Analyzing Environmental Performance of New Zealand Tannery

TASMAN
INSPIRING NEW LEATHERS FROM NEW ZEALAND

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Contents

Aim of The Study

Study Overview

- What is the study about?

Environmental evaluation of waterproof shoe leather production using Life Cycle Assessment.

- The goal of this study:

Determination of the “hotspots”

TASMAN Typhoon shoe leather

Aim of The Study

Where to start?

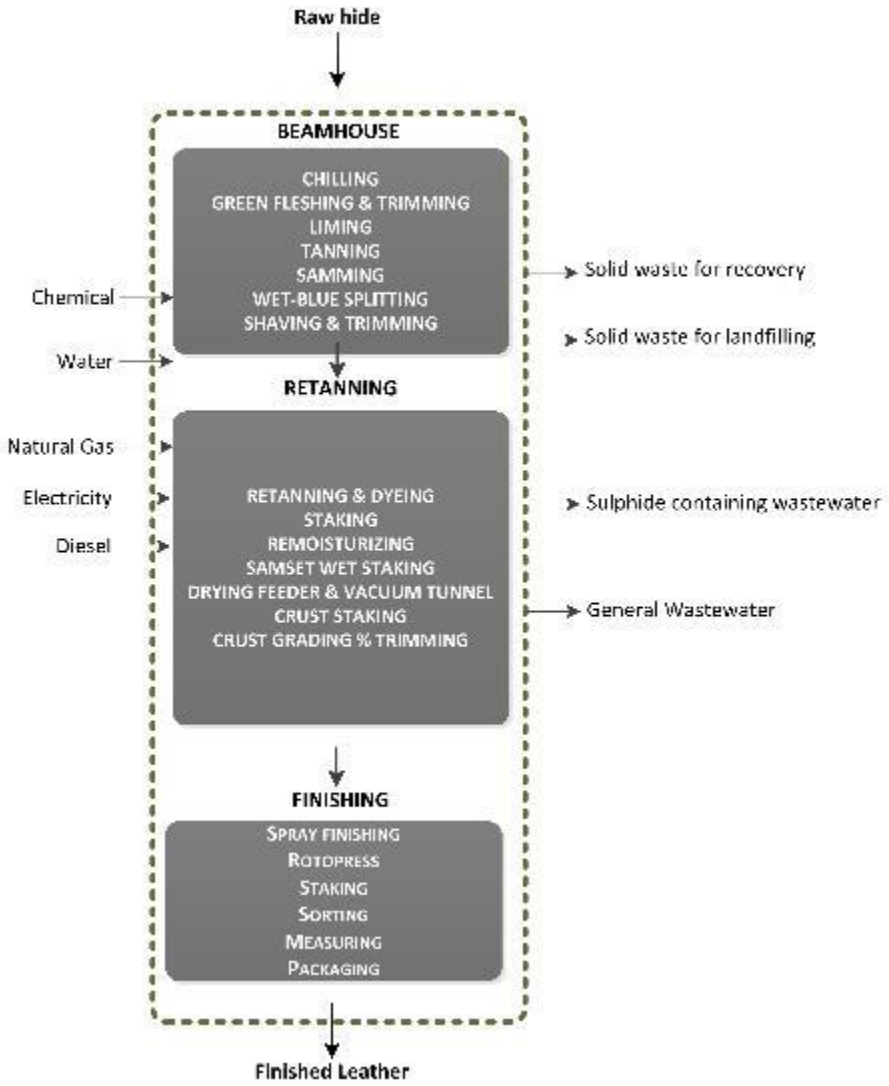
Data collection period June 2018- May 2019

Product type	m2	%	number of hides
Finished Uph	178032	4.4%	41402.8322
Crust Uph	315551	7.8%	73383.96507
Finished Shoe	568994	**14.0%**	132324.1047
Crust shoe	26241	0.6%	6102.443114
Splits	9157	0.2%	2129.525205
Gloving (from bovine)	9690	0.2%	2253.582139
Wet blue Bovine	1753334	43.1%	407752
Wet blue Ovine	101537	2.5%	156211
Pickle Ovine	337447	8.3%	519149
Salted Ovine	196266	4.8%	301947
Salted Hides	374964	9.2%	87201
Salted Collagen	196961	4.8%	45804.87442

TASMAN Typhoon shoe leather

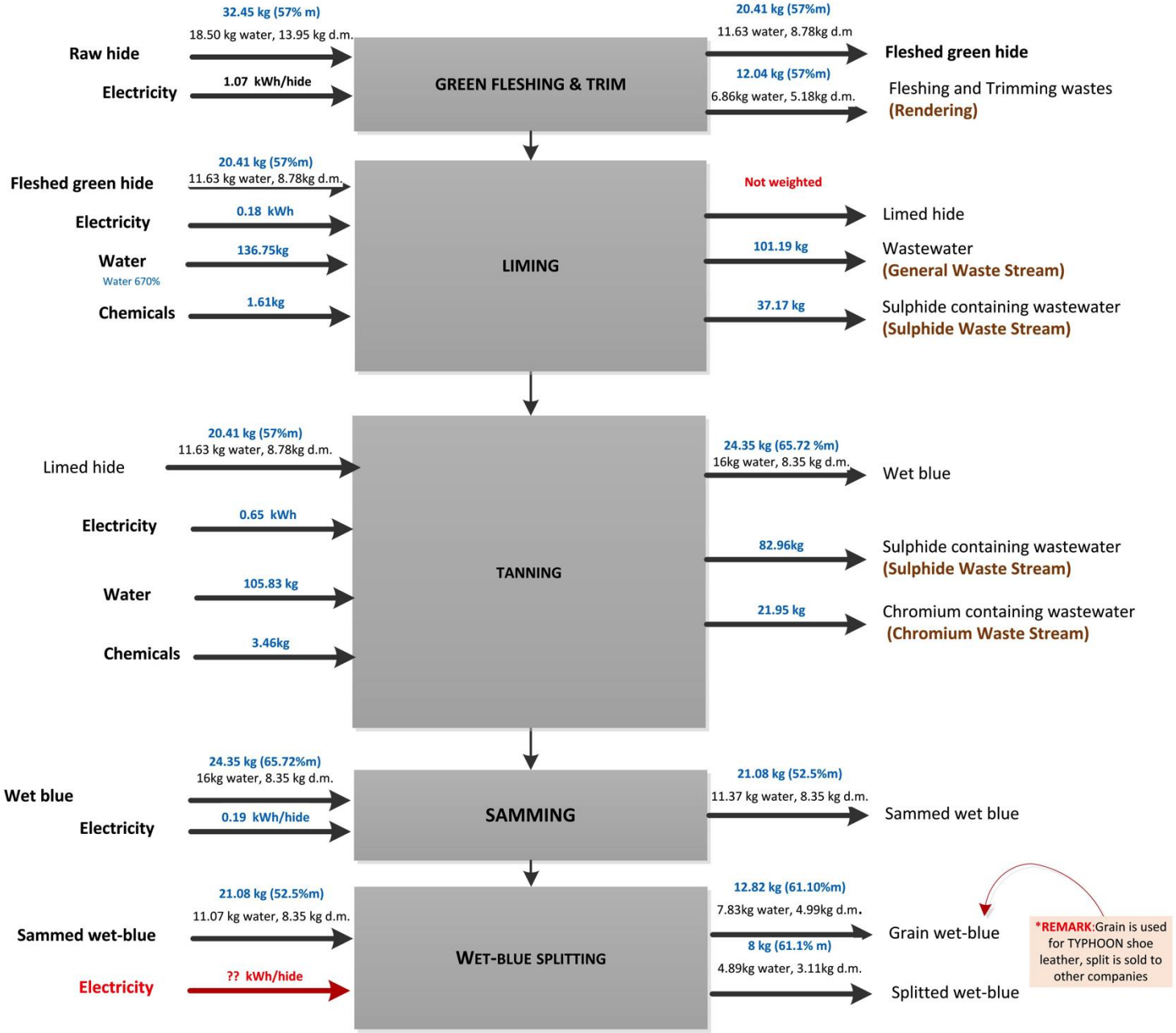
Functional unit= 1 raw hide (32.45 kg) to produce finished typhoon leather

