Briefing Note

JANUARY 2025

Energy Transitions Commission

Demand side flexibility – unleashing untapped potential for clean power

In February 2025, countries must submit new "nationally determined contributions" or NDCs, setting new, more ambitious emissions reduction targets for 2035. In our recent publication, *Credible Contributions: Bolder Plans for Higher Climate Ambition in the Next Round of NDCs,* the ETC highlights that current NDCs (for 2030) put the world on track for 2.1–2.5°C of warming by 2100 – far from the Paris agreement's goal of well below 2°C, or the higher ambition of 1.5°C. More ambitious targets are urgently needed, with stronger links to national policies.

As countries gear up to update NDCs in February, the spotlight is firmly on how to accelerate the transition to clean electrification; under net-zero scenarios, the global economy must deeply electrify.[1] At COP29, a Global Energy Storage and Grids Pledge was signed by 58 countries, including Brazil, the United States and United Kingdom.[2] The Pledge builds on COP28's pledge to triple renewables by 2030, signalling political commitment to accelerate system-level enablers required for rapid renewable deployment. It commits to increasing global energy storage capacity six times above 2022 levels, reaching 1,500 GW by 2030 and to add or refurbish 25 million km of grids as set out by the International Energy Agency (IEA).[3, 4]

While action on storage and grids (including long-distance transmission) is vital, another pillar of action – demand side flexibility – will also be critical to deliver clean, expanded power systems. Traditionally, power systems operated on building generation to meet demand. In future power systems – based on variable generation from wind and solar, and with a more dispersed network of electricity end-uses – demand is now positioned to play a much bigger role in actively responding to system needs.

Demand side flexibility means being able to shift the consumption of electricity at peak times – such as through "smart charging" an electric vehicle (EV), time-shifting usage of other electric devices, or using distributed storage. Critically, this flexibility can help to offset new grid and generation capacity needed across the system, reducing costs and speeding up the transition. **Overall, demand side flexibility can play a significant role in buildings, industry, and the transport sectors. ETC analysis at the global level suggests that a third of total electricity demand in 2050 could be flexible – roughly equivalent to today's entire electricity consumption.**

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1 ETC (2024), *Fossil Fuels in Transition: Committing to the phase-down of all fossil fuels.*

2 Global Renewables Alliance (2024), *COP29 Global Energy Storage and Grids Pledge*, available at *https://globalrenewablesalliance.org/news/flexible-energy-transition-gets-boost-as-over-58-nations-back-global-storage-and-grids-targets/.*

3 See ETC (2024), *Building Grids Faster: The backbone of the energy transition.*

4 IEA (2024), *From Taking Stock to Taking Action: How to implement the COP28 energy goals.*

In many cases, demand side flexibility options are low-cost and already available; many solutions require low to zero additional capital expenditure. For example, heating or cooling buildings a couple of hours ahead of need ("pre-heating" or "pre-cooling") can be achieved at no additional expense in well insulated buildings. Other solutions, such as smart-EV charging are 100% efficient and essentially free to implement – providing a low-cost alternative to short duration storage (such as lithium-ion batteries).[5] Much of this can be automated through software solutions. As the automation of demand shifting grows, the opportunities can scale. Furthermore, demand side flexibility can offer benefits to consumers, for example through lower tariffs and payments for shifting demand away from peak times.

The falling costs of solar, wind and batteries mean that power sector decarbonisation is accelerating around the world. By actively incorporating demand side flexibility into updated NDCs, and into national strategies and policies, progress towards decarbonised power systems can be accelerated, and be achieved at even lower cost. As the ETC has laid out,[6] effective NDCs must complement high ambition on emissions reductions with clear sectoral decarbonisation targets, including grid emissions intensity and renewable deployment targets. In support, countries must develop delivery plans which include clearly outlined deployment trajectories for clean generation and key enabling technologies such as grids, storage and demand side flexibility.[7] Technology deployment targets should be accompanied by targeted policies and implementation strategies, including for market design and grid regulation.

