Department for
Business, Energy
& Industrial Strategy

EVALUATION OF THE TRANSITIONAL ARRANGEMENTS FOR DEMAND SIDE RESPONSE

Phase 3 – Executive Summary

August 2018

Introduction

This report presents findings from the evaluation of the second auction of the Transitional Arrangements (TA) for Demand Side Response (DSR). The evaluation was undertaken for the Department for Business, Energy and Industrial Strategy (BEIS) by CAG Consultants, in partnership with Databuild, Verco and NERA Economic Consulting. This Phase 3 report covers findings about the second TA auction, while the future Phase 4 report will cover delivery of obligations for the second TA scheme. Findings from earlier phases can be found are on the www.gov.uk website[1].

Policy background

The TA is a pilot and forms part of the Capacity Market (CM) for security of electricity supply. The TA aims to encourage the development of DSR that is increasingly needed to balance supply and demand in a decarbonised electricity grid. This report uses the CM definition of DSR: the activity of reducing the metered volume of imported electricity of one or more customers below an established baseline, by means other than a permanent reduction in electricity use. Under this definition, DSR may be achieved through any combination of onsite generation, temporary demand reduction or load-shifting. We use the term 'turn-down' DSR to refer to the last two activities.

The TA scheme involved two auctions for specific types of capacity within the CM, the first for delivery of capacity in the 2016/17 delivery year[2], held in January 2016, and the second for delivery of capacity in 2017/18, held in March 2017. While the first TA scheme was open to all types of DSR and small-scale distribution-connected generation between 2 MW and 50 MW, the second TA scheme was only open to turn-down DSR and has a minimum threshold of 500 kW. The second TA had two main objectives: to encourage turn-down DSR and to contribute to the development of flexible capacity[3] for the future CM.

The TA auctions were additional to the main CM auctions[4] which are open to generation, storage and DSR capacity.The main steps in the TA process for each 'Capacity Market Unit' (CMU) are outlined in Figure A below, with drop-out points shown in pink. The main

[1] Findings from Phase 1 and 2 of the evaluation see: https://www.gov.uk/government/publications/evaluation-of-the-transitional-arrangements-phase-1 and https://www.gov.uk/government/publications/evaluation-of-the-transitional-arrangements-for-demand-side-response-phase-2

[2] The delivery year runs from 1st October of one year through to 30th September of the following year.

[3] By flexible capacity, we mean electricity demand and generating capacity that is able to increase or decrease in response to signals, to help balance supply and demand of electricity across the GB grid. For the purposes of the TA, flexible capacity does not include electrical storage.

[4] The main CM comprises the four-year ahead auctions (T-4) and the one-year ahead auctions (T-1) which will deliver capacity from 2018/19 onwards, and the Early Auction which is delivering capacity in 2017/18.

CM auctions follow a similar process. The grey steps had not occurred at the time of Phase 3 research and will be researched, where feasible, in Phase 4.

