Strathack on Sustainable Laptop Battery Solutions for National Grid

4th and 5th December 2024



Foreword

At Atos, we believe technology is a catalyst for meaningful, sustainable progress.

Some of the most rewarding moments come from collaborating with our clients and partners to tackle shared challenges—none more pressing than the journey to net zero. That's why we were proud to bring together National Grid, National Energy System Operator, Circular Computing, Dell Technologies, Microsoft, and Nexthink for a groundbreaking strathack exploring an innovative idea: transforming laptops into smart grid devices.

Energy consumption is a daily consideration, whether at home or in the workplace. While optimizing smartphone battery life has become second nature, laptops remain an untapped opportunity. Across millions of devices many are left plugged in throughout the day—smarter energy management could have a far-reaching impact: reducing strain on the electricity grid, lowering carbon intensity, and even cutting costs for consumers. A clear win for sustainability, business, and the planet.

Atos has long been committed to environmental leadership in the digital sector. Our ambitious target–validated by the Science-Based Target initiative (SBTi)–is to cut absolute greenhouse gas emissions by 50% by 2025. Since 2019, we've already reduced total CO_2 e emissions by 32.5%, with 68% of our global electricity consumption now sourced from renewables. This dedication to energy efficiency runs through every facet of our operations, from data centres to workplace solutions.



Ash Hardman Client Executive Partner



Bold Ideas, Real Change: Co-Creating a Greener Future

The strathack was a testament to the power of collective innovation. Sitting on the panel, I was inspired by the ingenuity and enthusiasm of the teams who delivered bold, practical solutions. Co-creating with our customers is fundamental to how we operate at Atos, and this initiative exemplified that ethos in action.

But this project isn't just about technology—it's about behaviour change, seamless integration, and unlocking the potential of existing resources to drive real impact. With the combined expertise of our partners and the commitment of National Grid, we have a unique opportunity to scale this vision and redefine the role of everyday technology in the energy transition.

The future of laptops is looking smarter-and greener. We're excited for what comes next.

David Welling IT Sustainability Governance Lead at National Grid

Reimagining device lifecycle management on the road to net zero

The carbon intensity of the electricity grid varies significantly throughout each day. Demand side response has long existed as a mechanism to better balance supply and demand, incentivising consumers to adjust their energy usage at different times of the day.

Today's electricity consumers think nothing of charging their washing machines or electric cars during certain time periods, depending on when electricity supply is higher, greener – and cheaper. So why not with laptops?

We've always targeted 68% UK workforce which is 22,501,200 laptops, together with the battery storage capacity they offer, there is now a significant opportunity to engineer device management solutions that can impact carbon intensity and demand on the grid.

That was the starting point of our strathack in December 2024. The ideas and outcomes generated by the partners throughout those two days point to exciting potential. By synthesising those insights, we can see how an ordinary laptop can be turned into a smart device that uses its battery dynamically according to grid conditions, both the carbon intensity of electricity supply and the load on the grid at any given moment.

Informing and inspiring people to embrace the service is crucial. The cumulative impact is key. Small changes together can make a massive difference – for individual users, for the economy, and of course the future of the planet.

No single organisation can do this alone. It's important to note that the roadmap we have identified makes intelligent use of existing resources in our partner ecosystem. Together, we have what it takes now to accelerate this change as key enabler on the path to net zero.



Introduction

On 4-5 December 2024, Atos and National Grid brought together key players, including the National Energy System Operator (NESO), Microsoft, Nexthink, Dell Technologies and Circular Computing, to cocreate an innovative solution for sustainable laptop battery usage.

The challenge:

how can we encourage laptop users across the UK to optimise their battery usage in order to help reduce demand on the electricity grid during peak times of high demand and carbon-intensive energy production? And can our solution respond dynamically to demand flexibility requests from NESO?

Over two days, this dynamic group of partners generated thought-provoking ideas and solutions, with clear commitment from senior executives to drive progress.

This document summarises the outcomes of the strathack. It pinpoints the potential and opportunities to leverage laptops as a demand side response (DSR) mechanism and what's needed to turn this new vision into a business reality for organisations to measurable increase their sustainability and manage their IT estates.



Outcomes: how to turn an ordinary laptop into a smart grid device

We've synthesised the outputs from the five teams at the strathack into a vision of the future and a roadmap to achieve it.

The vision and roadmap are based on two key principles:

- Make smart use of resources (hardware, applications and data) that already exist in our partner ecosystem.
- 2. Do not introduce new devices (unless absolutely essential).

Vision

A laptop that operates as a smart device to prioritise green charging and reduce grid load during peak times.

