efficient gaming

Report on the 2023 Review of the GAMES CONSOLES UK Voluntary Agreement

16 January 2024

Microsoft   Nintendo   Sony Interactive Entertainment

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1. Executive Summary

The Games Consoles Voluntary Agreement (GCVA), also referred to as the Self-Regulatory Initiative (SRI) is an industry-led initiative managed by the games console manufacturers - Microsoft Corporation, Nintendo Co., Ltd. and Sony Interactive Entertainment Inc. (the Signatories) - in consultation with the Secretary of State representatives and civil society organisations. Its objective is to reduce the environmental impact of games consoles over their life cycle and improve energy and resource efficiency through better design.

Since its launch in 2015, it has proven to be an effective self-regulatory measure that delivers on its objectives and benefits the environment without compromising console performance and gaming experience. By way of example, there has been up to ~50% reduction in power consumption in PlayStation 4 and Xbox One generation consoles, driven by GCVA requirements (Xbox One X vs Xbox One S; PlayStation). Six tiers of power cap reduction have been implemented, with the seventh proposed in this review.

With this review, which started in 2022, the GCVA has been revised four times. This report outlines the process followed by Signatories and explains the rationale behind the proposed amendments and updates since 2020. In terms of process, Signatories have assessed whether the key provisions of the GCVA required updating, taking into account recent technological and standardisation advancements, applicable regulatory changes and policy objectives of the Secretary of State to ensure the GCVA aligns with the latest developments. Signatories have also taken into consideration feedback from all stakeholders involved, such as the Secretary of State, national authorities, and non-governmental organisations (NGOs). The new version 2.0 of the UK VA is expected to be implemented retroactively as of 1 January 2024.

Updates of Industry Compliance with the GCVA

Until 2023, each Signatory had to submit an annual Product Compliance Report (PCR) to the Independent Inspector concerning the compliance of each of its games console models in scope. The Independent Inspector then issued an Annual Compliance Report (ACR), which addressed the reporting commitments to the Independent Inspector and the outcome of its compliance testing of all applicable new consoles that were introduced to the market during the reporting period. Both reports are then published on the GCVA website.

The last reporting cycle of the GCVA covered the period from 1 January 2022 to 31 December 2022[1]. No new models were placed on the market during that period. For the first time, consoles that consume less than 20 W in active gaming mode were also reviewed for compliance, as required by the UK VA version 1.1[2]. The Independent Inspector determined that all Signatories were compliant with their GCVA commitments and accounted for 100% of the in-scope games consoles sold in the UK in 2022.

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[1] Compliance: Efficient Gaming website
[2] Games_Consoles_UKVA_v1.1_FINAL.pdf (efficientgaming.info)

In an effort to further increase transparency and improve the compliance verification process, the Signatories propose giving the Independent Inspector the possibility to **test energy efficiency and verify resource requirements each year**, without requiring the trigger of a console launch. **The GCVA would be unique in requiring annual testing of products**. A detailed explanation of the revised methodology is available in section 5.1 of this report, which addresses the compliance and new verification process.

Review of Technology

The technology supporting games consoles advances at a rapid pace. **Manufacturers continuously make efforts to decrease their environmental impact with each new generation**.

In the realm of video streaming services, the AV1 codec, which offers a higher compression ratio than H.264, is now being used. Despite the potential increase in power consumption, the **Signatories have improved the hardware of current consoles to meet the GCVA streaming limits even when decoding AV1 streamed media**.

Consumers typically prefer purchasing physical copies or downloading games for local play due to higher speeds; the Signatories therefore anticipate that **cloud gaming** will not have a significant impact on console gaming in the near future.

With regard to resolution, the GCVA Signatories have successfully ensured that the next generation of **8K capable consoles do not exceed higher power cap limits**, despite significant performance improvements. As a result, these consoles have much lower power consumption for multimedia and streaming modes compared to the initial UHD gaming consoles. Meanwhile, the adoption of 8K resolution in the UK has been surprisingly low, making it **unlikely for resolution to increase to 16K** due to current energy regulations.

Reducing the size of transistors on integrated circuits has historically reduced power consumption and driven the doubling of microprocessor capability every two years, known as Moore's Law. As microprocessors are now approaching the lower limit of what may be physically possible in terms of size, it is uncertain whether efficiency improvements will be maintained in the future at rates console manufactures have previously achieved.

Nevertheless, the GCVA Signatories will continue to investigate methods of achieving power reductions through silicon design, but this will be more challenging in the future given the uncertainty in future hardware efficiency trends and the introduction of new video codecs. The scope and pace of further reductions remain uncertain.

Energy Efficiency Proposal

The GCVA Signatories estimate **energy saving in Europe of 77.8 TWh for the period between 2013 and August 2023 for the UHD and 8K consoles in scope**. The incorporation of numerous energy-efficient technologies by manufacturers has greatly contributed to these energy savings, resulting in faster-than-anticipated reductions in the power consumption of their

consoles, and in line with the UK's ambition to increase energy efficiency on the way to decarbonisation.

Despite facing technical challenges, the Signatories propose further reductions to the power caps for navigation and media modes in this review. Starting **from January 2024, a new tier 7 of power caps will be implemented to HD & UHD media capable consoles, and 8K capable consoles**, further explained in the energy efficiency section of this report.

In the area of energy efficiency information, **the GCVA website now includes estimates of the annual Typical Energy Consumption (TEC) of games consoles during one year of use** and provides links to the Signatories' own websites for more information.

Furthermore, it is worth noting that the VA will be updated in 2024 to reflect the **new (EU) 2023/826 Standby Regulation**[3] adopted in April 2023 and coming into effect in May 2025. Off-mode, standby mode and networked standby energy consumption regulations have not yet been included by the UK. The **new EU Regulation** does apply to the EU Member States and to Northern Island, thanks to the Windsor Framework[4] of 27 February 2023. For these reasons, the rest of the UK might consider introducing the same provisions in future legislations.

Resource Efficiency Proposal

In this section, the Signatories present several resource efficiency improvements to the VA and their rationale, which are in line with the UK's circular economy strategies as well as the EU Circular Economy Action Plan (CEAP)[5], stakeholder feedback, and the EU Ecodesign for Sustainable Products Regulation (ESPR)[6], presented in March 2022. This new set of rules aims to make sustainable products the norm in the EU, identifying consumer electronics as one of the key sectors where substantial resource efficiency gains can be made by improving their design.

Recognising repairability as one of the key pillars of the UK's circular economy package and sustainable consumption of goods, **the Signatories propose extending the period for providing spare parts to professional repairers and end-users from 2 to 5 years**. Instead of using the last unit placed on the market as the starting point, the Signatories propose **using the last date of manufacture**. This approach will allow the manufacturers not only to increase

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[3] Commission Regulation (EU) 2023/826 of 17 April 2023 laying down Ecodesign requirements for off mode, standby mode, and networked standby energy consumption of electrical and electronic household and office equipment pursuant to Directive 2009/125/EC. Available at: https://eur-lex.europa.eu/eli/reg/2023/826/oj. [Accessed September 2023].

[4] Windsor Framework of 27 February 2023. Available at: https://commission.europa.eu/strategy-and-policy/relations-non-eu-countries/relations-united-kingdom/eu-uk-withdrawal-agreement-new/windsor-framework-new_en. [Accessed January 2024].

[5] EU's Circular Economy action plan (March 2020). Available at: https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en. [Accessed September 2023].

[6] Ecodesign for Sustainable Products Regulation (30 March 2022). Available at: https://commission.europa.eu/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/sustainable-products/ecodesign-sustainable-products-regulation_en. [Accessed September 2023].

the period for spare parts provision, but also to increase the list of spare parts available to third parties and will enable consumers to keep and use their devices for even longer. This proposal excludes IP-protected parts to avoid game piracy.

On repair services, the Signatories propose to go beyond the current GCVA requirements and commercial warranty period and include, as of January 2026, **a minimum time commitment of 5 years for Signatories to provide out-of-warranty repair and refurbishment service**. This approach, aligned with the UK[7] and the European Commission[8]'s proposal on common rules to promote the repair of goods presented in March 2023, will benefit both the consumer and the environment.

In line with the EU Chemicals Strategy for Sustainability[9] and the upcoming UK Chemicals Strategy[10], one additional commitment proposed under the revised GCVA is to reduce the weight exemption for halogenated flame retardants in external plastic enclosure parts. **The Signatories suggest lowering the exemption from 25g to 0.5g**, which will enhance the recyclability of enclosures. This is expected to contribute to the achievement of non-toxic material cycles, including in the electronics sector, as well as to reduce the exposure and use of halogenated flame retardants.

In response to stakeholder requests, the **GCVA website** now has a **resource efficiency information section, where manufacturers provide information on repair and refurbishment services**, as well as additional information on the maintenance of their game consoles.

Summary of all proposed changes to the VA

This section outlines all the main updates and modifications suggested for the GCVA.

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[7] UK Ecodesign for energy-related products and energy information regulations (4 May 2021). Available at: https://www.legislation.gov.uk/ukdsi/2021/9780348222920. [Accessed January 2024].

[8] Rules promoting the repair of goods (22 March 2023). Available at: https://commission.europa.eu/law/law-topic/consumer-protection-law/consumer-contract-law/rules-promoting-repair-goods_en. [Accessed September 2023].

[9] EU Chemicals Strategy for Sustainability (14 October 2020). Available at: https://echa.europa.eu/hot-topics/chemicals-strategy-for-sustainability. [Accessed September 2023].

