MAPPING OF TEXTILE FLOWS IN DENMARK

Dakofa Textile Seminar 12 June 2018

David Watson, PlanMiljø

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Background

- Increasing focus on **increasing sustainability** in textile value chain
- Key leverage point: i**ncreasing circularity**
- EU Circular Economy package – changes to WFD – seperate collection of used textiles
- No status of collection/circularity since 2014 with 2010 data year

Project Goal

Provide detailed up-to-date picture of flows of textiles in DK as basis for potential actions/instruments to increase textile circularity

Special elements

- Split of flows between households, government and business end users
- Loss of economic value of ‘wasted’ textiles
- Recommendations for improving circularity and data availability

Wished for result	Method
Yearly consumption of new textiles	Use of import/export and production data from DST
Split of consumption between sectors	Use of Physical Supply and Use Tables
Separate collection from households	Survey of charities, private collectors, municipal waste companies
Quantity of discarded textiles in mixed waste	Picking studies + collection data on residual and bulky waste and small combustibles
Flows of used textiles from government and business	Survey of regions, municipalities, laundries, hotels/restaurants, military/police/fire services, private waste co., cleaning services etc.
Lost value of textiles in waste	Cleaning and sorting of textiles in mixed waste by professional sorters

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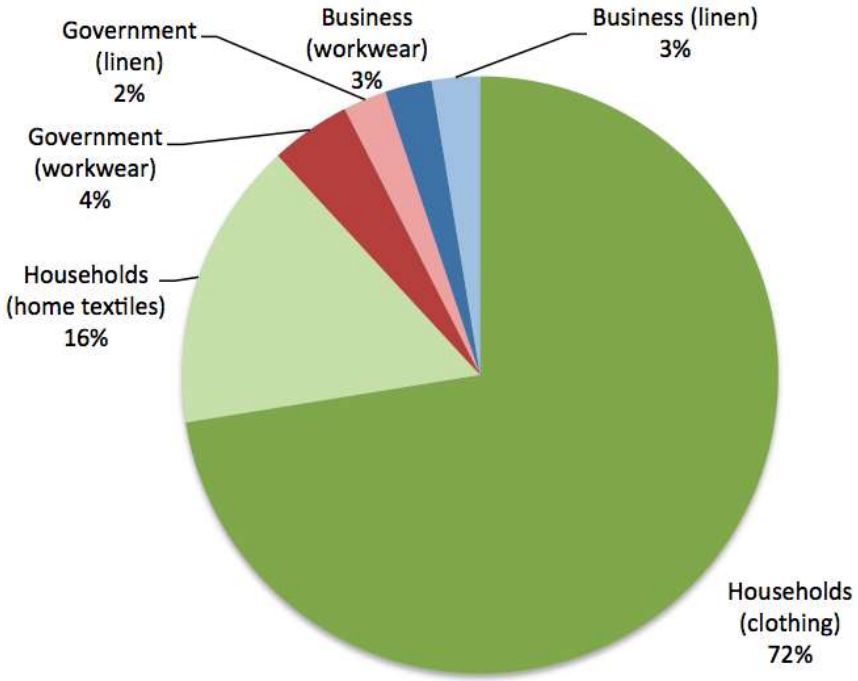
Supply of new textiles

Supply of new textiles to Denmark

	Households (tonnes)	Government & industry (tonnes)	Total supply (tonnes)	Households (kg/capita)	Total supply (kg/capita)
Clothing	61 900 *(82%)*	5 900 *(58%)*	67 800 *(77%)*	10.9	11.6
Home textiles	13 400 *(18%)*	4 200 *(42%)*	17 600 *(23%)*	2.3	3.4
TOTAL	75 300	10 100	85 400	13.2	15.0

New textiles split by user



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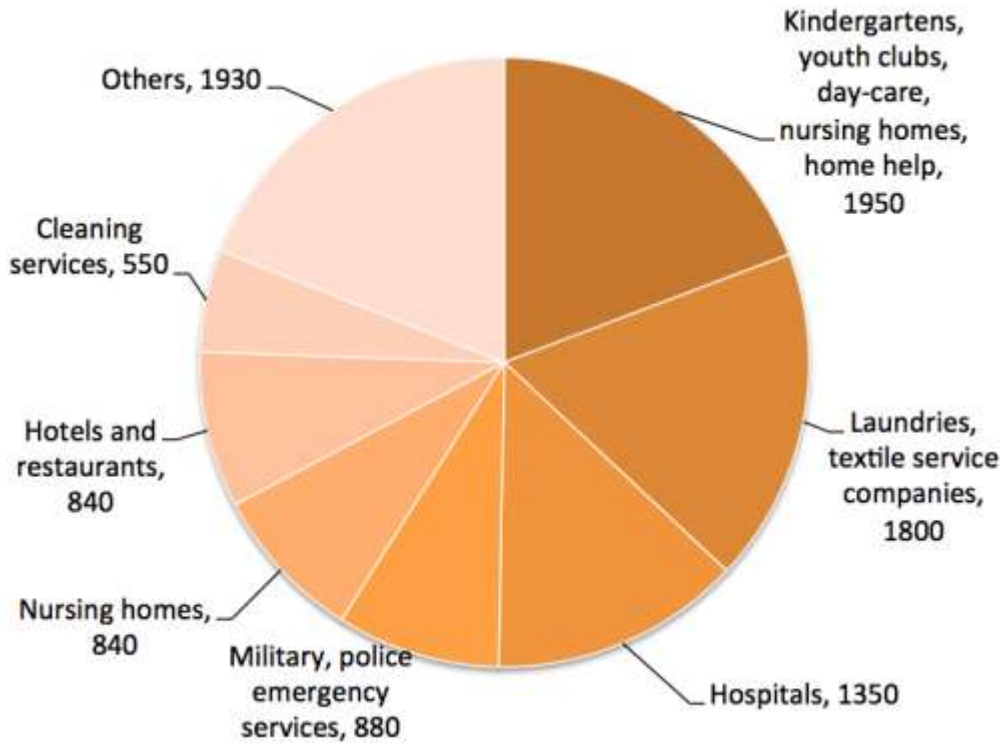
Government/business textiles by sector



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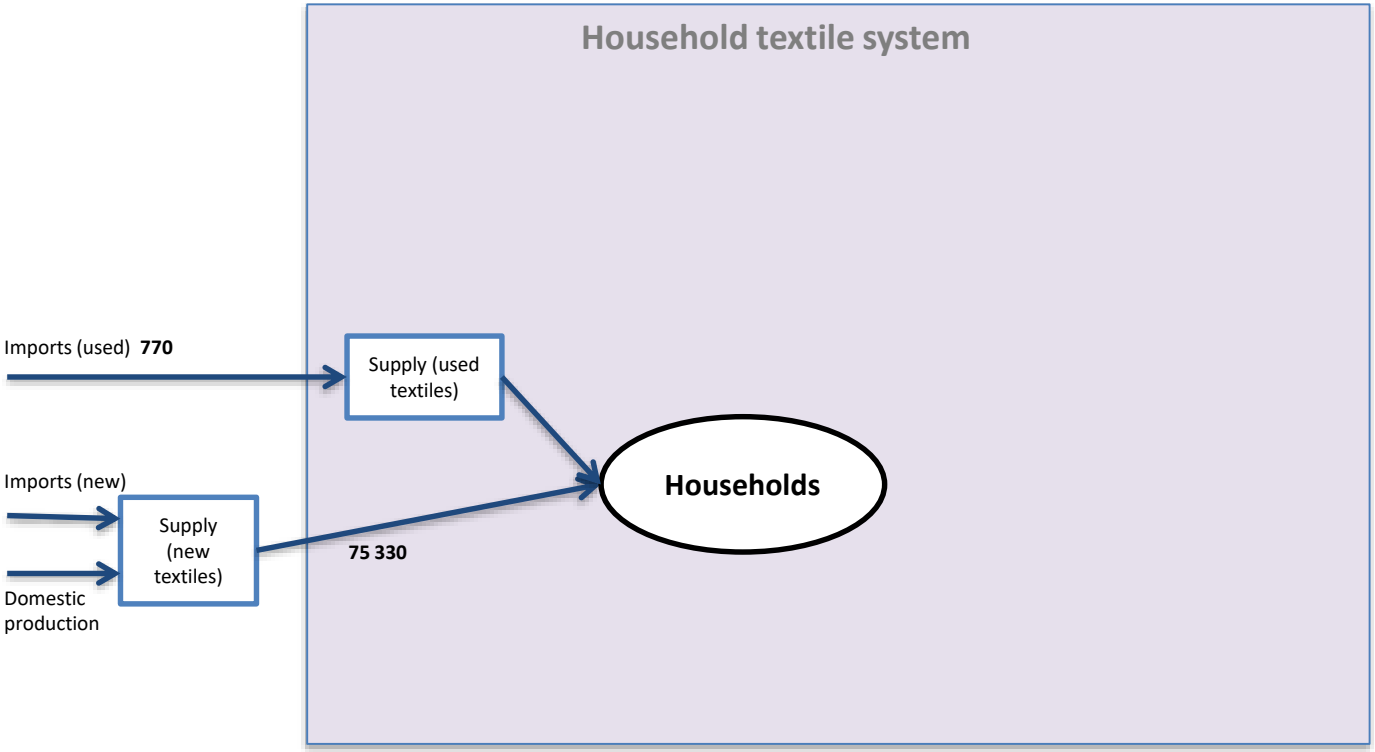
Flows of used textiles