- Dynamic battery use: The laptop uses its battery based on the carbon intensity of electricity and grid load at any given moment. When carbon intensity or load is high, it automatically switches from mains to battery, maintaining a battery level of 50% or higher to optimise efficiency.
- User engagement with icons and nudges: A green leaf icon signals when the service is live. Users can control or override the service as needed, such as when travelling.
- Integrated with user schedules: The service connects to Microsoft Outlook calendars to ensure the battery is sufficiently charged for daily activities, using mains power strategically when users are in fixed locations.

- Gamification for user inspiration: Dashboards and gamification features inform users of their contributions to reducing grid load. Users receive messages like "Congratulations, your laptop was carbon zero this week" or "You're in the top 5% of green users."
- Organizational reporting: Aggregated data on carbon reduction is made available to IT and Sustainability teams via dashboards, enabling informed decision-making and targeted user engagement campaigns.

Opportunity in numbers

20 million

Implementing this service across 20 million laptops (50% of the UK laptop estate) could save electricity equivalent to the daily consumption of Liverpool.

50,000

A single organization with 10,000 employees could save the electricity used by 50,000 homes.

16%

Around 16% of UK laptops are always plugged in, demonstrating significant behaviour-change potential.



Requirements: what's needed to turn the vision into reality?

These requirements scope activities to develop and deploy the service so that employees can start to use it quickly, and IT and Sustainability teams can measure impacts at an enterprise level.

1. Fundamental requirement.

Record the impact of actions taken.

Report via a dashboard the carbon created through laptop usage during a given working period. Do this using an API connecting test laptops to NESO carbon intensity data, with realtime data exchange.

Metrics to monitor:

- Carbon intensity of electricity consumed by a laptop.
- Cumulative impact of laptops switching to battery on grid load.

2. User engagement.

Demonstrate a gamification concept to involve users, for example:

- Battery icon changes to a green leaf when laptop power is switched to battery
- Green leaf appears on an MS Teams call when all attendees switch to battery power when running a collaboration call (with all laptop users to switch to battery power
- Notification appears when grid power demand is high to alert users to switch to battery
- Summary 'green leaf' notice for users at the end of a week, showing the cumulative impact of their laptop behaviour on carbon intensity of electricity consumed.

3. User feedback

Share insights on the carbon intensity of electricity used to power a device over a given period, in an intuitive and unobtrusive way (consider how mobile phone usage is already shared with users today).

Simple dashboard accessible on the laptop; monthly notification to users of their grid score (rankings, suggestions for micro actions to cut carbon).

4. Fundamental requirement 2.

Laptop's power consumption can be switched between mains and battery according to:

- Carbon intensity of electricity transmitted through the grid
- Peaks (and troughs) in demand for electricity from the grid.

Enabled by real-time data exchange with NESO. Laptop behaviour needs to take battery charge level into account. Based on best practice, our working view is to maintain battery level at 50% or above. It may be necessary to introduce a smart plug to enable this capability.

5. User control:

The user can see (simply and unobtrusively) if the service is live and:

- · Quickly override it if they need to
- Be prompted to switch it back on if the conditions are appropriate (for example, if they have been in a fixed indoor location for a period of time).

6. Automated user support.

Using data from the user's Microsoft Outlook calendar, the service can be enabled or overridden (automated power source switching as outlined above) according to user schedule for the day, ensuring that:

- The user has a full battery when travelling
- The service is switched on by default when their calendar indicates they will be in a fixed location.

So, what's next?

Delivery of this vision is achievable by leveraging the existing capabilities of our partner ecosystem, including:

- NESO's carbon intensity data.
- Power management solutions from Nexthink, Dell Technologies, and Microsoft.

Immediate actions:

- 1. Establish a Sustainability Advisory Board with representatives from all partners to oversee progress.
- 2. Develop proofs of concept for the outlined requirements (focus on the first three).
- 3. Pilot the service across Atos UK, involving corporate IT and Sustainability teams.

In conclusion

The transition to a sustainable, net-zero future depends on bold collaboration and forward-thinking innovation. This initiative is a testament to what we can achieve when industry leaders unite to tackle some of the most pressing challenges of our time.

For National Grid employees, your role in this journey is pivotal. By embracing innovative solutions like demand-side response-enabled laptops, you are actively contributing to a more resilient, efficient, and low-carbon energy system. Every small action compounds into a significant impact, driving the grid toward greater sustainability.

From a technical standpoint, this initiative aligns seamlessly with NESO's existing demand-side response programs and broader grid modernisation efforts. By integrating this smart device approach with current energy management frameworks, we can enhance real-time load balancing, reduce carbon intensity, and support the decarbonisation of the grid without disrupting existing operations. Together, we are shaping the future of sustainable energy. Let's continue to drive progress, innovate responsibly, and work towards a cleaner, more efficient world. The journey to net zero is one we all share—and every contribution counts.



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