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PÖYRY

**CHARTING MARKET SUCCESS IN SMART GRIDS
AND ENERGY**

3 June 2014

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Director

PÖYRY MANAGEMENT CONSULTING

Europe's leading specialist energy management consultancy

Offering expert advice from strategy to implementation on policy, regulation, business operations, financing and valuation and sustainability

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Over 200 energy market experts in 14 offices across Europe:

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Producing *Energy Reports* for electricity, gas, carbon and green certificate markets across Europe, with long-term price projections.



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PÖYRY MANAGEMENT CONSULTING DELIVERS IN-DEPTH UNDERSTANDING OF SMART ENERGY ISSUES

We provide commercial, regulatory and technical advice to regulators, DNOs, Suppliers and consumer groups on smart energy issues

- **We combine:**
 - significant understanding of commercial, regulatory and technical issues in relation to smart grids and smart energy systems (Demand Response, DG etc)
 - in-depth understanding of both wholesale markets and network regulatory frameworks across the EU
 - ability to use detailed models to quantitatively assess smart energy issues
 - a comprehensive understanding of consumer issues and how to tackle them
 - a valuable perspective of each player in the smart energy world
- **We offer:**
 - qualitative and quantitative views of the size of various markets (e.g. DR) and the value of flexibility in the future
 - an understanding of how the smart energy system, regulatory framework and resulting commercial opportunities could affect your business
 - strategy advice on where to position yourself in the smart energy world
 - development of smart city and smart grid technical and commercial plans
 - procurement and technical specifications of smart meter and smart grid roll outs
 - a “One stop shop“: capability span from technology to policy, option assessment to implementation

PÖYRY MANAGEMENT CONSULTING – SAMPLE OF CLIENTS

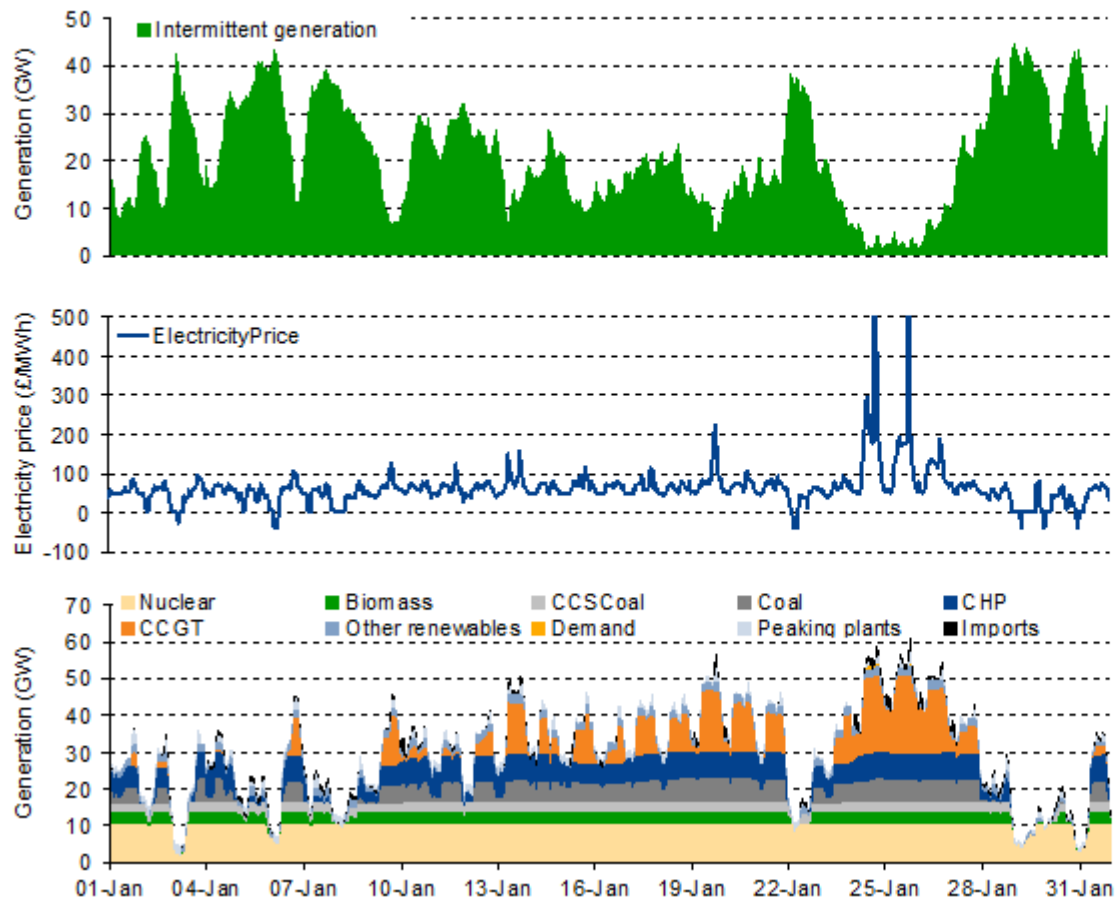


AGENDA

1. > The future market “cartography”
2. How Porter’s Five Forces can be helpful to key actors
3. Application to some key actors
4. Summary and conclusions

Overall, meeting European renewable targets will create a much more volatile energy system which will require increased flexibility

Wholesale prices and generation – 2030 (sample wind pattern)

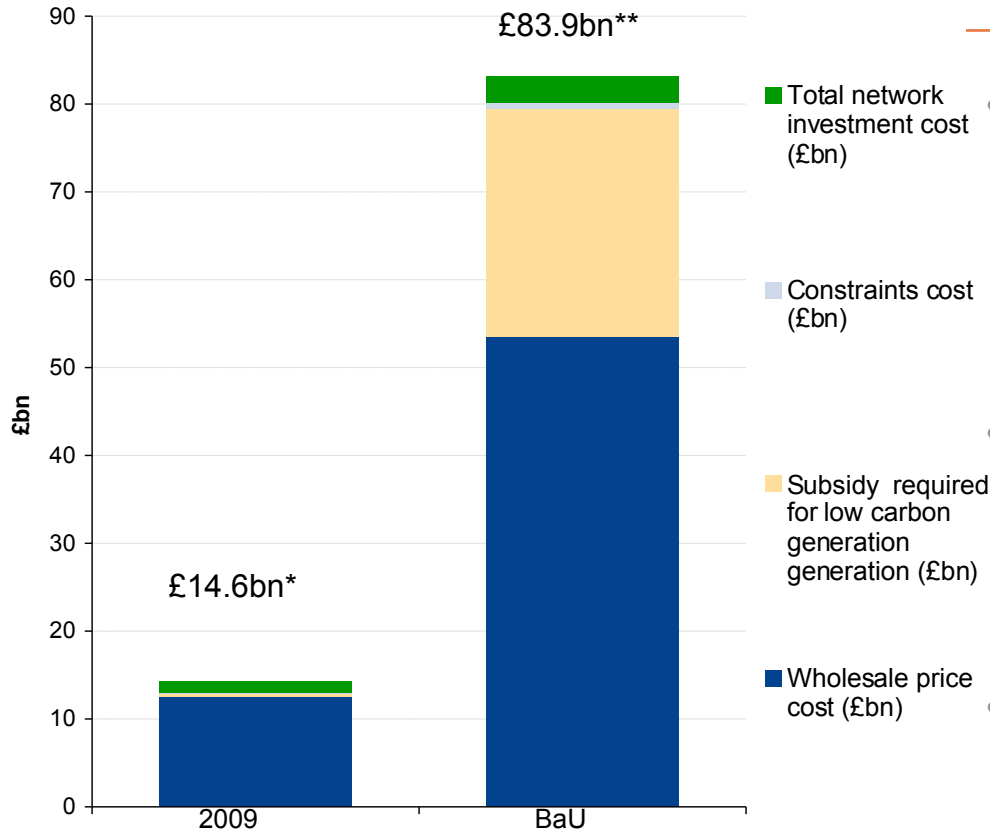


- Greater flexibility will be needed to operate the electricity system

- Four main options:
 - Flexible generation
 - Increased interconnection
 - Demand Side Response
 - Electricity storage

UNDER A “BUSINESS AS USUAL” SCENARIO, MEETING 2050 TARGETS COULD LEAD TO A FIVE FOLD INCREASE IN COSTS TO ELECTRICITY CONSUMERS#

Explanation



- Increase caused by doubling of demand largely driven by electrification of heat and transport and consequential need for and investment in generation and network capacity
- Whilst absolute costs rise by fivefold; the unit cost per MWh of consumption rises by less i.e. 2.5 times (due to increased demand consumption)
- It is important to recognise there are savings in other energy use via reduced consumption of oil and gas for transport and heating respectively

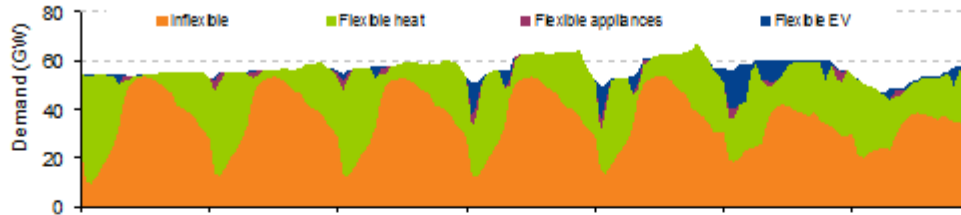
*Unit cost for 2009 approximately £46/MWh