Inventory data collection: **Production processes**

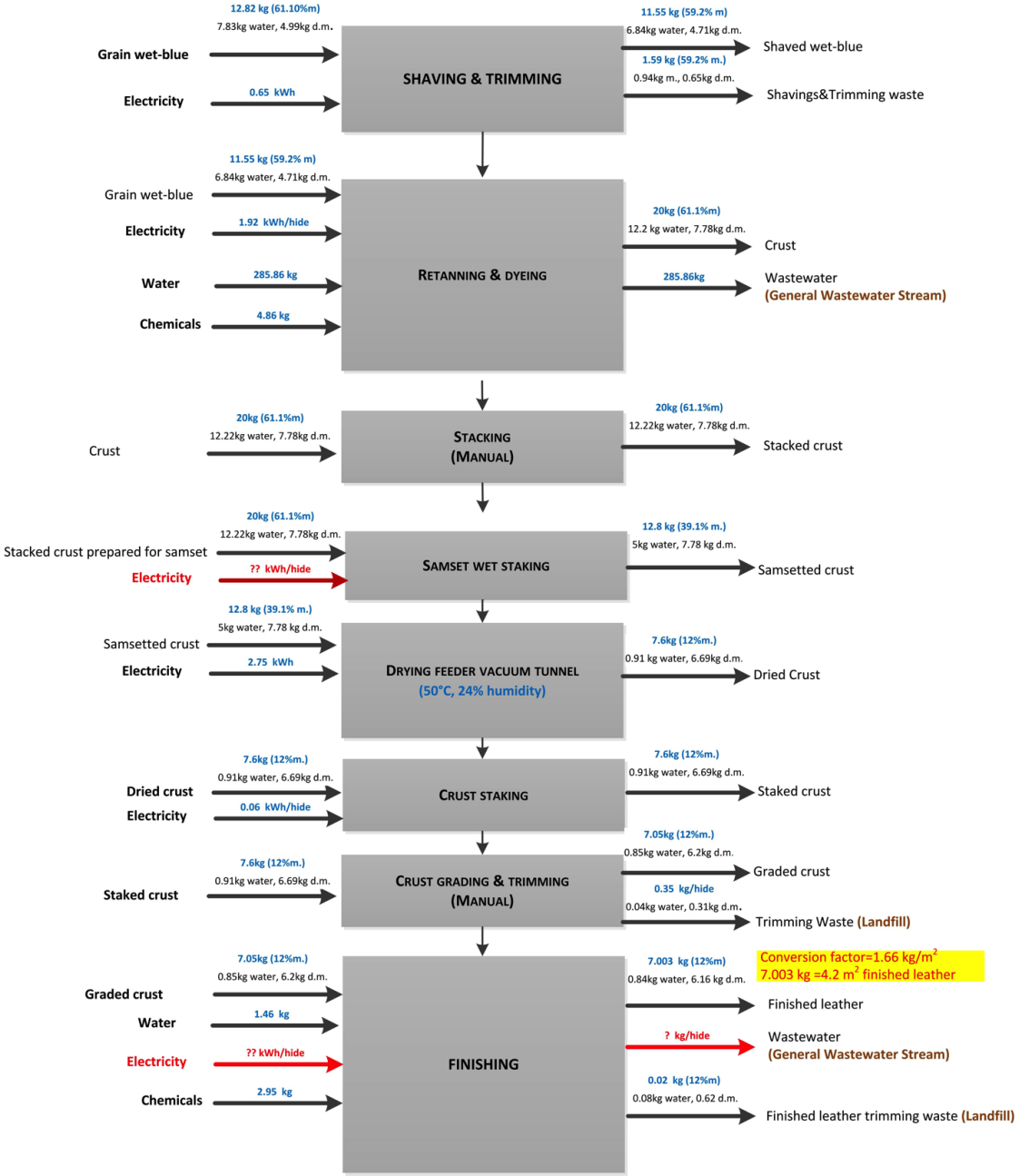


Inventory data collection: **Production processes**

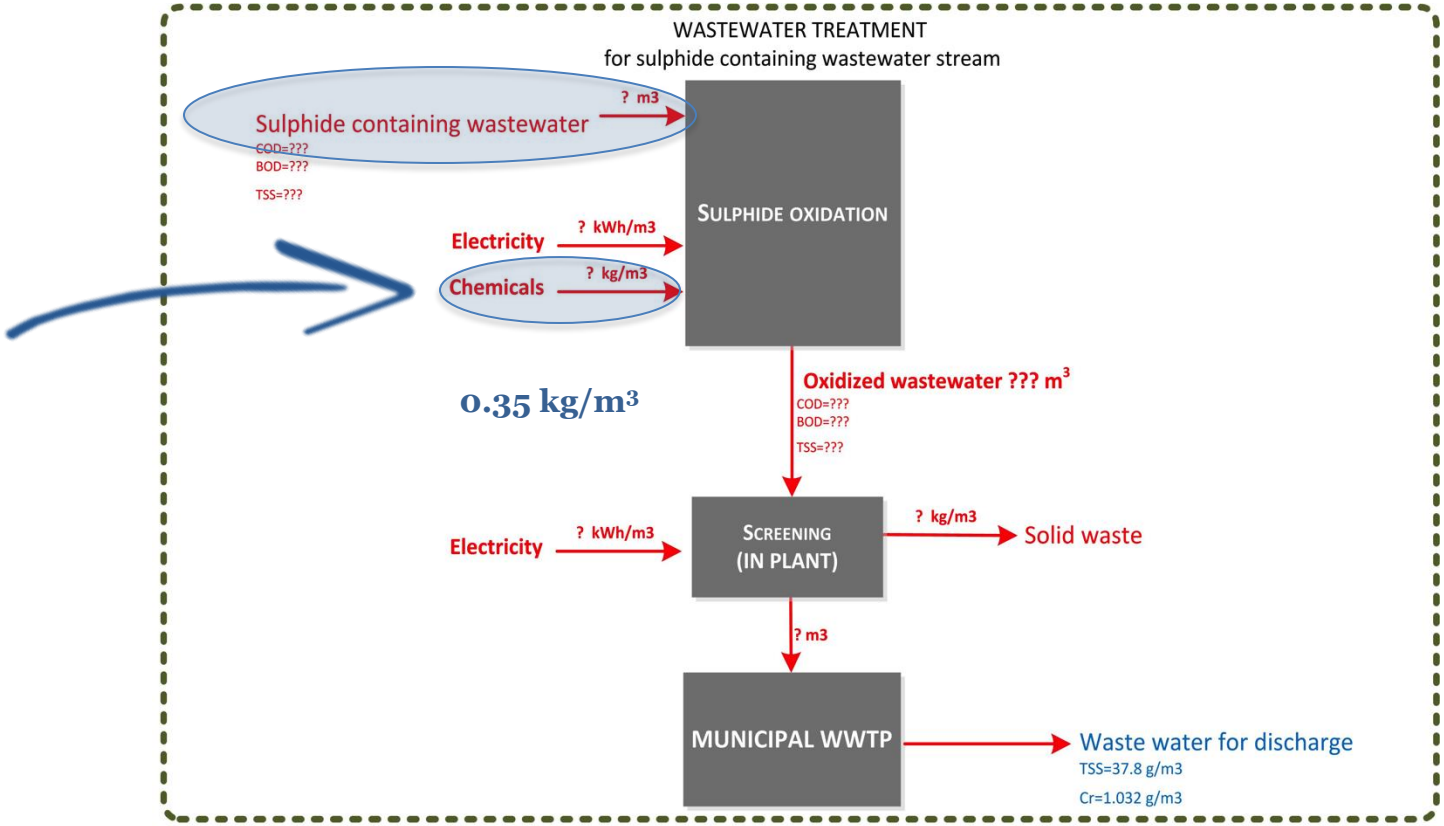
Functional unit= 1 raw hide (32.45 kg)