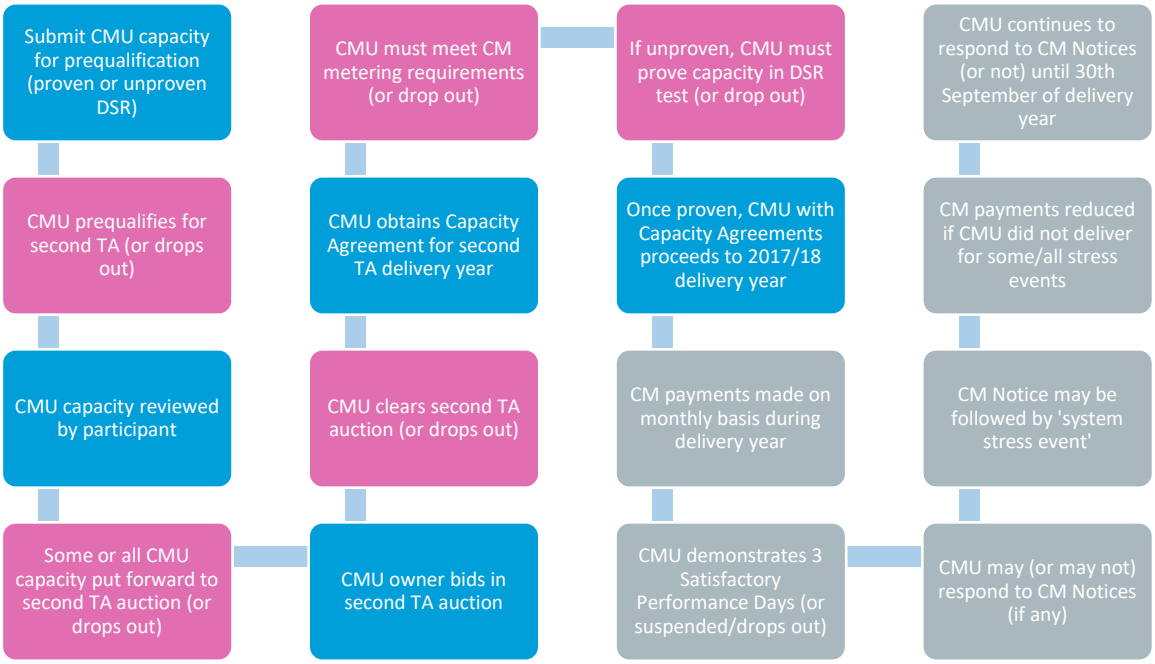

Figure A: Main steps in process for second TA

Evaluation aims and methodology

This evaluation is designed to answer five high-level questions (HLQs) posed by BEIS. This report presents findings that are relevant to HLQs 1, 2 and 4 for the second TA. It does not address HLQs 3 and 5[5], which will be covered in the Phase 4 report.

- HLQ 1 - What outcomes can be attributed to the TA and were they as intended by BEIS? What outcomes occurred for whom and under what circumstances?
- HLQ 2 - Through what levers and causal mechanisms has the TA contributed to these outcomes and the variation by group and circumstance?
- HLQ 4 - Which aspects of the TA's design and implementation account for the findings of HLQ 2 and 3?

[5] HLQ 3 - Did the TA represent good value for money to both scheme participants and the consumer?; HLQ 5- What are the implications of the findings for the future contribution of DSR and small-scale generation to the CM?

Our approach to this evaluation is realist and theory-based. A realist approach[6] emphasises the importance of understanding not only whether a policy contributes to outcomes (which may be intended or unintended) but how, for whom and in what circumstances. The development of a 'theory' of the TA is central to implementing a realist evaluation as it allows evaluators to rigorously examine the design and execution of the scheme, and test policy assumptions against available evidence. We developed an initial theoretical framework for Phase 3 of the evaluation, setting out the realist hypotheses that we tested against research evidence.

We gathered evidence during Phase 3 to test and revise the initial theoretical framework. This involved in-depth telephone interviews with representatives of 35 organisations from October to December 2017, including representatives of second TA participants, a sample of aggregator[7] clients and a sample of non-participants (both aggregators and individual organisations that could potentially have participated as clients or direct participants). An email survey was also sent to the TA participants and aggregator clients that were interviewed. Phase 3 evidence extended the information already gathered in Phases 1 and 2 of the evaluation.

The capacity provided through the second TA was characterised by matching meter point data from National Grid with commercially-available company databases, for CMUs that had passed testing at the time of Phase 3 research. We used a combination of data sources to identify the types of assets providing turn-down DSR on each site, and – where possible – the scale of capacity typically provided by each site. We aim to fill data gaps in Phase 4 research, as well as gathering further cost and revenue information.

Findings on participation in the second TA

The second TA auction, which was restricted to load turn-down DSR, attracted a lower volume of capacity (755 MW) than the first TA (1560 MW). This is because the latter was also open to back-up generation behind the meter and to small-scale, distribution-connected generation. The organisations attempting to prequalify capacity for the second TA were, with one exception, a subset of those that attempted to prequalify for the first TA.

Fourteen organisations attempted to qualify 47 Capacity Market Units (CMUs) for the second TA, putting forward 755 MW of turn-down DSR. As shown in Figure B, the final contracted DSR capacity going forward to delivery in the second TA was 293 MW of turn-down DSR, across 28 CMUs. Although the total volume of capacity was lower than the first TA, the volume of turn-down DSR was higher than the estimated 60-90 MW of turn-down DSR that went forward to delivery in the first TA.

[6] R Pawson, R, and Tilley, N. (1997) *Realistic Evaluation*. London: SAGE Publications Ltd; and Pawson, R. (2006) *Evidence-Based Policy*. London: SAGE Publications Ltd.

[7] An aggregator is an organisation that collates capacity from clients and puts it forward on their behalf.

