



YOUR QUESTIONS ANSWERED.

Our Show and Tell workshop are a series of **1-hour online sessions** exploring key aspects of **TRANSITION's** work over the last 4+ years with opportunities to explore learning, understand the challenges and opportunities uncovered, and ask questions from our expert team.

Within this document you will find a list of questions asked during the sessions and our responses below.

If you have any additional questions or feedback, please email our team at rory.brown@sse.com

Workshop 1: Data

Q: How important was it to build trust between yourselves and the asset providers across the trials - how did data help facilitate this trust

A: It was very important to build trust with those participating with the trials.

Data sharing and analysis facilitated the development of this trust throughout the trial periods. We could justify market decisions by sharing data – this made the markets accessible and transparent. On the other hand, we learnt a lot about the flexibility provider's assets and their delivery and availability.

There were numerous agreements and contracts put in place to protect their data too. There was a data sharing agreement between those within Project LEO and the Flexibility Service Agreement covered any data handling requirements too. For aggregators, any data was partial, so no personal data was shared.

To support these agreements and build trust, there were numerous workshops, meetings and training provided from the team to Industry Actors to ensure they understood and comfortable with the requirements.

Q: Does the work being undertaken on the Common Information Model help with the HV/LV data consistency challenge?

A: Yes CIM, as a standardised means to store data is instrumental to ensure that PSA models and datasets are as interoperable as possible in the future.

***Follow-up question:** given CIM is a global standard, is this a global issue? or is the poor applicability to GB distribution based on our network characteristics?*

Just to give a flavour, in our trials, we developed our PSA models in the DigSilent PowerFactory tool, in conjunction with OGS tool CIMphony to ensure best practice for model interoperability. We sourced some of the input data for those PowerFactory models in a GIS tool that



	<p>provided a CIM extract, and then also loaded the PowerFactory model into our Whole System Coordinator in a CIM export.</p> <p>We have thus used CIM directly in the TRANSITION modelling workflow for trials, with some useful learnings along the way - e.g. it's very important that we continue to engage with the industry to make sure the CIM standard and the tools that make use of it (e.g. PSA tools like PowerFactory, GIS tools like Electric Office, etc.) continue to be developed to accurately represent the characteristics of LV networks, such as Multi-phase representation (i.e. service cables are normally single phase).</p> <p>At the moment the CIM standard as applied in PSA tooling is somewhat biased for the higher voltage characteristics of transmission and sub-transmission networks, rather than LV networks where slightly different engineering phenomena apply.</p> <p>While it is a global issue, it can be addressed on a regional basis.</p> <p>The majority of European networks have the same characteristics as GB.</p> <p>Similar to the work done by ENTSO-E, supporting the development of CIM for transmission operators in the EU using the CGMES standard, a similar taskforce could be set up for distribution networks.</p> <p>We have participated in some discussions along those lines at the 2022 IEC CIM annual taskforce meeting in London, for example, where many of the prominent software tool vendors were present and participating in the discussion.</p>
<p>Q: Do you think a clearer consent mechanism would improve the use of Smart Meter Data for forecasting?</p>	<p>A: Smart metering data will be very important for the future DSO modelling and forecasting initiatives yes, in particular in the lower voltage levels of the network where customers are connected.</p>



	<p>In particular in the TRANSITION work, we used access to the voltage data recorded from the smart meters which allowed us to calibrate the LV PSA models we developed - that voltage data was specifically not GDPR sensitive and hence we could use it, but the actual customer energy consumption data from that meter was not directly available to us for GDPR reasons.</p> <p>The smart meter consumption data available to DNOs for LV modelling at this time only has 5-customer aggregation level (i.e. no individual customers).</p> <p>In order to develop accurate forecast models, we need data with a certain granularity (both on a temporal basis and on an individual customer basis)</p> <p>Our more recent work on smart meter voltage data analytics, which we use to validate customer phase connectivity, has already showed the benefits of being able to access smart meter data to improve LV network visibility.</p> <p>We would strongly support further work in this area to improve the data accessible to support local flexibility market forecasting and operation.</p>
<p>Q: Do you use any specific data quality metrics as part of this validation exercise? again, coming back to trust</p>	<p>A: Through our work on data for operational forecasting, we developed a range of forecasting model accuracy metrics and performance criteria that are expanded on in detail in the related technical reports by SIA Partners on our project website (e.g. MAPE*, RMSE, etc).</p> <p>We also invested a huge effort in to the input data filtering/cleaning and consistency checking task, which was necessary to build a solid foundation of the models developed thereafter.</p> <p>More broadly, if this question also touches on flexibility baseline / settlement tasks for quantifying how much flex was delivered by the customers, then we co-developed with TNEI and the ENA Open Networks Programme a new software tool for flexibility baseline that is available on the ENA website, and this was also covered in our 3rd Market Development session slide-pack with you.</p>



