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Subject:	COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT REPORT Accompanying the documents Commission Regulation laying down ecodesign requirements for smartphones, mobile phones other than smartphones, cordless phones and slate tablets pursuant to Directive 2009/125/EC of the European Parliament and of the Council and amending Commission Regulation (EU) 2023/826 and Commission Delegated Regulation supplementing Regulation (EU) 2017/1369 of the European Parliament and of the Council with regard to the energy labelling of smartphones and slate tablets
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Delegations will find attached document SWD(2023) 101 final part 7/7.

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EUROPEAN
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Brussels, 16.6.2023
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PART 7/7

COMMISSION STAFF WORKING DOCUMENT
IMPACT ASSESSMENT REPORT

Accompanying the documents

Commission Regulation

laying down ecodesign requirements for smartphones, mobile phones other than smartphones, cordless phones and slate tablets pursuant to Directive 2009/125/EC of the European Parliament and of the Council and amending Commission Regulation (EU) 2023/826

and

Commission Delegated Regulation

supplementing Regulation (EU) 2017/1369 of the European Parliament and of the Council with regard to the energy labelling of smartphones and slate tablets

{C(2023) 1672 final} - {C(2023) 3538 final} - {SEC(2023) 164 final} -
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Annex 11: Comparison of the options

Option 3

Effectiveness in achieving the specific objectives: The effectiveness of the sub-option 3.1 is high as it directly targets the problems and specific objectives. Though it is a bit early to assess the impacts of the French implementation of the reparability index, it is gaining attention and a recent survey shows its good uptake by consumers¹. Therefore, assuming a similar consideration by the citizens across EU, the sub-option 3.3 is expected to be quite effective.

Efficiency: The first sub-option 3.1 will be quite efficient though varies across 3.2 (3.2a and 3.2b) and 3.3. Sub-option 3.2a is less demanding in terms of ecodesign requirements, so expected benefits are lower compared to sub-option 3.2b. However, its cost is similar what results in less efficiency. For 3.2b higher environmental benefits but at higher costs as well thus less efficient, compared to 3.3. Also, the efficiency of 3.2 depends on how the market of cordless and feature phones evolve (expected to be declining). For some sectors, such as repair, refurbishment etc. the economic impacts will be positive in the case of 3.3 as the measures will result in growth of these markets.

Coherence: Sub-option 3.3 sets minimum requirements (circularity aspects) on products placed on the market and will be coherent with existing waste, product and resource policies and circular economy.

Option 4

Effectiveness in achieving the specific objectives: This option focuses only on the energy labelling thus its effectiveness will be limited to the specific objective on energy label requirements. Also, it is applicable to smartphones and tablets only. However, success of existing energy label in changing consumer behaviour could add to its effectiveness. Also, including durability/reparability information on the energy label could improve its effectiveness further.

Efficiency: This option has the lowest economic impact, but it also has limited social and environmental benefits, which will result into not very high efficiency.

Coherence: It will be coherence with energy related policies and not sufficient direct link with resource and waste policies.

Option 5

Effectiveness in achieving the specific objectives: although sub-option 5.1 already brings good results in terms of effectiveness, those related to sub-option 5.2 are even greater given the fact that it will bring an integrated approach, ecodesign, energy

¹ <https://news.samsung.com/fr/sondage-indice-reparabilite>

labelling and circular economy requirements. It would be effective in principle as it covers all fundamental principles of sustainability and circularity.

Efficiency: The efficiency of sub-option 5.2 will be similar to sub-option 3.3 (probably a little higher).

Coherence: Same as option 3.

Table 1 Summary of Benefit assessment (yearly figures for 2030), all devices

Description									Comments			
	Option 3.1	Option 3.2a	Option 3.2b	Option 3.3	Option 4	Option 5.1	Option 5.2					
Direct benefits												
New SMEs in repair/maintenance sector (n° firms)	+++	+++	+++	+++	+	+++	+++	Business. This refers how SMEs will evolve as consequence of new repairers but also by the growth of existing firms				
Promoting investment in the production of more energy efficient devices	++	++	++	+++	++	++	+++	Business. In overall, more requirements (Ecodesign, energy and/or reparability) will imply more investment				
Reduced GEI emissions (Mn tCO2 eq.)	-3	-3	-3	-3	-1	-3	-4	Society				
Reduced acidification (kt SO2 eq.)	-22	-22	-23	-23	-4	-23	-24	Society				
Reduced energy consumption (PJ)	-44	-43	-47	-48	-13	-48	-49	Consumer				
Employment creation in repair/maintenance sector (n° jobs)	+3,000	+3,040	+3,000	+3,200	+300	3,000	+ 3,200	Society				