**Unit cost for 2050 approximately £115/MWh

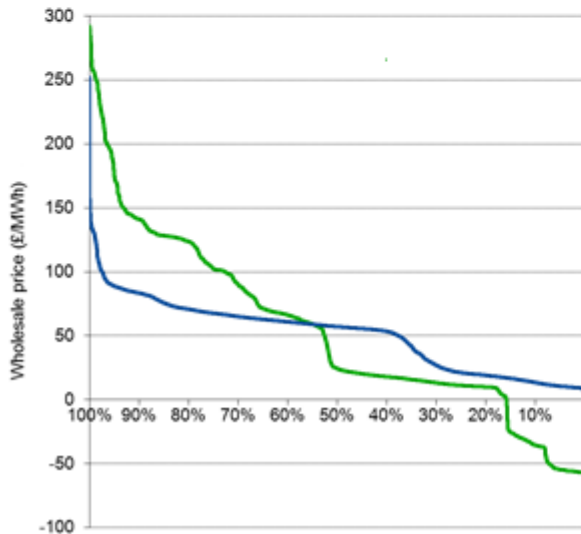
#Derived costs do not include network asset replacement costs, interconnection or retail margins

Thus for example material deployment of DSR will be crucial and we have demonstrated it is valuable to both the wholesale market and the networks

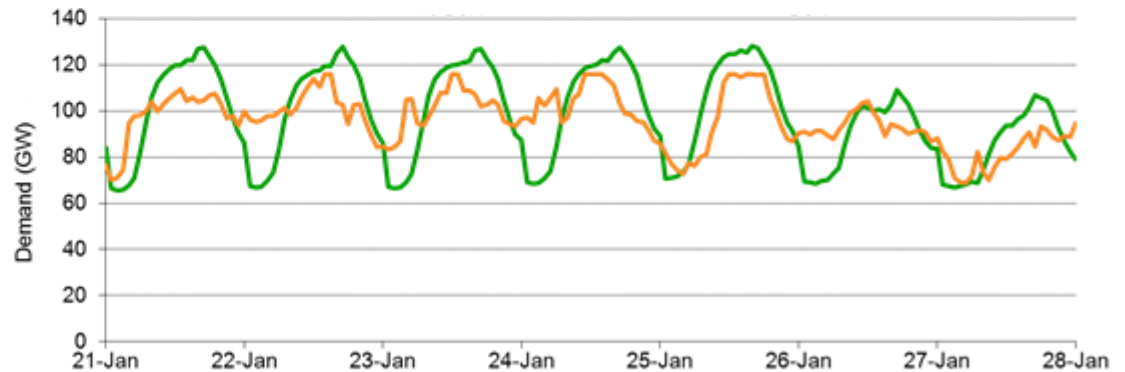
DSM deployment can provide real benefits



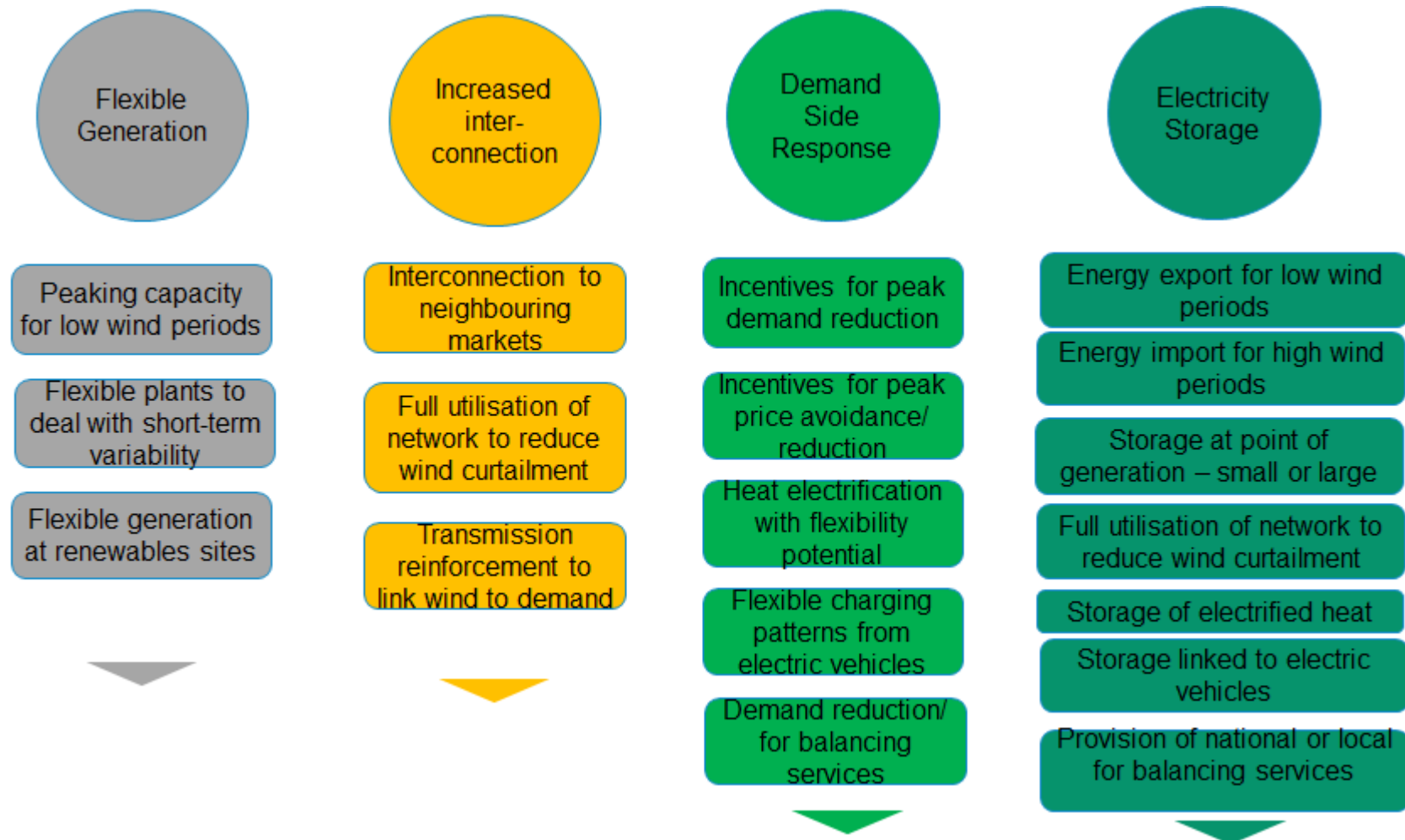
Price volatility is significantly reduced with lower and more stable generation costs



Management of peaks to reduce both network and generation investment otherwise needed

