Scottish & Southern Electricity Networks

TRANSMISSION

Commercial connections, innovation and whole system

Stakeholder engagement event

7th & 10th May 2019

Your Plan, Our Future: RIIO-T2

www.ssen-transmission.co.uk

Safety, Health and Wellbeing Moment

May is National Walking Month and now the evenings are lighter for longer, this makes it the perfect time to get outside, and get walking

A few of the benefits of walking include:

- ✓ Lowered risk of dementia
- ✓ Increased energy
- ✓ A full body workout
- ✓ Increased Vitamin D intake
- ✓ It can make you happy

RIIO-T2 DELIVERY PROGRAMME

Below is a timeline of how the project will run.

The timeline is correct as of August 2018 and is subject to change.
For further information please visit www.ssen-transmission.co.uk

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RIIO T2 Commercial and Connections Policy Ambitions and Initiatives

Lauren Logan, Commercial Policy Manager

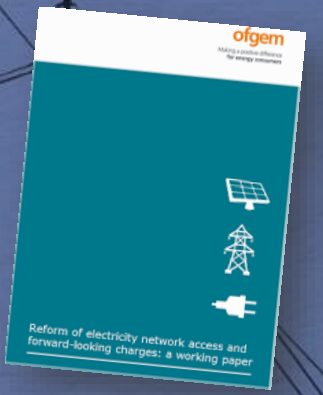
Commercial and Connections RIIO T2 Policy Proposals

Objective of today: Outline SHE-Transmission's RIIO T2 Commercial & Connections Policy plans and our proposals with our stakeholder and gather feedback to further refine plans

RE-CAP ON WHAT'S DRIVING T2 CHANGES

- **Customer feedback; more customer engagement** in physical and flexible connections
- **Lessons learned from T1 that customer expectations are changing:** innovative solutions and engagement **pre-application and post connection**

- **Increased engagement** with stakeholder on **wider policy** issues and industry change
- **FES Scenarios: Diversity in technology, size and location of customer**



From indirect customer relationship*

From T1

Towards T2

Customer focused business

*as set out in licence obligations and industry codes

PROPOSED AIM AND AMBITIONS

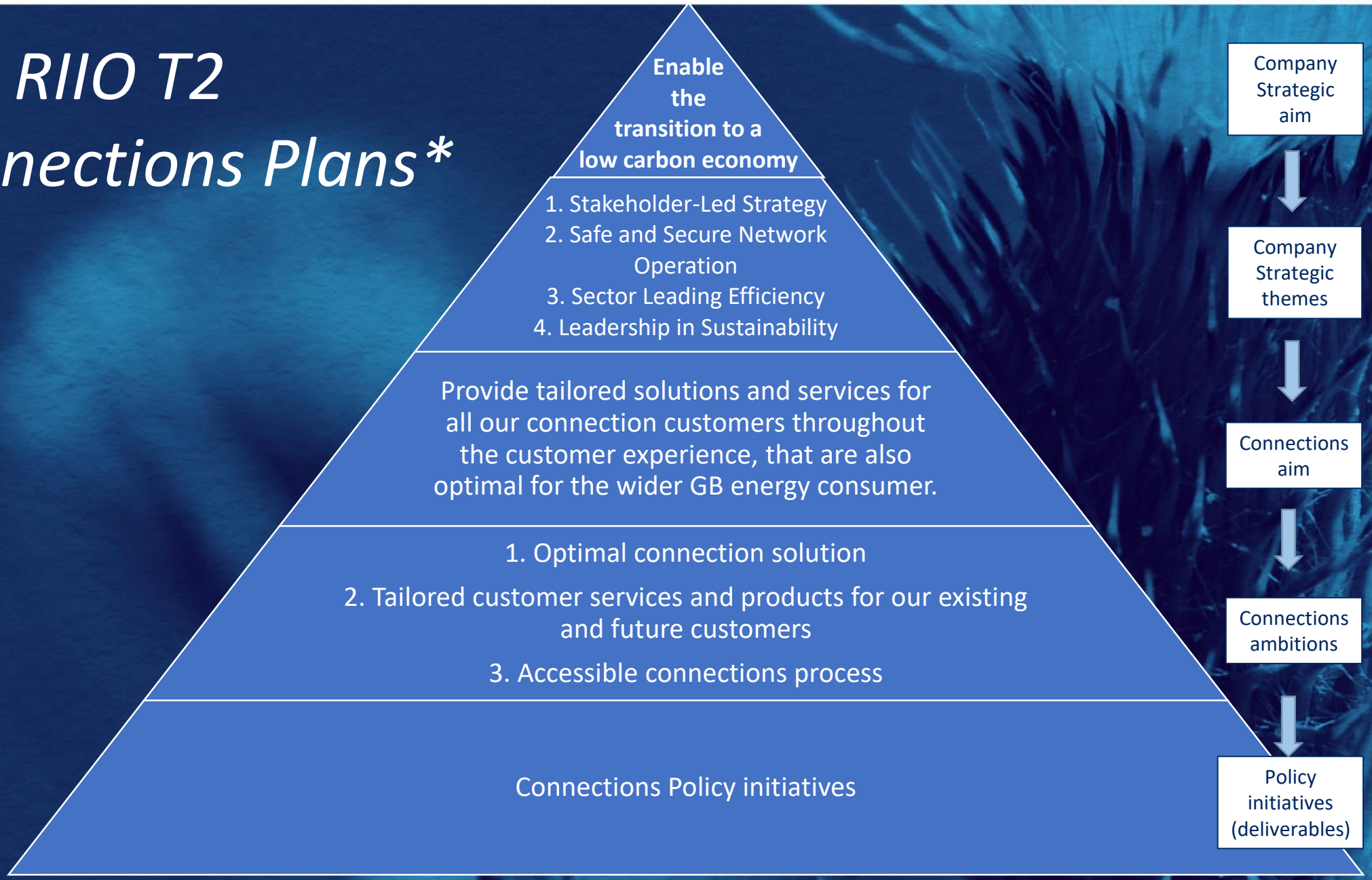
AIM: Provide tailored solutions and services for all our connection customers, that are also optimal for the wider GB energy consumer

Ambitions

1. **Tailored customer services and products for our existing and future customers**
2. **Optimal connection solutions**
3. **Accessible connections process**

Our ambition applies to each step of the Customer Experience from pre-application to post-energisation

*Our RIIO T2 Connections Plans**



**subject to consultation with stakeholders and regulatory approval*

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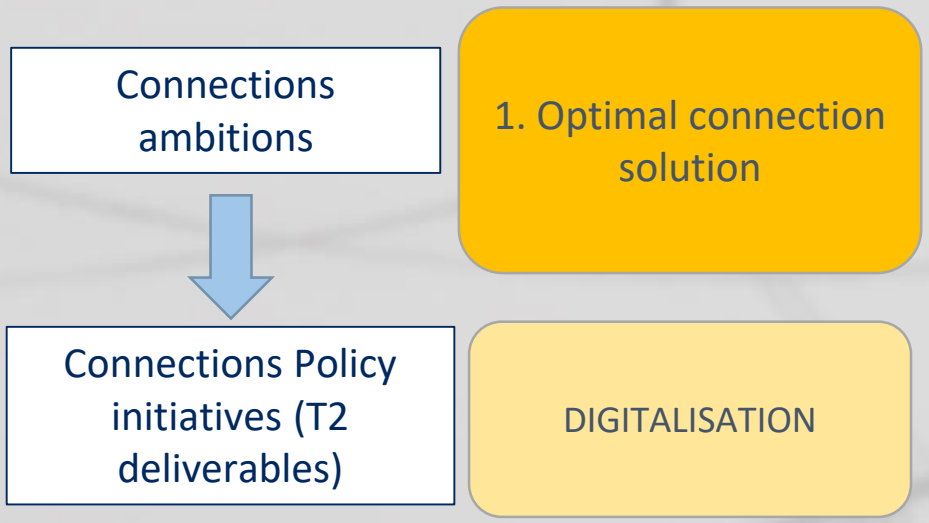
PROPOSED POLICY INITIATIVES

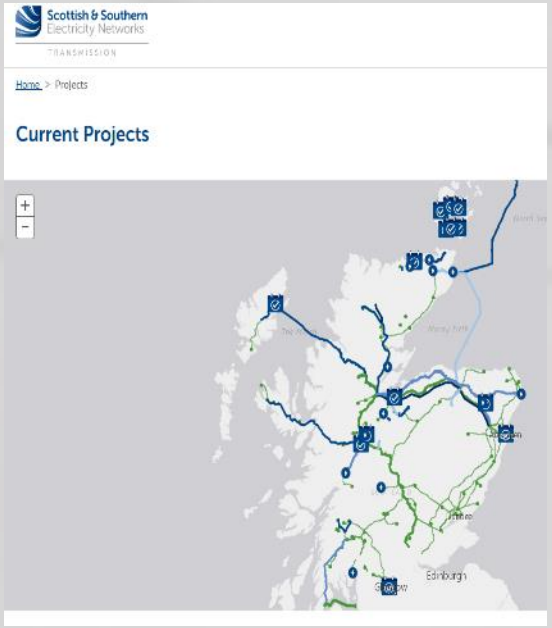
RIIO T2
AMBITION 1:OPTIMAL CONNECTIONS SOLOUTION



OPTIMAL CONNECTIONS SOLOUTION: DIGITLISATION

Digitalised Information

LIVE AVAILIBLITY MAP



- **Improvement to existing network map**
- **Where, when and what capacity** is available
- **Spatial requirements**
- **Type** of connection solutions
- **Expected curtailment calculator**
- **Cost estimation (with the ESO)**

