



Presentation

Infrastructure and flexibility: Key challenges for an efficient energy transition

E-invest conference Session III - The role of energy infrastructure, flexibility and firmness

Fabien Roques, Executive Vice President and Head of Energy Practice, Compass Lexecon

Brussels, 26 September 2019

CONTENTS

- 1 INTRODUCTION TO COMPASS LEXECON
- 2 THE INFRASTRUCTURE CHALLENGE
- 3 THE FLEXIBILITY CHALLENGE
- 4 CONCLUSIONS

1. Introduction to Compass Lexecon



FTI CONSULTING – COMPASS LEXECON AT A GLANCE

FTI Consulting is a global advisory firm that provides multidisciplinary solutions to complex challenges and opportunities faced by international companies.



GLOBAL REACH

With over 4,700 employees in 29 countries on six continents, our breadth and depth extends across every major social, political and economic hub across the globe.

EXPERIENCED PROFESSIONALS

FTI Consulting are trusted advisors with diverse expertise and exceptional credentials serving clients globally including accountants, economists, engineers, former CFOs and strategists.

The Compass Lexecon trademark brings together world-renowned competition and antitrust experts.

DEEP INDUSTRY EXPERTISE

FTI combines unparalleled expertise and industry knowledge to address critical challenges for clients. Our largest industry groups are:

- Energy, Power & Products**
- Financial Institutions & Insurance
- Healthcare & Life Sciences
- Real Estate
- Retail & Consumer
- Telecom, Media & Technology

FACTS AND FIGURES

1,300+
Clients served

3 Nobel laureates

700+
Industry experts

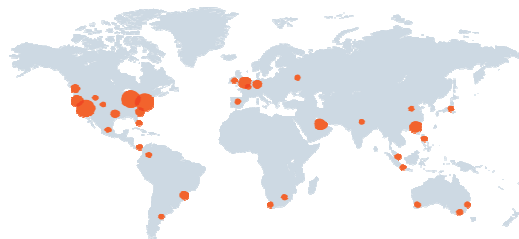
1982
Year founded

AMCF Association of Management Consulting Firms

2012 award for corporate strategy
FTI Consulting was rewarded for its support in the redesign of The E.W. Scripps Company's newspaper business model

\$2 BLN
Market capitalisation

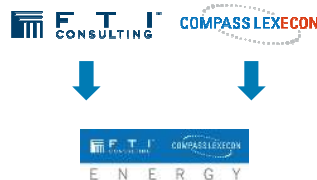
FCN
Publicly traded – NYSE



FTI-CL ENERGY IS A LEADING ADVISORY FIRM FOR ECONOMIC AND POLICY ANALYSES IN EUROPE

Services provided by FTI-CL Energy

- FTI-CL Energy is the cooperation of energy experts from FTI Consulting and its wholly-owned subsidiary Compass Lexecon, bringing together highly experienced economists, accountants and industry practitioners.



- FTI-CL Energy's experts support their clients on a wide range of assignments.
 - Policy and market design
 - Investment decision support
 - Energy markets modelling
 - Financial valuation of assets
 - Business model development
 - Corporate strategy design
 - Economic expertise in commercial litigations

COMPASS LEXECON

Selection of FTI-CL Energy's clients in the energy sector



4

2. The infrastructure challenge

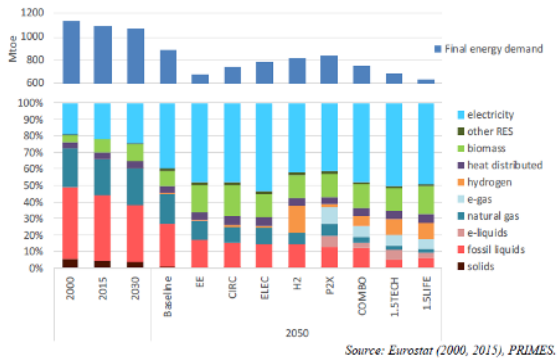


COMPASS LEXECON

5

INTRODUCTION: DEEP UNCERTAINTY ON ENERGY VECTORS AND ASSOCIATED INFRASTRUCTURE NEEDS FOR DECARBONISATION

Share of energy carriers in final energy consumption in European Commission 2050 scenarios



Source: European Commission (2018). A Clean Planet for all: A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy. European Commission, November 2018.