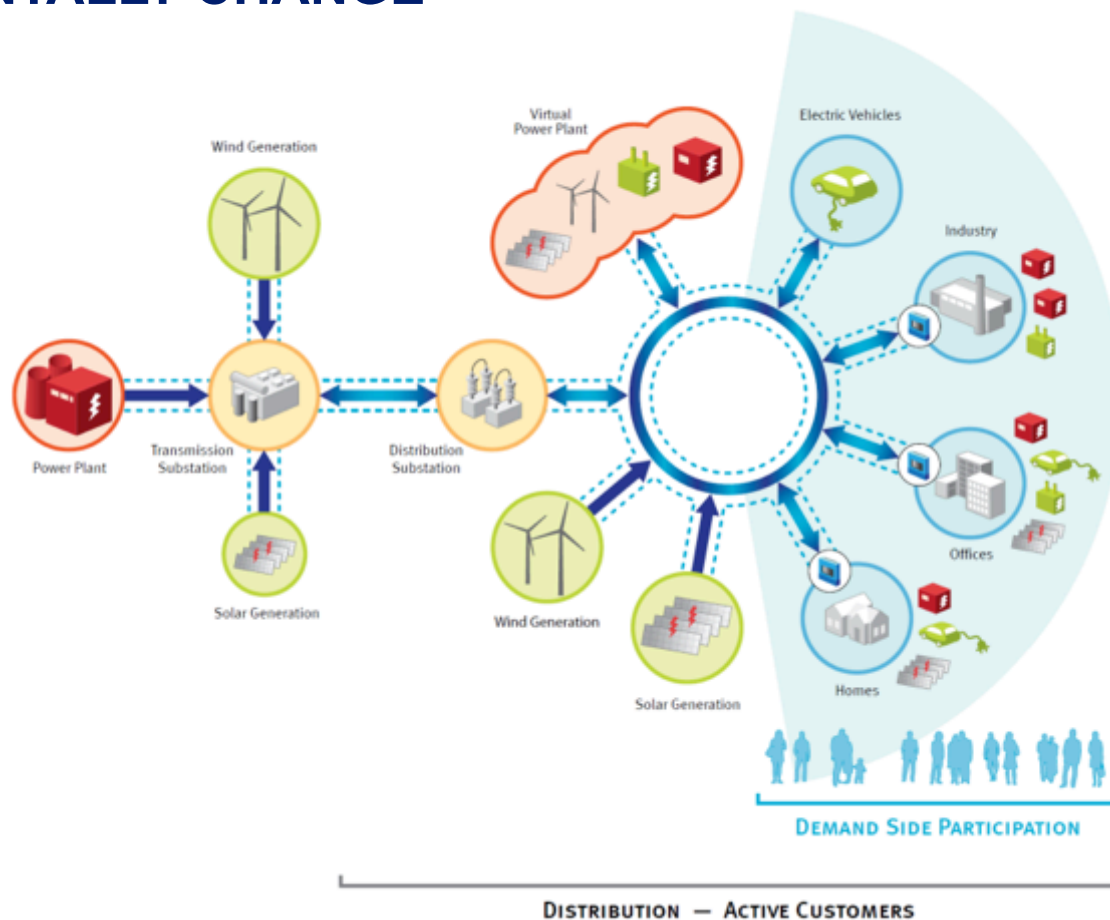


IN THE LONGER TERM ALL SOURCES OF FLEXIBILITY ARE NEEDED TO MANAGE INCREASING INTERMITTENCY AND ELECTRIFICATION



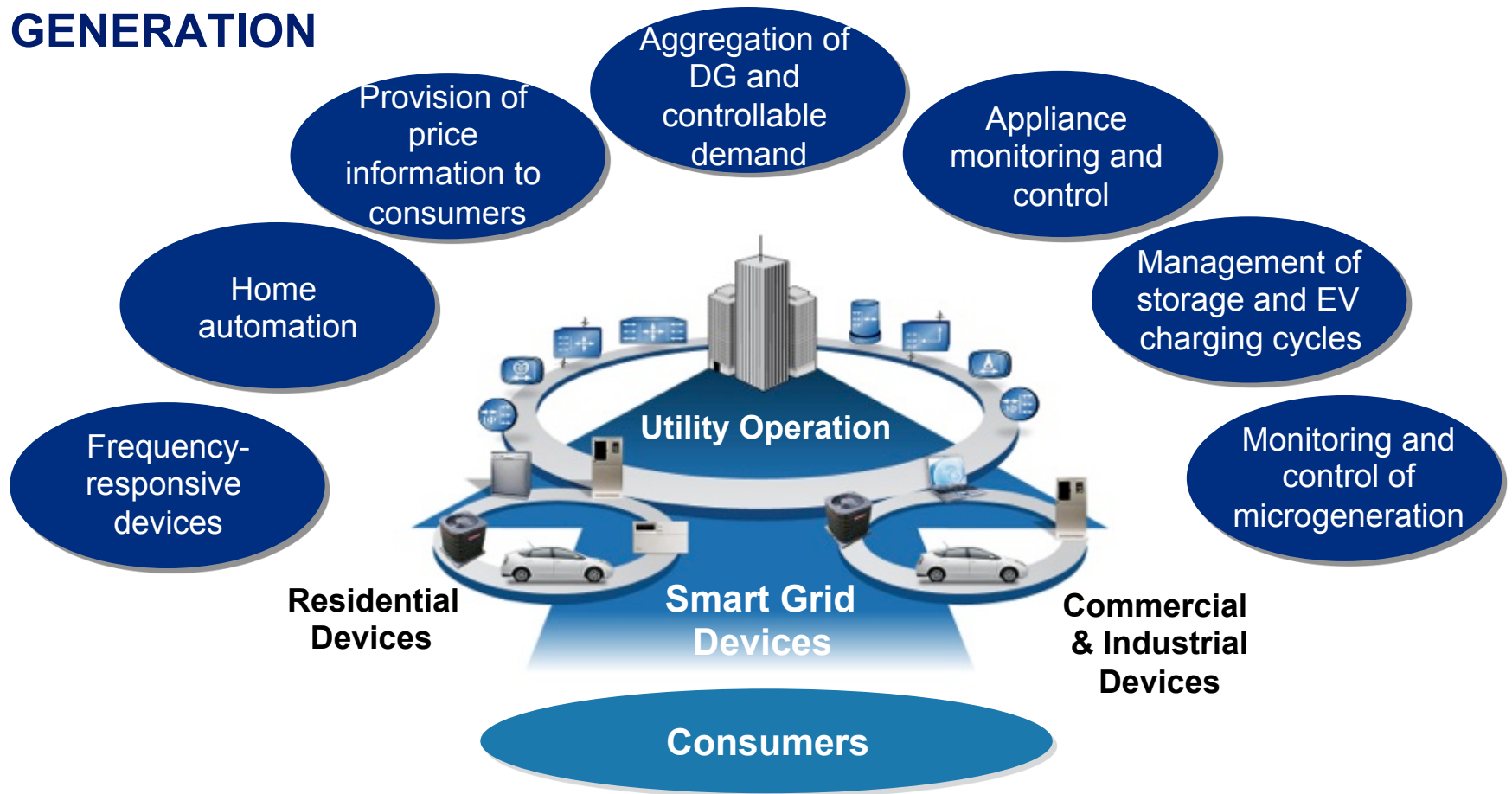
There are four major sources of provision of flexibility - electricity storage is the most diverse

THE WAY THE MARKET OPERATES IN THE FUTURE WILL FUNDAMENTALLY CHANGE



In future we will see a fully multi-directional and interactive market at national and local levels where dynamic and flexible demand co-optimises with diverse and more unpredictable sources of generation

FUTURE SMART GRIDS WILL INTERACT IN MANY DIFFERENT WAYS WITH A RANGE OF LOADS AND DISTRIBUTED GENERATION

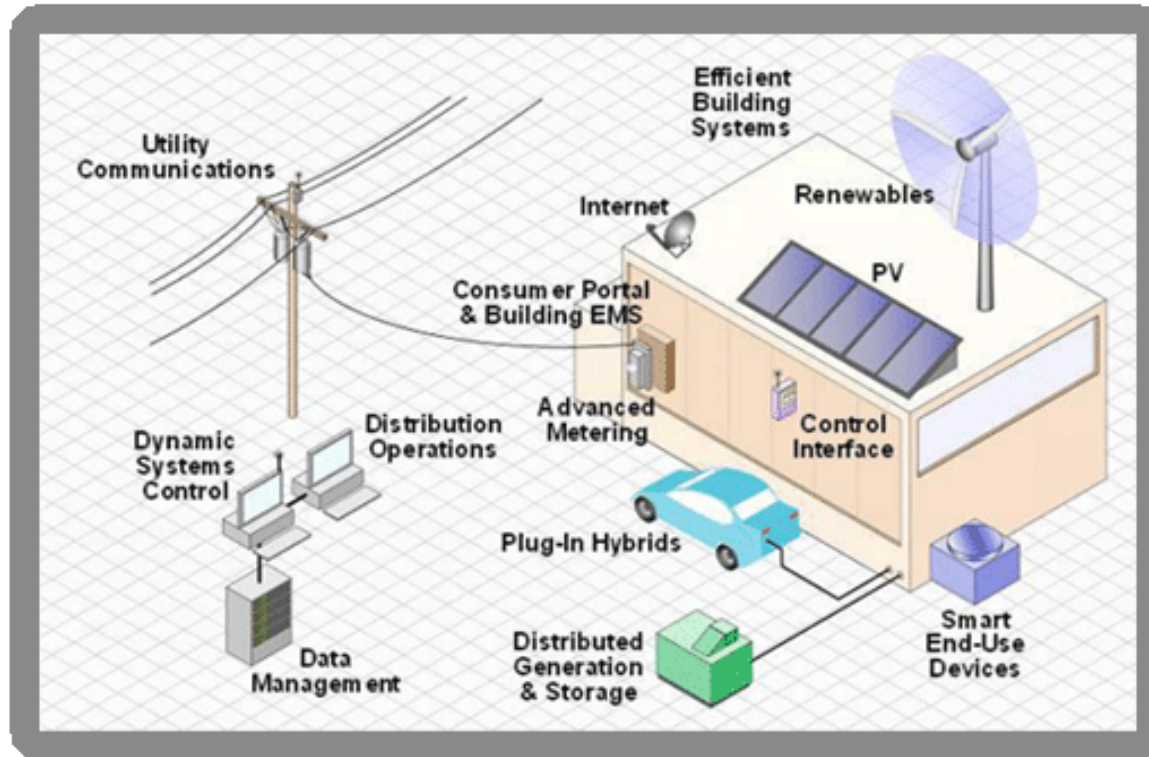


The key point is that demand behaviour at both a consumer and supplier level will become more dynamic and less predictable

Automation will be a key enabler of smart grids in this future dynamic environment

FUTURE DOMESTIC CONSUMERS WILL BE VERY DIFFERENT FROM TODAY AND BE AN INTEGRAL PART OF THE ENERGY SYSTEM

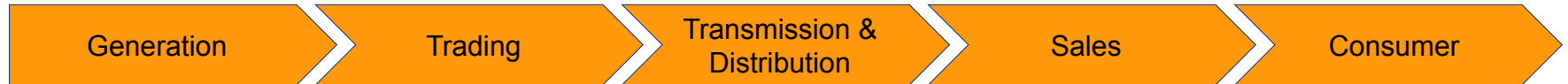
- Future consumers will have an array of technologies which can be deployed in different ways to provide benefits to energy networks and suppliers
- Emergence of local system operations via smart grids will be a key local feature



