Supplemental information

Important parameters in this study include the relative number of disposable items used for each bicomponent splitable microfiber reusable item and the number of reusable uses of each new item ordered by the laundry. The values explored in the scenario analyses are shown in Tables S1 and S2. For wipers, 2.3 disposable wipers are used for each reusable wiper use. Thus, 1000 reusable uses corresponds to 2,300 disposable wipers. For flat mop pads, 1000 reusable mop pad uses corresponds to 2,500 disposable flat mop pads.

Table S1. Parameter ranges for wipers

	Default	Low	High
Disposable wipers used : reusable wiper use	2.3:1	2:1	6.6:1
Number of uses of each new reusable wiper before replacement	30.5	20	100
Number of new wipers purchased / 1000 uses of reusable wipers	32.8	50	10

Table S2. Parameter ranges for flat mop pads

	Default	Low	High
Disposable mop pads used : reusable mop pad use	2.5:1	2:1	3:1
Number of uses of each new reusable mop pad	48.8	20 (low return rate)	100 (high return rate)
Number of new mop pads purchased / 1000 uses of reusable mop pads	20.5	50	10

For the default parameters, the results for blue water and solid waste are shown in Table S3. For wipers, the reusables have 50.7 kg blue water and 1.18 kg solid waste, and the disposables have 207 kg blue water and 13.7 kg solid waste. Thus, when one switches from disposable wipers to reusable wipers, the blue water savings is 75% and the solid waste savings is 91%. For flat mops, the reusable mop pads had a blue water usage of 126 kg / 1000 reusable uses and a solid waste generation of 1.95 kg / 1000 reusable uses. Disposable mop pads had a blue water use of 774 kg / 1000 reusable uses and a solid waste generation of 41.8 kg / 1000 reusable uses. Thus, when one switches from disposable mop pads to reusable ones, the blue water and solid waste savings are 84% and 95%.

Table S3. Blue water and Solid waste impacts for each wiper and flat mop life cycle stage

	Blue water, kg / 1000 reusable uses		**Solid waste, kg / 1000 reusable uses**	
	Reusable	Disposable	Reusable	Disposable
Wipers manufacture, ctg	24.3	202	0.890	13.5
Packaging for new wipers, ctg	0.0815	2.17	6.68E-03	0.230
Transport of new items to laundry or hospital	0.474	7.29	0	0
Packaging for laundry	1.84	0	0.283	0
Laundry	23.0	0	0	0
Transport laundry to hospital roundtrip	1.53	0	0	0
Incineration	-0.591	-5.529	0	0
Landfill	0.0519	0.602	0	0
Wipers, total	**50.7**	**207**	**1.18**	**13.7**
Flat mop manufacture, ctg	47.2	757	1.74	41.3
Packaging for new pads, ctg	0.0823	8.05	7.91E-03	0.588
Transport of new items to laundry or hospital	0.818	24.4	0	0
Packaging for laundry	1.30	0	0.200	0
Laundry	73.0	0	0	0
Transport laundry to hospital roundtrip	4.24	0	0	0
Incineration	-0.857	-16.8	0	0
Landfill	0.0853	1.84	0	0
Flat mop total,	**126**	**774**	**1.95**	**41.8**

The relative usage rate (disposable to reusable) affects the percent savings for reusable wipers. The impact is demonstrated in Table S4. Even if the disposable wipers were used at the same rate as reusables (1:1 ratio), the NREc savings are 23% and GWP savings are 28.3%, Table S4. The ratios of disposable wiper use to reusable wiper use for the same area was found in this study were 2.3:1 and 6.6:1. The percent savings for GWP over this range was 69% to 89%. These results can be calculated from the default case by adjusting the impact of the disposable wipers by the number required. For example, when switching from 2.3:1 to 6.6:1, the disposable blue water consumption increases from 207 kg to 207*6.6/2.3 = 594 kg blue water / 1000 reusable uses. Thus, the savings becomes (594-50.7)/594=91%.

Table S4. Percent savings when switching from disposable to reusable wipers: impact of the relative number of uses (disposable wipers uses / reusable wiper use).

	NREc	GWP	Blue water	Solid waste
Wipers, % savings @ default 2.3:1	66	69	75	91
Wipers % savings @ 6.6:1	88.3	89.1	91.4	97.0
Wipers, % savings @ 1:1	22.6	28.3	43.5	80.2

The number of cycles or uses of each new reusable item also has a significant impact on the result. The laundry, the transport to and from the hospital, and the associated packaging for these reused items are independent of the number of uses, and this makes up about 2/3 of the impact in energy and global warming categories. However, the manufacture of new wipers and flat mops, packaging of the new items, transport from the manufacturing site to the laundries, and the end of life does scale with the number of new items manufactured. These can be scaled by the number of new items required for 1000 uses to calculate the impacts for scenarios with different return rates. The results, expressed as percent savings are shown for wipers in Table S5 and for Flat mop pads in Table S6.

Table S5. Percent savings when using reusable wipers for the default return rate (30.5 uses for each new wiper), a low return rate (20 uses) and a high return rate (100 uses).

	NREc		GWP		Blue water		Solid waste	
	MJ HHV / 1000 reusable uses	% savings	kg CO2eq / 1000 reusable uses	% savings	kg BW / 1000 reusable uses	% savings	kg SW / 1000 reusable uses	% savings
Default	380	66	24	69	51	75	1.18	91
Low return rate (50 new items)	453	60	29	62.4	63	69	1.65	88
High return rate (10 new items)	283	75	18	77	34	84	0.56	96
Disposable (2.3:1)	1,130	0	77.9	0	207	0	13.7	0

Table S6. Percent savings when using reusable flat mop pads for the default return rate (48.8 uses for each new wiper), a low return rate (20 uses) and a high return rate (100 uses).

	NREc		GWP		Blue water		Solid waste	
	MJ HHV / 1000 reusable uses	% savings	kg CO2eq / 1000 reusable uses	% savings	kg BW / 1000 reusable uses	% savings	kg SW / 1000 reusable uses	% savings
Default	998	76	63	78	126	84	2	95
Low return rate (50 new items)	1381	67	88	68.7	194	75	4	89
High return rate (10 new items)	862	79	53	81	102	87	1	97
Disposable (2.3:1)	4,165	0	282.2	0	774	0	41.8	0