Role of the DSO in a changing environment

Welcome

Agenda

- Electricity distribution
  - Distribution System Operators
  - Regulation
- References
- Appendix 1 – Value Proposition and Business Model Canvas
- Appendix 2 – Gas Distribution

Electricity Distribution System Operators

- **Current organisation of the electricity market**
- **Changing environment – 3 step evolution**
- **Future role(s) of the DSO**

Living Tomorrow – Introduction

Distribution System Operator tasks

- **Ensure long-term system ability to meet reasonable demands for electricity**
- **Operate, maintain and develop a secure, reliable and efficient distribution system**
- **Network planning considering energy efficiency, demand side management and distributed generation**
- **Facilitate market functioning through non-discriminatory grid access and information**

Source: From Think Topic 12 and according to Article 25 of the Electricity Directive

Differences between DSOs and TSOs

Distribution System Operator	Transmission System Operator
DSO	TSO
Long-term distribution grid planning and grid development (including the connection of load and DG and guaranteeing efficient access and use of the grid)	Long-term transmission grid planning and grid development (including the connection of bulk generation (and load) and guaranteeing efficient access and use of the grid)
Grid operation, in particular: • Voltage control • Load/DG curtailment in case of emergencies	Grid operation, in particular • Frequency containment • Frequency restoration • Replacement of generation

Source: Think Topic 12, table 3

DSO differences – market concentration

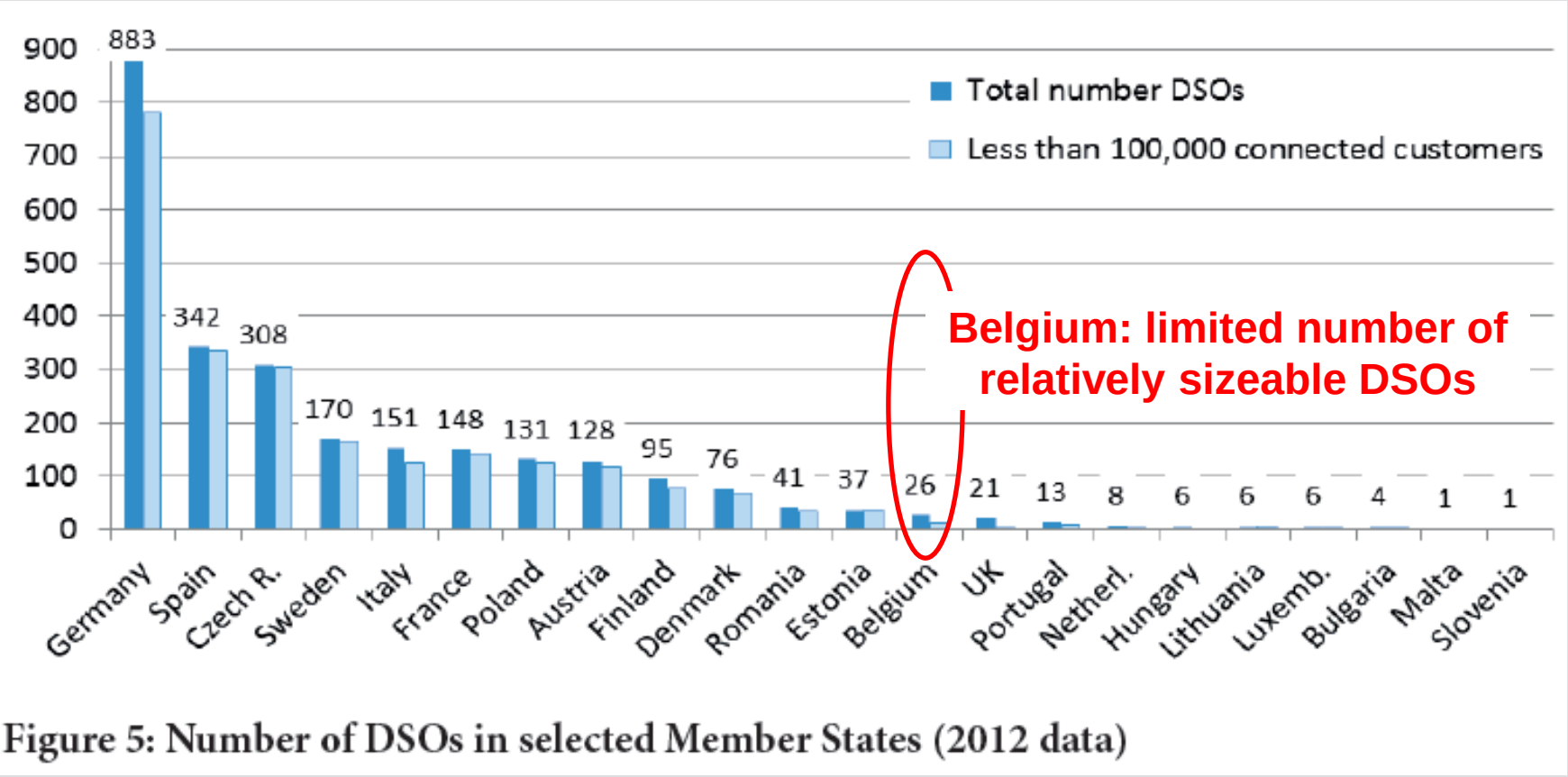


Figure 5: Number of DSOs in selected Member States (2012 data)

Source: Think Topic 12

DSO differences – voltage levels

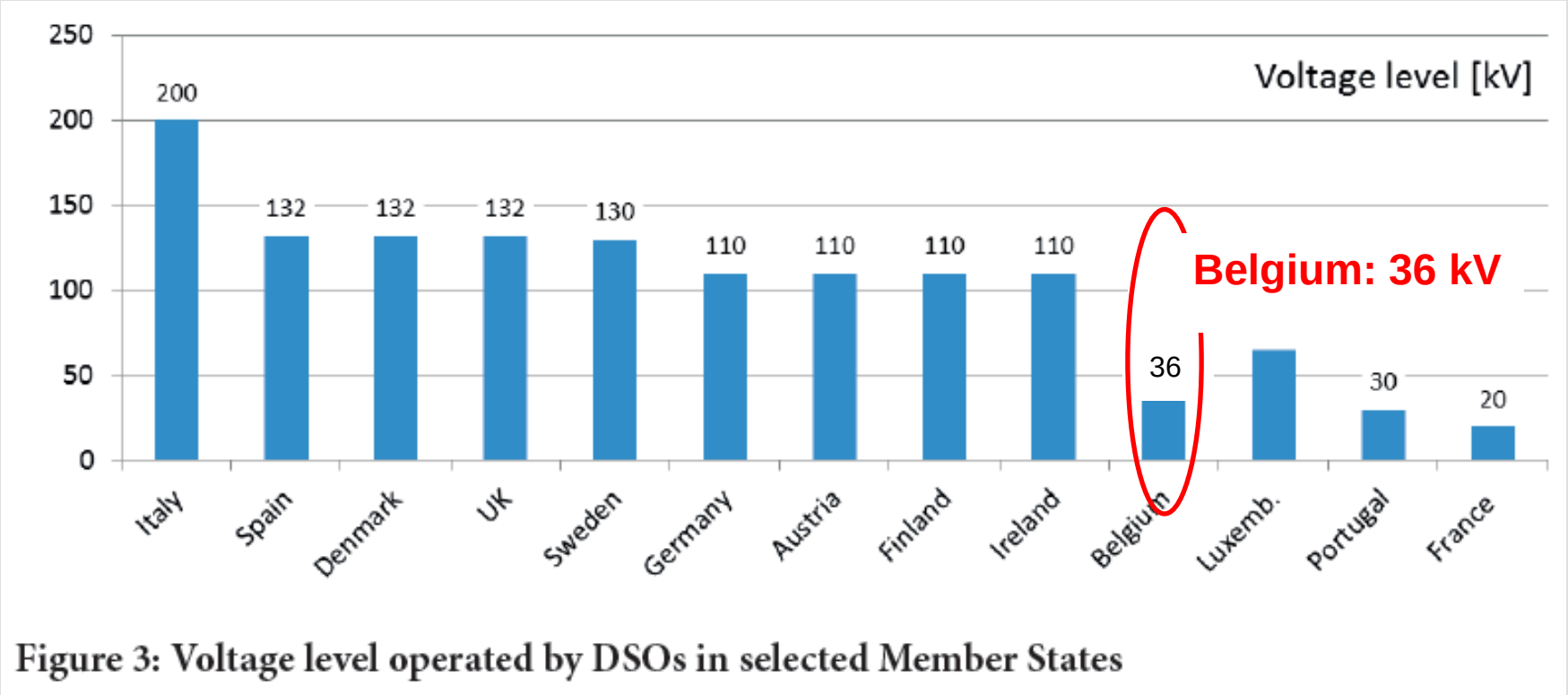


Figure 3: Voltage level operated by DSOs in selected Member States

Source: Think Topic 12

DSO differences – scope

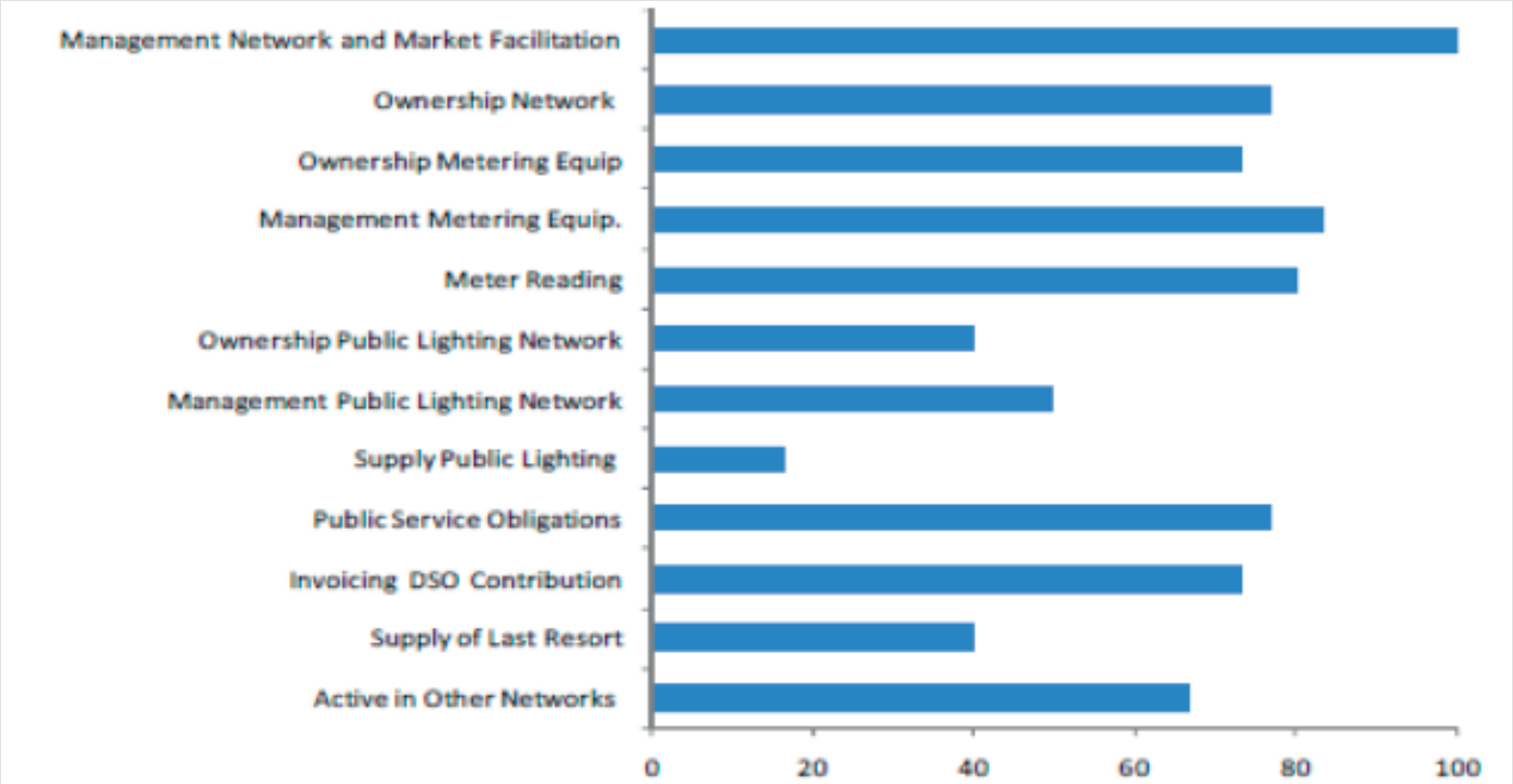


Figure 4: Scope of DSOs (survey data)