Comments							
Description	Option						
	Option 3.1	Option 3.2a	Option 3.2b	Option 3.3	Option 4	Option 5.1	Option 5.2
Reduced total annual consumer expenditure (Mn €)	-19,260	-19,500	-19,300	-20,000	-2,800	-19,300	-20,600
Reduced societal external annual damages (Mn €)	-980	-850	-1,020	-1,040	-150	-1,040	-1,080
Contribute to circular economy Material use reduction (less tons in comparison with Option 1)	-36,000	-35,300	-39,100	Material reduction is expected (decrease of more than 39,1000 tons of materials). In addition, it can promote the reuse of goods by providing more certainty regarding the remaining lifespan after first use.	-1,600	-40,300	Material reduction is expected (decrease of more than 40,300 tons of materials). In addition, it can promote the reuse of goods by providing more certainty regarding the remaining lifespan after first use.
Indirect benefits							
Ensure user's health,	++		++	++	+	++	++
Society This is related to the benefit of reduce material consumption under different options, since consumers and workers will be exposed to lower dangerous or toxic							

Comments							
Description	Option						
	3.1	3.2a	3.2b	3.3	4	5.1	5.2
compatibility across other devices and workers safety during production process							substances. Also, common requirements will assure compatibility among different devices.
Positive impact on the deployment and the diffusion of innovation	++		++	(+++) Promotion of repair skills among users	+	++	(+++) Promotion of repair skills among users
							Business. How innovations to achieve new requirements, will be promoted through the supply chain.

(1) Estimates are relative to the baseline for the policy option as a whole; (2) Please indicate which stakeholder group is the main recipient of the benefit in the comment section;(3) For reductions in regulatory costs, please describe details as to how the saving arises (e.g. reductions in compliance costs, administrative costs, regulatory charges, enforcement costs, etc.; see section 6 of the attached guidance).

Table 2 Summary of Cost assessment

Costs (all devices)							
Option 3.1		Citizens/Consumers		Businesses		Administrations	
		One-off	Recurrent	One-off	Recurrent	One-off	Recurrent
Higher compliance cost	Direct costs			(++) Increase in costs due to establish production and supply change to fulfil minimum requirements, testing equipment, etc.	(++) Increase regarding new personnel, develop after-sales, maintenance activities, etc.	(++) Increase in costs due to set up the enforcement process, government expenditure for conformity review, establishing minimum requirements	(++) Increase due to monitor compliance with the requirements (MS)
	Indirect costs			(++) Increase in up-front cost of products due inter alia to more accurate assembly, better qualified manufacturing work force, etc.	(++) Slight increase in up-front cost of products due inter alia to more accurate assembly, better qualified manufacturing work force, etc.		(++)
Reduces business revenue (Mn €)					Business revenue will reduce annually up to -19,400 in 2030		
Reduces SMEs in manufacture and retail sector (N° firms)					(-) Negatively affected because of lower sales, although other factors must be considered		
Higher repair costs (Mn €)			Repair costs will increase annually up to +350 in 2030				
Acquisition price (€/unit)		(+) Increase due to higher costs as consequence of incorporating					

Costs (all devices)									
Option 3.2a		Citizens/Consumers			Businesses			Administrations	
		One-off	Recurrent		One-off	Recurrent		One-off	Recurrent
Higher compliance cost	Direct costs			(++) Increase in costs due to establish production and supply change to fulfil minimum requirements, testing equipment, etc.	(++) Increase regarding new personnel, develop after-sales, maintenance activities, etc.		(++) Increase in costs due to set up the enforcement process, government expenditure for conformity review, establishing minimum requirements		(++) Increase due to monitor compliance with the requirements (MS)
	Indirect costs			(++) Increase in up-front cost of products due inter alia to more accurate assembly, better qualified manufacturing work force, etc.	(++) Slight increase in up-front cost of products due inter alia to more accurate assembly, better qualified manufacturing work force, etc.				(++)
Reduces business revenue (Mn €)						Business revenue will reduce annually up to –19,800 in 2030			
Reduces SMEs in manufacture and retail sector (N° firms)						(-) Negatively affected because of lower sales, although other factors must be considered			
Higher repair costs (Mn €)			Repair costs will increase annually up to +500 in 2030						
Acquisition price (€/unit)		(+) Increase due to higher costs as							

