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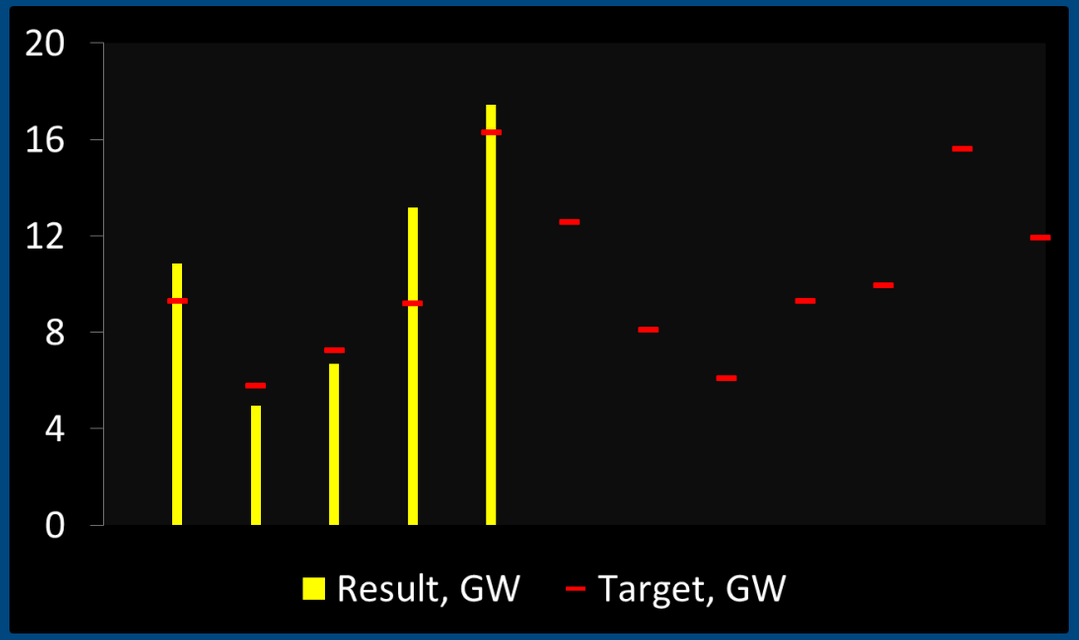
Future Energy Scenarios 2017

Afternoon session: Flexibility on a changing electricity system



Agenda

- Exploring flexibility as a concept
- How the game works
- Game 1 – Steady State 2030
- Game 2 – Consumer Power 2030
- Conclusions…

What do we mean by flexibility?

The extent to which electricity supply and demand can be adjusted, up or down, in response to a signal, to maintain a safe, balanced and secure network

Indirect – via a price signal

Direct – via signal from System Operator

Why is flexibility important?

Electricity supply and demand must be **balanced in real time** to keep the system at safe operational levels

The System Operator acts as **residual balancer**

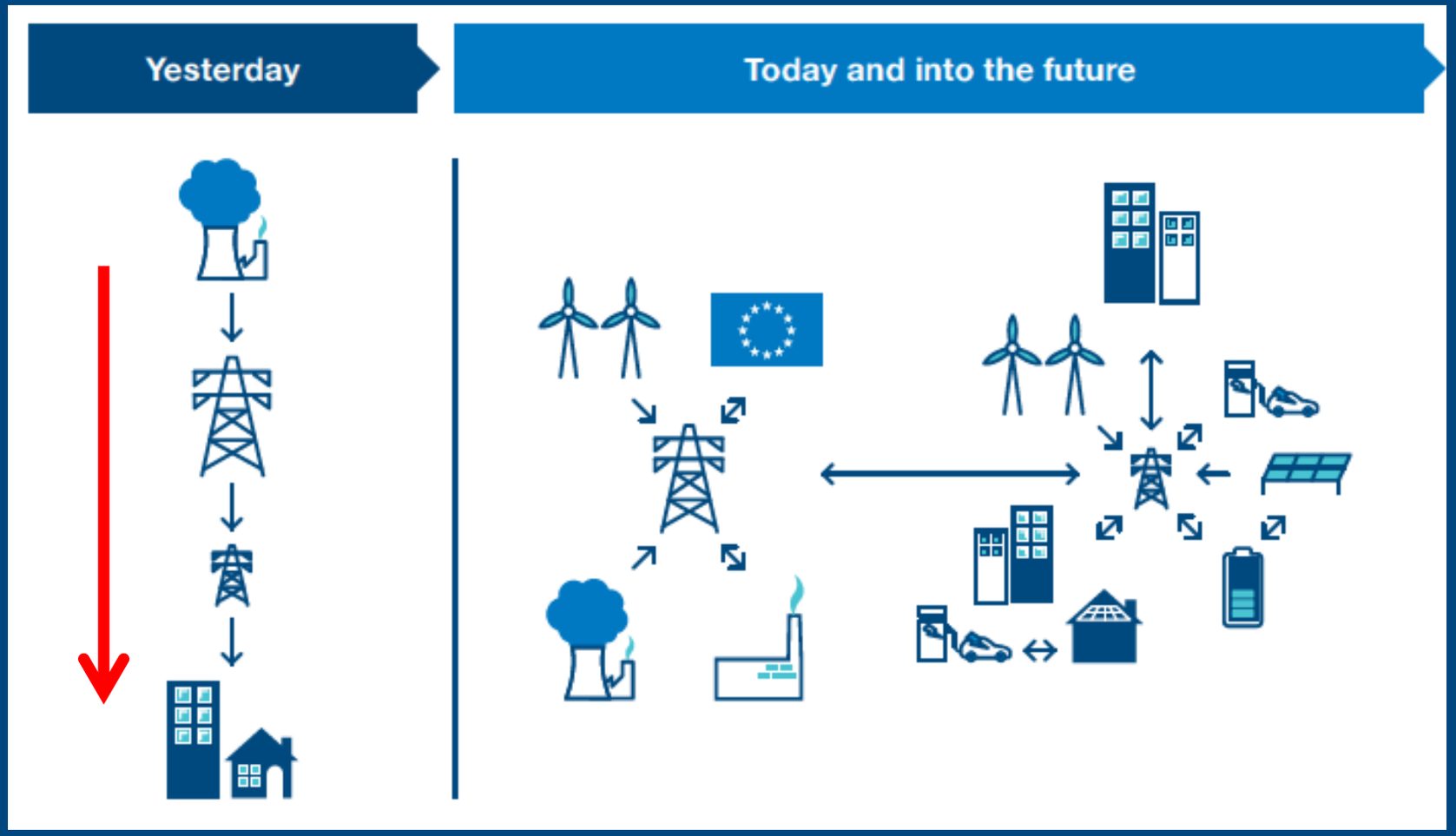
Sufficient flexibility is required across **all timescales**

