FLEXFORUM

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Electricity Authority

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FlexForum advice on rewarding industrial demand flexibility

FlexForum exists to support coordinated and collaborative action across the electricity ecosystem to make it easy and routine for households, businesses, communities to maximise the value of their distributed and flexible resources.

We are an incorporated society with 42 Members from across the electricity ecosystem.[1] Our touchstone is the Flexibility Plan; a whole-of-system list of the practical steps and actions needed to make it easy for people to maximise the value of flexible resources and support the affordable and reliable operation of the electricity market and system.

Flexibility[2] is our focus because it is central to an affordable, sustainable, reliable and consumer-centric electricity market and system.

This advice draws on the conclusions FlexForum reached about the nature and causes of several holes in the value stack. These holes are the main reason that flexibility from all sources, including large industrial and commercial electricity users, is an under-used bit player in the power system.

We have three points:

- treat all flexibility equally
- focus on the underlying problems
- the proposals are a good starting point, but will not address the problems which are preventing the efficient use of all sources of flexibility.

Treat all flexibility equally

Back in October 2022, BCG said a smart system evolution provided the most desirable pathway to a sustainable, reliable and resilient and affordable energy system. The smart system involves a bunch of investment, including 'about 5 GW of additional renewable generation capacity, supplemented with approximately 1 GW of supply-side and **2 GW of demand-side flexibility to be developed each decade**'.

[1] The list of FlexForum Members is available at https://flexforum.nz/about/. Members include: gentailers, retailers, metering services suppliers, electric vehicle charger manufacturers, energy management software firms, Transpower, distributors, solutions providers, universities, and some real people.

[2] Flexibility is the modification of generation injection and consumption patterns, on an individual or aggregated level, often in reaction to an external signal, to provide a service to the owner or within the power system.

Hitting this target relies on leveraging all sources of flexibility by enabling households, businesses (small and large) and communities to take their flexibility journey and 'say yes to flex'. We could not find a comprehensive assessment of the stock of flexibility currently deployed in the system.[3] Our initial best endeavours estimate indicates there is between 560 MW and 1060 MW of flexibility from all sources currently deployed in the system.[4] We have low confidence that the stock of deployed flexibility is actually at the upper end of the range.[5]

Industrial flexibility is not 'easier' or 'better' or 'faster' than other sources of flexibility. Household and smaller scale flexibility can potentially be accessed more easily and faster.

- All sources of latent flexibility require the owner to say yes to flex and require connectivity investments to integrate[6] the resource into the market and system arrangements.
- Industrial flexibility may also require investment in business process changes to enable access to the full flexibility potential at a site. Although most large electricity users can reduce power use when spot prices are very high (but use financial hedges to manage high prices), process changes may be needed.
- Household and business flexibility can potentially be accessed just as easily by leveraging existing or retrofitting connectivity, subject to the price (or incentive) being right. Scale can be achieved quickly. For example, Solarzero was able to add about 15MW of dependable flexibility to its portfolio over a few months in 2023.
- Electricity retailers and aggregators have the best capability to 'engage with new mechanisms and deliver benefits…' and represent an effective gateway to quickly access the latent flexibility of both industrial and household customers via customer propositions based on available and new cash signals. The key to opening the gate is to fill the holes in the value stack to support development of a wider range of flexible propositions for all customer types - large industrials, small and medium enterprises, communities and households.

Focus on the underlying problems

All sources of flexibility are underused due to holes in the value stack. These holes are the result of outdated pricing mechanisms not providing the cash signals needed to efficiently motivate and incentivise flexible responses.

As recognised by the Authority 'Under current settings, it is arguable that demand flexibility is under-incentivised and that more should be done'. We would go further and say that all sources of flexibility are under-incentivised, particularly flexibility able to provide a dependable response to unpredictable network and market conditions. This is evident through the relatively small number of opportunities for flexibility across the system.

The immediate reason for flexibility being a bit player is 'current pricing arrangements do not provide sufficient incentives.' FlexForum conclusions on this situation are:

- There are very few customer propositions asking people to say yes to flex. Most propositions today offer a predictable price – whether flat or TOU rates – which asks for a predictable response. The reasons include individual preferences (eg, for low, predictable power costs), low levels of integration (of

[3] 'Currently deployed in the system' means the resource is currently actively deployed for network, retail or system use cases. It does not include consumer response to TOU tariffs, as this is simply too difficult to estimate, and is not routinely deployable in response to system conditions.