		consequence of incorporating new requirements					
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Costs (all devices)							
Option 3.2b	Citizens/Consumers		Businesses		Administrations		
	One-off	Recurrent	One-off	Recurrent	One-off	Recurrent	
Higher compliance cost	Direct costs		(++) Increase in costs due to establish production and supply change to fulfil minimum requirements, testing equipment, etc.	(++) Increase regarding new personnel, develop after-sales, maintenance activities, etc.	(++) Increase in costs due to set up the enforcement process, government expenditure for conformity review, establishing minimum requirements	(++) Increase due to monitor compliance with the requirements (MS)	
	Indirect costs		(++) Increase in up-front cost of products due inter alia to more accurate assembly, better qualified manufacturing work force, etc.	(++) Increase in up-front cost of products due inter alia to more accurate assembly, better qualified manufacturing work force, etc.		(++)	
Reduces business revenue (Mn €)				Business revenue will reduce annually up to –19,500 in 2030			
Reduces SMEs in manufacture and retail sector (N° firms)				(-) Negatively affected because of lower sales, although other factors must be considered			
Higher repair costs (Mn €)		Repair costs will increase annually up to					

				+440 in 2030			
Acquisition price (€/unit)			(+) Increase due to higher costs as consequence of incorporating new requirements				

<i>Costs (all devices)</i>							
Option 3.3		Citizens/Consumers		Businesses		Administrations	
		One-off	Recurrent	One-off	Recurrent	One-off	Recurrent
Higher cost	Direct costs			(+++) Significant increase in costs due to establish production and supply change to fulfil minimum requirements, testing equipment, etc.	(+++) Significant increase regarding new personnel, develop after-sales, maintenance activities, etc.	(+++) Significant increase in costs due to set up the enforcement process, government expenditure for conformity review, establishing minimum requirements	(+++) Significant increase due to monitor compliance with the requirements (MS)
	Indirect costs			(+++) Significant increase in up-front cost of products due inter alia to more accurate assembly, better qualified manufacturing work force, etc.	(+++) Significant increase in up-front cost of products due inter alia to more accurate assembly, better qualified manufacturing work force, etc.		
Reduces business revenue (Mn €)					Business revenue will reduce annually up to –20,500 in 2030		
Reduces SMEs in					(-) Negatively affected because of lower sales,		

manufacture and retail sector (N° firms)							although other factors must be considered		
Higher repair costs (Mn €)							Repair costs will increase annually up to +610 in 2030		
Acquisition price (€/unit)							(+) Increase due to higher costs as consequence of incorporating new requirements		
Costs (all devices)									
Option 4		Citizens/Consumers			Businesses			Administrations	
		One-off		Recurrent	One-off		Recurrent	One-off	Recurrent
Higher compliance cost	Direct costs				(+) Slight increase in costs due to establish production and supply change to fulfil minimum requirements, testing equipment, etc.		(+) Slight increase regarding new personnel, develop after-sales, maintenance activities, etc.	(+) Slight increase in costs due to set up the enforcement process, government expenditure for conformity review, establishing minimum requirements	(+) Slight increase due to monitor compliance with the requirements (MS)
	Indirect costs				(+) Slight increase in up-front cost of products due inter alia to more accurate assembly, better qualified manufacturing work force, etc.		(+) Slight increased cost of products due to higher costs of minimum requirement obligations		(+)

Reduces business revenue (Mn €)					Business revenue will reduce annually up to –2,400 in 2030		
Reduces SMEs in manufacture and retail sector (N° firms)					(-) Negatively affected because of lower sales, although other factors must be considered		
Higher repair costs (Mn €)				Repair costs will decrease annually up to –170 in 2030			
Acquisition price (€/unit)		No changes (a minor increase for tablets)					