[10] GOV.UK: https://www.gov.uk/. [Accessed January 2024].

2. Introduction

The purpose of this report is to explain the process and rationale behind the proposed amendments and updates to the Games Consoles Voluntary Agreement (GCVA). The review process includes analysing the essential elements of the GCVA to determine whether they are still fit for purpose. The review takes into consideration the latest technological, standardisation and regulatory developments to ensure the GCVA is aligned with them, where relevant.

Under the GCVA - and in line with the EU and the UK ambition to increase energy efficiency of the electronics and ICT sector - consoles manufacturers commit to making ambitious improvements to the energy and resource efficiency of their consoles, without compromising product functionality and performance and therefore consumer experience. This is achieved through better design, setting modal power caps, inclusion of automatic power down (APD), resource efficiency and end-of-life design measures, and user information requirements for games consoles.

This is the fourth in-depth review of the EU VA and the first one of the UK VA. Other minor technical updates were carried out, with the last one in January 2023. All EU VA reviews were done in consultation with the relevant stakeholders, including the European Commission, Member State authorities and environmental NGOs. Likewise, during the UK VA review, the Signatories consulted with the Department for Energy Security and Net Zero (DESNZ) and the environmental NGO, the Energy Saving Trust.

The GCVA continues to be an effective driver of energy and resource efficiency.

As each Signatory develops and distributes their different console models globally, the GCVA provides *de facto* a global standard.

Fast pace	Rate of technology advancement outpaces regulatory processes. This is the fourth major review in 7 years.
Representativeness	Three Signatories representing vast majority of market share; facilitates consensus building.
Less costly to UK government	Implementation and maintenance costs are borne by Signatories, not taxpayers, or UK government.
Strict compliance and verification	By an independent inspector, the selection of which is approved by the Secretary of State.
Contribution to circular economy	Ample resource, efficiency and information requirements.
Complex nature of games consoles	Substantial differences between platforms render standardisation difficult.

Fast pace	Rate of technology advancement outpaces regulatory processes. This is the fourth major review in 7 years.
Transparent and inclusive process	UK stakeholders, including the Secretary of State and NGOs are all invited to comment. The GCVA has a dedicated website.

Table 1: Advantages of the GCVA

2.1 Progress to Date

Transparency and stakeholder involvement is critical to the GCVA review process. Representatives of NGOs and the Secretary of State are directly involved in the discussions shaping the development of the GCVA. The following table shows how several stakeholder requests have been addressed by the games consoles manufacturers to date.

Stakeholder request	GCVA response
Increase information available to consumers and GCVA stakeholders	Further information on commitments added to the GCVA (e.g. provide GCVA energy consumption information for consoles consuming < 20 W). A new and more user-friendly website launched in 2022, with detailed energy and resource efficiency information.
No power cap increase for the next generation of (8K) consoles	The Signatories were successful in ensuring the next generation of consoles (8K capable) did not set higher power cap limits despite considerable performance improvements.
Include consoles consuming <20 W in scope of information and material efficiency requirements	Implemented as of 2021.
Set more ambitious power caps for media playback mode	The UHD media power cap was reduced by 10 W for new (8K capable) consoles as of 2020. Further reduction of tiers will be considered in the next review.
Make spare parts available to independent repairers and end users	Hard disc drives and external power supplies made available as of 2022. Signatories continue to review which spare parts can be made available to professional repairers and end-users, whilst limiting the risk of game piracy.
Inform recyclers about plastic parts containing brominated flame retardants	Information on whether plastic casing contains brominated flame retardants within product disassembly instructions provided to repair and recycling operations and alternatively marked on

Stakeholder request	GCVA response
	the applicable parts included since 2020, thereby improving end-of-life recyclability.
Phase out halogenated flame retardants in plastic parts	Implemented request for product casing components as of 2022.
Clarify the anti-circumvention text and align it with other Ecodesign initiatives	Clarified that the intention of this requirement is not circumvention as of 2020.
Undergo an independent review	Signatories have supported this request and fully co-operated with the independent review process sponsored by the Commission, which was completed in 2019.
Better align GCVA requirements with other Ecodesign lots	Implemented as of 2020.
Remove instant-on mode as default choice for Microsoft consoles	Implemented as of 2022 when "Energy saver" mode was made the default globally for Microsoft consoles.

Table 2: Stakeholder requests

For this review, Signatories continued to examine the following topics raised by stakeholders during the previous review period in 2020, which were complex and required further investigation:

- Set tiered targets for energy efficiency where the level of ambition is continuously set higher for each of the tiers.
- Set an additional and more ambitious tier 5 requirement for the UHD media playback mode.
- Increase the spare parts availability period.
- Make more spare parts available to end-users.
- Align wording for the requirement on halogenated flame retardant-free plastics with the Electronic Displays Regulation (EU) 2019/2021[11].
- Introduce a requirement for post-consumer recycled plastic content in the plastic components of games consoles.
- Halogenated Flame Retardants: Lower the 25g weight exemption for external plastic enclosure parts.

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[11] Electronic Displays Regulation (EU) 2019/2021 (1 October 2019). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R2021#:~:text=Commission%20Regulation%20(EU)%202019%2F,642%2F2F2009%20(Text%20with%20EEA. [Accessed January 2024].

3.   Energy Efficiency

3.1   Introduction

Since the GCVA was first endorsed by the European Commission in 2015, and by the UK government (Secretary of State) in 2021, there have been substantial improvements in the energy efficiency of games consoles. The GCVA has been an effective driver of the energy efficiency of games consoles, due to the progressive power caps set on media and navigation modes. Power caps set on media and navigation modes have driven reductions in the power consumption of games consoles in all active modes, while the manufacturers have also made reductions across low power modes. This has resulted in substantial reductions in the energy use of consoles. For example, for UHD media-capable consoles, there was an estimated reduction in energy use of up to 50% within the generation.

Since 2015, the GCVA has introduced six tiers of power caps, with a seventh tier proposed for this review iteration (see section 3.2).

Power caps set for media and navigation modes help to drive overall console efficiency, which can be seen by comparing improvements in the power consumption of gameplay, media and navigation modes for games consoles since 2013:
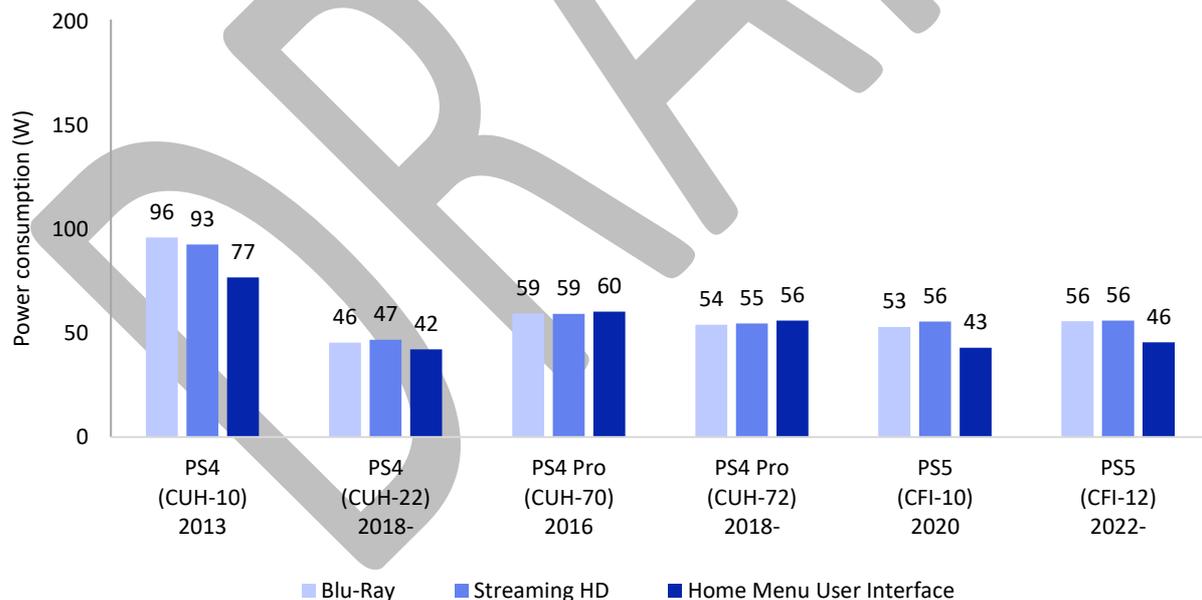
Figure 1: Media and navigation mode power consumption of PlayStation consoles
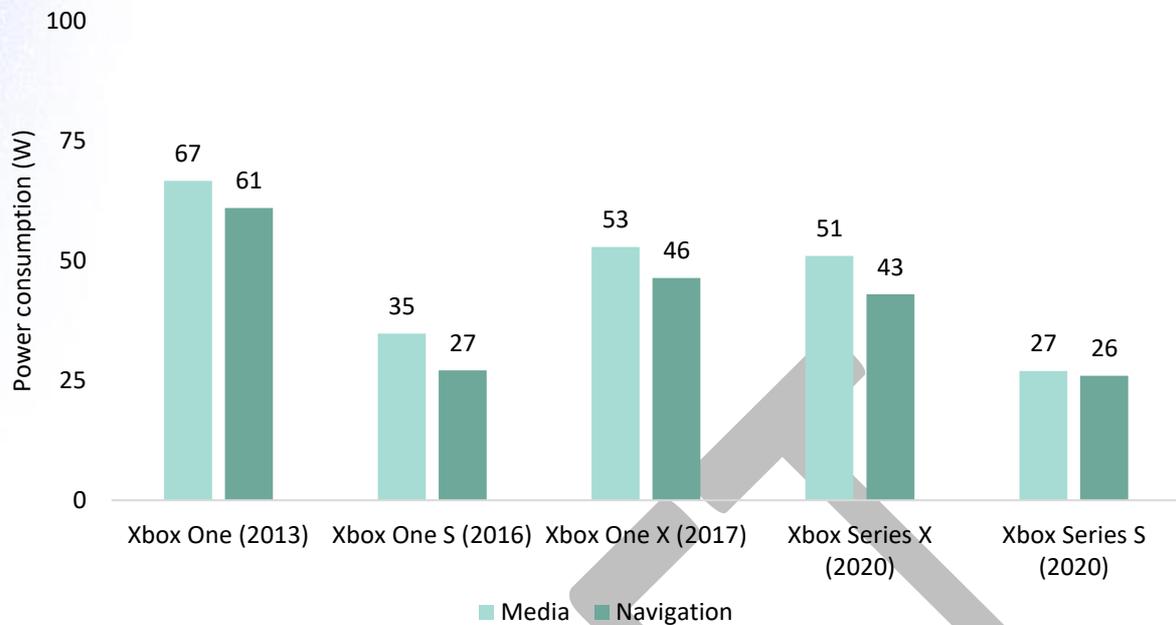
Figure 2: Media and navigation mode power consumption of Xbox consoles

