

# Smart Export Guarantee – consultation response

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*Please note the views expressed here are personal to the author in his role on the [Smart Energy Research Lab](#) (previously Smart Meter Research Portal) and do not represent the views of UCL. The Smart Energy Research Lab is a 5-year £6M EPSRC-funded research project to provide a secure, consistent and trusted channel for researchers to access high-resolution smart meter data and linked contextual data.*

## SUMMARY

- The Government intends for the Smart Export Guarantee (SEG) to support the future for small-scale low-carbon generation.
- The Government also intends to put consumers in control of their energy use by rolling out smart meters nation-wide.
- In this response I argue that the former hinders the aims of the latter.
- As it currently stands, the SEG does not provide *prosumers* with the energy information they need to control their energy use and make informed decisions in the market.
- This is because the SEG does not require ‘behind the meter’ generation assets to be metered.
- Without generation metering, households with SMETS2 smart meters who install generation are unable to know:
  - How much they generate
  - how much of their generation they self-consume,
  - and, perhaps most importantly, how much total energy they consume (their gross demand).
- Greg Clarke has stressed the need of ‘persuading customers to reduce their energy demand’. If prosumers are unable to know how much they consume then how can they be persuaded to reduce it effectively?
- I argue therefore that the SEG must make metering a requirement for all ‘behind the meter’ generation assets including solar PV and storage.
- Such generation metering should also be integrated into the GB smart metering infrastructure being developed by DCC. This will provide the best overall customer experience and help reduce costs associated with this extra metering equipment.
- Prosumers are not the only ones who will benefit. Generation metering will provide value to suppliers, networks, the solar trade, manufacturers of electric vehicles and batteries, the energy regulator, and to policy.
- 62% of the population would like to install solar panels. This is the opportunity to ensure that the nation’s metering is fit for purpose in a world in which distributed micro-generation becomes increasingly mainstream.

*The author would be happy to engage with BEIS to work through the issues and potential solutions described in this document in more detail.*

## Smart Export Guarantee design summary

1. *Will the SEG as described provide a suitable and practical route to market for exported electricity?*

2. *Will the SEG support innovation towards the 'smart' energy transition and if so how?*

No. As I argue in response to question 14 below the metering requirements should include the requirement for 'behind the meter' generation assets such as solar PV and storage to be independently metered and integrated within the SMETS2 standard. Below I outline why generation metering is required to support innovation towards the smart energy transition.

### Prosumers

- Without generation metering and smart meters prosumers cannot know their gross electricity demand. Enabling consumers to understand their energy consumption is a central aim of GB's smart metering roll-out and without this it will be harder to persuade prosumers to reduce their energy consumption.
- Prosumers cannot make informed demand response decisions if they do not know how much they are generating, how much of this they are self-consuming and hence their capacity to 'turn up' generation in response to market signals.

### Suppliers

- Government wants to encourage innovation in the energy retail tariff market. When designing and offering SEG tariffs to prosumers, suppliers will want to forecast the prosumer's generation and demand to manage risk and to minimise balancing and settlement costs. Without generation metering, suppliers will have an incomplete picture of energy supply and demand in prosumer households and this will adversely impact their tariff design and balancing and settlement. Generation metering integrated with the DCC will facilitate the suppliers in this task.

### CAD manufacturers

- CADs are an area of innovation, especially associated with 'smart' homes that include micro-generation. Currently these innovators are hampered by the lack of generation metering and often require prosumers to pay for and self-install sensors to monitor generation. Innovation in this space would be facilitated if generation data were integrated within the SMETS HAN and the 'smart' customer experience would be improved.

### Innovation technologies

- A variety of innovative technologies in the energy sector have business cases that are critically dependent on managing self-consumption in prosumer households including electric vehicles, home battery systems, and peer to peer energy trading. There is no 'self-consumption register' in SMETS2 however and there is an almost complete lack of high-quality empirical data on self-consumption to support the adoption of these technologies. Without generation metering, the SEG is continuing this data gap and this in turn will push another generation of prosumers into a world of innovation where they lack the fundamental knowledge of their own energy consumption to make informed decisions about further low-carbon adoptions such as EVs, batteries etc.