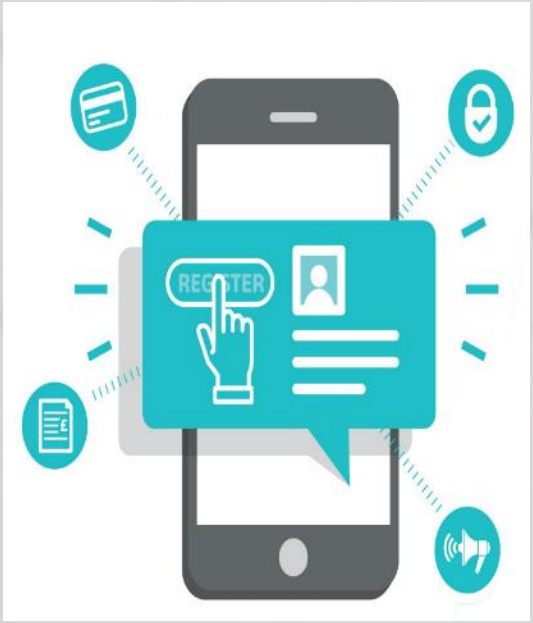
"Look at grid capacity availability …to tailor renewable offerings where capacity exists currently, without the need to reinforce …"

"… If we knew in advance this area would have capacity over the next five years, we would be able to plan for that…"

OPTIMAL CONNECTIONS SOLOUTION: DIGITLISATION

Digitalised Tools

ONLINE PORTAL



- **Digitalise current process**
- **apply** for connections products
- **track** the progress of **connection**;
- **engage** with who is working on their connection directly;
- **store** key documents;
- **pay connection fees** and services
- provide direct **feedback**
- **monitor performance and upcoming outages;**

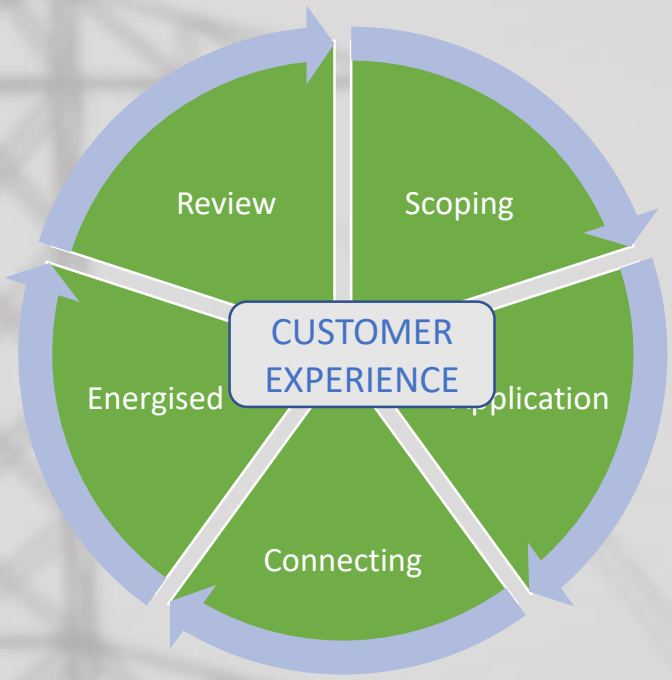
"It's not SHE Transmission's fault, but they have to go through National Grid. … The process is quite rigid. It needs more transparency."

"Customers would like to be kept up to date on their application, what stage it is at and what works has been completed.

OPTIMAL CONNECTIONS SOLOUTION

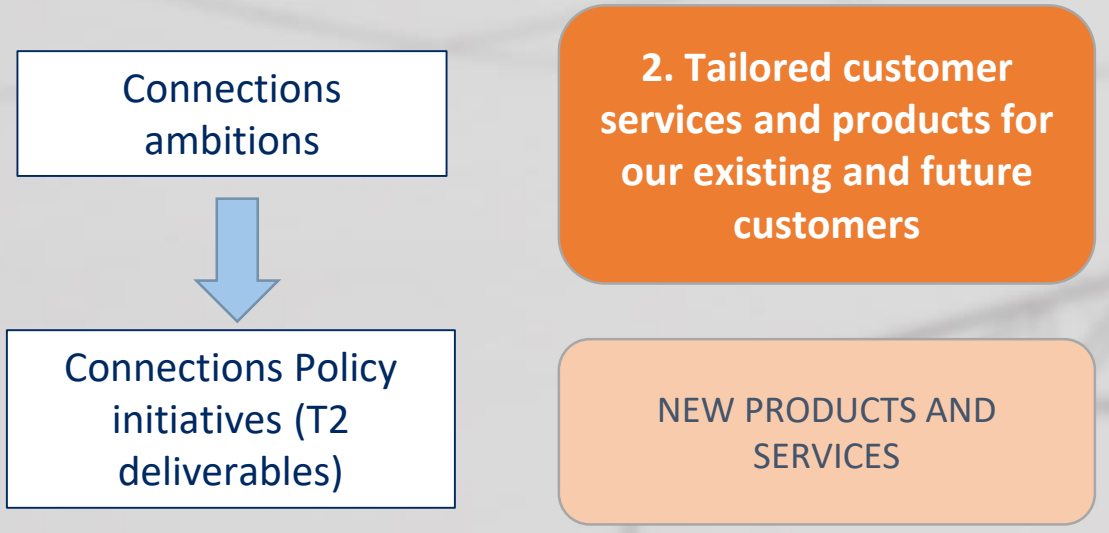
Customer benefits to digitalisation

- Support our **existing service ;** equipping customers with the information
- This information will **facilitate market opportunities**
- **P**romote new **opportunities**.
- Promotes **greater dynamic collaboration** between the ESO, TO and the end customer;
- enable collaboration and **whole system thinking**
- We will keep the map up to date by **linking it to our internal systems**



	Scoping	Application	Connecting	Energised	Review
Ambition 1:Optimal Connection	✓	✓	✓	✓	✓

RIIO T2
AMBITION 2: TAILORED CONNECTIONS PRODUCTS AND SERVICES



TAILORED CONNECTIONS PRODUCTS AND SERVICES

Offer in principle

- New flexible offer product
- Opportunity to explore connection options before formal offer stage
- Hold place in the capacity queue for a limited time

"collaboration during the offer assessment stage and ability to iterate the requirement (within reason)"

Queue Management

New Queue management service; provides an active capacity queue

New products:

- **accelerate connections**
- **minimal modification**; quicker turnaround for minor changes without comprising queue position

"… if a project is not progressing allow others to move forward"

"….– even a small one (modification) – then you have to start all over again which doesn't seem fair."

TAILORED CONNECTIONS PRODUCTS AND SERVICES (2)

Energised engagement service

- More engagement and information post connection
- Indicative outage plans in advance at the offer stage
- Dedicated contract manager
- **New Product**: Outage solution; accelerate outages or another connection solution

"However common sense and practical approaches mean we do interface [with the TO despite the rules] …to everyone's benefit…to know about any changes as soon as possible …

"A product which could allow customers to condense outages …"

Renew service

- Getting ready for your project's repowering or redesign
- Provide a proactive service to review your connection solution
- New product: 'connection renewal'

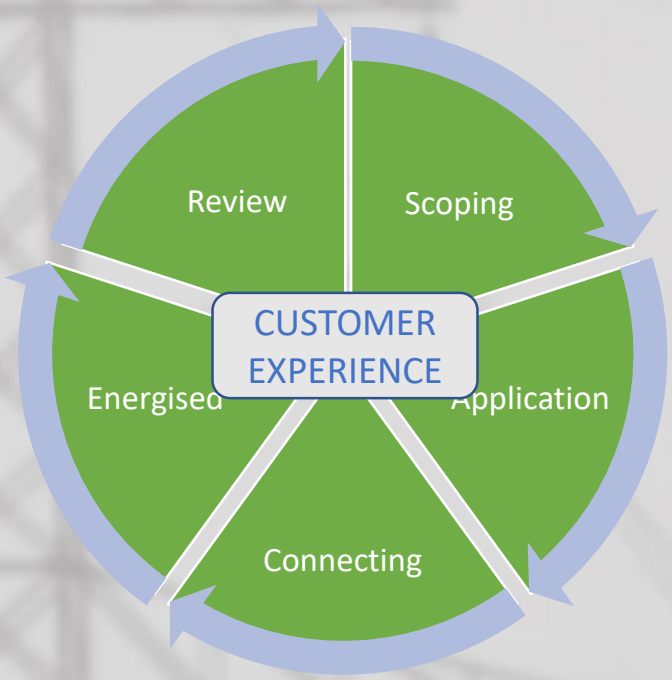
When we asked customers what they would use a post connection service for, 26% said design reviews .