Inputs to system



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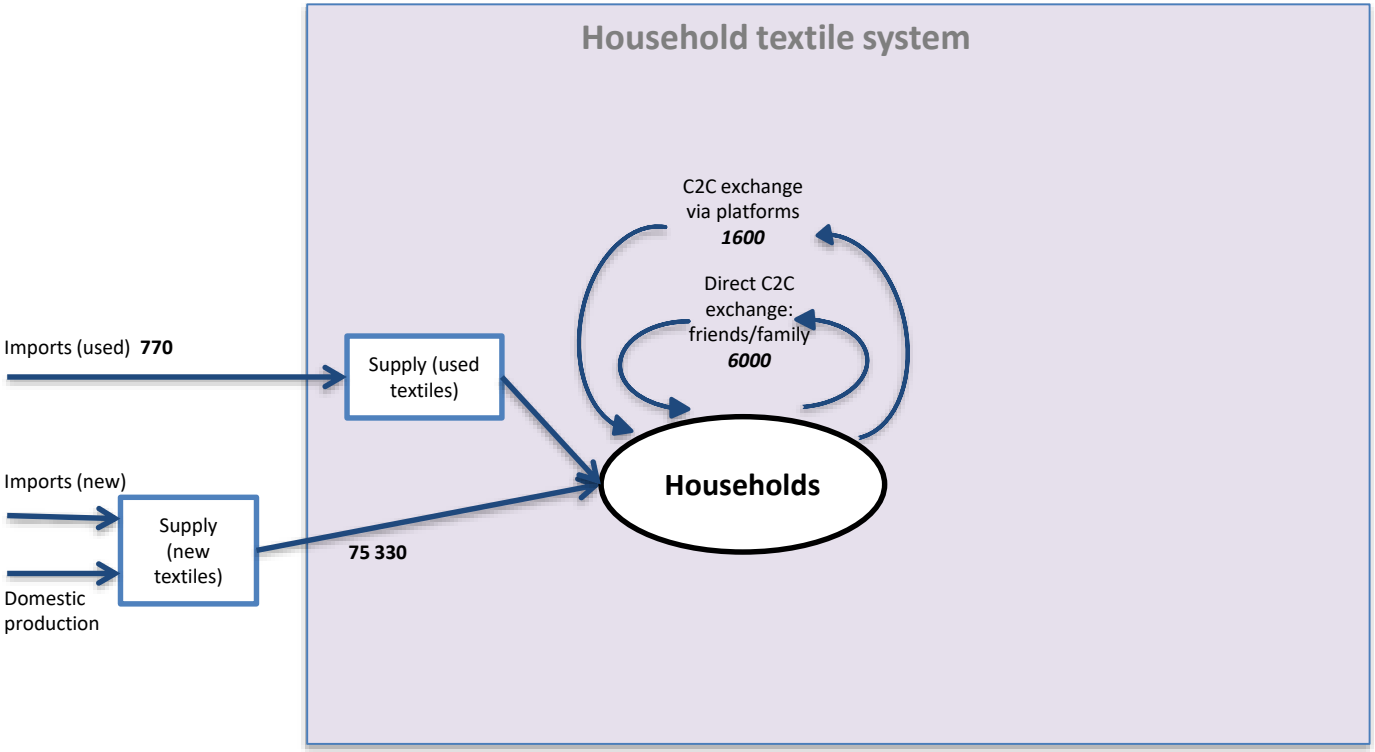

Inputs to system

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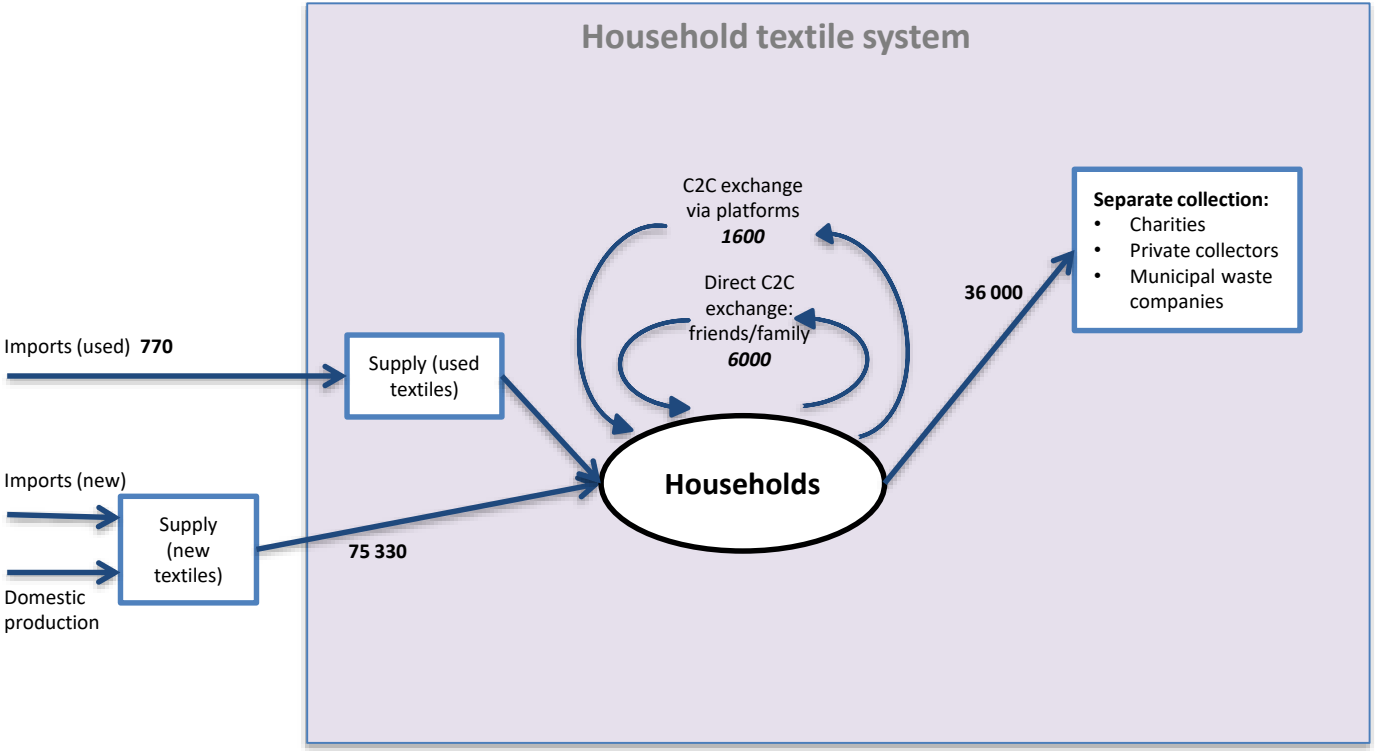
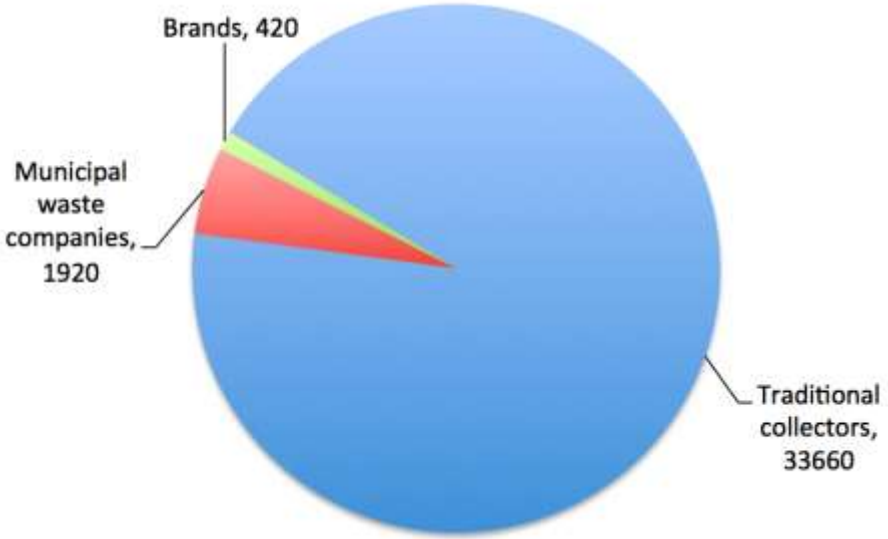
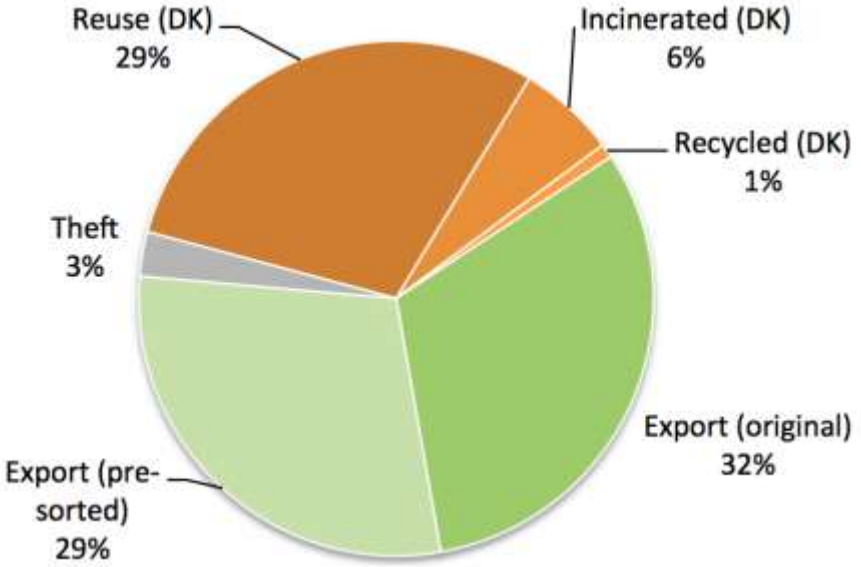


