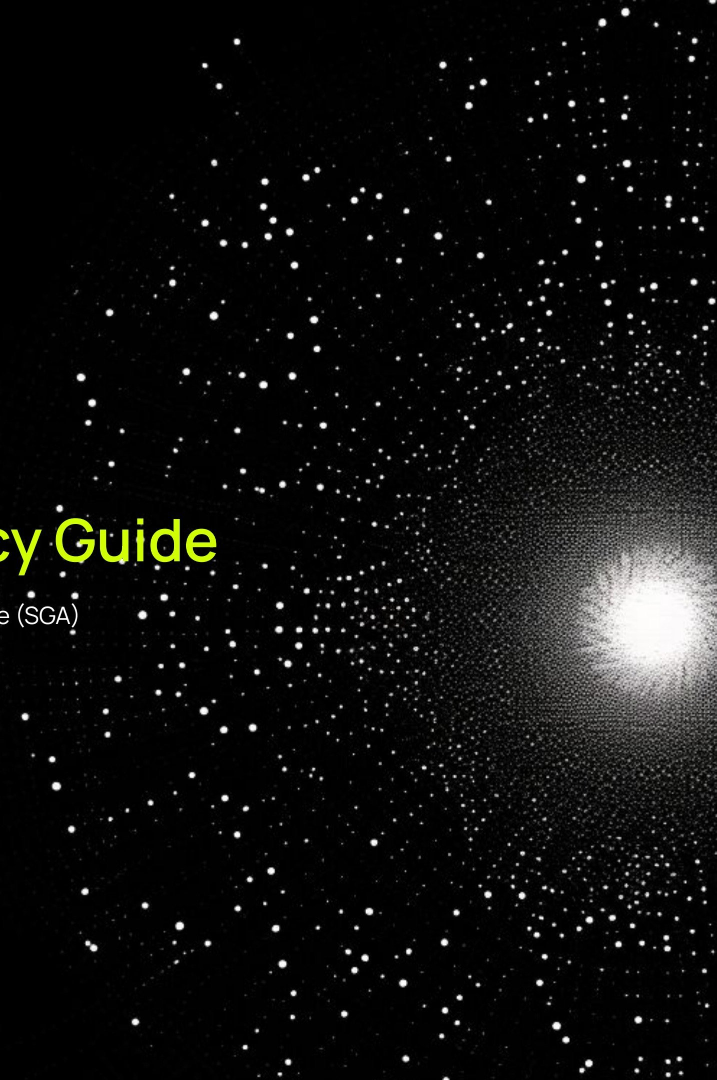
Sustainable
Games Alliance

Energy Efficiency Guide

March 2026, Sustainable Games Alliance (SGA)
https://sustainablegamesalliance.org

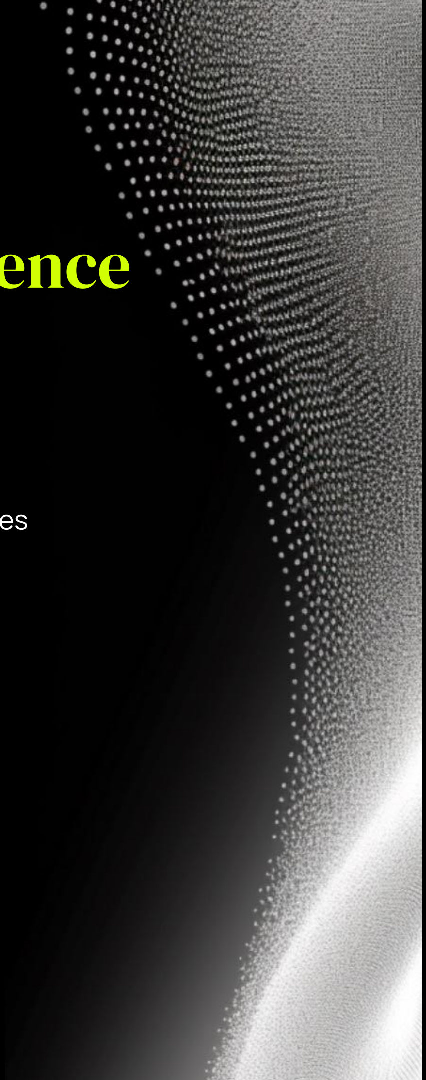


SGA Energy Efficiency Guide

Content

Benefits

Improved Player Experience



Especially on handheld devices, reducing the power consumption can improve the player experience

- Extended battery life
- Wider distribution and accessibility on more devices
- Cooler devices and less fan noise
- Longer hardware lifespan
- Lower energy bills

Possible side effects for the studio

- Happier players
- Extended playtime sessions
- Lower server costs

“**Energy efficiency is not just a technical detail, it’s a competitive advantage**. Longer battery life keeps players engaged on the go, while lower energy demand contributes to a more sustainable game industry.

To make real progress, we need reliable ways to measure and compare performance across the industry, and it is exciting to see **SGA being a leader of that transformation**.”

Laurent Gibert,
Principal Product Strategy Architect
& Co-Lead Unity Montreal

Basic Energy Optimization

Checklist

This is a **baseline of best practices** that can be used in any game and can be fit into the busiest production schedule **to reduce the energy consumption of games at runtime** focusing on solutions that

- are easy to implement and maintain
- don't directly affect the player experience
- have a substantial effect
- can be applied to pretty much every game

Author: Hauke Thießen, Technical Coordinator of SGAs Energy Efficiency Network and Technical Artist at Deck 13 Interactive.

✓ Adjustable Frame Limits

With more screens nowadays supporting 120+ Hz refresh rates, just using VSync to limit the frame rate isn't enough. **Adding an adjustable frame limit doesn't take much time and is one of the most effective ways to limit power consumption.** For any game that's not a competitive FPS, the default can safely be set to 60.

✓ Disable World Rendering in Menus

A considerable amount of playtime is spent in menus. **Disabling the world rendering in menus is easy to do and won't be noticed by the player**.
This is especially important for pause screens, which can be up for quite some time when the player paused the game. If the game world is still visible and not paused while the menus are open, **dropping the rendering resolution or frame rate is still a viable option**.

✓ Inactivity-based Energy Saving

While modern screens don't need screensavers anymore, the same technique can be used to save energy. Depending on the game genre, it's safe to assume that after 1-5 minutes without any user input, the game isn't being played anymore, and you can reduce the rendering resolution, cap the frame rate, etc.
On OLED screens, **even reducing the image brightness saves energy**.

✓ On XBox Series Consoles: Dynamic Power States

Using dynamic power states, the XBox GPU power consumption can be throttled when the current workload isn't that high. Most games don't use the GPU at full capacity in every situation, so this can reduce power consumption noticeably. Microsoft is responsible for the implementation details, **you just enable the feature, and for that, only a single enum value needs to be set**, as detailed in the linked documentation.

Energy Saving Plugins

Easy to enable

Unreal, Unity and Godot

Unreal Plugin by Hauke Thießen (Deck13 Interactive)
Unity Plugin by Oliver Stock (Walk the Frog UG)
Godot Plugin by Ashe Foltin (Bold Beetle Games)

Reduce energy consumption when player is idle, extend playtime on battery-powered platforms by **up to 15%**

These plugins dynamically detect when players become idle and **enable developers to integrate automatic energy-saving modes across the most widely used engines.**

After predefined thresholds, they reduce frame rate and rendering resolution, and in longer idle states can even temporarily disable rendering entirely. Once the player provides input, the game immediately returns to normal settings.

Before

Oh no, I left my Laptop / Steam Deck Running and now my Battery is dead!

If only the devs had installed

After

Oh great! I left my Laptop / Steam Deck Running, but the game went into Idle Mode!

Luckily the devs have installed

My battery is saved!

Godot Subreddit celebrated the Plugin with over 100 000 views in the first 48h and 840 shares.