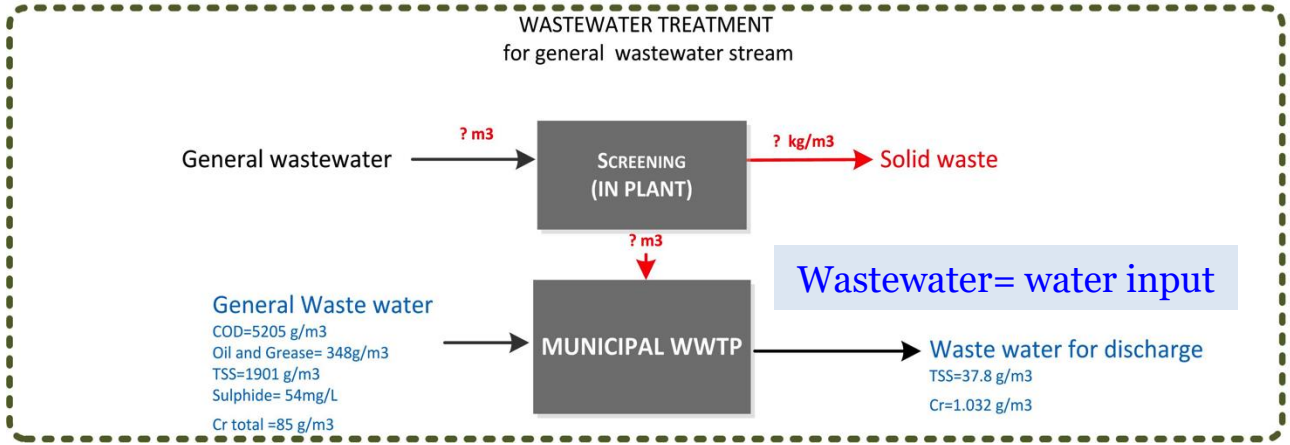


Inventory data collection: **Production processes**



Inventory data collection: **Wastewater treatment**



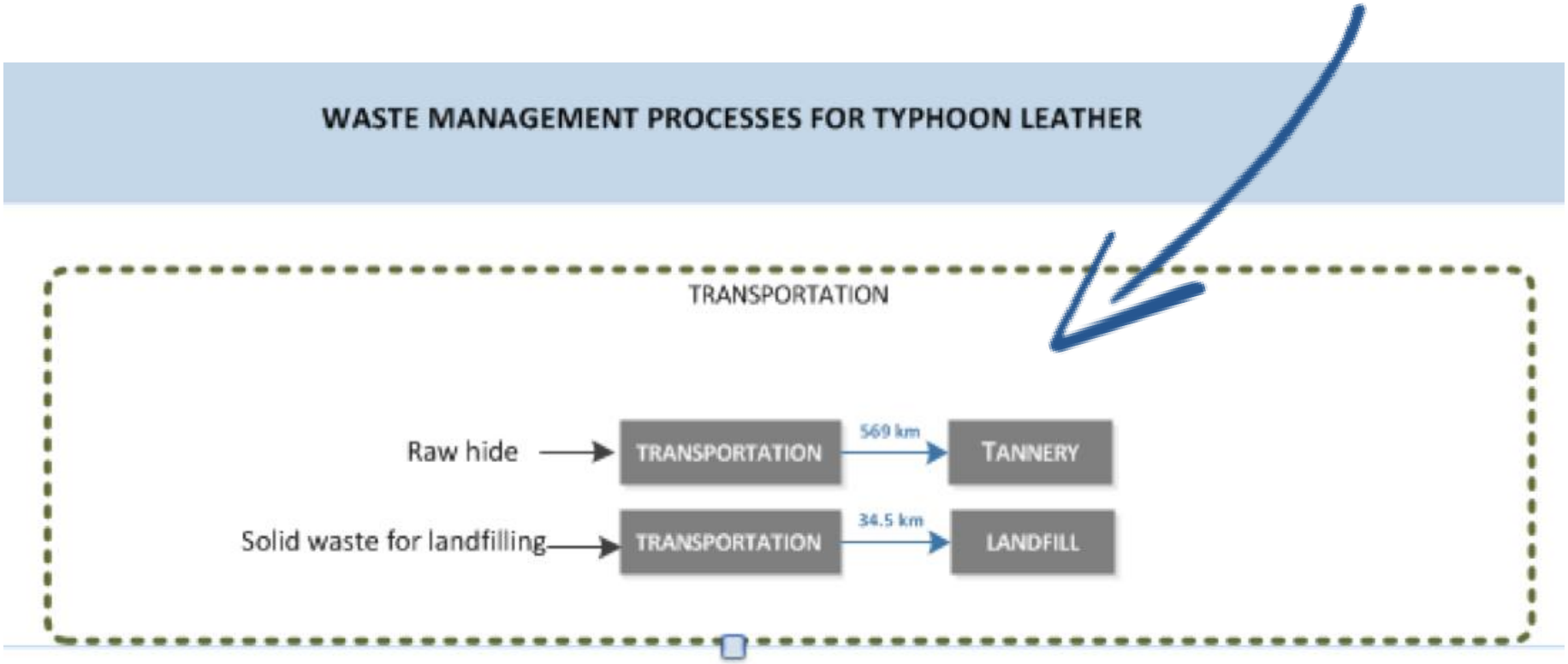


Inventory data collection: **Transportation processes**

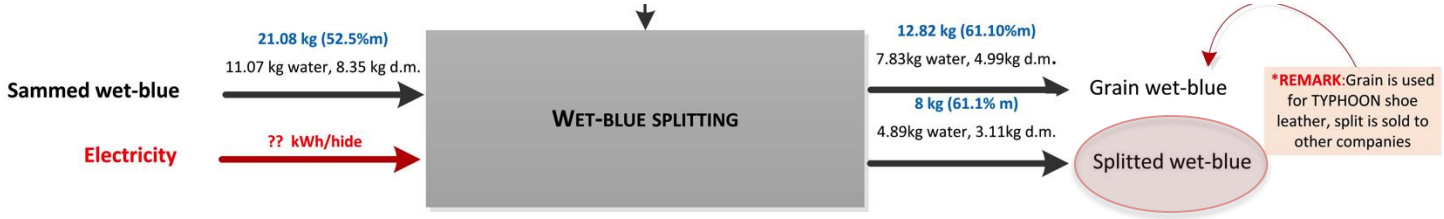
AVERAGE distance (km)	**62%** percent of hides comes from North Island
440.955	273.4
AVERAGE distance (km)	**38%** percent of hides comes from south Island
778.8571429	295.97

Weighted distance for rawhide transport

569



What issues have risen?: **Allocation of Co-products**



PRODUCT ENVIRONMENTAL FOOTPRINT CATEGORY RULES

Leather

Version for Review Panel
1 March 2018
Valid until 31 December 2020

Table 25 Allocation factors for bovine leather

From	Raw				Semi-processed products	Raw		
To	Semi-processed products, split, hair burn	Semi-processed products, split, hair save	Semi-processed products, full substance, hair burn	Semi-processed products, full substance, hair save	Crust or Finished Grain Split Leathers	Finished leather, split, hair save	Finished leather, split, hair burn	Finished Sole Leather
Grain Splits	64%	60%	100%	91%	100%	60%	63%	100%
Flesh Splits	36%	31%	-	-	-	31%	37%	-
Hair	-	9%	-	9%	-	9%	-	-

What issues have risen? **Lack of data on energy use**

- ISSUE: **no separate data available FOR**
  - Natural gas consumption
  - Diesel consumption
  - LPG consumption
- RESOLUTION: **Allocation from the general natural gas use**

ANNUAL PRODUCTION

	m^2	%
Finished Upholstery	178032	4.4%
Crust Upholstery	315551	7.8%
Finished Shoe	568994	14.0%
Crust shoe	26241	0.6%
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Salted Colllagen	196960.96	4.8%
	4068173	100%

What issues have risen? **Lack of data on energy use**

- RESOLUTION: **Allocation from the ANNUAL natural gas, diesel and LPG consumption**

Data collection period June 2018- May 2019

	Electricity, Kwh	Natural Gas, GJ	Water input, m3	Landfill waste, T	Rendering, T	Diesel, L	LPG, Kg	BOD (g/m³)	COD (g/m³)	O&G (g/m³)	TSS (g/m³)	Sulphide (mg/l)	Chromium - Total (g/m³)
18-May	596503	5849	50276	226.2	1064	6206	1840						
18-Jun	541544	6717	48427	165.8	628.507	7252	1107	2791	6473	879	3209	21	150
18-Jul	538879	6006	48558	187.66	607.72	4851	1053	2404	5735	519	2915	29	149
18-Aug	526245	5861	42450	231.14	1252.49	3292	1360	2126	4570	397	1857	45	87
18-Sep	488030	5260	39010	175.24	445.74	5401	960	1891	4136	186	1053	36	90
18-Oct	497067	5992	45844	247.08	533.9	4102	1320	1972	4115	180	859	38	53
18-Nov	532069	5508	36180	211.1	176.052	6676	973	2199	4473	156	876	55	62
18-Dec	393279	4153	26014	182.46	471.226	3001	827	2077	4321	261	1255	57	54
Jan-19	451241	3761	42771	234.71	162.262	6302	827	2096	4808	362	1671	81	80
Feb-19	503893	5016	32743	197.68	144.376	9350	987	2348	4630	190	1040	80	40
Mar-19	574684	4924	48471	255.69	580.721	5606	1000	2417	5532	252	2032	78	60
Apr-19	507448	5751	43154	199.02	62.108	5024	840	2658	6285	327	3088	55	115
May-19	611564	6159	48122	251.41	551.962	6297	1890	2887	7386	469	2954	71	86

ASSIGNED TO 14% shoe leather production

Chemical Modelling: **Assignment of chemicals in database**

Table 42 Chemicals modelling

Version for Review Panel
1 March 2018
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Category	Family	Representative substance	Process from database	Composition	Data quality
Acids	Hydroxy-carboxylic acids (Deliming agents)	Adipic	Adipic acid production| technology mix| production mix, at plant| 100% active substance {RER} [LCI result]	100,0%	1
		Citric	Citric acid production| technology mix| production mix, at plant| 100% active substance {RER} [LCI result]	50,0%	1
			Tap water| technology mix| at user| per kg water {EU-28+3} [LCI result]	50,0%	
		Lactic	Lactic acid production| technology mix| production mix, at plant| 100% active substance {RER} [LCI result]	80,0%	1
			Tap water| technology mix| at user| per kg water {EU-28+3} [LCI result]	20,0%	
	Strong mineral acids	Hydrochloric acid	Hydrochloric acid production| technology mix| production mix, at plant| 100% active substance {RER} [LCI result]	30,0%	1
			Tap water| technology mix| at user| per kg water {EU-28+3} [LCI result]	70,0%	
		Phosphonic acid	Phosphoric acid| fertiliser grade, dihydrate process| at plant| per kg {EU-28+3} [LCI result]	17,0%	3
			Tap water| technology mix| at user| per kg water {EU-28+3} [LCI result]	83,0%	
		Phosphoric acid	Phosphoric acid| fertiliser grade, dihydrate process| at plant| per kg {EU-28+3} [LCI result]	100,0%	1
		Sulfuric acid	Sulphuric acid production| technology mix| production mix, at plant| 100% active substance {RER} [LCI result]	100,0%	1
	Strong organic acids (fixing agent)	Acetic acid	Acetic acid production| technology mix| production mix, at plant| 100% active substance {RER} [LCI result]	98,0%	1
			Tap water| technology mix| at user| per kg water {EU-28+3} [LCI result]	2,0%	
	Strong organic acids (clearing agent)	Oxalic acid dehydrate	Adipic acid production| technology mix| production mix, at plant| 100% active substance {RER} [LCI result]	100,0%	4
		Formic acid	Formic acid production| technology mix| production mix, at plant| 100% active substance {RER} [LCI result]	85,0%	1