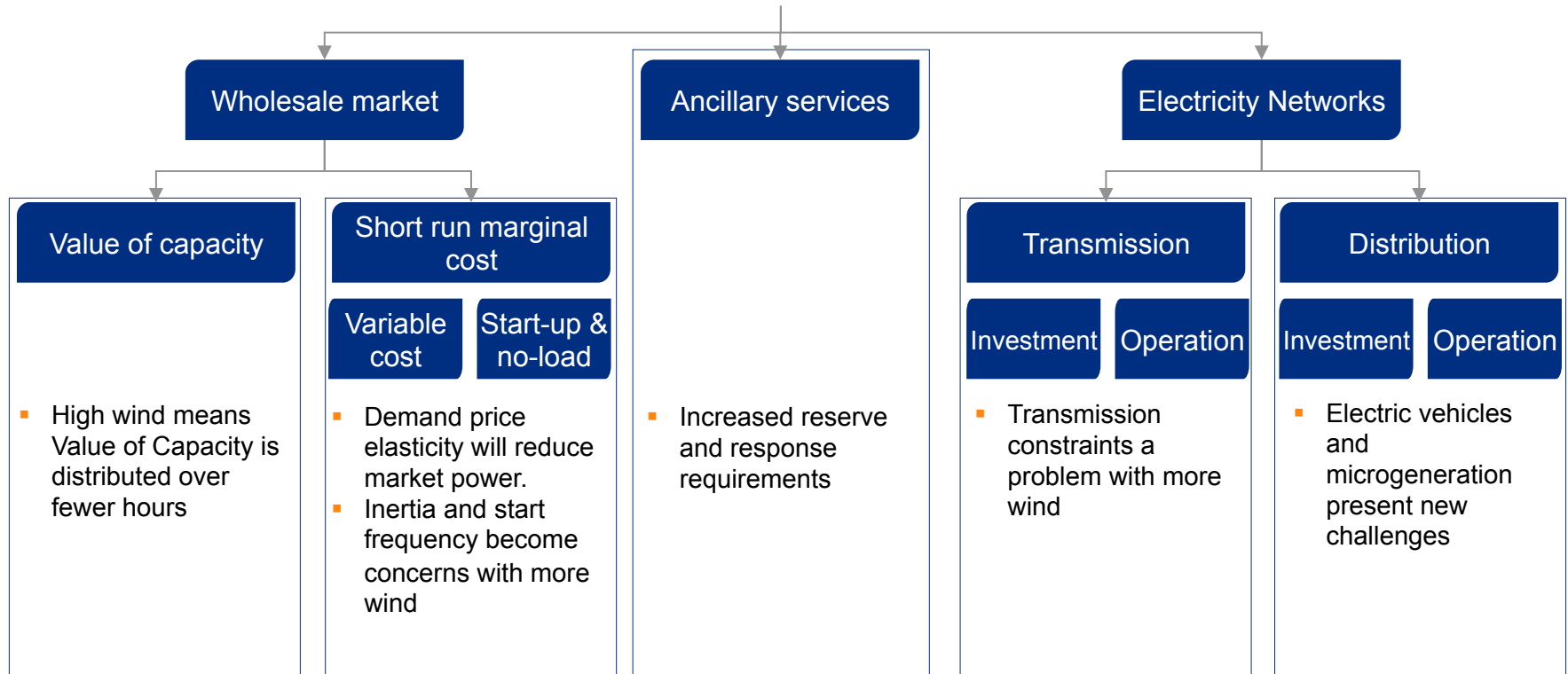
Communication and control technologies will be key to effective implementation of “soft demand side management” – complex operations with customer friendly interfaces

VALUE DRIVERS FOR SMART ENERGY EXIST ACROSS THE FULL ENERGY VALUE CHAIN

Systems with high penetration of wind have to meet challenges across the supply chain of electricity markets.

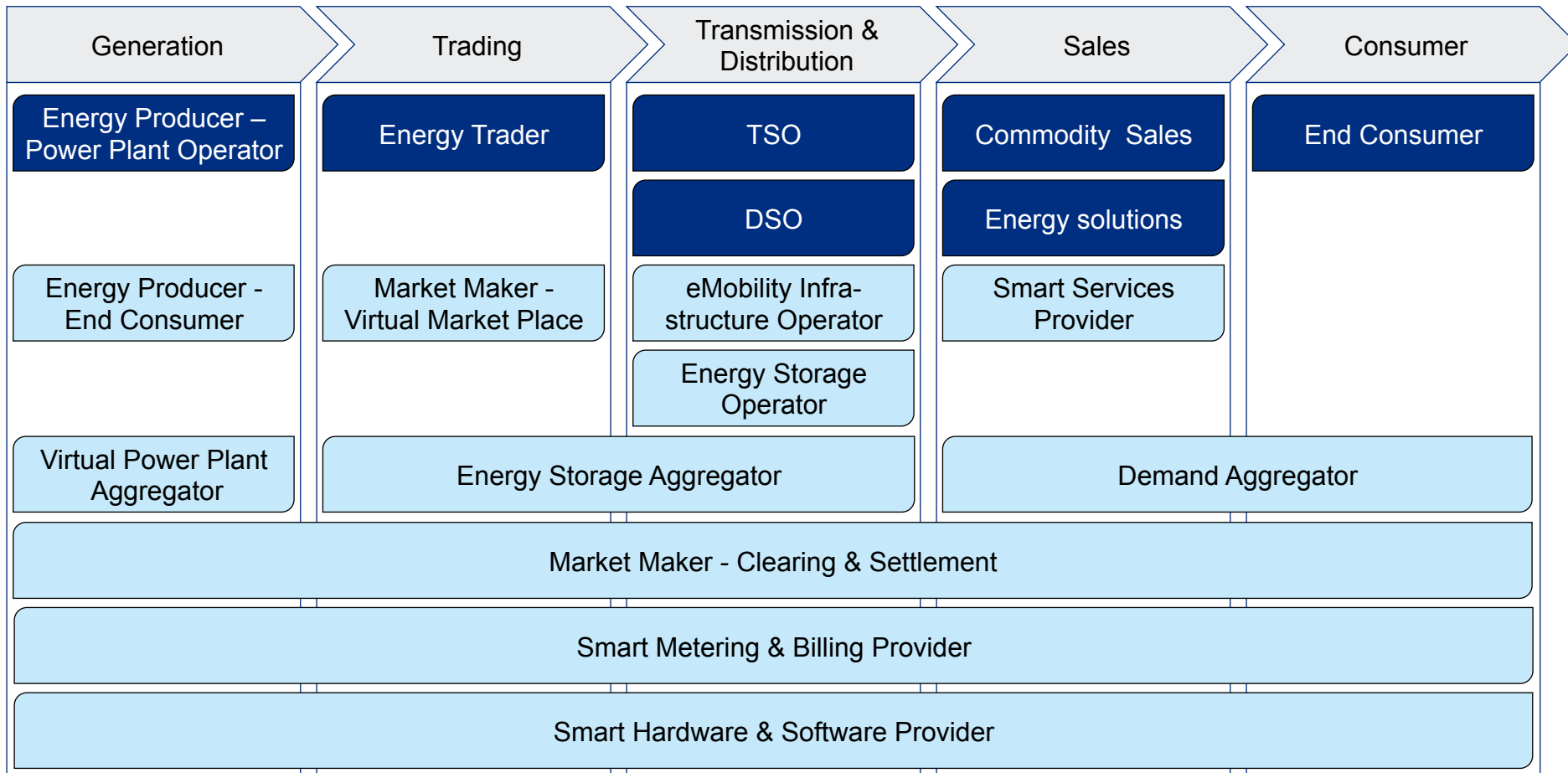


Cost components of electricity



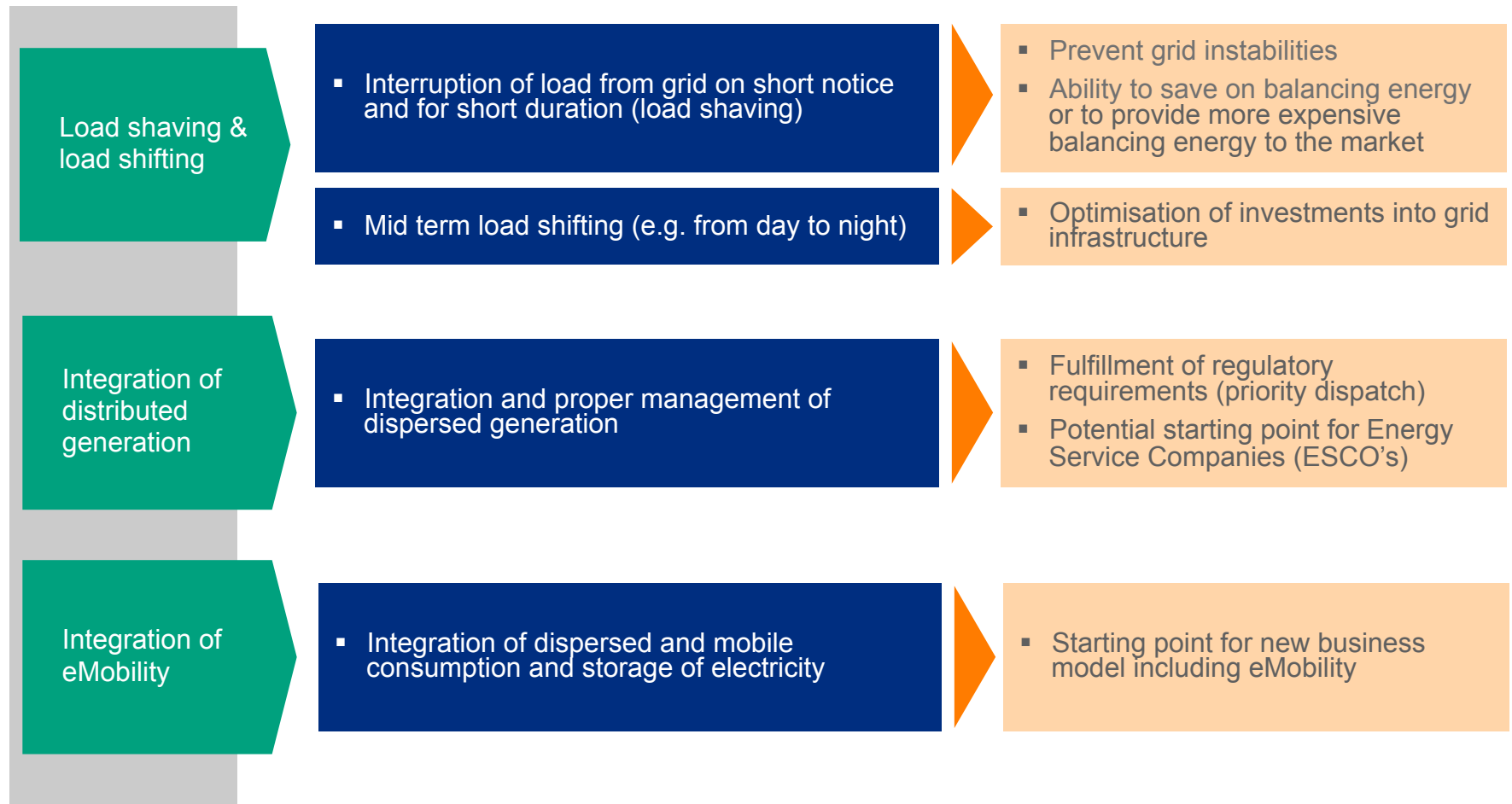
LEADING TO THE CREATION OF VARIOUS MARKET ROLES

Existing roles and responsibilities will change and new market roles will emerge



EXAMPLE – INCREASING USE OF DSR WILL CREATE NEW ROLES

DSR facilitated by smart grids will not just ensure security of supply is maintained but will create new commercial opportunities



THERE ARE MANY KEY QUESTIONS REGARDING DEPLOYMENT OF SMART ENERGY

How and where will smart grids be rolled out? How will they look and fit together?