This briefing note will therefore cover the following areas:

1. A deep-dive into how power systems are rapidly transforming.
2. The role of demand side flexibility in balancing the grid.
3. The significant potential for demand side flexibility.
4. How to unlock the potential of demand side flexibility.
5. Updating NDCs to deliver the flexibility opportunity.

5 Even on the higher-capex end of the spectrum, research from RMI indicates that virtual power plants (VPPs) that aggregate and coordinate flexible demand can significantly cut power sector costs. By reducing the need for new generation capacity, lowering wholesale energy prices, and deferring transmission and distribution investments, it is estimated that VPPs alone could reduce annual power sector expenditures by up to $17 billion by 2030. See RMI (2023), *Virtual Power Plants, Real Benefits*, available at *https://rmi.org/insight/virtual-power-plants-real-benefits/*. [Accessed 7/01/2024].

6 ETC (2024), *Credible Contributions: Bolder Plans for Higher Climate Ambition in the Next Round of NDCs.*

7 An example is the UK government's *Action Plan on Clean Power to 2030*, which outlines the capacity deployment required across generation and flexibility sources. See UK Government (2024), *Clean Power 2030 Action Plan: A new era of clean electricity*, available at *https://assets.publishing.service.gov.uk/media/675bfaa4cfbf84c3b2bcf986/clean-power-2030-action-plan.pdf*.

1. Power systems are rapidly transforming

Net-zero scenarios rely on massive clean electrification. The Energy Transitions Commission's latest scenarios estimate that electricity will grow from 20% of all energy used today to 60–70% by 2050. This means almost a tripling of global electricity use by 2050 compared to today's approximate 24,000 TWh, reaching between 79,000 TWh of demand in the ETC's Accelerated but Clearly Feasible (ACF) scenario, and 83,000 TWh of demand in the ETC's Possible but Stretching (PBS) scenario.[8] These figures include ~20,000 TWh[9] of electricity used to produce green hydrogen. Total generation required to deliver this in 2050 will be greater when accounting for storage and transmission losses, reaching 92,000–96,000 TWh across ACF and PBS.

To limit global warming, all of this electricity must be generated in a decarbonised manner, with global renewable capacity vastly expanding from today. To achieve this in just 25 years, the power system must expand in scale and transform how electrons flow through the system. The fundamental shift in power generation (from fossil fuels to variable renewables) and electrification of end-use sectors such as heating and road transport is leading to a more geographically dispersed system, with smaller-scale renewable assets spread across more – and new – locations, with a reduced role for large thermal generation (such as from coal or gas plants). Massive electrification, driven by the spread of EVs, heat pumps, increased air conditioning and industrial electrification will often require new or upgraded network connections.

Scaling clean power systems at the pace required will entail significant action, both in terms of building new infrastructure as well as running new, more complex systems. Overcoming barriers around planning and permitting, supply chains and materials, financing and power market design is critical; the ETC has previously covered many of these areas in depth.[10]

To run a bigger and more dispersed system, and enable an optimised, reliable and low-cost flow of electrons, there are two significant challenges to grapple with:

- **The need to connect more numerous, and more distributed, electricity generation and consumption sites** by building vast amounts of new grid, while simultaneously replacing ageing assets. Furthermore, grid optimisation – including through smart power routing, via new hardware that reduces losses, and restringing of existing lines – can reduce total build requirements, and increase the efficiency of power flows. Storage and flexibility, as well as the use of long-distance interconnectors, can also lead to a more efficient system. ETC analysis suggests that the size of grids must grow by more than 50% by 2050, growing from around 68 million km of grid in 2023, to a range of around 110–200 million km in 2050.[11] In addition, the IEA has recently set out a target to build and modernise 25 million km of grids by 2030.[12]

- The need to **manage the system balancing challenge**, which increases as the penetration of wind and solar grows, with the need to match electricity demand and supply. System balancing includes both meeting system operation challenges at the fraction-of-a-second level, as well as providing zero-carbon electricity at times when variable generation is not producing, including across hours, days, and multiple weeks.