TAILORED CONNECTIONS PRODUCTS AND SERVICES

Customer benefits to tailored products and services

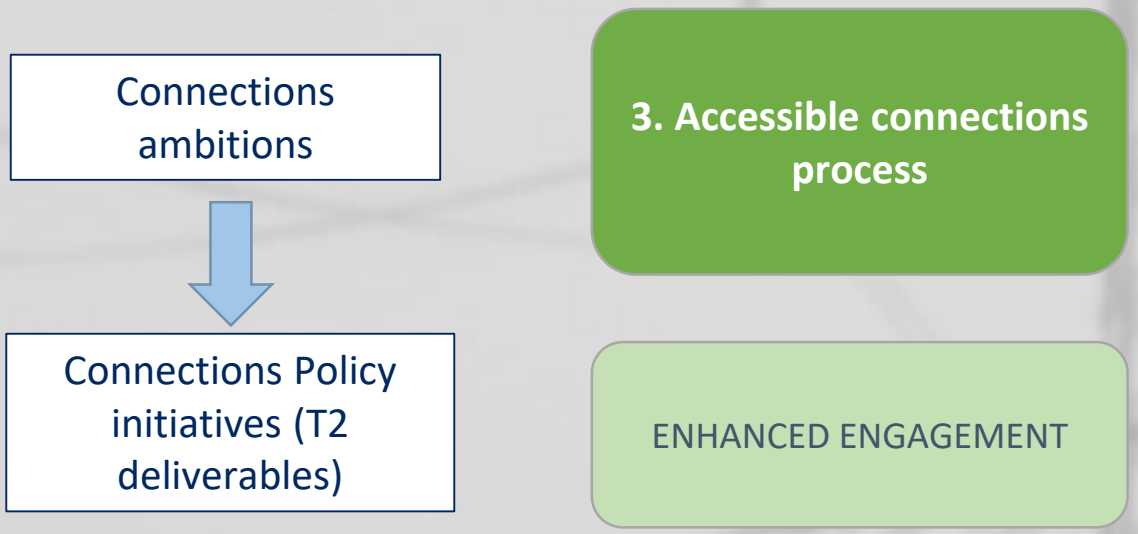
Tailoring our products and services ensures we meet the needs of every customer regardless of size or type

- **Offer in principle:** increased flexibility in the application process to explore and arrive at the most optimal solution before proceeding to formal offer
- **Queue Management**: quicker connections removing queue blockers; alignment of timelines
- **Energised Service:** minimise business disruption
- **Renew:** ensures customers remain on the most optimal solution ensures your project and our network performance as efficiently as possible



	Scoping	Application	Connecting	Energised	Review
Ambition 2: Tailored customer services and products	✓	✓	✓	✓	✓

RIIO T2
AMBITION 3:ACCESSIBLE CONNECTIONS PROCCESS



ACCESSIBLE CONNECTIONS PROCCESS

Customer Advocacy

Our new customer advocacy service aims to provide customers with up to date:

- **Industry policy changes**: including targeted events to educate customers on current practices, seek feedback on policy change and **advocate for policy change**
- **Market opportunities:** we will **horizon scan** and make our customers aware of any new opportunities

Our online portal will provide a link to share information and feedback and invite customers to events alongside new dedicated advocacy members.

"Reviewing industry frameworks for possible improvement and fighting for ways to improve how the industry works, is clearly a good idea."

"I think both 'supporting thriving communities' …Removing barriers in communities opens and enables other things to happen.

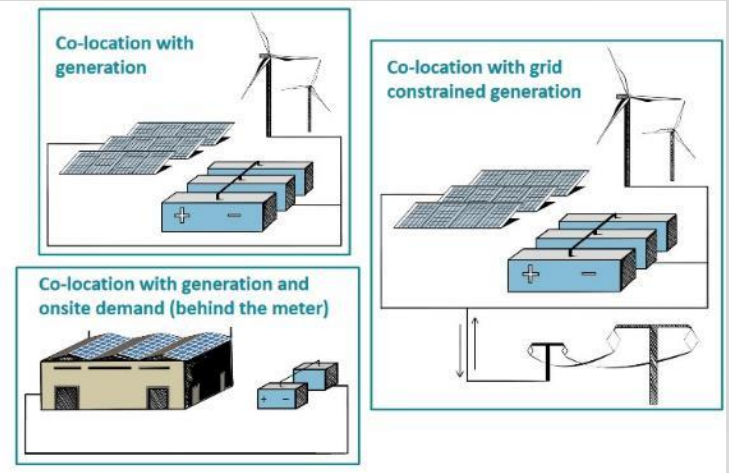
ACCESSIBLE CONNECTIONS PROCCESS

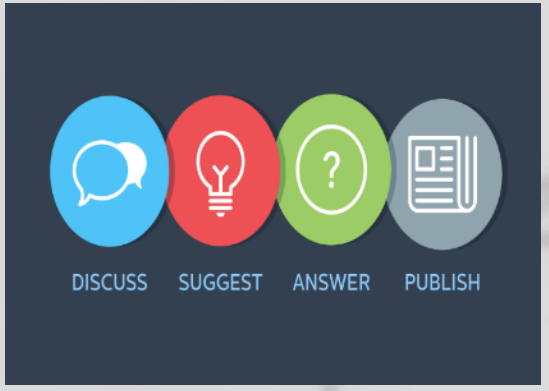
Customer Collaboration

Our customer collaboration service aims to enable collaboration between ourselves and customers and *between* customers:

- A '**register interest**' feature on our availability map to enable co-location and consortia opportunities
- An online **customer forum page** to discuss and debate key topics.

"… They have a tidal energy project and they're planning to put an Electric Vehicle (EV) charger onto that. How many more of these applications might be possible? We would very much want to work with the right organisations to enable that.





ACCESSIBLE CONNECTIONS PROCCESS

Customer benefits to customer advocacy and collaboration

- **Ensure customers are included in any policy changes, debates and opportunities** as we transition towards a smarter and flexible energy system.
- Collaboration arrive at the most optimal network solution; efficiency savings for the customer and GB consumer
- **Customer forum:** Areas on interest and debate for customers will allow us to analyse the information pinpointing which topics of interest and areas of improvement

	Scoping	Application	Connecting	Energised	Review
Ambition 3: Accessible connections process	✓	✓	✓	✓	✓

MEASURING SUCCESS: A QUALITY OF CUSTOMER EXPERIENCE INCENTIVE

Why do we need an incentive?

- To encourage **continuous improvement** to keep meeting customer's expectations throughout the price control;
- **Prioritising** this in our business decisions ; ensure the customer is **centric** to our focus
- **This is not BAU** this is a **behavioural change for TOs** incentivise;
- **Adaptability** to customers' needs above and beyond licence/code
- Customers expectations which are **high and fluctuating (uncertainty which customers we will serve)**;
- Solutions will increase in **complexity (requiring** innovation and whole system thinking)
- This requires a business and **cultural** change

PROPOSAL: A QUALITY OF CUSTOMER EXPERIENCE INCENTIVE

How will we measure success?

Placement survey questions:

- a short (3 questions) survey will **automatically** be issued to each customer following **completion** of each stage of the customer experience;
- Clear distinction between the role of the ESO and SHE-Transmission
- The quickness and simplicity of the survey will encourage customer responses
- Scores measured annually on the average rating across the experience [Ofgem submission]
- Targeted data in real time will **increase business focus** on every stage of the experience
- Feedback from customers on the connections team's performance

Conclusion

- Success during RIIO T1 has driven a and we have begun to transform our role as a TO
- Led by stakeholder feedback our RIIO T2 connections ambitions focus on delivering solutions and services which work for *every* customer *throughout* the customer experience
- **Our policy initiatives** have been developed to improve the customer experience based on stakeholder feedback; your feedback will **refine** our idea further
- Regulatory incentives should reflect, measure and drive this **behavioural change towards a more customer centric business**
- **Next steps**: refine plans, first draft of our RIIO T2 policy to be submitted to Ofgem and published on our website in July , final draft in December

Scottish & Southern Electricity Networks

TRANSMISSION

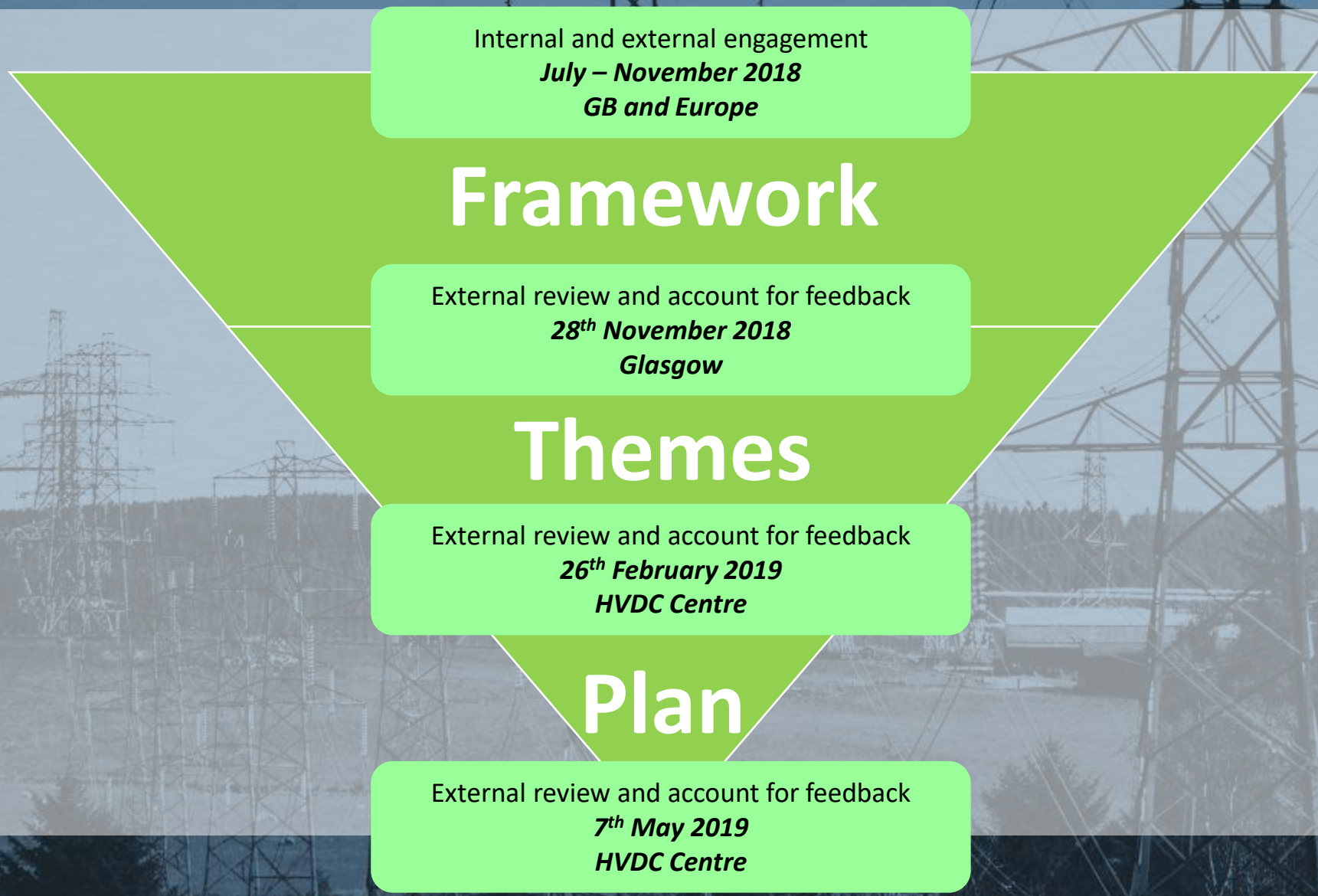
RIIO T2 SHE Transmission Innovation

Andrew Urquhart, Transmission Commercial and Innovation Manager

Overview

- Innovation Strategy development
- SHET Innovation objective and definition
- February roundtable event - feedback
- Innovation life cycle
  - Pre, during and post-project phase
- Stakeholder opportunities

Innovation Strategy Development



SHE Transmission Innovation Objective and Definition

Objective

We aim to **support** the transition towards a low carbon economy, whilst maintaining high levels of reliability in electricity supply and ensuring energy remains affordable for all.