- second to second
- **day to day**
- winter to summer

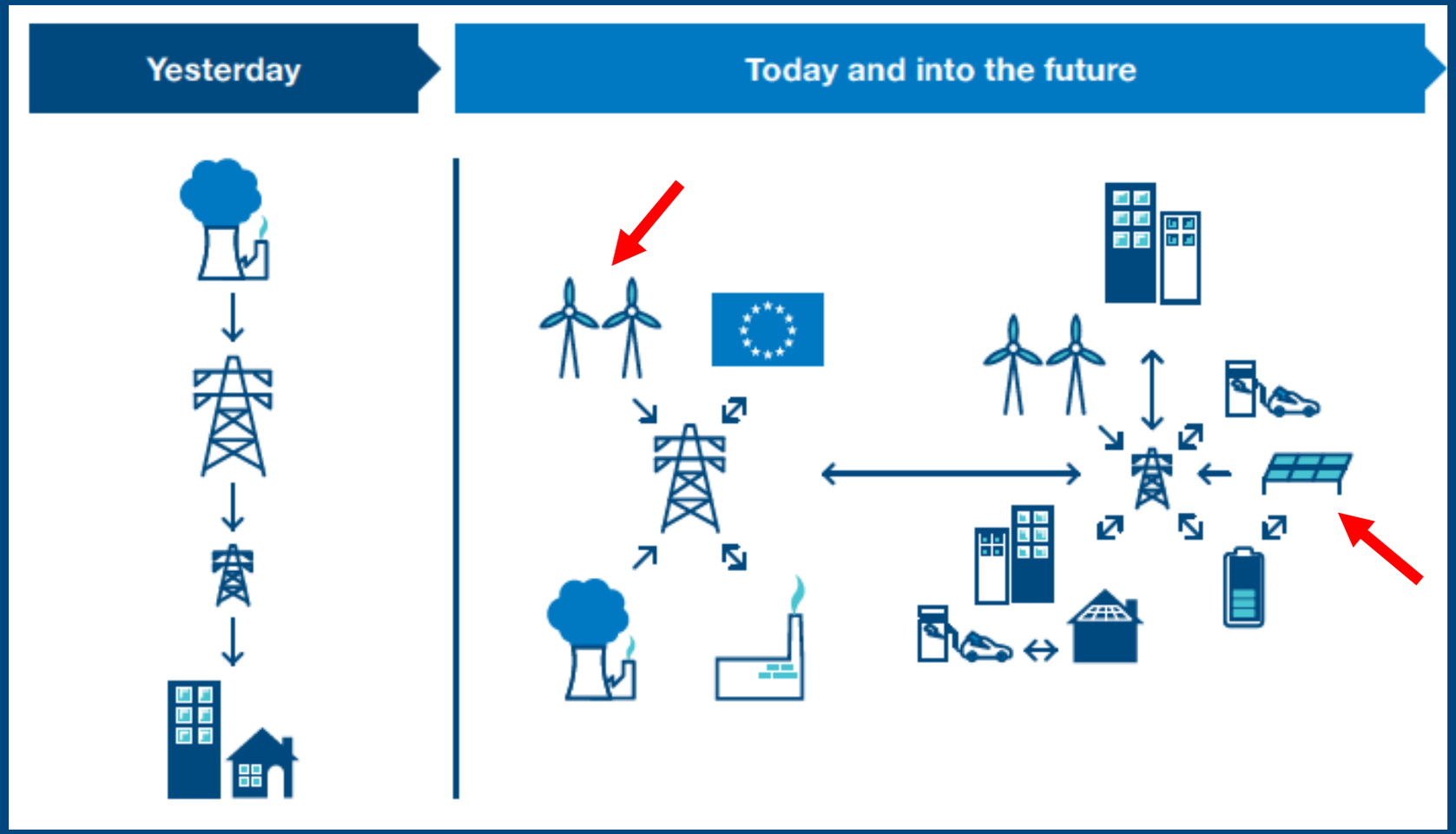
The SO is adapting…

Flexibility provided by supply side

Demand relatively predictable

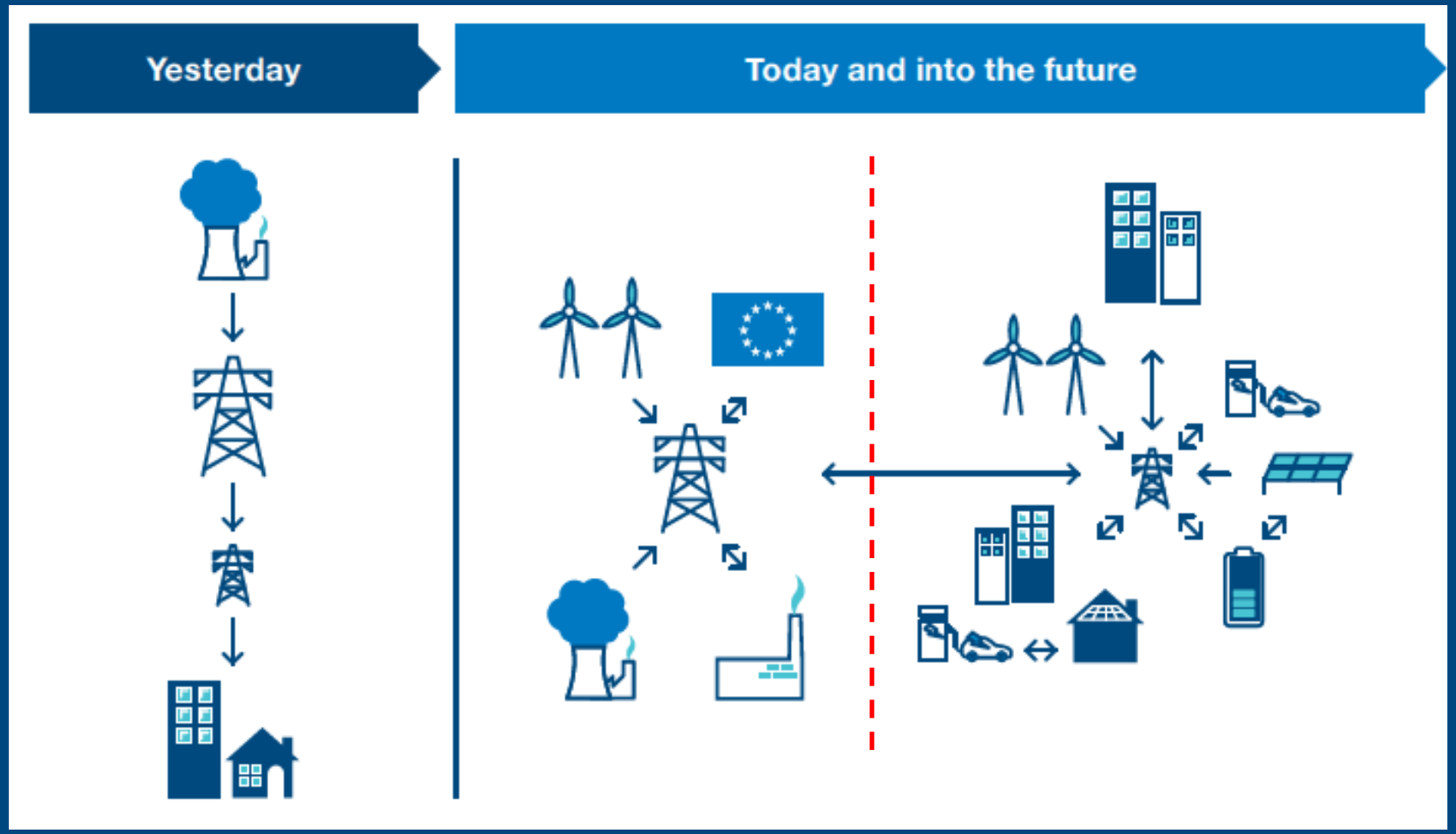


The SO is adapting…



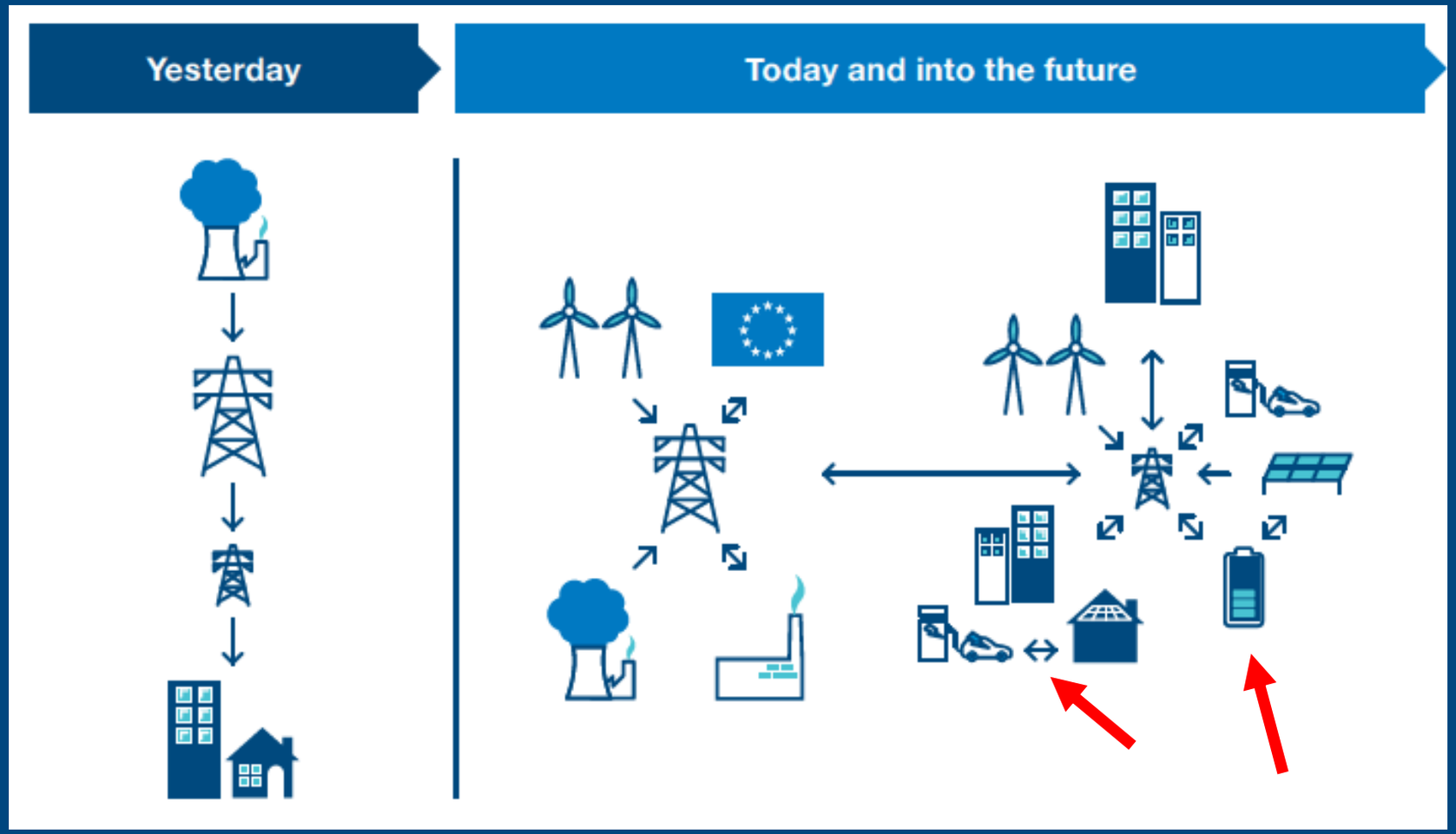
Decarbonisation

The SO is adapting…



Decentralisation

The SO is adapting…



Digitalisation

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The SO is adapting…