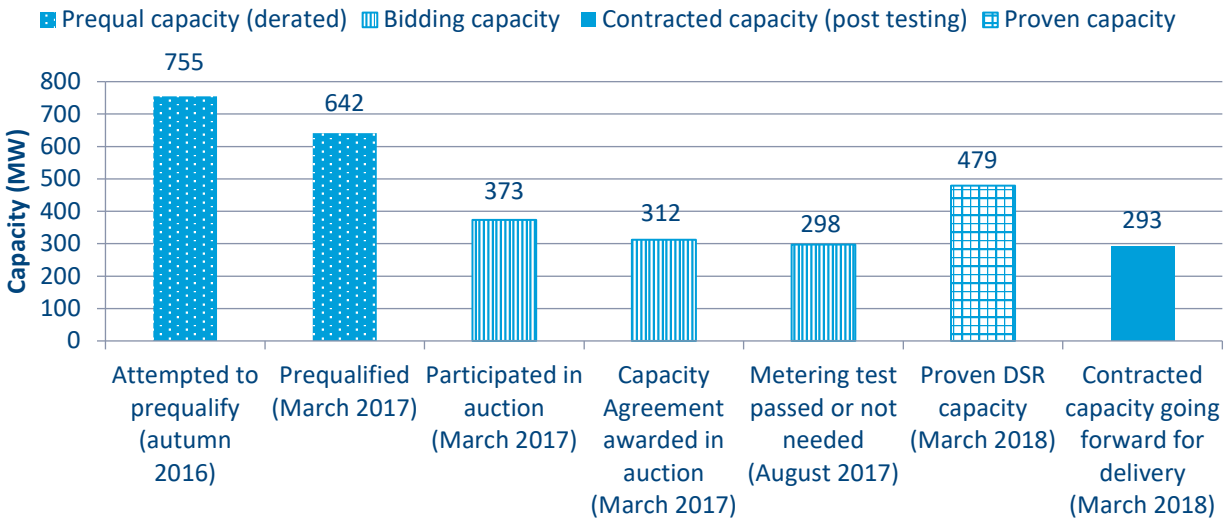

Figure B: MW of capacity participating in the stages of the second TA (source: CM register)

Aggregators contributed 82% of the capacity going forward to delivery in the second TA. Participating aggregators saw the second TA as an opportunity to build their business or build revenue for existing clients. Aggregators that chose not to participate regarded the TA as incompatible with their DSR portfolio or the timing of their business development.

Individual organisations that participated, whether directly or as aggregator clients, were able to offer turn-down DSR cost-effectively because they had sizeable sites suitable for turn-down DSR and did not face excessive upfront costs or excessive risks to their business. They tended to feel confident about delivering turn-down DSR because they were already doing 'self-despatch' of turn-down DSR for Triad management. Individual organisations that chose not to participate did so for technical reasons (e.g. their sites were unsuitable), because their sites were not cost-effective (e.g. too small to justify upfront costs), or because senior management were not persuaded of the business case for turn-down DSR and perceived it as too risky for their business.

Reasons for capacity changes in the second TA

293 MW (40%) of the capacity that participants attempted to prequalify for the second TA was proven and contracted for delivery. As shown in Figure C, the main drop-out point for capacity in the second TA was withdrawal of capacity before the auction (269 MW).