Meeting these challenges will require both "supply-side" and "demand side" options. Indeed, supply-side action is critical; the ETC has previously outlined the need to build new grids,[13] and focused on the role of energy storage in short to long durations. **But alongside this, demand side flexibility can play a crucial role for hourly balancing – one that is often understated.**

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8 Both ETC scenarios are net-zero aligned scenarios. The ACF Scenario is clearly technically and economically feasible, but in some sectors will require more forceful policy support than currently in place. The PBS Scenario is also technically and economically feasible, but would require significant strengthening of current commitments and policies. The ACF is a 2°C scenario and the PBS is 1.5°C scenario.

9 ETC (2021), *Making Clean Electrification Possible: 30 Years to Electrify the Global Economy.*

10 ETC (2024), *Streamlining planning and permitting to accelerate wind and solar deployment*; ETC (2023), *Better, Faster, Cleaner: Securing clean energy technology supply chains*; ETC (2023), *Financing the Transition: How to Make the Money Flow for a Net-Zero Economy*.

11 ETC (2024), *Building Grids Faster: The backbone of the energy transition.*

12 IEA (2024), *From Taking Stock to Taking Action: How to implement the COP28 energy goals*.

13 ETC (2024), *Building Grids Faster: The backbone of the energy transition.*

2. Role of demand side flexibility

There are multiple forms of demand side flexibility – including electricity "load shifting" (moving energy use to off-peak periods), electricity "load shedding" (eliminating some load during peak periods), as well as deployment distributed (or "behind-the-metre") storage, which can provide flexibility by charging and discharging at optimal times for the grid.[14] A mix of these strategies can enable grids to balance across periods of high and low renewable supply on a short-term (i.e. hourly) basis.

Opportunity for demand side flexibility increases with the degree of automation. Automated solutions where data centre network is in existence, such as smart systems controlling heating or cooling loads, can play a significant role in delivering rapid and precise demand adjustments. In contrast, manual interventions, such as manually running appliances at optimal times, or contracts with industry end users for interruptible supply, are less scalable but – in the industry case – remain relevant for addressing larger, less time-sensitive adjustments. Maximised flexibility potential could be achieved when combining automated, real-time responses with strategic manual shifts.

Demand side flexibility solutions are growing – for example demand side flexibility market in France was approximately 2.4 GW in 2022, and is expected to grow by 12% in 2023.[15] **However, these solutions can and should scale more rapidly.** As electrification accelerates, higher numbers of heat pumps and EVs can provide significant depth for demand flexibility. For example, global EV battery capacity available for grid storage could reach 90–170 TWh by 2050.[16] Short-term grid storage demand could theoretically be met by EV batteries as early as 2030 across most regions[17] – 250 times greater than today's ~360 GWh energy storage installed capacity.[18] The use of automated software solutions, which interact with demand side hardware, are increasing, and will be critical to scaling demand side flexibility by avoiding the need for direct user action.

Critically, in many cases, options are low-cost; many solutions require low to zero additional spend or "capex" (capital expenditure), making them a compelling avenue for system flexibility and grid optimisation [Exhibit 1]. Even where there is some capex required for DSF, savings from shifting away from peak prices lead to competitive payback periods. For example, ETC analysis showed that water cylinders with a capex of EUR 1000 would have a payback of 5 years.[19] However, while low cost, many demand side flexibility solutions rely on getting the right enablers in place e.g., smart metres, granular price signals for wholesale and consumers, as well as insulation as a prerequisite for building flexibility.

Demand side flexibility also offers benefits to consumers, such as through lower tariffs for electricity at optimal times for the grids (enabled by time-of-use tariffs), as well as in some cases remuneration from grid operators for shifting demand away from peak times (e.g., "demand response" events, including load shedding and shifting), as well as exporting from batteries.

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14 The term "Behind the Metre (BTM)" refers to energy-related activities that occur on the consumer side, which are typically smaller-scale and can be owned by individuals.

15 IEA (2024), *Demand Response*.

16 Based on 1.5–1.7 billion EVs in 2050, and a 60–100 kWh average battery pack.

17 Xu et al. (2022), *Electric vehicle batteries alone could satisfy short-term grid storage demand by as early as 2030*.