What issues have risen?: **Assignment of chemicals in database**

- **ISSUE: in LCA database no data available for**
  - Polyurethane dispersion
  - Synthetic tannins
  - Natural tannins
  - Basic chromium sulfate
  - Synthetic fatliquors

Polyurethane dispersion| Technology mix| Production mix, at plant| 40% in water {GLO} [LCI result]

Syntetic tannins and retanning agents production| technology mix| production mix, at plant| 100% active substance {RER} [LCI result]

Natural tannins extracted from chestnut production| technology mix| production mix, at plant| 100% active substance {RER} [LCI result]

Basic chrome sulfate production| technology mix| production mix, at plant| 100% active substance {ZA} [LCI result]

Synthetic fatliquors production| technology mix| production mix, at plant| 100% active substance {RER} [LCI result]

- **RESOLUTION: Assignment of similar/proxy processes**
  - Polyurethane dispersion= Polyurethane based adhesive
  - Synthetic tannins= **X**
  - Natural tannins=**X**
  - Basic chromium sulfate= Chromium oxide
  - Synthetic fatliquors= Lubricating oil (petrochemical based), silicone (silicone based)

Introduction of inventory data into software (Massey University)

Software

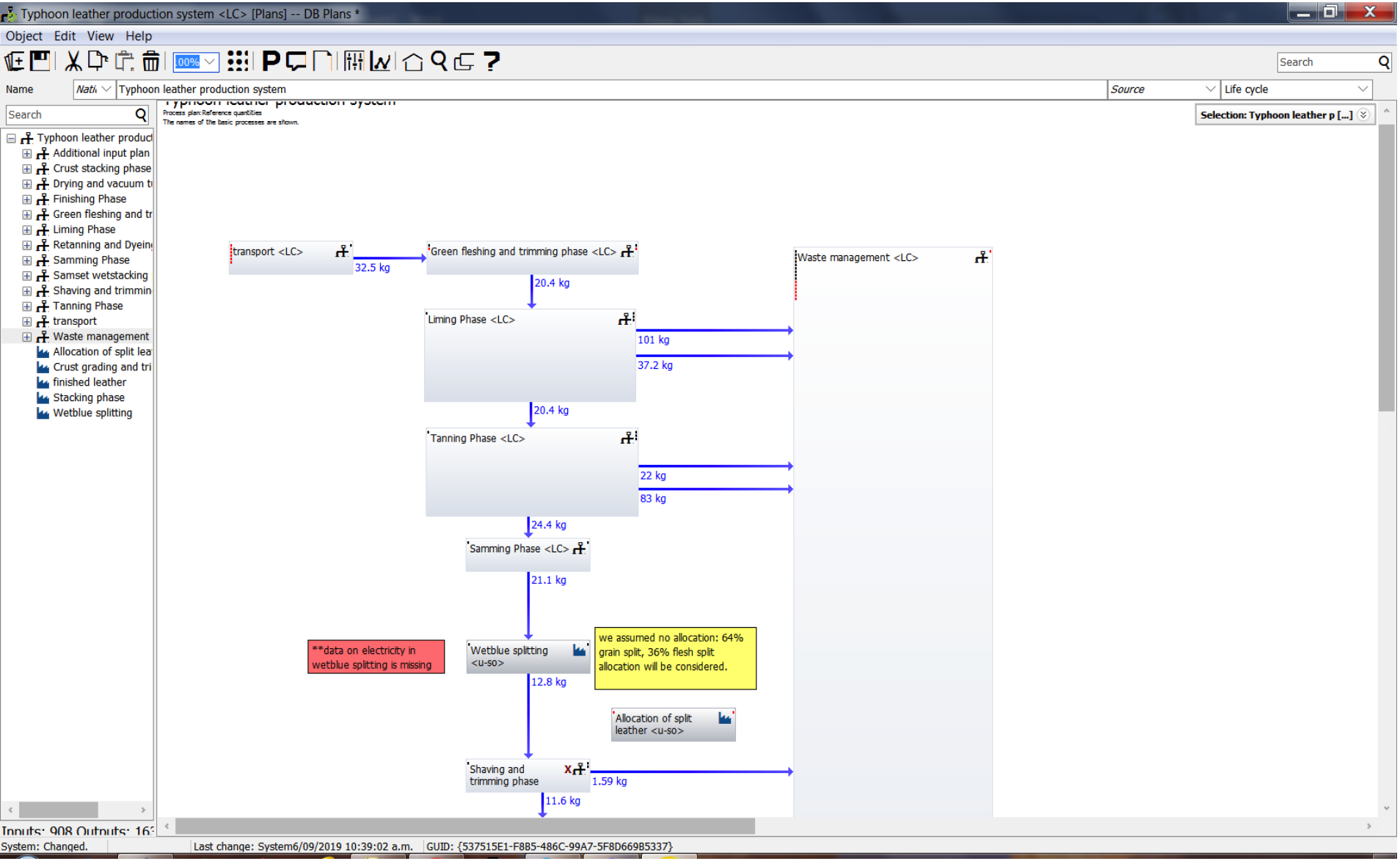
thinkstep