Several possible pathways depending on technology developments and choice of energy vectors:

- Electrification to different degrees, with debate on role of other possible energy vectors: Green gas, Hydrogen, etc.
- Use of existing infrastructures and need for new infrastructures different depending on scenario
- Deep uncertainty for infrastructure planning and risk of stranded assets

REGULATORY FRAMEWORK: ALIGN INCENTIVES WITH POLICY OBJECTIVES

Lack of vertical and horizontal coupling of policies and regulations

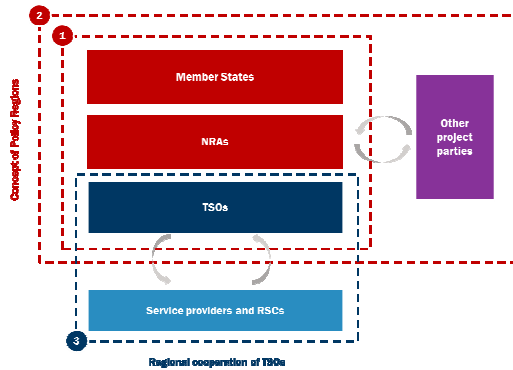
- Lack of coordination between electricity and gas regulations
 - Insufficient coordination of 'downstream policies' for e.g. buildings and transport sectors with upstream energy policies
 - Lack of coordination between energy regulator and buildings / transport regulatory agencies
- ➔
- Reinforce governance framework for regional cross sector policy coordination (policy regions)
 - Revisit mandate and foster coordination of regulatory agencies

Need to review incentives for TSOs / DSOs

- Electricity / gas system operators incentivised based on their own sector KPIs
 - "Regulated Asset Base" approach can create bias toward CAPEX solutions over OPEX approaches
- ➔
- Definition of sector coupling KPIs and related incentives for regulated companies
 - Focus on output regulation, potentially TOTEX approaches to avoid CAPEX bias
 - "Sandbagging" where relevant to unleash regulatory innovation

GOVERNANCE: THE NEED FOR GREATER COORDINATION OF POLICIES AND REGULATION

Multi stakeholder “policy regions”



Source: Fabien Roques and Charles Verhaeghe (2016), Options for the future of power system regional coordination, FTI-CL Energy report for ENTSOE

Governance of the European energy sector will need to be reviewed to foster closer coordination of policies and regulations at different levels

At the European and regional level:

- Regional bodies in key ‘policy regions’ to coordinate across neighboring countries key policy decisions affecting the common energy market and deployment of critical infrastructures and be articulated with role of the pan European existing bodies ACER and ENTSO-E/G

At the local level:

- Local consultation and coordination processes to be implemented both in urban as well as in rural areas at the relevant scale, with a view to engage the relevant stakeholders into a set of indicative coordination and planning processes for the deployment of key infrastructures

PLANNING: A NEW APPROACH IS NEEDED

Traditional approach to planning

- Indicative planning on a sector basis (electricity, gas, transport, etc.)
- Mix of uncoordinated planning processes at the national and European levels
- Limited account of uncertainty given known technology paradigms – central scenario and alternatives / sensitivities
- Authorization / public support largely decided based on CBA