<p>Q: Have you done any engagement with the Automatic Asset Registration innovation project? Seems like that would be a key data asset to challenge your connectivity model with</p>	<p>A: Not directly no, however as part of the operational forecasting work package we engaged with ElectraLink to access half-hourly meter data, which we believe is a good first step towards integrating other datasets in the future, including that from the AAR.</p>

Workshop 2: Tools and Platforms

<p>Q: On the process flow diagram, it would be interesting to know when you're transferring data between systems vs within systems</p>	<p>A: There were numerous systems interlinked to ensure the End-to-End objective was achieved. The diagram to show this in more details is here</p> <p>In summary, the systems were broken down into 3 main objectives. PSA was to identify the constraints; the S&D tool was to procure and select the best viable contract and the NMF/PICLO platforms were customer facing market platforms.</p> <p>Feeding in to the PSA were the Network Model, Contingency Scenarios, Maintenance Schedule, Switch Positions, SIA (Forecasts) and NeRDA (real-time connectivity).</p> <p>The S&D was connected to the PSA via a file sharing Interface and to the NMF via a swivel chair. An API would be recommended going forward but due to time constraints and complexity, this was used within the Technical Trials.</p> <p>The NMF was connected to PICLO via 4 APIs so each could communicate regarding requests, responses, decisions and dispatches.</p>
<p>Q: Were there any issues from households/FSPs in honouring their contracted flex delivery? How did you resolve/prevent these issues?</p>	<p>A: There were a few challenges with asset delivery and baselining. As part of project TRANSITION, TNEI developed a baselining tool and reliability index. The main baseline methodology we used in TRANSITION was the historical baseline with same day adjustment. More</p>



	<p>about the methodology can be found here - on21-ws1a-p7-appendix-b-mathematical-specification-(13-jan-2022).pdf (energynetworks.org). The historical baseline methodology had a differing mean absolute error depending on several factors including asset type, season, data quality etc. This meant that for many assets they had issues with their baseline results.</p> <p>The baseline results in the trials were used in the reliability index calculations. They indicated that many assets struggled to deliver the requested flex and thus their reliability was lower. However, the delivery and reliability results must be contextualised. If the baseline accuracy improves it is very likely these would improve as well.</p> <p>Beyond mere baselining, if a flex provider knew ahead of a dispatch instruction being issued that their asset was no longer available at a particular time that they were contracted, they could submit an unavailability notice and this would remove them from consideration for dispatch.</p>
<p>Q: Can you show how/where the PICLO platform sits on a diagram showing all your interlinked systems?</p>	<p>A: The PICLO platform was connected to the NMF via 4 different APIs. These were to ensure requests, responses, decisions and dispatches were communicated between the two platforms. This meant anything that was completed via the PICLO platform was sent to the NMF and therefore connected to the rest of the systems from there. This reduced the complexity of connecting both market platforms to the backend systems and provided a uniform approach regardless of the market platform chosen. Please see the link here for a more visual explanation.</p>
<p>Q: Could you speak a bit more to the point that one market place across all DNO/ESO might be preferred</p>	<p>A: The TRANSITION project has explored the principle of a Neutral Market Facilitator platform, which has both (i) allowed industry actors alternate means to enter the market (i.e. directly through the NMF or indirectly through Piclo which was then integrated to the NMF) and (ii) allowed a separation of the market/commercial platform tool from the set of systems and tools that are used to forecast and calculate the constraints and make flex dispatch decisions (i.e. the PSA / S+D and WSC tools).</p>