[4] This is an initial estimate developed using public information and expert insights. We have low confidence in the upper range estimate of 1060 MW. More work is needed to provide a comprehensive assessment of the stock of currently deployed flexibility.

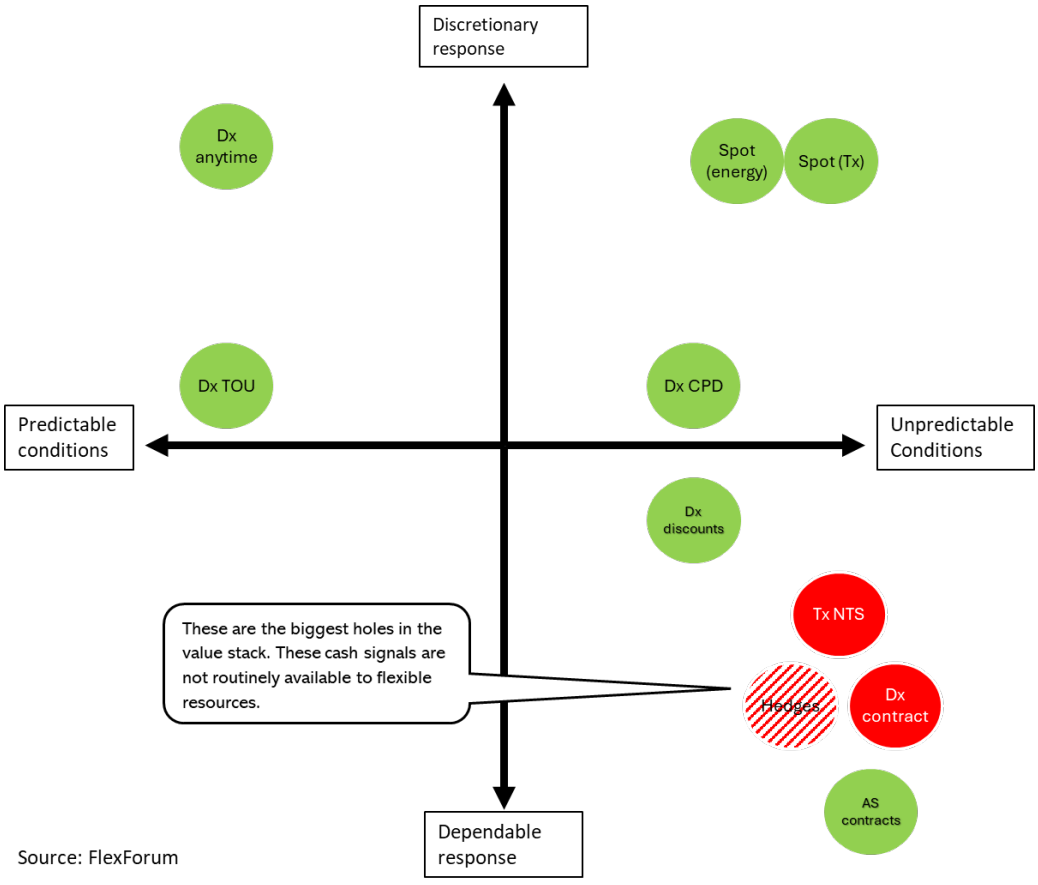
[5] The main difference between the low end and high end of this range is how much ripple controlled hot water is actually deployed nationally across all use cases by distributors and retailers. The only figure in the public domain is Concept (2020), which estimated 644MW of ripple control hot water was available in 2020 during peak periods. However, the inputs into this figure are not publicly available.

[6] Flexible resources are most useful and valuable when integrated into the system. Integration means a resource is plugged into a set of open access communication pathways and the counterparty relationships which are needed to enable the routine use of flexibility.

flexibility), and ease of implementation from a retailer's perspective. Industrial customers are not so different from households. They also have individual preferences (eg, for low, predictable power costs) and not much flexibility.