Source: Think Topic 12

DSO differences – regulatory model

Figure 1. Mapping selected power and utilities regulation in Europe

See Appendix for full details of the regulatory system covered in each country

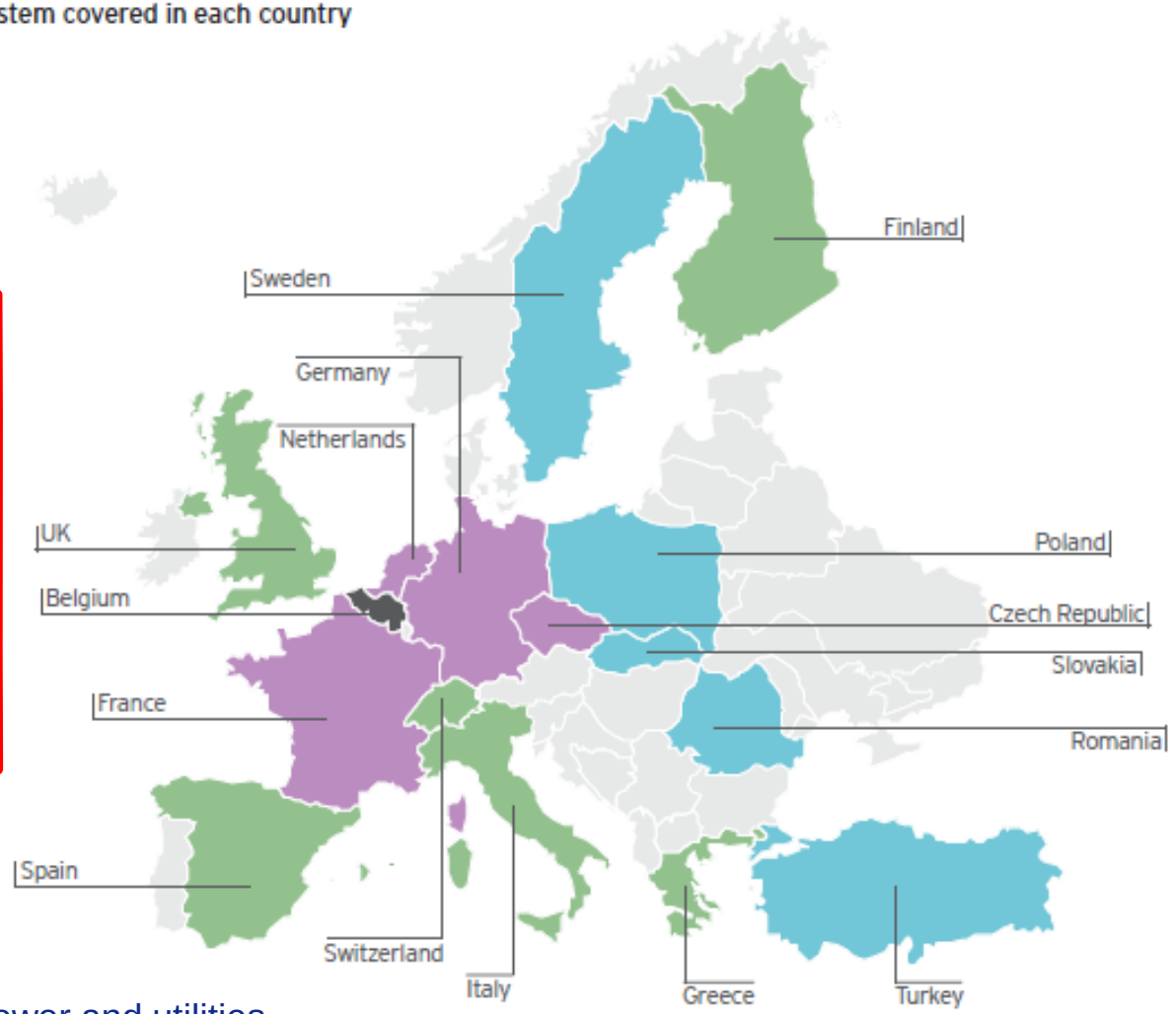
National regulatory model

Cost plus
- Belgium

Incentive-based
- Czech Republic
- France
- Germany
- The Netherlands

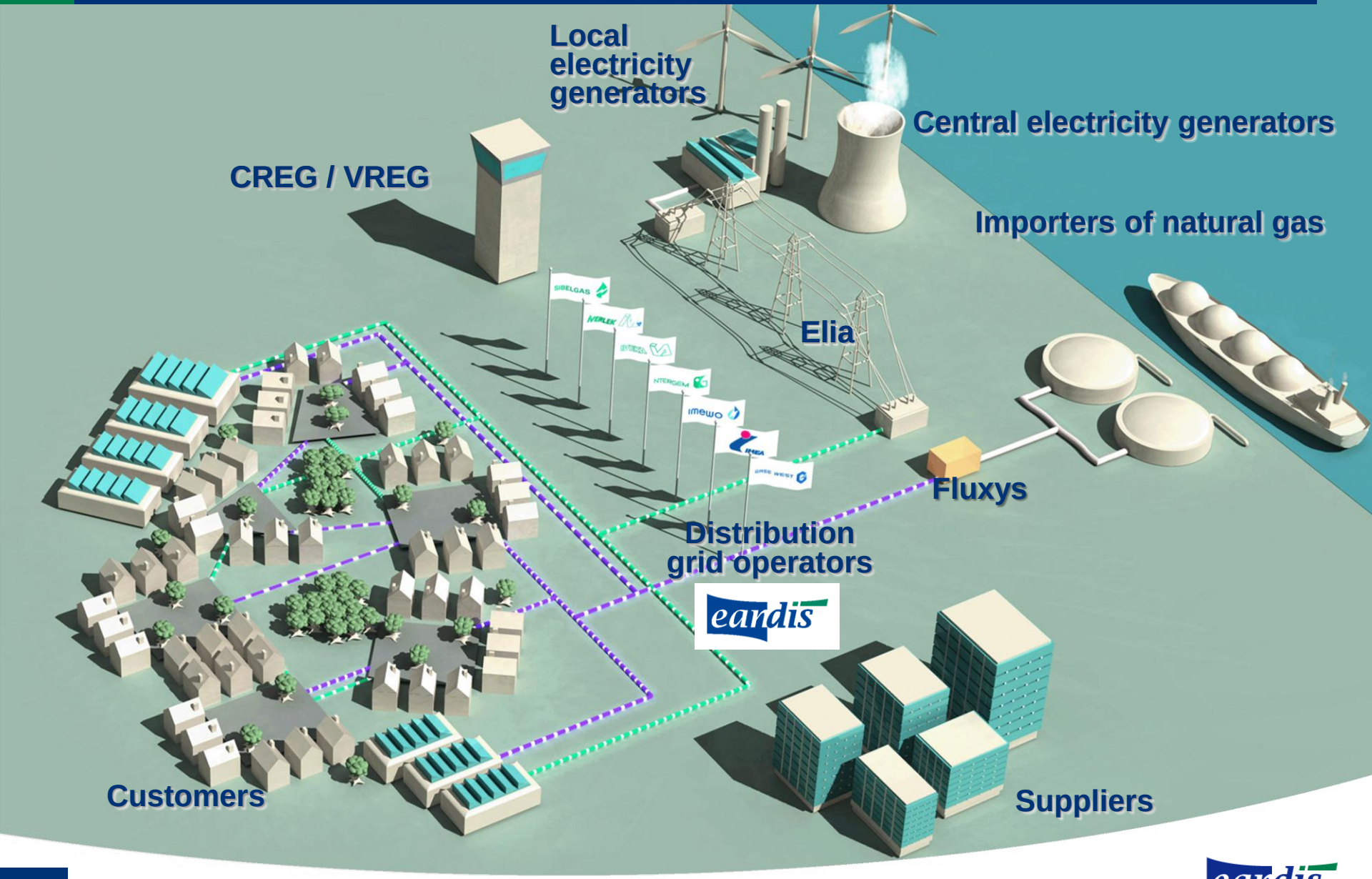
Combination of models
- Finland
- Greece
- Italy
- Spain
- Switzerland
- The UK

Revenue/price/income cap
- Poland
- Romania
- Slovakia
- Sweden
- Turkey



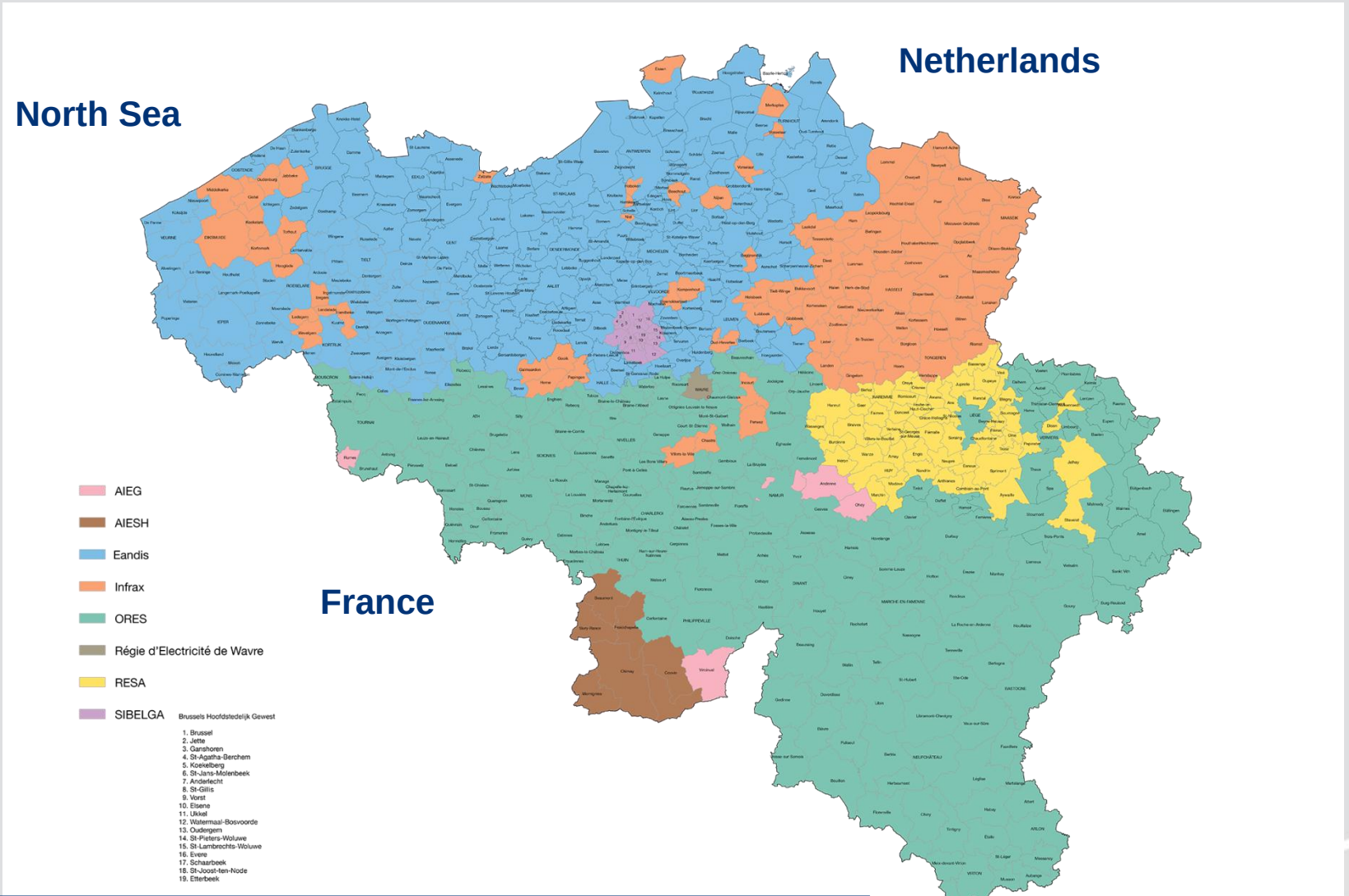
Source: Ernst & Young, “Mapping power and utilities regulation in Europe (2013)”

Who's who in the Flemish energy market ?