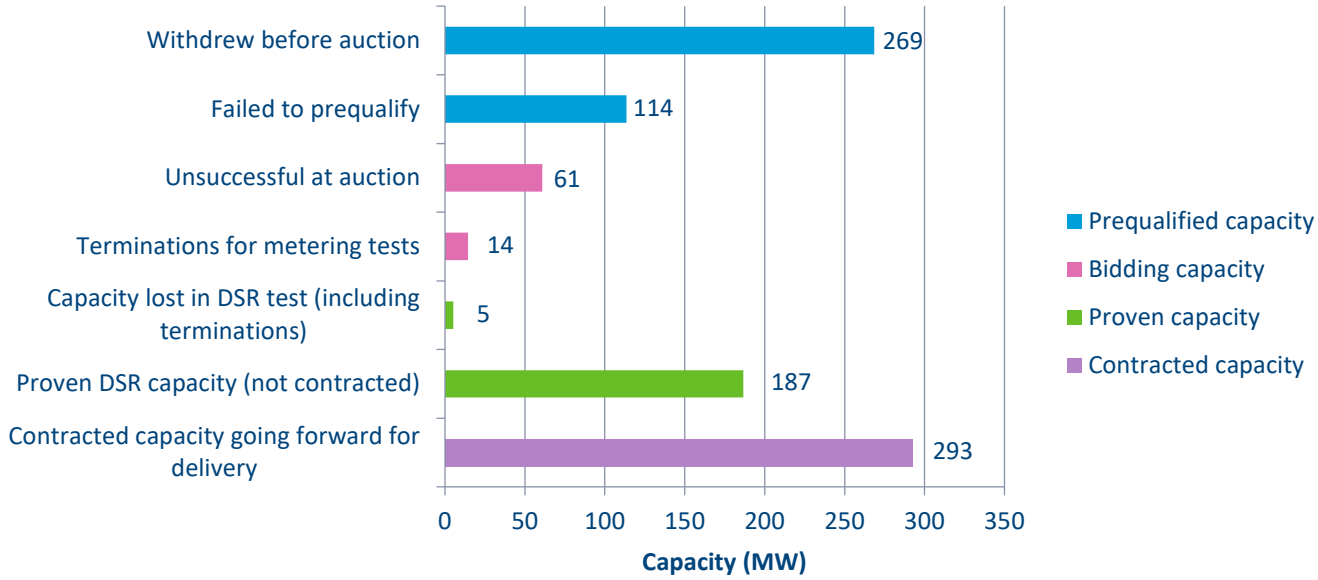

Figure C: Change in capacity provided in second TA, by steps in TA process

Withdrawal of capacity before the auction contributed to low liquidity in the second TA, which led to a high clearing price of £45/kW. Pre-auction drop-out was caused by changes in the circumstances of specific aggregator clients and downwards revisions in the capacity that aggregators and direct participants thought they could realistically contract in the second TA (in the light of the low clearing price in the Early Auction (£6.95/kW), just prior to the second TA auction).

There was little drop-out of capacity during the testing stage, after the auction. This was partly because of learning from the first TA and partly because the high price helped aggregators to attract clients.

Most participants overfilled their CMUs (i.e. lined up more capacity than strictly needed) as a precaution against losing capacity during testing or delivery. This resulted in 187 MW of additional capacity being 'proven' in DSR tests but not contracted for the second TA. As shown in Figure D, some CMUs were overfilled by more than 100%.

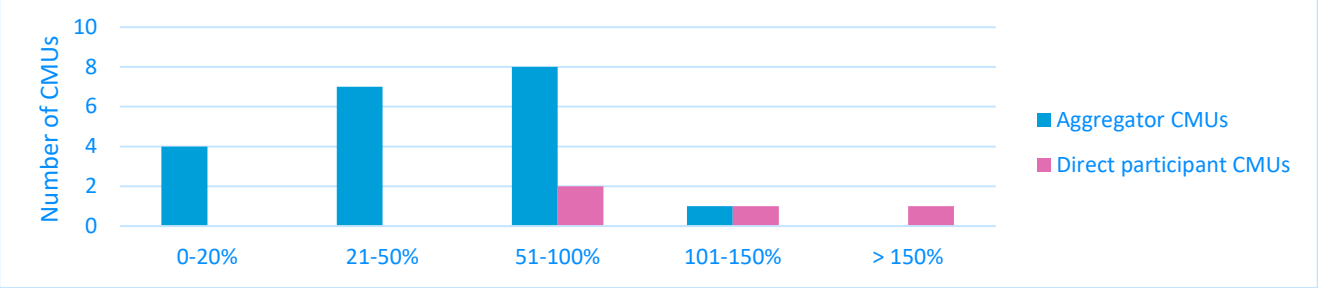

Figure D: Excess of proven capacity over contracted capacity for overfilled CMUs in second TA (as a proportion of contracted capacity) (%)

The high level of overfilling was driven largely by learning from the first TA (in which many aggregator CMUs failed to demonstrate their proven capacity) but was also enabled by the high clearing price for the second TA (which facilitated recruitment by aggregators and provided an incentive for participants to demonstrate their full capacity). This excess capacity might not be demonstrated in a stress event as this would occur at shorter notice, probably at a more inconvenient time and possibly for longer than the 30-minute DSR test window.

Early findings on topics to be researched further in Phase 4

Our analysis of CMU data from National Grid indicated that the 28 CMUs going forward to delivery comprised 304 separate components, each consisting of a separate location or site. Figure E below shows that over a third of these CMUs comprised only one site, but that some CMUs had large numbers of sites. On average, there were 11 sites per CMU.