Power consumption was reduced substantially for UHD-media capable consoles (PS4 and Xbox One/Xbox One S). The newest generation, 8K capable consoles (PS5 and Xbox Series X) were launched without increasing power caps set for UHD gaming-capable consoles (PS4 Pro and Xbox One X). As a result, these consoles consume much less for media and navigation modes compared to the launch model UHD media-capable consoles.
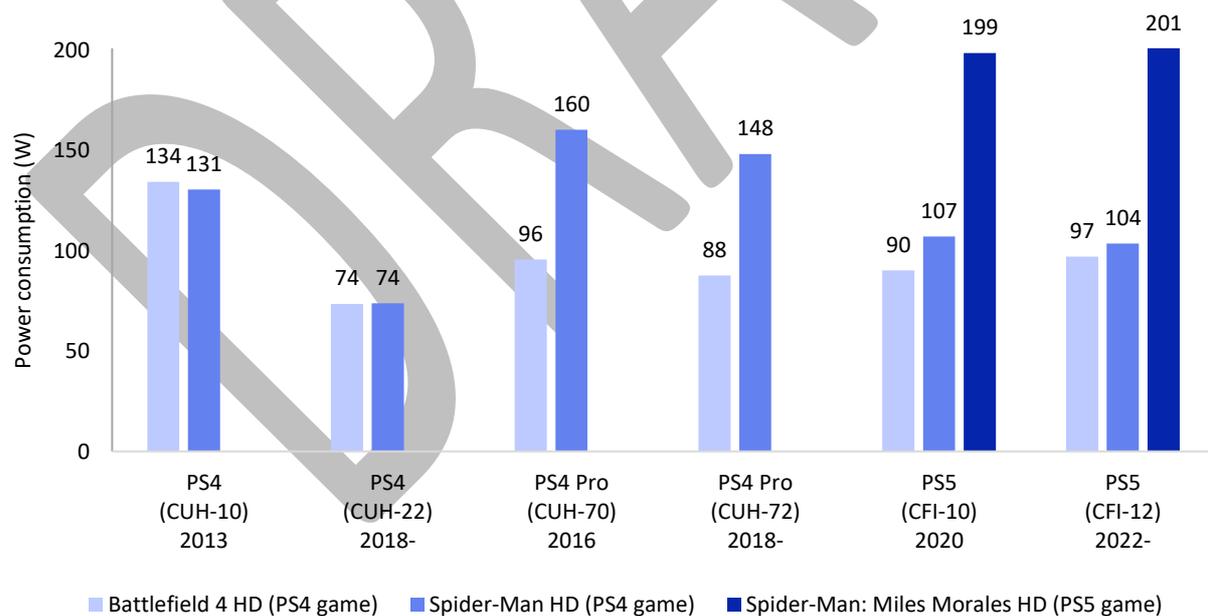
Figure 3: Gaming power consumption for PlayStation consoles
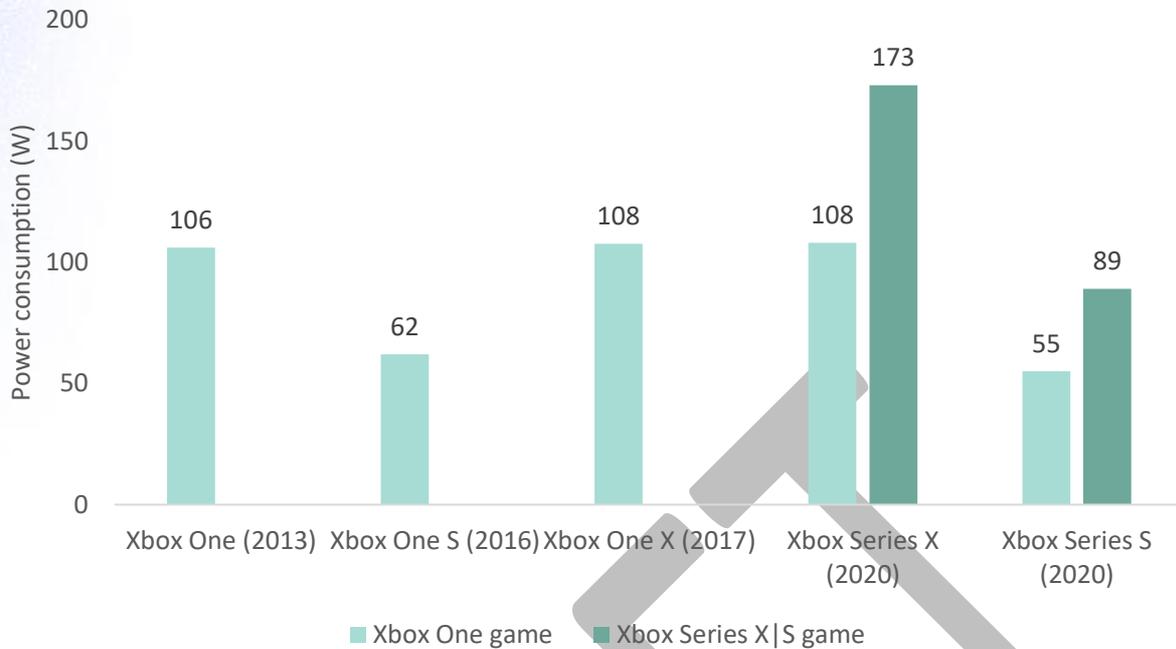
Figure 4: Gaming power consumption for Xbox consoles

Game power varies significantly depending on the console, the game being played, and even between different gaming sessions. The power consumption of PS5 while gaming is highly variable, for example from below 100 W to around 200 W for the measurements shown below (with next generation PS5 games typically running at the higher end of this range). The increased efficiency PS5 is clear; in contrast PS4 games played on the PS5 can draw up to around a third less power than when played on PS4 Pro.

Power consumption on the Xbox consoles will also vary significantly between different gaming sessions, but they show a similar trend to the PlayStation. An Xbox One game played on the Xbox Series X consumes the same power as previous generations, while the same game played on the Xbox Series S will use about a third less power.

The following Figure shows the power consumption of the PS4, PS4 Pro and PS5 in different conditions, including power saver mode.
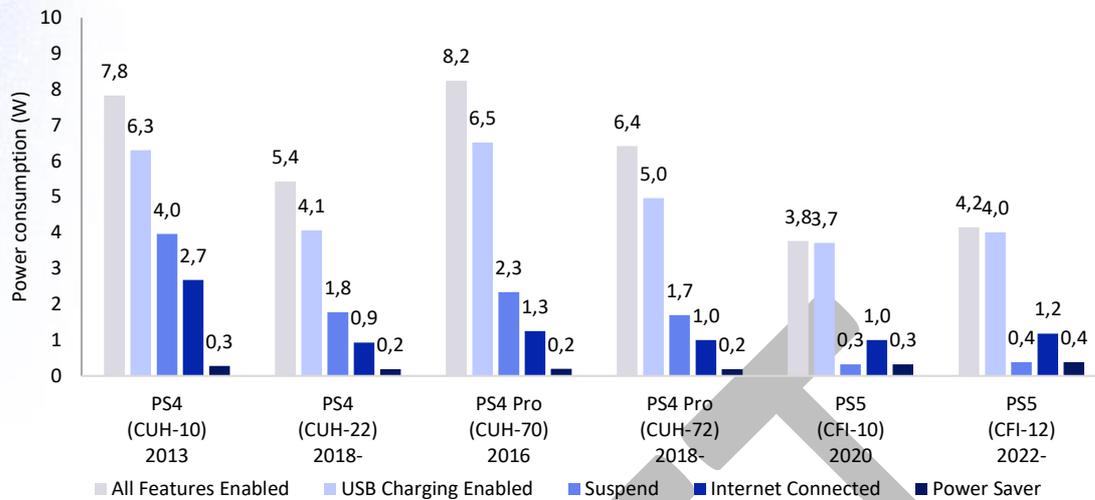
Figure 5: Power consumption of low power modes for PlayStation consoles

Compared to similar product groups under the Ecodesign Regulation, power caps set for consoles have been fast-paced and more regularly improved. The EU Computer regulation[12], for example, has had no updates in the energy efficiency requirements since 2013.

