Wood flow modelling in Germany

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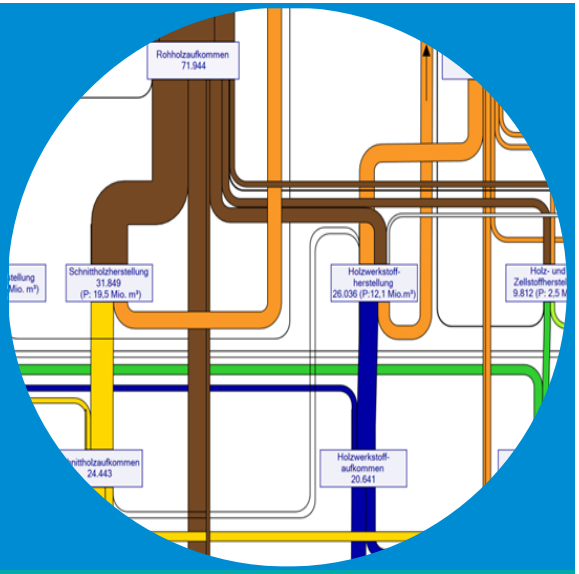


Second Meeting of the
UNECE/FAO Team of Specialists on Wood Energy

Vienna,
11.-12.03.2015

How much wood do we use? And what for?

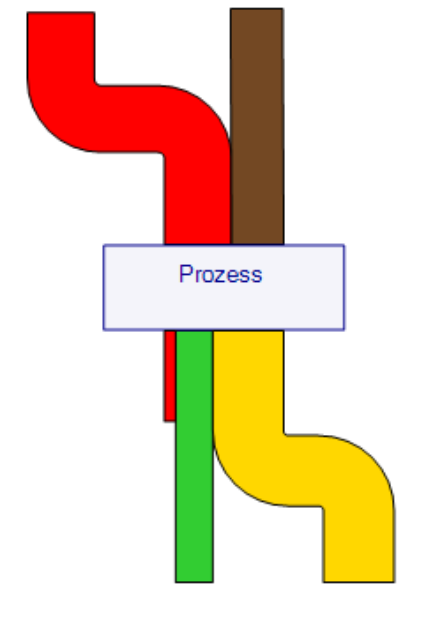
Problem:

→ imprecise statistics

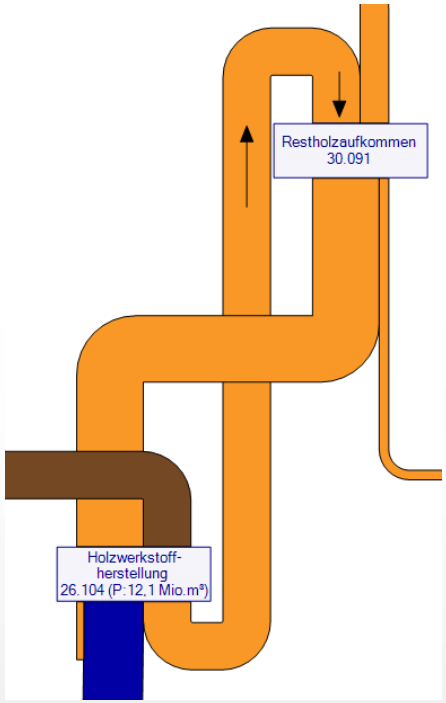
→ do not provide all relevant information