Desirable characteristics of new approach

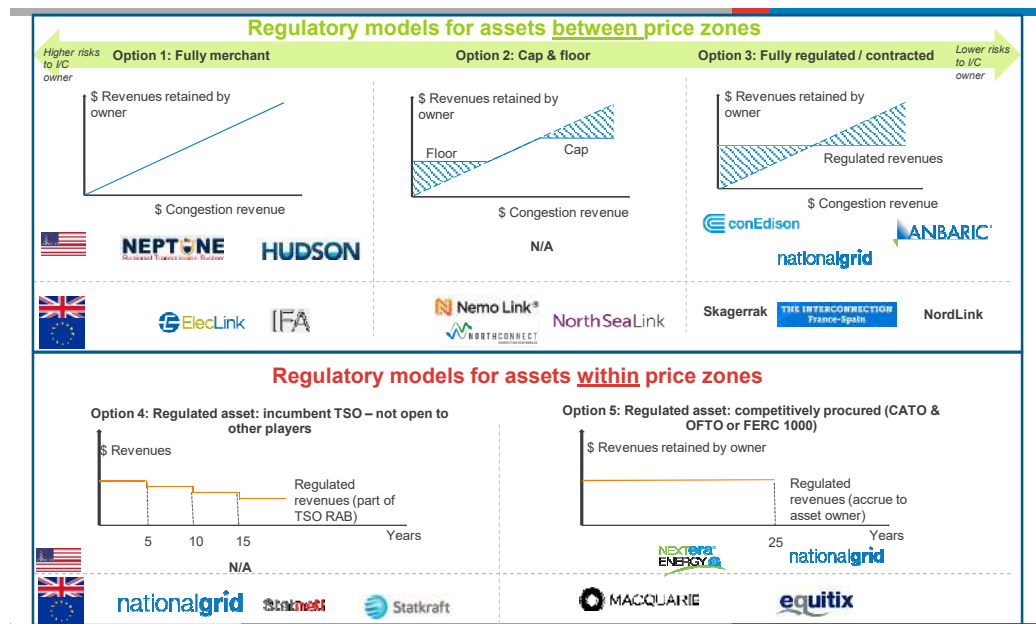
- Integrated / cross sector planning with holistic approach
- Coordination of planning at different geographic levels (local, regional, European)
- Approach factoring in uncertainty and path dependency
- Identify ‘low regret options’ and minimize potential stranded costs

STRANDED ASSETS: POTENTIAL MITIGATION STRATEGIES

Energy market operators can proactively take a number of steps to limit the risks of stranded assets:

- Work with regulators and policy makers to **design efficient energy transition policies** and **anticipate the impact of regulatory interventions** on assets revenues, for instance mechanisms that decouple / insulate asset revenues and utilization and/or risk sharing mechanisms with regard to policy / regulatory changes
- Cut operating costs** and **accelerate depreciation schedule** for existing assets, renegotiate or buy out expensive long term contracts
- Strategy for new investment should factor in risk of regulatory / policy change, eg. **favor investments with fast payback** and with **flexibility / optionality providing resilience** across different possible future regulatory pathways (c.f. recent investment in small and scalable technologies)

CASE STUDY 1: BUSINESS MODEL VARIANTS FOR TRANSMISSION INVESTMENTS



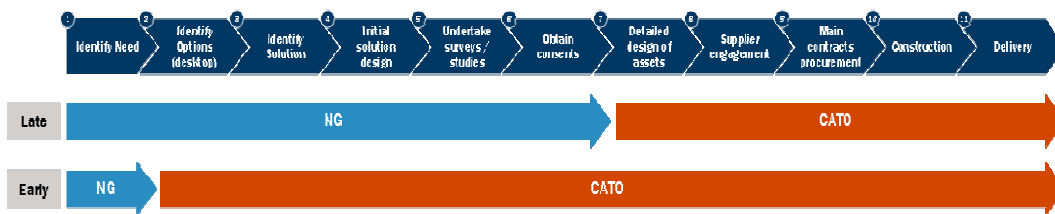
CASE STUDY 2: OFGEM EFFORTS TO DEVELOP AN 'EARLY MODEL' OF COMPETITION TO STIMULATE INNOVATION

The issue: system operators are in charge of defining the need for network reinforcement and may introduce a bias toward 'grid solutions' compared to other flexibility solutions and/or more innovative approaches

The approach: introduce tendering an early stage in the project definition so as to **maximize scope for innovation** and ensure a **level playing field between different technologies**

The challenge: during the initial phases of the project lifecycle there is a large degree of uncertainty, in particular, future load requirements and the cost and benefits of proposed alternative flexibility solutions

Comparison of 'late' and 'early' models to introduce competition in network projects