18 BNEF (2024), *Energy 2H 2024 Energy Storage Market Outlook*.

19 Systemiq analysis for the ETC.

EXHIBIT 1

Demand side flexibility options have a range of capital expenditure

No/limited capex → Increasing capex

Examples of solutions	Details	Capex considerations
Pre-heating / pre-cooling	Heating or cooling a building before it's needed, keeping the space warm/cool during the peak demand period	**No additional capex** required in **well insulated buildings** – simply involves turning on heating/cooling earlier
Smart appliances	Appliances like washing machines or dishwashers that automatically operate at optimal times	**No additional capex** – most modern smart appliances **come equipped** with shifting capabilities
EV smart charging	**Shifting charging load** to optimal times	**No additional capex – smart wall box** is often provided with the vehicle or charging system
Shifting data centre demand geographically	**Moving computing tasks** across data centres to optimal times	**Low additional capex – software-based** solutions where data centre network is in existence
Water tanks in homes	**Storing heated** water during off-peak hours to be used during peak times	**Moderate capex** for installation of water tanks, if not already installed
"Smart" building management system	Centralised system that **automates and optimises energy use in commercial buildings**	**Moderate capex** required for **installation of sensors and controls**
Heat battery-boiler	Stores heat that can be used during peak demand period	**Requires capex** involving specialised installation
Industrial load management	Automatically **controlling industrial processes** based on grid signals	**Requires capex** in automated control systems and infrastructure
Additional distributed energy resources (DERs)	Solar PV and batteries installed behind the metre and connected to the local grid	**Requires capex** for installation

Source: Systemiq analysis for the ETC.

3. Significant potential for demand side flexibility

Overall, the ETC's analysis suggests that a third of global electricity demand in 2050 could be flexible – roughly equivalent to today's entire electricity consumption [Exhibit 2]. This flexibility could fundamentally reshape grid dynamics by smoothing peak loads, lowering system costs, and enabling higher shares of renewables.

To assess the global flexibility potential across buildings, industry, and road transport, the ETC takes a 3-step methodology.[20] The first step takes the 2050 electricity demand by type of use. From this, the ETC estimates the proportion of electricity demand that could theoretically be shed or time-shifted without disrupting living comfort, mobility needs, or industrial processes. Finally, the ETC refines this assessment to estimate realistic flexibility potential, factoring in technology deployment, economic viability, behavioural barriers and likely policy support.

20 The ETC's focus on flexibility potential in buildings, heavy industry, and passenger EVs stems from their significant share of electricity consumption and their clear flexibility routes. By contrast, sectors like shipping and aviation consume a smaller portion of electricity and rely more heavily on direct fuel use. Additionally, their electrified components often offer limited flexibility due to operational constraints or minimal load variability.

Demand side flexibility can play a significant role:

- **Buildings:** Flexibility is enabled by smart energy management systems, including automated controls and smart metres. Key flexibility routes for building heating and cooling include reversible heat pumps for pre-heating or cooling, heat storage systems like water tanks, if not already installed, smart appliances, and behind-the-metre battery storage systems.
- **Industry:** Thermal energy storage systems (e.g., battery-boilers), flexible industrial processes, and hydrogen production via electrolysis provide substantial flexibility potential.
- **Road transport:** Smart charging for EVs offers a critical avenue for shifting demand. These specific flexibility solutions are explored in more detail in the following sections.