Separate collection from households





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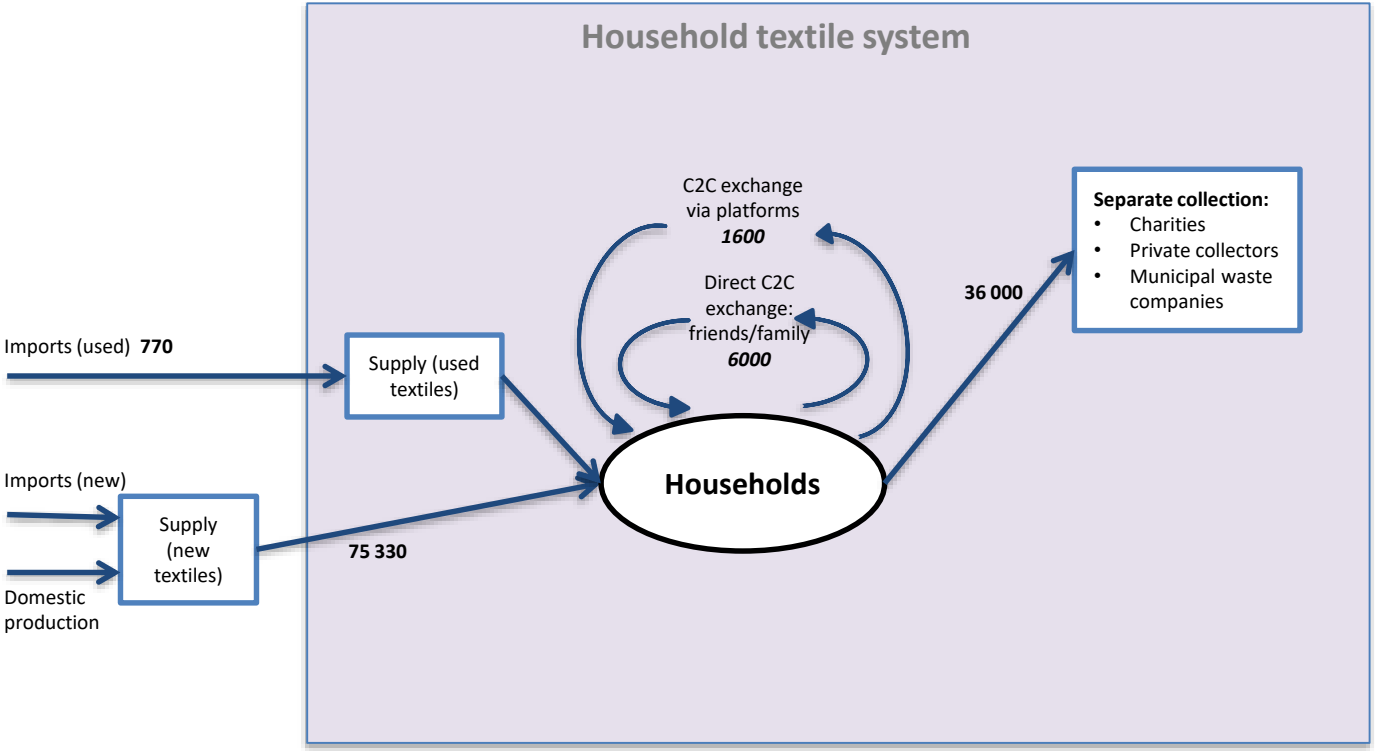