- (i) geography and speed; (ii) design, technology and integration – many options for each

Which incentive and/or control signals will be used – and how?

- this has implications for communication and smart metering technology choice

What regulatory framework(s) need to be put in place?

- to provide appropriate oversight and protection for the consumer

What kind of commercial relationships are required?

- for example, how are DSO benefits captured and by whom?

What and where is the most valuable use of the available flexibility?

- e.g. reducing investments or smoothing prices

Who has control of the flexible generation and demand?

- device / customer / DSO / supplier / 3rd party / TSO

–Will consumers play ball?

- Consumer willingness to become more active market “participants” will be a key challenge

–Who stores the data, who manages it and who has access to it? How, where and when?

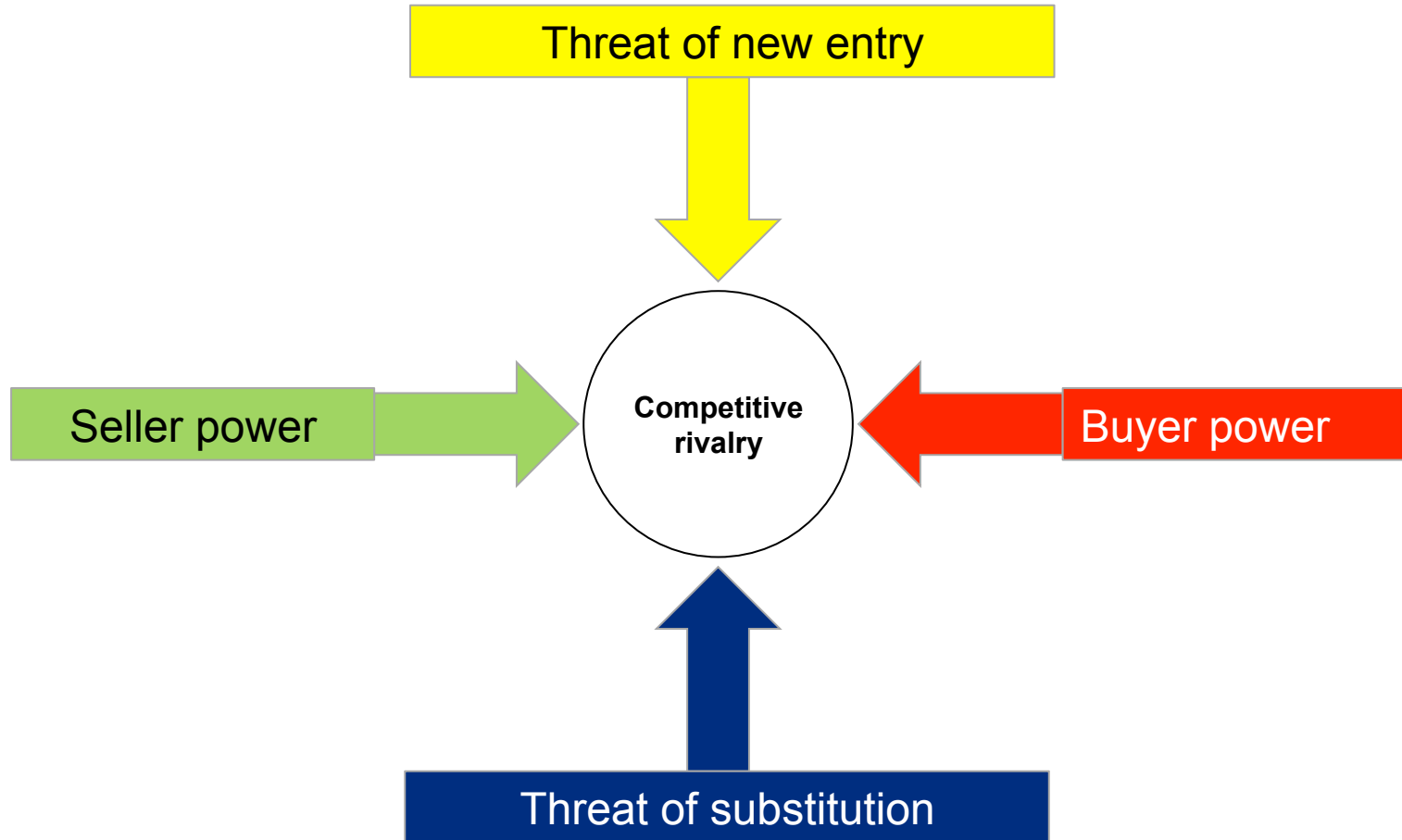
- How will the new GB DCC interface with smart grid operations?

This creates a future ripe with uncertainty for all existing market actors and potential new market actors – how do you try to map this out?

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PORTER'S FIVE FORCES



Simple but powerful tool for understanding the potential for profitability in a market – both now and in the future

WHAT DOES PORTER'S "5 FORCES" MODEL ADDRESS?

Seller power

Number of sellers
Size of sellers
Competition for seller's input
Cost of switching sellers

Threat of new entry

Costs of entry
Regulatory and legal barriers
Economies of scale for existing firms
Technology protection
Access to distribution channels

+

Competitive rivalry

Number of competitors; Market size; Market growth prospects; Product differentiation; Brand loyalty;
Capacity utilisation; Exit costs

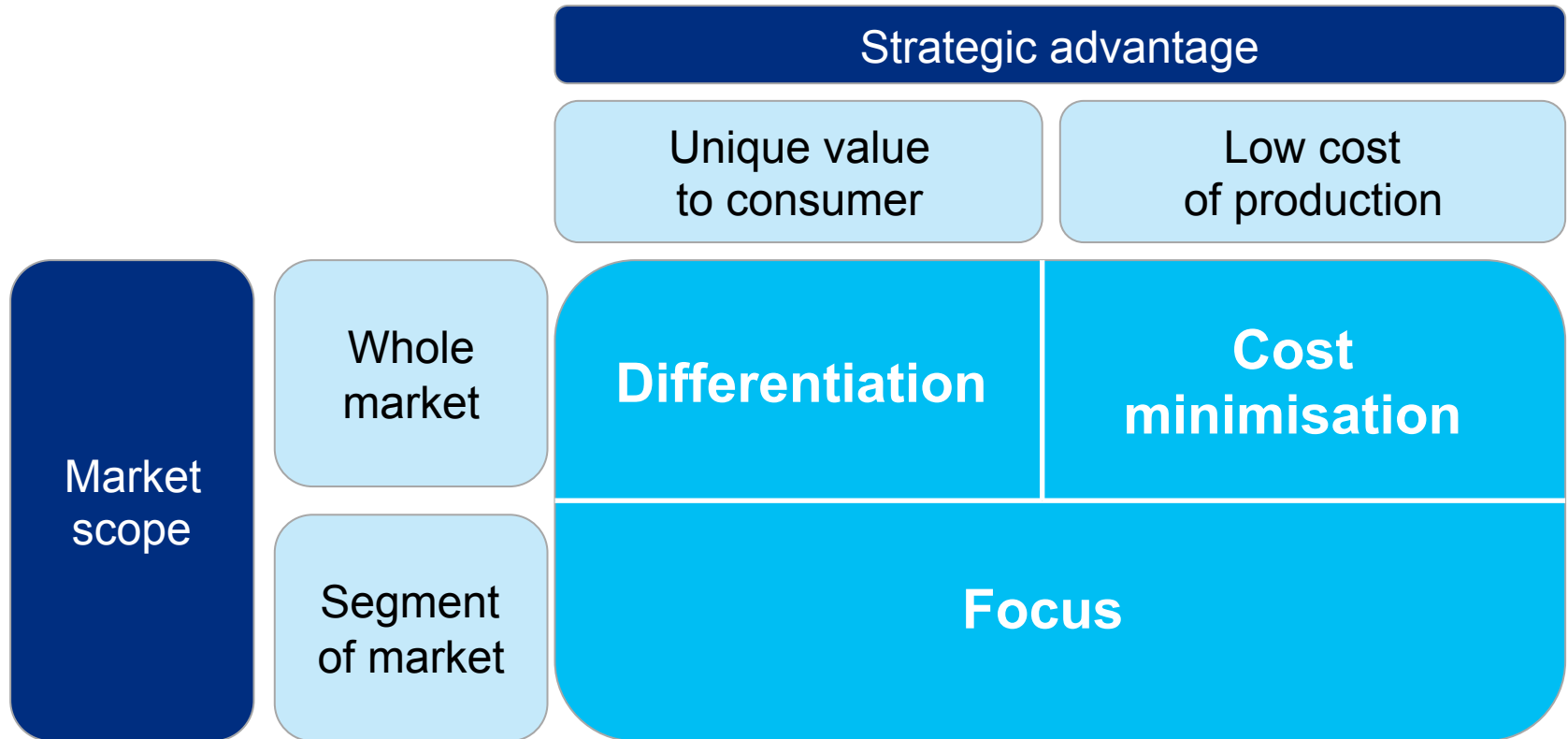
Threat of substitution

Substitute performance
Cost of changing to substitute
Brand loyalty

Buyer power

Number of customers
Differentiation of competitors
Price sensitivity
Ability to substitute
Cost of changing
Threat of backward integration