The Xbox Series X|S have only two low-power modes. There is an optional mode with all features enabled that consumes 8 – 13 W of power. However, more than 85% of users are now selecting to remain in the default 0.5 W "Energy Saver" standby power mode. The Xbox Series X|S use solid state drives that allow fast startup and more features in the lowest power mode. This has allowed the significant reduction in the average standby power for all Xbox consoles used in Europe.

The Signatories have provided estimates for the total lifetime energy use for the UHD/8K consoles sold up to August 2023 in Europe, for each of the applicable console categories in the VA. The following table gives a breakdown of energy use for each console category:

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[12] Ecodesign requirements for computers (EU) 617/2013 (26 June 2013). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32013R0617. [Accessed January 2024].

Console category	Console included in estimate	Estimated energy use to date (TWh)	Estimated energy use avoided to date (TWh)	Estimated lifetime energy use – for consoles sold to date (TWh)	Estimated lifetime energy use avoided – for consoles sold to date (TWh)	Notes
UHD media-capable consoles	PS4, Xbox One, Xbox One S, Xbox Series S	59.7 TWh	73.6 TWh	74.5 TWh	94.9 TWh	
UHD gaming-capable consoles	PS4 Pro, Xbox One X`	6.77 TWh	1.86 TWh	10.3 TWh	2.86 TWh	Currently no UHD-gaming capable consoles on the market
8K capable consoles	PS5, Xbox Series X	4.52 TWh	2.35 TWh	15.2 TWh	8.39 TWh	

Table 3: Breakdown of energy use for the console categories

The lifetime estimates include estimated future energy use for UHD/8K consoles sold up to August 2023. They do not include future energy use projected for any consoles that may be sold past August 2023 – also shown in Figure 6 below.
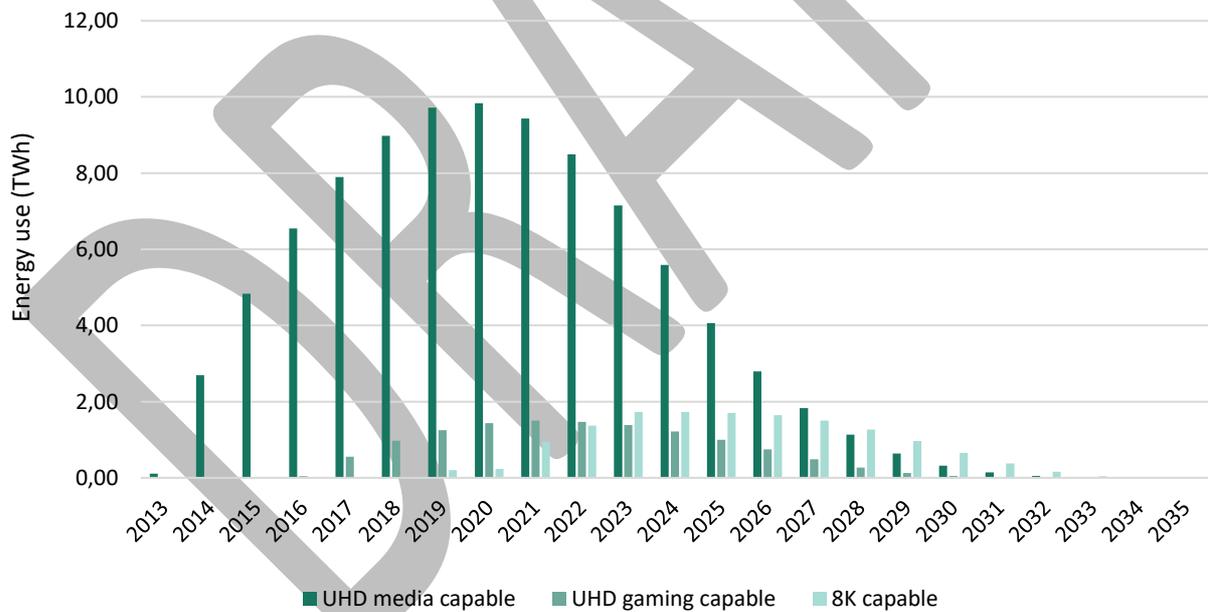
Figure 6: Estimated energy use for consoles sold to date in Europe, including estimated lifetime energy use for those consoles

Figure 7 below shows the total estimated energy use of all UHD/8K games consoles in Europe each year from 2013 to date. The graph also shows what the energy use is estimated to have been, had no efficiency improvements been made. To estimate the avoided energy use achieved through adoption of energy efficient technologies, business-as-usual (BAU) scenarios were applied as baselines to compare to the actual energy use of the consoles (as per ErP MEERP methodology).
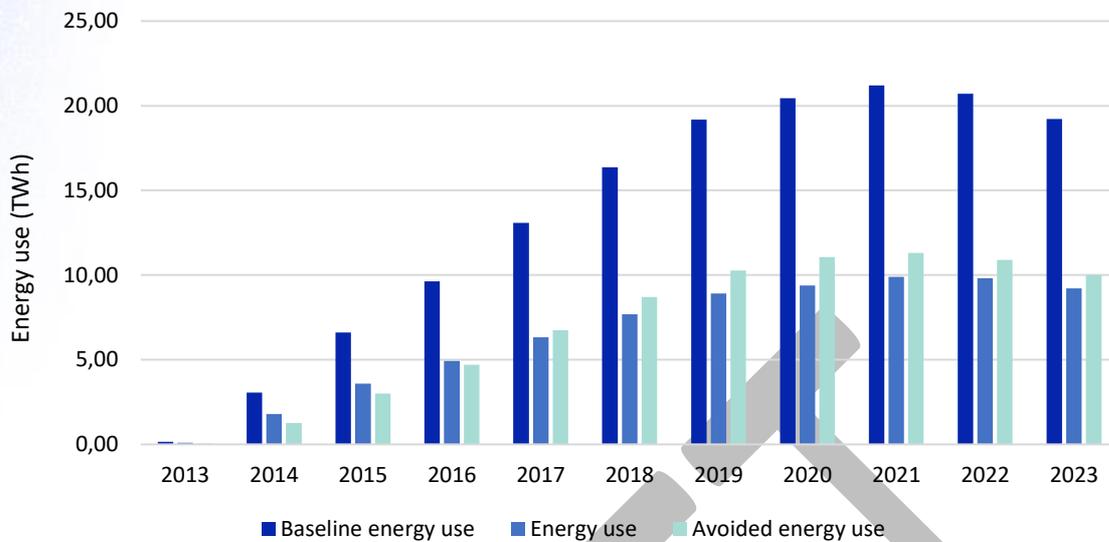
Figure 7: Total estimated energy use of all UHD/8K games consoles in Europe each year from 2013 to date

Overall, the total estimated lifetime avoided energy use of UHD media-, UHD gaming-, and 8K capable consoles sold to date in Europe is 106 TWh – comparable to around double the electricity consumption of Denmark in 2021. This estimate does not include the energy use and avoided energy use of future new consoles sold.

In 2022, the Signatories estimate that up to 10.9 TWh of energy use was avoided through the improvement in energy efficiency of consoles, compared to baseline energy use estimates. The original target set for the GCVA was to achieve energy savings of 1 TWh per year. This demonstrates that the GCVA continues to be an effective driver of energy efficiency for games consoles. The next section outlines our proposal for further energy efficiency commitments in the GCVA.

3.2   Energy efficiency proposal

The Signatories' proposal for further energy efficiency commitments in the GCVA will both ensure the GCVA continues to drive energy efficiency and meet the UK government's ambition on energy reduction.

Standby/Off mode

The new Standby Regulation (EU) 2023/826 was adopted in April 2023. It includes new requirements, including shorter minimum APD period and additional informational requirements. The Signatories will update the GCVA to reflect the requirements of the new Regulation before its implementation date (9 May 2025).

The EU Regulation does apply to the EU Member States and to Northern Island, thanks to the Windsor Framework of 27 February 2023. However, off-mode, standby mode and networked standby energy consumption regulations have not yet been included in Great Britain by the UK Government.

Power caps

Responding to UK policymakers' call to increase energy efficiency, the games consoles manufacturers propose further reductions to the power limits for both the navigation and media modes. The new tier 7 power caps will apply to HD capable consoles, UHD media capable consoles, and 8K capable consoles. The proposed power cap reductions from 1st January 2024 are as shown in the table below:

HD capable	Current	Proposal
Navigation HD	50 W	40 W
Media HD	60 W	45 W
UHD media capable	Current	Proposal
Navigation HD	50 W	45 W
Navigation UHD	50 W	45 W
Media HD	60 W	50 W
Media UHD	60 W	50 W
8k capable	Current	Proposal
Navigation HD	70 W	60 W
Navigation UHD	70 W	60 W
Media HD	70 W	60 W
Media UHD	100 W	85 W

Table 4: Proposed power cap reductions from 1 January 2024

Signatories do not currently produce UHD gaming capable consoles, therefore no further power caps have been proposed for these consoles.