### Regulation

- The SEG will be confusing for prosumers, at least initially. Ofgem will have an important role in ensuring the SEG is transparent and fair. Part of this should be monitoring SEG tariffs

being offered and providing impartial advice on what constitutes a fair tariff. A critical part of determining this will be understanding the costs and benefits of installing solar PV, and without data on self-consumption (how much PV reduces imports from the grid) this will be difficult.

## Networks

- Existing penetrations of distributed generation are already causing problems for National Grid and the DNOs in part because they are unmetered and the operators have no accurate visibility of these assets. As the costs of solar and storage continue to decline, we can expect these problems will get worse. By mandating that distributed generation assets are metered and integrated into SMETS2, the SEG will ensure that micro-generation metering is fit for the purposes of secure and efficient management of future networks.

## Policy

- Historically BEIS has been developing solar energy policy in the absence any good evidence about solar self-consumption. This directly affected BEIS assumptions when setting feed-in tariff rates. While BEIS no longer needs to determine what a fair feed-in tariff rate should be, self-consumption will nonetheless continue to be an important part of the energy consumption landscape given the dependency of several innovation technologies such as batteries. It is likely that BEIS would benefit from having better evidence about self-consumption to inform policies going forward.
- BEIS energy efficiency policy relies in part on analysis using the NEED data framework. However when consumers become prosumers then NEED will stop observing *gross demand* and will be limited to observations of imports and exports. It is far from clear that NEED's current analyses concerning the impact of energy efficiency measures will continue to be effective if gross demand is no longer observed. Generation metering is required to preserve the effectiveness of such analyses going forward.

## DCC

- We are spending over £11bn on GB's smart metering infrastructure. While clearly the priority is getting this functioning effectively for electricity imports, exports, and gas consumption, we should make the most out of this expensive national asset. Including generation metering within the DCC will make better use of it.

## Setting a SEG tariff and the tariff structure

### Factors that may impact tariff design

3. *Given the options set out above in table 1, what type of SEG tariff would be appropriate at this point? Please provide justification for your answer.*
4. *Do you agree that Government should not take a role in price setting, e.g. through a fixed discount against a 'wholesale price', as this would detract from the objective of the SEG, for example by reducing location and time specific price signals?*
5. *Should the SEG have a fixed end date or not? Please provide justification for your answer.*

6. *Will the SEG allow the market to innovate and bring forward additional routes to market, and create a competitive market to provide generators with the best tariffs?*

No. Please see my answer to question 1 above.

7. *We are aware that whilst segments of the small-scale sector (e.g. commercial rooftop PV) are able to deploy without direct support, others, particularly some of the less mature technologies and more complex community developed schemes are still often marginal at best in delivering commercial returns. Do the proposed arrangements create additional challenges for certain segments, e.g. through reducing access to finance, and how can these be effectively mitigated through the SEG?*

Any segment which depends on observations of self-consumption will not be well served unless generation is metered. In the absence of FiTs, the adoption of PV is almost entirely dependent on self-consumption. Accurate observations of self-consumption are vital for the solar trade therefore.

Paragraph 2.24 mentions prosumers being able to 'turn up' generation. Note that this requires visibility of generation and self-consumption.

8. *How long will it take for suppliers to put systems in place in order to administer the SEG, and what would the associated administrative costs of the SEG be? Please provide justification for your answer.*
9. *We would welcome views on whether the SEG can and should be linked to any similar mandatory communications requirements.*

## Proposed approach in a negative price scenario

### Tariff guidance and market condition report

10. *Do you agree that appropriate guidance on the administrative arrangements that suppliers will need to consider in order to set a SEG tariff should be issued? Please provide your reasoning.*
11. *What factors would suppliers consider when setting a SEG tariff, and what additional costs do suppliers expect might be incurred as a result of providing a SEG tariff?*
12. *Do you agree that an annual market condition report should be published for the SEG? Please provide your reasoning.*