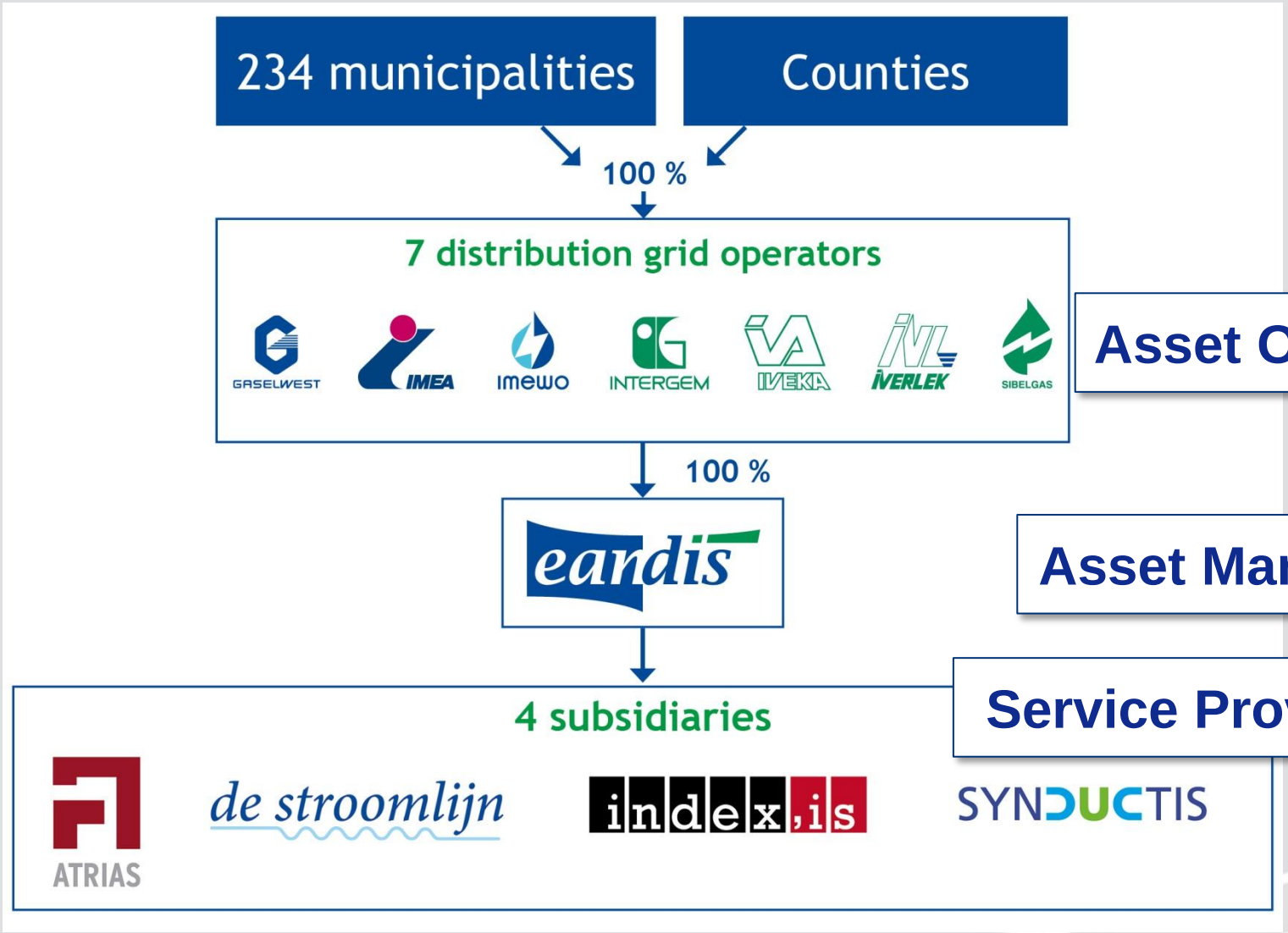
Distribution network maquette

Eandis Operational area electricity distribution



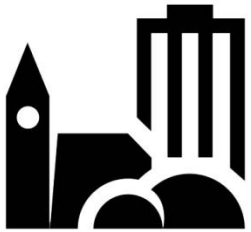
Eandis covers 78 % of Flemish Municipalities

Structure Eandis group



Eandis Key Figures (12 / 2014)

4 170
employees



Active in 234 towns / municipalities

96 000 km
electricity network (twice around the world)

- 2,6 million connections
- 61 500 social supplier customers

42 000 km
natural gas network (once around the world)

- 1,7 million connections
- 48 000 social supplier customers

840 000
street lights

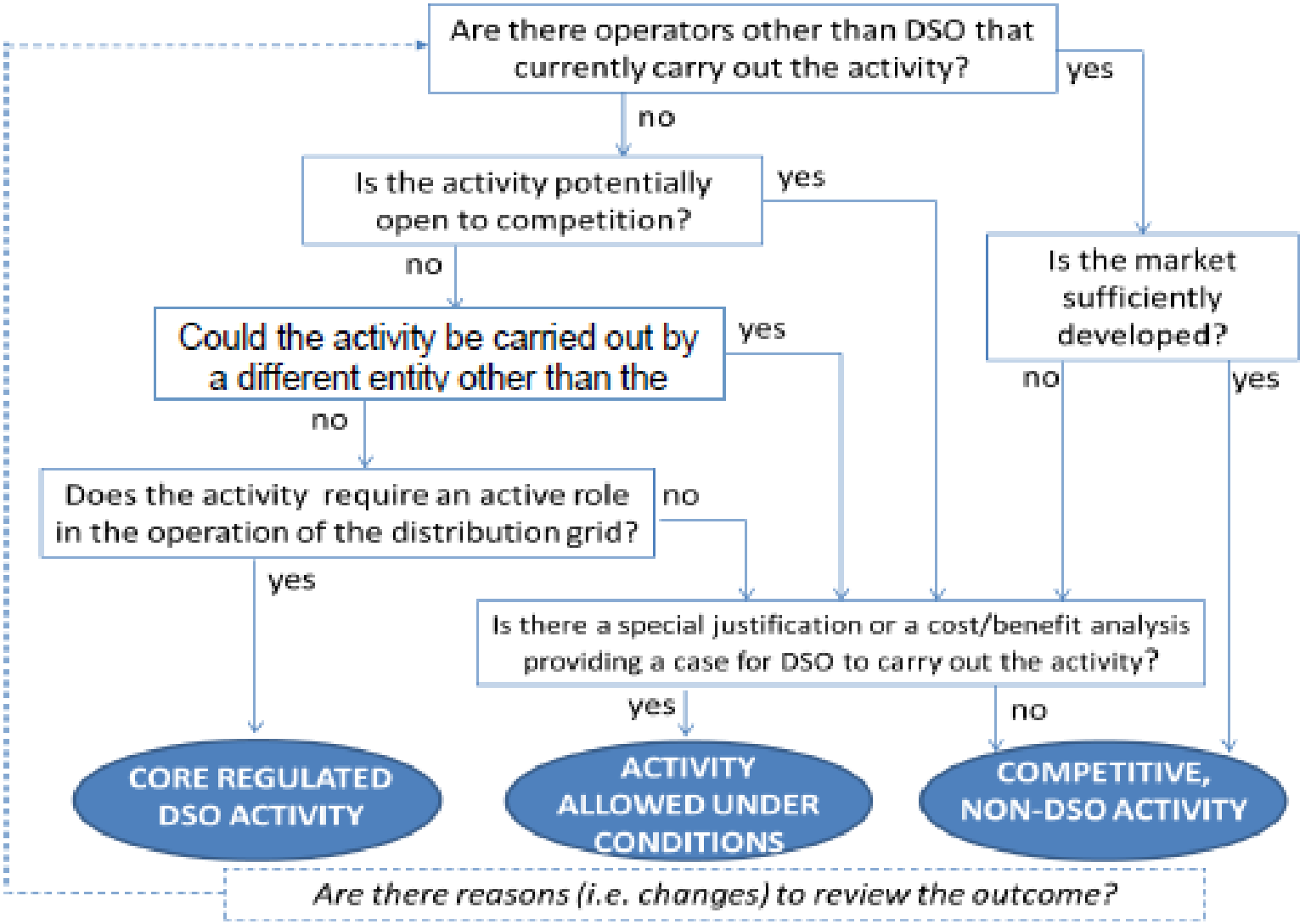
customer contact

Website: visitors/month (upward)
240 000

Call centre: calls/month (downward)
109 000

25 customer offices: visitors/month
14 300

Framework for DSO activities



Source: CEER conclusions paper – Future Role of DSOs

What Eandis does and what it doesn't do

✓ Belgian DSO scope

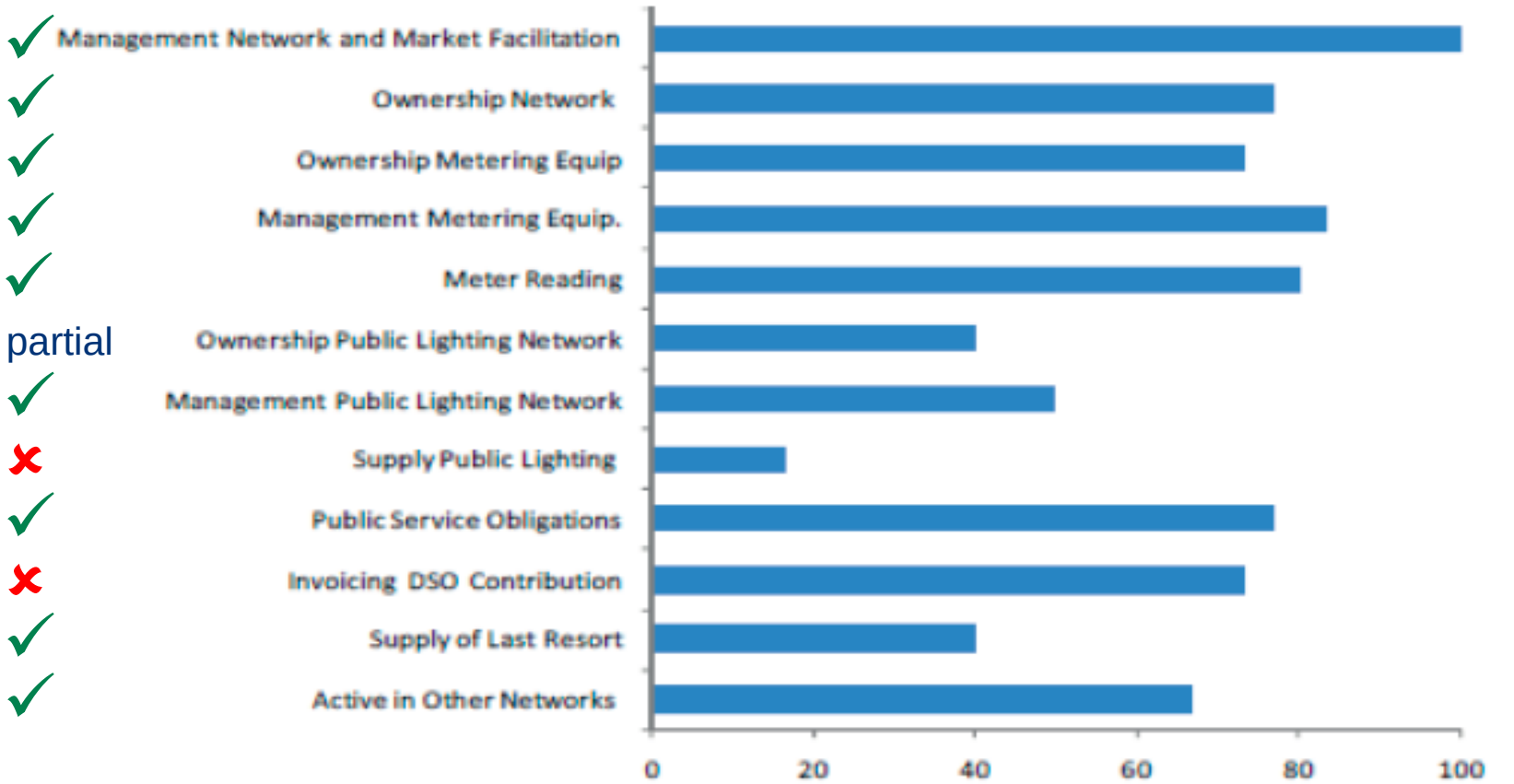


Figure 4: Scope of DSOs (survey data)