COMPASS LEXECON

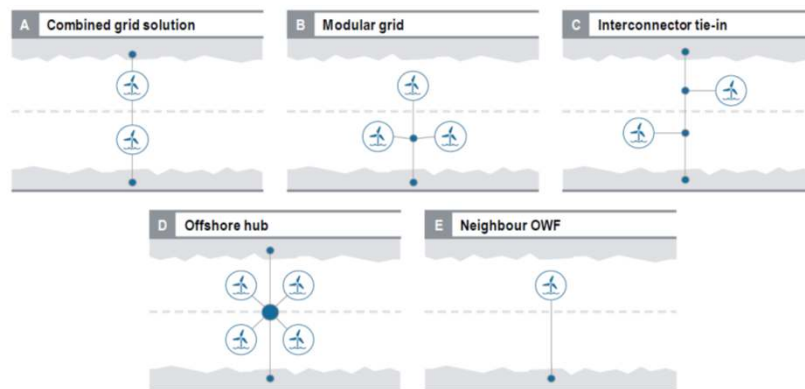
12

CASE STUDY 3: PLANNING PROCESSES AND REGULATORY FRAMEWORK FOR OFFSHORE PLATFORMS

The issue: Offshore wind potential in North Seas of more than 635 GW by 2030. Traditionally, strong national focus with the transmission line feeding just one national grid.

The challenge: Hybrid projects combine generation and transmission, linking two or more countries and providing a **platform for coordination between them reducing overall system costs**. But the regulatory framework and associated business models remains to be defined.

Comparison of different approaches for connecting offshore wind farms



COMPASS LEXECON

13

3. The flexibility challenge

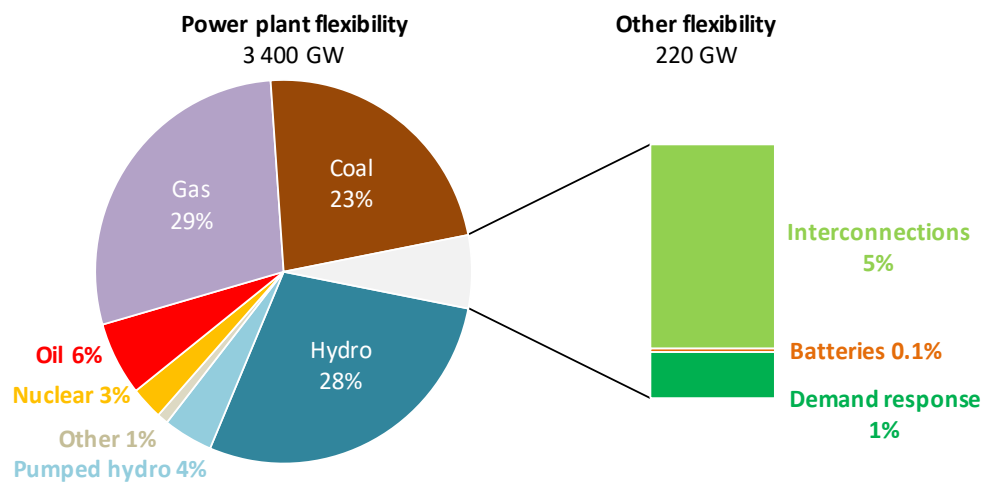


COMPASS LEXECON

14

TIMELY SCALING UP OF FLEXIBILITY: THE GATEWAY FOR AN EFFICIENT POWER SECTOR DECARBONISATION

Integration of renewables will require to **scale up investment in flexibility solutions**, as some of the current sources of flexibility will retire in the coming years



Source: International Energy Agency, *World Energy Outlook*, 2018

COMPASS LEXECON

15

MONETIZING THE DIFFERENTIATED SYSTEM VALUE OF FLEXIBILITY OPTIONS

	Pumped hydro	Interconnectors	CCGT	OCGT	Gas recip	Diesel recip	Batteries	Demand-side response
A Wholesale market	High potential	High potential	High potential	High potential	High potential	High potential	High potential	High potential
B Balancing Mechanism	High potential	High potential	High potential	High potential	High potential	High potential	High potential	High potential
C Capacity Market	High potential	High potential	High potential	High potential	High potential	Low potential	High potential	High potential
D FCR	High potential	Low potential	High potential	High potential	High potential	High potential	High potential	Low potential
E aFRR	High potential	Low potential	High potential	High potential	High potential	High potential	High potential	High potential
F Optional benefits	Low potential	Low potential	High potential	High potential	High potential	High potential	High potential	High potential

■ Low potential
■ Medium potential
■ High potential

- Flexibility options provide a range of services to the electricity system which can be monetized across different markets
- It is important that all sources of value of flexibility are recognized and adequately remunerated in a non-discriminatory way

