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NTS Charging Forum
Future Energy Scenarios 2017

08 May 2017

Single View Forecast Vs Scenarios

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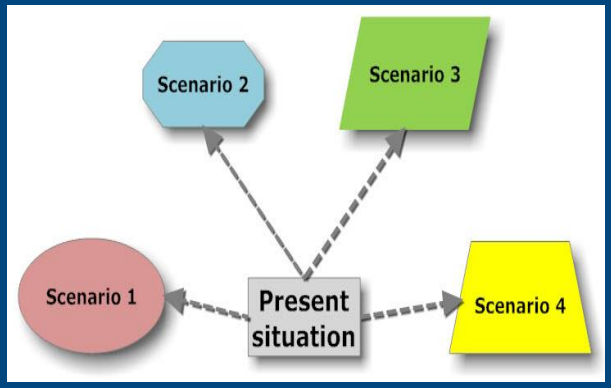
Forecasting

Scenarios



Why Scenarios:

- Over the last 10 years uncertainty has increased hugely in the energy market
- Scenarios look to address the increased uncertainty by providing a range of potential future outcomes
- There are too many variables that can impact the future of the energy market to have a single view over the long term
- Scenarios provide the flexibility to consider a wide range of underlying assumptions
- The process for scenario framework creation allows for a wide range of stakeholder views to be taken into account
- Scenarios allow for the “flexing” of certain variables e.g. the energy trilemma elements; Prosperity (Affordability) and Green Ambition (Sustainability)

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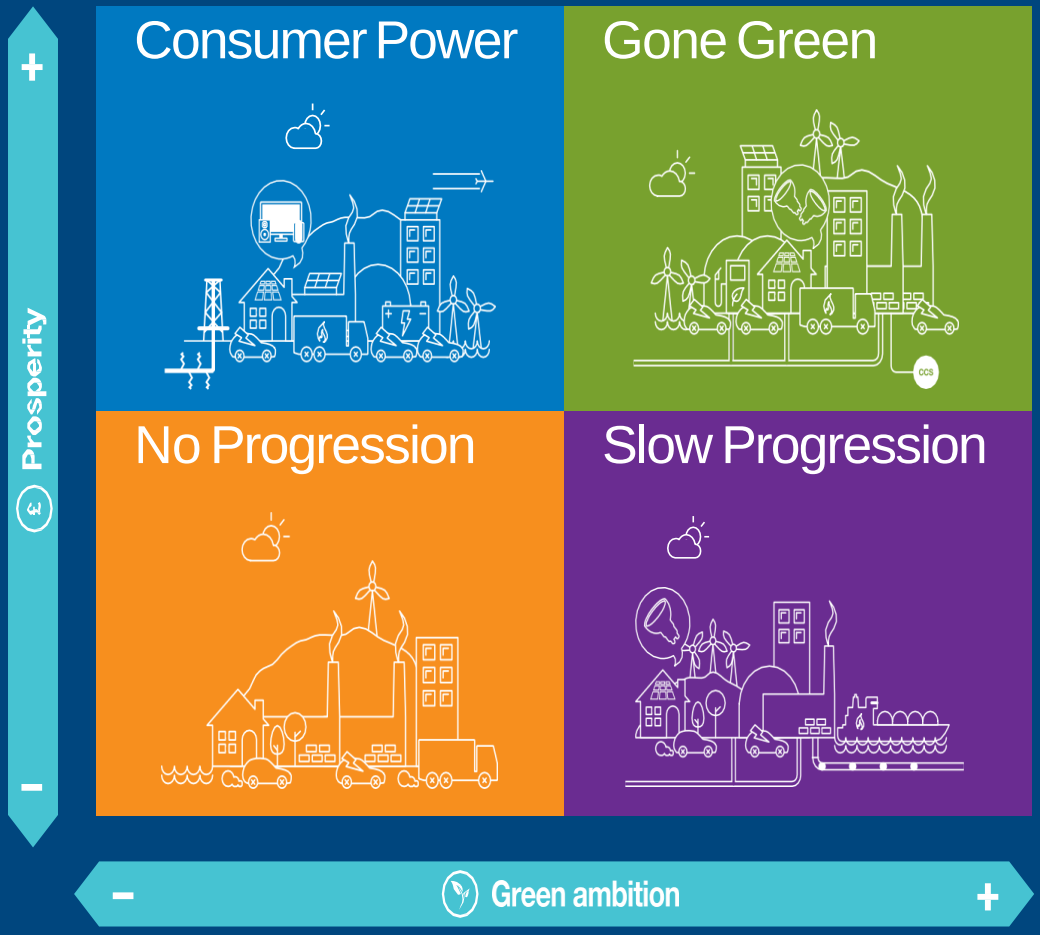
2016 Future Energy Scenarios



FES: High Level Process

- The complete FES cycle takes a year to complete
- It is a continuous process
- Stakeholder engagement is an essential and integral part of creating our scenarios
- Stakeholder feedback flows directly into our analysis through the scenario framework

A first look at our engagement reach for 2016

Through focused enhancements to our stakeholder engagement activities we consulted 391 organisations this year, increasing our engagement from 362 organisations last year.

Energy Industry	150
Customers	61
Small Businesses (including individuals)	35
Innovators	26
Supply Chain	25
Educational Interest	20
Investors	20
Political	19
Non-Government Organisations	18
Media	7
Communities and their representatives	5
Consumer Groups	3
Regulators	2

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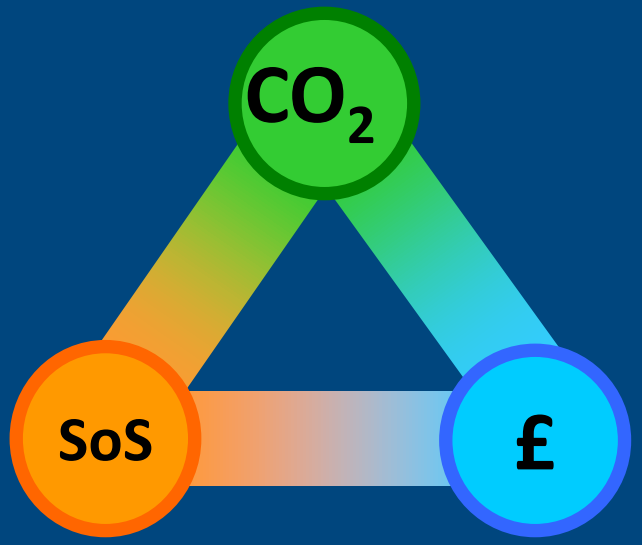
FES Development