<i>Costs (all devices)</i>							
Option 5.1		Citizens/Consumers		Businesses		Administrations	
		One-off	Recurrent	One-off	Recurrent	One-off	Recurrent
Higher compliance cost	Direct costs			(++) Significant increase in costs due to establish production and supply change to fulfil minimum requirements, testing equipment, etc.	(++) Significant increase regarding new personnel, develop after-sales, maintenance activities, etc.	(++) Significant increase in costs due to set up the enforcement process, government expenditure for conformity review, establishing minimum requirements	(++) Significant increase due to monitor compliance with the requirements (MS)
	Indirect cost			(++) Significant increase in up-front cost of products due inter alia to more accurate assembly, better	(++) Significant increase in up-front cost of products due inter alia to more accurate		

						qualified manufacturing work force, etc.	assembly, better qualified manufacturing work force, etc.		
Reduces business revenue (Mn €)							Business revenue will reduce annually up to –19,500 in 2030		
Reduces SMEs in manufacture and retail sector (N° firms)							(-) Negatively affected because of lower sales, although other factors must be considered		
Higher repair costs (Mn €)						Repair costs will increase annually up to +440 in 2030			
Acquisition price (€/unit)					(+) Increase due to higher costs as consequence of incorporating new requirements				

<i>Costs (all devices)</i>									
Option 5.2	Citizens/Consumers			Businesses			Administrations		
	One-off		Recurrent	One-off		Recurrent	One-off		Recurrent
Higher compliance cost	Direct costs			(++) Higher costs. Production and supply chain changes, equipment testing, and capital expenditure for adaption (manufacturing)			(++) Higher costs. New personnel with Ecodesign competencies, to carry testing and verification, after-sales, maintenance		
				(++) Higher costs. Production and supply chain changes, equipment testing, and capital expenditure for adaption (manufacturing)			(++) Higher costs. Setting up the enforcement process, government expenditure for conformity review,		
							(++) Higher costs. Monitoring compliance with the requirements		

Table 3 Summary of coherence assessment

		Option 3 (3.1, 3.2a, 3.2b and 3.3)	Option 4	Option 5 (5.1 and 5.2)
<i>External coherence</i>		++	++	++

Overall comparison

	Policy option 1 (baseline)	Policy option 3.1	Policy option 3.2a	Policy option 3.2b	Policy option 3.3	Policy option 4	Policy option 5.1	Policy option 5.2
Overall comparison								
Effectiveness	0	++	++	++	++	++	++	+++
Environmental Impacts	0	++	++	++	+++	++	++	+++
Economic Impacts	0	--	--	--	--	-	--	--
Social Impacts		+	+	+	++	+	++	+++

Annex 12: The SME Test – Summary of results

(1) Preliminary assessment of businesses likely to be affected	In terms of market share, SMEs are certainly not the main player in the mobile phones and tablets OEM sector. However, when it comes to the analysis of the full life cycle stage of mobile phones and tablets, it is noteworthy that there are European SMEs – in the order of some thousands - working on services or activities related to these products (product assembly, repair and maintenance).	(See section 2 [<i>Problem definition</i>] as well as Annex 5)
(2) Consultation with SMEs representatives	All categories of stakeholders identified in the stakeholder mapping, among which SMEs, participated in various consultation activities. SMEs (in the field of repair and maintenance services) actively participated throughout the preparatory process and meetings, in particular the Consultation Forum meeting. With reference to the latter, there was a general consensus in proceeding with the analysis and formulation of Ecodesign and Energy Labelling requirements. On top of this, SMEs mainly working in the field of repair, refurbishment and recycling judged as very relevant (a game changer, in some cases) the proposed material efficiency requirements on durability, reparability, upgradability, maintenance, reuse and recycling.	(See section 5 [<i>What are the available policy options?</i>], as well as Annex 2)