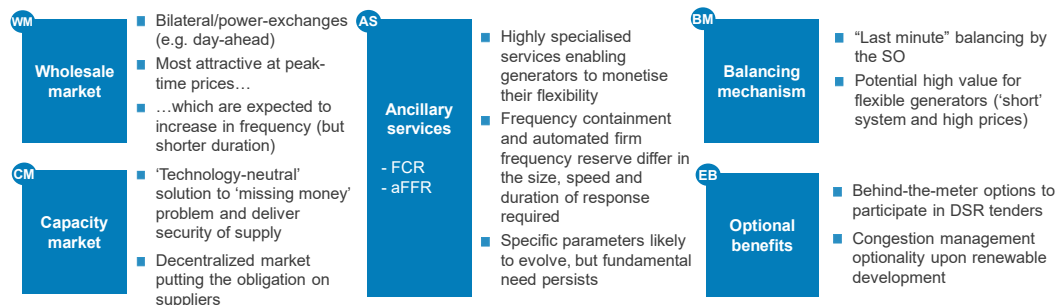
COMPASS LEXECON

16

FLEXIBILITY ASSETS NEED TO ADJUST BUSINESS MODELS AS STACKING POSSIBILITIES ACROSS DIFFERENT MARKETS EVOLVE

Key issue is to identify **business models and regulatory frameworks that allow the 'stacking up' of the different sources of system value:**

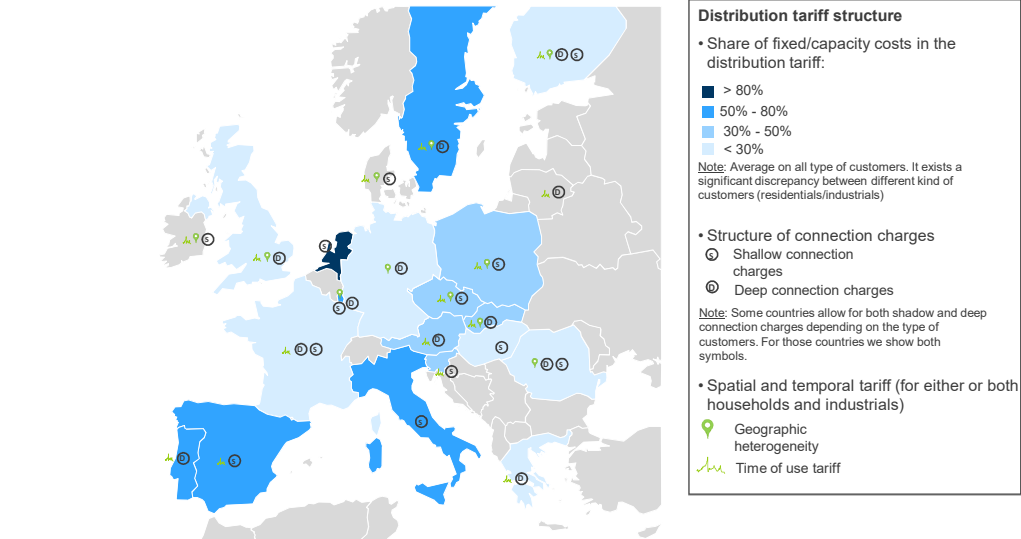
- Historically, there has been evidence of value shifting across markets as markets evolve and technology advances.
- The regulatory framework will be key to ensure timely deployment of flexibility in a technology neutral way.



COMPASS LEXECON

17

CASE STUDY 1: DISTRIBUTION TARIFF STRUCTURES NEED TO ADAPT TO CHANGES IN NETWORK ROLES (E.G. INSURANCE)



COMPASS LEXECON

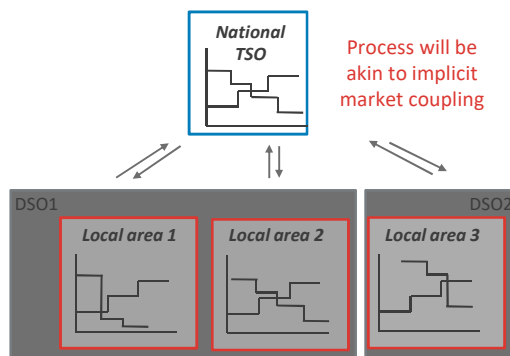
Source: European Commission (2015), "Study on tariff design for distribution systems"
https://ec.europa.eu/energy/sites/ener/files/documents/20150313%20Tariff%20report%20final_revREF-E.PDF