Definition

Identifying and proving new **ways of working** for the **long-term benefit** of our customers, our stakeholders and ourselves

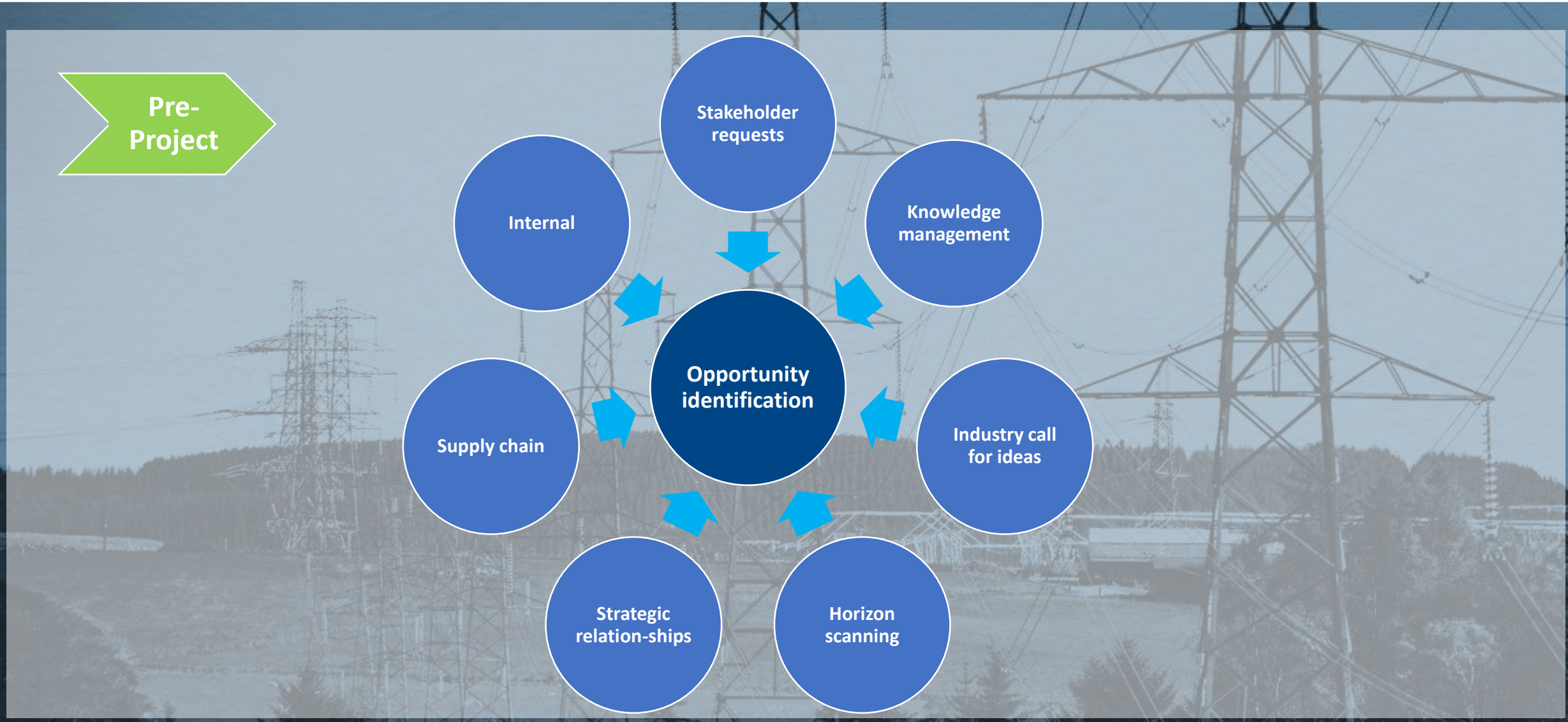
Stakeholder Event 26th February 2019 Feedback

Stakeholder Feedback	Our plans
"I didn't see digitalisation. Through technology, commercially, it's how we interact with customers." Infrastructure / engineering representative	- Increased importance of this in ***Safe and Secure Network Operation*** theme and ***Sector Leading Efficiency*** theme - Connections process is also going to look at this
"I think what's missing is technical policy, either at a national or network level. That needs to be part of it." Infrastructure / engineering representative	- Initial innovation opportunity identification to include wider industry travel and policy changes - BaU transfer will ensure policy is updated and disseminated to relevant parties
"Whole system, energy system transition and using network flexibility all go hand in hand. Thinking about electric vehicles, the whole decarbonisation agenda fits in there too. Whole system approach is key to developing that innovation piece too. Otherwise it's fragmented and won't encompass disparate elements." Infrastructure / engineering representative	- Identified whole system as a key topic to apply innovation to during T2 - Standard collaboration across industry including government and ENA to identify innovation opportunities
"I think there needs to be the long-term approach, making sure we look at the wider societal benefits of new connections." Environmental group representative	- Cost Benefit Analysis (CBA) will form the basis of all innovation definition, testing and delivery
"Reviewing industry frameworks for possible improvement and fighting for ways to improve how the industry works is clearly a good idea." Infrastructure / engineering representative	- Helped inform development of 'advocacy' principle as defined in connection policy - Commercial project being worked up for Queue Management

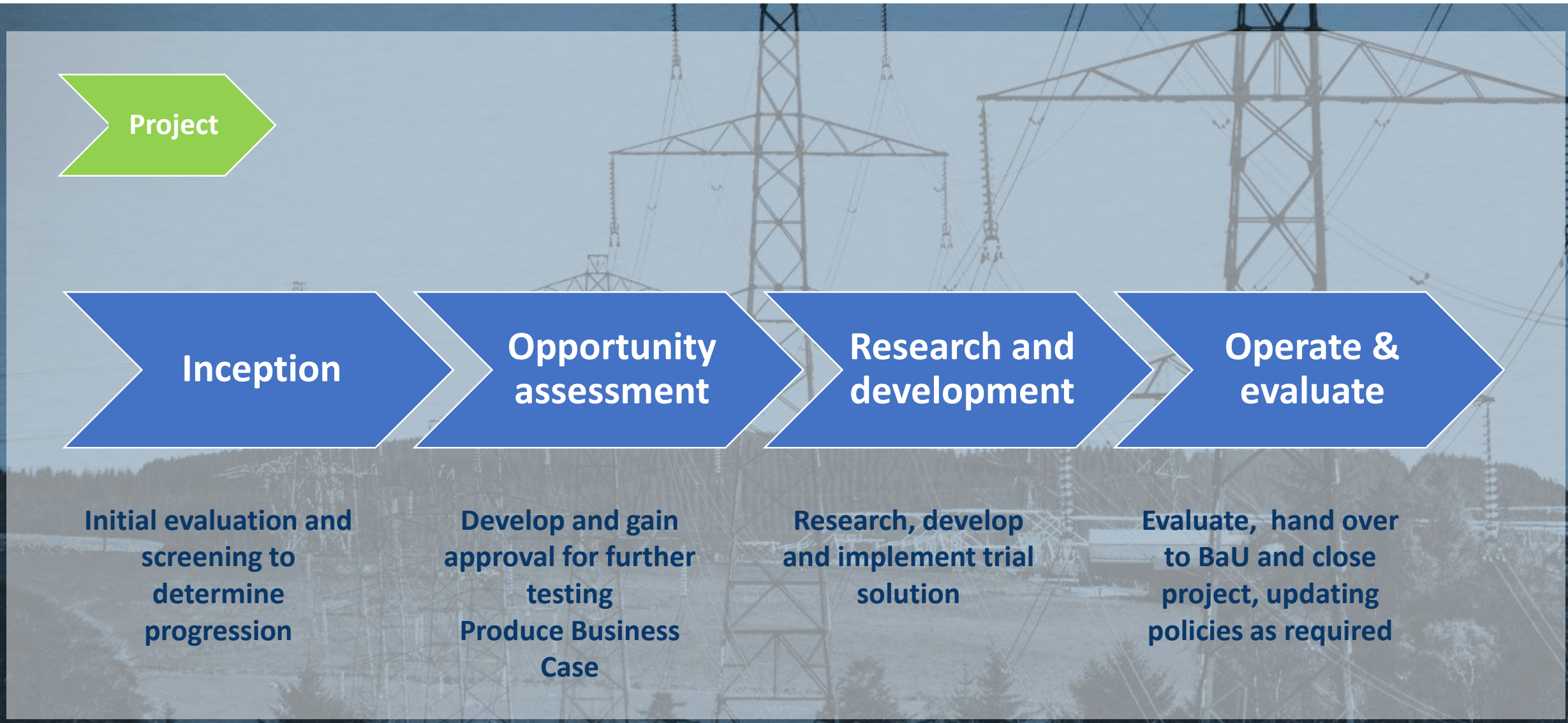
Innovation Lifecycle

Pre-Project	Opportunity assessment
Project	Research and development
Post-Project	Benefits realisation