The scenarios are underpinned by the energy trilemma

Decarbonise energy
80% CO_2 reduction by 2050



Ensure security of supply

Existing power station closures ~25% of total capacity by 2020

Affordability

Minimise the impact on consumer bills

The scenario framework

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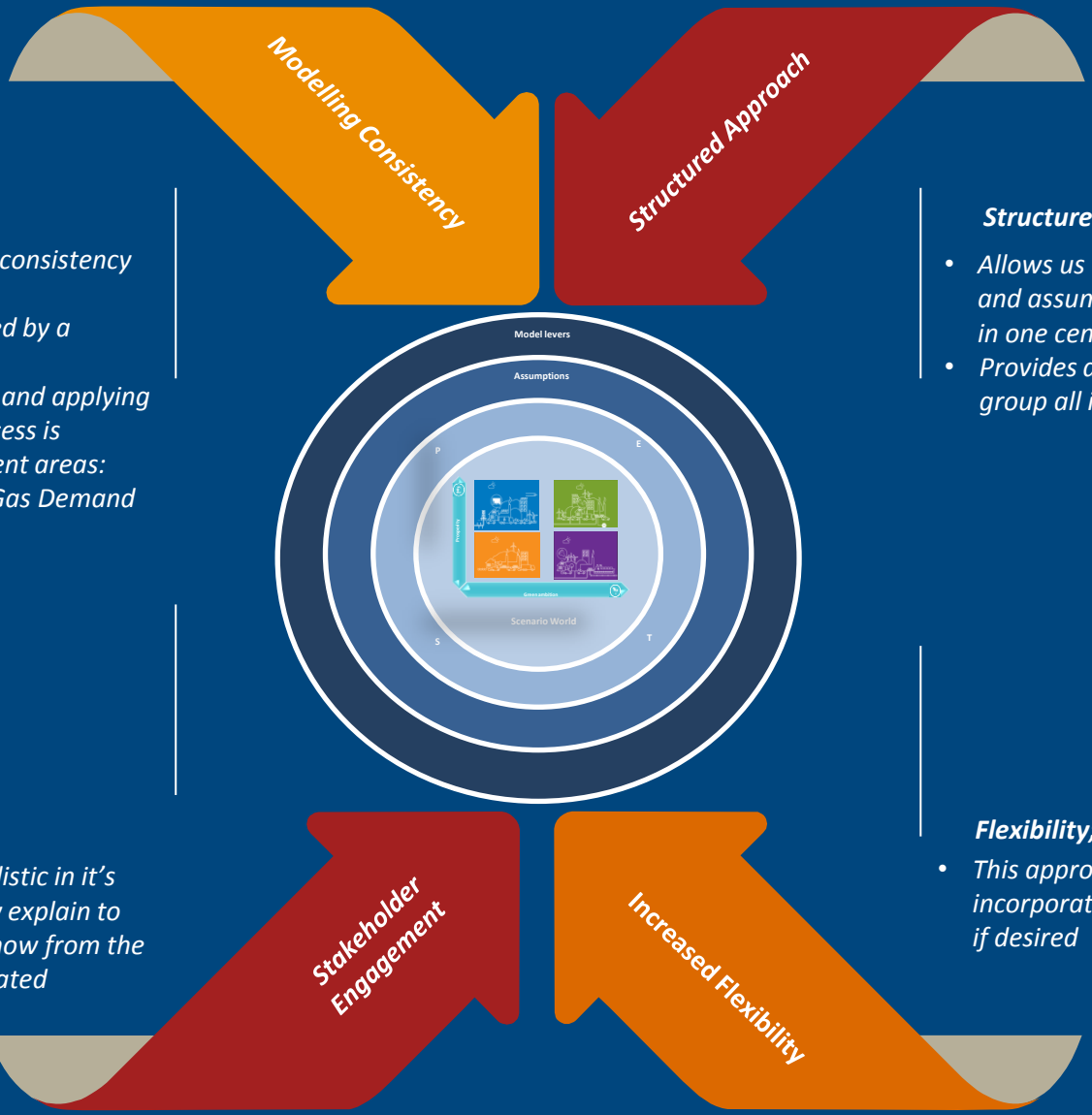

Modelling Consistency;

- *We believe this approach drives consistency across our analysis*
- *Each analysis area is underpinned by a common scenario framework*
- *Right up to the point of defining and applying levers the scenario creation process is consistent across the four different areas: Power Demand, Power Supply, Gas Demand and Gas Supply*

Structured Approach;

- *Allows us to clearly define the inputs and assumptions for all of our scenarios in one central location*
- *Provides a single reference document to group all inputs and assumptions*

Stakeholder Engagement;

- *This scenario framework is simplistic in it's approach and allows us to easily explain to stakeholders and the regulator how from the bottom up our scenarios are created*

Flexibility;

- *This approach is easily adapted to incorporate more layers or assumptions if desired*

Example through the frame work

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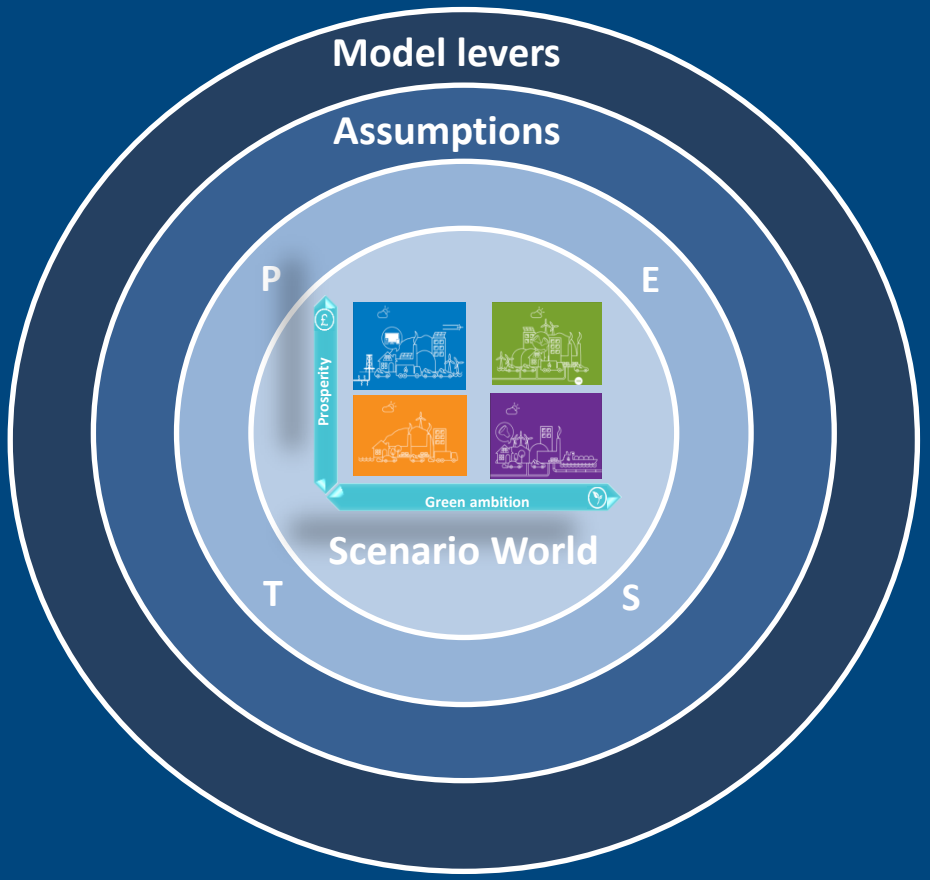