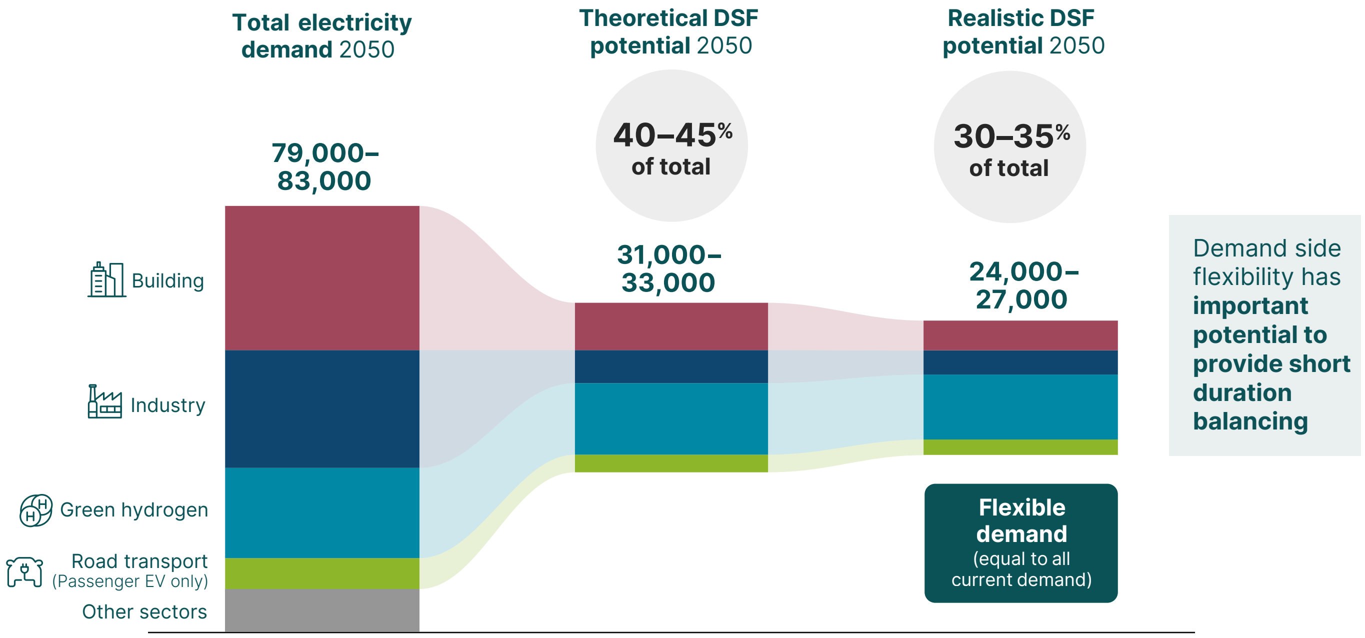
Realising this flexibility potential will require overcoming specific barriers, such as inadequate regulations, new business models, and high costs in some cases. A critical variable is the level and overall confidence of consumer adoption, as well as potential variations in electrification rates across industry sectors. Additionally, the scalability of certain technologies, like heat battery-boilers, relies on supportive infrastructure and robust market incentives.

EXHIBIT 2

Around 30% of overall electricity demand in 2050 could be flexible

Global electricity demand and DSF potential, 2050

TWh



Note: To assess demand side flexibility (DSF) potential, we start by looking at theoretical potential — the maximum flexibility we could achieve if all technology and behaviour changes were fully adopted. Then, we evaluate realistic potential, which considers practical barriers including technological, economic, policy and behaviour. This approach helps us understand both the ideal possibilities and what can be realistically achieved in the near term. ACF refers to the ETC's Accelerated but Feasible Scenario, PBS refers to the ETC's Possible but Stretching Scenario. The ACF Scenario is clearly technically and economically feasible, but in some sectors will require more forceful policy support than currently in place. The PBS Scenario is also technically and economically feasible, but would require significant strengthening of current commitments and policies. The ACF is a 2°C scenario and the PBS is 1.5°C scenario.

Source: Systemiq analysis for the ETC; IEA (2024), *World Energy Outlook 2024*; RMI (2023), *Unlocking demand-side flexibility in China*; Macquarie (2020), *Flexibility of Hydrogen Electrolysers*; IEA (2024), *Global EV Outlook 2024*; World Electric Vehicle Journal (2019), *Flexibility of EV demand*.

Demand-side flexibility potential by sector:

Buildings

Global electricity demand from buildings is expected to more than double by 2050, from around 13,000 TWh in 2023 to approximately 23–26,000 TWh in the ETC scenarios. This rise is driven by increased urbanisation, the electrification of heating systems, and expanded use of cooling technologies.

By 2050, under the ACF scenario, roughly 35% of building electricity demand could theoretically become flexible, but realistically, only around 20% may be achievable given current and anticipated technological and infrastructure developments [Exhibit 3]. This flexibility is primarily enabled by innovations in thermal energy storage and smart management systems.