Methodology: Material flow analysis

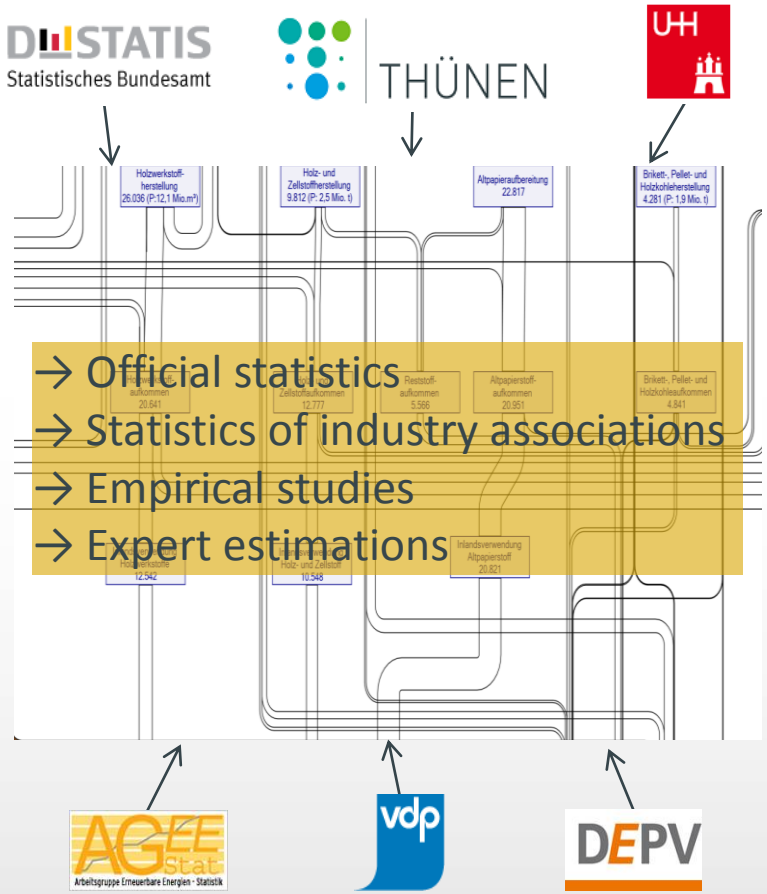
Processes with inflows and outflows of wood