Figures 8, 9, and 10 below demonstrate the progression of power caps set for consoles under the GCVA, since 2015.
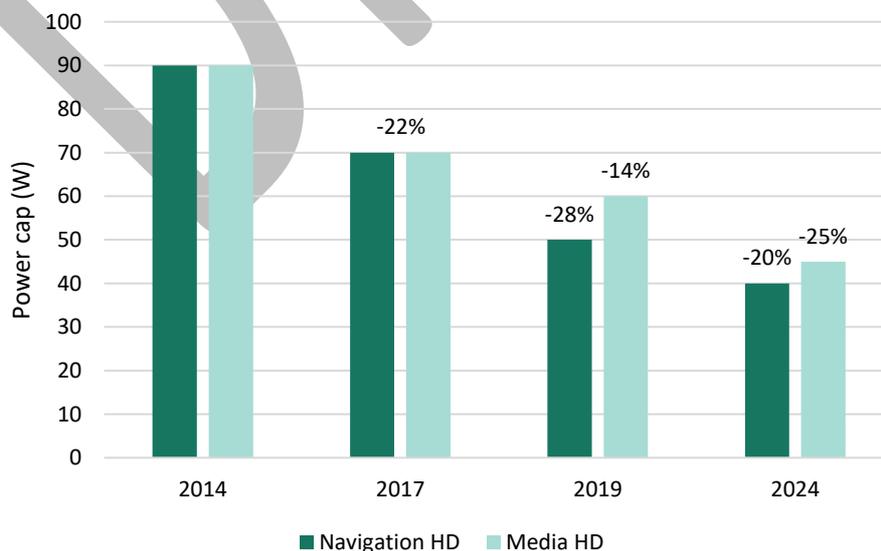
Figure 8: HD capable console power cap progression
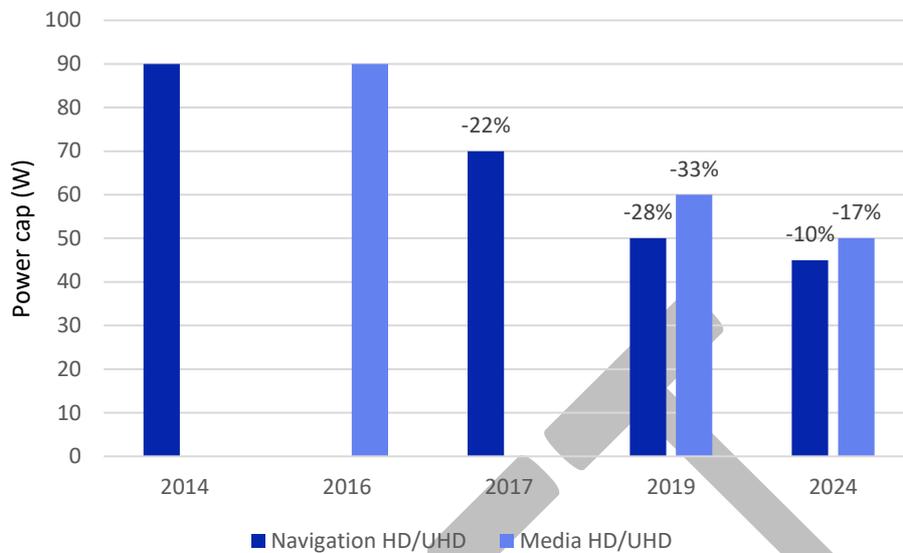
Figure 9: HD/UHD capable console power cap progression
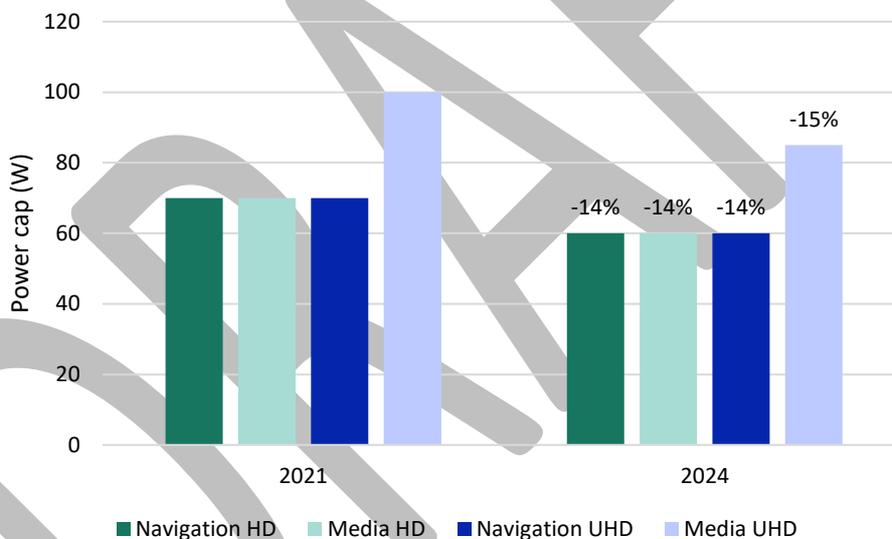
Figure 10: 8K capable console power cap progression

3.3   Future energy efficiency - limiting factors

The overall technology underpinning games consoles evolves rapidly, and the games consoles manufacturers have strived to minimise the environmental impact with every new generation or in some cases even within one generation of their products. However, while many hardware components are under the control of the manufacturer, some are not.

The Signatories are facing some challenges to further reduce the power consumption of games consoles, with the key factors influencing such limitation being the new generation of video codecs and the end of Moore's Law.

New Generation of Video Codecs

Video streaming services are starting to use the newer AV1 codec as it has a higher compression ratio than H.264 and it has a royalty-free licensing model. However, to achieve the higher compression, more computing power is required by the receiving system to decompress the data stream. Although this would normally lead to increased energy consumption in streaming devices, the GCVA Signatories have been able to improve hardware such that the current consoles will still meet the streaming limits of the GCVA even when decoding media streamed in AV1. However, this codec, along with likely future higher-compression codecs, will make it challenging to continue to reduce streaming limits within the GCVA.

Efficiency Improvement Trends

We asked Dr. Jonathan Koomey, one of the world's top scientists on the energy efficiency of computing, to summarise the implications of the latest research on this topic. His words are as follows:

"For about 3 decades, from the advent of the first microprocessor in 1971 to the early 2000s the computing industry was able to rely on regular and rapid improvements in performance and peak output efficiency of computer hardware (the efficiency of computers when they run at 100% of capacity). Peak output efficiency reliably doubled about every 1.5 years over that period, showing a remarkable 540,000-fold improvement from 1971 to 2001.

The industry accomplished this remarkable feat mainly by the use of Dennard scaling. As clock speed ramped up, chip manufacturers pushed voltage down. This trick reduces leakage current between transistors to acceptable levels and allowed rapid improvements in performance and efficiency to continue for a long time.

In the early 2000s, the industry approached the threshold voltage for silicon for their microprocessors, which meant that Dennard scaling would no longer work, and it would get harder to shrink transistors more. This constraint was not just a physical one, as it got harder to shrink transistors the cost of chips fabs escalated rapidly, so there are implied economic constraints as well.

To deal with the end of Dennard scaling the industry focused on building multiple cores in a chip, which allowed parallel processing of certain workloads and sped things up, albeit not as rapidly as before Dennard scaling ended. The first such chips were released in the early 2000s, and by about 2005 multicore chips were dominant in the marketplace. This new hardware architecture helped with performance constraints, but it was not a panacea. Not all workloads could be parallelized, and software needed to be rewritten to take advantage of the new multi-core architectures.

In an article in Science in 2020[13], Leiserson et al. described the kinds of innovations that will be needed as constraints on die shrinkage make it difficult to match historical improvement rates for performance and peak output efficiency. The three major categories they define

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[13] Leiserson et al. (5 June 2020) There's plenty of room at the Top: What will drive computer performance after Moore's law? Available at: https://www.science.org/doi/10.1126/science.aam9744. [Accessed October 2023].

(beyond die shrink) are hardware architecture, software optimization, and algorithmic innovation.

The application of multiple cores is one example of how changes in hardware architectures can increase performance more rapidly even if single core performance improvements have slowed. Other examples include creating integrated chips (system on a chip), incorporating other components on the chip (which allows for faster access of memory and GPUs, for example), clock gating, power gating, and building 3D chips (which minimizes wire lengths between parts of the system). Other changes in hardware architecture can improve efficiency when computing devices are in standby or off modes,

Leiserson et al. discuss software optimization as another important source of increased performance and efficiency. The cost of bloatware in the past was limited by the rapidly improving performance and efficiency of computing hardware over time, and that led to a focus on minimizing programmer time. Now that hardware improvements have slowed, it will be incumbent on companies to encourage programmers to create code that speeds up the whole stack, and sometimes that means more programming time.

Leiserson et al. also discuss algorithmic innovations, which help software solve problems more quickly. Optimization of such algorithms can be powerful, but the potential gains are problem- and workload-specific, and successful applications depend on detailed topic knowledge.

The potential for optimized computing systems to increase is vast, but it requires optimization and co-design of the entire system stack. Leiserson et al. show a stylized example for the multiplication of 4096 X 4096 matrices indicating the potential to increase the speed of the computation by more than 60,000 times compared to a simple implementation in python, using software and algorithmic innovations.

With the potential for die shrink falling, the focus will need to be on other aspects of the software and hardware stack to keep efficiency and performance improving."

The GCVA Signatories will continue to investigate methods of achieving power reductions through silicon design, but this will be more challenging in the future, and it remains uncertain whether further reductions can be made at the rates previously achieved by the industry.