Yes. The SEG is likely to be confusing for prosumers, at least initially. Ofgem will have a role to play in ensuring the SEG is transparent and fair. In New South Wales, Australia, they went from a mandatory to a voluntary market-led feed-in tariff. The Independent Pricing and Regulatory Tribunal publishes annual reports assessing the market and providing an assessment of what a fair tariff should look like to help prosumers make informed decisions when searching for the best tariff to switch to. I think it would make sense for Ofgem to do something similar. Note that this will be difficult without good empirical data on generation, imports and exports for prosumers, hence this is an additional need for generation metering.

## Costs and impacts of the SEG

### Costs

### Impact on fuel poverty

### Impact on Energy Intensive Industries

*13. Do you agree with our assessment of the impacts of the SEG on certain consumer groups such as those in or at risk of fuel poverty or energy intensive industries?*

## Eligibility requirements

### Metering requirements

*14. Do you agree with the proposed metering requirements for the SEG? If you disagree with the proposal, please explain why and provide reasoning.*

No. The current SEG proposal makes no provision for metering of 'behind the meter' generation assets. My view is that generation assets such as solar PV and storage should be metered and that this metering should be integrated with the GB smart metering infrastructure currently being rolled out. I explain why and provide reasoning below.

The fundamental argument why 'behind the meter' generation metering is required is because without this information it is impossible to accurately observe:

- How much electricity is being generated by distributed micro-generation
- How much of the generation is being self-consumed by prosumers
- How much electricity prosumers consume (their gross electricity demand)

Under current SEG metering requirements, consumers that install micro-generation will not know how much electricity they generate, consume and self-consume. They will only know how much they import and export, and this is an incomplete picture.

In his lecture Greg Clarke stressed the need of 'persuading customers to reduce their energy demand'. If prosumers are unable to know how much they consume, then how can they be persuaded to reduce it effectively?

The Government is rolling out smart meters to every household because they provide benefits to consumers including: accurate measurements of energy use which allow consumers to understand their energy use better. The proposed SEG metering requirements do not however deliver these benefits to prosumers. While prosumers are a minority, the majority (62%) of the population would like to install solar panels<sup>1</sup>. By definition, the SEG is the mechanism to support these future potential adopters. It should not be designed to be incompatible with the Government's policy regarding smart metering.

Generation metering is not new – every existing FiT installation has one. The SEG should continue this requirement – not because of its required for receiving a FiT generation payment, but because it aligns with Government energy policy and will enable a number of benefits, some of which are outlined elsewhere in this response.

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<sup>1</sup> <https://www.theguardian.com/money/2018/aug/20/majority-of-uk-public-want-to-install-solar-panels-poll-finds>

The difference however is that the vast majority of existing generation meters are not smart. There are almost 1m prosumers, the majority of whom have 'dumb' generation meters and are required to submit manual meter readings. Though these people have generation metering, they still do not know how much they consume and self-consume because they haven't had smart meters that measure imports and exports. Even when smart meters are installed in their homes they still won't have a satisfactory customer experience because the generation metering is not smart and not integrated with SMETS2. This is not the smart customer experience being promised to people. The SEG is the opportunity to make sure that this doesn't happen for the other >10m households who would like to install PV in future.

Mandating generation metering and requiring that this is integrated with SMETS2 is not the easy option for the SEG, but I believe it is the right one for consumers and for supporting innovation around micro-generation.

*15. Are non-SMETS stand-alone export meters, with an ability to record half-hourly export, currently available on the market? Please provide information on the costs for stand-alone export meters, such as capital and installation costs.*

One of the challenges of mandating generation metering and integrating it with SMETS2 is that it involves additional costs beyond the current SEG metering requirements:

- Meter costs
- Data costs
- Admin costs
- R&D costs

These are briefly discussed below. My view is that the costs need to be quantified and that these should be recuperated through the cost of metering as part of the micro-generation installation cost. These costs should be incorporated in the assessment of SEG tariffs proposed for Ofgem to do, and that Ofgem should provide guidance to prosumers on what constitutes a fair SEG tariff (see answer to Tariff Guidance above).