	<p>We have also explored in a series of simulation workshops, the issues that arise from Conflict Avoidance and Market Models, the qualitative results of which are published on our website.</p> <p>We have also directly fed into the discussions around Service Primacy within the ENA Open Networks over the last number of years, to ensure that real world flex market trial experience has been used to guide those in an informed way.</p> <p>The flex market platforms delivered under TRANSITION work do not have any direct service primacy / conflict management rules embedded in to them, however, it would be a straightforward extension of the work that once any finalisation of industry rules for these matters are derived, if they can be codified, then additional logic could be built in to the S+D/PSA tools to implement those rules in a further version of the platforms.</p> <p>Furthermore, the TRANSITION project has also informed our BAU internal SSEN thinking on this matter, and our response to the various consultations ongoing within industry.</p>
<p>Q: Arrived a bit late, so apologies if I missed this. Have these processes/systems now been adopted as BAU by SSEN or were they only used for the trial?</p>	<p>A: This is a very important aspect for the project, and one that has been a significant focus of our internal dissemination efforts over the last number of years to maximize the value of the learning and the impact of the innovation work overall.</p> <p>There will also be a balance of how the processes and tools may be adopted directly as is, and/or also how they can further inform the requirements and specifications for future tenders for tools with similar DSO functionality to support our ED2 transformation.</p> <p>Some examples of these might be :</p> <p>For example, the Operational Forecasting tool that we have developed with Sia Partners is directly informing the requirements/specifications of a likely near term tender from our BAU colleagues who are looking to develop that functionality in practice.</p>



	<p>Although our Technical Trials where we have developed our Select/Dispatch and PSA functionality have just finished in the last fortnight, once we consolidate the learning from those trials, we are also expecting/planning a similar effort to inform the analogous tools that our BAU colleagues will need to implement as part of SSEN ED2 plans for flexibility management.</p> <p>Other examples of processes as opposed to tools would be that a number of the TRANSITION innovation project team members are now directly working in the BAU Flexibility Market development team, where the learnings around Market and Service design and participant recruitment from the TRANSITION trials are being directly transferred via that human route.</p>
<p>Q: are these tools / processes being adopted / standardised across all DNOs? Or do they differ substantively from what other DNOs are implementing?</p>	<p>A: Throughout the timeframe of the TRANSITION project, and in conjunction with TEF partners, the project has had a very significant presence within the ENA Open Networks programme whereby the key aspects of flexibility market development and DSO function delivery have been progressed across all the other DNOs in a single coordinated forum.</p> <p>For example, we have both taken significant outputs from ENA and tested those within our trials (e.g. the flexibility Services Agreement (FSA), the Services design, and so on) , but also fed back significant learnings and other developments as well in the other direction (e.g. the TRANSITION Baseline tool co-developed with TNEI and the ENA). The TRANSITION trials have therefore further refined the outputs of the ENA deliverables accordingly.</p> <p>In particular, the TRANSITION Baseline tool is now hosted on the ENA website as an exemplar, and it is inconsideration by other DNOS for potential adoption – directly, in part, or as part of a requirement specification for further solutions.</p> <p>Furthermore, in particular with regards to delivery of the Select+Dispatch and PSA tools, the Operational Forecasting solution etc, we have run a series of specific dissemination and demo sessions for the other DNOs and the ESO where by we have showcased the tools and</p>



	<p>functionality delivered and flagged that it can be adopted by them if they so prefer with learnings and recommendations on how to improve these systems going forward.</p>
<p>Q: Did the process and trials take into consideration any worst-case-scenarios/margins of error when predicting what could be provided by potential flex participants?</p>	<p>A: We designed the Select + Dispatch tool to include a reliability index factor as part of the selection process (which would de-rate an industry actor’s perceived volume contribution linearly based on historical provision data) – so in theory, there is this functionality possible in the tool, that can be further developed as experience with flex markets grows</p> <p>However due to the scarcity of data we did not test it thoroughly or at scale in the trials.</p>
<p>Q: could you explain more about how the tools are open source and others are able to implement them? are they paid for? is it compulsory to allow them to be used?</p>	<p>A: Both the PSA and the S&D tool were developed using open-source software (e.g. Python, JavaScript). While we used DigSILENT PowerFactory (which requires a license) as a load flow engine, the architecture and interface of PSA and S&D were designed in a way that any other load flow engine could be used, as long as the output is processed to make it compatible with the file sharing interface.</p> <p>Furthermore, as mentioned above, as the TRANSITION project is NIC funded, then any of the other network operators in GB can access the IP of these tools directly for adoption in their area free of charge, and we have recently run a series of demonstration and dissemination sessions with the ENA to make sure that all the relevant parties are aware of what has been delivered and how it can complement their own activities in due course.</p> <p>A specific example of this might be the TRANSITION Baseline tool that has been adopted by the ENA as it’s flagship baseline exemplar tool on its website.</p>
<p>Q: What was the scale of the trial? Do you have a number of events, transactions, FSPs, etc?</p>	<p>A: The project used an agile methodology in order to develop our own understanding of the requirements for each system/process, but more importantly listen to the customers requirements. So, in the first trial period the</p>