Source: Think Topic 12

Public Service Obligations

Ecological

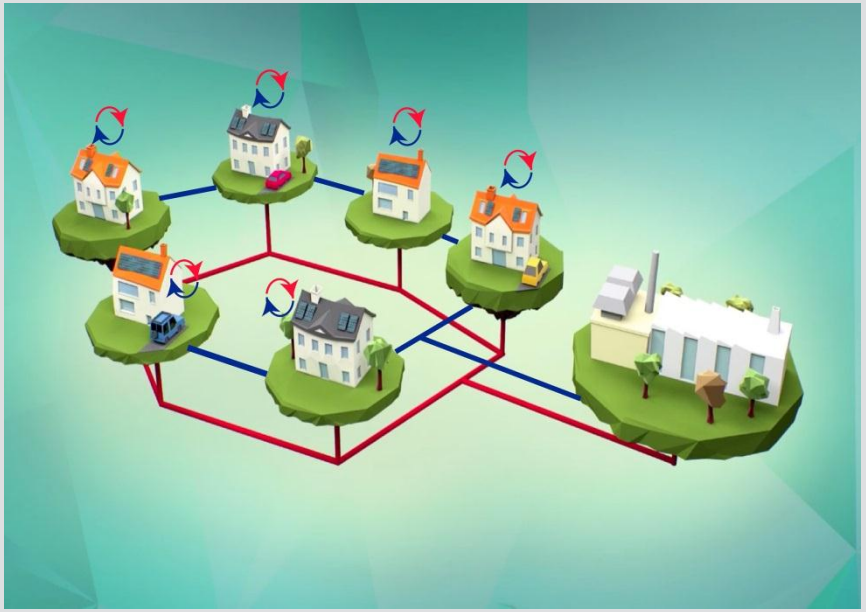
- rational use of energy
- green power certificates
- cogeneration

Social

- energy supply to dropped customers by commercial market
- installation / activation / deactivation of budget meters
- minimum supply of 10 A
- procedure in case of non-payment of bills
- application of social tariffs
- grant of free kWh electricity

Non-regulated activities

District heating networks

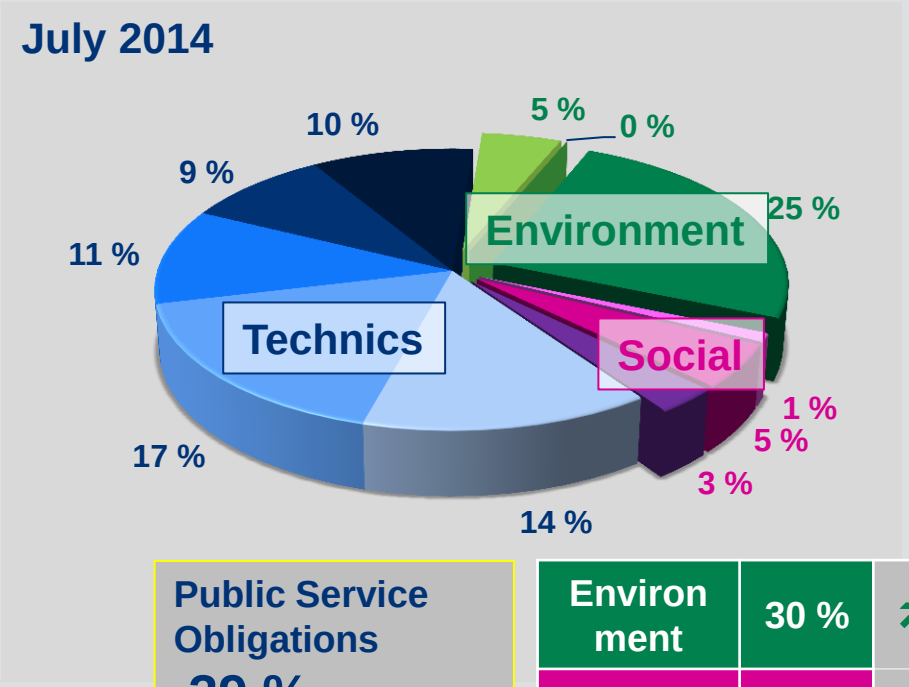


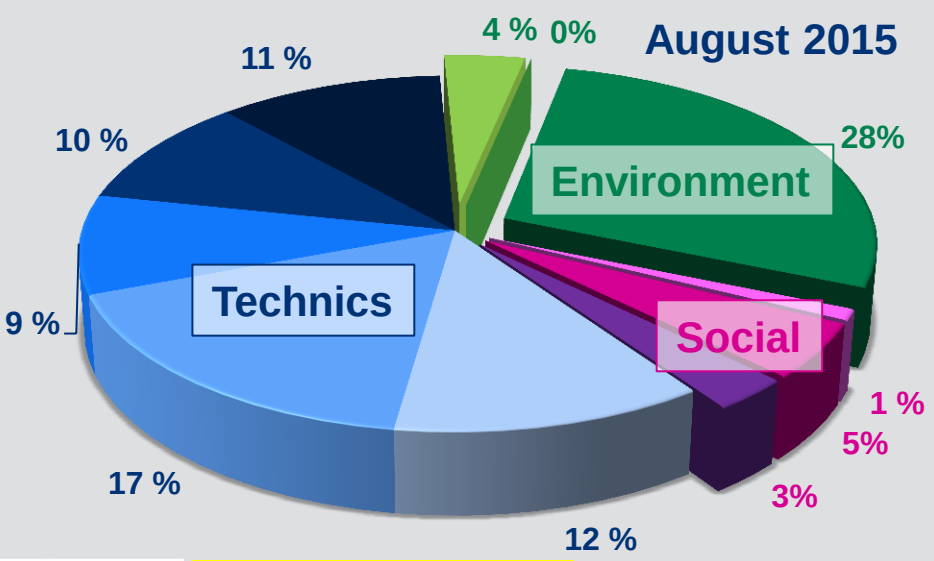
Energy Services for Local Authorities

Revenues: regulated in grid tariff

- **VREG approved tariffs E & G for 2015**
  - **Transitory tariff period of 2 years**
  - **4-year tariff periods to start in 2017-2020**
- **Basic tarification principles**
  - **Regulated revenue from 'cost+' to 'revenue cap'**
  - **RAB x WACC for 2015**
    - **Cost of equity at 5,7 %**
      ($R_f = yield\ Belgian\ government + \beta \cdot R_p$)
    - **Cost of debt at 4,1 %**
    - **RAB-based WACC at 4,8 %**
  - **Recovery of regulatory balances 2008-2009 over 2015-2016**

Components Electricity grid tariff - type: 3 500 kWh





Public Service Obligations
39 %

Environment	30 %	↗	32 %
Social	9 %	=	9 %
Technics	61 %	↘	59 %

Public Service Obligations
41 % = + 2 %

- Rational use of energy
- CHP
- Greenpower certificates

- Streetlights
- 100 kWh free
- Social customers

- Operations
- Depreciations
- Fair renumeration
- Embedded costs
- Other (network losses …)

Electricity Distribution System Operators

- Current organisation of the electricity market
- Changing environment – 3 step evolution
- Future role(s) of the DSO

Changing environment – 3 step evolution?

Passive distribution networks

"Fit-and-Forget"

Reactive DER integration

"Operation only"-approach

Active system management

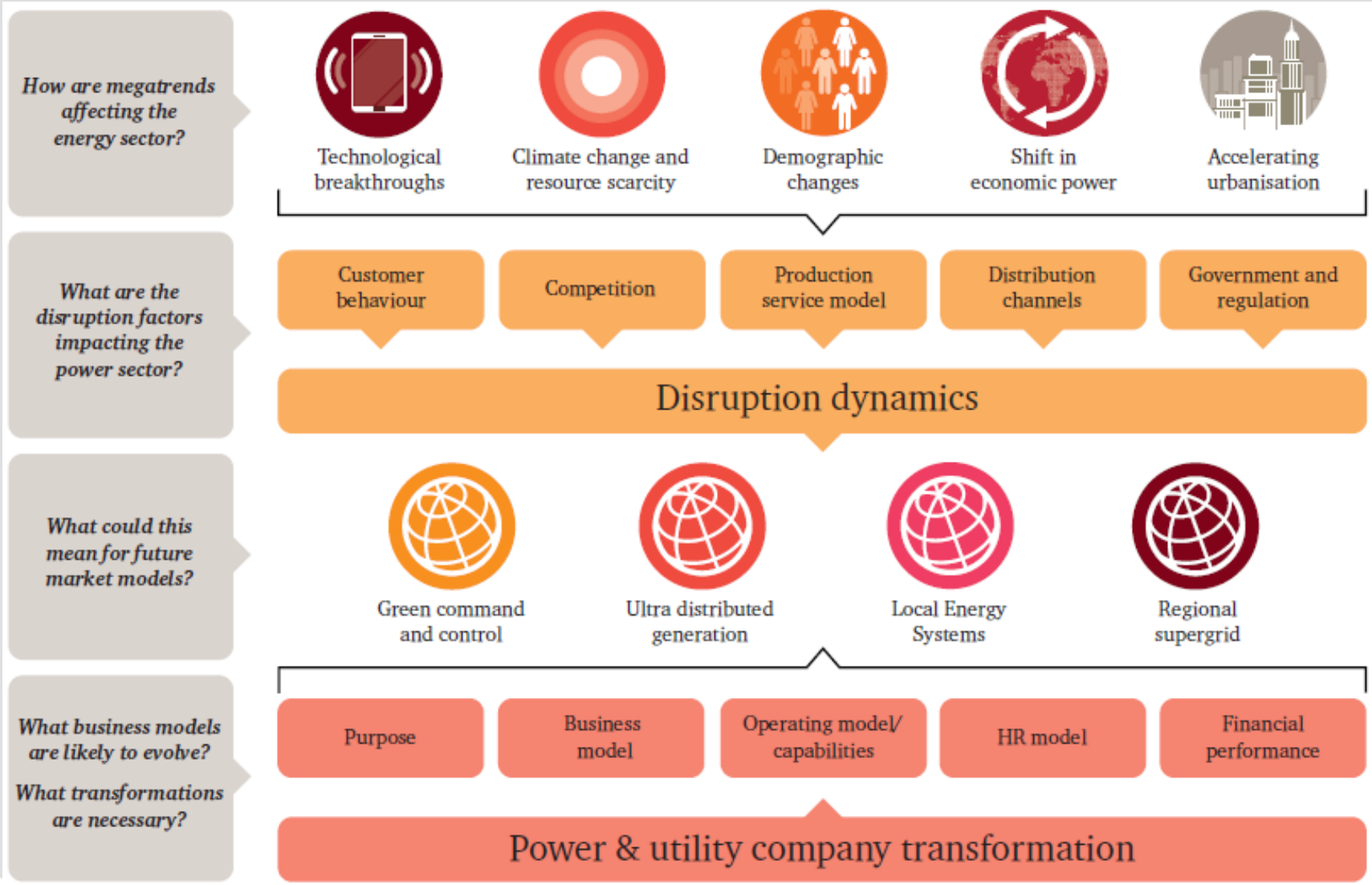
"Real system operator"

Source: Think Topic 12, p. 5

Changing environment – World

- Energy is of major societal and strategic importance
  - USA: large scale shale gas export
  - Rusland: oil and gas as strategic weapon
  - Europe:
    - How to defend common interest at an international level?
    - Focus on renewable energy
- Sharp decline of oil price on international markets
- Unsure future of nuclear after Fukushima
- Energiewende in Germany

Five global megatrends



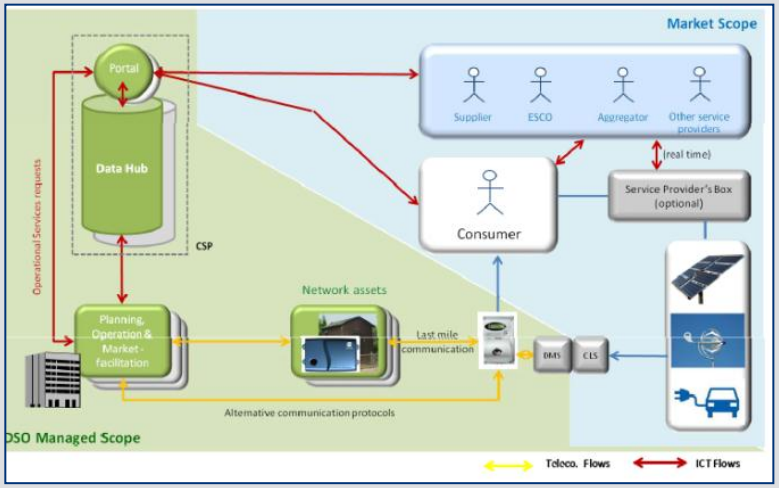
Source: The road ahead: Gaining momentum from energy transformation