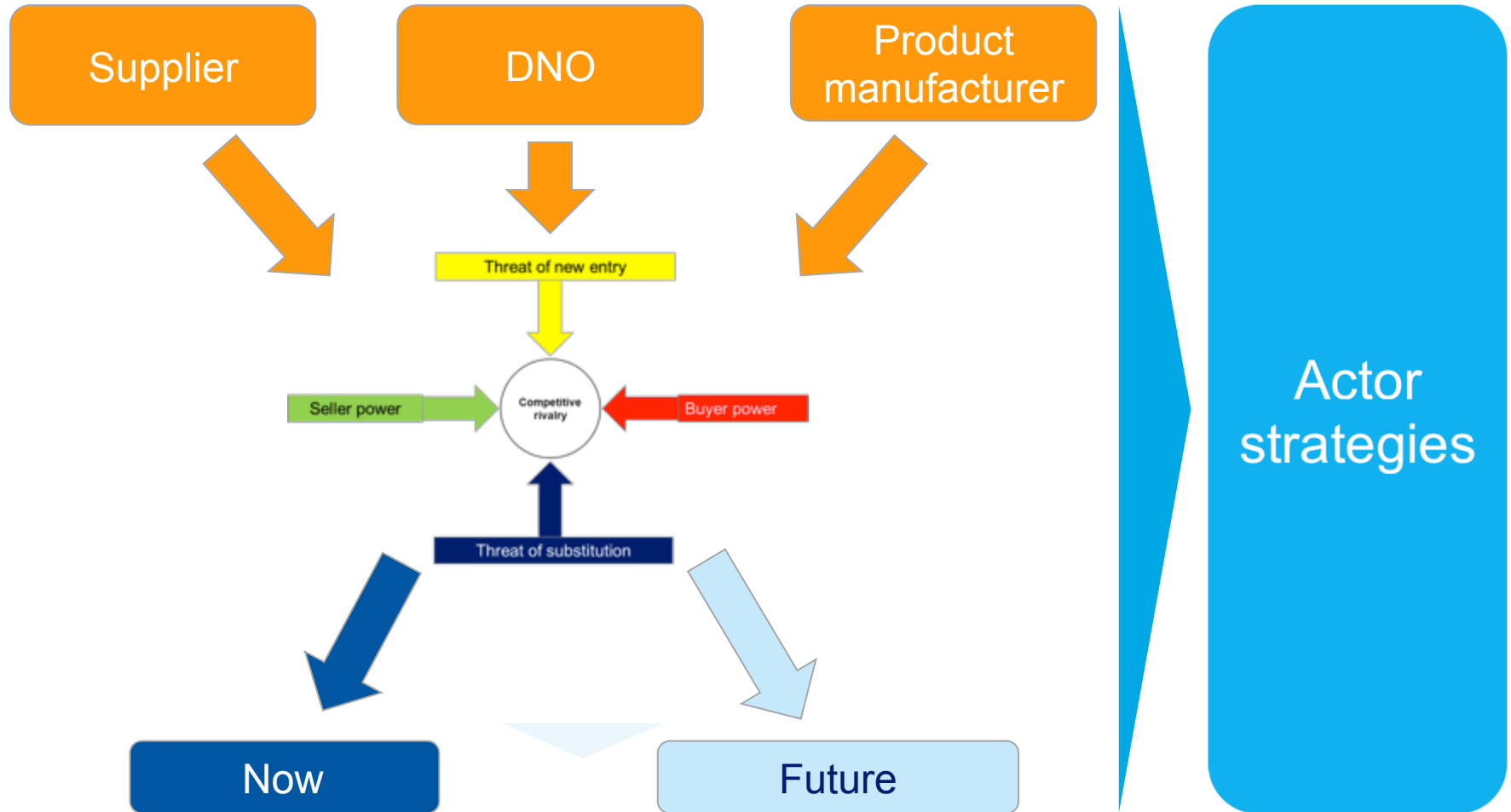
PORTER PROPOSES THREE GENERIC STRATEGIES BASED ON THE 5 FORCES MODEL



- Three generic strategies: differentiation, cost minimisation and focus
- In general, a company should choose only one strategy, or risk being inefficient

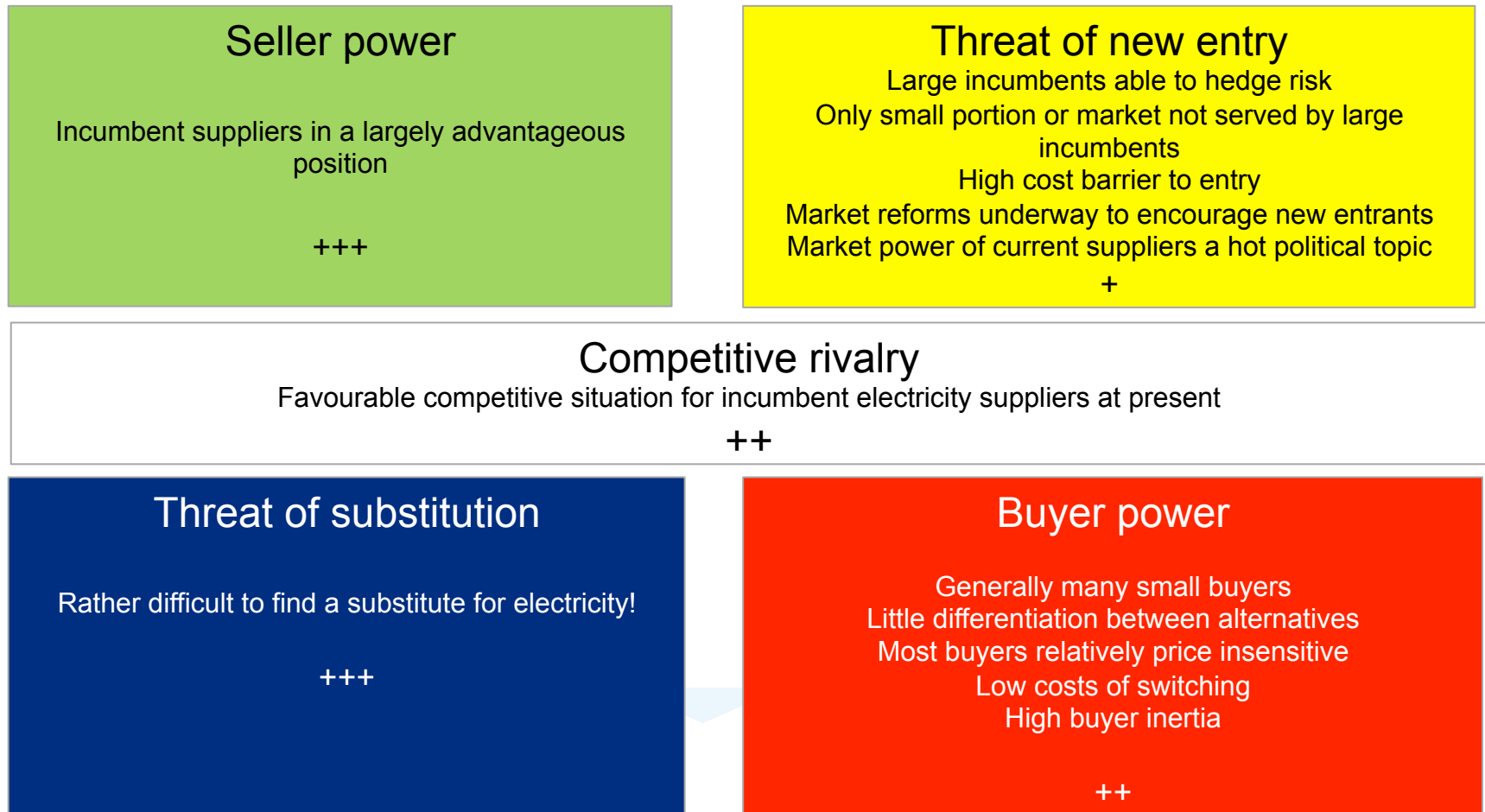
WE CAN APPLY PORTER'S FIVE FORCES TO VARIOUS KEY ACTORS

It can also be interesting to examine how the assessment changes if you look at the situation of today versus that of tomorrow to guide change of strategies



EXAMPLE: INCUMBENT ELECTRICITY SUPPLIER AT PRESENT

Assessment of today shows (large) incumbent suppliers to be in a strong position



EXAMPLE: INCUMBENT ELECTRICITY SUPPLIER IN FUTURE

Assessment of tomorrow shows incumbent suppliers to be under threat – so the strategy of today needs to be revisited

Seller power

Generators required to trade transparently
More small scale distributed generation
More consumers become exporters
Discerning customers require bespoke solutions