(3) Measurement of the impact on SMEs	SMEs belonging to the repair and maintenance sector are expected to strongly benefit from the initiatives, in particular thanks to the proposed Ecodesign requirements on reparability and ease of disassembly. Not only will new repairers appear in the sector, but also existing ones will grow. To a minor extent, workers of recycling plants would benefit from the proposed Ecodesign information requirements on the manufacturing phase of certain components (as described in Annex 9), as the use of toxic materials use would be reduced. SMEs in the retail sector could be negatively affected because of the expected sales reduction under all considered options. However, it is difficult to establish the retail path with accuracy, because of many factors that can be considered and not all of them affect in the same way (for example, retailers can shift their supply to other devices with a better future projection, in term of sales).
	(See section 6 [<i>What are the impacts of the policy options?</i>] as well as Annex 10)

4) Assess alternative options and mitigating measures	
Given that SMEs, in particular those belonging to the repair and maintenance sector, are expected to strongly benefit from the initiatives, there has been no need to assess alternative options and/or mitigating measures. The detailed feedback from SMEs (as well as from other stakeholders) was helpful for the ‘fine tuning’ of the formulation of the proposed Ecodesign requirements.	(See Annex 9)

1. PUBLICATION BIBLIOGRAPHY

Apple Inc. (2019): Environmental Responsibility Report. 2019 Progress Report, covering fiscal year 2018. Available online at https://www.apple.com/environment/pdf/Apple_Environmental_Responsibility_Report_2019.pdf, checked on 3/31/2021.

Berwald, Anton; Clemm, Christian; Prewitz, Carolin (2020): Environmental evaluation of current and future design rules. Deliverable no. 2.5 of the EU H2020 PROMPT project. Available online at <https://prompt-project.eu/>.

Bitkom e.V. (2020a): Smartphone-Markt: Konjunktur und Trends. Available online at https://www.bitkom.org/sites/default/files/2020-02/bitkom-pressekonferenz-smartphone-markt-20-02-2020-prasentation_final.pdf, checked on 5/22/2021.

Bitkom e.V. (2020b): Deutsche horten fast 200 Millionen Alt-Handys. In *Bitkom e.V.*, 4/16/2020. Available online at <https://www.bitkom.org/Presse/Presseinformation/Deutsche-horten-fast-200-Millionen-Alt-Handys>, checked on 6/10/2020.

Bookhagen, B.; Bastian, D.; Buchholz, P.; Faulstich, M.; Oppen, C.; Irrgeher, J. et al. (2020): Metallic resources in smartphones. In *Resources Policy* 68, p. 101750. DOI: 10.1016/j.resourpol.2020.101750.

Cecere, Grazia; Corrocher, Nicoletta; Battaglia, Riccardo David (2015): Innovation and competition in the smartphone industry: Is there a dominant design? In *Telecommunications Policy* 39 (3-4), pp. 162–175. DOI: 10.1016/j.telpol.2014.07.002.

Chancerel, Perrine; Marwede, Max; Mathieux, Fabrice; Talens Peiro, Laura (2016): Feasibility study for setting-up reference values to support the calculation of recyclability / recoverability rates of electr(on)ic products: Publications Office.

Clemm, Christian; Berwald, Anton; Prewitz, Carolin; Nissen, Nils F.; Schneider-Ramelow, Martin (2020): Market Trends in Smartphone Design and Reliability Testing. Edited by Electronics Goes Green.

Clemm, Christian; Sinai, C.; Ferkinghoff, C.; Dethlefs, N.; Nissen, N. F.; Lang, K.-D. (2016): Durability and cycle frequency of smartphone and tablet lithium-ion batteries in the field. In : 2016 Electronics Goes Green 2016+ (EGG). 2016 Electronics Goes Green 2016+ (EGG), pp. 1–7.

clickrepair (2019): Smartphone-Reparatur-Studie 2019. Edited by WERTGARANTIE Beteiligungen GmbH. Hannover, Germany.

Cordella, Mauro; Alfieri, Felice; Clemm, Christian; Berwald, Anton (2021): Durability of smartphones: A technical analysis of reliability and repairability aspects. In *Journal of Cleaner Production* 286, p. 125388. DOI: 10.1016/j.jclepro.2020.125388.

Cordella, Mauro; Alfieri, Felice; Sanfelix, Javier (2020): Guidance for the Assessment of Material Efficiency: Application to Smartphones. Edited by Publications Office of the European Union. Luxembourg (JRC116106).