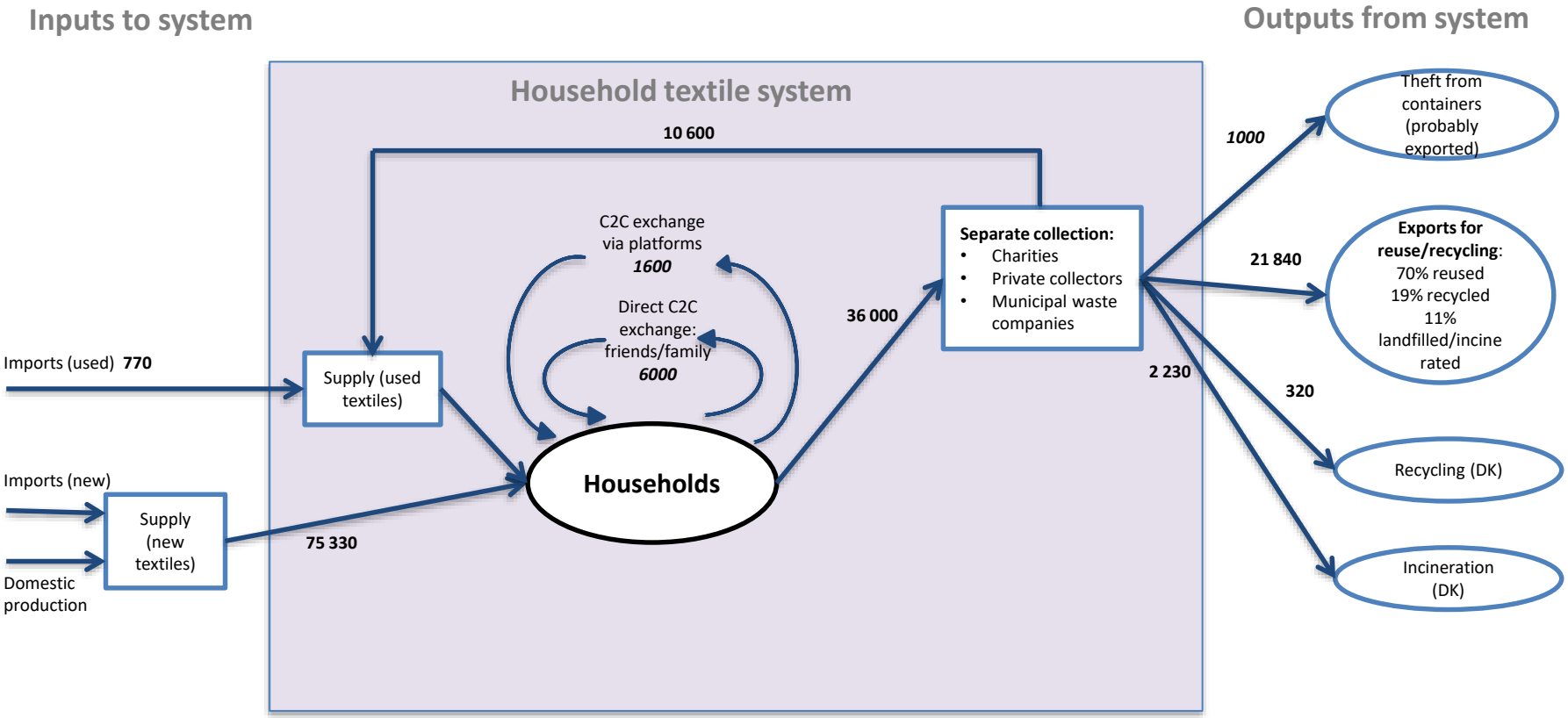
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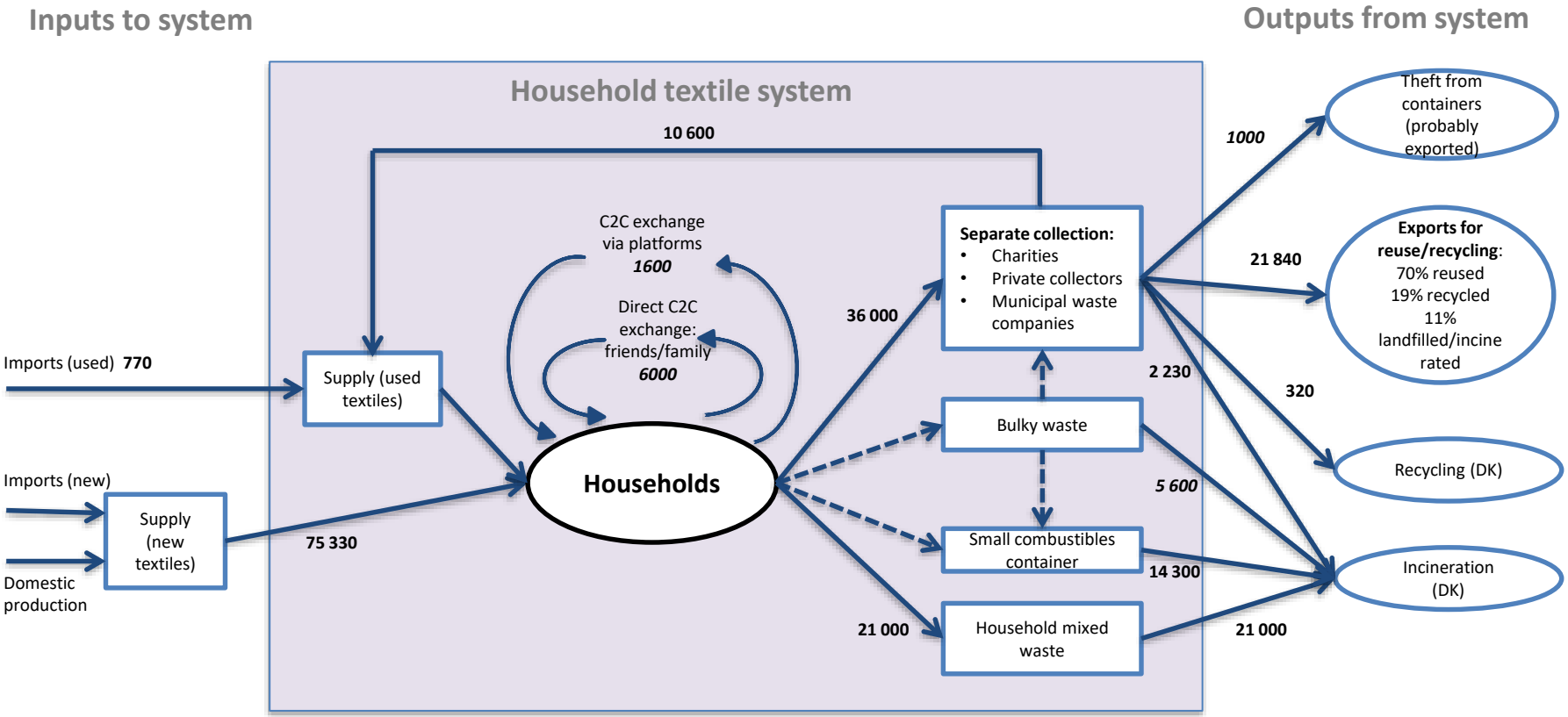
Outputs from system
Household textile system
10 600
C2C exchange via platforms
1600
Direct C2C exchange: friends/family
6000
Separate collection:
• Charities
• Private collectors
• Municipal waste companies
36 000
1000
Theft from containers (probably exported)
21 840
Exports for reuse/recycling: 70% reused 19% recycled 11% landfilled/incinerated
2 230
320
Recycling (DK)
Incineration (DK)
Imports (used) 770
Supply (used textiles)
Imports (new)
Supply (new textiles)
Domestic production
75 330
Households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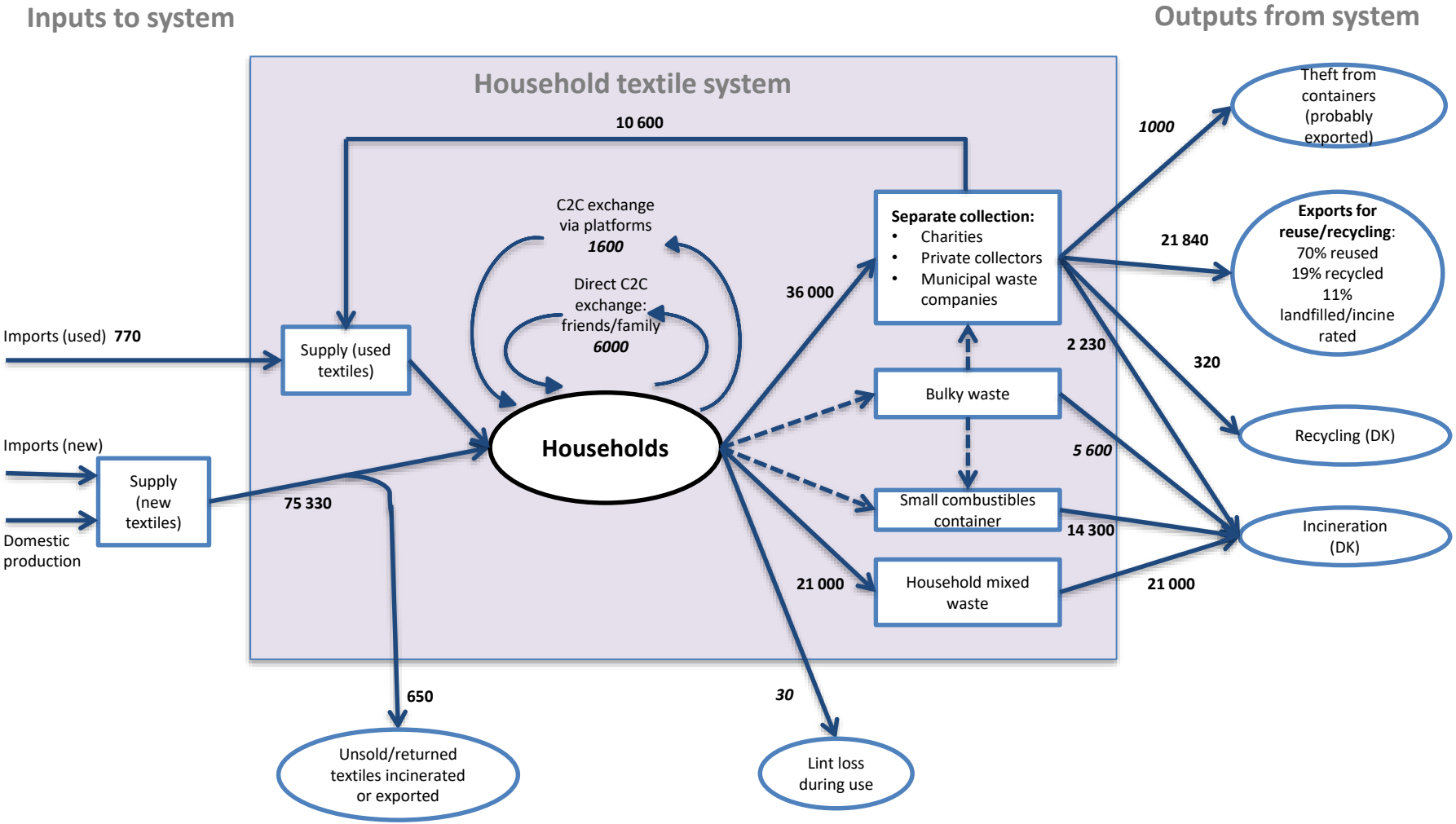
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Rough estimates of fate of used textiles from other sectors