- **Heating and cooling flexibility** is achieved by leveraging **thermal energy storage** such as heat batteries, or via time shifting heating and cooling enabled by **insulation.**
- **Lighting and appliance flexibility** can be enhanced with smart technologies and automated building management systems.
- **Overall, commercial buildings face fewer barriers to flexibility than residential buildings due to centralised systems and access to capital and resources.**

Industry

Global electricity demand from the industrial sector (including indirect electricity use, for the production of green hydrogen) is anticipated to surge from around 8,000 TWh in 2023 to approximately 38,000 TWh in ACF and 41,000 TWh in PBS by 2050, with electrified industrial heat expected to account for roughly 27% and hydrogen production for 45% of this total [Exhibit 3].

By 2050, under the ACF scenario, around 45% of industrial demand could realistically become flexible, largely driven by the unique potential of hydrogen production, which is expected to contribute over 75% of this flexibility.

- **Electrified industrial heat** can become a significant source of flexibility, especially when paired with **heat storage.**
- **Batch processes,** such as food production, can be adjusted or paused without significant impact on output. In contrast, **continuous processes** like iron processing are less flexible due to the operational constraints.
- **Data centres** are among the fastest-growing consumers of electricity globally, and demand side flexibility emerges as a vital solution for managing this demand efficiently. In addition to time shifting, there's theoretical potential for 100% load shifting through location flexibility – meaning shifting demand across borders.
- Green hydrogen production stands out as the biggest potential source of industrial flexibility. **Electrolysers,** which convert electricity into hydrogen, can ramp up or down based on grid needs (albeit at reduced efficiency).

Road Transport

As EV adoption accelerates, electricity demand for passenger EV charging is projected to soar from 180 TWh in 2023 to over 5,600 TWh in ACF and 8,000 in PBS by 2050. By 2050, under the ACF scenario, about 50% of this demand could realistically be flexible, largely enabled through smart charging and Vehicle-to-Grid (V2G) technology [Exhibit 3].