More Tools

Apple Xcode power profiler

Android power profiler

AMD uProf

Intel VTune

Nvidia Nsight

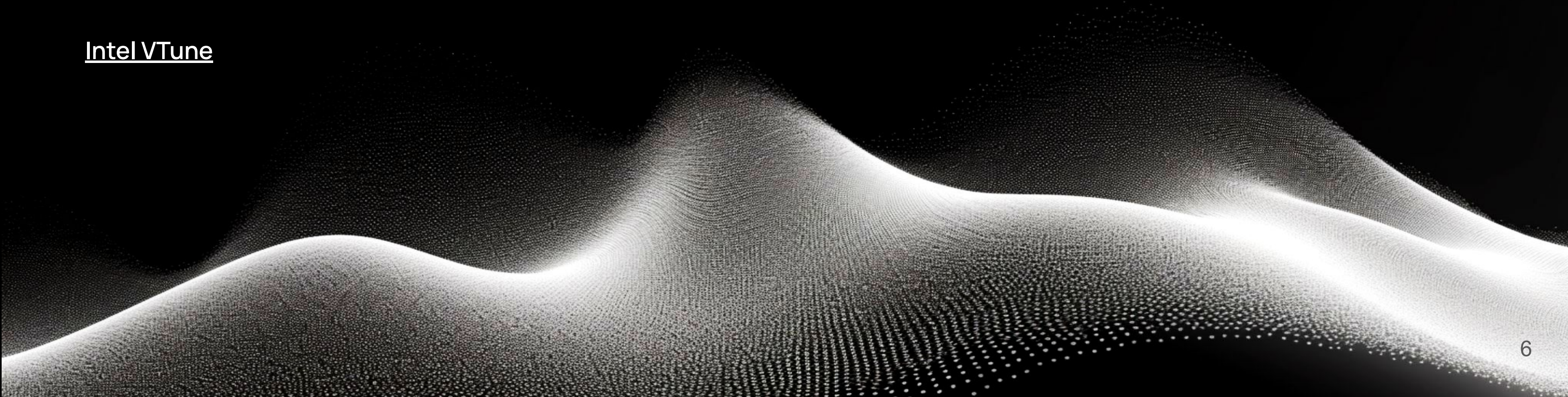
Unity Adaptive Performance Tool

Watt Wiser

Windows RAPL driver

Windows Performance Analyzer

Xbox Sustainability Toolkit



More Tools

Validating measurements with a simple power meter

A wall plug power meter is enough to validate your power savings.

Any meaningful intervention that shifts power consumption will be measurable on a 14€ wall plug power meter.

For already low-power devices (mobile/switch/etc) more accurate tools will be needed (and these can still be meaningful in aggregate).

Case Studies

Power Saving Modes: Epic Games *Fortnite*, Ubisoft *For Honour* and Infinity Ward *Call of Duty*

Pause rendering & 2.5D Menus: *343 Industries Halo Infinite*

Screen Dimming: Bethesda *TES: Online*

Power saving on mobile *detecting "running on battery"*

Controller Disconnect *Minecraft*

Hardware Limitations EA *Battlefield 6*

Optimising for low fan noise/heat GOALS *GOALS*

Playstation 5 **"Power Saver" Mode**

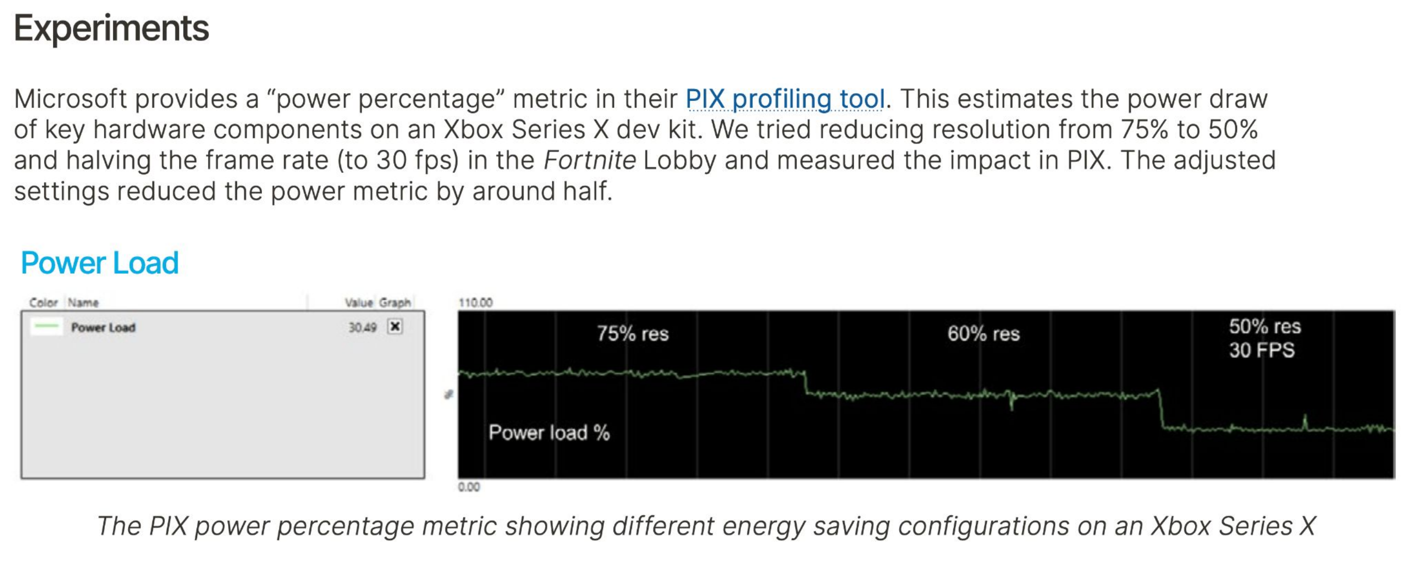
Xbox **Dynamic Power States (DPS) System**

Graphics options in constrained FPS modes

Game engine differences in energy consumption

Power Saving Modes

Fortnite



Experiments

Microsoft provides a “power percentage” metric in their PIX profiling tool. This estimates the power draw of key hardware components on an Xbox Series X dev kit. We tried reducing resolution from 75% to 50% and halving the frame rate (to 30 fps) in the *Fortnite* Lobby and measured the impact in PIX. The adjusted settings reduced the power metric by around half.

Power Load

Color	Name	Value	Graph
🟩	Power Load	30.49	☒

The PIX power percentage metric showing different energy saving configurations on an Xbox Series X

Fortnite experimented with resolution scaling & idle states (AFK on menus)

FPS and resolution are major determinants of power use.

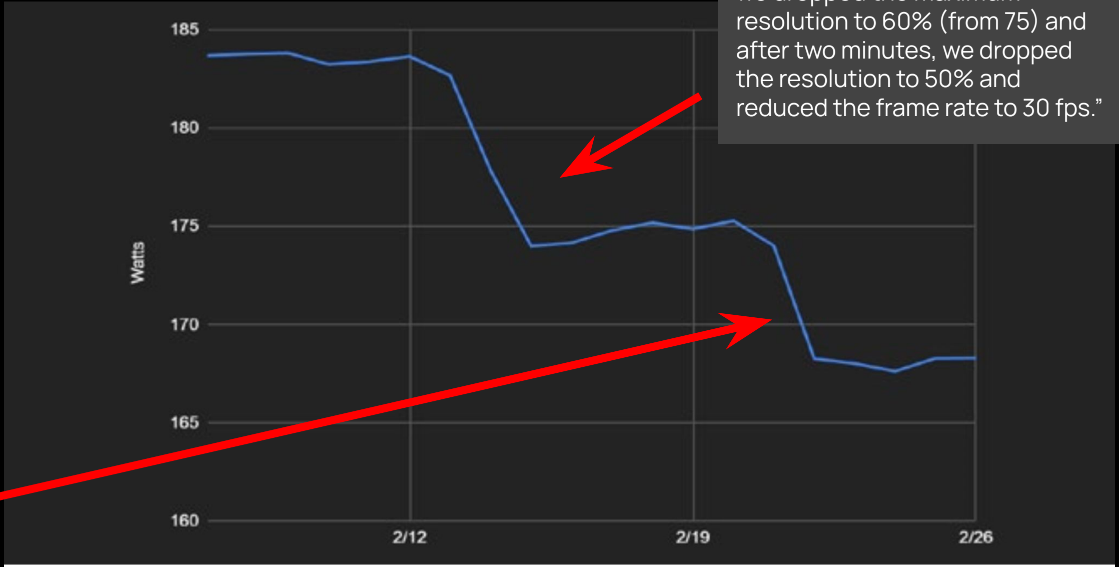
Power Saving Modes

Fortnite

Live game implementation

Power savings equivalent to 14 wind turbines running for a year, just from changing behaviour in idle states.

“As a result of these changes, we estimate around 200 MWh per day of savings across our total player base, or 73 GWh per year.”



“After one minute in the front end, we dropped the maximum resolution to 60% (from 75) and after two minutes, we dropped the resolution to 50% and reduced the frame rate to 30 fps.”

“After analyzing the data and reviewing player sentiment, we decided to take a more aggressive approach. We adjusted the front-end energy saving settings to kick in fully after 30 seconds, dropping to 30 fps and 50% resolution; we also reduced the maximum resolution of the game from 75% to 65%.”