Innovation Lifecycle Pre-Project – idea generation



Innovation Lifecycle Project – Stages



Innovation Lifecycle Project – CBA Level to Apply

Project

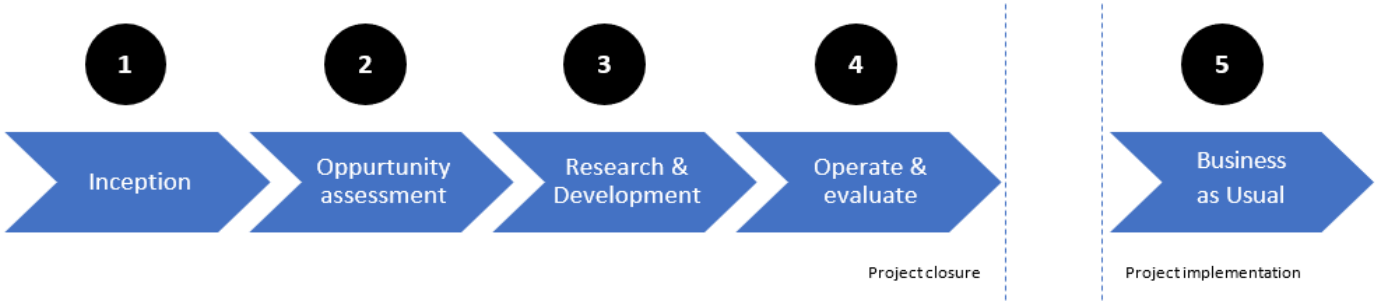
Readiness	TRL 2-6 *(research and development)*	TRL 6-8 *(pilot demonstration)*	TRL 8-9 *(commercially ready)*
Overall CBA approach	• Focus on the overall benefits of enacting that concept.	• Quantify assumptions where possible • Highlight level of confidence in each element and include placeholder for unknown costs and benefits.	• Detailed cost and benefit line items, including confidence. • Converted to scenarios • Key variables highlighted
Time horizon	• Highlight the points in time (or key triggers) where the concept may be required, • Do not attempt to quantify trajectory of benefits.	• Focus on short term (e.g. single year) • Note ways in which the CBA would change (e.g. saturation of market, policy change).	• Typically, multi-year, covering a number of price controls, and showing the effect of discounting (align to Green Book) • Ensure “end effects” do not hide costs or benefits.

Innovation Lifecycle Project – Using CBA

Project

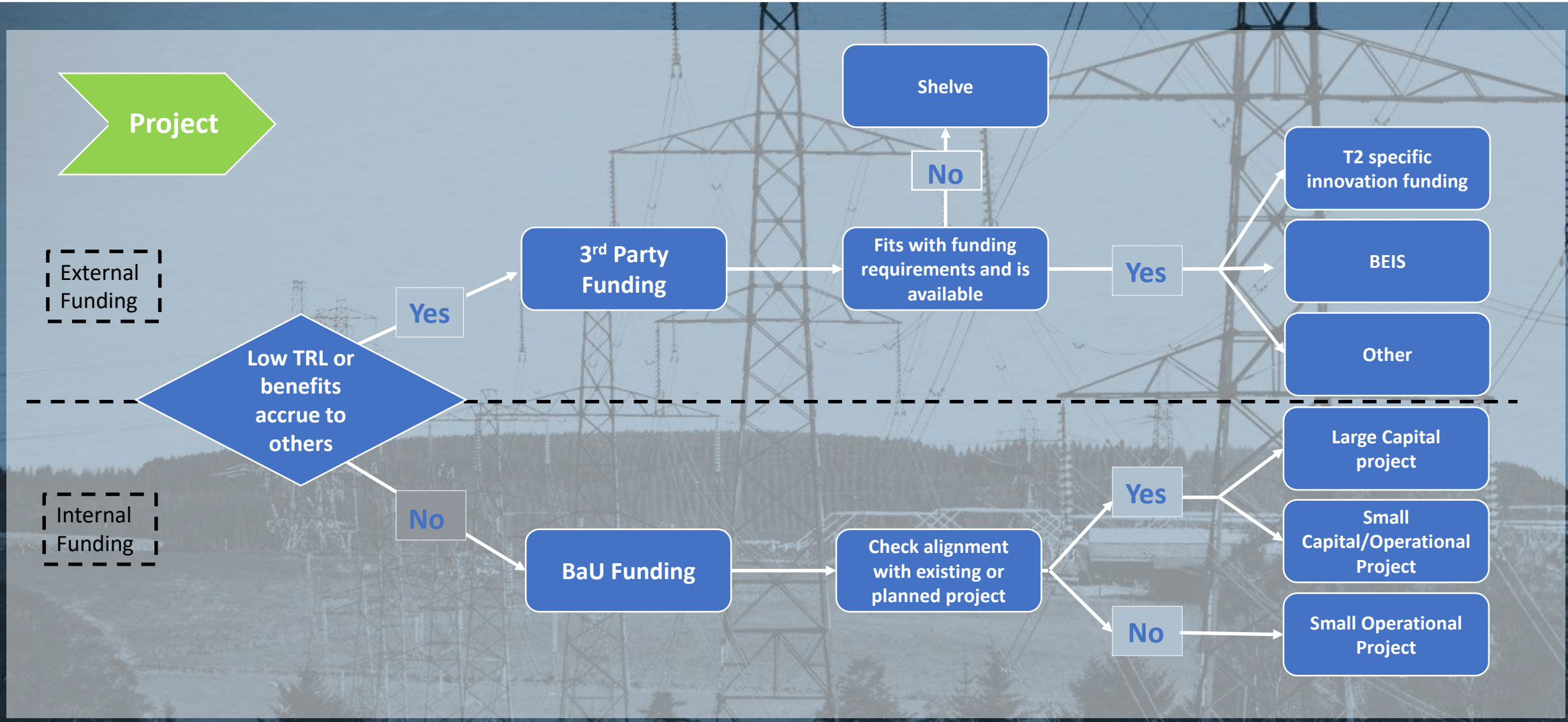
Example: New Hovering Tower Design

1. *No one has done this so low TRL*
2. *CBA high level as little idea how to float a tower but could improve planning and footprint*
3. *Test rockets and hover boards in trial and capture costs associated*
4. *Run CBA with captured info*
5. *Don't transfer to BaU as madness*



1. Assess the TRL of project and identify suitable CBA approach. Start collecting data to undertake CBA
2. Undertake the CBA. Identify key variables that the trial will assess performance against and forecast that performance in CBA
3. Monitor the outturn performance against the key variables in the trial and re-run CBA during the trial
4. Re-run the CBA at the end of the trial based on final results. Compare the result to those forecast
5. Monitor outturn results of the rollout to check that impact is similar to that observed in the trial

Innovation Lifecycle Project – Funding



Innovation Lifecycle Project – Transfer to BaU

Post-Project

Technical Innovation	Non Technical Innovation
• Functional specification for new technology • Technical documentation • Testing results • Risk assessment for the installation, operational, maintenance and disposal of the new technology • Failure modes assessment detailed any known failure modes • Storage requirements • Installation and maintenance requirements including training/skills requirements • Decommissioning/disposal requirements • Business Readiness Plan(s) • Acceptance by senior business function user • Benefits Realisation Plan • Project Closure Report • Lessons Learned	• Technical documentation • Test Completion Reports • User Acceptance Test Plan • Service Level Agreements • Business Readiness Plan(s) • Acceptance by senior business function user • Benefits Realisation Plan • Completion Certificate • Complete history of closed and open risks to service • Training/skills requirements • Project Closure Report • Lessons Learned

Innovation Lifecycle Post Project – Benefits Realisation

Post-Project

Issue	Ofgem consultation comment	Our response
Delivering benefit	*"Provide a better understanding of the benefits delivered through innovation"*	Developing a common approach to forecasting and tracking innovation benefits
BaU adoption	*"Demonstrate how innovation has moved into BaU"*	Framework includes measures aiding transfer to BaU which shall be tracked
Funding BaU innovations	*"Concerned that innovation funding has been used for operational and maintenance projects which could have been funded through BaU"*	All innovations being tested will go through rigorous CBA which will identify the optimal funding route
Influence of past learning	*"Need to demonstrate how learning from past projects has informed new projects"*	All innovations will track what feeds into and out of their development
Foster Collaboration	Increased collaboration in innovation including whole system	Our framework establishes collaboration across the whole innovation lifecycle

Future Stakeholder Engagement

Pre-Project

- General innovation engagement
  - Annual report publication and consultation
  - Innovation webpage and social media coverage
  - Strategy and plan reviews
- Innovation opportunity identification
  - Ideas and issues
  - Industry change
  - Strategic partnerships

Project

- Information gathering feeding into screening
- Identifying and establishing project specific collaborations
- Project affected stakeholders
- Project update dissemination

Post Project

- Project affected stakeholders
- Final project dissemination

Innovation Roundtable Session

RIIO T2 Whole Systems

Bless Kuri & Qi Tang

Transmission System Planning and Investment

SHE Transmission's Whole System Definition

"Adopting a whole system approach to system planning, development, operation and maintenance to maximise consumer benefits and support decarbonisation"

SHE Transmission's Whole System Objective

Make effective whole system decisions to deliver value for GB consumers in a sustainable way, based on

- Understanding of electricity network needs
- A comprehensive range of solution options
- Impact of protentional solutions to our own system, stakeholders and consumers

Recap

Currently, different parties in the energy industries pursue the solutions to their individual systems with minimum considerations to other parties, e.g. electricity distribution and transmission identify network issues and solutions independently.