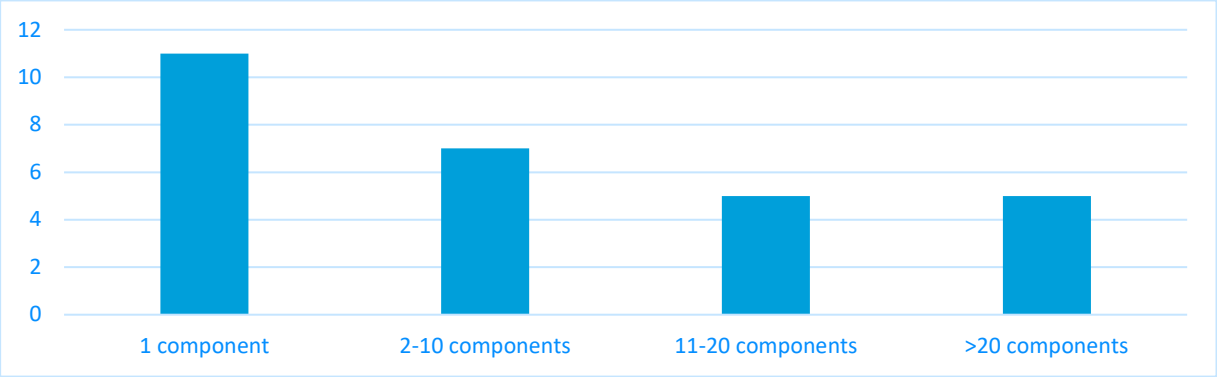

Figure E: Number of components per CMU (in CMUs going forward to delivery)

Phase 3 research indicated that participants generally used one of two strategies for CMU design: ‘simple’ CMUs with single-sites or single-clients which were simple to administer and test; and ‘portfolio’ CMUs with multiple clients and sites, which were more complex to administer and test but potentially offered more diverse and therefore more reliable capacity. The implications of ‘simple’ vs ‘portfolio’ CMU designs for reliable delivery will be researched further in Phase 4.

Phase 3 research also indicated that almost all of sites participating in the second TA were industrial rather than commercial, as shown in Figure F below.

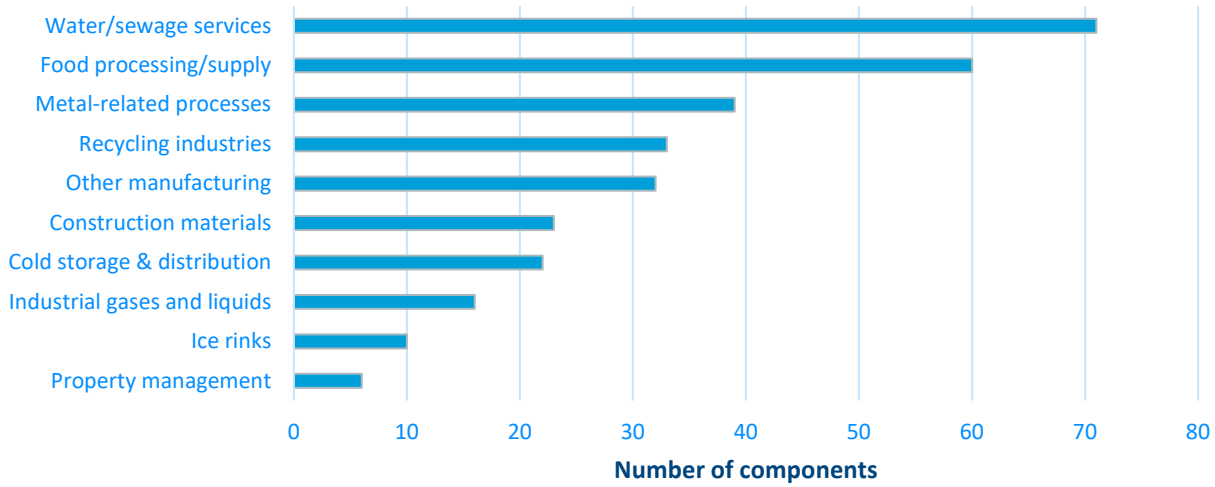

Figure F: Number of sites in second TA, by sector (source: National Grid meter data)

Early evidence from the email survey indicates that process heating and 'other' bespoke industrial processes typically contribute much higher capacity per site than refrigeration, chillers, pumps, other motors and drives. This suggests that sectors such as water and sewerage put forward many small pumping sites, while sectors such as metal-related processes and construction materials put forward a smaller number of sites involving much larger loads. The nature of turn-down DSR provided in the second TA, and the costs associated with delivery, will be researched further in Phase 4.

Conclusions

It is too early to assess fully the second TA's contribution to its objectives. However, early findings from Phase 3 suggest that the second TA stimulated learning about turn-down DSR for some participants and also encouraged some aggregator clients to expand from 'self-despatch' of turn-down DSR for Triad to delivery of flexibility for the Capacity market – at least on a trial basis. The extent of the TA's contribution to its objectives, relative to other external factors and trends, will be assessed further during Phase 4. Phase 4 will also provide some insights into the value for money provided by the second TA, and the prospects for turn-down DSR in the future Capacity Market.

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