Sector	Purchases	*Recycling/upcycling (DK)*	*Export for reuse/recycling*	*Mixed waste for incineration*
Kindergartens, youth clubs, day-care, nursing homes, home help	2 790			2 790
Laundries, textile service companies	1 800	50	500	1 350
Hospitals	1 350	50	400	900
Military, police, emergency services	880			880
Hotels and restaurants	840		20	820
Cleaning services	550			550
Others	1 930			1 930
TOTAL	**10140**	**100 (1%)**	**920 (9%)**	**9220 (90%)**

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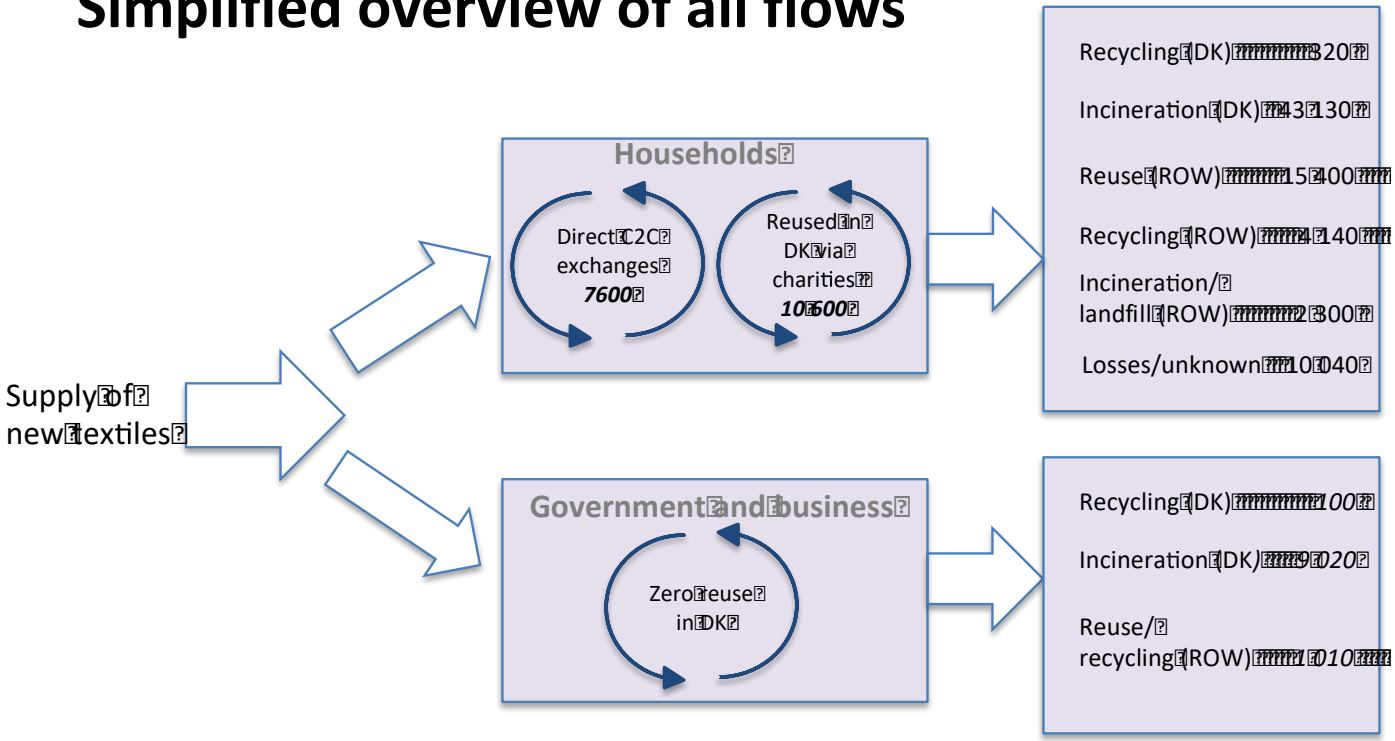
Simplified overview of all flows



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The lost value of
incinerated textiles

Textiles in residual waste

- 235 kg of textiles from 7 municipalities in 4 regions
- Laundered 3 times, weighed and removed non-relevant textiles
- Sorted by quality and material and weighed

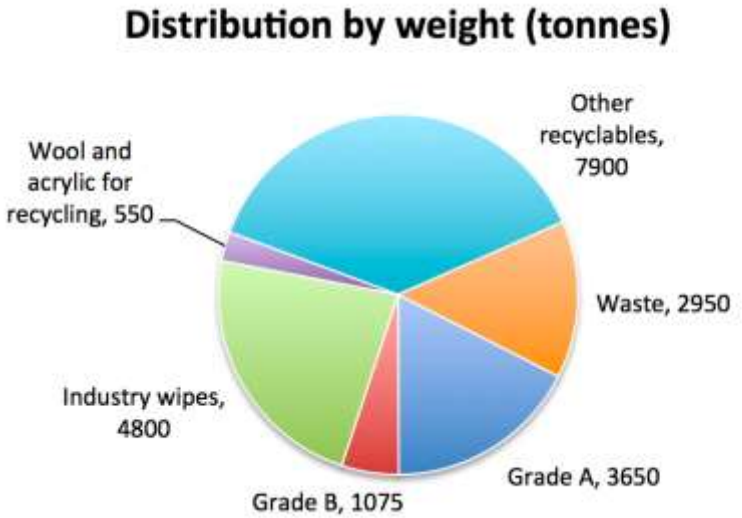
First sorting

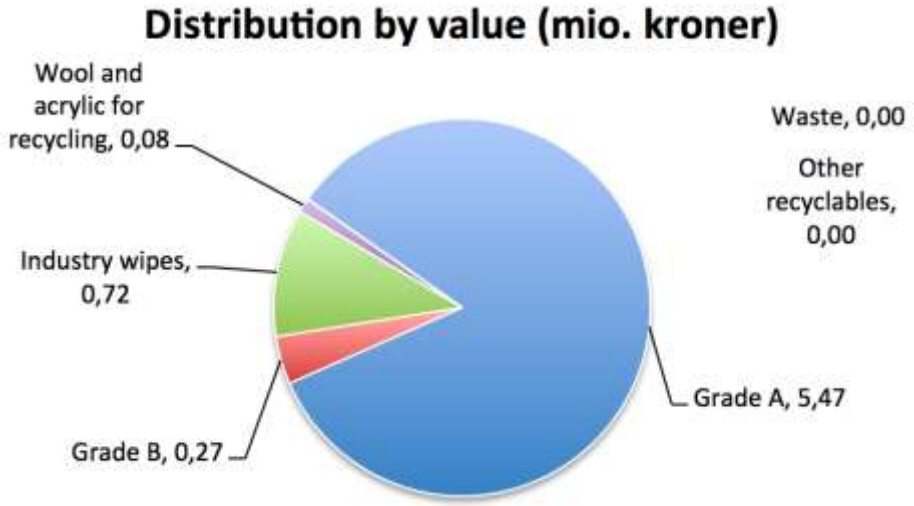
		Multi-family housing (MFH)	Single-family house with garden (SFH)
Within scope	**Home textiles**	**22%**	**22%**
	Textiles clothing	**51%**	**49%**
Outside scope	Shoes, bags, belts	23%	23%
	Duvets and pillows	4%	2%
	Non-textile clothing	0.5%	2%
	Cuddly toys	1%	2%
	Sum	**100%**	**100%**

