tables as official accounts

Can CREEA waste tables be used as official accounts?

- Currently => No! what goes in comes out
 - CREEA is a mass harvest of statistical data => errors
 - Different statistics report different data
- Outlook => Yes
 - The current approach is the right one!
 - National agencies need to verify input data