Cox, Jayne; Griffith, Sarah; Giorgi, Sara; King, Geoff (2013): Consumer understanding of product lifetimes. In *Resources, Conservation and Recycling* 79, pp. 21–29. DOI: 10.1016/j.resconrec.2013.05.003.

Deloitte (2016): Study on Socioeconomic impacts of increased reparability – Final Report. Prepared for the European Commission, DG ENV. Available online at <https://op.europa.eu/de/publication-detail/-/publication/c6865b39-2628-11e6-86d0-01aa75ed71a1>.

Deubzer, Otmar (2007): Explorative study into the sustainable use and substitution of soldering metals in electronics. Ecological and economical consequences of the ban of lead in electronics and lessons to be learned for the future. [S.l.]: [s.n.] (Design for Sustainability Program publication, 15).

Dobs, Tom; Sánchez, David; Schischke, Karsten; Wittler, Olaf; Schneider-Ramelow, Martin (2020): Assessment of the influencing parameters of the tumble test for robustness testing of smartphones. In *Proceedings of International Congress Electronics Goes Green 2020+*, pp. 515–520.

EEA (2020): Europe’s consumption in a circular economy: the benefits of longer-lasting electronics. Available online at <https://mk0eeborgicuypctuf7e.kinstacdn.com/wp-content/uploads/2019/09/Coolproducts-briefing.pdf>.

EEA (2021): A framework for enabling circular business models in Europe. Available online at <https://www.eea.europa.eu/publications/a-framework-for-enabling-circular/a-framework-for-enabling-circular>.

EEB (2019): Coolproducts don't cost the earth. Available online at <https://mk0eeborgicuypctuf7e.kinstacdn.com/wp-content/uploads/2019/09/Coolproducts-briefing.pdf>.

Ellen MacArthur Foundation (2013): Towards the Circular Economy. Economic and business rationale for an accelerated transition. Available online at <https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf>.

EN 45554:2020: EN 45554:2020. Available online at https://standards.cen.eu/dyn/www/f?p=204:110:0:::FSP_PROJECT:65685&cs=19B548B0604010194C2AC96A048412874, checked on 5/22/2021.

European Commission (2014a): Attitudes of Europeans towards waste management and resource efficiency. Flash Eurobarometer 388.

European Commission (2018): Behavioural Study on Consumers' Engagement in the Circular Economy. Available online at https://ec.europa.eu/info/sites/default/files/ec_circular_economy_final_report_0.pdf.

European Commission (2019a): Impact assessment study on common chargers of portable devices. Available online at <https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/c6fadfea-4641-11ea-b81b-01aa75ed71a1>.

European Commission (2019b): The European Green Deal. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS. Available online at https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF.

European Commission (2020a): Circular Economy Action Plan. Available online at https://ec.europa.eu/environment/pdf/circular-economy/new_circular_economy_action_plan.pdf.

European Commission (2020b): Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) No 2019/1020. Available online at https://eur-lex.europa.eu/resource.html?uri=cellar:4b5d88a6-3ad8-11eb-b27b-01aa75ed71a1.0001.02/DOC_1&format=PDF.

European Commission (2020c): Attitudes Towards The Impact of Digitalisation on Daily Lives (Special Eurobarometer).

European Commission (2021): Ecodesign preparatory study on mobile phones, smartphones and tablets: Publications Office.

European Commission (2022): COMMISSION STAFF WORKING DOCUMENT. EU strategic dependencies and capacities: second stage of in-depth reviews. SWD(2022) 41 final.

European Commission, Brussels (2014b): Flash Eurobarometer 388 (Attitudes of Europeans Towards Waste Management and Resource Efficiency). With assistance of European Commission, Brussels DG Communication COMM A1 'Strategy, Corporate Communication Actions And Eurobarometer' Unit, TNS Dimarso, Brussels, Belgium, TNS BBSS, Sofia, Bulgaria, TNS Aisa S.R.O., Prague, Czech Republic, TNS GALLUP A/S, Copenhagen, Denmark, TNS Infratest, Munich, Germany et al.

European Court of Auditors (2021): EU actions and existing challenges on electronic waste. Available online at <https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=58526>, checked on 5/24/2021.