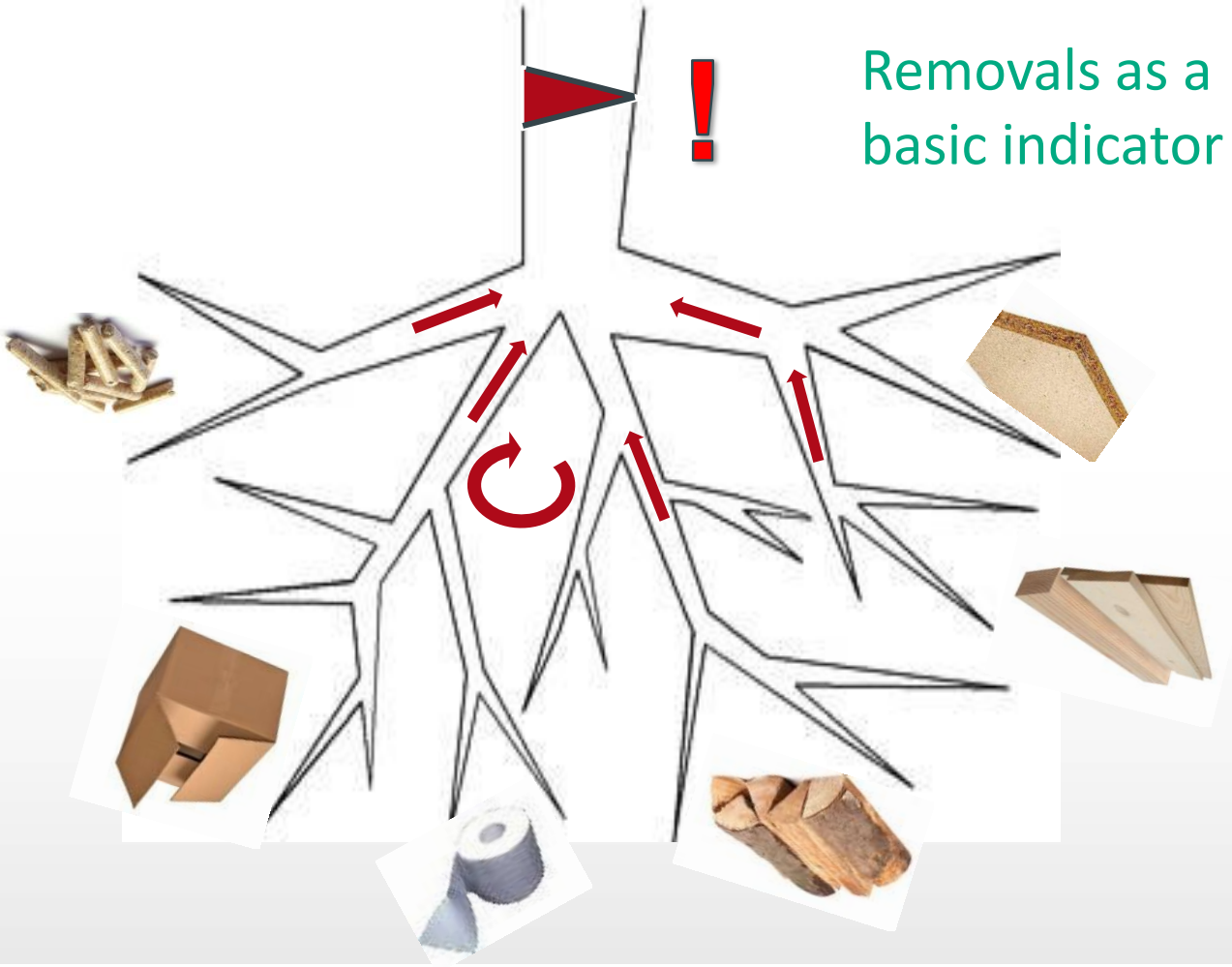
Backflow cycles



Data sources



Methodology: Calculation based on the uses of wood



Removals as a
basic indicator (e. g.)

Methodology: Reference unit

How to connect the flows?

The material flow covers only the flow of wood fibres.

Other materials/non-wood components of products are excluded, e. g. glue.

To connect flows of different products and units (tons, m³ etc.) the reference unit wood fibre equivalent m³ (f) is defined.

It refers only to the volume of the wood fibres in the product or flow

The formal calculation is as follows:

1. The mass m_w of the wood fibres is defined as

$$m_W = m_T - m_{H_2O} - \sum_{i=1} m_{NW_i}$$

where m_T = mass of production; m_{H2O} = mass of water in prod.; m_{NW} = mass of *i* non-wood-materials

2. The volume V_W (the wood fibre equivalent m³ (f)) at fibre saturation level is calculated:

$$V_W = \sum_{j=1} \frac{m_W}{\frac{\rho_j}{\alpha_j}}$$

where ρ_j = density by volume of the wood species *j*; α_j = share of species *j* on all wood fibres in product

Source: Weimar (2011)