Future market designs

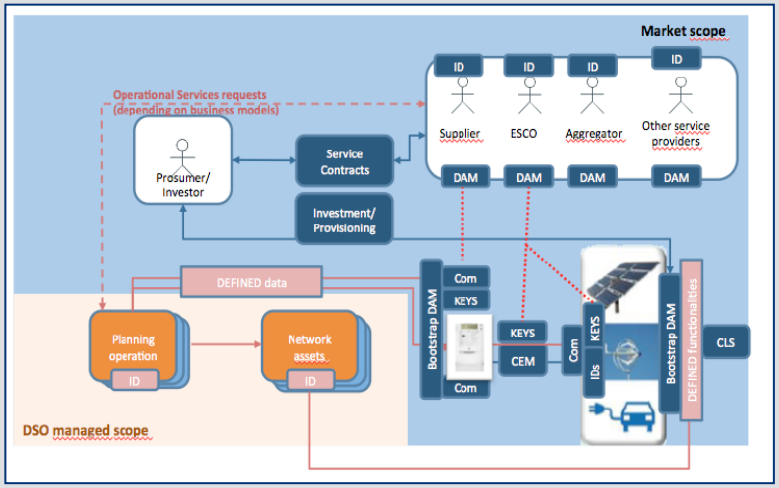
Source: The road ahead: Gaining momentum from energy transformation

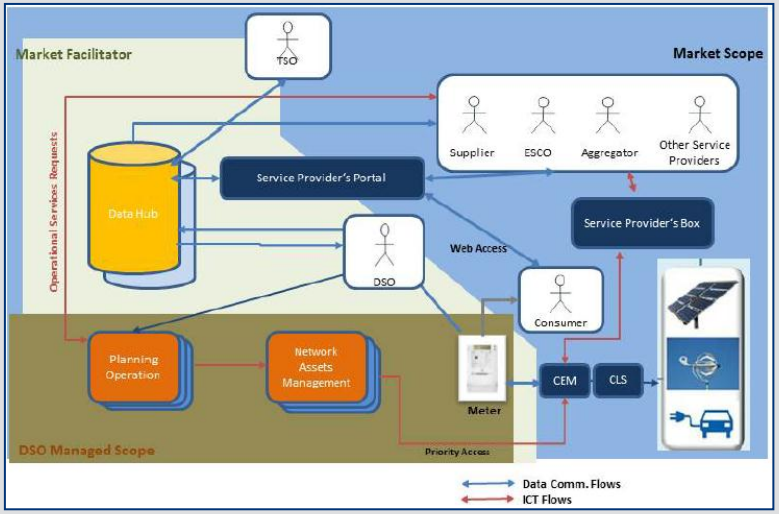
Future market models for data

DSO AS MARKET FACILITATOR



DATA ACCESS-POINT MANAGER





Source: EG3 report – january 2013

INDEPENDENT CENTRAL DATA HUB

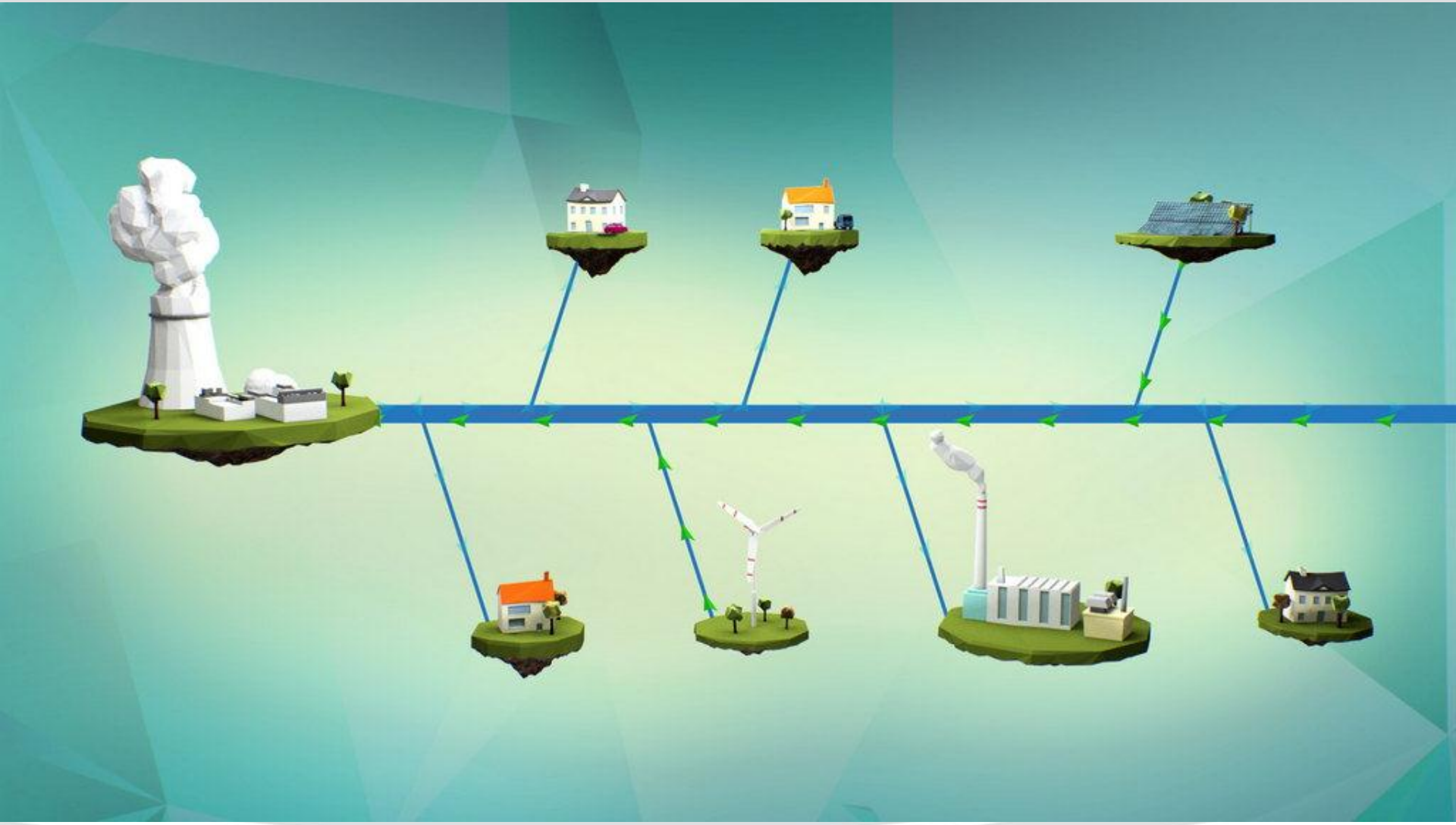
Changing environment – Europe

- Towards a European Energy Union with integrated infrastructure
- 20-20-20 becomes 40-27-27-10
- Objective: sustainable, safe and affordable energy for all EU citizens
- Key terms: energy diplomacy, energy efficiency, reduced carbon emission

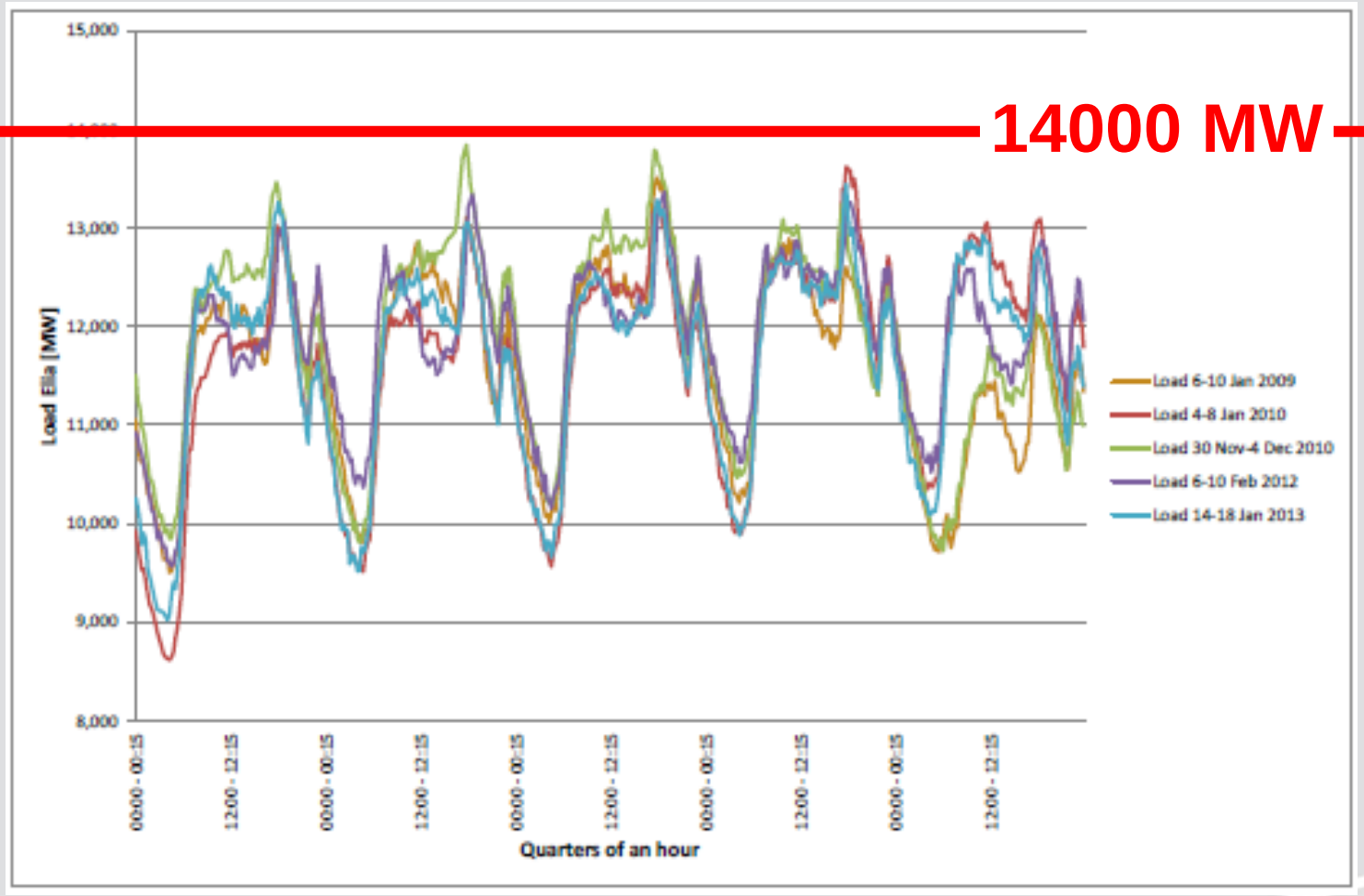
Changing environment – Belgium

- Risk of electricity shortage and disconnection plan
- Investment in additional transmission capacity (towards UK and Germany)
- Production
  - Closure of unprofitable (gas) plants
  - Continued growth of Distributed Energy Resources
  - Increased offshore capacity
- Net-electricity import in Belgium increases
- Changes in energy subsidy policy?