Cloud Gaming

The development of cloud gaming has been slower than anticipated and still has low usage compared to traditional gaming media. Cloud gaming typically requires a high-bandwidth, reliable internet connection with no data interruptions. Video streaming can take advantage of the fact that a movie or television show can be transmitted in packets, with five to ten minutes of programming being downloaded ahead of time to provide a buffer for network interruptions. Cloud gaming cannot do this type of buffering, as the information to be downloaded depends on what the gamer is doing at any given moment. Cloud gaming does consume lower power on the console than local gaming, and high levels of renewable energy are utilised by the cloud servers. As such, cloud gaming is not included during this review cycle for the GCVA, as current impact is low.

3.4   Other Energy Efficiency Initiatives

TEC information

Recognising transparency as a key pillar for consumers to make more sustainable and informed choices, the GCVA Signatories now provide estimates of the annual Typical Energy Consumption (TEC) of their consoles online. This provides users and other interested parties with estimates for the annual energy use of different console models based on typical usage and measured power consumption data.

Each Signatory makes this information available on the GCVA website, including information on how the mode-profile was chosen for the estimate. The website now also provides links to the Signatories' websites for additional information.

Manufacturer	Console Model	Estimated annual TEC	Comment
Microsoft	Xbox Series S	132 kWh	Based on the Lawrence Berkeley National Laboratory (LBNL) model using the « Intensive » profile with the default « Energy Saving » standby mode used 1/3 of the time and gaming at HD resolution.
Microsoft	Xbox Series X	225 kWh	
Nintendo	Nintendo Switch [HAC-001(-01)]	6 kWh	When used for gaming an average two hours per day. Only Wi-Fi is connected.
Nintendo	Nintendo Switch – OLED Model [HEG-001]	6 kWh	When used for gaming an average two hours per day. Only Wi-Fi is connected.
		21 kWh	When used for gaming an average two hours per day. When the wired LAN connection is maintained during Sleep Mode.
Sony	PS4 CUH-10xx	151 – 160 kWh	Based on gaming at HD resolution
Sony	PS4 CUH-11xx	136 – 144 kWh	
Sony	PS4 CUH-20xx	104 – 110 kWh	
Sony	PS4 CUH-12xx	89 – 95 kWh	
Sony	PS4 CUH-21xx	82 – 88 kWh	
Sony	PS4 CUH-22xx	81 – 85 kWh	
Sony	PS4 Pro CUH-70xx	133 – 138 kWh	Based on gaming at UHD resolution
Sony	PS4 Pro CUH-71xx	131 – 136 kWh	
Sony	PS4 Pro CUH-72xx	131 – 134 kWh	
Sony	PS5 CFI-1016A	134 – 135 kWh	Based on a mix of gaming using 25% PS4 games (at UHD resolution) and 75% PS5 games (at UHD resolution)
Sony	PS5 CFI-1016B	133 – 134 kWh	

Table 5: Typical Energy Consumption (TEC) per manufacturer

4. Resource Efficiency

4.1 Introduction

In 2020, in parallel with the European Commission's Circular Economy Action Plan (CEAP), the UK Governments issued a statement on The Circular Economy Package (CEP) which confirmed the collective ambition of the UK nations to move towards a circular economy and maintain, if not exceed, the environmental standards of the EU. Specific actions for the electronics and ICT sectors under the CEAP include improving the efficiency of materials and resources used throughout the product's lifecycle, as well as prolonging the products' lifespan through more circular design and easier repairability and removability/replaceability of parts.

Since the last major review of the GCVA in 2020, the UK and European Commission presented a series of proposals aiming to make products more sustainable and empowering consumers to make informed choices. The key proposals published under the circular economy framework in the last two years include:

- Proposal for a Regulation establishing a framework for setting Ecodesign requirements for sustainable products and repealing Directive 2009/125/EC, known as ESPR;
- Proposal for a Directive on empowering consumers for the green transition;
- Competition and Markets Authority Green Claims Code (UK) / Proposal for a Directive on Green Claims (EU);
- The Ecodesign for Energy-Related Products and Energy Information Regulations 2021 (UK) / Proposal for a Directive on common rules promoting the repair of goods (EU).

Resource efficiency and chemicals reduction commitments proposed by the Signatories of the GCVA aim to address stakeholder feedback received during the 2020 GCVA review (see section 2.1), build on existing Ecodesign commitments and reflect the aims of the above policy initiatives.

Signatories propose the following resource efficiency changes to the UK VA version 1.1:

- **Halogenated Flame Retardants:** Lower the 25g weight exemption for external plastic enclosure parts to 0.5g.
- **Out-of-warranty repair:** Include a minimum time commitment of 5 years for Signatories to ensure end users have access to out-of-warranty repair and/or refurbishment.
- **Spare parts:**
  - Increase the length of time Signatories make spare parts available to third parties from 2 years to 5 years.
  - Increase the number and types of spare parts made available to third parties.

4.2 Resource efficiency proposal

Halogenated Flame Retardants

Currently, the GCVA Signatories commit to excluding the use of halogenated flame retardants in plastic external enclosure parts greater than 25g. As the presence of halogenated flame retardants represents a major impediment in the recycling of plastics, reducing the use of halogenated flame retardants will improve end-of-life recyclability of enclosures.

Therefore, after careful consideration, the Signatories propose to lower the weight exemption of parts to just 0.5g from 1 January 2024, in order to permit even higher yields of recycled plastics, as well as help achieve toxic-free material cycles for games consoles by tackling challenges caused by hazardous and legacy substances, as prescribed under the EU Chemicals Strategy for Sustainability.

Out-of-warranty repair and refurbishment service

Currently, Signatories commit under the GCVA to provide a repair and refurbishment service for games consoles beyond both the commercial guarantee period (i.e., 'out-of-warranty') and the legal guarantee period[14]. This out-of-warranty repair and refurbishment service offers many benefits to the end-user, including safe and reliable repairs. The repair process is made more efficient and streamlined by collecting data on reoccurring issues from the service centres. The information is also directly fed back to product design teams and used to improve the product, making consoles more reliable in the longer term. In fact, there has been an 80% reduction in return rates from the initial PlayStation 4 model to the most recent model[15].

This business model therefore benefits both the consumer and the environment as it considers the whole life cycle of the product, helping to improve product reliability, while also avoiding the need for consumers to replace any broken consoles unnecessarily through an efficient collection, repair or refurbishment, and return process. In addition, games consoles manufacturers are committed to minimising their environmental impact and research conducted using primary data from one of the Signatories' own repair centres estimates that the carbon equivalent emissions from an average repair of a PS4 is around half of those from producing and distributing a new console[16].

In response to stakeholder feedback, and to better align with the European rules promoting the repair of goods[17], the GCVA Signatories propose a minimum time period for provision of

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[14] To determine whether a repair is in or out-of-warranty manufacturers use the length of the commercial guarantee period rather than the legal guarantee period. This is because the GCVA is an agreement entered into by games consoles manufacturers who provide voluntary commercial guarantees for their respective products. The legal guarantee on the other hand is a statutory right which the consumer exercises against their retailer, not the manufacturer, as this is the party they are contracting with for purchase of the product.

[15] DEFRA (2018) Our Waste, Our Resources A strategy for England

[16] Fenwick, C. (2022) Material Efficiency Strategies for Games Consoles, Doctoral thesis, University of Surrey DOI: https://doi.org/10.15126/thesis.900582

[17] Rules promoting the repair of goods (22 March 2023). Available at: https://commission.europa.eu/law/law-topic/consumer-protection-law/consumer-contract-law/rules-promoting-repair-goods_en. [Accessed September 2023].

repair by means of repair and refurbishment services and/or availability of spare parts and repair guides.

From 1 January 2026, authorised repair or refurbishment centres shall provide an out-of-warranty repair and refurbishment service to end-users for a minimum of five years after the last unit of the model of game console was manufactured. The applicable start date of '*last unit of the model being manufactured*' creates a single, worldwide date allowing for consistent customer expectations and enhanced forecasting by console manufacturers.

Provision of Spare Parts

Background & Context

Notwithstanding the benefits of the out-of-warranty repair and refurbishment services offered to consumers currently, Signatories are aware of increasing consumer and regulatory expectations to provide spare parts to end users and independent repair professionals in order to increase the likelihood of repair and keep electronic devices in use for as long as possible. Signatories aim to align, where possible, with current repair and reuse requirements within the Ecodesign Requirements for Electronic Displays, Regulation (EU) 2019/2021 and Ecodesign Requirements for smartphones and tablets, Regulation (EU) 2023/167[18], as well as with the EU Right to Repair initiative. However, games consoles as a product group have several unique considerations:

- Game consoles are complex electronic products which often require thorough knowledge and skills to repair. Authorised service centre operators have access to the necessary information - including confidential, proprietary information - and are adequately trained to perform such repairs.
- In addition, many key internal components form part of a secure system that consists of Technological Protection Measures ("TPMs") designed to protect against intellectual property infringement and against risks of hacking and piracy of video games. As software used to diagnose broken games consoles contains detailed proprietary blueprints, console manufacturers cannot directly provide these key internal components or similar diagnostic software to independent repair companies without compromising this vital protection.

Both the Entertainment Software Association (ESA) and Video Games Europe testify to the unique nature of games consoles and highlight the significant risks of game piracy to the wider video games industry:

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[18] Electronic requirements for smartphones and tables (EU) 2023/1670 (16 June 2023). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023R1670. [Accessed January 2024].