Results: Wood flow in Germany 2013*

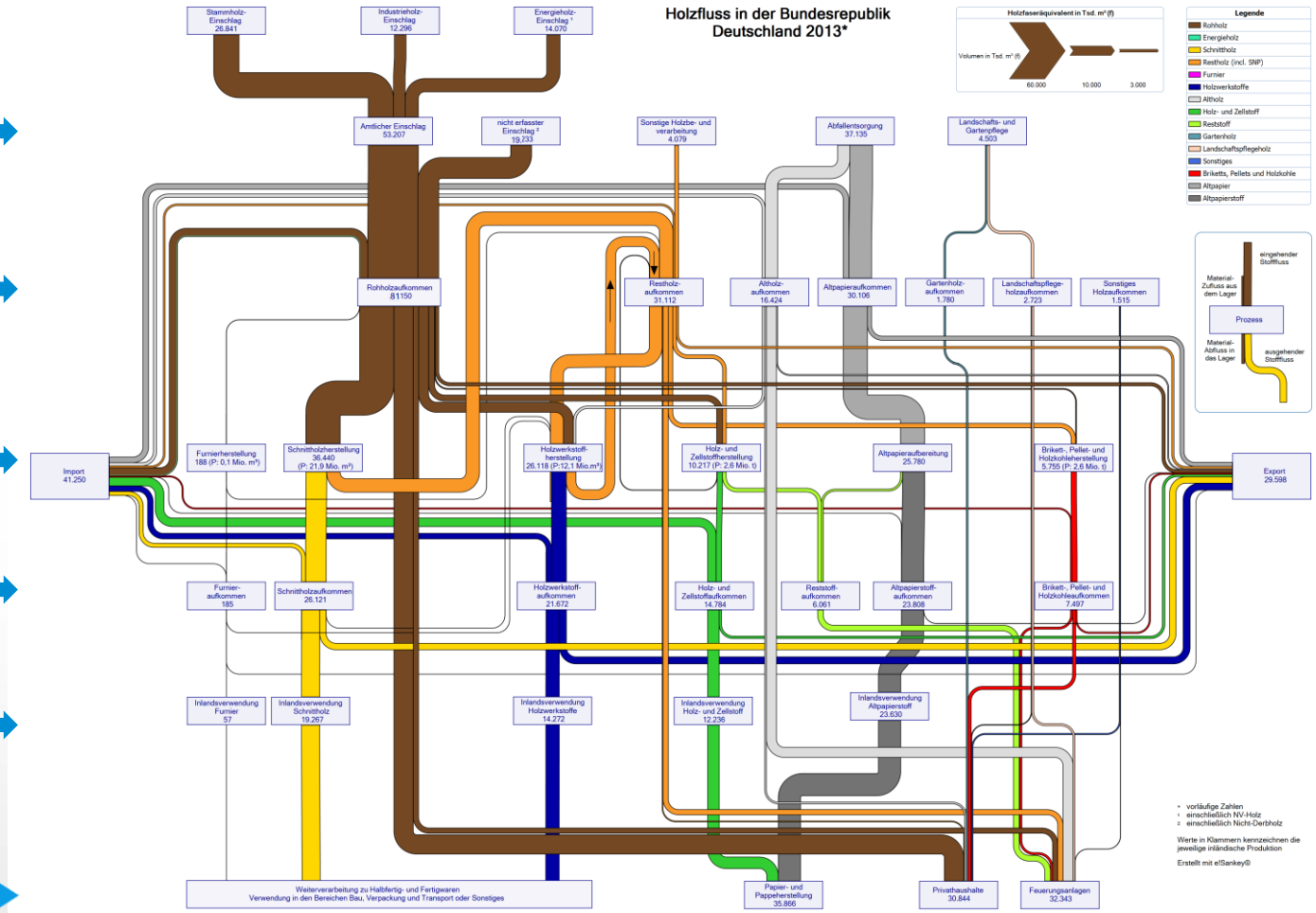
Sources

Supply of wood resources

Processing of wood

Products (1st proc. stage)

Domestic use:
- Semi-fin. products
- Energetic use



* Preliminary

Source: Weimar (2011/2014)

Results: m³ (f) conversion factors

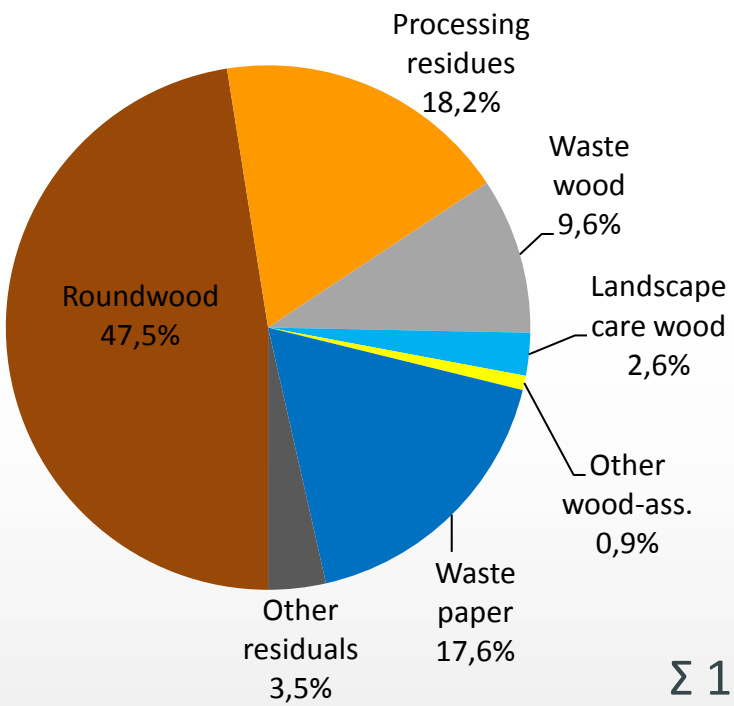
Examples

Product	Unit	Conv. Factor m³ (f)
Raw wood	m^3	1,00
Wood processing residues	m^3	1,00
Wood processing residues (C/NC)	$t_{air\text{-}dry}$	1,98/1,42
Recovered Wood	$t_{air\text{-}dry}$	1,82
Sawn wood	m^3	1,00
Veneer	m^3	1,00
Particle board (incl. OSB)	m^3	1,25
Fibre board	m^3	1,47
Wood pulp	t	2,22
Chemical pulp	t	2,13
Recovered paper	t	1,54
Wood pellets	t	2,22
Wood charcoal	t	1,65