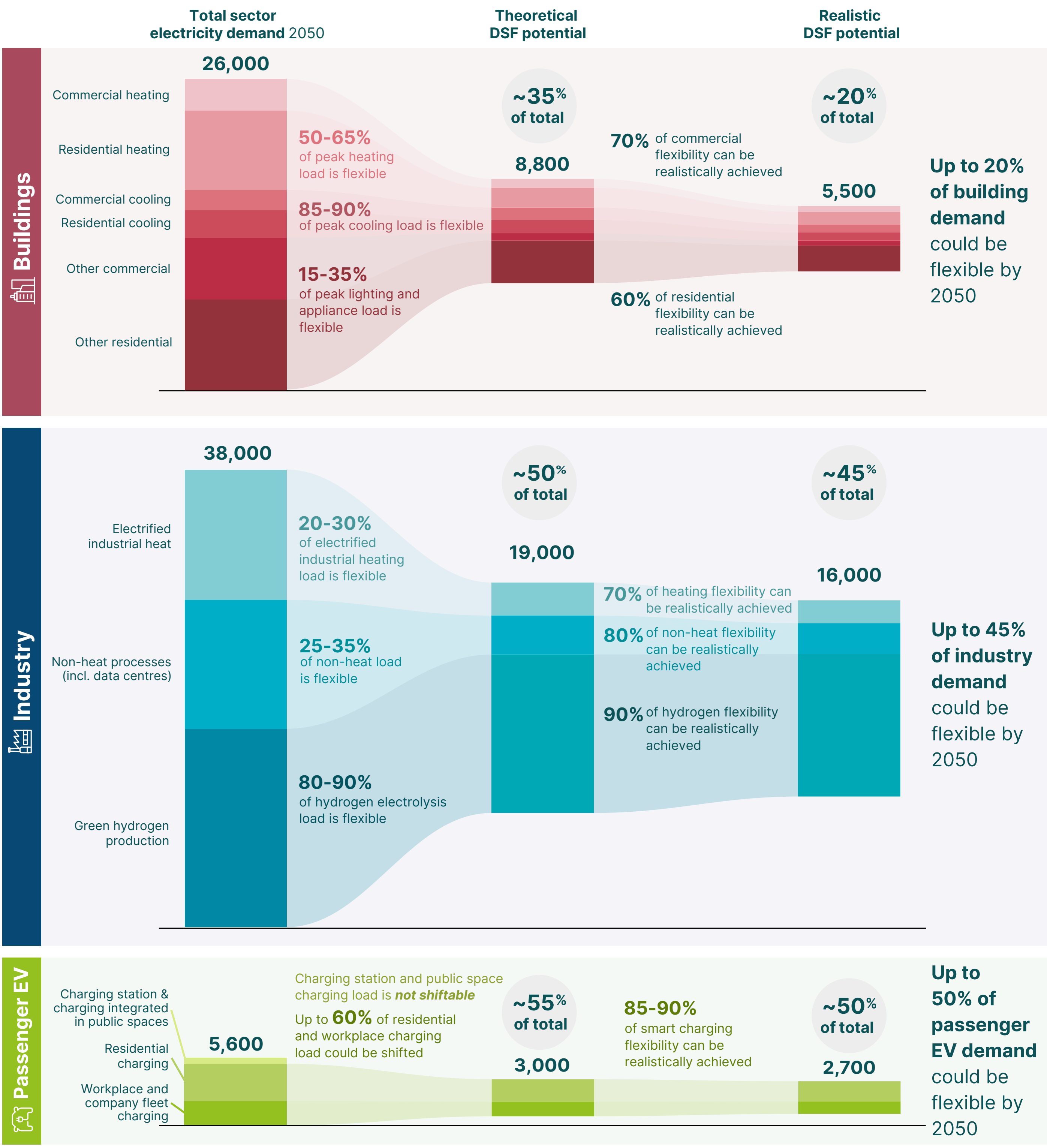
- **Smart charging** solutions enable EVs to charge during times of low demand or high renewable generation based on grid signals. This technology is **practically capex-free** for EV owners who will already need to own a charger. This low-cost setup makes it more **economically feasible and policy-friendly,** allowing for **quicker adoption** at a larger scale.
- **V2G** technology offers additional flexibility by enabling EVs **to discharge power back into the grid.** However, V2G technology involves **higher capex** due to the need for bidirectional chargers and vehicle adaptations, and there are also concerns about battery degradation.

EXHIBIT 3

Significant potential for DSF across sectors

Global electricity demand and DSF potential

TWh *Shares based on ETC ACF Scenario*



Note: Energy consumption in buildings follows predictable patterns, such as higher heating demand during mornings and evenings. This approach allows consumers to shift energy use from peak to off-peak times, directly reducing stress on the grid during high-demand periods. Our analysis focuses on the flexibility potential of peak load. **Source:** Systemiq analysis for the ETC; IEA (2024), *World Energy Outlook 2024*.

Note: Industry includes the production of green hydrogen, for all use cases. Defining industry demand peak load is challenging due to the variability in production cycles, differing energy needs across processes, and the influence of external factors like market demand. This complexity makes it harder to pinpoint peak periods, so our analysis focuses on overall flexibility potential which could be deployed in response to peak periods on the overall grid, rather than specific peak load patterns, unlike more predictable sectors like residential heating. The flexibility potential is also based on current industry outlook – the potential could be much higher if we see a high uptake of heat battery and storage taking place in 2050. **Source:** Systemiq analysis for the ETC; RMI (2023), *Unlocking demand-side flexibility in China*; Macquarie (2020), *Flexibility of Hydrogen Electrolysers*.