GaBi Solutions

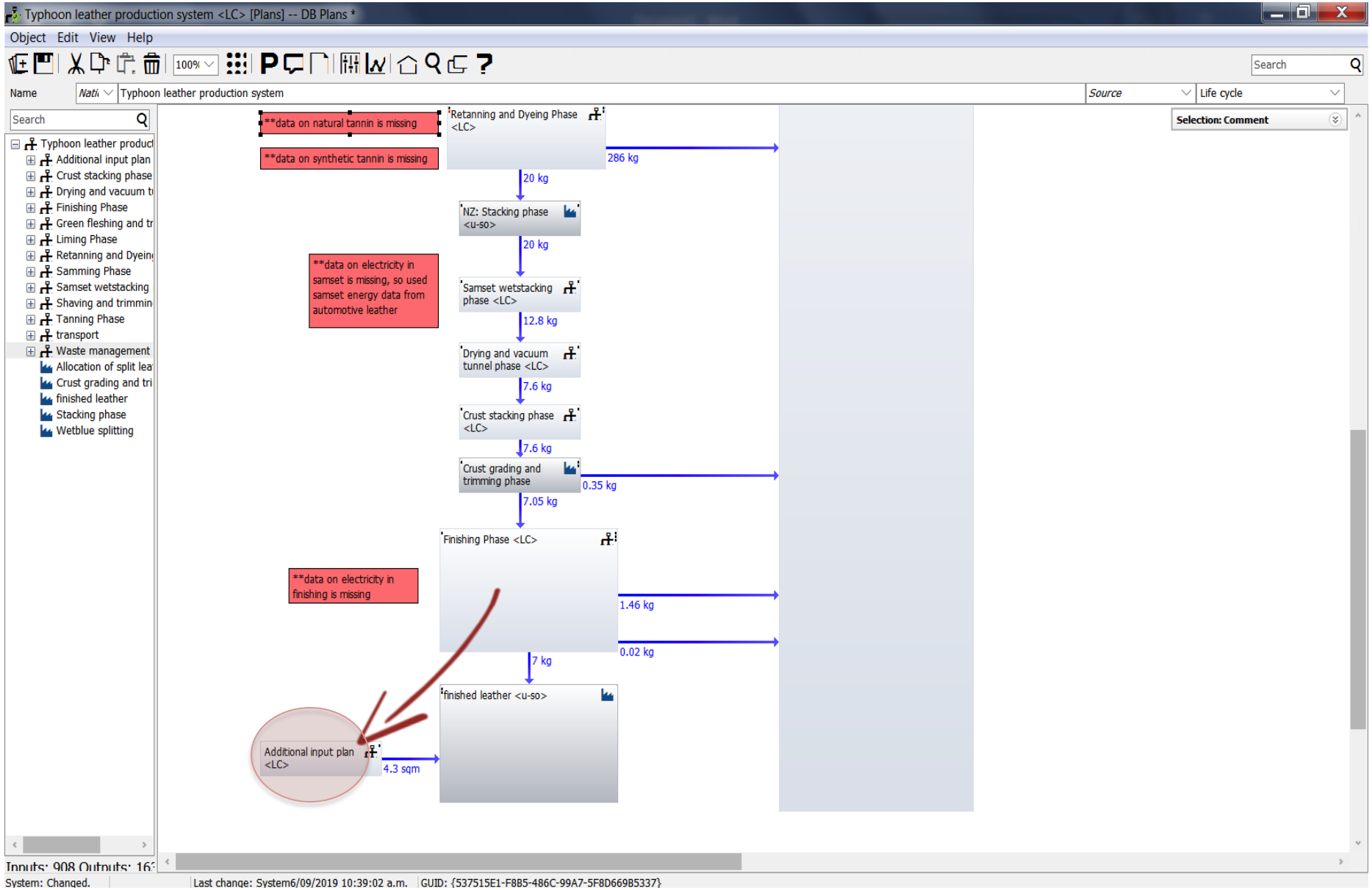
Database

thinkstep
GaBi

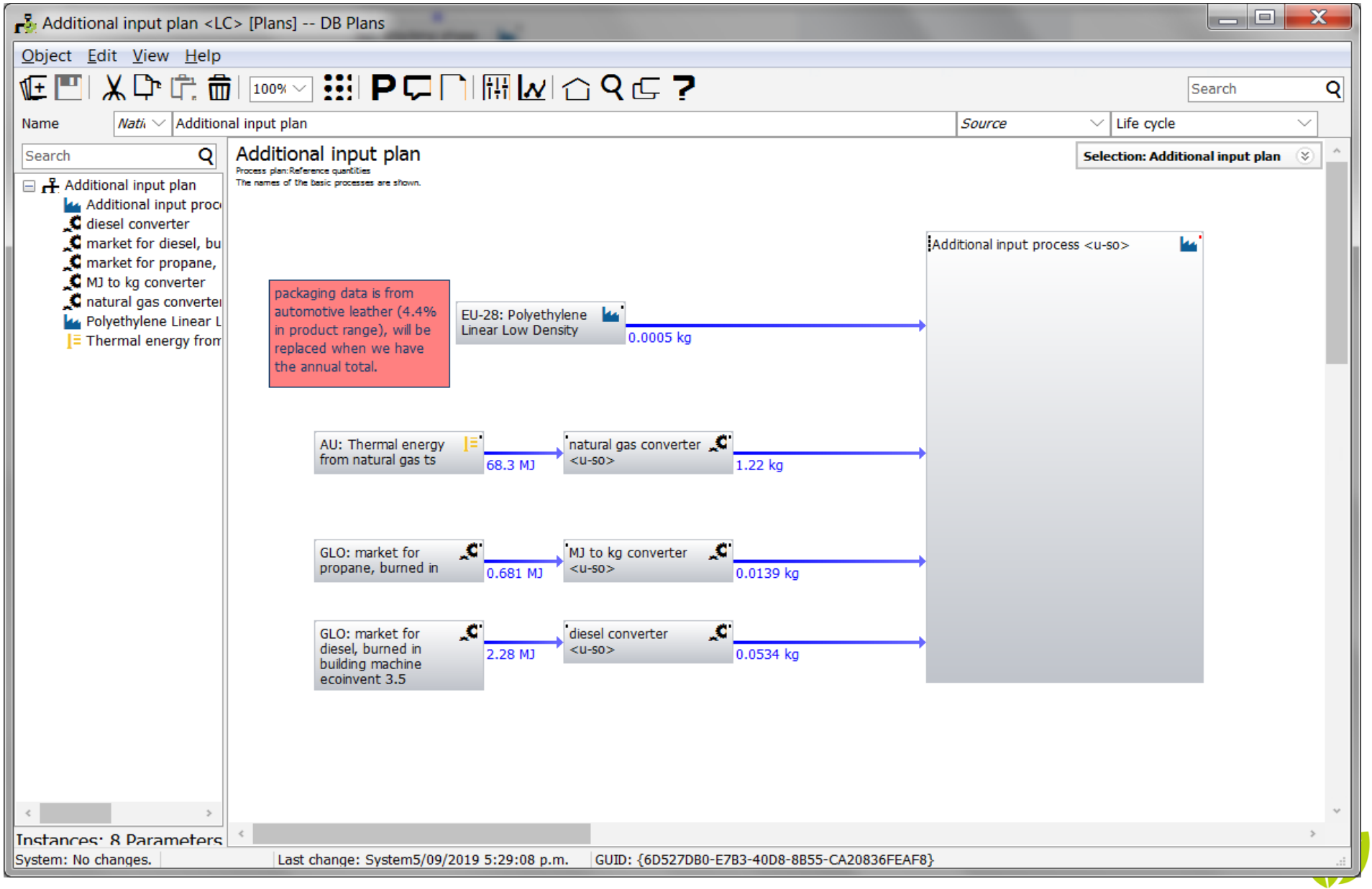
LCA Modelling Gabi software



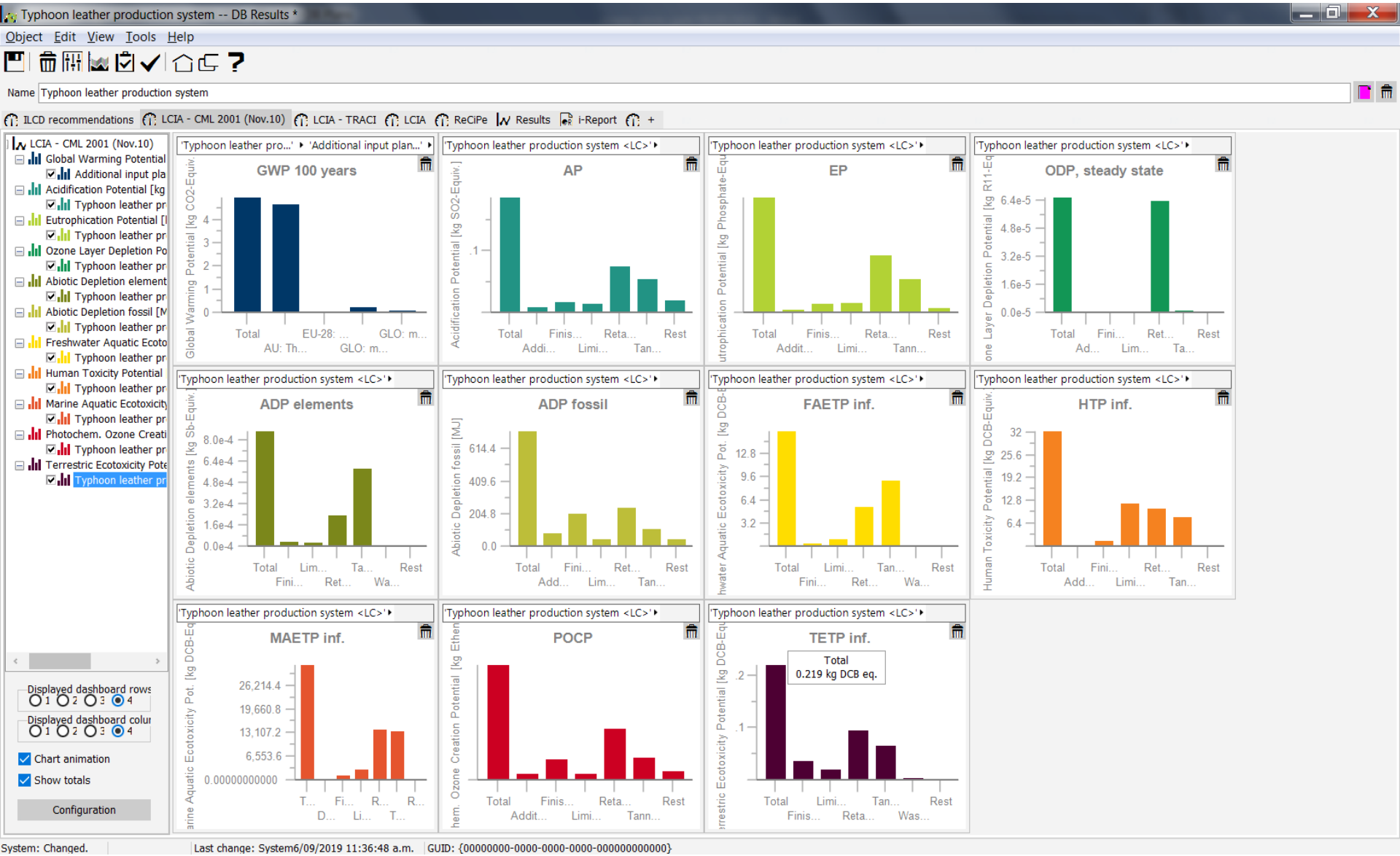
LCA Modelling Gabi software



LCA Modelling Gabi software



Impact assessment results



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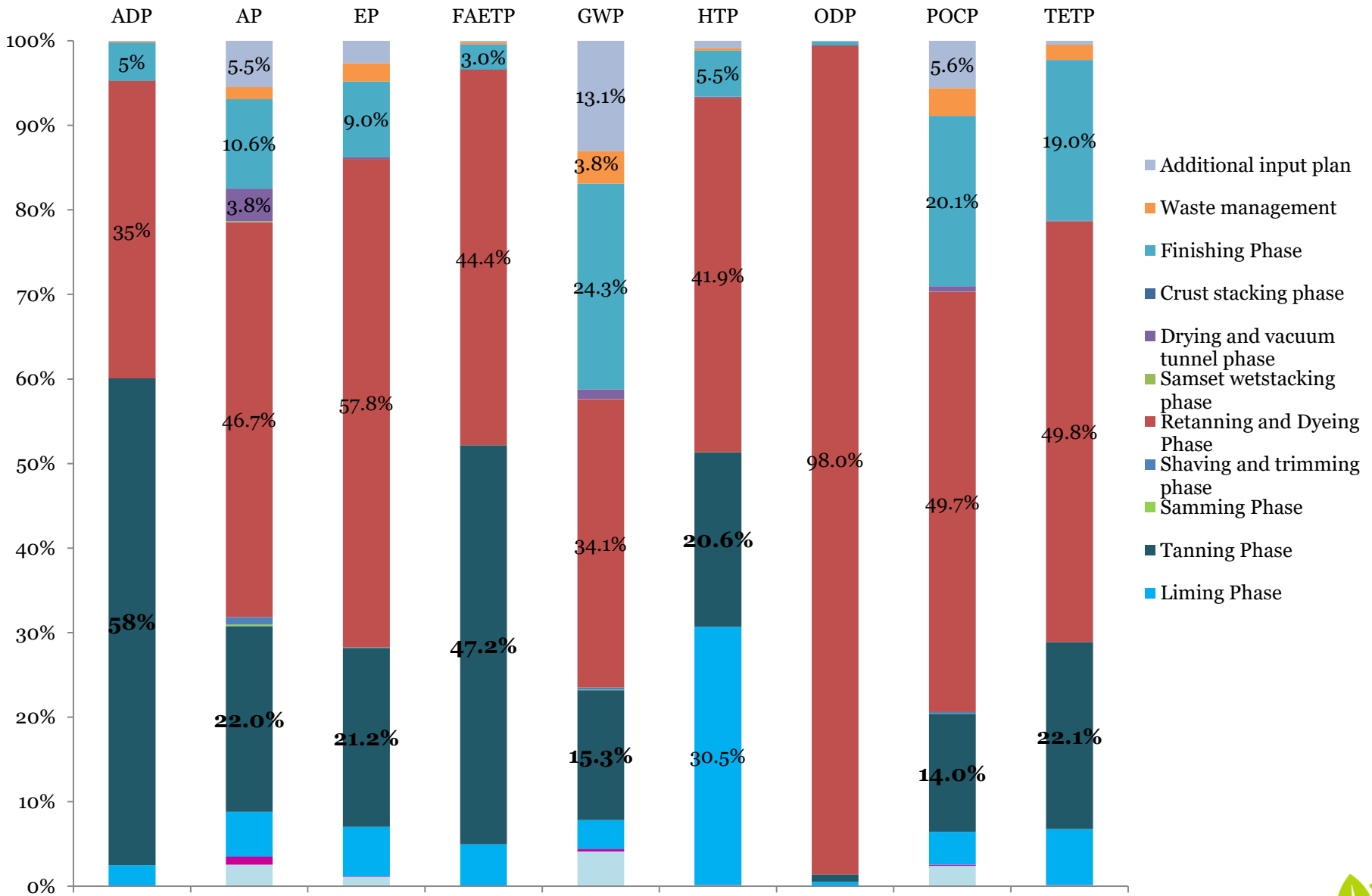
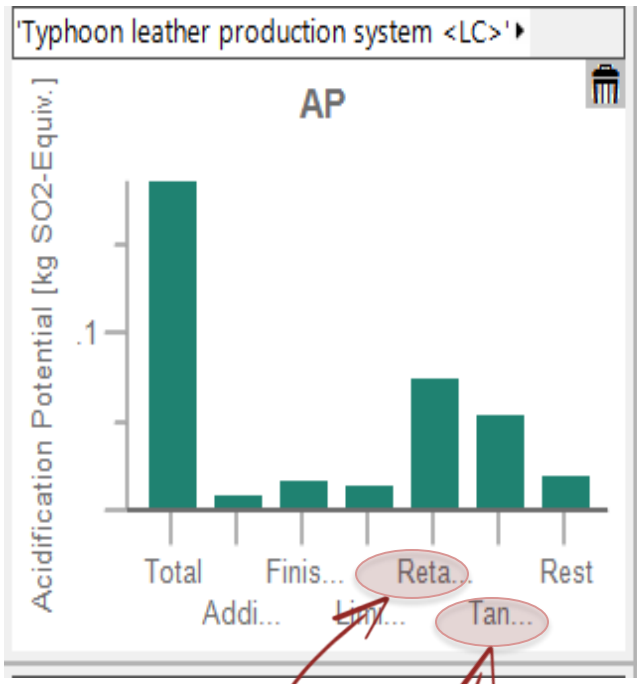


Impact assessment results

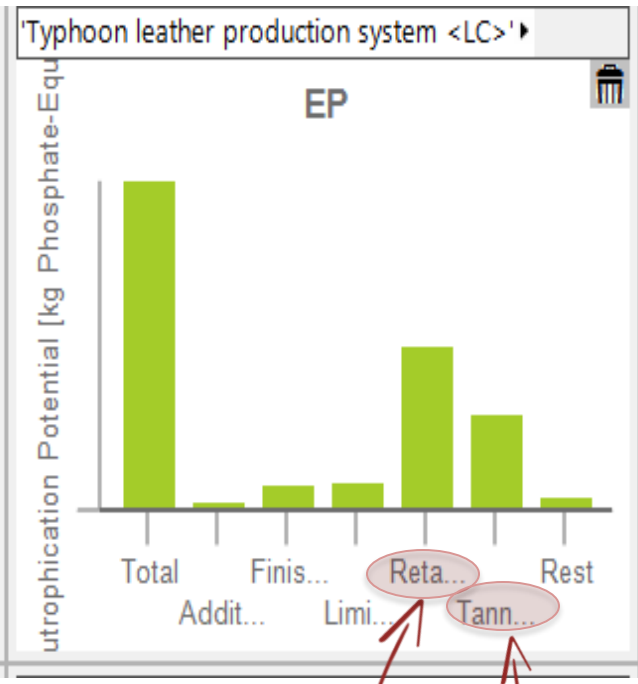
Acidification Potential (AP)



Aniline 33%

Chromium oxide 78%

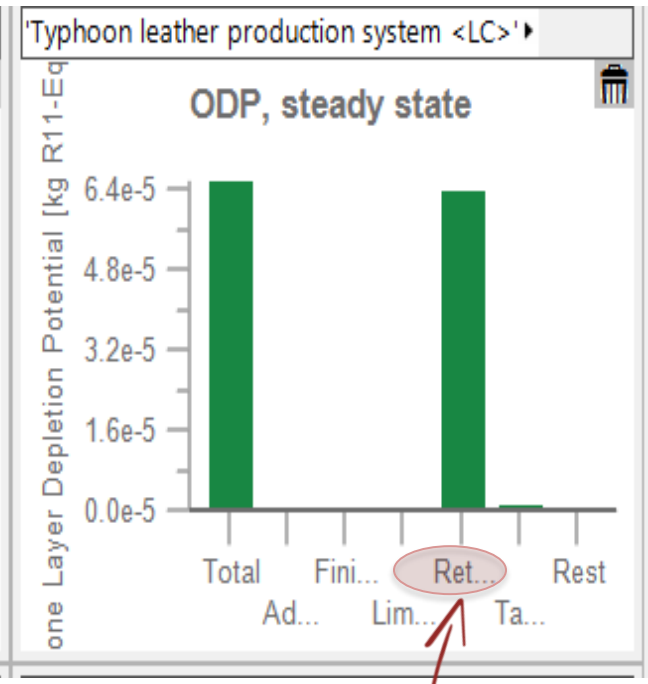
Eutrophication Potential (EP)