Average power consumption by date on Xbox Series X, showing initial and improved energy-saving configurations

Power Saving Modes

Fortnite

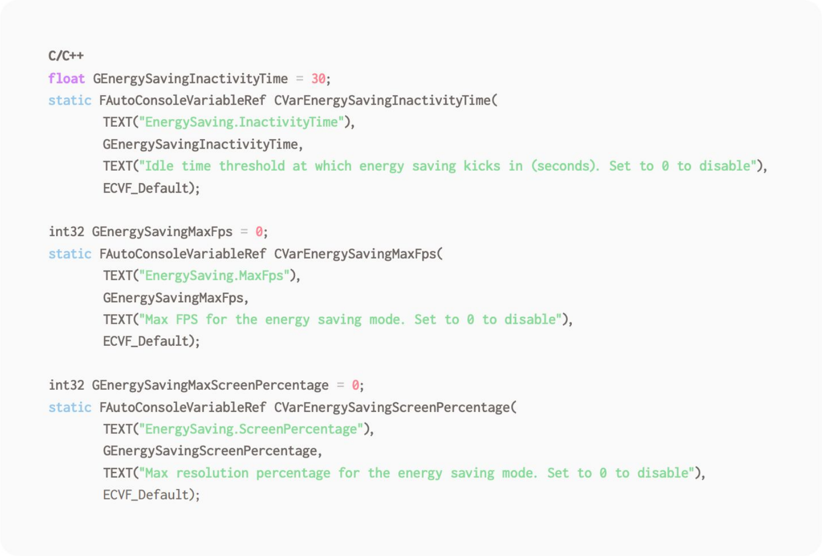
Epic games whitepaper has code examples of power saving-mode implementation in Unreal.

This case study served as the foundation for all the Power Saving Plugins listed on page 5, which can now be easily implemented.

Implementation example

We provide some example code for handling inactivity-based energy saving in a UE5 game in front-end screens. This is intended as a starting point for a game-specific implementation. Developers may wish to expand this and incorporate support for their own game-specific logic.

The inactivity time threshold and the frame rate and resolution can be configured via console variables. This enables you to override per platform via DeviceProfile ini files:



```
C/C++
float GEnergySavingInactivityTime = 30;
static FAutoConsoleVariableRef CVarEnergySavingInactivityTime(
        TEXT("EnergySaving.InactivityTime"),
        GEnergySavingInactivityTime,
        TEXT("Idle time threshold at which energy saving kicks in (seconds). Set to 0 to disable"),
        ECVF_Default);

int32 GEnergySavingMaxFps = 0;
static FAutoConsoleVariableRef CVarEnergySavingMaxFps(
        TEXT("EnergySaving.MaxFps"),
        GEnergySavingMaxFps,
        TEXT("Max FPS for the energy saving mode. Set to 0 to disable"),
        ECVF_Default);

int32 GEnergySavingMaxScreenPercentage = 0;
static FAutoConsoleVariableRef CVarEnergySavingScreenPercentage(
        TEXT("EnergySaving.ScreenPercentage"),
        GEnergySavingScreenPercentage,
        TEXT("Max resolution percentage for the energy saving mode. Set to 0 to disable"),
        ECVF_Default);
```

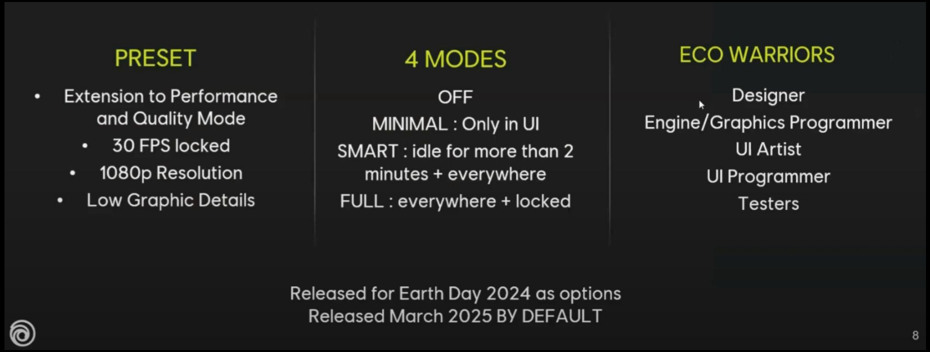
Power Saving Modes

For Honor

The implementation process at Ubisoft took two months, from conception to release. However, with the adoption of established best practices, the process can now be completed in a significantly shorter time.

- Ubisoft started with two graphics modes.
- Similar process as Fortnite, testing with power meters.
- Expanded to add power saving modes.

Finding: If the power-saving mode is set to "default," most players will retain it.



PRESET

- Extension to Performance and Quality Mode
- 30 FPS locked
- 1080p Resolution
- Low Graphic Details

4 MODES

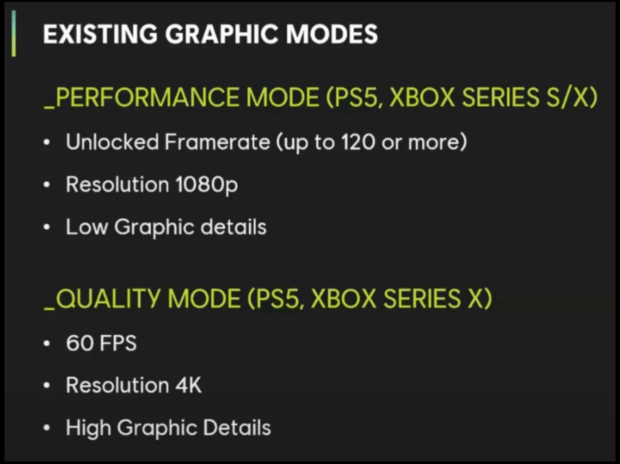
OFF
MINIMAL : Only in UI
SMART : idle for more than 2 minutes + everywhere
FULL : everywhere + locked

ECO WARRIORS

Designer
Engine/Graphics Programmer
UI Artist
UI Programmer
Testers

Released for Earth Day 2024 as options
Released March 2025 BY DEFAULT

8



EXISTING GRAPHIC MODES

_PERFORMANCE MODE (PS5, XBOX SERIES S/X)

- Unlocked Framerate (up to 120 or more)
- Resolution 1080p
- Low Graphic details

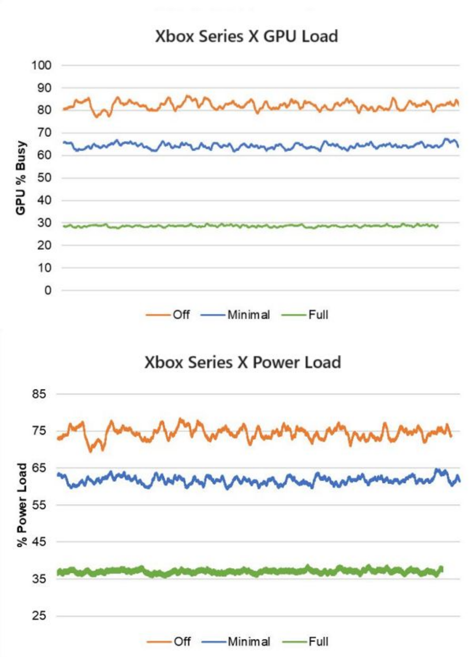
_QUALITY MODE (PS5, XBOX SERIES X)

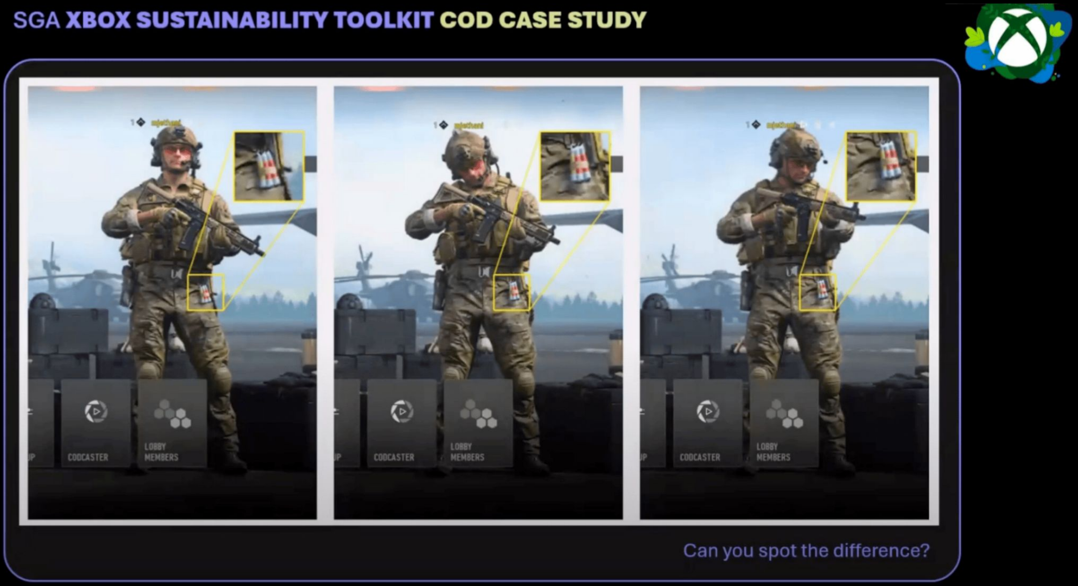
- 60 FPS
- Resolution 4K
- High Graphic Details

SGA Meetup Recording on Power Saving Mode in For Honor with Ubisoft and XBOX

Power Saving Modes

Call of Duty - Off / Minimal / Full Eco Mode





SGA **XBOX SUSTAINABILITY TOOLKIT** **COD CASE STUDY**

Can you spot the difference?