18

18

CASE STUDY 2: LOCAL FLEXIBILITY MARKETS ARE A PROMISING WAY FORWARD, BUT RAISE REGULATORY CHALLENGES

Example of a potential model of "co-optimised" local flexibility markets with national markets



Issues to be addressed around coordination of TSOs / DSOs and approach for coupling of markets at different levels.

Current flexibility platform experiments show different approaches:



COMPASS LEXECON

19

4. Conclusion



SUMMARY: NEED FOR ADAPTATIONS AND INNOVATIONS IN THE MARKET DESIGN AND REGULATORY FRAMEWORK

- Uncertainty on pathways for decarbonisation leads to **uncertainty in planning infrastructure investments**
- Need for innovation in **infrastructure planning and regulatory frameworks** for an efficient decarbonisation
 - Cross sector planning and regulation to create incentives for sector coupling (vertical and horizontal)
 - Changes in governance to foster cooperation across different geographical levels
 - New planning and evaluation methods taking into uncertainty ('low regret options') to minimise stranded costs
- The **timely development of flexibility** is a prerequisite for an efficient decarbonisation of the power sector
 - Identify business models and regulatory frameworks that allow the 'stacking up' of the different sources of system value
 - Need to ensure that all sources of value of flexibility are recognized and adequately remunerated in a non-discriminatory way

FINAL THOUGHTS: A WINDOW OF OPPORTUNITY

"At present there is a global and structural need for infrastructure investment of nearly 7 trillion dollars per year, taking into account the energy transition in addition to traditional investment requirements.

Paradoxically, the investment gap is growing at a time when governments can obtain long-term financing at very low, even negative, rates."

Laurence Boone, OECD Chief Economist ([weblink](#))

Growing recognition among economists that **monetary policy is reaching its limits in stimulating economic growth... and that investment in infrastructure can be an efficient way to support the economy at times of low / negative interest rates.**

⇒ **New European Commission and revision of State Aid guidelines for energy represent an opportunity to scale up investments in infrastructure and deliver on Europe's climate ambitions**

THANK YOU FOR YOUR ATTENTION

Fabien Roques
Executive Vice President
FTI - COMPASS LEXECON

froques@compasslexecon.com



Fabien Roques
Associate Professor
Université Paris Dauphine

fabien.roques@dauphine.fr



DISCLAIMER

The authors and the publisher of this work have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication. However, neither the authors nor the publisher nor any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete, and they are not responsible for any errors or omissions or for the results obtained from use of such information. The authors and the publisher expressly disclaim any express or implied warranty, including any implied warranty of merchantability or fitness for a specific purpose, or that the use of the information contained in this work is free from intellectual property infringement. This work and all information are supplied "AS IS." Readers are encouraged to confirm the information contained herein with other sources. The information provided herein is not intended to replace professional advice. The authors and the publisher make no representations or warranties with respect to any action or failure to act by any person following the information offered or provided within or through this work. The authors and the publisher will not be liable for any direct, indirect, consequential, special, exemplary, or other damages arising therefrom. Statements or opinions expressed in the work are those of their respective authors only. The views expressed on this work do not necessarily represent the views of the publisher, its management or employees, and the publisher is not responsible for, and disclaims any and all liability for the content of statements written by authors of this work.

REFERENCES

RES-E-MARKETS:

Electricity market design and renewable energy deployment

[Web link](#)



Electricity Market Design and RE Deployment
(RES-E-MARKETS)

IEA-RETD

Publications on energy policy

Study of a Carbon Price Floor in European Countries: Analysis of Power Market and Consumer Impacts [Web link](#)

Study on the role of gas in Belgium's future energy system [Web link](#)

Publications on European electricity markets

The new European Energy Union - Toward a consistent EU energy and climate policy? [Web link](#)

European electricity markets in crisis: diagnostic and way forward [Web link](#)

Toward the Target Model 2.0- Policy recommendations for a sustainable EU power market design [Web link](#)