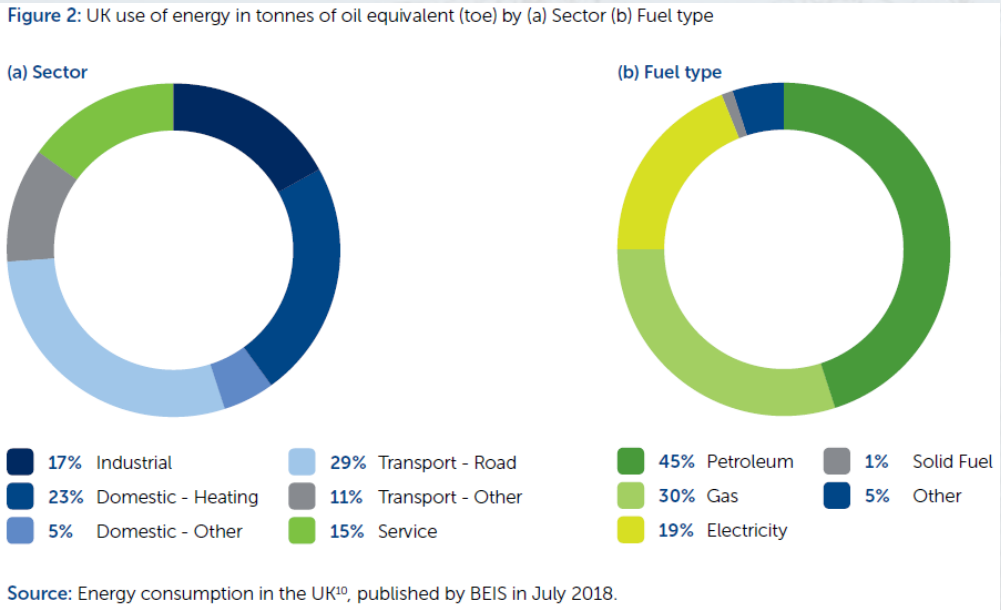
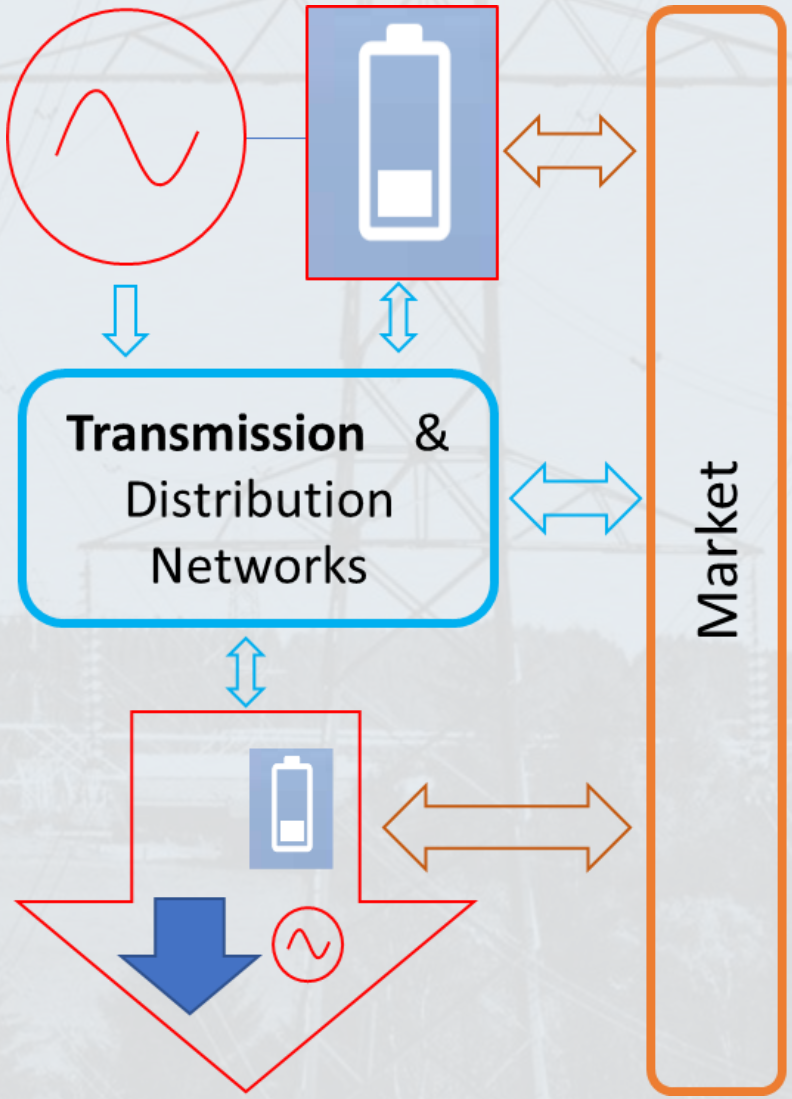


Figure 2: UK use of energy in tonnes of oil equivalent (toe) by (a) Sector (b) Fuel type

Source: Energy consumption in the UK[10], published by BEIS in July 2018.



Whole System – Why We Need It?

Whole System Drivers

Decarbonisation
- Low Carbon Transition
- Coal/Gas->Wind/PV/Tide/Biomass

Decentralisation
- Distributed Energy Resource's Behaviours
- DNO->DSO; Flexible Connections

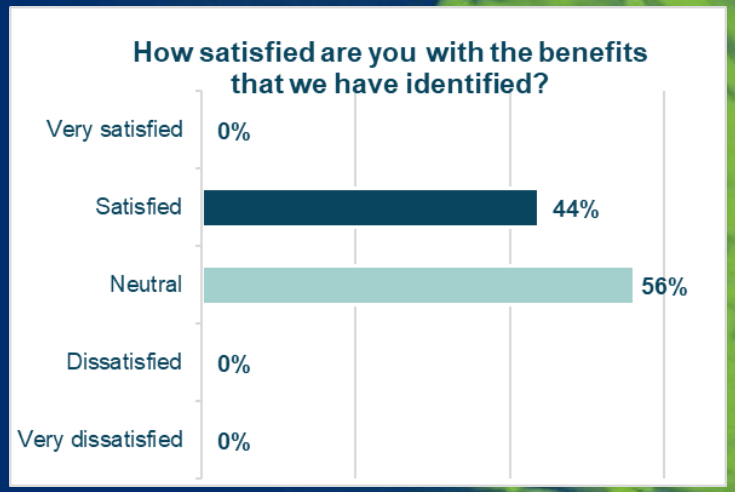
Digitisation
- System Stability/Security Against Physical/Cyber Threats
- System Monitoring /Communication (Black Start)

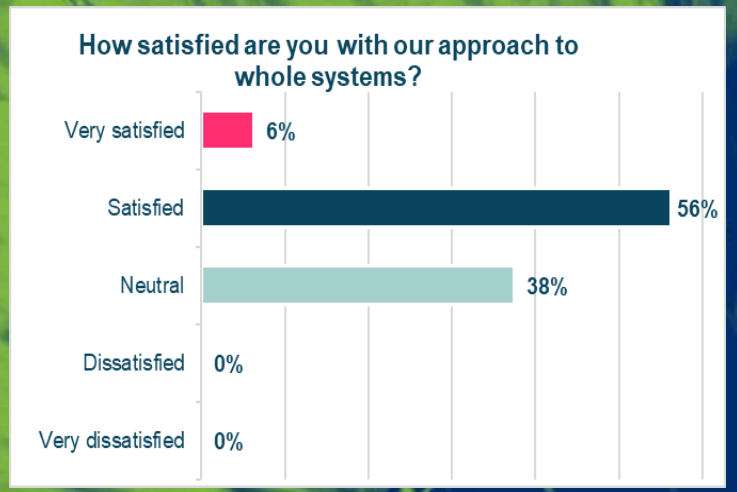
Democratisation
- Data and Information Collection/Review/Sharing
- Balance between consumers' needs and cost/security of supply

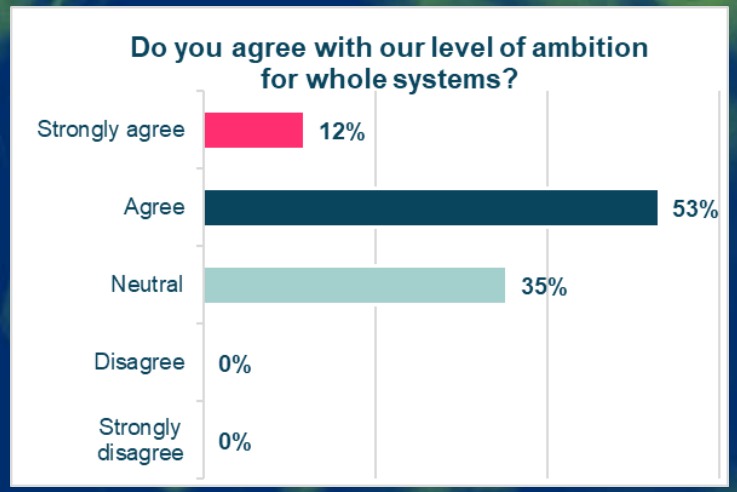
Whole System – Our Dynamic Definition

	Purpose	Major Barriers	Aspiration
Advanced 2025/26 –	To explore whole system solutions considering wider energy vectors, including wider societal impact	A national whole system framework and a consensus of potential benefits versus effort	Beyond RIIO-T2, Informed by learning from lower levels.
Intermediate 2021/22–2025/26	To explore whole system solutions within closely coupled energy vectors, e.g. Electricity–Gas–Transport–Heat	Whole system cross sector-specific industry frameworks and regulatory mechanisms	During RIIO-T2, exploratory and innovative work (**learning by trying**)
Beginner –2021/22	To explore whole system solutions within the single electricity vector, e.g. Electricity Transmission–Distribution	Whole system electricity industry frameworks to allow equitable participation of regulated and non-regulated entities	Within RIIO-T1, exploratory and innovative work (beyond current standards and codes)
Baseline Now	To discharge existing licence obligations	None – sufficient provision within regulatory framework to meet licence obligations, however not adequately cover whole system	Embedded in BAU

Stakeholder Event 26th February 2019 Feedback Review







Stakeholder's Thoughts – Opportunities

Benefiting customers by offering the flexibility in connection offers and ultimately saving the end customer's money

SHE Transmission is unique to do the Transmission-Distribution collaboration in the North Scotland given that both networks are run within SSE group

Relevant and accurate data sharing under the whole system, including peak demand, availability and usage of EV charging points

Establish a mechanism to regularly update stakeholders on whole system initiatives

Support the decarbonisation agenda

Collaborate with:

- EV manufacturers
- Regulator
- Energy suppliers
- SP Network
- Economic development agencies

Focus on system stability as well as "black start"

Stakeholder's Thoughts – Challenges

Planning for the variability between generation and demand

Flexible planning requirements between the rural and urban networks

Educating consumers about possible ways they might use energy in future

Collaboration with ESO/DSOs/TOs/Government to educate consumers about possible energy use cases

Is it too ambitious to be achieved by the end of RIIO-T2?