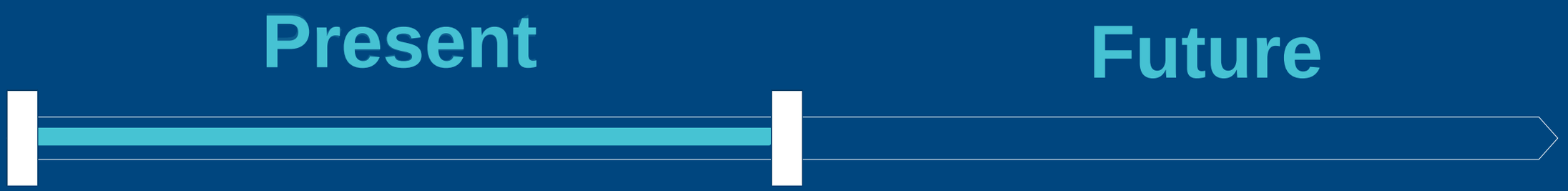
System Operability Framework (SOF) assesses future operational needs

System Needs and Product Strategy consults on how we can best meet these needs

Power Responsive provides a collaborative approach help realise the possibilities created by demand side solutions

Future Role of the SO recognises that the changes needed to support the transition to a more decentralised and interactive low-carbon system