Second sorting

Grade		Multifamily housing (MFH)		Single-family house with garden (SFH)	
		Kg/person/year	Share (%)	Kg/person/year	Share (%)
Reusable	**Total**	**1.06**	**33.3%**	**0.24**	**16.4%**
	Shop quality	0	0%	0	0%
	Grade A	0.85	26.8%	0.18	12.0%
	Grade B	0.21	6.5%	0.06	4.4%
Recyclable – *current markets*	**Total**	**0.66**	**20.7%**	**0.41**	**28.1%**
	Industry wipes	0.57	17.9%	0.37	25.7%
	Wool/Acrylic	0.09	2.8%	0.04	2.4%
Recyclable – *future markets*	**Total**	**1.03**	**32.4%**	**0.60**	**41.0%**
	>95% Cotton	0.64	20.3%	0.44	30.0%
	Polycotton	0.10	3.0%	0.02	1.1%
	>95% Nylon	0.06	2.0%	0.04	2.6%
	>95% Viscose	0.06	1.9%	0.06	4.1%
	>95% Polyester	0.16	5.2%	0.05	3.3%
Waste *for incineration*		**0.43**	**13.6%**	**0.21**	**14.4%**
Total		**3.17**	**100%**	**1.45**	**100%**

Distribution by weight and value (DK total)





Discard 12-15 mio. kr worth of used textiles in mixed waste

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Reflections

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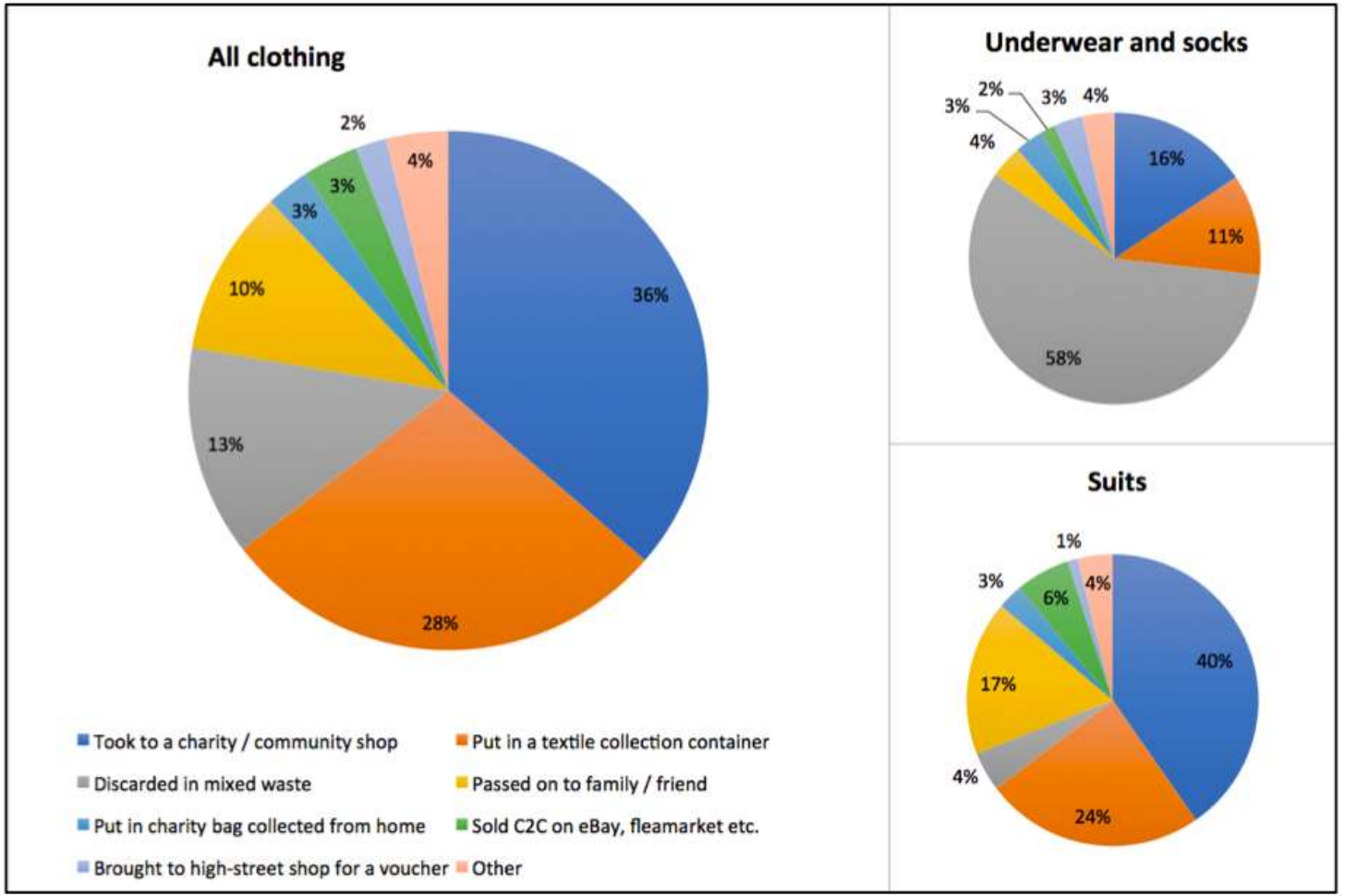

Source: survey carried out of 1000 adult Danes by WRAP UK as part of the European Clothing Action Plan

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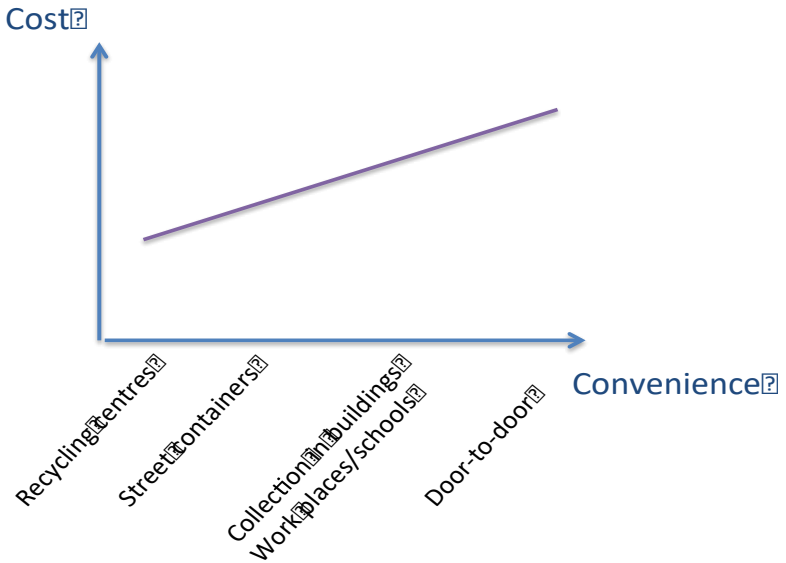
If the uncollected textiles are of low value…

- Extra effort needed to collect them may not be economically viable



- Support needed?

Is bulky waste a low hanging fruit?