Aniline 43%

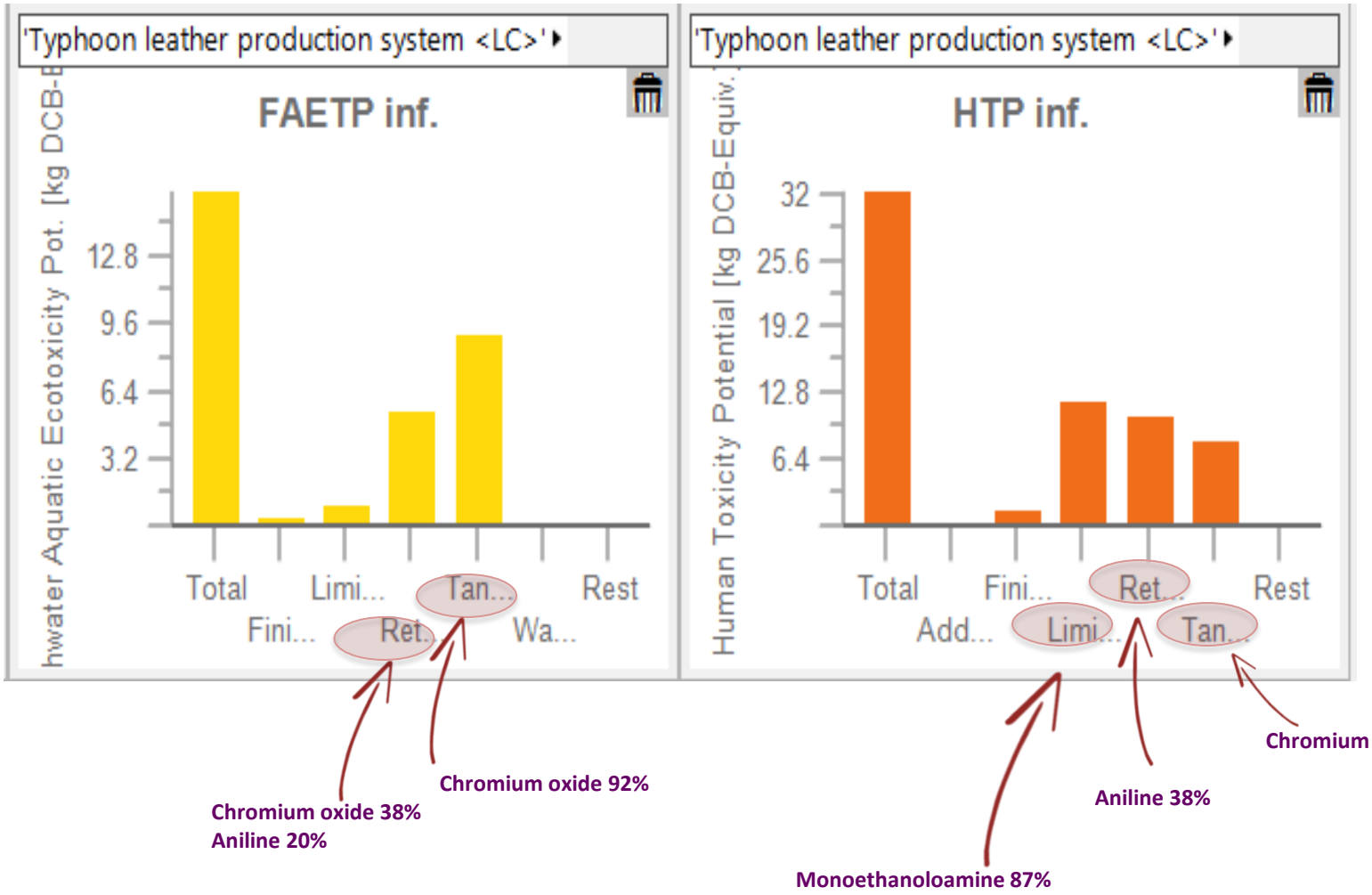
Chromium oxide 81%

Ozone Depletion Potential (ODP)



Anionic resin 98%

Impact assessment results



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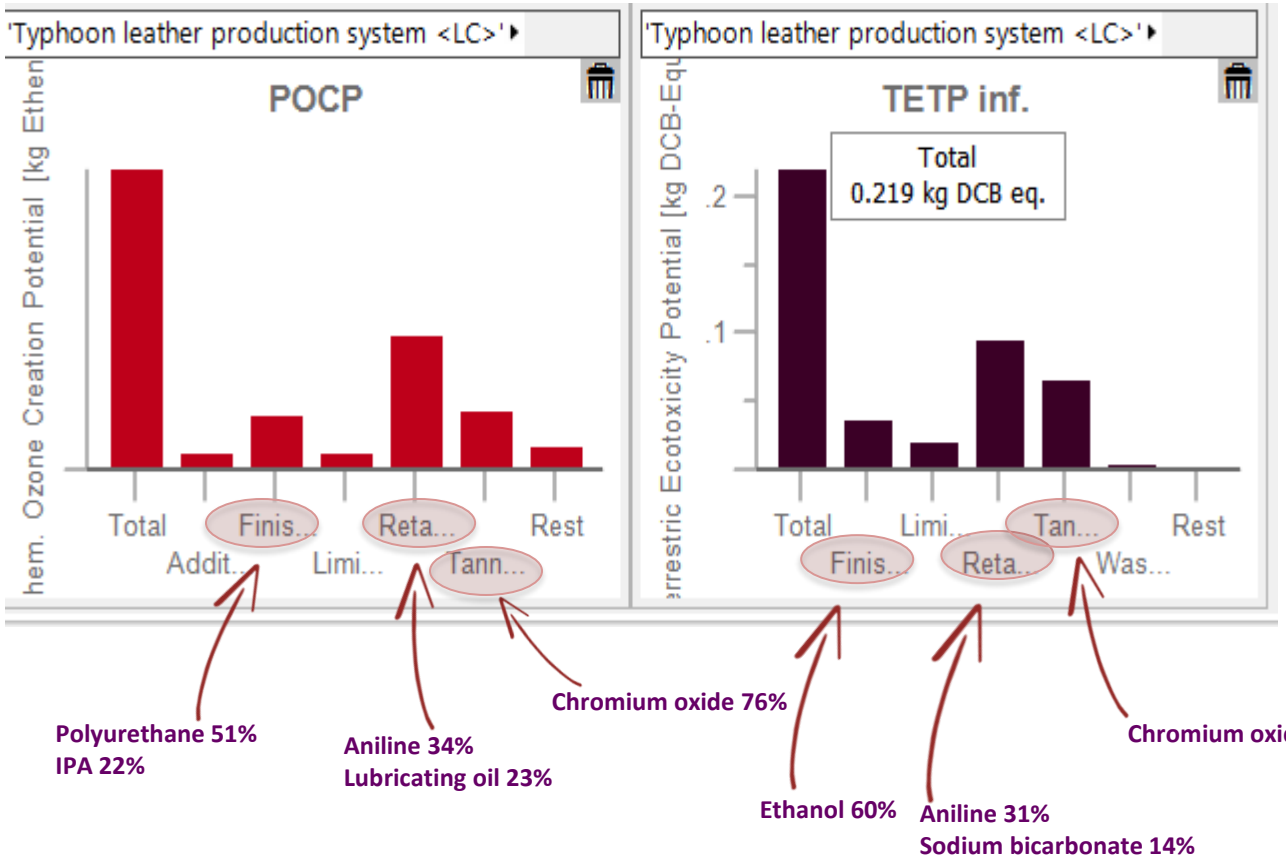