Living Tomorrow – Balancing supply and demand

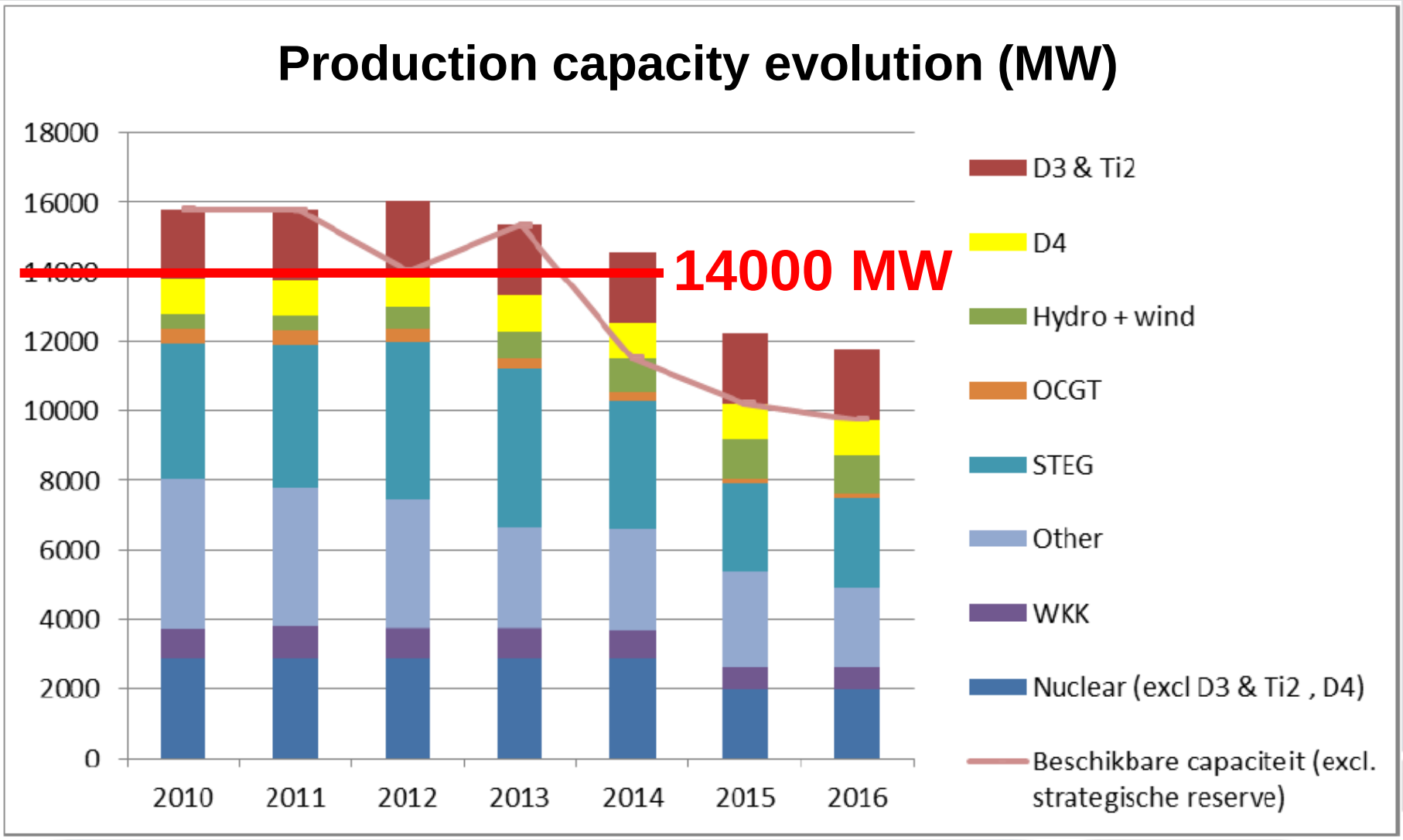


Peak demand – Belgium



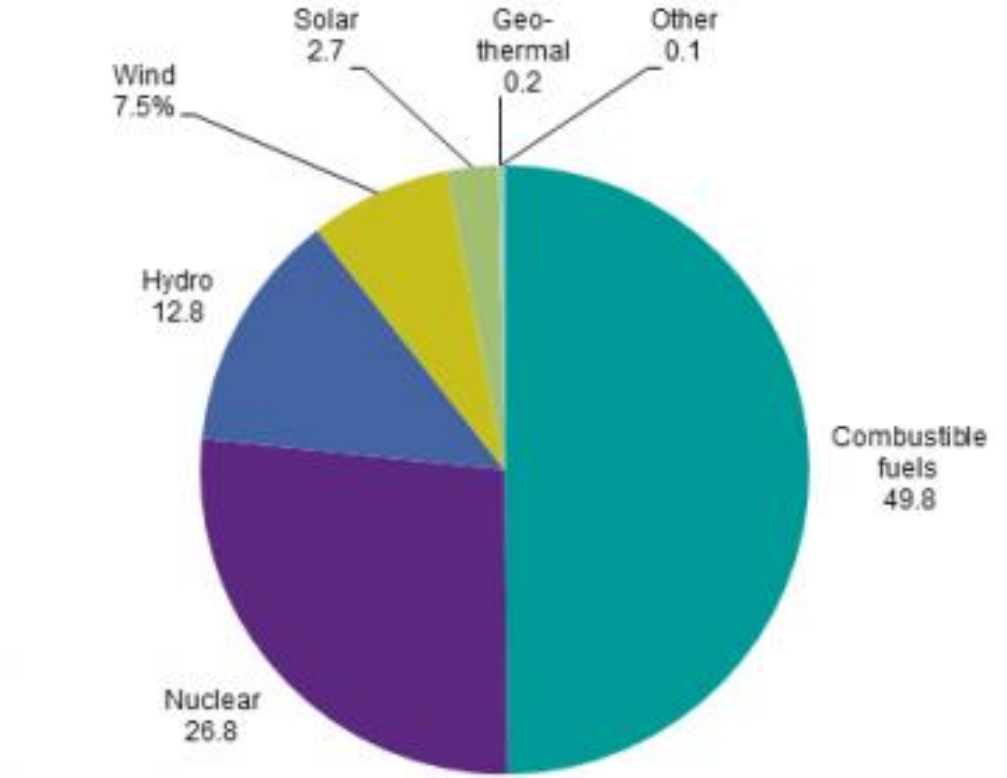
Source: “De Belgische groothandelsmarkt bij stroomschaarste en stroomtekort” (CREG, 140908-CDC-1352)

Installed production capacity – Belgium



Source: "De Belgische groothandelsmarkt bij stroomschaarste en stroomtekort" (CREG, 140908-CDC-1352)

Installed production capacity – Europe

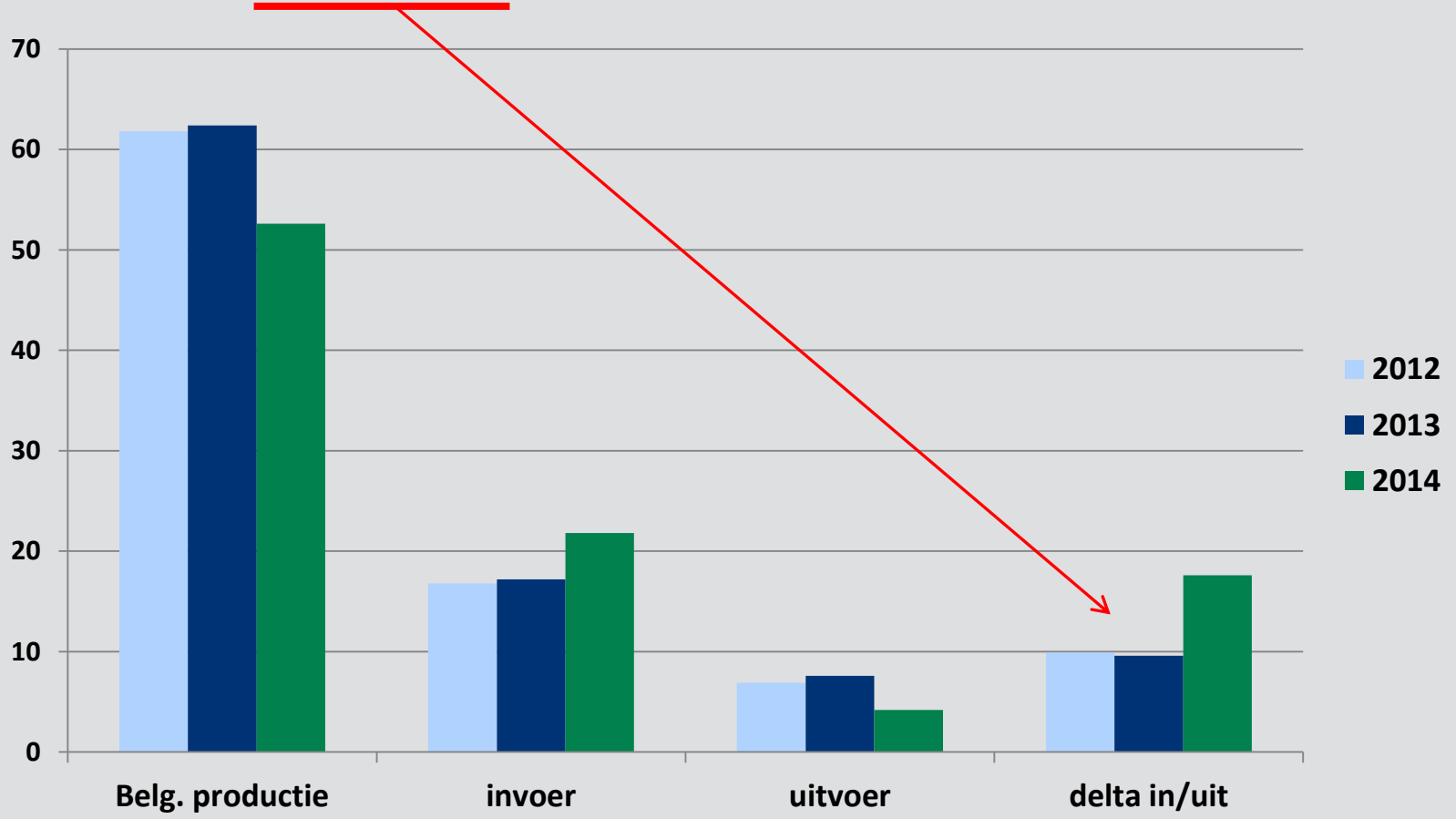


(1) Figures do not sum to 100 % due to rounding.
Source: Eurostat (online data code: nrg_105a)

Source: Eurostat - Net electricity generation, EU-28, 2013

Net electricity import increases (2012-2014)

2014: increased import (+ 27 %) vs decreased export (- 45 %) w.r.t. 2013

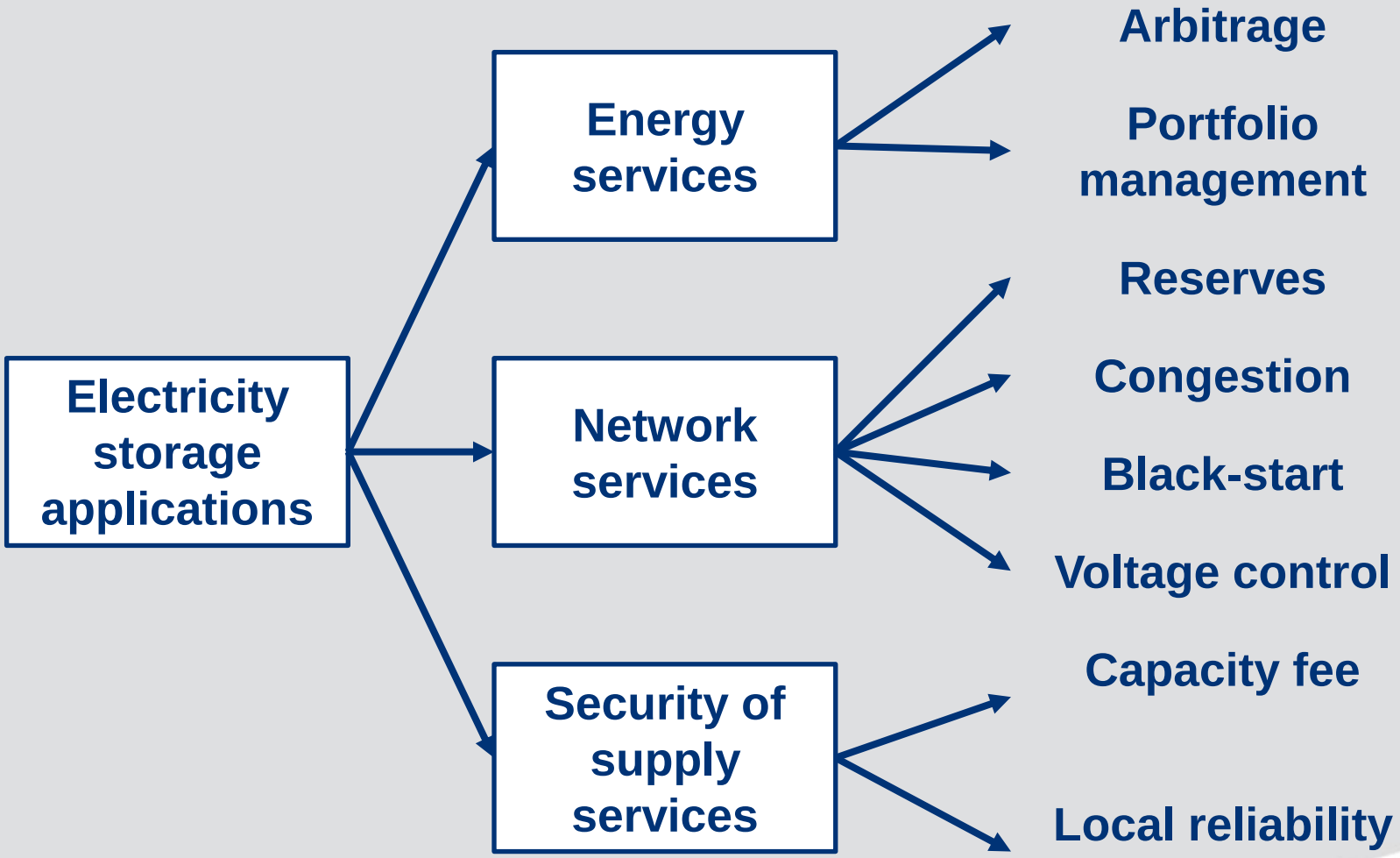


source: Synergrid – all amounts in TWh – Production in Belgium directly connected to the Elia-network