project ran a flexibility service for Sustain, Week Ahead at bulk supply point. A development cycle increased our capability so by the time we ran trials in trial period 3 the project procured circa 120MW of flex, use six flex services, three procurement time horizon, at a mix of BSP and Primary, with 180 individual contracts.

Workshop 3: Market Development

Q: on the Flex market timeline slide, could you explain which processes are manual vs automatic? Would be good to understand the resource required and how that impacts scalability

A: Most processes were automated with the exception of a few. For the initial three trial periods, automation was completed throughout so by the end of TP3 most processes were automated via the NMF and the participants. Baselining was still required to be completed manually, manual selection and acceptance of contracts was required, and auctions would also need to be posted on the NMF manually. Participants needed to manually dispatch their assets too as they were not connected via an API although Piclo did have the capability to do this for some assets.

Within the Technical Trials there was less automation as the NMF was not connected to the S&D via an API. This was therefore completed via a 'swivel chair' user passing information between the NMF and the S&D tool. Intents to dispatch, settlement, baselining and contract acceptance were all done manually. This was solely to do with timescales and not a reflection of the ability to connect the S&D to a Market Platform.

Going forward, especially if at scale, automation of market platforms and assets would be highly recommended to overcome some of the challenges faced by doing this manually.

Q: is the FSA an Open Networks output? (I may have missed this)

A: Yes – it forms part of the ENA Open Networks Project outputs. Specifically, it is part of the market development stream of work – more information can be found here: [Market development – Energy Networks Association \(ENA\)](#)

The TRANSITION project tested early versions of this FSA agreement, modified them to ensure suitability for our trials, and fed back learnings and suggestions accordingly to the ENA.



Q: Do you know why the ESO has an exclusivity clause? E.g. is just a historic thing or due to a technical requirement etc. And follow-up, have you had much luck convincing the ESO to get rid of the clause?

A: We are not directly aware of the basis for the exclusivity clauses of some of the ESO services, and have raised it with them informally previously – we assume it is related to the issues around system security at national level e.g. frequency stability.

There is an ENA Open Networks working group that is exploring Service Primacy rules between DSO and the ESO, including their implementation and use cases - [dno-coordination-ver-1.0-\(mar-2023\).pdf](#) ([energynetworks.org](#)).

TRANSITION project has participated in that forum on a regular basis over the last number of years to ensure useful learnings were fed back accordingly.

Q: I think you covered this already (I was probably taking notes) but could you talk to the final point re: DSO services needing to be more competitive a bit more?

A: The trials involved 9 participant organisations and successfully demonstrated the market principles involved in the procurement of flexibility, and that these services impacted the network. However, this is a relatively small number of participants so market liquidity was low. In order to better understand barriers to entry in the market we held two workshops with participants to discuss their commercial business models and how participation in flexibility markets could feed into these in future. Almost all participants fed back that they felt the ceiling prices during the trials were too low. In particular, participants whose business models did not center around energy service provision (e.g. community organisations rather than aggregators) found that the price they were receiving for flexibility was often not sufficient to recoup the costs associated with getting 'flex-ready' and actual participation in the market (employee resource for registration forms, submitting bids, and uploading measurement data). This could be remediated in part by streamlining of processes and automation to lower costs of entry to the market, however, to access the as many potential market participants as possible, the price ceiling would need to be increased to make the market appealing. Additionally, aggregators who also participate in ESO services commented on the fact that the value of participation in DSO services is much lower than that of ESO services. This is to be expected since our price ceilings are determined against the alternative cost of



reinforcing the network, whereas the alternative for ESO services is the balancing mechanism, which results in much higher prices being available. However, this feedback does indicate that we need to make sure the price ceilings are set as high as justifiable, which means including all wider socio-economic benefits of flexibility in the price ceiling analysis in order to reflect the true value of flexibility.