> *Allowing unauthorized parties to bypass the specialized software that protects video game consoles creates significant potential for security and piracy risks. Indeed, even using the manufacturer's specifications for repairs could allow an unauthorized party to modify consoles in a way that could compromise protections that are vital to providing a secure media environment. In fact, hackers and other bad actors are constantly attempting to modify (or "crack") consoles to enable piracy and to sell their illicit services to consumers both online and in physical storefronts. While most repair shops might not seek to use repair methods for illegal purposes (such as removal or disabling of a device's security features), publication of a console's security roadmap would allow bad actors to use this knowledge to undermine the entire console ecosystem.*

Entertainment Software Association (ESA)

> *The deployment of TPMs by the video games console manufacturers benefits all those who create and develop games for consoles, and not just the platform holder. With a secure hardware system in which to create and publish new games, developers (who are often SME's) are more willing to make the financial investments necessary to support the development of new games. This in turn benefits the consumer who has a wider array of games and interactive experiences to enjoy. More than 110,000 people are employed in the video games sector in Europe, and the EU is also the home of more than 5,500 game development studios. It is essential that the console ecosystem is secure to also ensure the sustainable growth of European studios that are developing games for this platform. By console manufacturers taking steps to prevent illegally copied games they protect game developers and the wider video game industry.*

Video Games Europe

In addition, when considering the Ecodesign Requirements for Electronic Displays[19] and the EU Ecodesign Requirements for smartphones and tablets, games consoles also significantly differ in terms when considering the changes between product generations. For example, typical time periods between smartphone models can be around 1-3 years, whereas there have historically been new games console generations every 5 to 7 years. New console generations generally provide new and innovative ways to entertain consumers, which can often result in drastic structural differences between product generations, compared to smartphones and displays which generally tend to have similar construction internally and externally across generations. This divergence between generations, and manufacturers, makes the spare part obligations as for example those in the above-mentioned regulations more challenging to apply to games consoles.

Strategy behind the proposal

The Signatories propose a unique and progressive strategy for the supply of spare parts to independent repairers and end-users. By **utilising one or more of the following strategies** Signatories can support their own repair and refurbishment processes for consoles and provide spare parts to third parties:

1. Providing new parts

This method is the most traditional approach to providing spare parts, where manufacturers typically forecast demand and create additional parts during the manufacturing process to store. It is usually not feasible to restart a defunct manufacturing line to make new parts in the future should supplies run out.

2. Providing refurbished parts or refurbished consoles

As part of the Signatories' usual repair and refurbishment services available to consumers, typically a pool of refurbished consoles is available to provide quicker replacements and replacements when consoles cannot be repaired. By utilising this process, Signatories can ensure that even if new parts are unavailable, a replacement refurbished part or console can still be provided as a remedy to the consumer.

3. Providing recovered parts, e.g. from broken consoles

One benefit of the Signatories' established repair and refurbishment services is that faulty consoles beyond economic or technical repair can still be re-utilised to harvest spare parts. Thus, reducing the amount of electronic waste directed to recyclers.

4. Providing compatible third-party parts or directing the user or independent repairer to the third party parts supplier, when safe and technically feasible

Some parts are already commercially available from third party part suppliers. In these cases, Signatories may direct end-users to these established businesses.

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[19] UK Ecodesign for Energy-Related Products and Energy Information Regulations (2021). Available at: https://www.legislation.gov.uk/uksi/2021/745/contents/made. [Accessed January 2024].

5. *Keeping an archive of new [or used] consoles for parts recovery*
The above approaches mean that keeping an archive of new or used consoles will also fulfil any commitment to provide spare parts, as these can be used to recover parts, if necessary.

By using one or more of the methods described above to provide parts, Signatories not only ensure their products can be repaired for longer, but also reduce the need for stockpiling new parts and thus reduce the risk of creating unnecessary waste if parts go unused. This approach is therefore likely to be more resource-efficient and minimises impact on the environment, as it avoids the unnecessary additional manufacture and provision of brand-new parts. In addition, this approach aligns with the objective to move towards a circular economy, as re-use, repair and refurbishment are prioritised.

Regulatory handling of spare parts
The GCVA Signatories commit to improving resource efficiency by providing spare parts to third parties, and to reducing waste from excess inventory, where possible (stockpiling).

In some instances, updates to either EU or UK regulations and standards (e.g. safety, chemicals, etc.) may prevent Signatories from providing spare parts to third parties, as spare parts would need to meet these new regulatory requirements which come into force after the original console was last placed on the market.

The GCVA proposal
The strategy described above will enable Signatories to (1) increase the length of time they can provide spare parts and, (2) increase the types of spare parts available to third parties. Both aspects of this proposal are explained in more detail below.

1. **Spare Parts: increase length of provision from two to five years**
The Signatories propose to increase the length of time for the provision of spare parts (currently, in the GCVA, External Power Supplies and Hard Disc Drives are to be provided to end-users) from two to five years from 1 January 2026. This proposal is contingent upon changing how the period of time from which the commitment is calculated. Namely, to change from 'last unit placed on the market' to 'last date of manufacture' which will provide a consistent date for both customers and console manufacturers as explained above (see: Out-of-warranty repair and refurbishment service).

2. **Spare Parts: increase the types of spare parts provided to third parties**
During this review period, Signatories have assessed the technical feasibility of increasing the types of spare parts provided to independent repairers and end-users.

As games consoles are not a homogenous product group and can have very different design factors, manufacturers have different abilities to determine which parts can be safely and feasibly provided to third parties. Also as discussed above, the divergence between console generations makes it extremely difficult to reuse parts across multiple product generations. Consequently, if stockpiled parts exceed subsequent market demand, it would result in such

parts being unused and wasted, thus lowering the resource efficiency generally for games consoles.

Nonetheless, in order to increase the types of spare parts that can be made available, Signatories first considered the types of parts listed in other equivalent Ecodesign Regulations, to whom they are made available, as well as parts currently made available for games consoles and parts mentioned in previous GCVA stakeholder feedback. These lists are shown in the two tables below:

Product Group	Spare Parts made available to professional repairers only	Spare Parts made available to professional repairers and end-users
Display Equipment (Lot 5 - (EU) 2019/2021)	- internal power supply, - connectors to connect external equipment (cable, antenna, USB, DVD and Blu-Ray), - capacitors, - batteries and accumulators, - DVD/Blu-Ray module if applicable and HD/SSD module.	- external power supply, - remote control.
Smartphones ((EU) 2023/1670)	- battery, - back cover or back cover assembly, - display assembly, - front-facing camera assembly, - rear-facing camera assembly, - external audio connector(s), - external charging port(s), - mechanical button(s), - main microphone(s), - speaker(s), - hinge assembly, - mechanical display folding mechanism, - protective foil for foldable displays, - charger, unless the device complies with common charger provision, Article 3(4) of Directive 2014/53/EU, - SIM tray and memory card tray, if there is an external slot.	- battery or batteries, - back cover or back cover assembly, if to be fully removed for replacement of the battery, - protective foil for foldable displays, - display assembly, - charger, unless the device complies with common charger provision, - SIM tray and memory card tray, if there is an external slot for a SIM tray or memory card tray.
Tablets ((EU) 2023/1670)	- battery or batteries, - front-facing camera assembly, - rear-facing camera assembly, - external audio connector(s),	- battery or batteries, - back cover or back cover assembly, if to be fully

Product Group	Spare Parts made available to professional repairers only	Spare Parts made available to professional repairers and end-users
	- external charging port(s), - mechanical button(s), - main microphone(s), - speaker(s), - hinge assembly, - mechanical display folding mechanism.	removed for replacement of the battery, - protective foil for foldable displays, - display assembly, - charger, unless the device complies with common charger provision, - SIM tray and memory card tray, if there is an external slot for a SIM tray or memory card tray.

Table 6: Benchmarking of spare parts in other Ecodesign Regulations

	Already provided under GCVA:	GCVA Stakeholder requests:
Spare parts	- External power supplies, - HDD.	- Components that do not form part of the encryption system (E.g., Fan, batteries, buttons, connectors, internal power supply, wi-fi), - Controllers and other accessories (those bundled as standard with the product), - Spare parts for controllers (e.g. Buttons, joysticks).

Table 7: List of spare parts already provided under GCVA and stakeholder requests

After compiling these lists, the Signatories excluded some components from the technical review process for the following reasons:

- Not relevant to games consoles currently on the market (e.g. Hinge Assembly, Camera Assembly, protective foil etc).
- IP-protected components that form part of the encryption system (e.g. HD/Blu-ray module - otherwise known as optical drive -, SSD module - as typically connected to the motherboard).
- Parts that would be considered as part of a larger assembly (e.g. capacitors that would form part of the PSU).
- Components already in scope of existing regulations on spare part availability (e.g. batteries).

Therefore, the technical review focused on internal parts that are not part of the encryption system (e.g. fan, PSU), external casing and cover parts, accessories that come as standard with the console and components of accessories. Following this review, the Signatories propose to provide the following spare parts to third parties from 1 January 2026.

Internal and external parts that are not part of the encryption system (when applicable) to be provided to professional repairers:

- Internal axial fan
- Internal power supply
- Circuit board assemblies not protected by internal encryption
- External plastic enclosure parts

Standard bundled external cables (when applicable), such as USB, power and HDMI, are to be provided to professional repairers and end-users.