Summary



We have an increasing need for flexibility today

FES 2017 shows that this need will only increase in the future

Today's flexibility game

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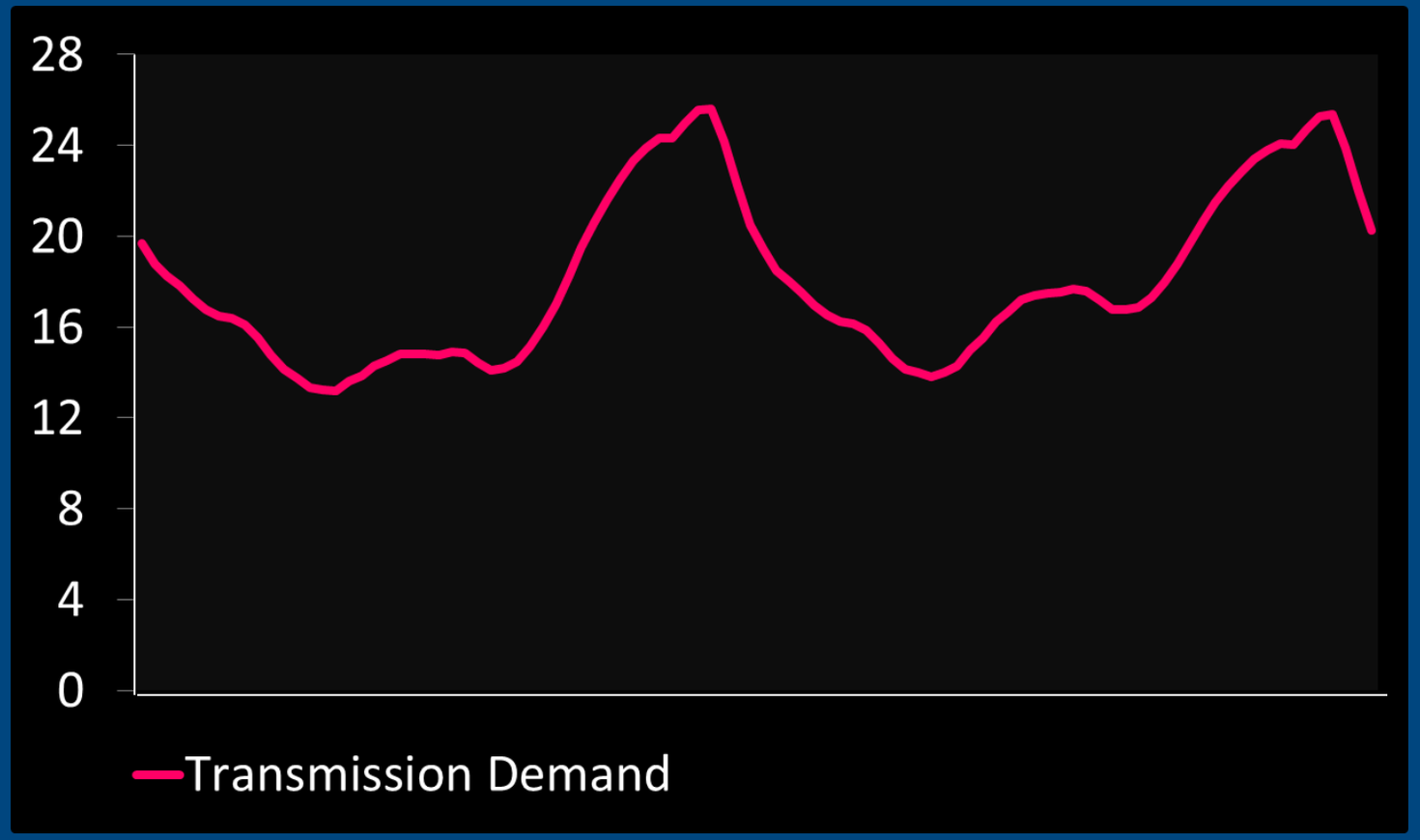
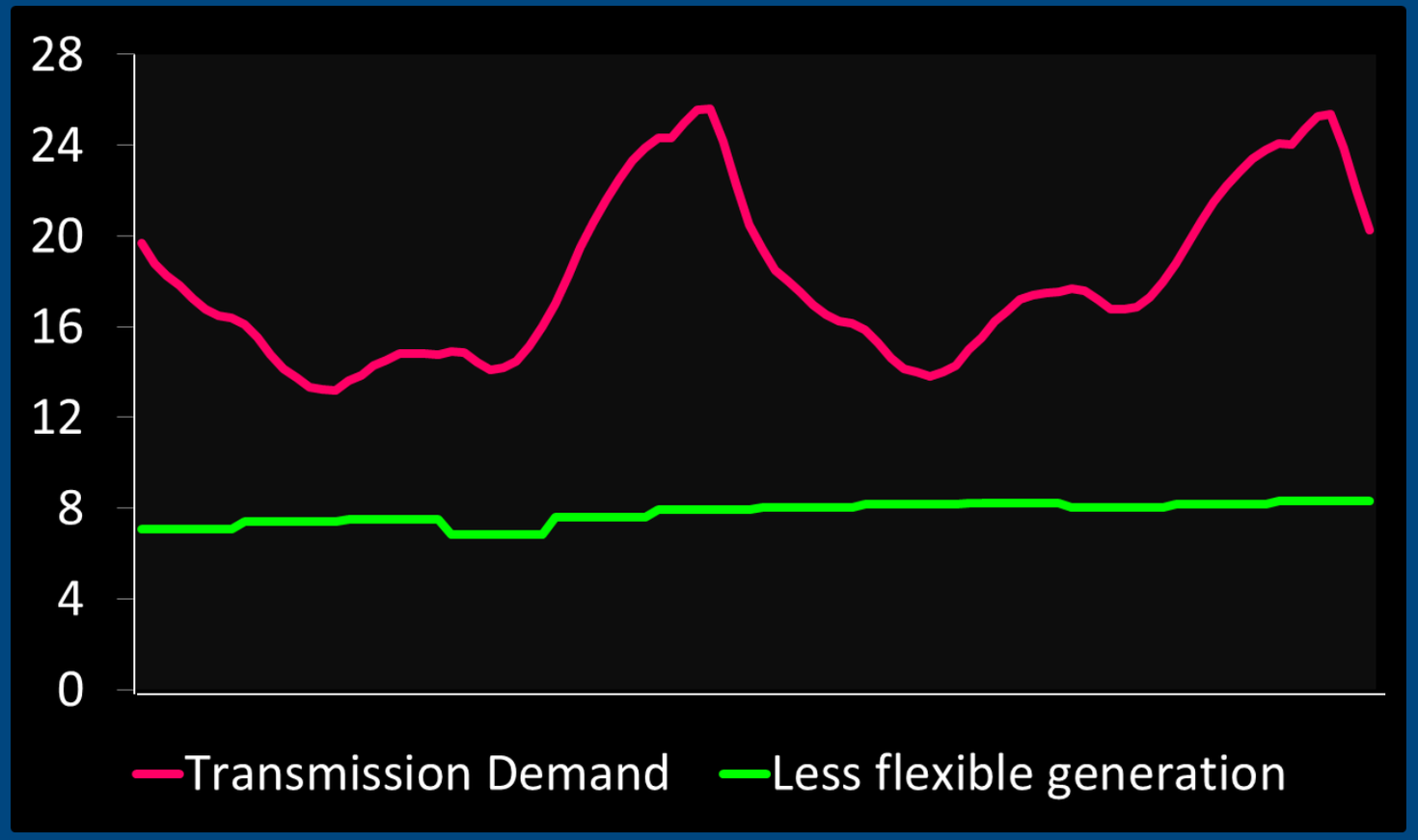
Round 1: System Conditions



Two consecutive summer days in 2030.

Transmission level demand at half-hourly granularity.