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Threat of new entry

Supply side innovation reduces barriers to entry (e.g. Apple, Google)
Requirement for smart technology –sees new major players from IT & telecoms to supermarket

--

Competitive rivalry

Competition enquiry could change the competitive landscape in GB, Smart energy solutions could benefit new market entrants

Threat of substitution

Rather difficult to find a substitute for electricity – but more differentiated products become available
Multi-utility offering can open up market to much more diversified range of participants

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Buyer power

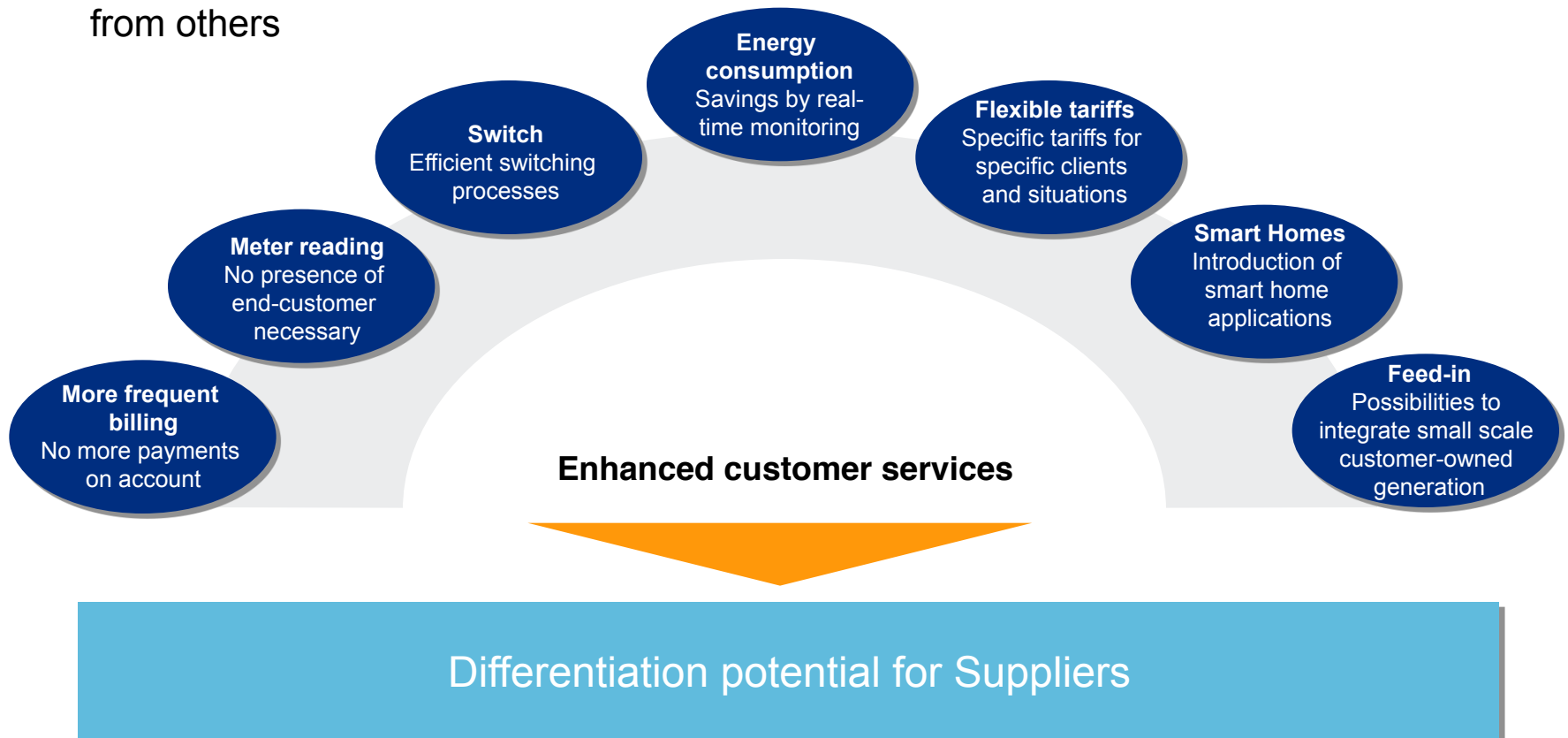
Advent of demand aggregators increases buyer power
Real-time pricing lead to increased price sensitivity and to more transparency through HH settlement
Greater differentiation in supply company offerings

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EXAMPLE OF POTENTIAL FUTURE DIFFERENTIATION STRATEGY FOR AN INCUMBENT SUPPLIER

A key potential strategy for incumbent suppliers is “differentiation” – especially from their existing rivals

- Flexible demand with smarter metering will give suppliers greater differentiation potential
- Success will depend on forging stronger links with customers based on differentiation from others



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SWOT ANALYSIS FOR A NEW SUPPLY COMPANY – DISCUSS

Strengths

- Incumbent energy companies are not trusted
- Customers becoming more active in choosing supplier

Weaknesses

- Customers who are switching may be the more price sensitive ones (harder to keep captured market)
- Market entry process is complicated, infrastructure costs and credit worthiness requirements significant

Opportunities

- New brand (smart can help)
- Will current Big 6 market share be sustainable?
- Creating bespoke offering to segment customer base (easier with scale)

Threats

- Vis have access to more resources
- Changing regulatory framework
- New obligations with size (e.g. ECO kicks in with 250,000 customers)

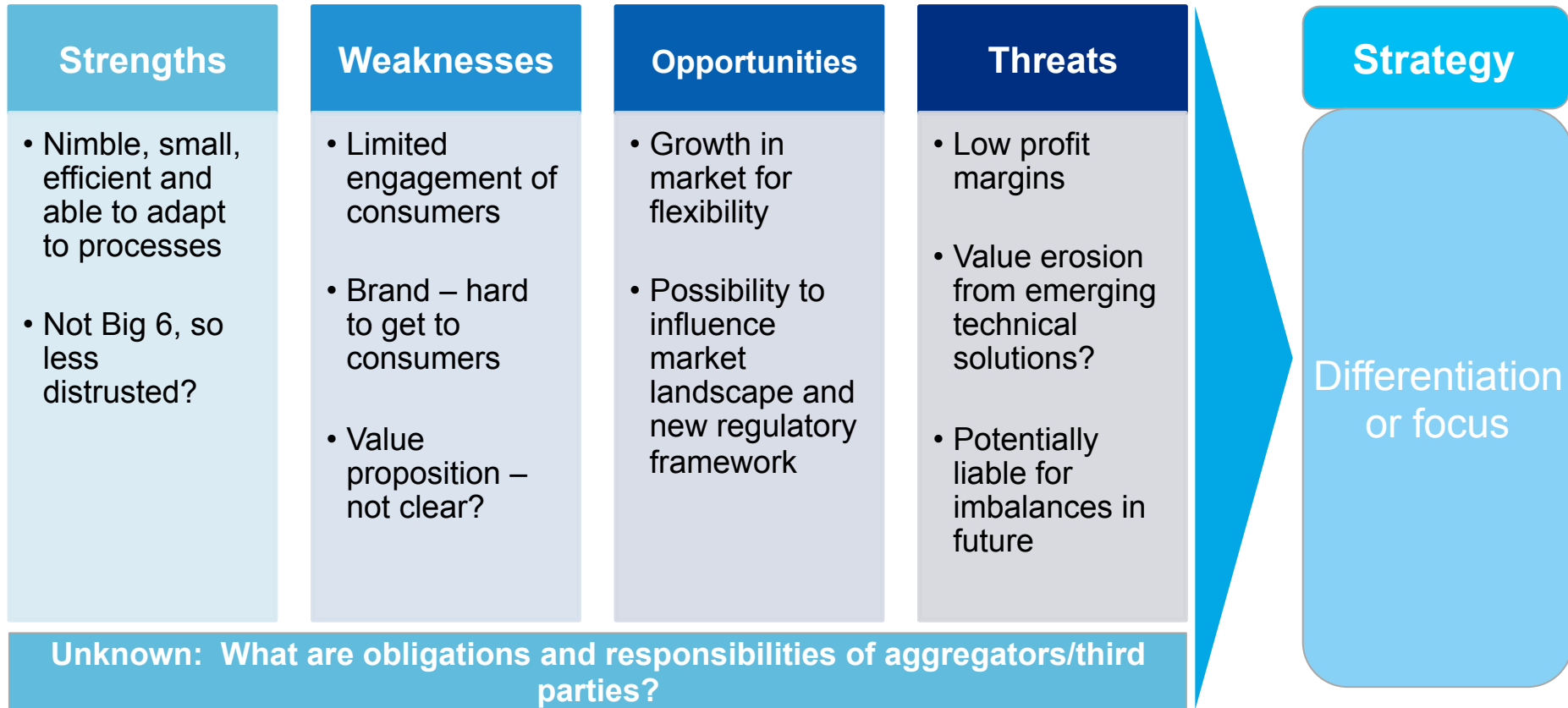
Strategy

Differentiation

Unknown: No understanding of actual consumption pattern (deemed profiles at the moment)