Technological changes

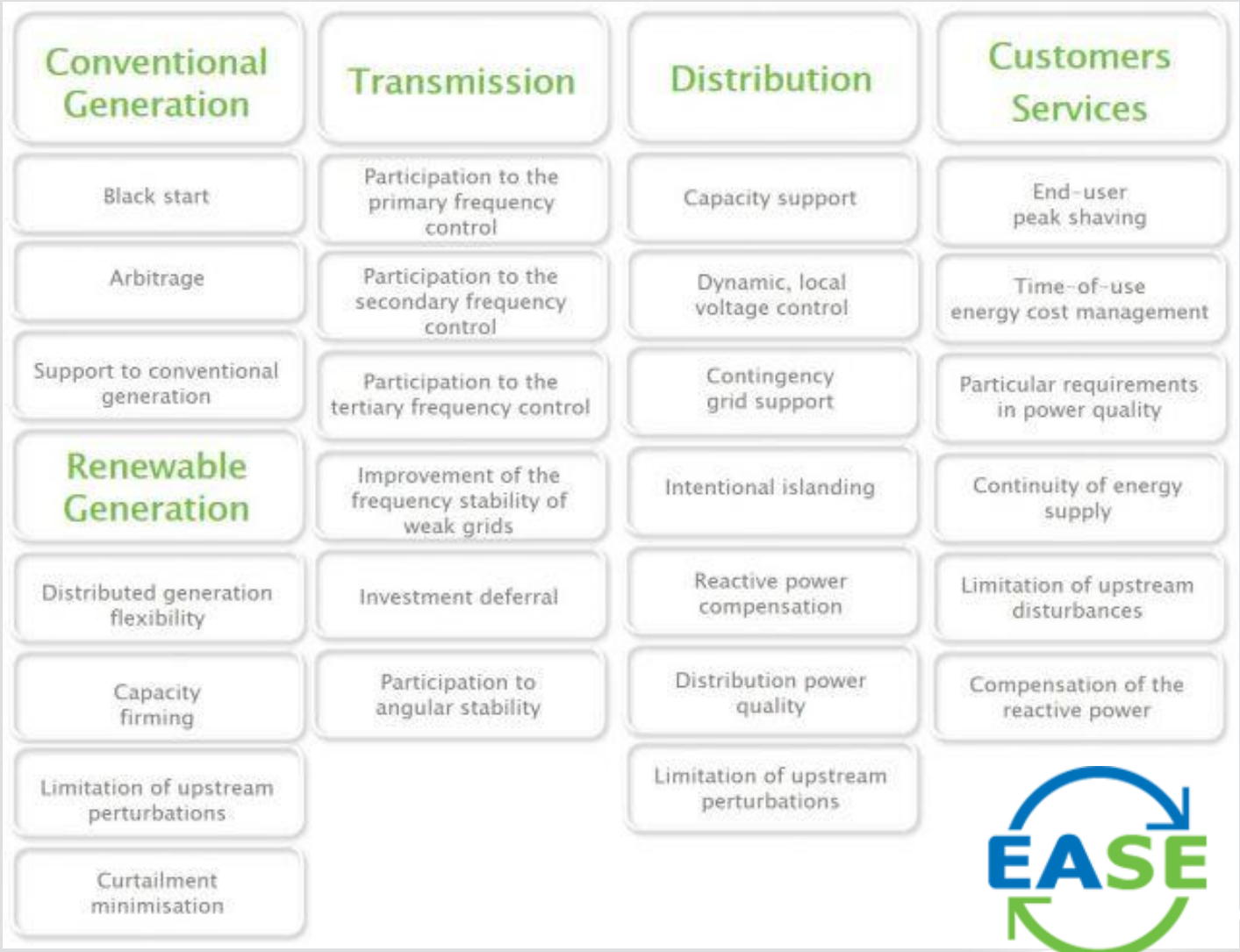
- Distributed Energy Resources (DER)
  - Electric Vehicles
  - Demand Response
  - Local storage
- Smart Metering
- Smart Grids
- Storage
- (Big) data

Storage applications



Translated from “Studie inzake de mogelijkheden tot opslag van elektriciteit”

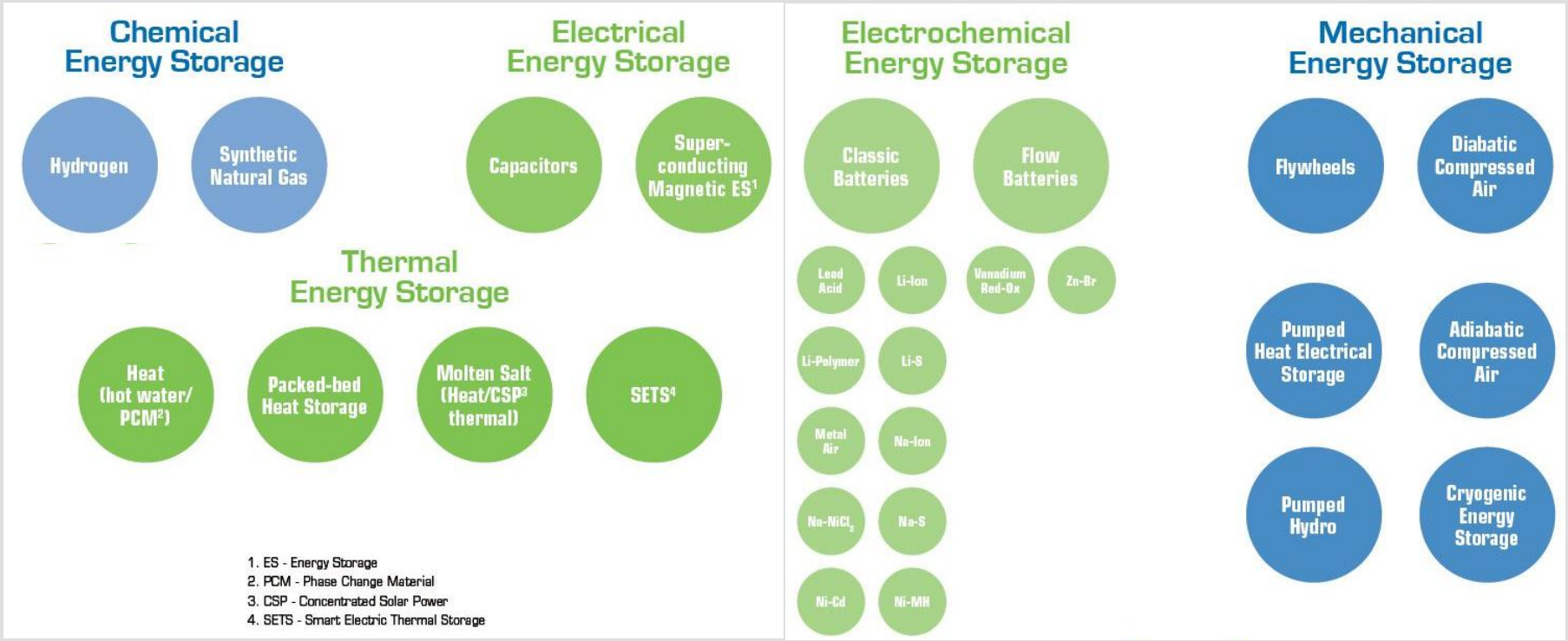
Storage applications (alternatief voor vorige)



EASE
European Association for Storage of Energy

eandis

Storage technologies



EASE
European Association for Storage of Energy

eandis

Characteristics of storage technologies

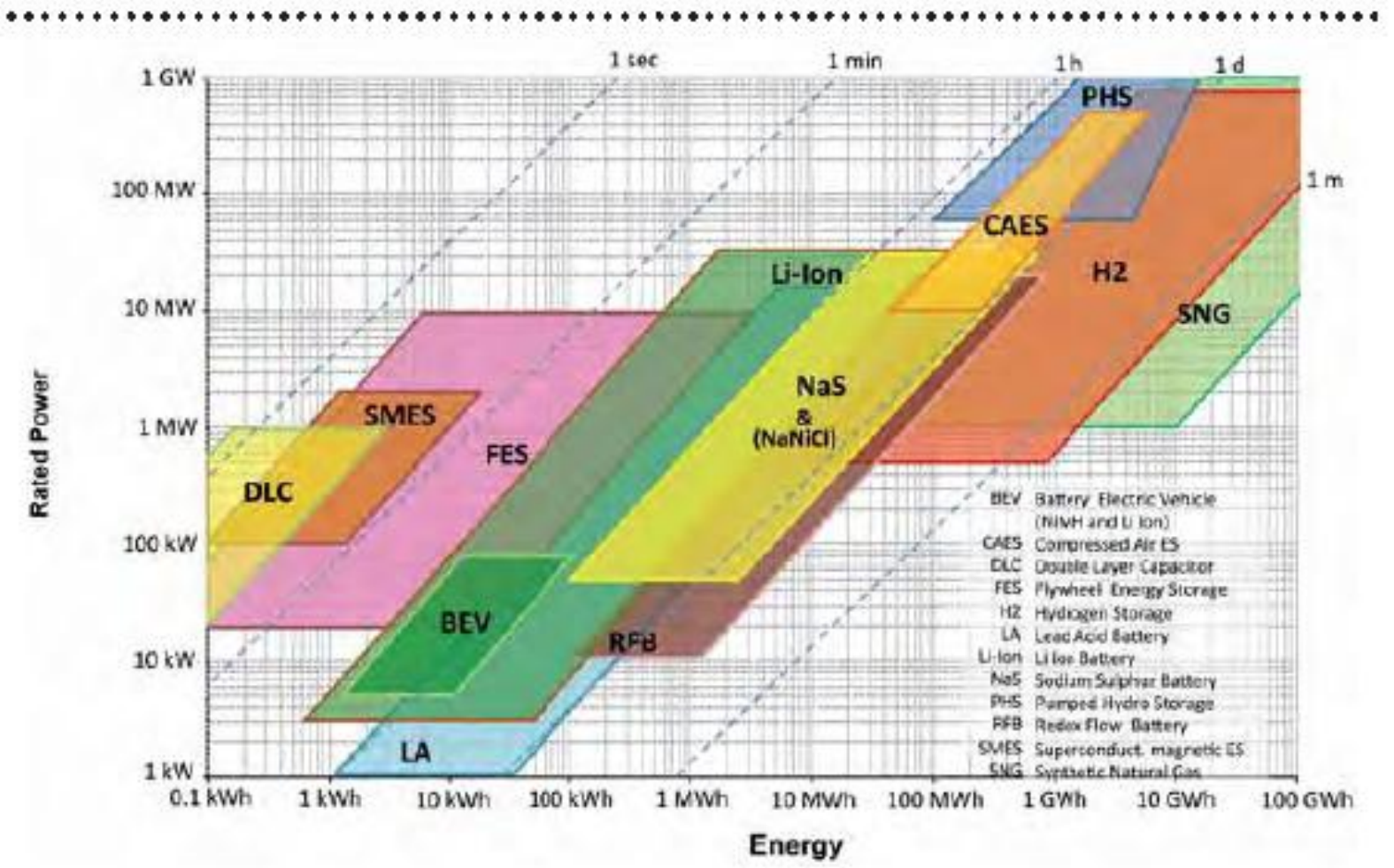
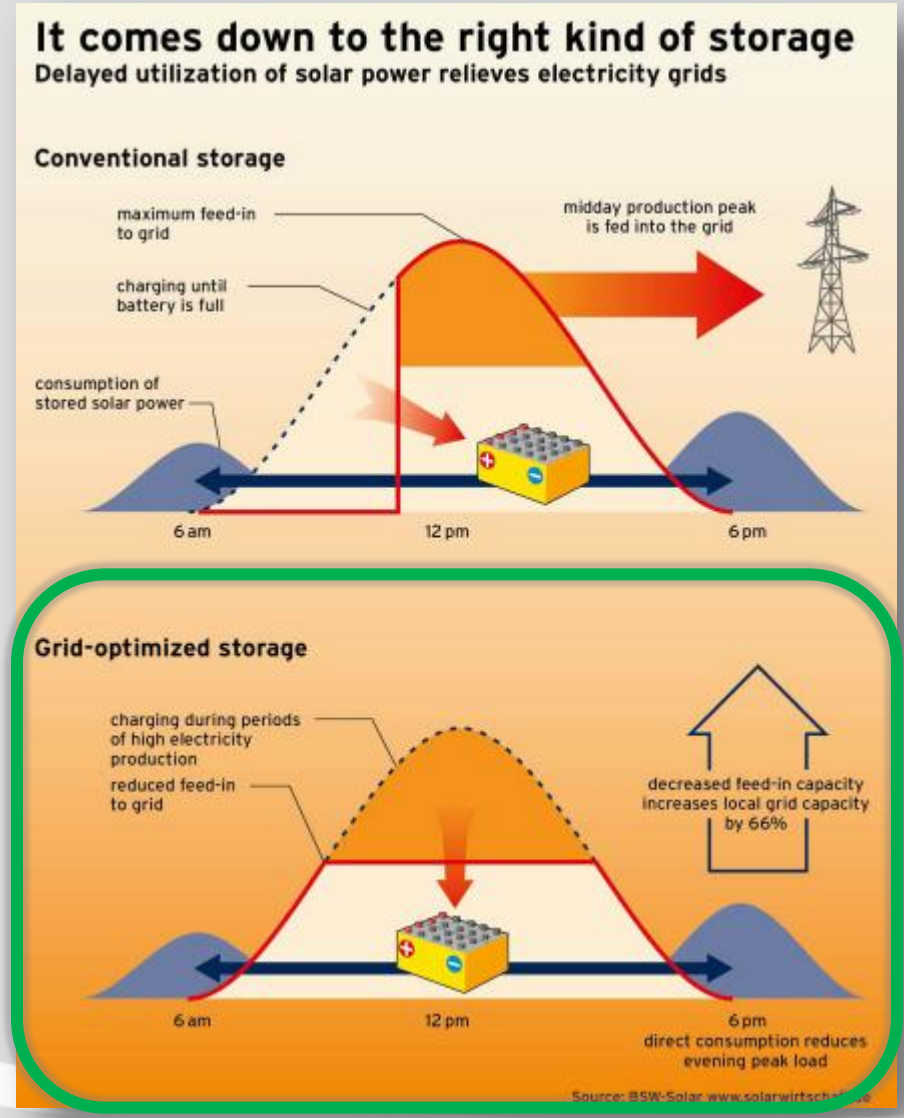