- 5-10 000 tonnes of textiles in bulky waste
- 2/3 of textiles in bulky waste are delivered in clear plastic bags
- Possibility of separation ***post*** collection
- More study needed

How to increase circular economy in other sectors?

- Need for CE textile policy/action in central administrations
- Leasing presents an opportunity if textile service companies engage in circularity
- CE criteria in procurement contracts

Two examples

Helsingør municipality - contract with a private municipal services company for setting up of containers at schools, kindergartens. Donated to charity.

Region Midt – InterGen receives and processes dicarded furniture, equipment, textiles from region's hospitals and identifies possible users in Denmark and abroad.

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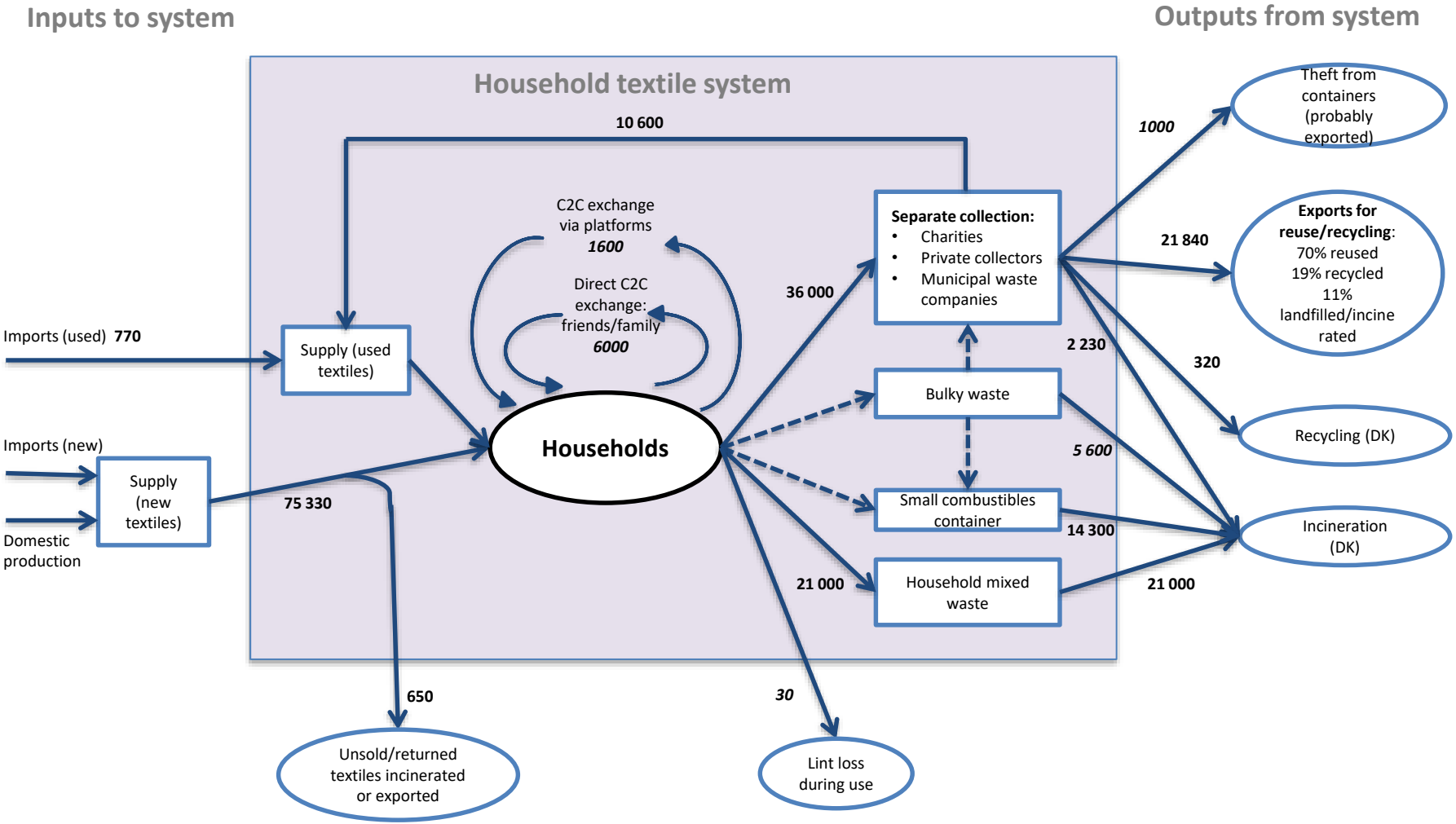
Uncertainty and need to improve data quality

‘Missing’ 9150 tonnes of textiles

Potential causes:

- Increasing storage in homes
- Errors in quantity of new textiles in households
- Errors in total collection quantities
- Errors in share of collected, reused in DK
- Errors in estimates of textiles in bulky waste/small combustibles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Improving data quality:

- ***Codes of conduct for textile collectors*** including weighing and reporting all flows to map C2C flows and donation attitudes
- ***Regular surveys of citizen behaviour***
- ***Systemised picking analyses*** of bulky waste, small combustibles and mixed household waste
- ***More systematic registration of bulky waste collection*** in ADS
- ***Registration of separate textile collection*** by municipal and private waste companies

Uncertainty and need to improve data quality

'Missing' 9150 tonnes of textiles

Potential causes:

- Increasing storage in homes
- Errors in quantity of new textiles in households
- Errors in total collection quantities
- Errors in share of collected, reused in DK
- Errors in estimates of textiles in bulky waste/small combustibles

Further reading:

Questions:

- Marianne Ladekarl Thygesen
  malth@mst.dk
- David Watson
  dw@planmiljoe.dk

Extra slides. I KNOW you're going to ask for these

			Inputs (tonnes)			Outputs (tonnes)				
	Number of shops	Number of containers	Collected via containers and shops	Purchased from waste companies	Total collection (excluding shoes/bags)	Reuse (DK)	Recycled (DK)	Export (original)	Export (pre-sorted)	Incinerated (DK)
Private collector 1	0	1 600	4 520		4 181[4]			89%	9%	2%
Private collector 2		30	85	400	450[4]			100%		
Charity 1	0	920	2 015		1 770			100%		
Charity 2	125	200	950	650	1 360	6%	2%	74%	18%	1%
Charity 3	240	1 700	7 000		6 160	20%		2%	74%	4%
Charity 4	82	20	3 000	50	2 900	40%			55%	5%
Charity 5	248		5 000		4 625[4]	85%			5%	10%
Charity 6	25	1 200	6 000		5 700	25%	5%	50%	15%	5%
Charity 7	60	500	1 870		1 730[4]	11%		37%	43%	9%
Charity 8	73	95	1 740[1]		1 610[4]	*40%*		*0%*	*55%*	*5%*
Smaller collectors	158[2]	*250*	*3 670*[1]		*3 390*[4]	*50%*			*30%*	*20%*
Brands	102		420		420			100%		
Municipal waste companies[5]			2120[3]		*1920*	14%	0.4%	18%		4%
Sum					35 000[6]	10 620	320	11 340	10 500	2 220

[1]estimate based on number of shops and containers multiplied by reported collection rates in shops and containers by other actors

[2]numbers of second-hand shops run by members of ISOBRO other than those included above

[3] see next table

[4]Assumes 7.5% shoes by weight, based on average levels reported by other collectors

[5] Note that the percentages on the output side form municipalities only add up to 36%. The remaining 74% are sold to the collectors listed above and included in their accounts

[6]To avoid double counting this total only includes 36% of the textiles collected by municipal waste companies. The remaining 74% are sold on to the traditional collectors who have included them in their reporting in the rows above

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Table 4.4: collection and processing of textiles by municipal waste companies as input to Table 4.3

Municipality	Quantity collected (2016)	Sold in shop (2016)	Sold to collector listed in Table 4.3	Recycled (DK)	Exported (unsorted)	Incinerated (DK)
Kara Novoren			*Started in 2017*			
Odense			*Started in 2017*			
Tønder Forsyning			*Started in 2017*			
Gladsaxe	61				61	
Affaldplus	500	40	*455*			5
AVV	200	100	*94*	6		
Horsens	174	46	*128*			
ARWOS	280	15	*215*			50
REFA	200				200	
Sum (with shoes/bags)	1415	201	*892*	6	261	55
Sum (without shoes/ bags)	1286	183	*810*	5	237	50
Share (%)	100%	14%	62%	0,4%	18%	4%