Pause Rendering & 2.5D Menus

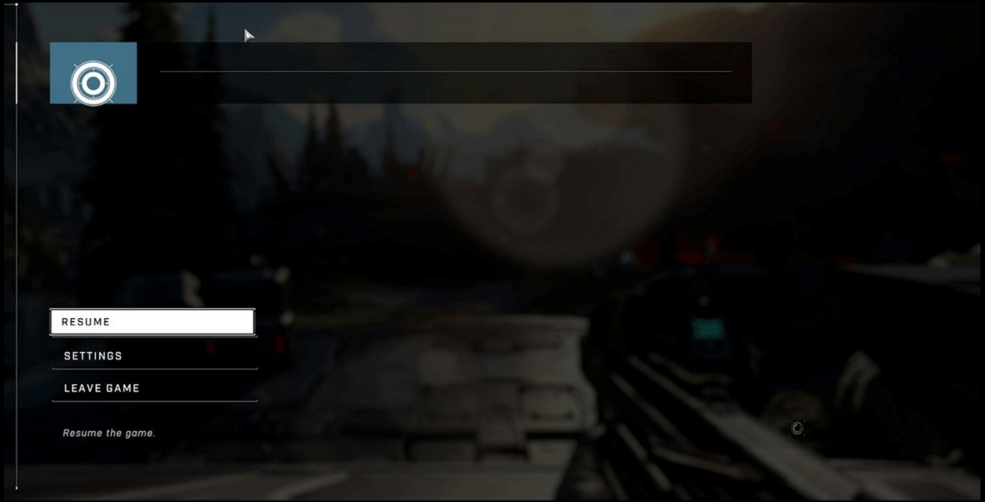
Pause Rendering - Halo Infinite

"The image… shows our Campaign gameplay running on Xbox Series X at 4K / 60FPS. We've measured our Power Consumption with multiple devices and confirmed our total power draw was 64% of our GPU + CPU capacity, or 185 watts total AC power."

When you pause? It's still rendering the whole scene at 4K & 60FPS

Pause Rendering & 2.5D Menus

Pause Rendering – Halo Infinite



“The game is paused in the same location, but the resolution is automatically lowered to 1080p. We were able to measure a 55% power draw on the GPU + CPU after our change, or 165 watts total AC power.”

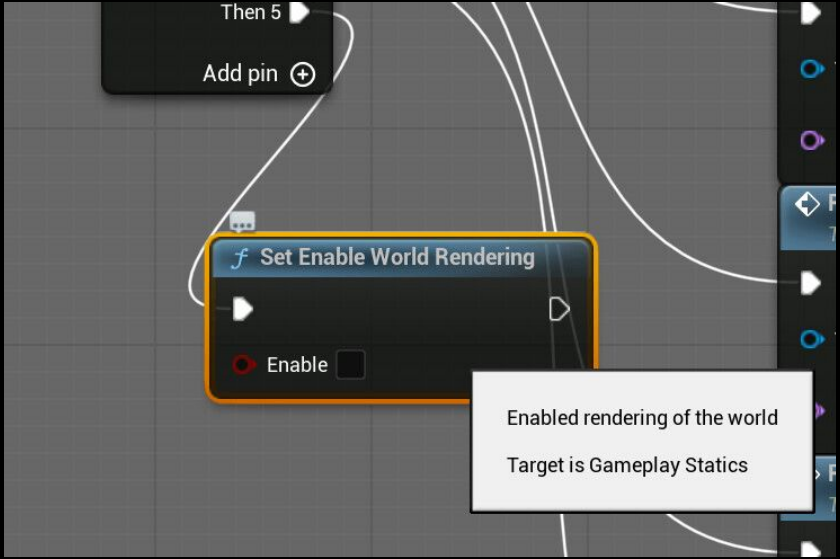
20 watts power saving for free.

Stopping the world render while paused, replacing it with a static image, lowering FPS/res is very easy and saves real power.

You can go further with 2.5D.

Pause Rendering & 2.5D Menus

Pause Rendering – Unreal implementation



Enabled rendering of the world

Target is Gameplay Statics

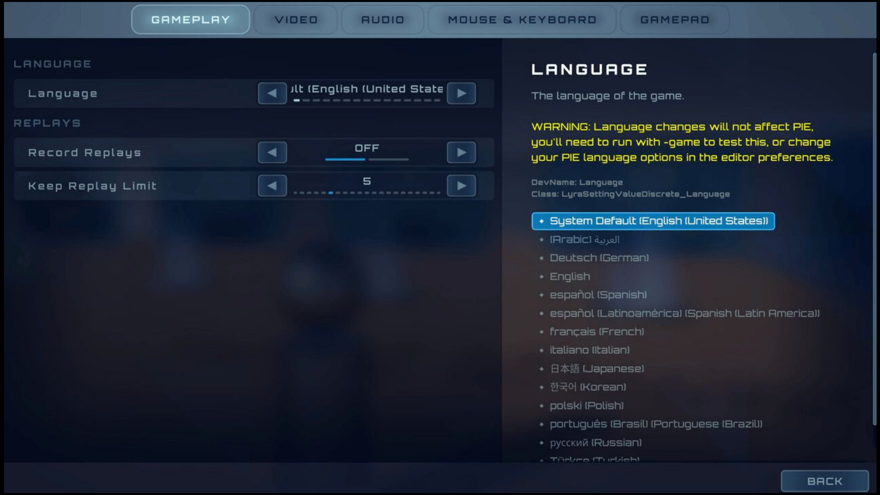
“Opening the same menu with world rendering disabled results in a 35% decrease in power consumption, from 93 to 59 watts. You could save even more energy by pausing the gameplay logic while in the menu.

If you really want to keep the transparent menus, you can take a screenshot when you open the menu and display that while the menu is open. If you don’t want to pause the game or change the background, you can reduce the rendering resolution instead. Since the game is blurred anyway, even ridiculously low resolutions are fine”

haukethiessen.com/developing-games-for-devices-with-batteries/

Pause Rendering & 2.5D Menus

Pause Menu Rendering – Unreal implementation



LANGUAGE

Language ◀ ılt (English (United State ▶

REPLAYS

Record Replays ◀ OFF ▶

Keep Replay Limit ◀ 5 ▶

LANGUAGE

The language of the game.

WARNING: Language changes will not affect PIE, you'll need to run with -game to test this, or change your PIE language options in the editor preferences.

DevName: Language
Class: LyraSettingValueDiscrete_Language

- System Default (English (United States))
- (Arabic) العربية
- Deutsch (German)
- English
- español (Spanish)
- español (Latinoamérica) (Spanish (Latin America))
- français (French)
- italiano (Italian)
- 日本語 (Japanese)
- 한국어 (Korean)
- polski (Polish)
- português (Brasil) (Portuguese (Brazil))
- русский (Russian)
- Türkçe (Turkish)

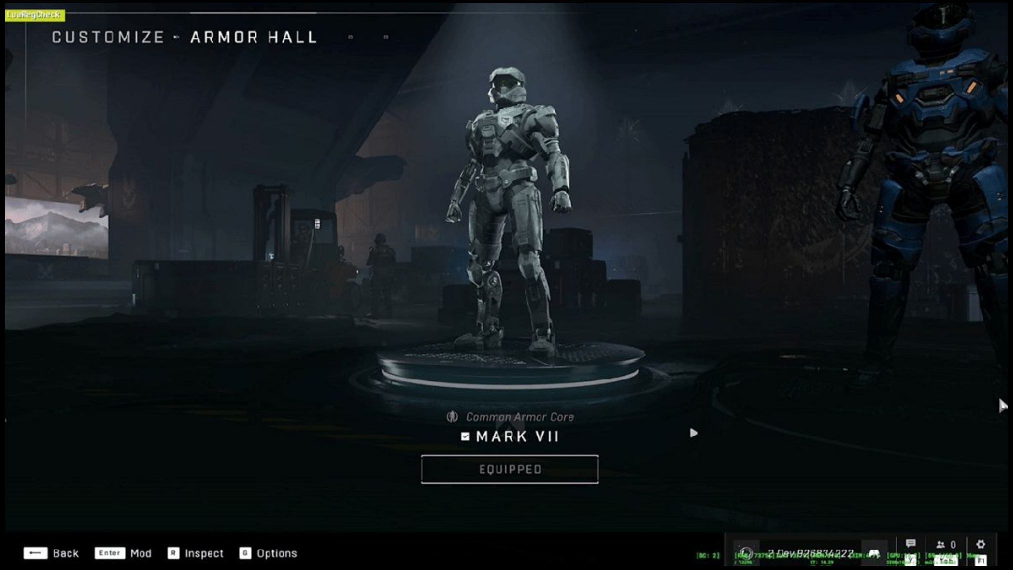
"In this screenshot, the screen percentage is reduced to just 10%. In case you are not familiar with how screen percentage works in Unreal: It scales the internal resolution used to render the image. For example, if the output resolution is 2560x1440 and the screen percentage is 10%, then the internal resolution is 256x144 pixels. This means the number of pixels rendered drops by 99%!