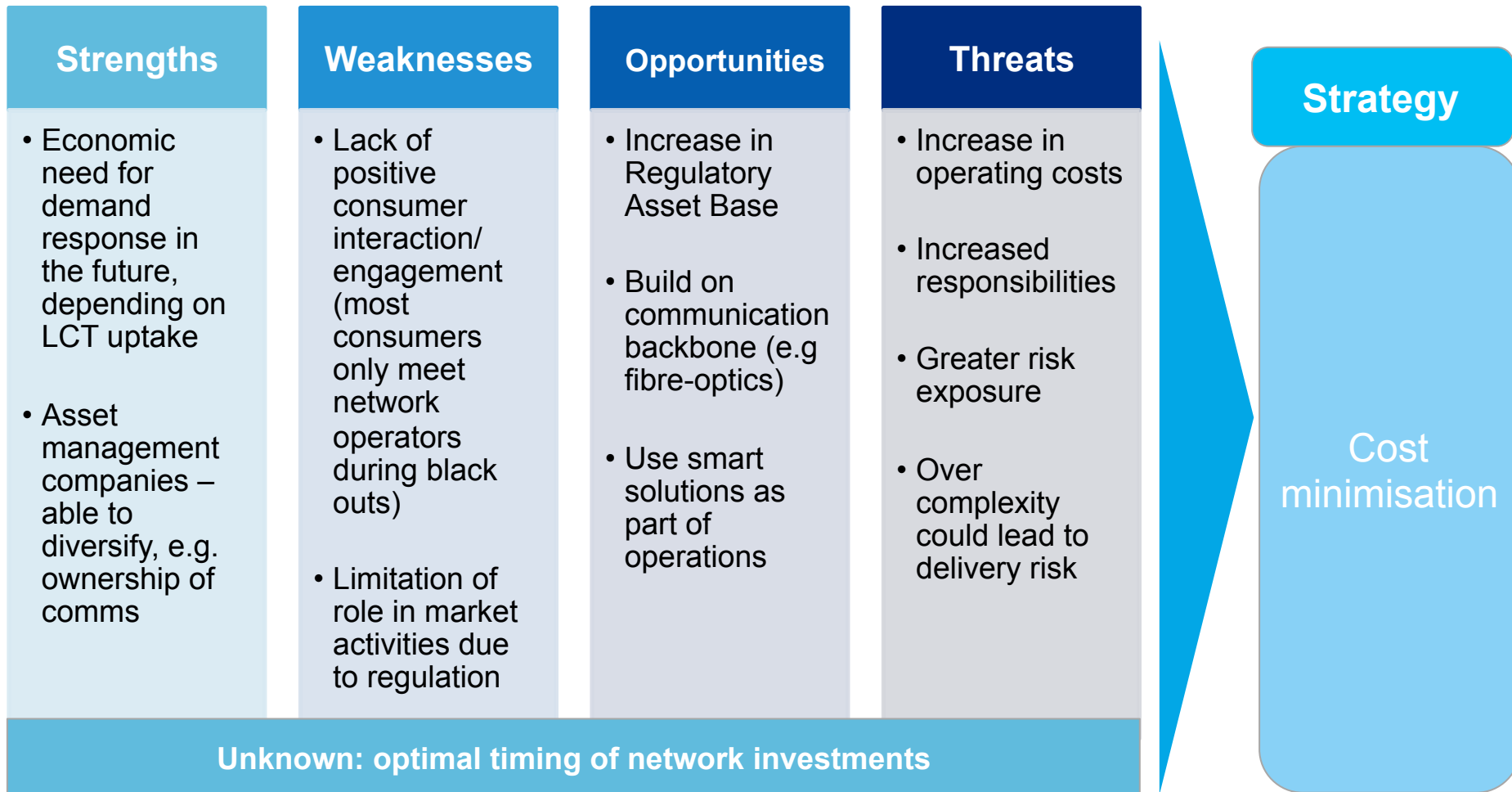
There is the opportunity to profit from the difficulties of the “old guard” – but persuading the consumer you are not “one of them” is easier said than done

SWOT ANALYSIS FOR AGGREGATORS – DISCUSS



Not being associated with the “old guard” and “old model” is a good thing – but there will be a need for clear differentiation from the increasing “new guard” too

SWOT ANALYSIS FOR NETWORK COMPANIES – DISCUSS



Tomorrow's cost minimisation is not today's – it will not be about capex delivery but about efficiently enabling flexibility using capex and opex; timing will be key

SWOT ANALYSIS FOR A CONSUMER – DISCUSS

Strengths

- Information and knowledge of their own consumption patterns
- Increased ability to control consumption

Weaknesses

- Lack of understanding
- Lack of time
- Need to acquire hardware to participate effectively
- Perception of data protection and privacy issues ('Big Brother')

Opportunities

- Ability to take control of own consumption
- Ability to drive suppliers to offer more bespoke solutions
- Cost reduction through better optimisation of consumption

Threats

- Fear that costs will increase under ToU tariffs
- Too much choice or too much complexity in offerings

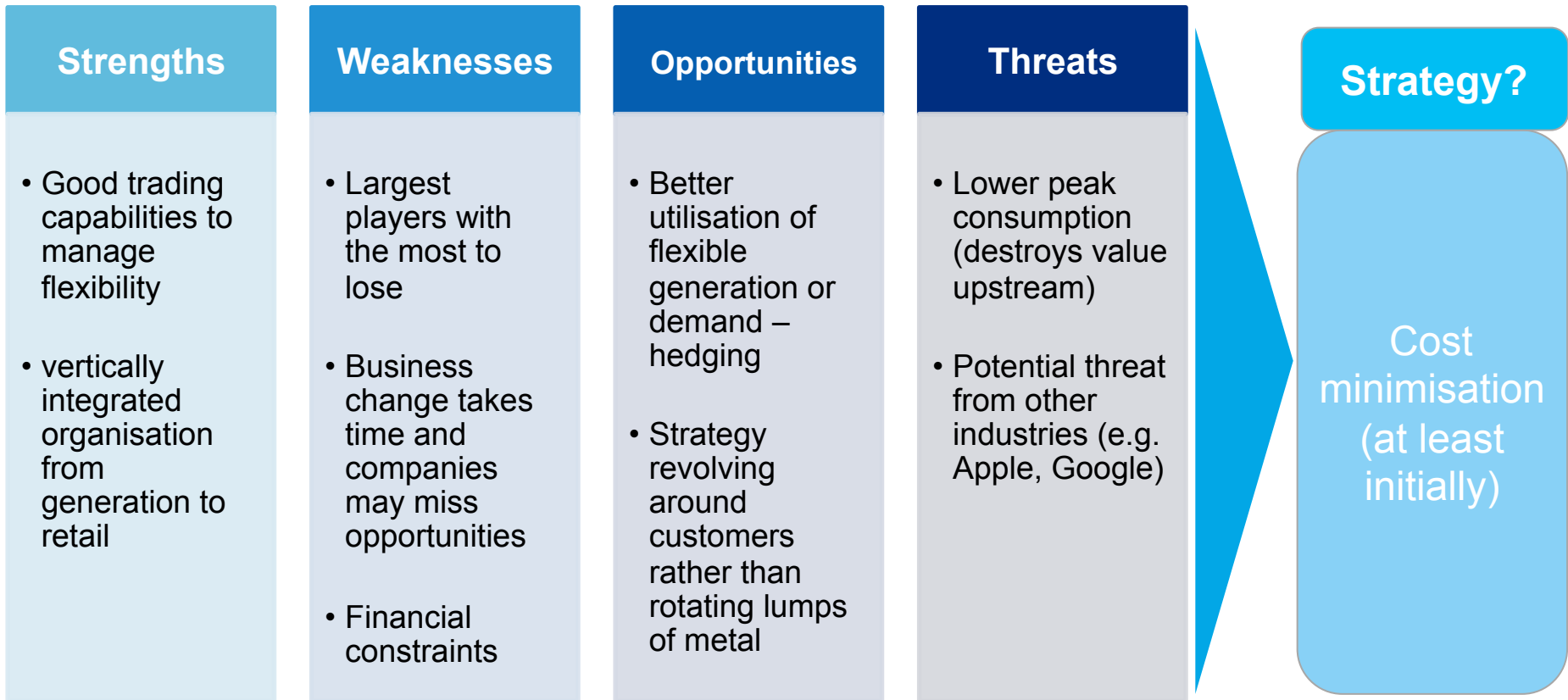
Strategy?

Vis-à-vis a supplier:
cost minimisation but increasingly differentiation?

Unknown: What is the benefit to different types of customers of smart meter roll out?

Future opportunities and potential downsides for consumers are high – educated active engagement will become increasingly important

SWOT ANALYSIS FOR BIG 6 GENERATION COMPANIES – DISCUSS



Tomorrow's cost minimisation is not today's – it will not be about flat out efficiency but about reliable flexibility

SWOT ANALYSIS FOR A NEW PRODUCT MANUFACTURER – DISCUSS

Strengths

- Capacity for mass production at low unit cost
- Potential for innovative products is high with smart metering, HH wholesale settlement.

Weaknesses

- High upfront developments costs

Opportunities

- Increased need for equipment to manage and interrogate data
- Suppliers need to provide more bespoke offering in future

Threats

- Uncertain evolution of product standards in the future
- Data protection and privacy may be a barrier to new products in future

Strategy?

Focus

Unknown: Which will be the most valuable products in a smart world?

The risks of wrong decisions are high – so the importance of expert understanding of the market and the timing of key commitments is critical

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Summary and Conclusions

So what are the key messages from today...

1

The energy sector is transforming – technology and **regulatory** developments are forcing change

2

The smart energy paradigm is no longer a concept it is an emerging reality – today's business models and strategies are not fit for purpose

3

The future landscape is ripe with uncertainty – applying Porters 5 forces model is a helpful assessment framework to understand what this means for business strategy

4

It is clear that existing market players' business strategies need to change – equally new market players need to set theirs carefully as risks can be high

5

The key to success will be to have a clear strategy which fits the future BUT also to be agile in the detailed execution as key uncertainties become clearer



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