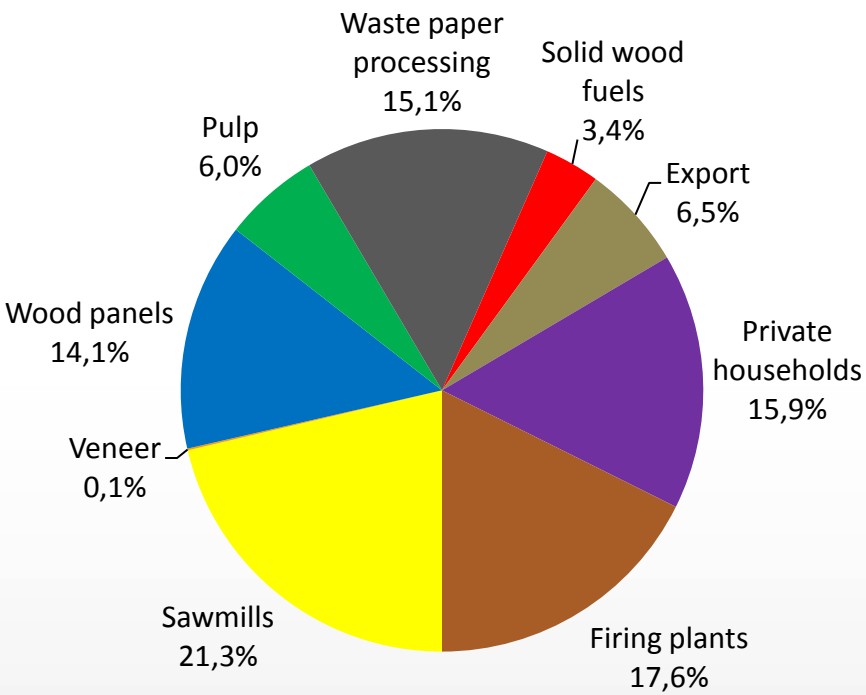
Source: Weimar (2011)