Note: Our analysis focuses on the flexibility potential of peak charging load. **Source:** Systemiq analysis for the ETC; IEA (2024), *Global EV Outlook 2024*; World Electric Vehicle Journal (2019), *Flexibility of EV demand.*

4. Unlocking the potential of demand side flexibility

To deliver clean power systems, scaling storage and expanding grids, including long distance transmission, are critical, and will remain indispensable to handle the projected demand surges and variable renewable generation. However, **demand side flexibility is a critical solution required that should be developed for a resilient, low-carbon power system.**

Across the full set of demand side flexibility available options should be prioritised based on their cost, barriers to implementation, efficiency, and potential for automation. High-priority solutions should be low-cost and low-barrier, such as pre-heating and pre-cooling in insulated buildings. For commercial applications, building management systems should be prioritised, as well as EV smart charging across both residential and commercial premises. Lower-priority solutions, which involve higher costs and barriers, include V2G technology as well as shifting demand for continuous industrial processes.

Driving demand side flexibility adoption at scale will require an integrated approach across several key enablers [Exhibit 4]. Enabling technologies, such as smart metres, and intelligent **management software** and real-time data sharing can enable coordination across the grid. **However, in addition to technical solutions, demand flexibility routes will rely on several other levers. Some of these include:**

- **Market reforms** that expand Distribution System Operators (DSOs)/Transmission System Operators (TSOs) flexibility procurement capabilities to enhance participation.
- **Pricing mechanisms,** such as time-of-use tariffs. For example, in 2018, Kenya introduced a time-of-use tariff to encourage large consumers, such as factories, to cut electricity use during off-peak hours by offering a discount of 50%.[21]
- **Financial support.** For example, Energy Service Companies (ESCOs) can spread capital costs across multiple users and reduce the financial burden on individual customers by bundling and managing demand side flexibility solutions.
- **Behavioural change,** as transparency of value, awareness and trust in demand side flexibility systems can drive wider adoption and lower transaction costs. This is showcased in Hong Kong's reward point programme, which incentivised consumers to lower load during hot summer evenings that typically spike air conditioning use, in exchange for reward points which could be redeemed for food coupons, smart appliances, and more.[22]

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21 CleanTechnica (2022), *Kenya's Energy Regulator Approves New e-Mobility Specific Electricity Tariffs & New Time of Use Tariffs.*

22 CLP (2022), *Residential Customers Save 300,000 kWh of Electricity in 4 Hours Responding to CLP's Energy-Saving Missions in Hot Summer Evenings.*

EXHIBIT 4

Key enablers for driving demand side flexibility adoption

Hardware	Accelerate adoption of **smart meters** and **asset metering devices** through regulation and financing.
Software	i) Software to enable **automated interactions** between end-user and flexibility provider. ii) Software to enable **optimisation of electricity use** for the end-user across all devices. iii) Software to enable **integration across TSO and DSO**.
Data exchange	Establish clear rules on **data usage, exchange** and **interoperability standards.**
Pricing structures	Implement **time-of-use tariffs**, **real-time pricing**, wholesale **price signals** that can be used to incentivise flexibility at all consumer levels in real time.
Cost	**Reduce barriers to entry** via financing through **financial institutions and government-backed grants.**
Market reform	Enable DSOs/TSOs to expand **flexibility procurement capabilities** and **streamline the export process** for grid-connected consumers, including via dynamic operating envelopes.
Behaviour change	**Reveal the value of DSF** to consumers through simplifying the offer, encouraging greater energy literacy, and transparent, personal billing.
Other	Leverage other policy as incentives, such as **building codes, EPCs.**

Source: Systemiq analysis for The ETC.

5. Updating NDCs to progress the flexibility opportunity

As countries gear up to increase ambition of NDCs in February, it is critical to recognise that demand side flexibility can help to deliver a cost-effective and scalable solution to deliver cleaner power systems at faster pace and lower cost. Alongside deployment of clean generation capacity, with clear capacity deployment targets of grids, storage, and demand side flexibility is critical. It is essential for effective NDCs to support high ambition emissions reductions targets with strong power decarbonisation aims, including grid emissions intensity and renewable deployment targets. This must be supported by clear strategies to deliver with clear capacity deployment targets of grids, storage and demand side flexibility and targeted policies and implementation strategies including on market design, grid regulation and strategies to increase consumer engagement and trust.

In 2025, the ETC will be publishing a comprehensive view of routes for optimising power flows, enhancing system resilience, and supporting a clean, electrified future.

For further information see www.energy-transitions.org
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