Scenario World

- The scenario world captures the core elements which are fixed across the scenarios
- Any rules which cannot be flexed across the scenarios are held here, e.g. Security of Supply
- **Example: the matrix approach, number of scenarios**

PEST

- The PEST layer looks at the scenario themes: Political, Economic, Social and Technological.
- Provides structure to the narrative and categories for the assumptions
- **Example: Onshore wind comes under Technological**

Assumptions

- For every sectorial model (e.g. onshore wind) there is a high level assumption that is flexed
- Assumptions are set to High, Medium or Low
- **Example: Onshore wind – installed capacity:**
  - **Two Degrees = High**
  - **Slow Progression = Medium**
  - **Consumer Power = Medium**
  - **Steady State = Low**

Levers

- Model levers are the most granular level of detail required for the sectorial models and cover **all** data inputs to the models
- The assumptions guide how multiple model levers are determined
- **Example: level of consents which are built (for 'Low': only consented plant get built) or construction rate (for 'High': assumes fast construction rates)**

Fixed Assumptions

- There are some inputs we do not vary between the scenarios which are used as fixed assumptions
- **Examples of fixed assumptions:**
  - **Population**
  - **Exchange rates**
  - **Existing Government legislation**

Creating the scenario world…

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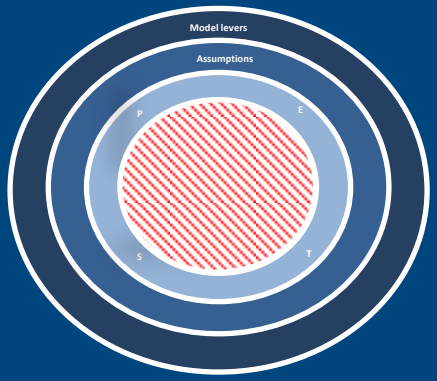

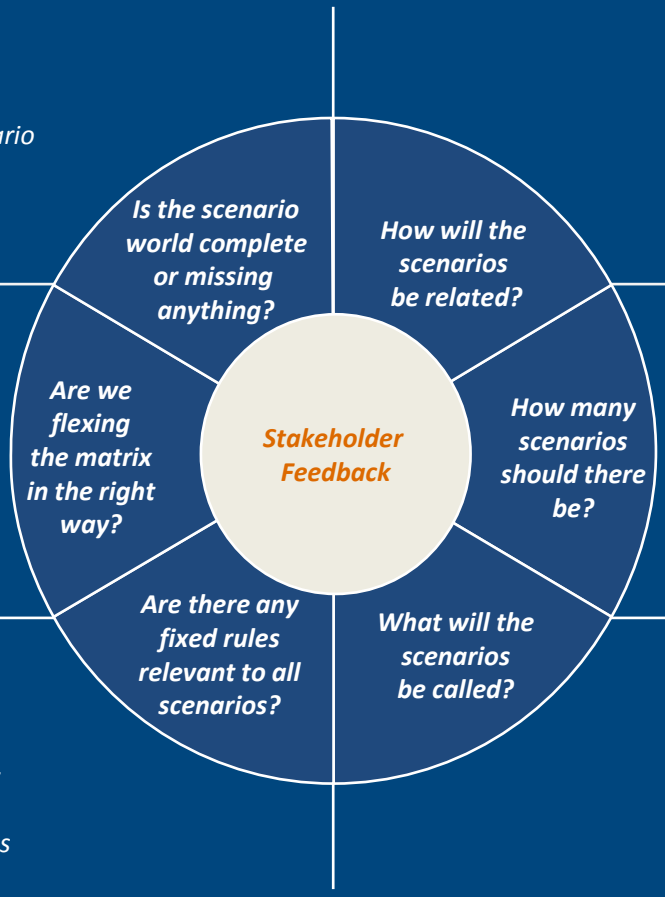

Is the method of using the scenario world still relevant?

This is currently the matrix 2x2 approach

The matrix is currently flexed by prosperity and green ambition.

These relate to the energy trilemma.

The number of scenarios is dictated by stakeholder feedback

Over the last 5 years the FES has contained different numbers of scenarios

Current stakeholder feedback from the industry is that 4 is a suitable number

The only rule that currently underpins all of the scenarios consistently is security of supply.

This is fixed across all 4 scenarios

The scenario names must be appropriate and reflect a particular set of underlying assumptions