- The power system has been built and operated based on predictable use patterns. Flexibility is less useful (and therefore less valuable) in a predictable environment. Pricing mechanisms which provide cash signals to incentivise and motivate flexible responses have not been needed. Network operators have been able to plan and invest based on predictable network usage profiles. Retailers have calculated retail prices based on averaging electricity input costs and predictable electricity usage profiles.
- Things are becoming less predictable. This creates an opportunity to use the growing stock of flexibility resources to respond to the more volatile and less predictable network and market conditions.
- New cash signals are needed because the benefit of responding to existing signals is not sufficient. The responses need to be dependable (dispatchable) to be a dependable alternative to poles, pylons and power stations. Dependable flexibility involves the costs of investments to develop and maintain the connectivity infrastructure and the opportunity costs of flexing usage or generation.

This figure highlights the problem by plotting pricing mechanisms based on the type of response (discretionary or dependable) and the type of conditions (predictable or unpredictable).



Source: FlexForum

Notes: The red circles represent insufficient or missing pricing mechanisms to provide cash signals to motivate and incentivise a dependable flexible response to unpredictable transmission, distribution and electricity conditions.

FlexForum considers the underlying reason the new cash signals needed to underpin a wider range of flexible propositions are not emerging is that retailers and network operators do not face sufficient financial and non-financial incentives to develop them.

This paraphrased extract from the FlexForum Insights on the nature and causes of the holes in the value stack provides more detail on the barriers to the development of new cash signals.

Solving these problems will strengthen incentives for network operators and retailers to create the cash signals required to efficiently reward all sources of flexibility.

Practical and capability-related barriers	Financial and risk-related barriers
Insufficient experience and know-how with practical use of distributed flexibility	Flexibility is not commercially attractive compared to other investment priorities even when it is the efficient solution
Integration of flexible resources into the system requires development of common market infrastructure such as communications pathways, contractual frameworks and cash signals	

There is **not yet enough experience with using flexibility** to know it is dependable. Using flexibility to manage network congestion or other purposes requires a business case to commit to the investment and expenditure. The decision maker – executive or board – will want assurances the proposal stacks up and will do the job. Key concerns for decision-makers include:

- The difficulty with proving that sufficient flexibility will be available when it is wanted. A lot of flexibility is latent[7] and is not integrated into the system.
- Uncertainty about the lifespan of a flexibility solution. For example, a distributor would mainly use flexibility to defer reinforcement. At some point, the flexibility solution will be substituted for poles and wires and the cash signal will not be needed or efficient. A lack of experience with forecasting how long flexibility will be used has implications for the expected solution cost and the resulting cash signal with both over and under-estimates[8] have potential adverse consequences.

Integrating flexible resources involves common costs. Flexible resources are most useful and valuable when integrated into the system. Integration means a resource is plugged in to open access communication pathways and counterparty relationships. These things require a common market infrastructure to be developed via a collective effort or regulatory intervention.

Flexible solutions may be efficient but not commercially attractive because financial incentives are not sufficient to motivate network operators and retailers to buy flexibility when it is the most efficient option, or to invest in integration and developing experience with flexible resources.

Network operators will continue to prefer capital expenditure and building more network (capex) to using flexibility (opex). Although the equal treatment of capex and opex (ie, totex) strengthens financial incentives to use flexibility, opex options will never be as commercially attractive while there is no way to earn a commercial return, or grow enterprise value, from opex. In this context, the motivation to invest in and use flexibility is the result of non-financial incentives arising from local factors such as adverse reliability impacts or not being able to build fast enough.

Historically, retailers with generation mostly had adequate tools for managing price risk, even if these tools did not represent the lowest operating cost solutions. Today, extra tools, including flexibility, are needed to manage increased spot price volatility[9], but investments by individual retailers to enable flexibility are in early stages and narrowly focused due to:

[7] FlexForum estimated between 280 to 420 megawatts of flexibility may be available at any one time from residential and commercial space heating and cooling equipment, hot water, EVs and EV chargers, and battery storage. Our estimates are supported by Electricity Authority survey findings indicating about 450MW of demand-side flexibility could be available now, including 160MW of reported hot water and ripple control, which may already be offered into the reserve market. Findings from the Orion and Wellington Electricity Resiflex project include the potential to harness 280MW of flexibility by creating a cash signal and customer proposition.

[8] Over-estimating the solution duration could mean committing to paying for unnecessary flexibility. Under-estimating the solution duration could adversely affect reliability.