Round 1: System Conditions

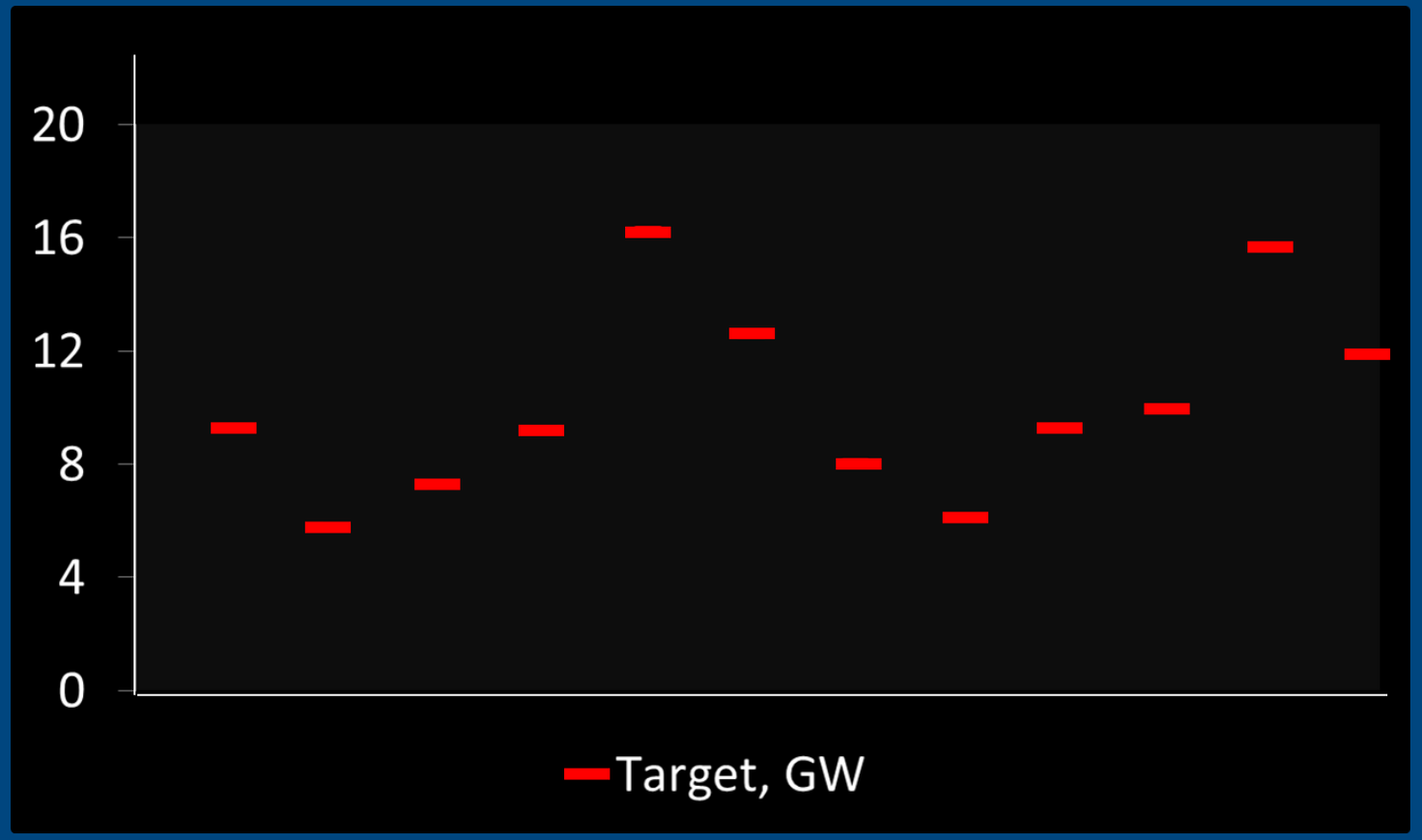


Two consecutive summer days in 2030.

Transmission level demand at half-hourly granularity.

Generation output from less flexible generation (e.g. wind, nuclear).