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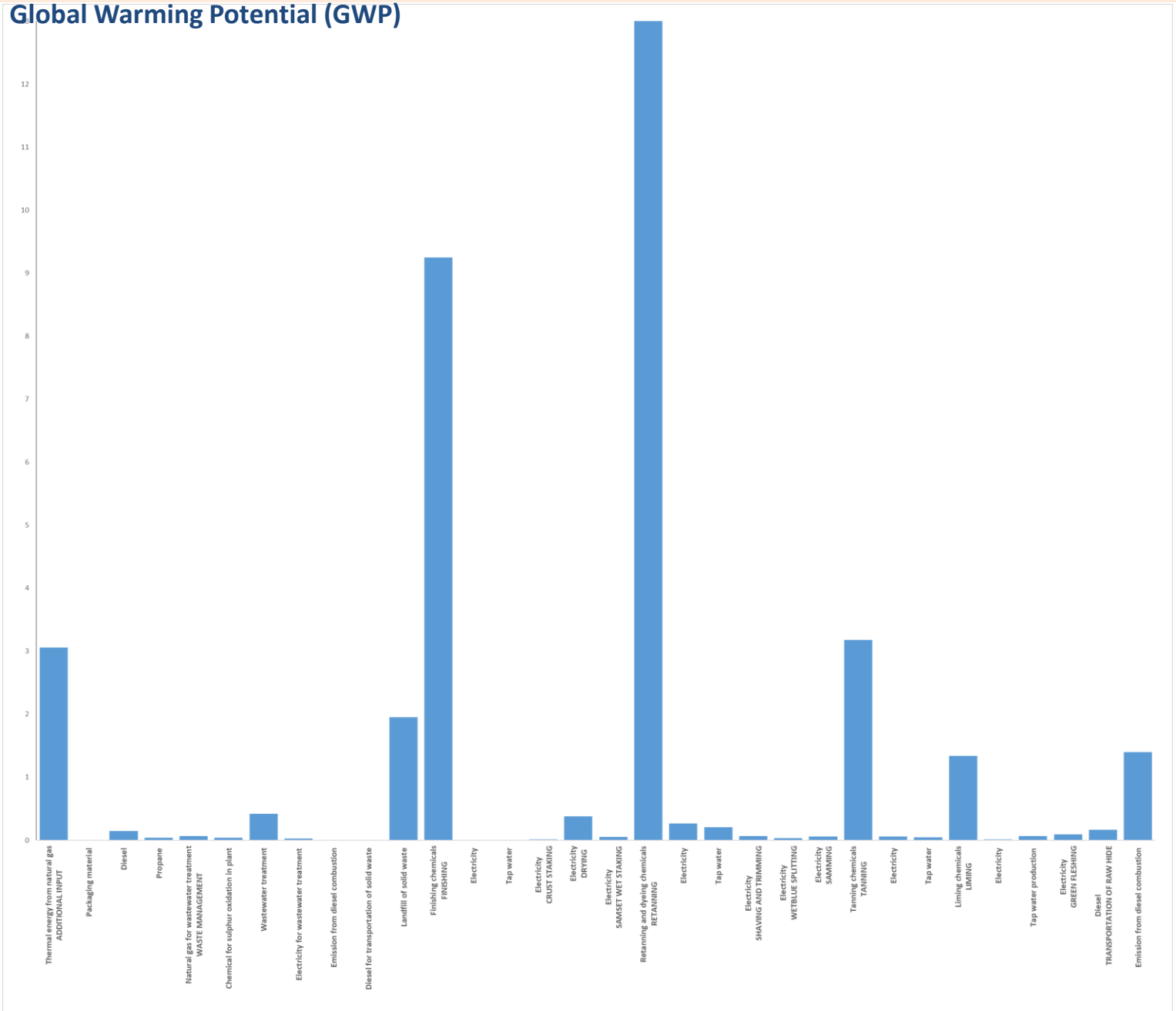
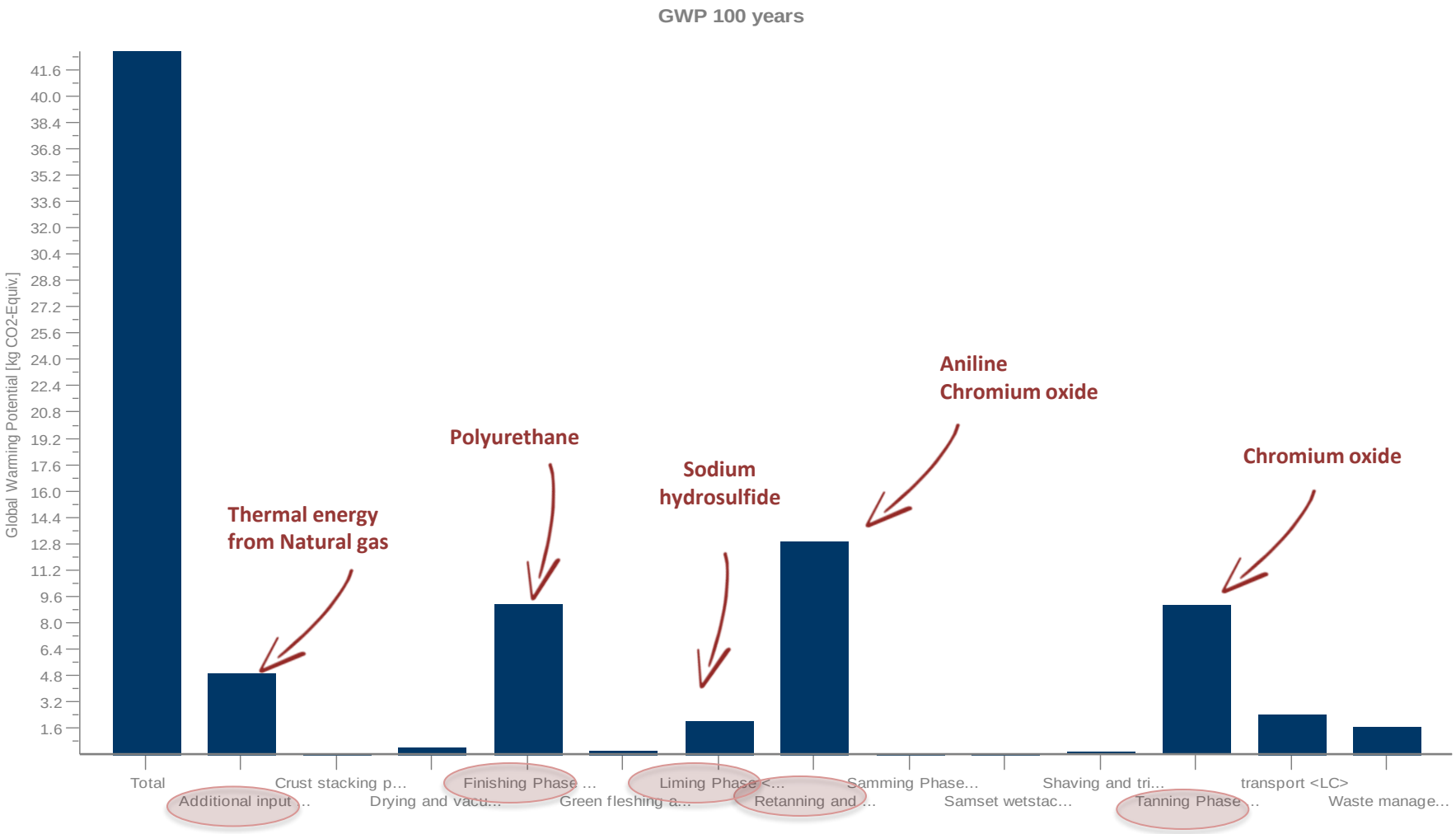


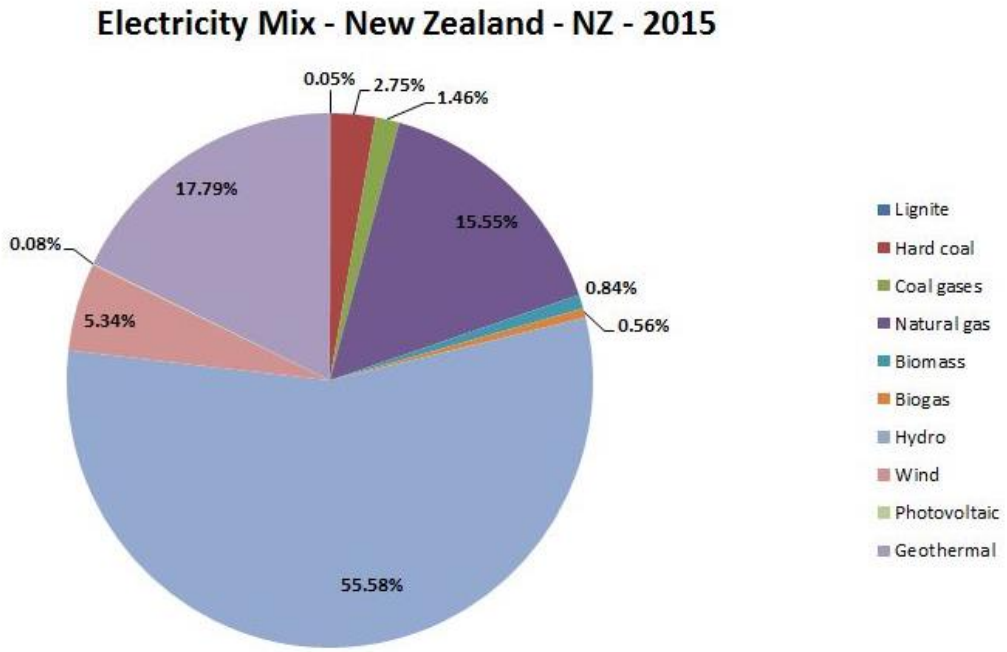
Impact assessment results

Global Warming Potential (GWP)



Environmental benefits provided by New Zealand system

* New Zealand has an electricity grid mix with a high proportion of renewable primary energy, comprising nearly 78% of the total electricity supply.



≈78% renewable energy

*New Zealand system provide some environmental benefits due to application of green fleshing, which avoids the need for preservation of raw hides, and the soaking process, resulting in chemical-free fleshing waste.

Environmental benefits provided by New Zealand system

**New Zealand system provide some environmental benefits due to application of green fleshing, which avoids the need for preservation of raw hides, and the soaking process, resulting in chemical-free fleshing waste.

* New Zealand's farming practices, mainly based on extensive farming, are a distinguishing feature in terms of animal welfare. However, the PEFCR is currently limited to assessment of a specified set of environmental impacts and does not include wider sustainability aspects such as social issues and animal welfare.

Concluding remark

- The waste management stage contributes nearly 95% to the climate change (biogenic) impact category, mainly due to greenhouse gas emissions from landfilling of solid wastes.

** Production process data regarding **vegetable tannins** and **synthetic tannins** are missing !

*** In particular, prioritising the optimisation of chemical use and promoting energy recovery in landfill – or alternative end-of-life management technologies - could mitigate multiple environmental impacts associated with leather production.

*** This is an ongoing study so modelling and assumptions may change.


TEŞEKKÜR
הדות
ĎAKUJEM
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DANKE
спасибо
ХВАЛА
TERIMA KASIH.
THANK YOU
NGIYABONGA
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