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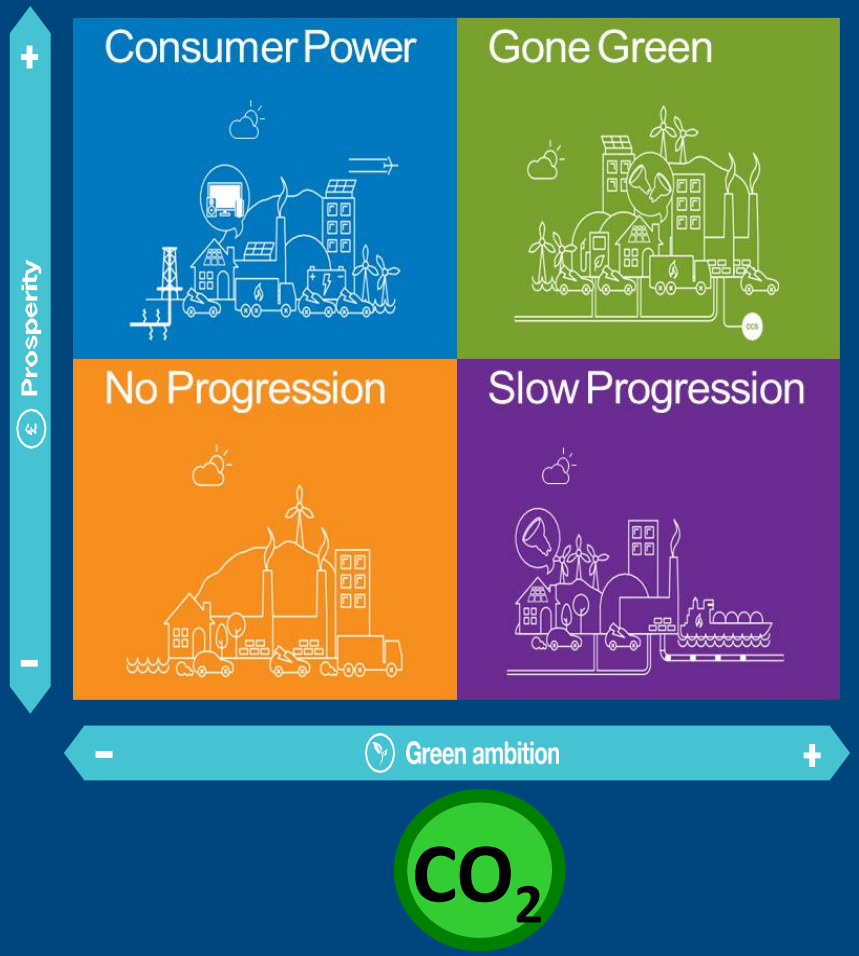
The Scenario Matrix

Green ambition – how much focus there is both from government and consumers to facilitate a green future.
Key Flexes – government policy (including environmental targets), incentives , consumer behaviour, innovation etc…

Prosperity – how much money is available for both the economy in general and consumers
Key Flexes – Disposable incomes, economic growth rate, energy prices, subsidies, R&D funding etc…

Security of Supply is NOT flexed. ALL scenarios are built to meet the security of supply standard.



Scenario assumptions

- We need to define what assumptions we will make in each scenario
- These need to cover every input
- We group our assumptions into categories:
  - Political
  - Economic
  - Social
  - Technological
- For each scenario we look through the list of assumptions and select a level of either high, medium or low.

- Again, we use stakeholder feedback to help set the level for each assumption

Example

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Assumptions

- Subsidies for electric vehicles
- Tax regime for shale gas
- Tax regime for offshore gas production
- Building regulations
- European harmonisation
- Subsidies for renewable generation

- For each of the input statements; High, Medium or Low will be assigned per scenario
- These will be appropriately aligned to the prosperity and green ambition axis e.g. high green ambition would be conducive of high subsidies for renewable generation
- Model levers are then flexed appropriately

Assumptions for renewable subsidies

Consumer Power: MED	Gone Green: HIGH
No Progression: LOW	Slow Progression: MED

Model Levers

- These are detailed assumptions that are flexed across the scenarios dependent on the PEST assumptions.
- These form part of the underlying analysis rather than part of the scenario framework

Lever Examples

- Number of wind project connections
- Number of tidal project connections
- Increased likelihood of renewable connections in general
- Speed of connection for renewable generation projects