The ambition is defined as "Exploratory and innovative work – learning by trying" during T2

Electrical Vehicles VS Hydrogen Vehicles

Working closely with ENA Open Network Project and ESO on the future energy scenario

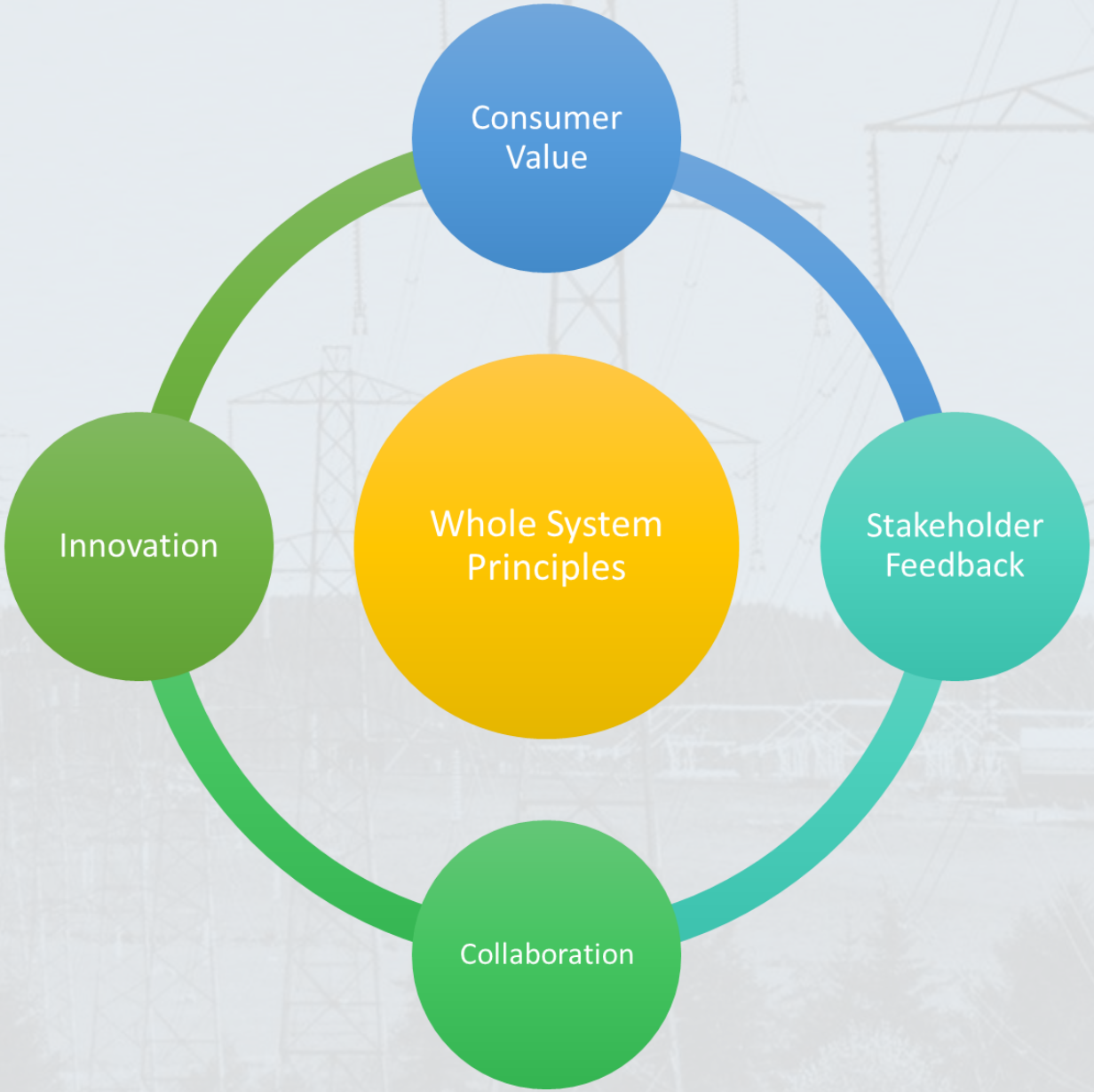
Is Gas the most important energy vector collaboration? To be examined in RIIO-T2

Working with ENA ONP Whole Energy System to track the performance of cross energy vectors.

Compensating EV owners for their car battery used for the storage solution

It would be mainly DSO to design the specific commercial scheme in terms of the EV's capacity. SHE Transmission will definitely work together from a whole system perspective

Whole System – Principles



Whole System – Consumer Value

At the heart of our whole system policy is to deliver value for consumers

- Assess the impact of SHE Transmission's activities on others (Electricity + Other Energy Vectors) and Focus on those impacts driving highest benefits for consumers.
- Whole System Solution Development Cost versus Overall Benefits
  - Adopt a **whole system cost benefit analysis** approach
  - Assess the consumer value delivered by the whole system activities
  - Rank the priorities of our whole system activities

Whole System – Stakeholder Feedback

An effective two-way communication, tailored for different customers and stakeholders at all levels

We Listen

- What are your prioritised needs
- What are your prioritised concerns
- How your activities may impact us
- How your activities may impact other stakeholders within different sectors
- What is your view on balance between security and cost

We Speak

- Our position within the electricity industry
- Constraints of our network
- Our relationship with the stakeholders
- How our activities impact our stakeholders and customers
- How we consider stakeholders' input in shaping our strategies

We Act, Review and Update

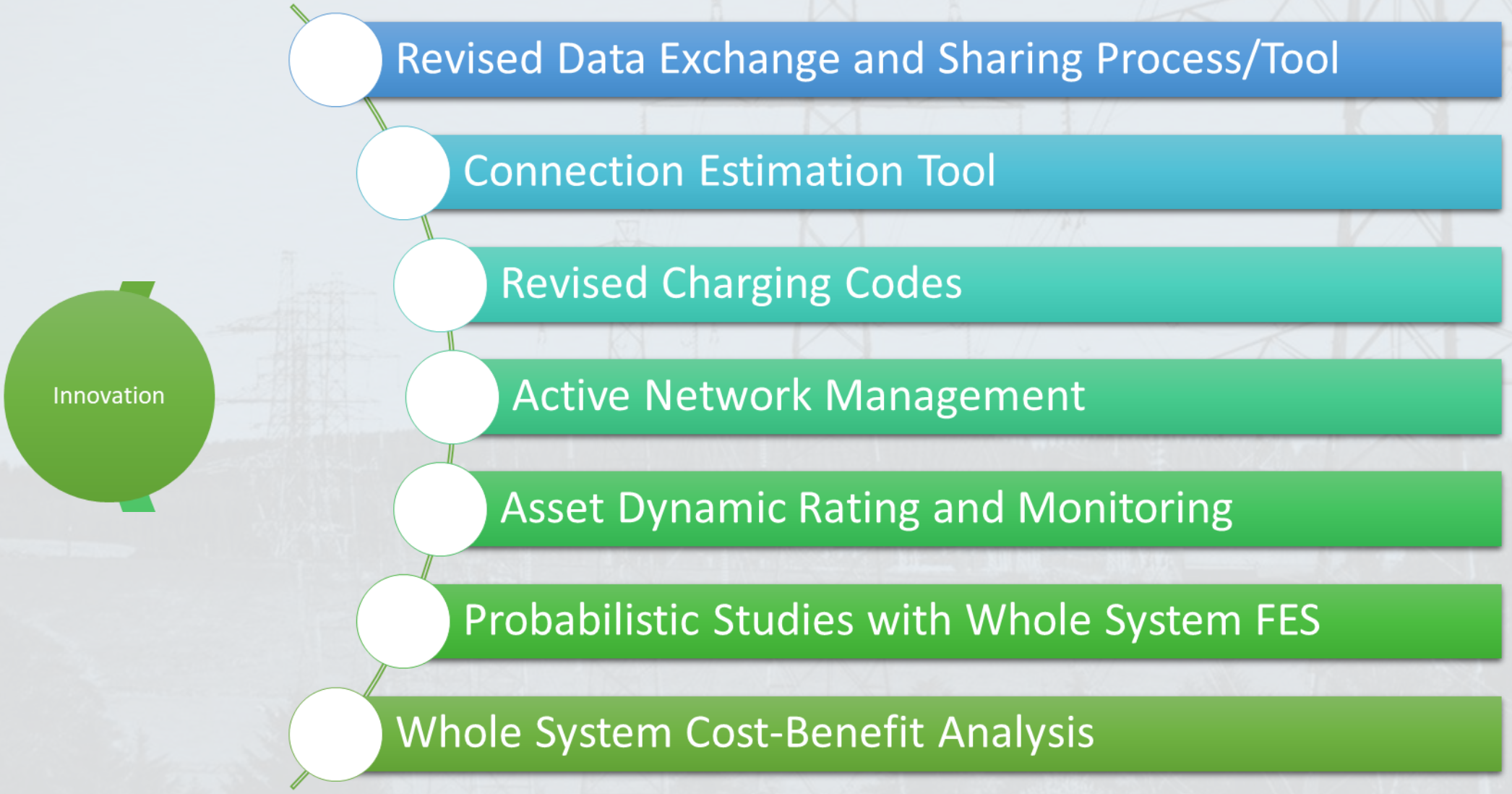
Whole System – Collaboration

Interface	TO-NGESO	TO-DSO/TO	TO-Customer	TO-Wider Stakeholders
Consumer Values	• Faster access to low marginal cost/sustainable generation • Lower constraint costs from outages	Optimum overall cost solutions for network issues (capacity, operability, etc.)	• Optimum overall cost solutions for green power and network capacity with flexible connections • Improved power quality (harmonics, voltage flicker, etc.)	• Stakeholder input/feedback • Cross-vectors collaboration such as Gas, Transport and Heat to meet consumer demand and decarbonising in a timely fashion