Table 4.7: Textiles found in household residual mixed waste: results of picking analyses

	Single family housing (SFH) with garden				Apartments in multi-family housing			
Picking analysis	Households (number)	People (number)	Kg/household/ yea	Kg/person/ year	Households (number)	People (number)	Kg/household/ yea	Kg/person/ year
Viborg Kommune	198	477	5.7	2.7				
Aarhus	294	773	8.4	3.2	586	1043	9.7	5.4
ARC	405	1013	11.5	4.6	503	755	10.7	7.2
Odense	282	700	9.5	4	275	534	11.4	5.7
Hadersiev	294	688	6.0	2.6	333	523	22.2	14.1
Sønderborg	269	611	9.6	4.2	120	196	5.5	3.3
Aabenraa	100	226	9.4	4.2	306	490	4.7	2.6
Tønder					120	194	8.3	5.1
DTU analysis from 11 municipalities	2488	6698	11.4	4.4	320	488	5.3	3.5
Holstebro	107	249	13.6	5.6				
Lemvig	83	193	3.0	1.3				
Skive	96	224	7.2	3.1				
Struer	117	273	7.4	3.2				
PlanMiljø analysis from 7 municipalities*	1171	3002	3.8	1.8	716	1359	6.0	3.2
Total/ *average*	**5904**	**15126**	***8.9***	***3.5***	**3279**	**5581**	***7.1***	***4.1***

*the textiles here were provided to PlanMiljø by Econet. Econet gathered them under a large picking analysis carried out in 2017/18 for the Danish EPA

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Table 4.8: Textiles found in household residual mixed waste across Denmark as a whole

	Number of households	Number of inhabitants	Textiles – extrapolated from number of households (tonnes)	Textiles – extrapolated from number of inhabitants (tonnes)
SF housing – DK total	1 553 175	3 754 694	13 762	13 271
Apartments in MF housing – DK total	1 056 135	1 847 494	7 492	7 642
SF & MF housing – DK total	**2 609 310**	**5 602 188**	**21 254**	**20 913**

Table 4.9: Share of textiles in bulky waste; results of five picking analyses

Picking analysis place and date		Black/coloured bags	Clear bags	Loose	Total
Solrød (2014)	Textiles	1	81	22	104
	Total waste	30	562	2063	2655
	% Textiles	**3.3%**	**14.4%**	**1.1%**	**3.9%**
Greve (2014)	Textiles	-	191	60	251
	Total waste	11	1884	3015	4910
	% Textiles		**10.1%**	**2.0%**	**5.1%**
Gentofte (2017)	Textiles	47	442	249	738
	Total waste	157	2102	6928	9187
	% Textiles	**29.9%**	**21.0%**	**3.6%**	**8.0%**
Tårnby (2016)	Textiles	18	218	14	250
	Total waste	129	1267	6781	8177
	% Textiles	**14.0%**	**17.2%**	**0.2%**	**3.1%**
Hvidovre (2016)	Textiles		157	80	237
	Total waste		1316	6400	7716
	% Textiles		**11.9%**	**1.3%**	**3.1%**
Weighted average share of textiles					**4.8%**

Multi-family housing (MFH)

Weighing of:

- Duvets/pillows without covers
- Home textiles
- Clothing (textiles)
- Shoes, bags and cuddly toys
- Non-textile clothing (leather etc.)

- Home textiles
- Clothing (textiles)

Duvets/pillows without covers
Shoes, bags and cuddly toys
Non-textile clothing (leather etc.)

Set aside

Sorting/weighing by quality:

Reusable:
- Shop quality
- Grade A/tropical mix
- Grade B

Recyclable (current markets):
- Industry wipes
- Acrylic/wool

Recyclable (Future markets)
- >95% Cotton
- >95% polyester
- >95% viscose
- >95% nylon
- Polycotton mix

Non-recyclable waste

Single-family housing (SFH)

Weighing of:

- Duvets/pillows without covers
- Home textiles
- Clothing (textiles)
- Shoes, bags and cuddly toys
- Non-textile clothing (leather etc.)

- Home textiles
- Clothing (textiles)

Duvets/pillows without covers
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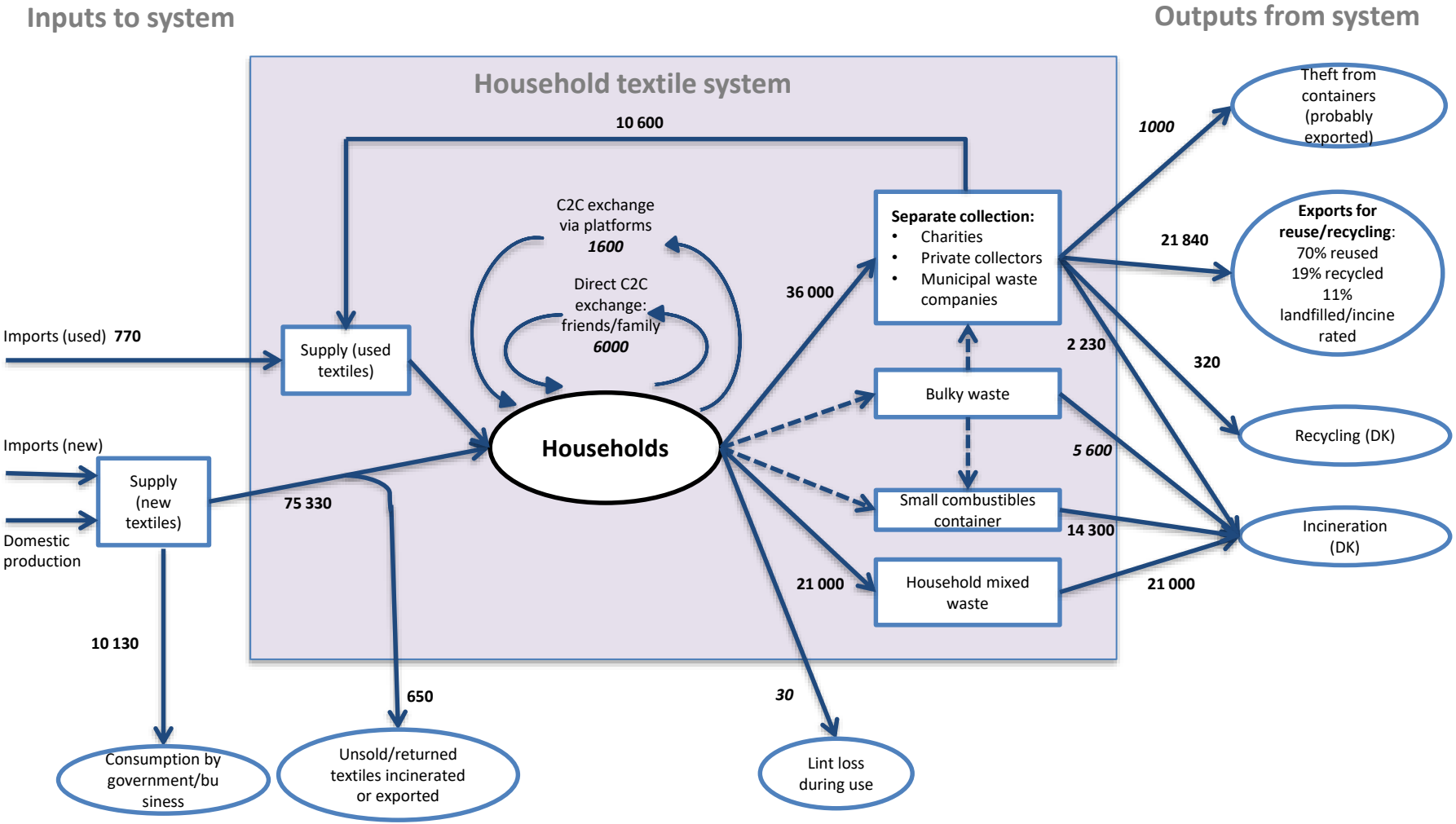
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