European Economic and Social Committee (2019): Identifying the impact of the circular economy on the Fast-Moving Consumer Goods Industry: opportunities and challenges for businesses, workers and consumers – mobile phones as an example. Available online at <https://www.eesc.europa.eu/sites/default/files/files/qe-03-19-510-en-n.pdf>, checked on 4/4/2021.

European Parliament and the European Council (2012): Consolidated text: Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE) (recast) (Text with EEA relevance). Available online at <https://eur-lex.europa.eu/eli/dir/2012/19/oj/eng>, checked on 4/4/2021.

Eurostat (2020): Enlargement countries - information and communication technology statistics. Available online at <https://ec.europa.eu/eurostat/statistics-explained/pdfscache/32183.pdf>, checked on 4/3/2021.

Fairphone (2017): Fairphone's Report on Recyclability. Does modularity contribute to better recovery of materials? Available online at <https://www.fairphone.com/wp-content/uploads/2017/02/FairphoneRecyclabilityReport022017.pdf>, checked on 3/30/2021.

Federal Trade Commission (2021): Nixing the Fix: An FTC Report to Congress on Repair Restrictions. Available online at <https://www.ftc.gov/reports/nixing-fix-ftc-report-congress-repair-restrictions>.

FNAC DARTY; Harris Interactive; ADEME (2019): La 2e Édition du Baromètre du SAV. Available online at <https://labo.fnac.com/wp-content/uploads/2019/06/Pres-web-2e%CC%80me-e%CC%81dition-Barome%CC%80tre-SAV-Darty-Juin-2019.pdf>, checked on 2/6/2020.

Hennies, L.; Stamminger, R. (2016): An empirical survey on the obsolescence of appliances in German households. In *Resources, Conservation and Recycling* 112, pp. 73–82.

Houston, L.; Jackson, S. J. (Eds.) (2016): Caring for the next billion mobile handsets: opening proprietary closures through the work of repair: ICTD '16 Proceedings of the Eighth International Conference on Information and Communication Technologies and Development.

IZT (2018): Machbarkeitsstudie zum Aufbau einer Qualitätsgemeinschaft Reparatur in Berlin. Available online at https://www.berlin.de/senuvk/umwelt/abfall/abfallstrategien/download/reparaturnetzwerk_machbarkeitsstudie.pdf.

Jaeger-Erben, Melanie; Hipp, Tamina (2018): All the rage or take it easy -Expectations and experiences in the context of longevity in electronic devices. Descriptive analysis of a representative online survey in Germany. 1/2018. Edited by Obsolescence Research Group. Technische Universität Berlin, Fraunhofer IZM. Berlin, Germany (OHA texts).

Kemna, René; Wierda, Leo; Li, William; van den Boorn, Roy; van Elburg, Martijn; Viegand, Jan; Wu, Anson (2020): ICT Impact study. Technical Assistance, Final Report.

Lu, Tina (2017): Smartphone Users Replace Their Device Every Twenty-One Months. Counterpoint Research. Available online at <https://www.counterpointresearch.com/smartphone-users-replace-their-device-every-twenty-one-months/>, updated on 11/8/2017, checked on 6/1/2020.

Makov, Tamar; Fishman, Tomer; Chertow, Marian R.; Blass, Vered (2019): What Affects the Secondhand Value of Smartphones: Evidence from eBay. In *Journal of Industrial Ecology* 23 (3), pp. 549–559. DOI: 10.1111/jiec.12806.

Manhart, Andreas; Blepp, Markus; Fischer, Corinna; Graulich, Kathrin (2016): Resource Efficiency in the ICT Sector. Available online at https://www.greenpeace.de/sites/www.greenpeace.de/files/publications/20161109_oeko_resource_efficiency_final_full-report.pdf, checked on 7/9/2020.

Martinho, Graça; Magalhães, Diogo; Pires, Ana (2017): Consumer behavior with respect to the consumption and recycling of smartphones and tablets: An exploratory study in Portugal. In *Journal of Cleaner Production* 156, pp. 147–158. DOI: 10.1016/j.jclepro.2017.04.039.

Ng, Abigail (2019): Smartphone users are waiting longer before upgrading — here's why. Available online at <https://www.cnbc.com/2019/05/17/smartphone-users-are-waiting-longer-before-upgrading-heres-why.html>, updated on 5/17/2019, checked on 6/1/2020.