#### **Meter costs**

The first thing to note is that every current FiT installation has to have a generation meter and so (under the proposed changes to the SEG outlined here) the only change in the cost of installing a new solar PV system will be the requirement for the generation meter to be 'smart' going forward.

I have spoken to a solar installer and anecdotally I can say that a 'dumb' meter might cost £20 while a smart (but non-SMETS) generation meter might cost £79. This would be an increase of ~£60 or 1.5% on a typical installation cost ~£4k.

Arguably however this does not reflect the true counterfactual because many households with PV already pay extra to install some sort of monitoring of their PV generation either:

- A smart (but non-SMETS) meter
- An inverter that provides data and monitoring via Bluetooth or wifi
- Or simple current clamp 'clip on' sensors

The costs of these vary but indicatively are in the range £50-200. If SMETS generation metering was required then a proportion of adopters going forward would not require

purchasing this additional generation monitoring equipment, and perhaps saving money compared to what they would have spent otherwise.

CAD manufacturers would benefit because they could access generation data alongside export and import via the HAN rather than requiring a separate sensor be installed (at cost) and this would result in a better customer experience for prosumers and encourage innovation in services.

### **Data costs**

Non-SMETS but smart generation meters have considerable data costs, anecdotally ~£14/year. This is for collecting the (half-hourly) data remotely from the generation meter and providing access to it to the prosumer.

This is clearly an area where it makes sense to use the DCC instead. There will be extra costs to using the DCC however these will be marginal.

### **Admin costs**

There are considerable costs to becoming a DCC user. Once set up however additional costs associated with accessing data from an additional meter are marginal. Market forces will help drive down costs.

### **R&D costs**

Meter asset costs for SMETS2 electricity meter installations used by BEIS<sup>2</sup> are lower than the generation meter cost indicated above (£67 vs £79). Furthermore, a SMETS2 generation meter would not need to be as functionally advanced as a SMETS2 electricity meter, so it is possible that a cheaper SMETS2-compliant generation meter could be developed which could drive down costs. This would however come at a considerable R&D cost. Considering volumes would be relatively low (unless there was a programme to retro-fit smart generation meters on existing FiTs installation), then it would probably make sense to simply re-purpose existing SMETS2 electricity meters for the purpose of generation metering. SMETS2 supports up to 4 electricity meters per dwelling, so one of these could serve as the generation meter (and a further one for storage if co-located).

The SMETS2 standard would nonetheless need to be modified to account for generation (and storage), and this would come with considerable time and cost.

### **Energy efficiency**

*16. Do you agree that installations entering into the SEG should not be required to meet a certain energy efficiency standard? If you disagree with the proposal, please explain why and provide evidence.*

### **Installations in receipt of other support schemes**

*17. Do you agree it is the correct approach to allow applicants eligible for further local or regional support to also be potential SEG applicants?*



## Co-location with storage

*18. Where storage is co-located with an eligible generation technology, should SEG payments be made on 'brown' electricity exported from storage or limited to exported 'green' electricity? Please explain your reasoning.*

While it may be intuitive to think in terms of storage being charged with 'green' or 'brown' electricity depending on whether it happens when the PV system is generating or not, this would be incorrect. The emissions impact of storage operation, which is what this question is really about, depends on the marginal emissions factor of electricity at the times when the storage is being charged or discharged. Renewables ('green' electricity) are rarely the marginal generator, at least currently. The marginal generator (or generators) depend on how the electricity system is operated by National Grid and how players in the market operate. The simplistic distinction between brown and green does not provide an accurate reflection of the emissions impact of the operation of storage and as a result the SEG payments should not be based on it. I have written further about the environmental impact of home battery systems, links are provided in the footnote below<sup>3</sup>.