Results: Total balance of wood fibres

Sources of wood fibres



Uses of wood fibres

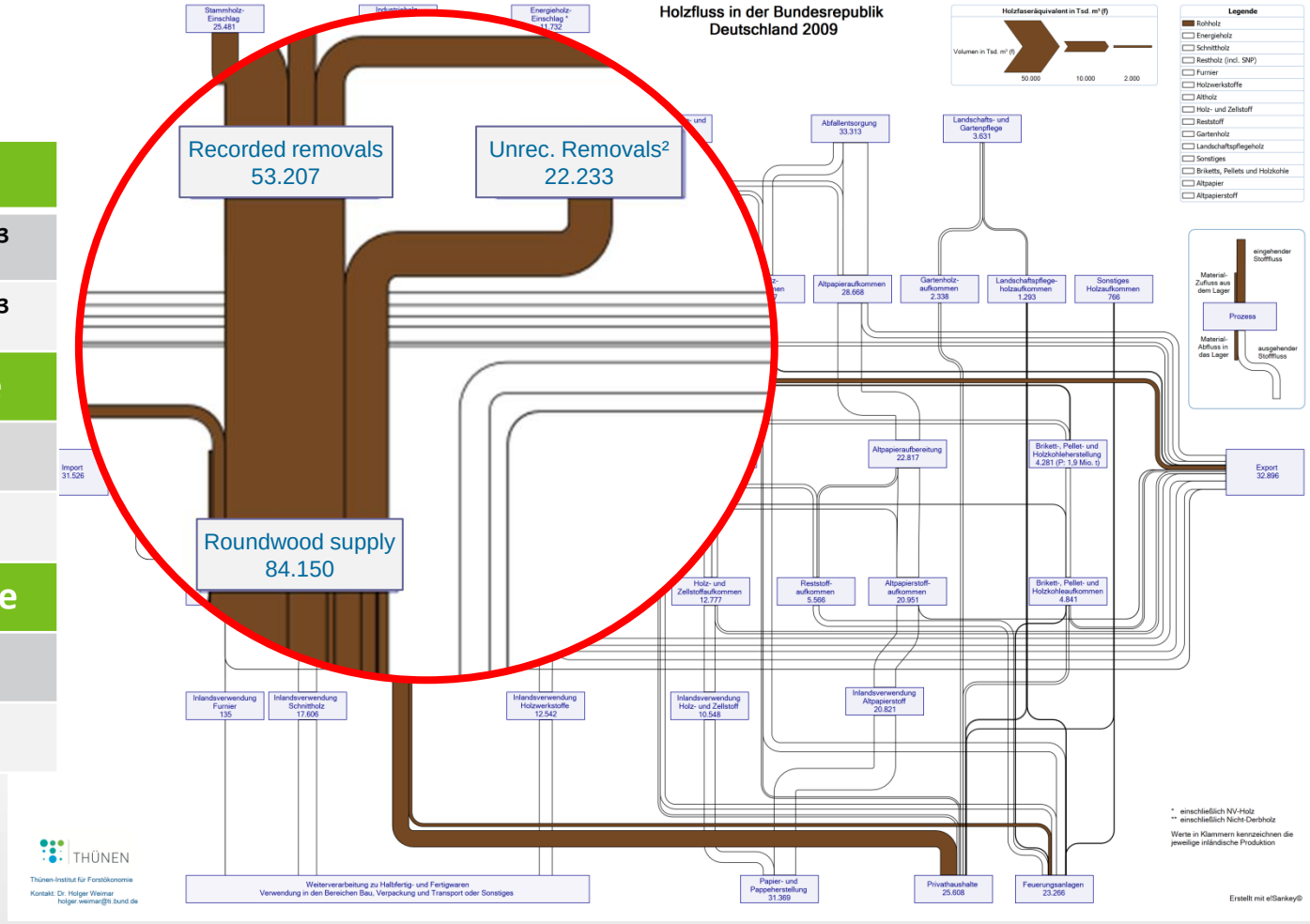


Σ 171 Mio. m³ (f)

Source: Weimar (2011)