…It's not as efficient as disabling the rendering completely, but in my tests, the power consumption was just slightly >60 watts."

haukethiessen.com/developing-games-for-devices-with-batteries/

Pause Rendering & 2.5D Menus

2.5D Menus – Halo Infinite



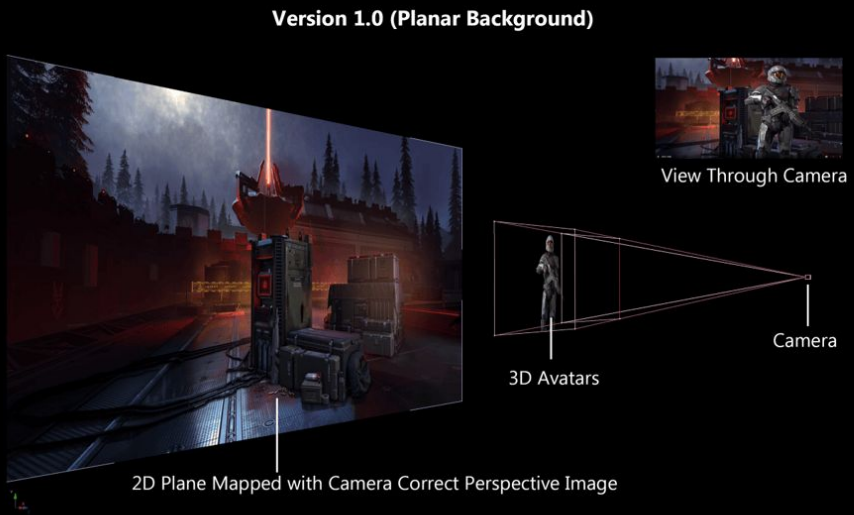
Originally shipped with 3D menus @ 60FPS and 4K

- Average GPU: 96.2%
- Average Power: 67.5%

Started by dropping FPS to 30

Pause Rendering & 2.5D Menus

2.5D Menus – Halo Infinite

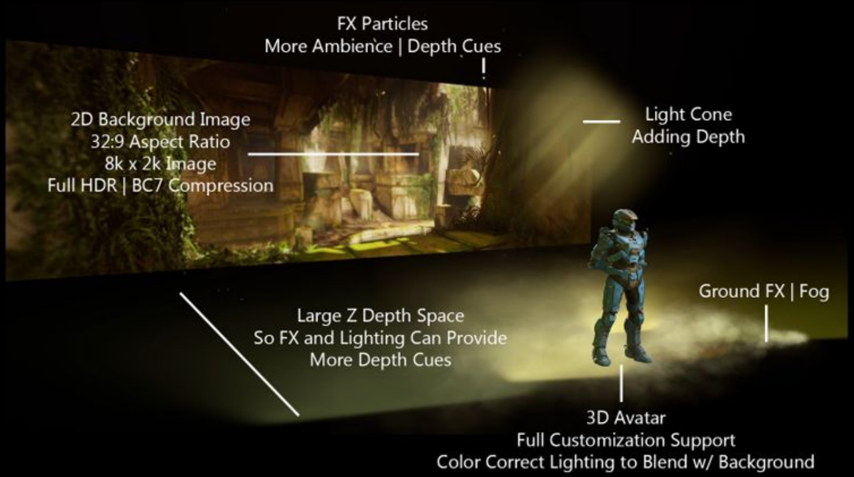

Version 1.0 (Planar Background)
View Through Camera
Camera
3D Avatars
2D Plane Mapped with Camera Correct Perspective Image

Upsides of 2.5D Menus

- Minimal components
- Easy to upgrade
- 2D background image can be created in any tool, generated in-house or outsourced
- Load times should significantly improve
- Power consumption and energy bills for gamers' devices should be lower

Pause Rendering & 2.5D Menus

2.5D Menus – Halo Infinite



FX Particles
More Ambience | Depth Cues
2D Background Image
32:9 Aspect Ratio
8k x 2k Image
Full HDR | BC7 Compression
Light Cone
Adding Depth
Ground FX | Fog
Large Z Depth Space
So FX and Lighting Can Provide
More Depth Cues
3D Avatar
Full Customization Support
Color Correct Lighting to Blend w/ Background

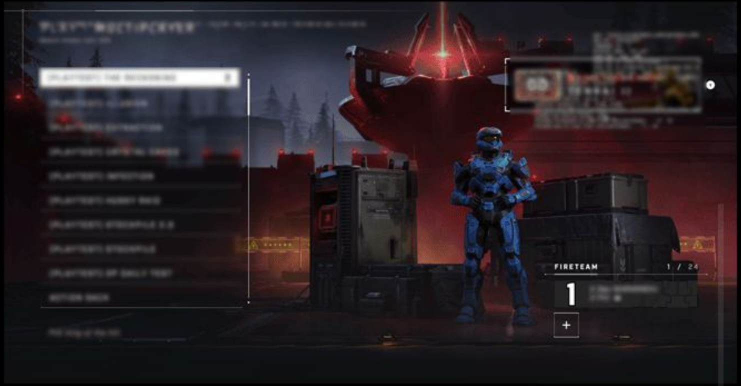
Constraints

- 3D avatars need to be lit to match the new 2D backplate
- Background cannot support motion
- Cannot support DOF on avatars but you can bake DOF into background image

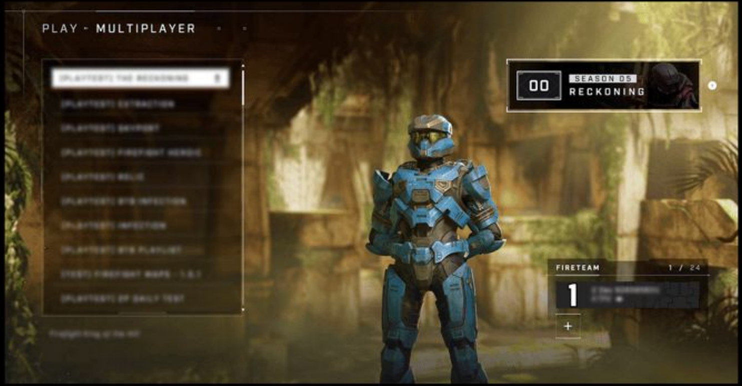
Pause Rendering & 2.5D Menus

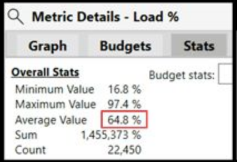
2.5D Menus – Halo Infinite

3D MP Menu Season 4



2.5D MP Menu Season 5





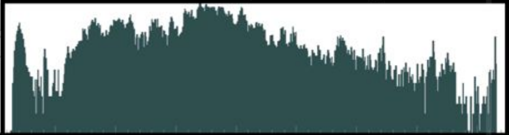
Metric Details - Load %

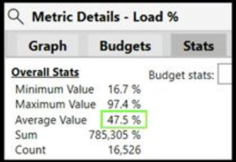
Graph | Budgets | Stats

Overall Stats Budget stats:

Minimum Value	16.8 %
Maximum Value	97.4 %
Average Value	64.8 %
Sum	1,455,373 %
Count	22,450

Power Use | Histogram





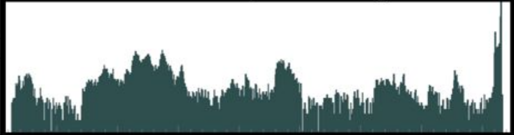
Metric Details - Load %

Graph | Budgets | Stats

Overall Stats Budget stats:

Minimum Value	16.7 %
Maximum Value	97.4 %
Average Value	47.5 %
Sum	785,305 %
Count	16,526

Power Use | Histogram



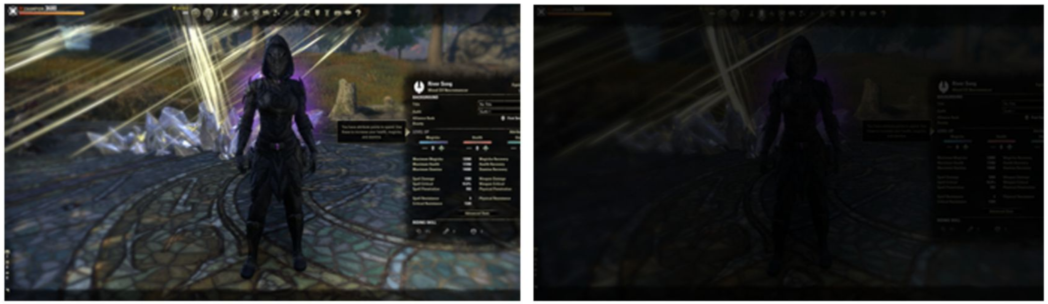
3D Scene 64.8%

2.5D Scene 47.5%

30% Power Savings | With Resolution Locked

Screen Dimming

TES Online (Bethesda)