More generally, however, it is clearly important that storage is encouraged to operate in a way that means the owner benefits financially *and* the system benefits environmentally. SEG payments should therefore reflect the needs of the system e.g. as a gross simplification low export prices when supply (from renewables) is high and demand is low, and high export prices when supply (from renewables) is low and demand is high. To achieve this it is important that storage is metered and its operation is integrated (perhaps through an aggregator) with the markets where it can have the most positive impact. Note that Elexon Issue 70 also proposes metering of assets such as storage for effective integration into markets<sup>4</sup>.

*19. Do you agree with the metering arrangements when co-locating storage with generation technologies eligible for the SEG? If you disagree with the proposal, please explain why and provide reasoning.*

As mentioned above in response to Q18, I think storage should be required to be metered. The arguments put forward previously concerning the reason why solar PV should be metered also apply to storage, they are just less important due to the smaller scale of the storage market.

*20. If SEG payments were to be made on 'brown' electricity exported from a co-located storage device, are there any potential opportunities for gaming? If so, please provide details.*

As long as the price signals from SEG tariffs are aligned with the carbon intensity of the marginal generator(s) then there shouldn't be any problem with SEG payments for 'brown' electricity.

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<sup>3</sup> [Link to paper 1](#) [Link to paper 2](#) [Link to paper 3](#)

<sup>4</sup> <https://www.elexon.co.uk/smg-issue/issue-70/>



*21. Should the SEG make provision for installations where an eligible technology is co-located with a non-eligible technology and/or storage? If so, what would the necessary metering arrangements need to be?*

As mentioned previously, all 'behind the meter' generation technology should be metered and, ideally, integrated into SMETS2/DCC.

#### Sustainability criteria and feedstock restrictions

*22. Do you agree or disagree that AD installations newly accredited under any future arrangements to support small-scale low-carbon generation should be subject to the same sustainability criteria and feedstock requirements as AD installations under the FIT? Please provide your reasoning.*

*23. Do you agree that the current FIT reporting requirements and administration process, including the arrangements for payment adjustment for ineligible electricity, would be appropriate and practical for the SEG? Please provide evidence for your answer.*

#### Transitional arrangements

### Operational and administration arrangements

#### The role of BEIS, Ofgem, and suppliers

*24. Do you agree with the proposed obligations and functions on each of the other parties involved in the SEG - BEIS, Ofgem, and suppliers - including the enforcement action required by suppliers and Ofgem? If not, why?*

*25. Do you agree with the review process proposal for the SEG? If not, what alternative approach would you suggest?*

*26. Do you agree that the threshold for mandatory SEG suppliers should be set at 250,000 or more domestic electricity customers? If not, what alternative threshold would you suggest? Please provide any useful information or evidence to support your suggestion.*

*27. Do we need to set out arrangements for the event in which a supplier either loses its supplier licence or goes into administration? If so, what provisions need to be made?*

#### The Customer experience: Finding a SEG provider and getting paid

*28. Do you agree with our preferred approach to help ensure consumer protection? Is it practical and are there other factors that should be considered and why?*

I note that paragraph 2.100 mentions the importance of assuring performance of installations, and enabling provision of accurate forecasts of energy outputs. These cannot be done without generation metering.

Also paragraph 2.106 mentions the importance of metering arrangements being as fully integrated into existing standards as possible. This is why generation metering should be integrated with the DCC.

*29. This policy is focused on power generation, however increasingly we anticipate that installations will be integrated with battery and vehicle-to-grid technologies. What additional technical challenges might we need to consider, for example relating to installation standards, and how would this effect the development of the market?*

#### Registering installations accepted for the SEG

*30. Is the process for applying to the SEG practical, and will it ensure only eligible generators are able to participate in the SEG?*

*31. Should deployment of installations through the SEG be submitted to a central register administered by Ofgem?*

#### Settlement basis

*32. Are our proposals for the treatment of settlement practical for suppliers to implement, and compatible with the Balancing and Settlement Code? If not please explain why.*

#### Ownership of installations

#### Tax treatment

*33. Are there any other issues you would like to raise as part of your response to this consultation?*