This new proposal means that the majority of console components will now be available to third parties for all consoles. Other components, including IP-protected components that form part of the encryption system, remain available through Signatories' out-of-warranty repair services. This proposal means the GCVA will ensure consumers have greater access to spare parts, enabling a wider range of repair options and remedies for their console.

This novel approach for providing spare parts to enable increased repair is a major step forward toward the right to repair and circular economy. Consoles remain very durable devices with low return rates and rarely appear in the waste stream. This proposal will enable consumers to keep and use their devices for even longer.

4.3   Other Resource Efficiency Initiatives

- **Resource efficiency information**

After the inclusion of comprehensive energy efficiency information on the new GCVA website in 2022, the Signatories have added a resource efficiency section in 2023. This increases transparency, offering the public more detailed information on the repair and refurbishment service for games consoles, as well as an introduction to other resource efficiency commitments of the GCVA.

- **Reducing plastic use and/or increasing the usage of recycled plastics**

Reduction of the overall plastic usage by size reduction or by changing to other (e.g. metal) materials and/or inclusion of a greater percentage of recycled plastics could better align with stakeholders resource efficiency expectations and provide an important way to help to improve the recyclability as well.

The [WEEE Regulation](#) encourages manufacturers to integrate recycled material into new equipment. Signatories have committed to continue to review possibilities to use recycled plastics in new console production, following stakeholder feedback (see section [2.1](#)). However, due to technical limitations of the available supply of materials, Signatories are unable to propose a commitment during this review cycle. Recyclers continue to struggle to meet specifications required by electronic products. For example, at present there is limited availability of recycled polymers used in consoles that complies with flame retardant grade V-1 or better, required by safety standard EN IEC 62368-1:2023[20].

Despite these challenges, Signatories continue to review and have even conducted research into eco-design options to improve the recyclability of WEEE plastics [21]. In addition, manufacturers are taking individual steps toward this goal and include recycled content in their product portfolios where possible. Microsoft has started incorporating post-consumer recycled (PCR) content in some consoles and controllers. The Remix Special Edition controller features a combination of PCR content and recovered, pre-consumer content. Another line of Xbox special edition controllers have 20% PCR content in the plastic enclosures and Additionally, Xbox Series S console began incorporating PCR resins resulting in a minimum, 28% of the mechanical component plastic by weight of PCR. SIE successfully trialled the use of recycled Polypropylene (PP) plastics in PS5 stands at one of their factories in FY2022. Over 2 million stands were produced using a minimum of 24% post-consumer recycled PP[22], sourced from washing machines and refrigerators. In addition, SIE game cases used worldwide in FY2022 included an average of 14% recycled PP from post-industrial waste.

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[20] EN IEC 62368-1:2023 (26 May 2023). Available at: https://webstore.iec.ch/publication/69308. [Accessed January 2024].

[21] Fenwick, C. et al. (2023) 'Recycling plastics from e-waste: Implications for effective eco-design', Journal of Industrial Ecology, doi:10.1111/jiec.13409. [Accessed September 2023].

[22] This equates to approximately 3% of the total PP used for PS5 stands (that were sold globally in FY22), which is sourced from post-consumer recycled PP.

5. General Updates

5.1 Compliance and verification process

The Signatories propose further improvements to the compliance verification process by making the following changes:

- Independent Inspector is given authority to do additional market surveillance testing of an existing console if no new models have been launched in the previous reporting period.
- The select Signatory will submit verification of resource efficiency requirements to be checked by the Inspector.
- Increasing the probability of console sample representativeness for power consumption testing.

Increased transparency through annual energy efficiency testing and resource efficiency verification

Existing regulatory measures do not impose annual testing of products. In an effort to increase transparency, the changes proposed by the Signatories to the annual testing and verification processes would be unique and reinforce the fact that games consoles are thoroughly and routinely monitored under the GCVA.

Currently, the Independent Inspector is required to carry out energy efficiency testing when one of the Signatories launches a new console model. This means that there can be several years between tests. The Signatories therefore propose that, each year, the Independent Inspector shall select a manufacturer's console to test for compliance with the GCVA energy efficiency requirements, with confirmation of the selected model by the Signatories (through the administrator). The selection process would be based on a yearly rotation between the three Signatories. The annual testing of an existing games console will be carried out if no new games console is launched during the last reporting period. When a given Signatory launches a new generation or revised model of an existing console(s), the annual testing should focus solely on the newly launched model(s), as is currently required by the GCVA (Annex C, Compliance investigations).

Likewise, the resource efficiency requirements specified by the GCVA will be verified yearly by the Independent Inspector for the selected games consoles.

5.2 Other updates

Other updates and changes to the GCVA are as follows:

- Title of the document has been modified, now reflecting the fact that the GCVA sets requirements for resource as well as energy efficiency.
- Grammatical and punctuation improvements.

6. Conclusions and Next Steps

The 2023 GCVA Review Report is the product of months of research and consultation by the GCVA Signatories, considering the suggestions of all relevant stakeholders who expressed interest and submitted their comments along the process. It provides the background for the changes and updates carried out in the GCVA document.

The Signatories have made substantial effort to ensure that the GCVA continues to deliver commitments that further reduces the environmental impact of games consoles and drive progress in both energy - and resource - efficiency, in line with the UK's sustainability goals.

In terms of energy efficiency, this proposal puts forwards a seventh tier of power cap reductions, since the GCVA was first recognised in 2015. In comparison to regulatory measures for similar products, such as PCs where energy efficiency measures are yet to be updated since 2013, the GCVA framework continues to drive improvements in console energy efficiency effectively. We believe this also meets the expectations of stakeholders, who have challenged the Signatories to provide ambitious new power cap commitments.

In terms of resource efficiency, this proposal outlines a novel approach to spare parts provision, which could reduce the potential of stockpiling parts that may never be used. The strategy outlined in this proposal will ensure that third parties may have access to parts (non IP protected) for repair, while minimising the risk of wasting resources, encouraging the refurbishment and of components, and recovering components from broken consoles. We believe this approach is in line with the general circular economy objectives and will ensure that more users and independent repairers can access parts when required. Furthermore, the Signatories propose to further their commitment to out of warranty repair, by guaranteeing consumers have access to this service for at least five years after last manufacturing a console model. This ensures that all users have access to viable options to get their console repaired, regardless of component.

With regards to compliance verification, the manufacturers have exceeded existing regulatory measures. The GCVA gives greater transparency and confidence to stakeholders that consoles are thoroughly and routinely monitored under the GCVA.

The following table summarises the key proposed updates from the Signatories:

Energy Efficiency
Reference to the new Standby Regulation
Power cap reductions for Navigation and Media modes
Adding consoles TEC and average power consumption information in the GCVA website
Resource Efficiency
Increase duration of spare parts provision from 2 to 5 years
Increase the number and types of spare parts made available
Included a minimum time commitment of 5 years to provide an out-of-warranty repair and refurbishment services
Exclusion of halogenated flame retardants in plastic external enclosure parts greater than 0.5g
Resource efficiency information section added to GCVA website
General Updates
Compliance and verification process: yearly energy efficiency testing and resource efficiency verification
The word "resource" added to the GCVA title

Table 8: Summary of updates to the GCVA for this review

The new version of the GCVA is expected to be effective retroactively from January 2024.

efficient gaming

7.   ANNEX: Process Timeline

This review process started in the first quarter of 2023 and feedback from all interested stakeholders were considered throughout.

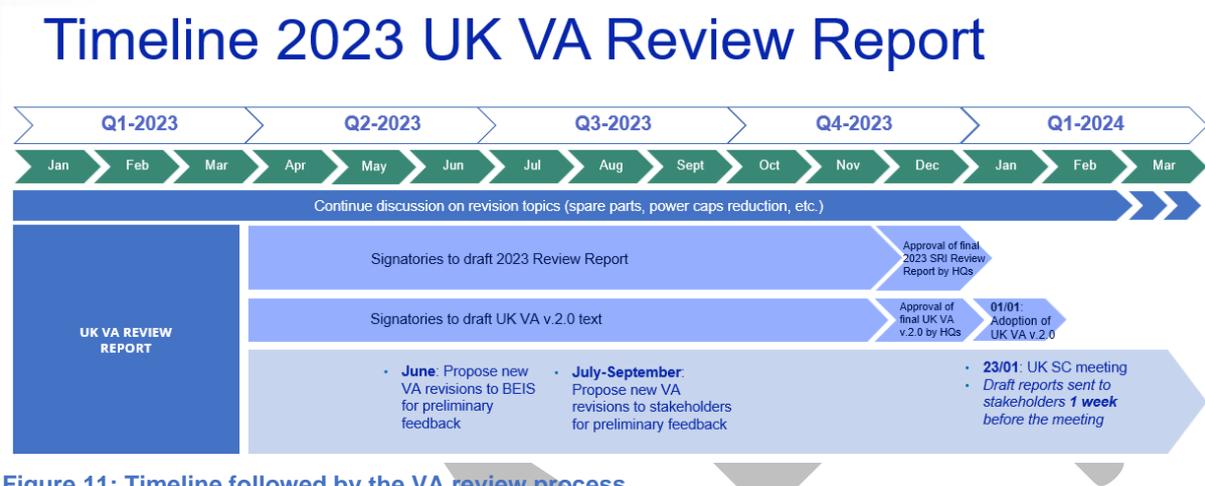Signatories followed the timeline shown in the Figure below for the 2023 review.

Figure 11: Timeline followed by the VA review process