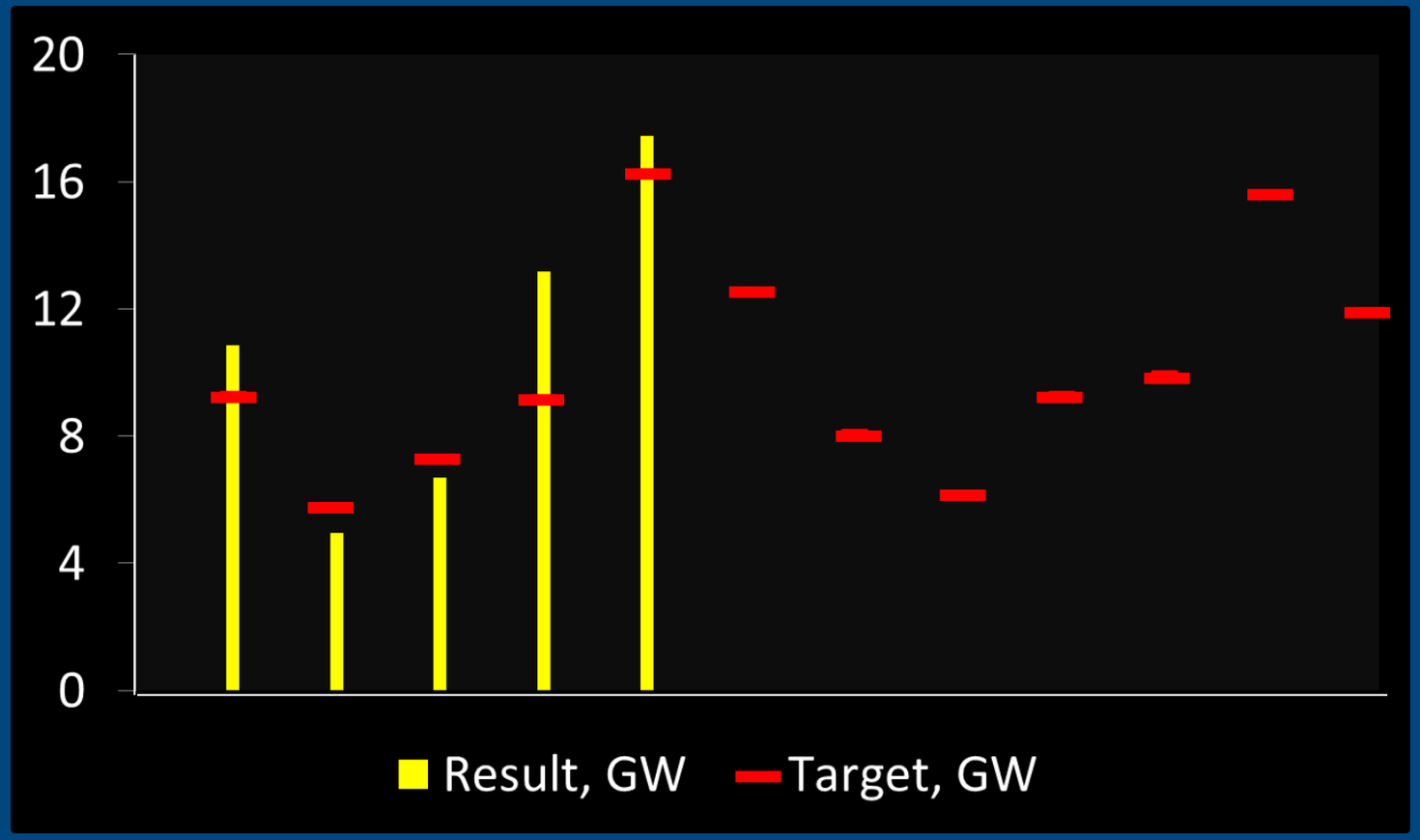
Round 1: Flexibility Target



The difference is the “Target” level of flexibility we would like you to dispatch.

This is shown by the red markers.

Round 1: How did you do?



The difference is the “Target” level of flexibility we would like you to dispatch.

This is shown by the red markers.

Yellow bars show your results.

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Round 1: Your available flexibility technologies

01	02	03	04	05	06	07	08	09	10	I/C Import
11	12	13	14	15	16	17	18	19	20	I/C Export
21	22	23	24	25	26	27	28	29	30	Storage Supply
31	32	33	34	35	36	37	38	39	40	Storage Demand
41	42	43	44	45	46	47	48	49	50	DSR Turn Down
51	52	53	54	55	56	57	58	59	60	DSR Turn Up
61	62	63	64	65	66	67	68	69	70	Gas Fired Power
71	72	73	74	75	76	77	78	79	80	Gas Fired Power
81	82	83	84	85	86	87	88	89	90	Gas Fired Power
91	92	93	94	95	96	97	98	99	100	Gas Fired Power

You all have an individually numbered clicker.

These are grouped in to blocks of 10 representing a particular flexibility provider (one direction only).

Press 1 to dispatch your unit and 0 to un-dispatch.

Round 1: How much flexible capacity is there?

Interconnector	9805
Storage	5818
Demand Side Response	4322
Gas Fired Power	38231

These are the levels of flexible capacity as per the FES Steady State scenario.

Network / plant outages and SO requirements reduce the available capacity over the summer

Interconnector	7354
Storage	5236
Demand Side Response	3890
Gas Fired Power	25232

These are the levels of flexible capacity that will be available in the game.

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What the game doesn't do…

In this game we have tried to represent simply in an interactive manner a subject that is extremely complex.

Here are some areas that we have simplified:

- Pricing
- Fast reserve / frequency response / locational issues
- Differing needs between seasons

There are also many sources of flexibility that we have either aggregated (e.g. Electric Vehicles as part of Demand Side Response) or not considered (e.g. services from wind or nuclear generation)