Modelling Processes

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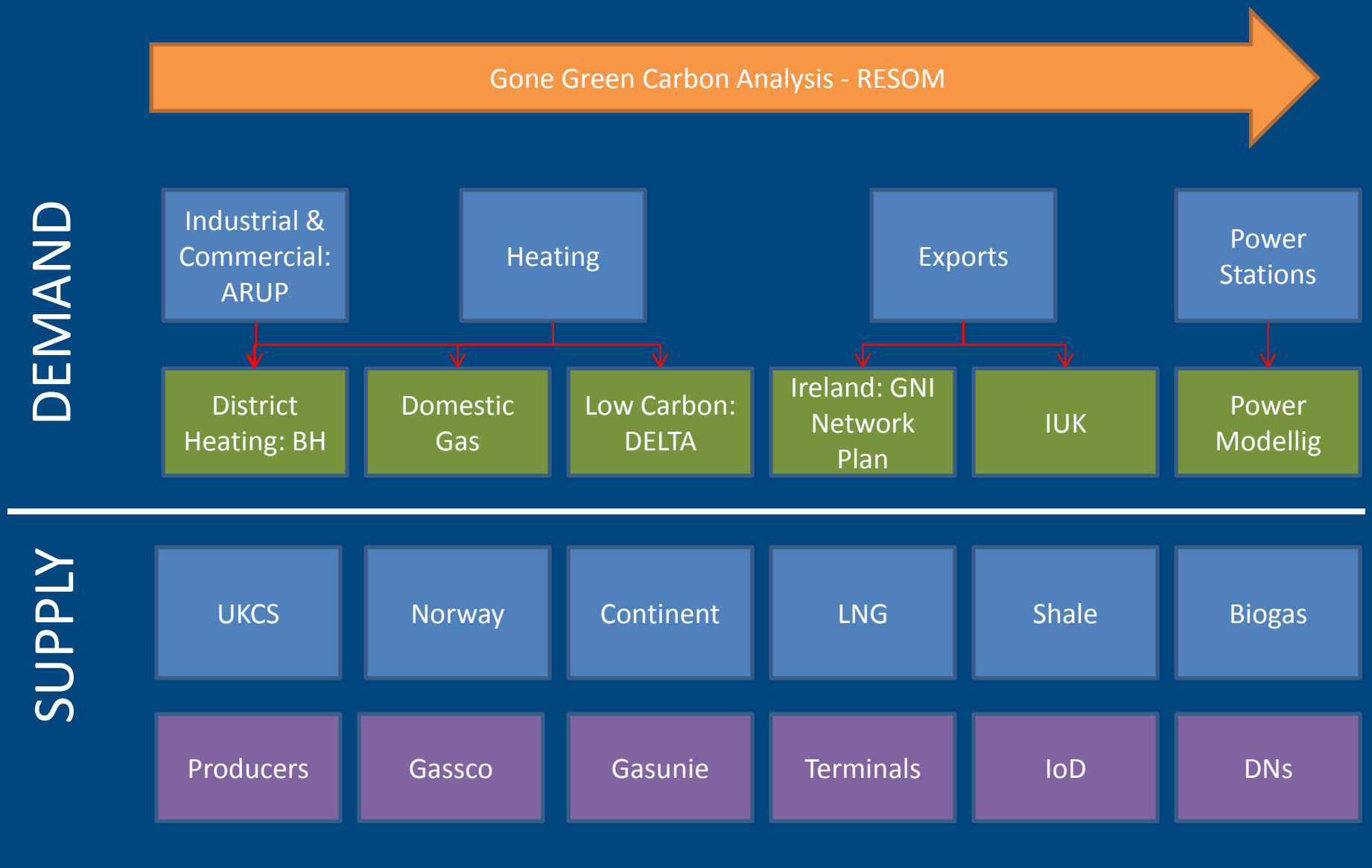
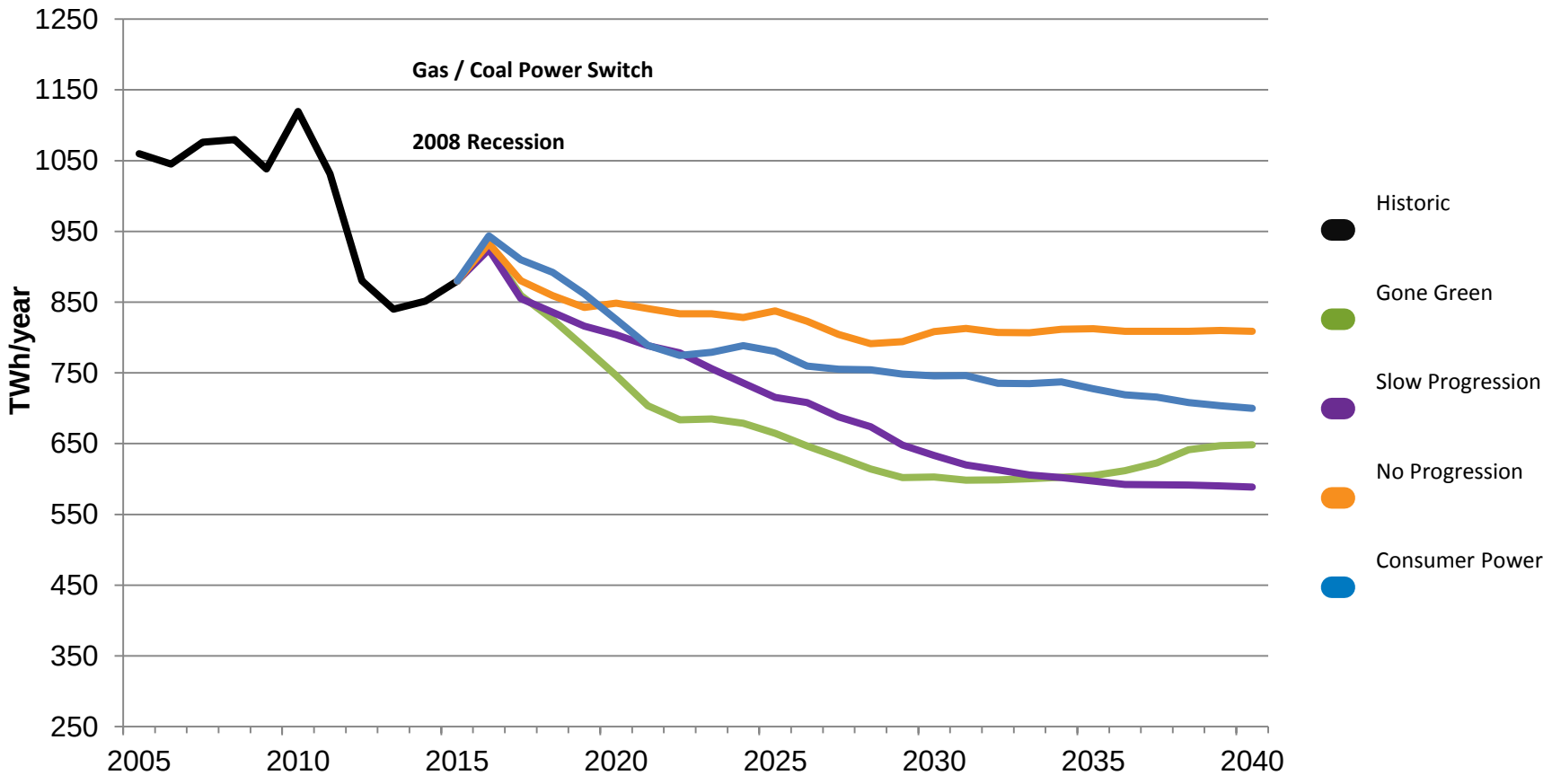
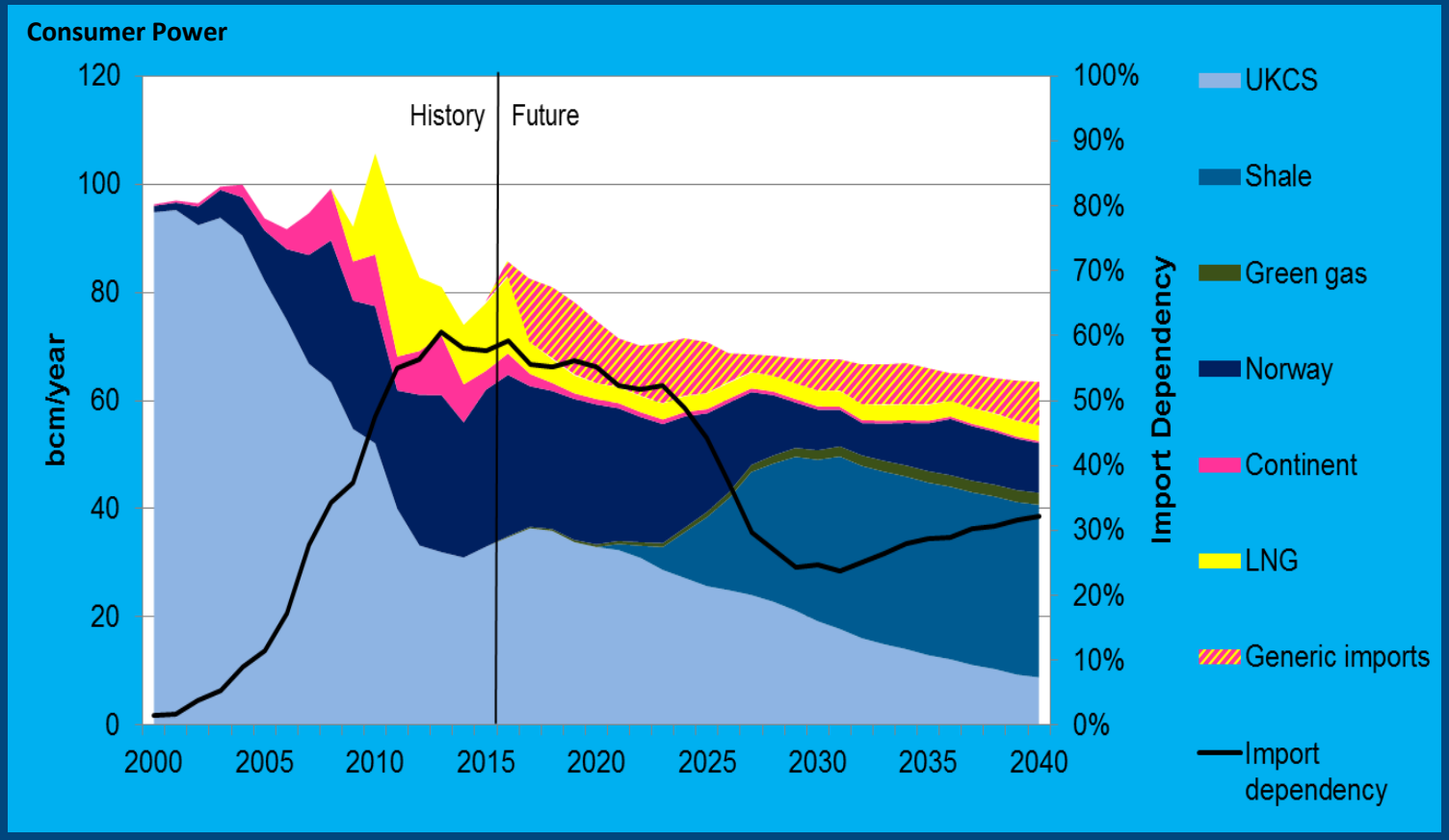