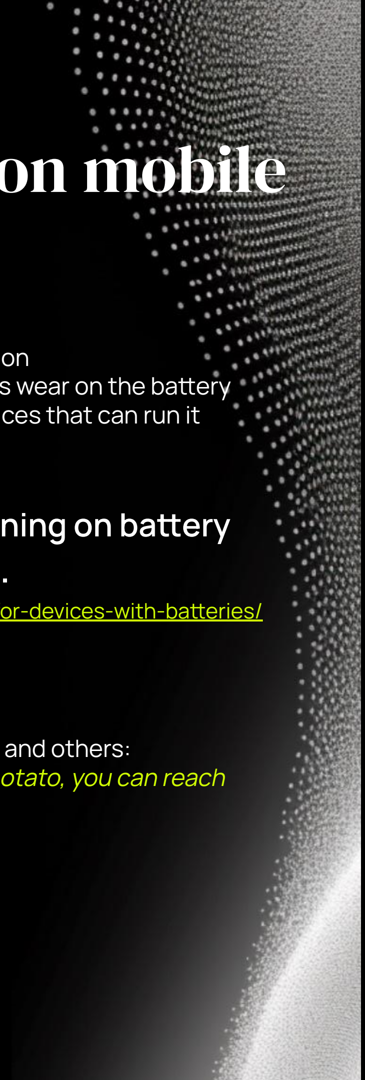
Active Player

Inactive Player (more than 5 minutes)

Screens use power, so screen dimming is useful for OLED screens, as they can actually reduce power consumption if displayed image is darker (while classic LCD screens always use the same amount of energy)

- Dimming the screen when inactive saves power on OLED screens
- OLED “dark modes” can save ~15 watts on OLED laptops
- Dark-mode option for interface scenes

“All major consoles have some OS level setting to do this but there is no PC counterpart, so we implemented it ourselves”



Power saving on mobile

Benefits

- Reduces battery consumption
- Reduces daily charges – less wear on the battery
- Efficient games = more devices that can run it

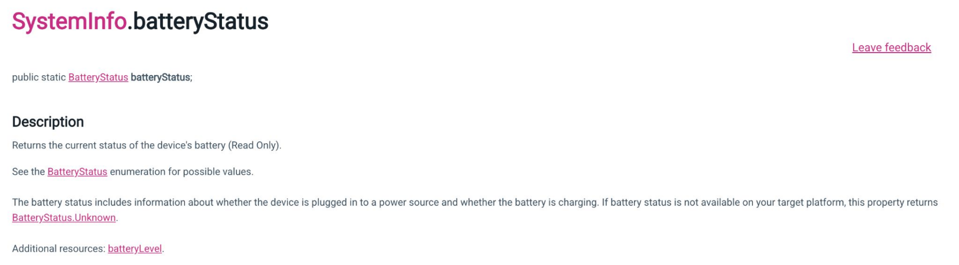
Detect whether you're running on battery and optimise for power life.

haukethiessen.com/developing-games-for-devices-with-batteries/

Lessons from Roblox, Subway Surfers and others:

"If you can make your game run on a potato, you can reach an incredible number of players."

In Unity



SystemInfo.batteryStatus

Leave feedback

public static BatteryStatus batteryStatus;

Description

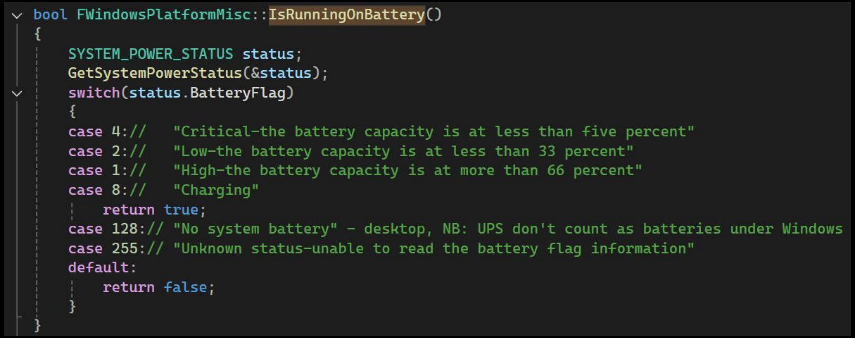
Returns the current status of the device's battery (Read Only).

See the BatteryStatus enumeration for possible values.

The battery status includes information about whether the device is plugged in to a power source and whether the battery is charging. If battery status is not available on your target platform, this property returns BatteryStatus.Unknown.

Additional resources: batteryLevel.

In Unreal



```
bool FWindowsPlatformMisc::IsRunningOnBattery()
{
    SYSTEM_POWER_STATUS status;
    GetSystemPowerStatus(&status);
    switch(status.BatteryFlag)
    {
    case 4://   "Critical-the battery capacity is at less than five percent"
    case 2://   "Low-the battery capacity is at less than 33 percent"
    case 1://   "High-the battery capacity is at more than 66 percent"
    case 8://   "Charging"
        return true;
    case 128:// "No system battery" - desktop, NB: UPS don't count as batteries under Windows
    case 255:// "Unknown status-unable to read the battery flag information"
    default:
        return false;
    }
}
```

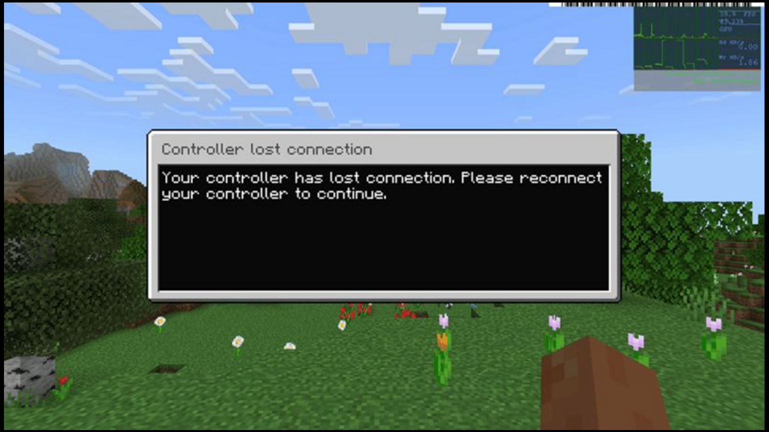
On Windows, it's a bit more complicated.

Disconnected Controllers

Minecraft

Controller inactivity = AFK

“we lowered the frame rate when the controller disconnection notice is on screen for greater than 60 seconds.”



Controller lost connection

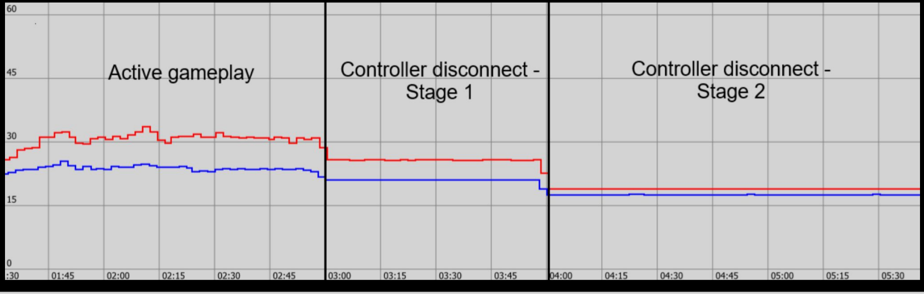
Your controller has lost connection. Please reconnect your controller to continue.