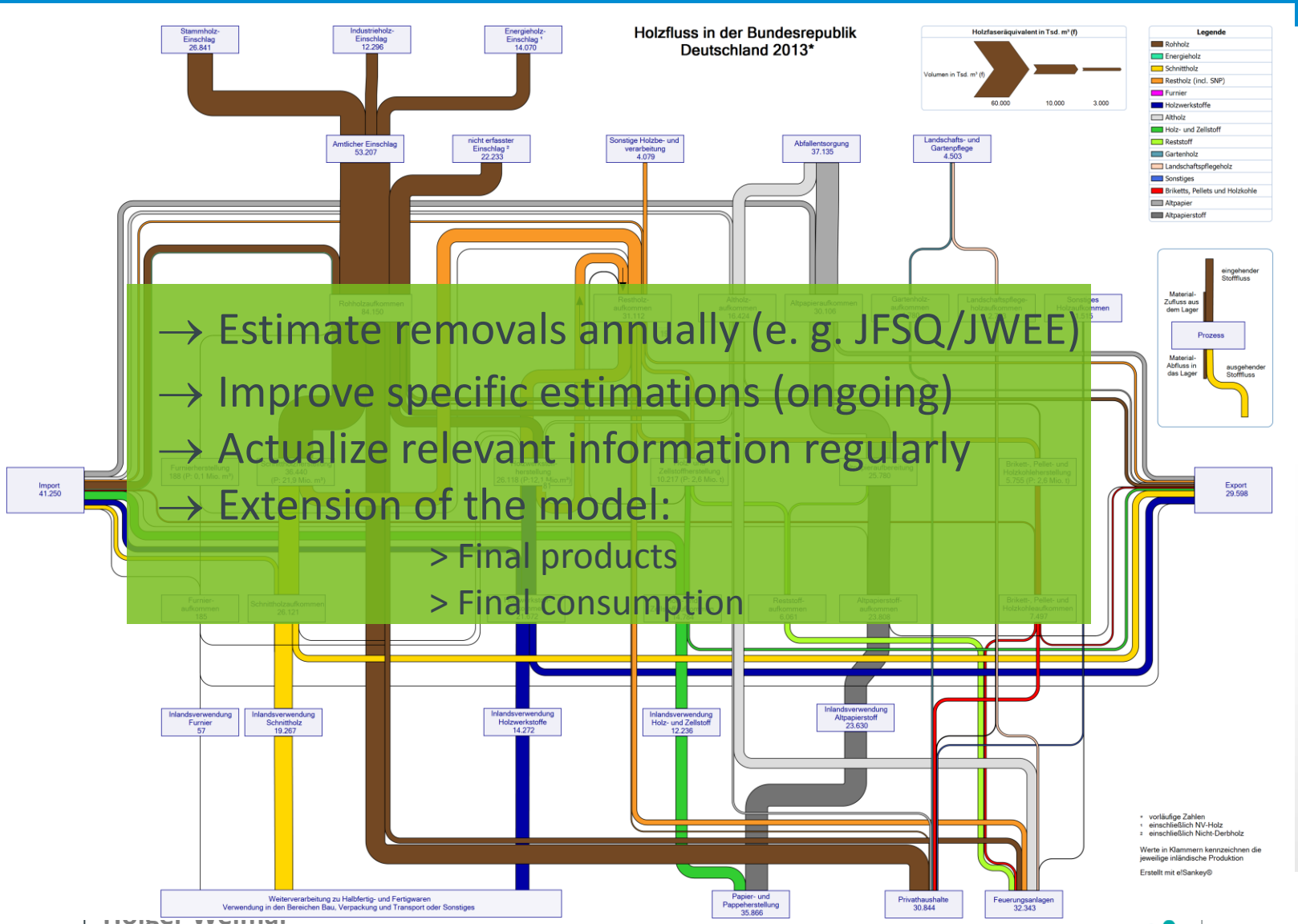
Results: Removals 2013

Removals 2013*
Recorded: 53,2 Mio. m³
Unrecorded: 22,2 Mio. m³
Roundwood material use
Coniferous: 90 %
Non-Conif.: 10 %
Roundwood energetic use
Coniferous: 43 %
Non-Conif.: 57 %



* Preliminary

Next steps



→ Estimate removals annually (e. g. JFSQ/JWEE)

→ Improve specific estimations (ongoing)

→ Actualize relevant information regularly

→ Extension of the model:

> Final products

> Final consumption

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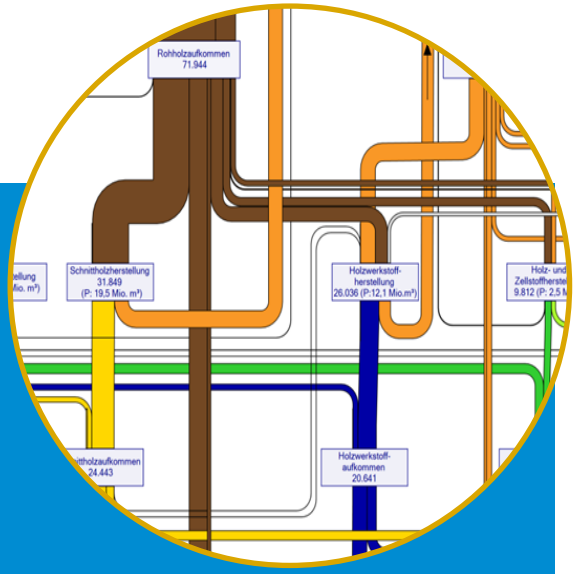

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Annex

Sources:

Weimar, H. (2011): Der Holzfluss in der Bundesrepublik Deutschland 2009: Methode und Ergebnis der Modellierung des Stoffflusses von Holz. Hamburg: vTI, 36 p, Arbeitsber Inst Ökon Forst Holzwirtsch vTI 2011/06 (http://literatur.ti.bund.de/digbib_extern/bitv/dn049777.pdf)