[9] As reported by the Market Development Advisory Group, a higher renewables-based system will lead to more volatile spot prices, and potentially that some market participants will be 'short flexibility', even though they own significant generation assets. This will require

- Concerns about a first-mover penalty because investments in integration are rivalrous but non-excludable and someone else could reap the benefit without incurring your costs. Decision makers may want assurances that early-stage investments will deliver a guaranteed revenue stream.
- The relatively small scale of investments. With finite time, executives and boards prefer to prioritise, for example, a $100 million windfarm investment over a $10 million flexibility investment, particularly when the flexibility investment may not deliver guaranteed MW and holes in the value stack causes holes in the business case.
- The ability to offer flexible customer propositions greatly relies on a retailer's customer management and billing system. Each retailer has a list of IT system investments to prioritise. Building capability to offer a proposition which might only initially be attractive to a small number of customers is unlikely to be prioritised without a clear incentive and motivation, e.g., from a regulatory expectation or from a sudden surge of interest from people in that type of product.

The proposed actions are a good starting point

The proposed actions are a good starting point but will not address the problems which are preventing the efficient use of all sources of flexibility.

Specific comments on the 11 proposals are provided in the Appendix.

We think effective solutions are best identified through:

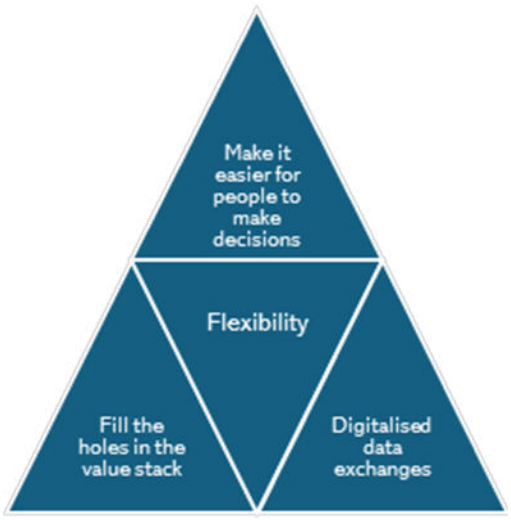
- A whole-of-system approach to integrate flexibility. Industrial flexibility does not have any unique characteristics which makes it easier or faster. We need a set of solutions to address the problems for all sources of flexibility.
- More urgency – waiting until 2029 to consider options for future markets, platforms of other mechanisms to enable efficient flexibility is leaving things to the last minute, making it difficult to be confident of achieving the BCG target of 2 GW of flexibility each decade as part of a smart system.

A whole-of-system approach to integrate flexibility

Flexibility Plan 2.0 outlines 41 steps and tasks to realise the value and benefits of flexibility. There are no flexibility source specific tasks. Flexibility is flexibility.

Most tasks in the plan involve developing 'back-office' capabilities, processes or practices to integrate flexible resources into the market and system by filling holes in the value stack and enabling digitalised data exchanges. Effort is also required to make it easier for people to make decisions about flexibility.

new tools, including flexibility, to manage increased spot price volatility, which, until recently, have been provided by flexible supply-side resources such as gas peakers.



Prioritising efforts in each of these areas will most effectively address the underlying problems and accelerate the efficient use of all sources of flexibility. Specific actions to focus on are listed in the Appendix (refer comments on proposal # 6). These actions are drawn from the 2024 assessment of progress with the Flexibility Plan and this advice on the 3 proposals to empower electricity consumers.

More urgency is possible and necessary

BCG said a smart system evolution provided the most desirable pathway to a sustainable, reliable and resilient and affordable energy system. The smart system involves a bunch of investment about 2GW of demand-side flex in the 2020s, 1.7GW in the 2030s and 2.1GW in the 2040s.

Based on our best endeavours estimates, we have 4.5 years to find, or encourage into the system, somewhere between 1 GW and 1.5 GW of flexibility to hit the 2 GW target BCG said is needed by 2030 to realise the economic benefits of the preferred smart system pathway.

Achieving this target, and the associated benefits, relies on the electricity ecosystem delivering a long list of tasks to enable households, businesses and communities to find it easy and routine to say yes to flex.