OHA - Obsoleszenz als Herausforderung für Nachhaltigkeit (Ed.) (2019): Lange Nutzungsdauern zwischen Anspruch und Wirklichkeit – Erste Ergebnisse der Befragung 2019, website. Available online at <https://challengeobsolescence.info/befragung-2019/>, checked on 9/23/2020.

Proske, Marina; Baur, Sarah-Jane; Rückschloss, Jana; Teusch, Christoph; Krause, Thomas; Poppe, Erik (2020a): Bestandsaufnahme Smartphones. Übersicht Modellhistorie und modulare Konzepte. Projektbericht MoDeSt.

Proske, Marina; Clemm, Christian; Richter, Nikolai (2016): Life Cycle Assessment of the Fairphone 2. Final Report. Berlin. Available online at https://www.fairphone.com/wp-content/uploads/2016/11/Fairphone_2_LCA_Final_20161122.pdf.

Proske, Marina; Sánchez, David; Clemm, Christian; Baur, Sarah-Jane (2020b): Life Cycle Assessment of the Fairphone 3. Fraunhofer IZM. Amsterdam, The Netherlands. Available online at https://www.fairphone.com/wp-content/uploads/2020/07/Fairphone_3_LCA.pdf, checked on 9/27/2020.

Qualcomm Technologies, Inc. (2021): Qualcomm and Google Announce Collaboration to Extend Android OS Support and Simplify Upgrades | Qualcomm. Available online at

<https://www.qualcomm.com/news/releases/2020/12/16/qualcomm-and-google-announce-collaboration-extend-android-os-support-and>, updated on 2/2/2021, checked on 2/2/2021.

Sabbaghi, Mostafa; Behdad, Sara (2018): Consumer decisions to repair mobile phones and manufacturer pricing policies: The concept of value leakage. In *Resources, Conservation and Recycling* 133, pp. 101–111. DOI: 10.1016/j.resconrec.2018.01.015.

Smedley, Stuart (2016): Greenpeace Smartphone Recycling Research; Survey Germany 22 July – 26 July 2016. File number 15-063306-29 Greenpeace Smartphone Recycling DE w v3 Public.xlsx.

Sofies and Bio Innovation Service (2019): Étude du marché et parc de téléphones portables français en vue d'augmenter durablement leur taux de collecte.

statcounter (2021): Mobile Vendor Market Share Europe. Available online at <https://gs.statcounter.com/vendor-market-share/mobile/europe>, checked on 4/3/2021.

Triggs, Robert (2018): Why we are keeping phones for longer. Available online at <https://www.androidauthority.com/keeping-phones-longer-833509/>, updated on 6/1/2020, checked on 6/1/2020.

van den Berge, Renske; Thysen, Tom (2020): State-of-the-art knowledge on user, market and legal issues related to premature obsolescence. PROMPT Deliverable 2.6 Version 1. Available online at https://prompt-project.eu/wp-content/uploads/2020/07/PROMPT_20200430_State-of-the-art-overview-of-the-user-market-and-legal-aspects.pdf, checked on 9/25/2020.

Velázquez-Martínez; Valio; Santasalo-Aarnio; Reuter; Serna-Guerrero (2019): A Critical Review of Lithium-Ion Battery Recycling Processes from a Circular Economy Perspective. In *Batteries* 5 (4), p. 68. DOI: 10.3390/batteries5040068.

WERTGARANTIE (2018): Tablet Repair Study 2018. Edited by WERTGARANTIE Beteiligungen GmbH. Hannover, Germany.

Wieser, Harald; Tröger, Nina (2018): Exploring the inner loops of the circular economy: Replacement, repair, and reuse of mobile phones in Austria. In *Journal of Cleaner Production* 172, pp. 3042–3055. DOI: 10.1016/j.jclepro.2017.11.106.

Wieser, Harald; Tröger, Nina; Hübner, R. (2015): The Consumers' Desired and Expected Product Lifetimes. In *PLATE conference*.

Wolf, Marc-Andree (2018): Quantitative environmental benefits of recycling and energy recovery. White paper. Available online at https://maki-consulting.com/wp-content/uploads/2018/03/Environmental-benefits-recycling_White-paper_clean.pdf, checked on 3/30/2021.