Device & Area	Screen Time %	Median FPS
Windows	7.1%	60 FPS
Xbox One: controller disconnected screen	14%	60 FPS
Xbox One: pause screen	1%	60 FPS
Xbox Series: controller disconnected screen	10.6%	60 FPS
Xbox Series: pause screen	0.5%	60 FPS

Disconnected Controllers

Minecraft

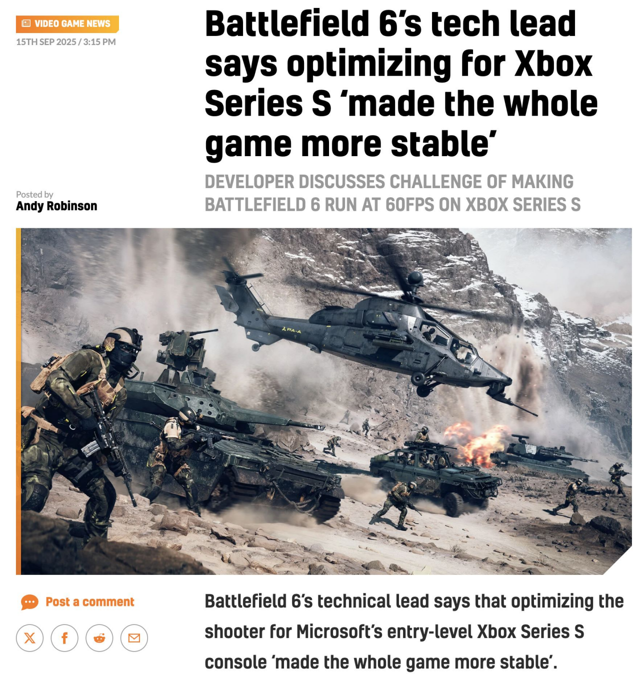
Y-axis is “estimated average power consumption”



	Avg % In Active Gameplay	Avg % During Stage 1	Avg % During State 2	Avg Wattage In Active Gameplay	Avg Wattage During Stage 1	Avg Wattage During Stage 2
Xbox Series X	24%	21%	17%	102W	89W	81W
Xbox Series S	31%	26%	19%	62W	52W	48W

Productive Hardware Limitations

Battlefield 6



VIDEO GAME NEWS

15TH SEP 2025 / 3:15 PM

Battlefield 6's tech lead says optimizing for Xbox Series S 'made the whole game more stable'

DEVELOPER DISCUSSES CHALLENGE OF MAKING BATTLEFIELD 6 RUN AT 60FPS ON XBOX SERIES S

Posted by
Andy Robinson

Post a comment

Battlefield 6's technical lead says that optimizing the shooter for Microsoft's entry-level Xbox Series S console 'made the whole game more stable'.

Optimisation for Xbox Series S hardware constraint

"made the whole game more stable"

Incredible co-benefit of targeting legacy/lower spec hardware

Unknown effect on power, but if GPU/CPU load equals power, this would probably also save power

- only if the CPU & GPU aren't running at 100% capacity
- need an (power saving-mode style) FPS/resolution cap
- there are places you can make efficiency improvements without it translating into saving energy

Mid-Game Power Measurement

GOALS

GOALS is a highly optimised game, which can easily run at 500+ FPS w high end PCs

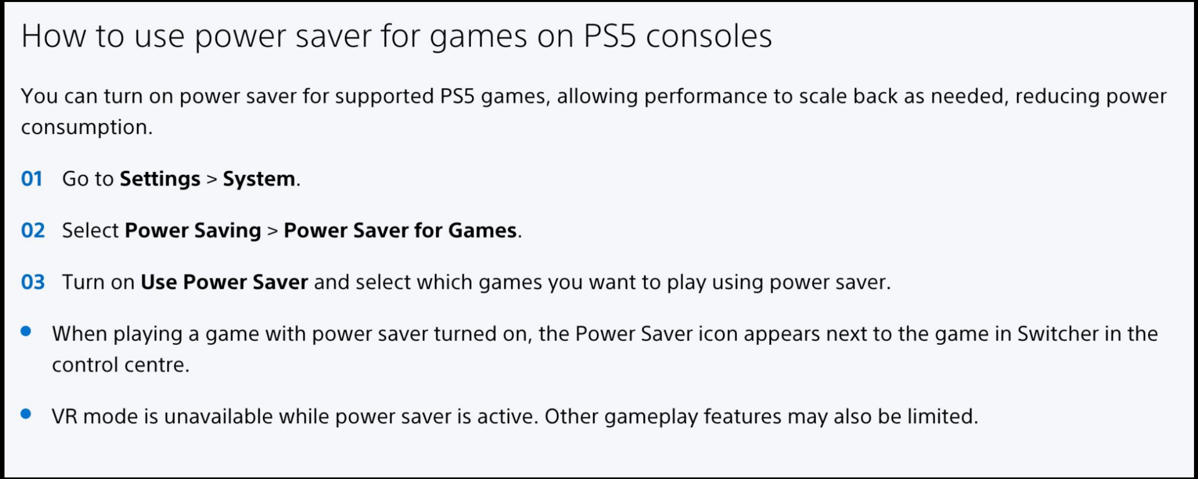
No practical use for 500+ FPS, taxes hardware, generates heat and noise

Technical Director of GOALS **Torbjörn Söderman** wrote some code to monitor the heat/load on player GPUs and target a good user experience

- Also saves power – and not just in *idle state*
- *Access recording of this method*

TSUCHITA
FAST-PACED // COMPETITIVE // FREE TO PLAY
THE ESPORTS-READY FOOTBALL GAME
PC
XBOX
PLAYSTATION

Playstation 5 Energy Saver Mode



How to use power saver for games on PS5 consoles

You can turn on power saver for supported PS5 games, allowing performance to scale back as needed, reducing power consumption.

01 Go to **Settings** > **System**.

02 Select **Power Saving** > **Power Saver for Games**.

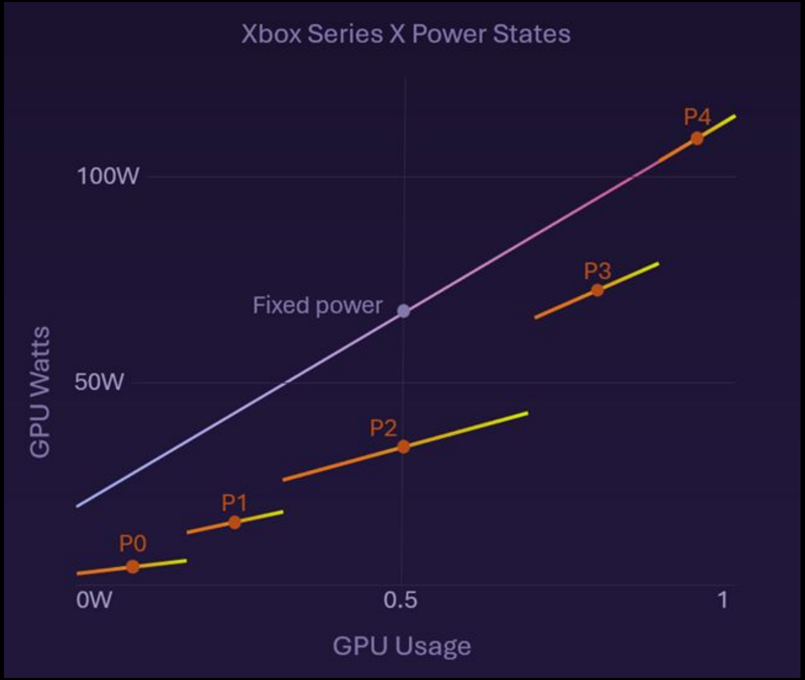
03 Turn on **Use Power Saver** and select which games you want to play using power saver.

- When playing a game with power saver turned on, the Power Saver icon appears next to the game in Switcher in the control centre.
- VR mode is unavailable while power saver is active. Other gameplay features may also be limited.

Launched in Sept 2025 PS update.

There is not a lot of info available so far: *possibly* throttles or disables PS hardware (because VR mode unavailable)

Xbox Dynamic Power States (DPS)



The intent of DPS is to unlock voltage savings for games without impacting performance.

How do to achieve this:

- Enable GPU dynamic power states
- GPU calculates normalized frame statistics and stores it as historical data
- GPU automatically changes power states based on the current game demands and the historical data, saving energy”

Dynamic Power States - Microsoft Game Dev

Xbox Dynamic Power States (DPS)

Call of Duty© Black Ops 6

*"We spent a few days experimenting with DPS and the results were promising. Specifically, we could see an additional **10-15% power savings** in areas beyond those we introduced using the **Xbox Sustainability Toolkit**. We were already throttling parts of the game engine down (for example, while in menus or front-end screen), with no change to the players' framerates, which saved us a lot of power, but **DPS allowed us to get additional savings with no effort**."*

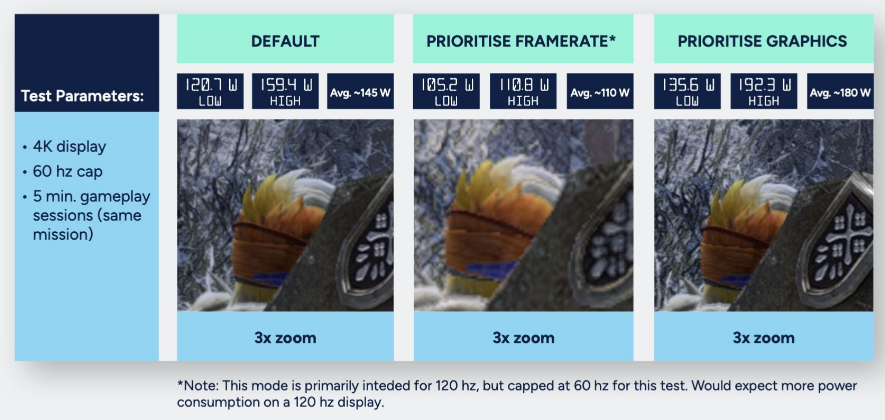
"At the time of shipping Black Ops 6, our current implementation plan settled on:

- *Enable DPS in all areas of the game where we're already applying power saving measures*
- *Expose a flag that enables DPS at all times, which is off by default. Since we are very sensitive to even the smallest drop in performance, we will be using this flag to perform some multi-day performance testing and go from there. It would be nice to turn on all the time, but only once we have sufficient data to back that decision."*

*– **Rulon Raymond, Senior Director of Technology***

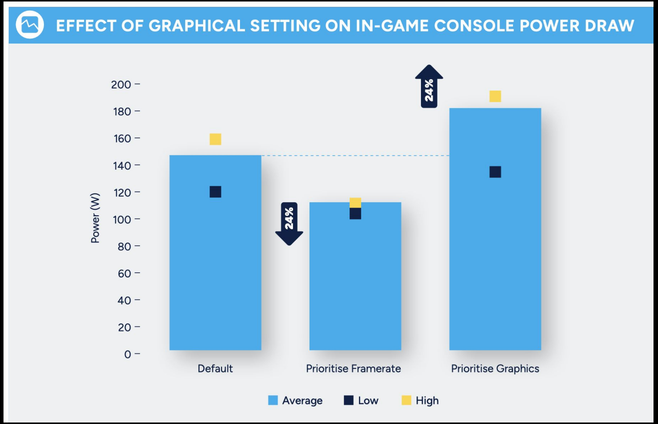
Graphics options in constrained FPS modes

In contexts where FPS is capped (e.g. at 60FPS) by hardware capability (e.g. certain televisions), graphic mode options that prioritise “FPS” can reduce energy consumption vs modes that prioritise “graphics”



Test Parameters:	DEFAULT	PRIORITISE FRAMERATE*	PRIORITISE GRAPHICS
• 4K display • 60 hz cap • 5 min. gameplay sessions (same mission)	120.7 W LOW 159.4 W HIGH Avg. ~145 W	105.2 W LOW 110.8 W HIGH Avg. ~110 W	135.6 W LOW 192.3 W HIGH Avg. ~180 W
	3x zoom	3x zoom	3x zoom

*Note: This mode is primarily inteded for 120 hz, but capped at 60 hz for this test. Would expect more power consumption on a 120 hz display.



EFFECT OF GRAPHICAL SETTING ON IN-GAME CONSOLE POWER DRAW

Untangling the carbon complexities of the games industry report

Game engine energy consumption differences

Unity and Unreal have different energy use characteristics on tests of performance on:

- Physics
- Static mesh rendering
- Animated dynamic mesh rendering

Unlikely to be actionable for most developers – but could become future points of differentiation

From preprint paper: A Comparative Analysis of Energy Consumption Between the Widespread Unity and Unreal Video Game Engines

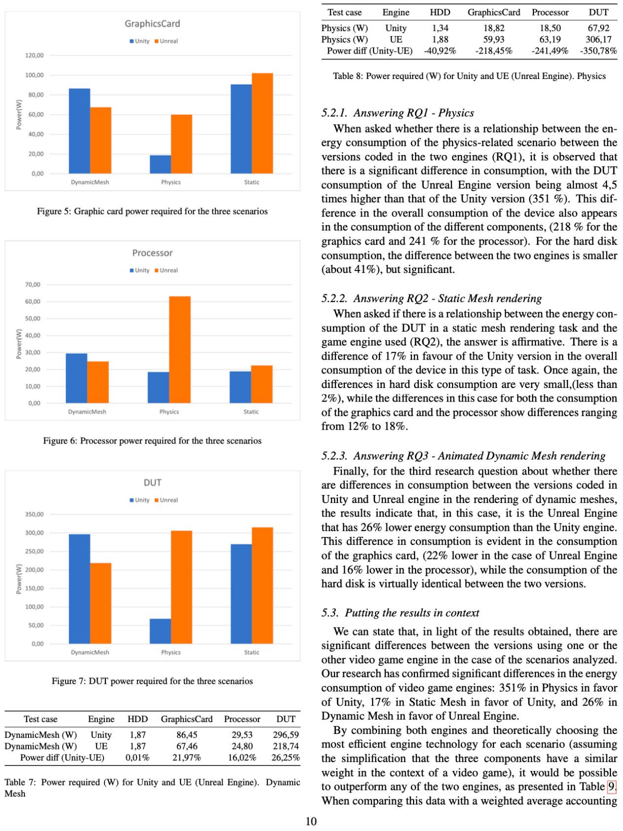


Figure 5: Graphic card power required for the three scenarios

Figure 6: Processor power required for the three scenarios

Figure 7: DUT power required for the three scenarios

Test case	Engine	HDD	GraphicsCard	Processor	DUT
DynamicMesh (W)	Unity	1,87	86,45	29,53	296,59
DynamicMesh (W)	UE	1,87	67,46	24,80	218,74
Power diff (Unity-UE)		0,01%	21,97%	16,02%	26,25%

Table 7: Power required (W) for Unity and UE (Unreal Engine). Dynamic Mesh

Test case	Engine	HDD	GraphicsCard	Processor	DUT
Physics (W)	Unity	1,34	18,82	18,50	67,92
Physics (W)	UE	1,88	59,93	63,19	306,17
Power diff (Unity-UE)		-40,92%	-218,45%	-241,49%	-350,78%

Table 8: Power required (W) for Unity and UE (Unreal Engine). Physics

5.2.1. Answering RQ1 - Physics

When asked whether there is a relationship between the energy consumption of the physics-related scenario between the versions coded in the two engines (RQ1), it is observed that there is a significant difference in consumption, with the DUT consumption of the Unreal Engine version being almost 4,5 times higher than that of the Unity version (351 %). This difference in the overall consumption of the device also appears in the consumption of the different components, (218 % for the graphics card and 241 % for the processor). For the hard disk consumption, the difference between the two engines is smaller (about 41%), but significant.

5.2.2. Answering RQ2 - Static Mesh rendering

When asked if there is a relationship between the energy consumption of the DUT in a static mesh rendering task and the game engine used (RQ2), the answer is affirmative. There is a difference of 17% in favour of the Unity version in the overall consumption of the device in this type of task. Once again, the differences in hard disk consumption are very small,(less than 2%), while the differences in this case for both the consumption of the graphics card and the processor show differences ranging from 12% to 18%.

5.2.3. Answering RQ3 - Animated Dynamic Mesh rendering

Finally, for the third research question about whether there are differences in consumption between the versions coded in Unity and Unreal engine in the rendering of dynamic meshes, the results indicate that, in this case, it is the Unreal Engine that has 26% lower energy consumption than the Unity engine. This difference in consumption is evident in the consumption of the graphics card, (22% lower in the case of Unreal Engine and 16% lower in the processor), while the consumption of the hard disk is virtually identical between the two versions.

5.3. Putting the results in context

We can state that, in light of the results obtained, there are significant differences between the versions using one or the other video game engine in the case of the scenarios analyzed. Our research has confirmed significant differences in the energy consumption of video game engines: 351% in Physics in favor of Unity, 17% in Static Mesh in favor of Unity, and 26% in Dynamic Mesh in favor of Unreal Engine.

By combining both engines and theoretically choosing the most efficient engine technology for each scenario (assuming the simplification that the three components have a similar weight in the context of a video game), it would be possible to outperform any of the two engines, as presented in Table 9. When comparing this data with a weighted average accounting

Resources

Microsoft Case Studies

White paper: Reducing Fortnite’s power consumption

A Comparative Analysis of Energy Consumption Between the Widespread Unity and Unreal Video Game Engines

Dynamic Power States - Microsoft Game Dev

Hauke Tießen: Developing Games for Devices with Batteries

SGA Optimizing Energy Efficiency and Player Experience YouTube Channel

Game Industry Experts Discuss Energy Efficiency and Player Experience

Optimizing Game Performance with Torbjörn Söderman, Technical Director at GOALS

Reducing the Games Industry Climate Impact While Improving Player Experience - SGA @ Unity Montréal

Improving energy efficiency without compromising the player experience with Ubisoft and Microsoft

Pragmatic ways to optimize energy efficiency with Hauke Tießen

SGA Energy Efficiency Network

This Energy Efficiency Guide is the result and summary of expert discussions and work conducted by SGA, particularly through the SGA Energy Efficiency Network.

This Network was born out of highly attended SGA Energy Efficiency meetups, where companies such as **Microsoft, Unreal, Unity, Deck 13 Interactive, Ubisoft, Nitro Games**, and **GOALS** shared their best practices, tools, and ideas on how to optimize the energy efficiency of games.

It is a global network of game development professionals committed to advancing the **reduction of the environmental impact of gameplay systemically while optimizing game performance, player experience, and cost efficiency**.

The network shares best practices through quarterly meetups and **drives the development of game development tools and features that improve energy efficiency and player experience**.

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Thank You

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