GB annual demand overview



Gas Supply Example



Gas Supply Scenarios

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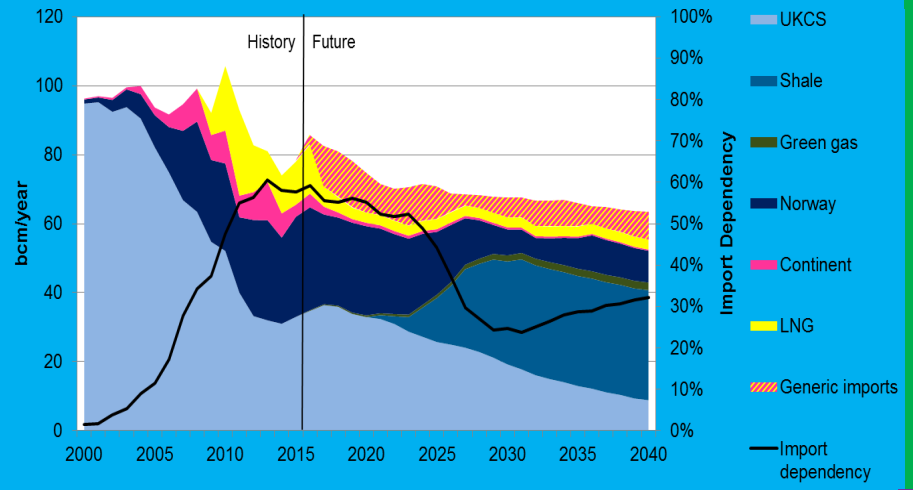
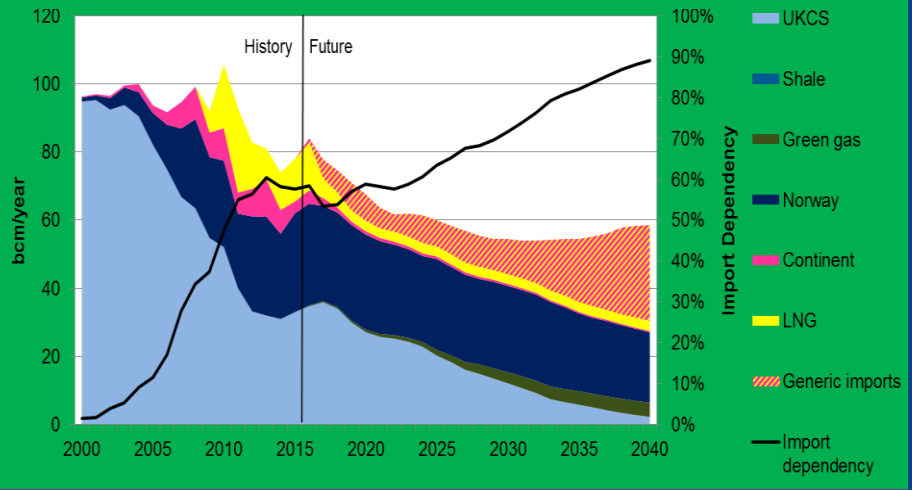
Prosperity