The Authority is fundamental to the pace of progress and is working on several tasks which are or could support delivering the tasks in Flexibility Plan 2.0. However, no single party can do the job on its own. FlexForum sees an opportunity for the Authority to support faster progress by 'outsourcing' market development activity to industry experts while focusing its efforts on issues where there are obvious irreconcilable views and to complete the Code amendment process.

We see and appreciate the growing use of working groups, hui and workshops, but consider the Authority can further step up its coordination and collaboration game to make faster progress. Doing things differently means at a minimum making a serious effort to try this approach for regulatory and policy work that requires understanding and exploring how to get stuff done. As an example, FlexForum has been able to deliver a robust, expert consensus on contentious topics within 3-4 months.

Concluding points

Industrial flexibility does not have any unique characteristics which makes it easier or faster than other sources of flexibility.

FlexForum suggests the Authority take a whole-of-system approach to enable the efficient use of all sources of flexibility. The proposed actions are a good starting point, but are not sufficient to address the problems which are preventing the efficient use of either industrial or all other sources of flexibility. Specific comments on the 11 proposals are provided in the Appendix.

We recommend the Authority identify solutions by convening a series of structured open workshops to identify facts and issues and enable the iterative exploration and testing of ideas.

We consider these workshops would be more effective, enjoyable and faster than further rounds of written consultation.

Faster progress is critical. Waiting until 2029 to consider options for future markets, platforms of other mechanisms to enable efficient flexibility is leaving things to the last minute, making it difficult to be confident of achieving the BCG target of 2 GW of flexibility by 2030.

This is FlexForum advice. Individual FlexForum Members will have their own perspectives and positions.

You can contact FlexForum at info@flexforum.nz with any questions and to arrange further discussion.

Appendix: assessment of proposals

#	Proposal	FlexForum perspective
1.	Establish an Emergency Reserve Scheme to provide a peak capacity tool where industrial demand flexibility could be activated before involuntary load shedding, with compensation for participants. Scheme design in 2025. In place by Winter 2026	The proposal is a last resort option which does not directly address the underlying problems. The need for last resort tools would be much reduced if retailers had sufficient incentives to purchase flexibility and did not face a collective action problem for integration investments. Focus on this proposal should not distract or divert effort to deliver solutions which create the enduring cash signal required to effectively fill holes in the value stack. We encourage focusing efforts on enduring solutions ahead of last resort schemes given "peak capacity risks, especially during cold snaps, will persist until there is sufficient investment in flexible resources such as batteries, demand response and peaking generation." This investment will be fast-tracked if motivated by a relevant enduring cash signal.
2.	Develop a standardised demand flexibility product to support bilateral arrangements between retailers and flexibility providers, including industrials and aggregators. Scheme design in 2025. In place by Winter 2026.	The proposal partly addresses the underlying problems. FF said 'A way to speed up development of propositions which incentivise and motivate dependable flexible responses to unpredictable events, such as high spot prices and network congestion, is to develop a suite of common risk management products focused on shift and shed-type flexibility. If nothing else, having these products in the market will enhance price transparency and signal what 'the market' thinks flexibility is worth.' To address the problems, the proposal needs to be complemented by actions to fast-track development of market infrastructure to integrate flexible resources into the system. This should strengthen incentives for retailers to routinely use flexibility for spot price risk management by mitigating concerns about a first mover penalty and higher investment risks from a competitor eating my flexibility lunch.
3.	Develop a new clause 2.16 notice for demand response contracted by EDBs and Transpower for consultation asap	Establishing a record of flexibility resources available and the services offered/provided at each location would provide equivalent transparency about the volumes and uses of flexibility. A more enduring solution could be to prioritise Flexibility Plan 2.0 step #28 Make changes to the registry to make flexible resources visible to the market and system.
4.	Develop and publish guidance for pilots and trials. Monitor and update guidance as necessary. Publish guidance in 2026.	FF is doing this and is currently developing a template to increase transparency. EA support would be welcome. We consider an effective first step is to increase transparency about the 'so what' of learning by doing, including how the project deliverable is expected to/does improve a specific outcome and the relevance to the wider ecosystem. This gap could be addressed by mapping projects to the Flexibility Plan. We have discussed the opportunity to increase transparency with the Electricity Authority about the Power innovation pathway projects and with the EEA about the scan projects. More transparency will enable more effective assessment of progress and more targeted advice about what learning is needed. Our 2024 progress report highlighted a lack of focus on the discover/assess phases (ie, the customer) of the Flexibility Plan. The 2025 progress report will be available in September.
5.	Publish information about the use of demand response. From early 2026 after action 3 is finished.	See comment on proposal 3.
6.	Explore Code or other changes to enable third-party providers to participate in the provision of flexibility services by industrial demand flexibility across all market and contractual mechanisms (including hedging). 2026	Flexibility Plan 2.0 lists the steps required to enable third parties / flexibility coordinators to participate in the electricity market. There are 3 interdependent sets of tasks: **Make it easier for people to make decisions about flexibility** • #2 Determine if people can easily get information about their existing electricity retail rates and charges. • #9 Introduce rules to require data holders (eg, retailers) to instantaneously respond to requests by a person or their agent for usage data from the data holder.