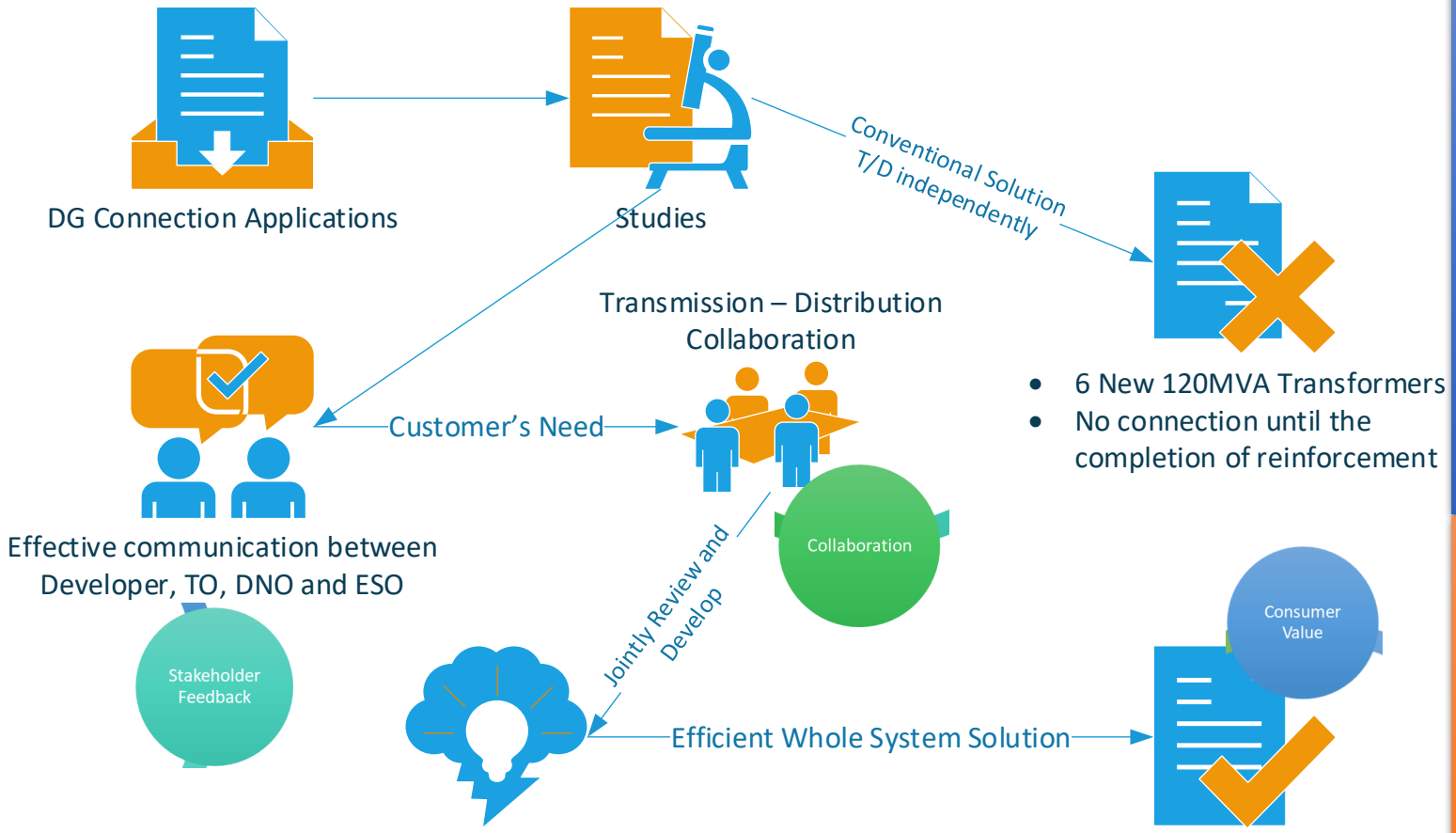
Grid Code, STC, CUSC, SQSS, BSC Review/Changes to facilitate the collaboration

Direction of Travel

Whole System – Innovation



Whole System Activity – Carradale GSP Reinforcement Practice



- 6 New 120MVA Transformers
- No connection until the completion of reinforcement

- Distribution reconfigures 33kV busbar – balance the power flow
- Modify normal running arrangement – solve fault level issues
- Intertripping/ANM schemes – flexible connection offers

- 4 New 120MVA Transformers
- Earlier connection date

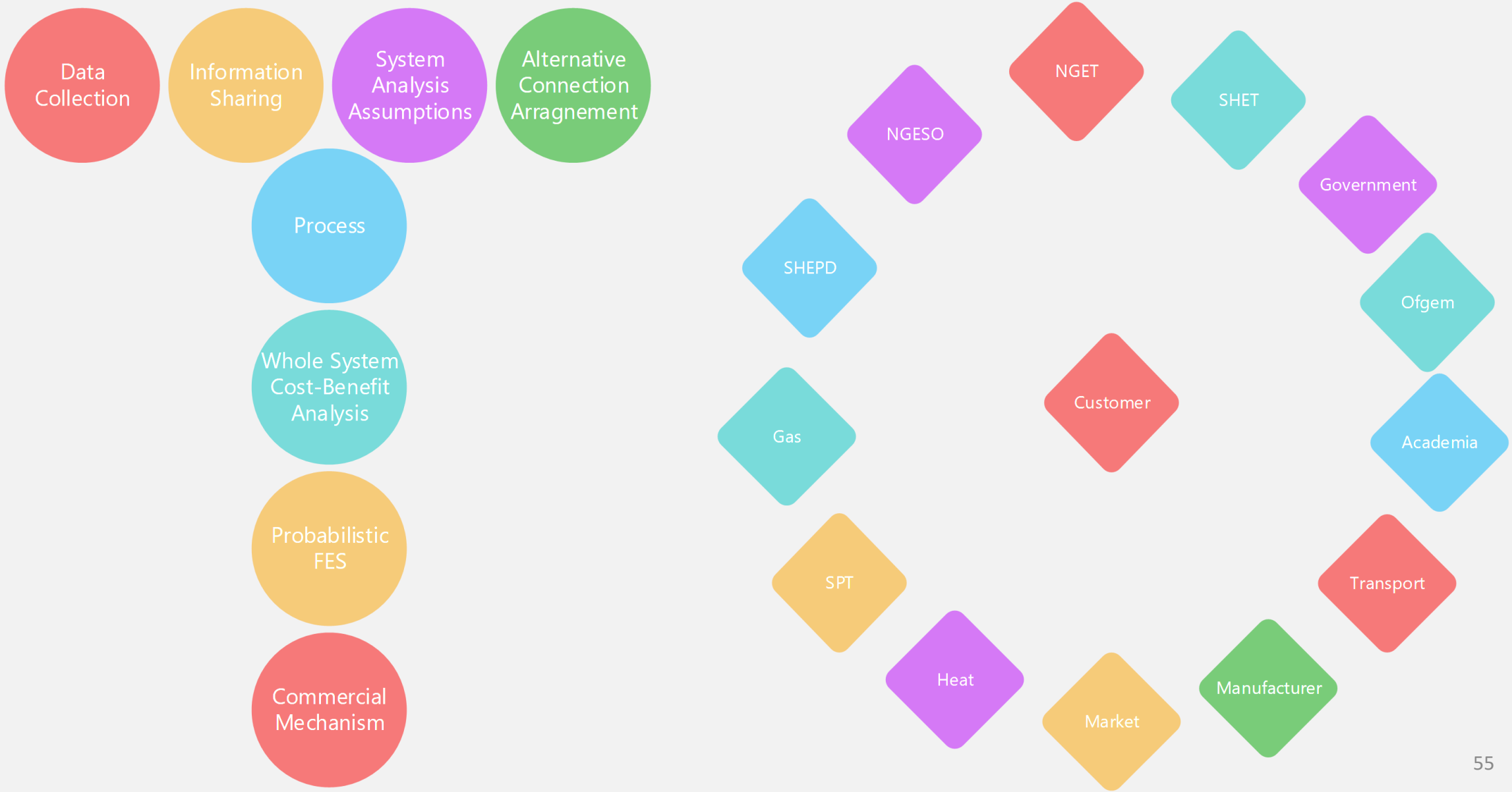
Benefits

- Defer the high-cost transmission works
- Maximise the utilisation of assets
- Efficient solution to reduce construction works
- Facilitate the renewable generation connection
- Coordinate with asset condition based works

Challenges

- Increased workload for both T and D
  - Guaranteed Standards vs Extra communication/studies
- Information sharing between T, D and Developers
  - GDPR, Regulatory and Framework
- Funding and charging mechanism for the non-conventional whole system solution, as well as exploratory works

Whole System Activity – Going Forward…



Next Steps

- Analyse feedback from today and webinar on Friday
- Refine our plans based on your feedback
- Upload feedback report to our website
- Submit our first draft business plans to Ofgem and publish on our website in July
- Further consultation
- Final business plans in Dec

Thank you!

Any further feedback please speak to us or email:

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