Green Ambition

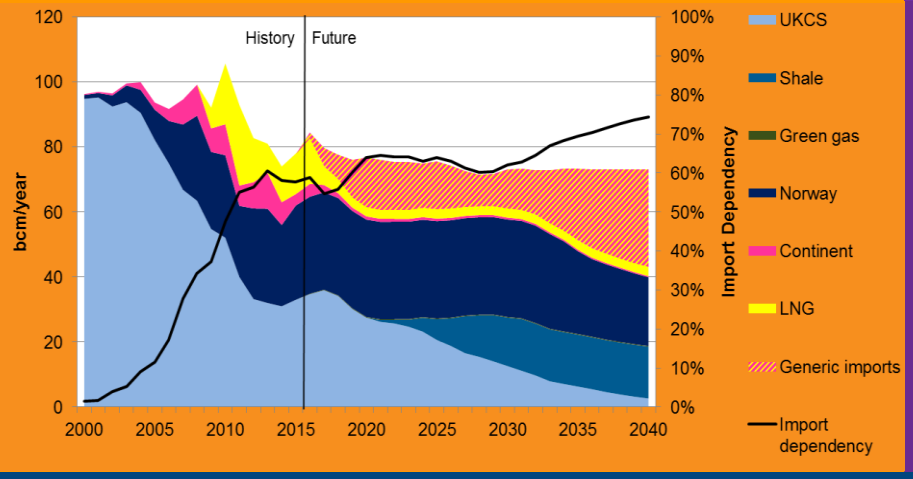
Consumer Power



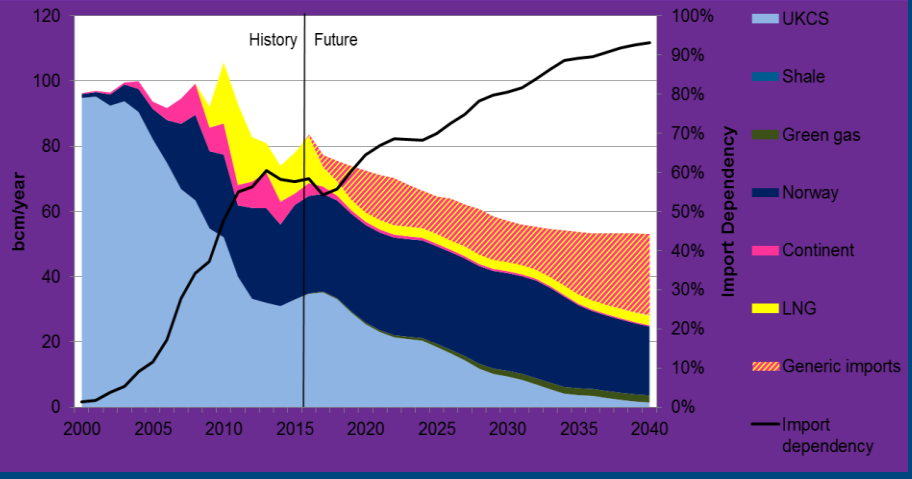
Gone Green



No Progression



Slow Progression



Appendix

FES 2017 scenario matrix

More money available

Prosperity

Less money available

Political – Higher localism and reduced UK government intervention. Government policies focus on indigenous supplies and carbon reduction. Developments are mainly market-driven.

Economic – High growth rate.

Social – Consumerism and lifestyle-comfort drive behaviour. This is a "gadget world".

Technological – High innovation and market-led investment in R&D, driven by focus on financial returns, leading to high levels of distributed generation and a mixture of generation types at a national level.

Environmental – UK carbon and renewable ambition becomes more relaxed.

Consumer Power

Political – There is highly effective policy intervention with long-term environmental energy policy certainty.

Economic – Highest growth rate.

Social – Society makes conscious choices, actively engaged with reducing carbon and mitigating climate change.

Technological – Higher R&D in general, with the main focus on low carbon technology and long-term investments, delivering high levels of low carbon energy at a national level.

Environmental – Policies ensure all carbon budgets and 2050 targets met.

Two Degrees

Steady State

Political – Short-term policies focused on security of supply and affordability. Only low cost environmental initiatives are supported.

Economic – Lowest growth rate.

Social – Society is focused on the here and now and on short-term cost savings.

Technological – Low risk business as usual innovation, focused on maximising short-term value, leading to gas being the preferred choice for generation and heating over low carbon technologies.

Environmental - Reduced low carbon policy support and limited new interventions.

Slow Progression

Political – Focus on cost-efficient long-term environmental energy policies, with effective policy intervention.

Economic – Low growth rate.

Social – Society is engaged in going green but choices are limited by cost.

Technological – Medium levels of innovation, seeking to maximise green value, whilst taking a longer-term view. This leads to a focus on a mixture of renewable and low carbon technologies as well as an increase in distributed generation.

Environmental - Policy interventions are constrained by affordability.

Words in green showing changes from FES 2016

Less focus on green ambition

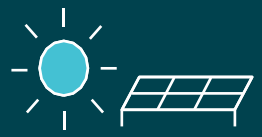
Green ambition

More focus on green ambition

Key changes from FES 2016

A. Reflecting recent generator trends

- Greater distributed generation focus
- In FES 2017, two scenarios with distribution focus (Slow Progression and Consumer Power), compared to one in FES 2016.
- Reflecting trends in electricity market and stakeholder feedback



B. Brexit reflected in economics

- Analysis and feedback show uncertainty of Brexit impact
- Will be managed by greater range of economic growth forecasts in FES 2017
- Each scenario has its own growth rate

Key changes from FES 2016 (cont.)

C. Retiring the names Gone Green and No Progression

- Names no longer reflect scenario narratives
- GG replaced by “Two Degrees”: Low carbon focus, meeting carbon budgets & 2050 emissions target, in line with Paris Agreement
- NP replaced by “Steady State”: Some progress as business as usual activities prevail

D. Applying wider sensitivities

- The four core scenarios provide our view of plausible and credible energy futures.
- In addition, we will develop a broader range of sensitivities around the four main scenarios, looking at broader but still possible outcomes outside the normal scenario framework.

We continue to develop the scenarios and engage with our stakeholders

End Jan. 2017:

Submission of proposed high level scenarios to Ofgem for review

Jan.- Jun. 2017:

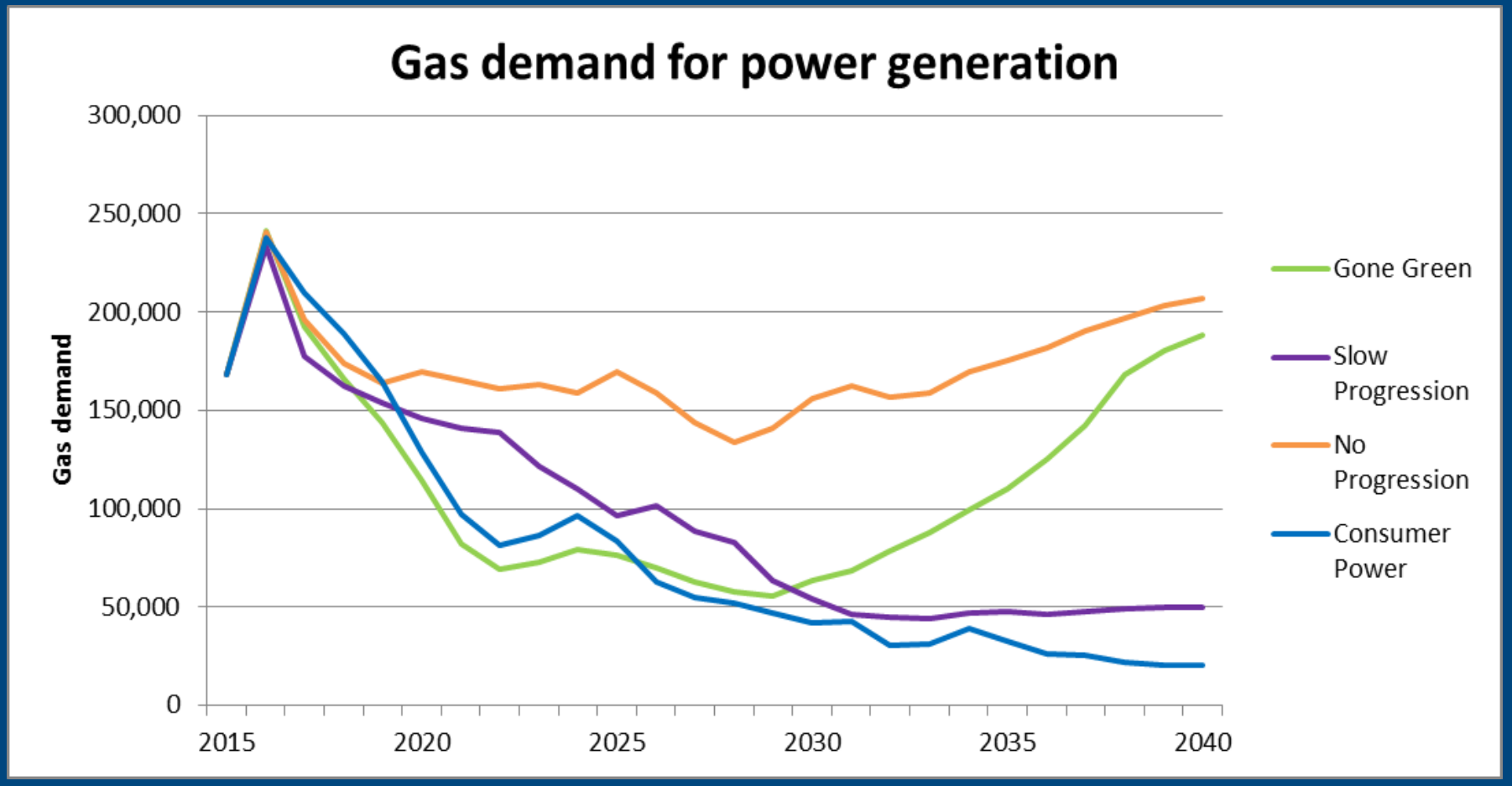
Data gathering, scenario modelling and write-up

July 2017:

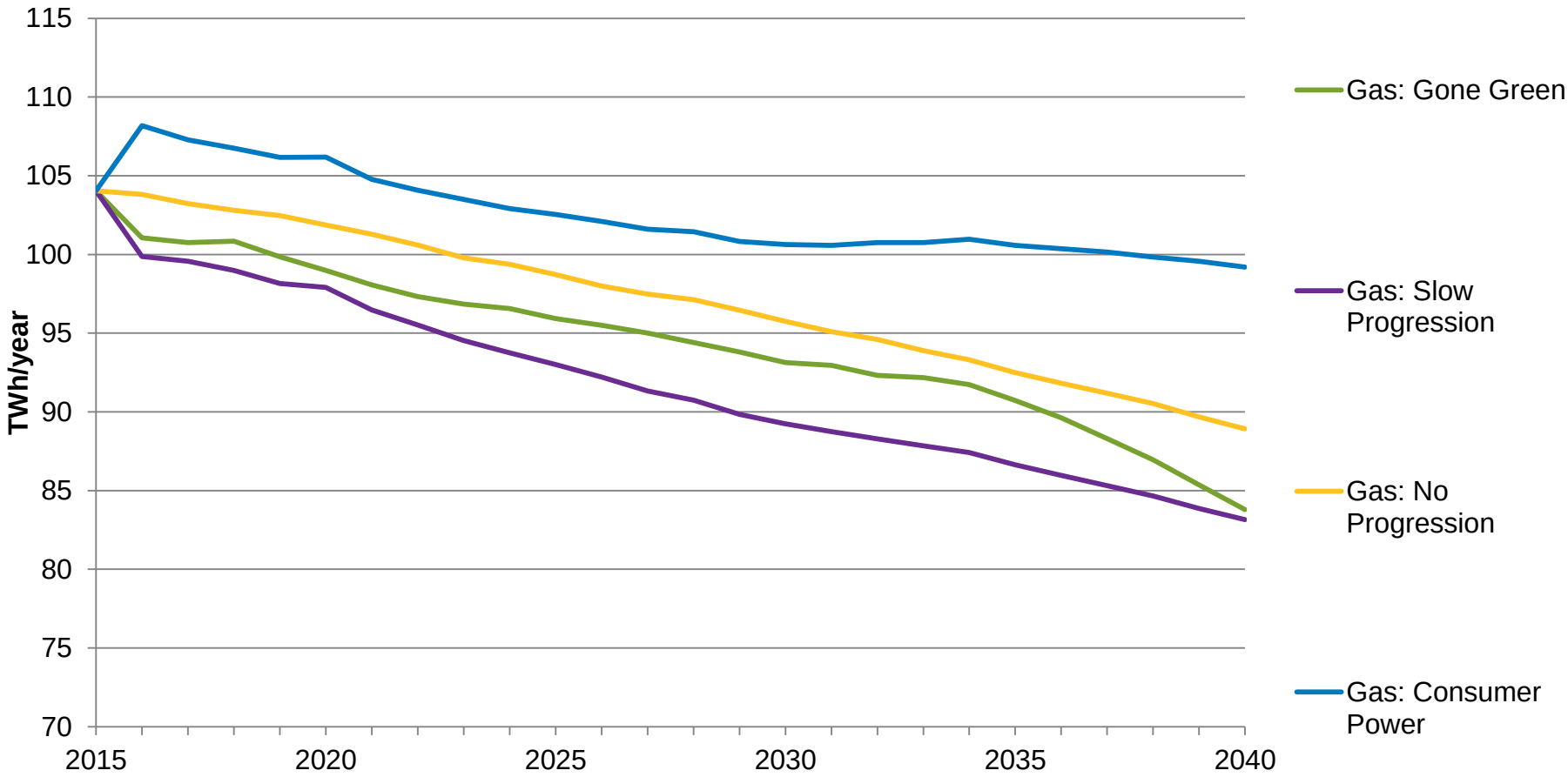
Publication of FES 2017 & FES conference

Ongoing stakeholder engage-ment

Power station demand



Industrial Gas Demand



Residential gas demand