#	Proposal	FlexForum perspective
		• #12 Determine the options to make it easy for people to compare their connection options and costs with and without flexibility. **Fill the holes in the value stack** • #7 Develop an initial common description of the use cases for each electricity outcome • #10 Develop and deliver a plan to provide cash signals which are accurate (as possible), give easy access to benefits, and motivate efficient responses. • #24 Identify and develop mechanisms for exchanging flexibility for each use case which are low cost, support liquidity and participation and make it easy for people to maximise the benefits of their flexibility. Enable digitalised data exchanges between data holders and data users • #9 Introduce rules to require data holders (eg, retailers) to instantaneously respond to requests by a person or their agent for usage data from the data holder • #19 Develop a common minimum functionality for each flexibility use case so the same device can provide the same services across the country. • #28 Make changes to the registry to make flexible resources visible to the market and system • #30 Develop a minimum set of operational visibility requirements and capability to support integration of flexible resources into distribution networks and the system. • #31 Develop a minimum set of forecasting requirements and capability to support integration of flexible resources into distribution networks and the system. • #36 Develop a common approach to connectivity which easily integrates and maximises the value of flexible resources. • #39 Identify the functions, capability and roles required to coordinate a power system with multi-directional power flows and flexibility.
7.	Explore Code or other changes to enable new or upgraded connections to be 'demand response ready'. 2026-2027	Flexibility Plan 2.0 lists the steps required to enable new and upgraded connections to be demand response ready. Key steps are: • #8 Develop and distribute information for people and expert advisers about flexibility options and potential solutions • #12 Determine the options to make it easy for people to compare their connection options and costs with and without flexibility. • #16 Develop guides describing the network connection implications and requirements of typical flexibility solutions • #19 Develop a common minimum functionality for each flexibility use case so the same device can provide the same services across the country • #21 Develop a common technical standard for devices, including but not limited to flexible resources, connected to a network which can individually affect network performance or safety. • #22 Develop network connection application and delivery processes which make it easy for people and distributors to connect flexible resources as quickly as possible.
8.	Monitor the use of demand response for non network solutions and evaluate need for enhanced regulatory requirements. Late 2027	FlexForum found that financial incentives for flexibility-related investments are not sufficient and the investment that is happening is mostly motivated by conditions unique to each distributor. INTSA only partly addresses the barrier so distributors in aggregate are going to keep the foot on the flexibility brake. The Commission (and Authority) should start now to get data/evidence testing whether flexibility investments are due to local factors or universal incentives. It would also be useful to consider what financial and non-financial incentives could be used to move the foot to the accelerator. An option to consider is to introduce more granular, probabilistic and risk-informed quality standards from 2030.
9.	Monitor the use of demand response, including in pilots and trials, in New Zealand and internationally, and explore	FF will be reporting on progress annually. See comment on proposal 4.

#	Proposal	FlexForum perspective
	opportunities to enhance existing mechanisms. Ongoing	The Authority can help by publishing more detail on the projects participating in the power innovation pathway including the idea, the actual/perceived regulatory barriers confronted, and the actions being taken to address those barriers.
10.	Undertake post implementation reviews of Emergency Reserve Scheme and standardised demand flexibility product (if implemented) 2028	NA
11.	Consider options for flexibility services from demand response in the future, including new markets or platforms 2029+	More urgency is needed. Waiting until 2029 to consider options for future markets, platforms of other mechanisms to enable efficient flexibility is leaving things to the last minute, making it difficult to be confident of achieving the target of 2 GW of flexibility each decade.