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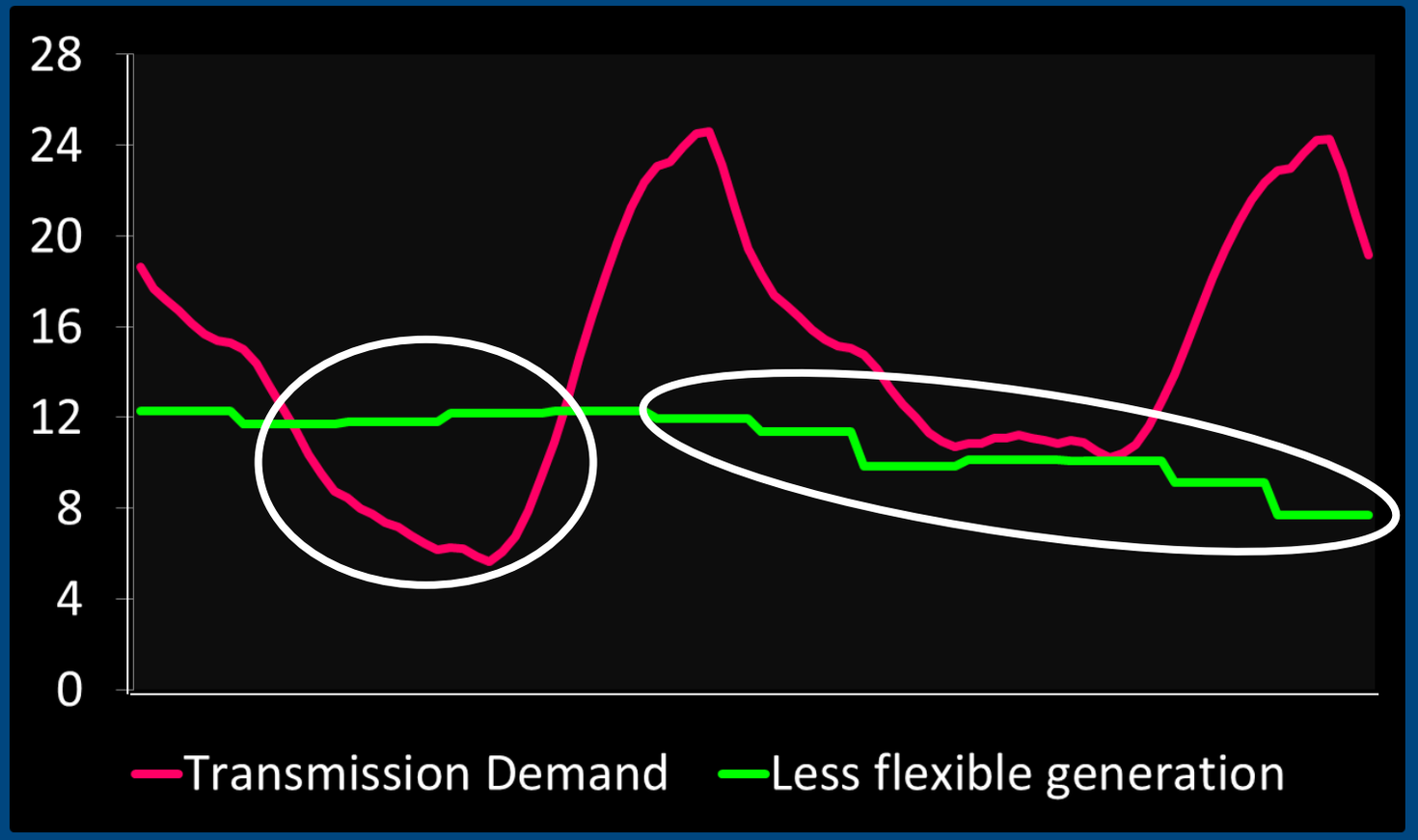
Round 2: Consumer Power
Summer 2030

Round 2: System Conditions



For Consumer Power high levels of solar output in Day 1 result in low transmission demand.

Less flexible generation output declines during the second day as the wind levels drop.

Round 2: How much flexible capacity is there?

Interconnector	16505
Storage	8886
Demand Side Response	6272
Gas Fired Power	22195

Network / plant outages and SO requirements reduce the available capacity over the summer

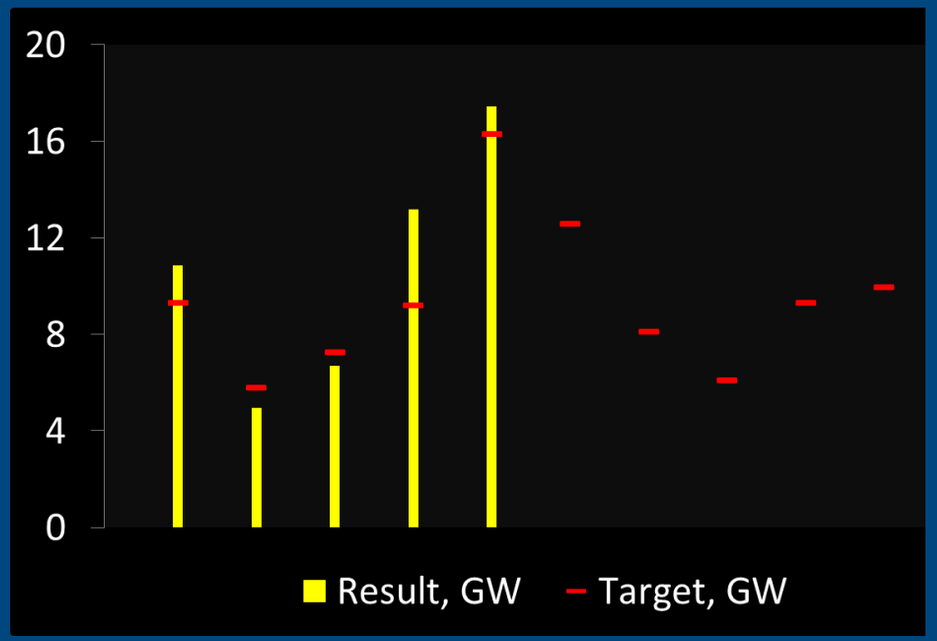
Interconnector	12379
Storage	7997
Demand Side Response	5645
Gas Fired Power	14649

As before we assume a certain level of unavailability over summer.

This round has less gas and higher levels of interconnection to reflect the Consumer Power world. There is also more storage & DSR available.

Everyone with keypads 81 to 100 now represent interconnectors instead of gas.

What are your main take-away points?



- There is already a need for flexibility
- Need for flexibility is increasing and varies with each scenario
- There are lots of different ways to provide flexibility
- It’s not easy!!?

Continuing the conversation

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or email us **Transmission.UKFES@nationalgrid.com**

Coming up soon: **Energy Insights Newsletter**
Webinars: 18, 24, 25, 26 July
Workshops: 4, 11, 18, 24 October

System Operability Framework Webinar – 14th July 2017

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