Figure 2-9 | Comparison of rated power, energy content and discharge time of different EES technologies *(Fraunhofer ISE)*

Grid-optimized storage – German example



Policy: Extra subsidy

⇩

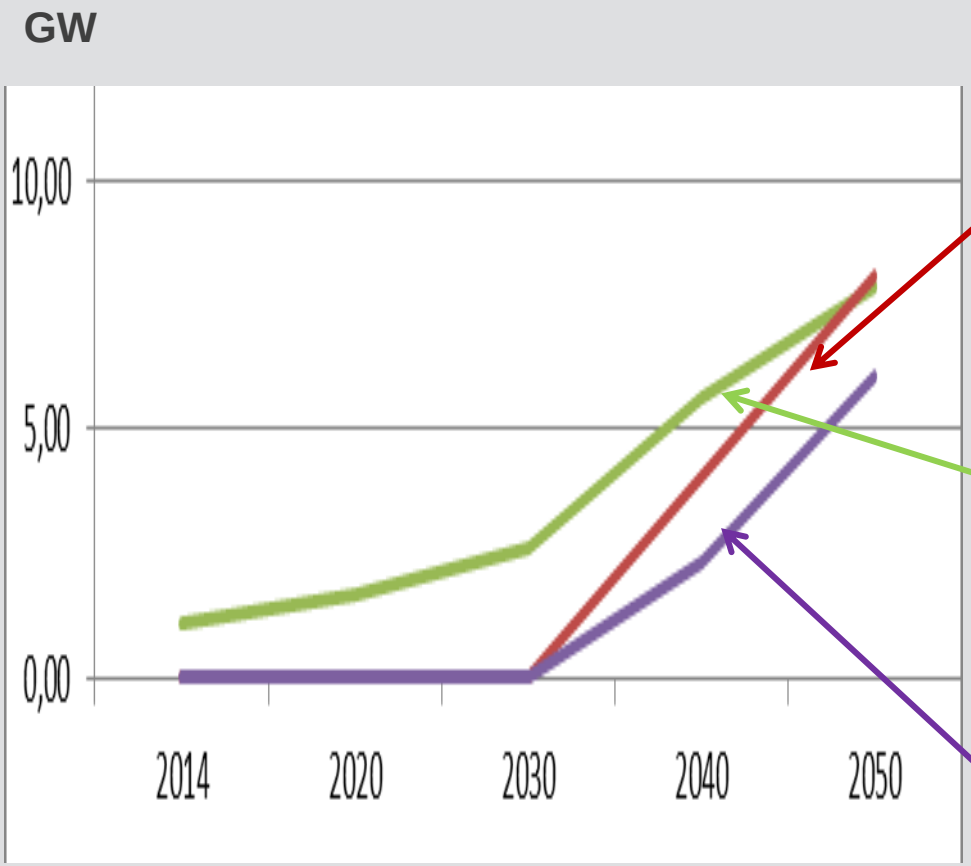
Promote intelligent Building Management System

Practice: Subsidy too low

⇩

Installation of basic Building Management System

Storage capacity forecast Eandis



Estimate based on individual balancing assumption

Estimate based on installed distributed production capacity[1]

Estimate based on installed distributed production capacity[2]

[1]with algorithm from D³O project

[2]with algorithm from “Sizing and grid integration of residential PV battery systems”

Consequences of changing environment

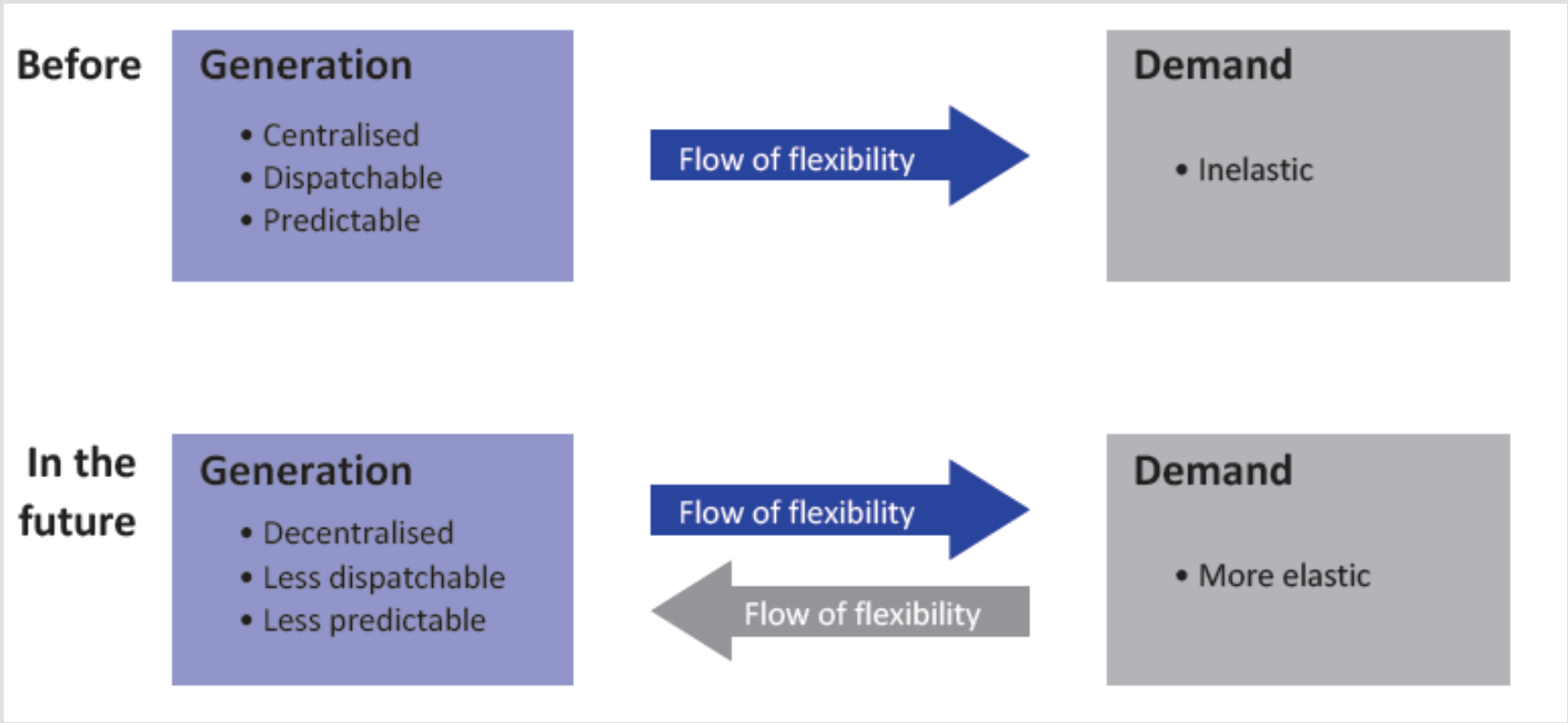
Changing DEMAND

Changing PRODUCTION

Changes in MATCHING

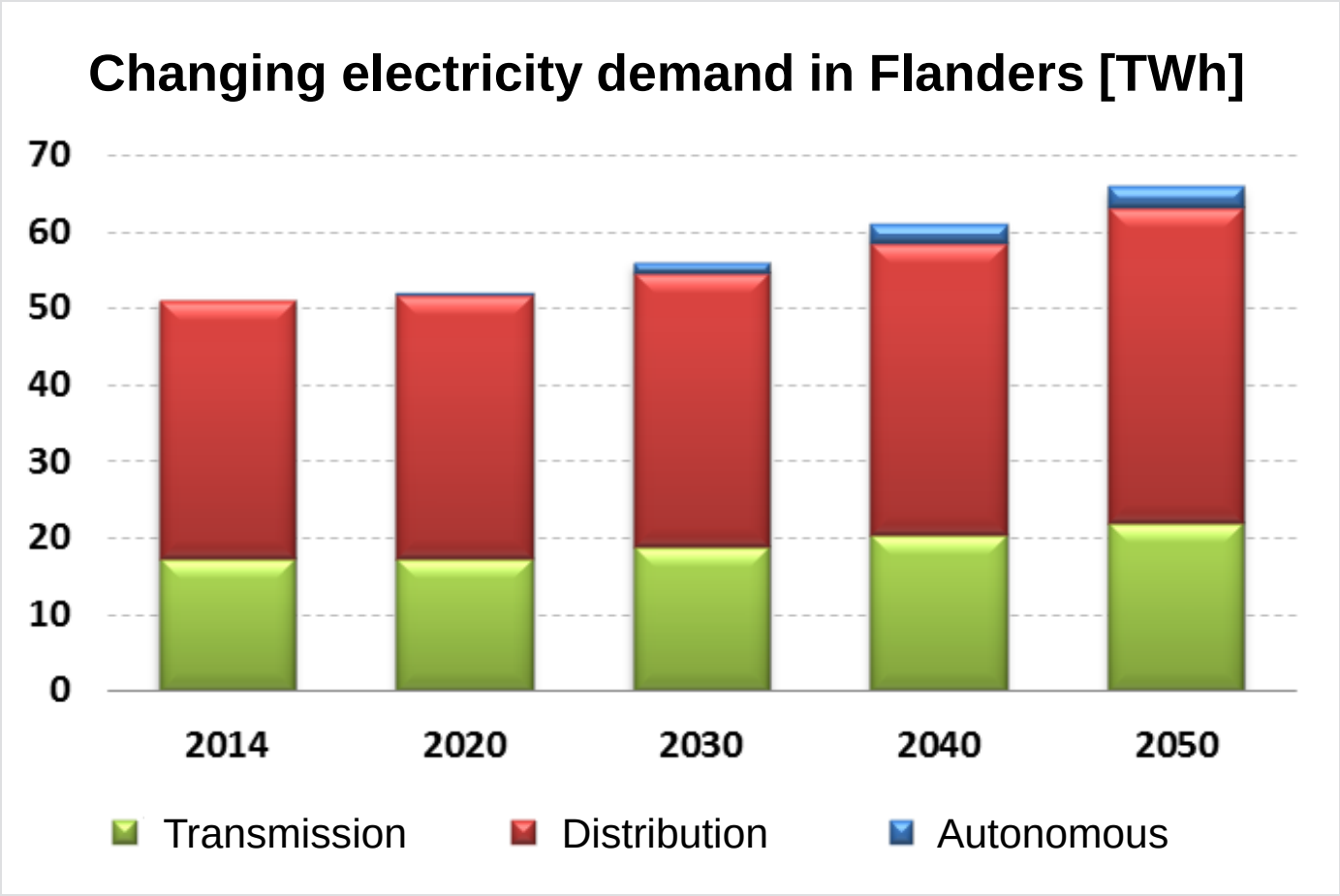
Changing GRID IMPACT

Paradigm shift



Source: Think topic 11

Increased demand, especially at DSO level



Electrification

Electric Vehicles breakthrough after 2020

Peakshaving, storage and home automation

Decreasing gas consumption for heating

Breakthrough electric heat pumps after 2030

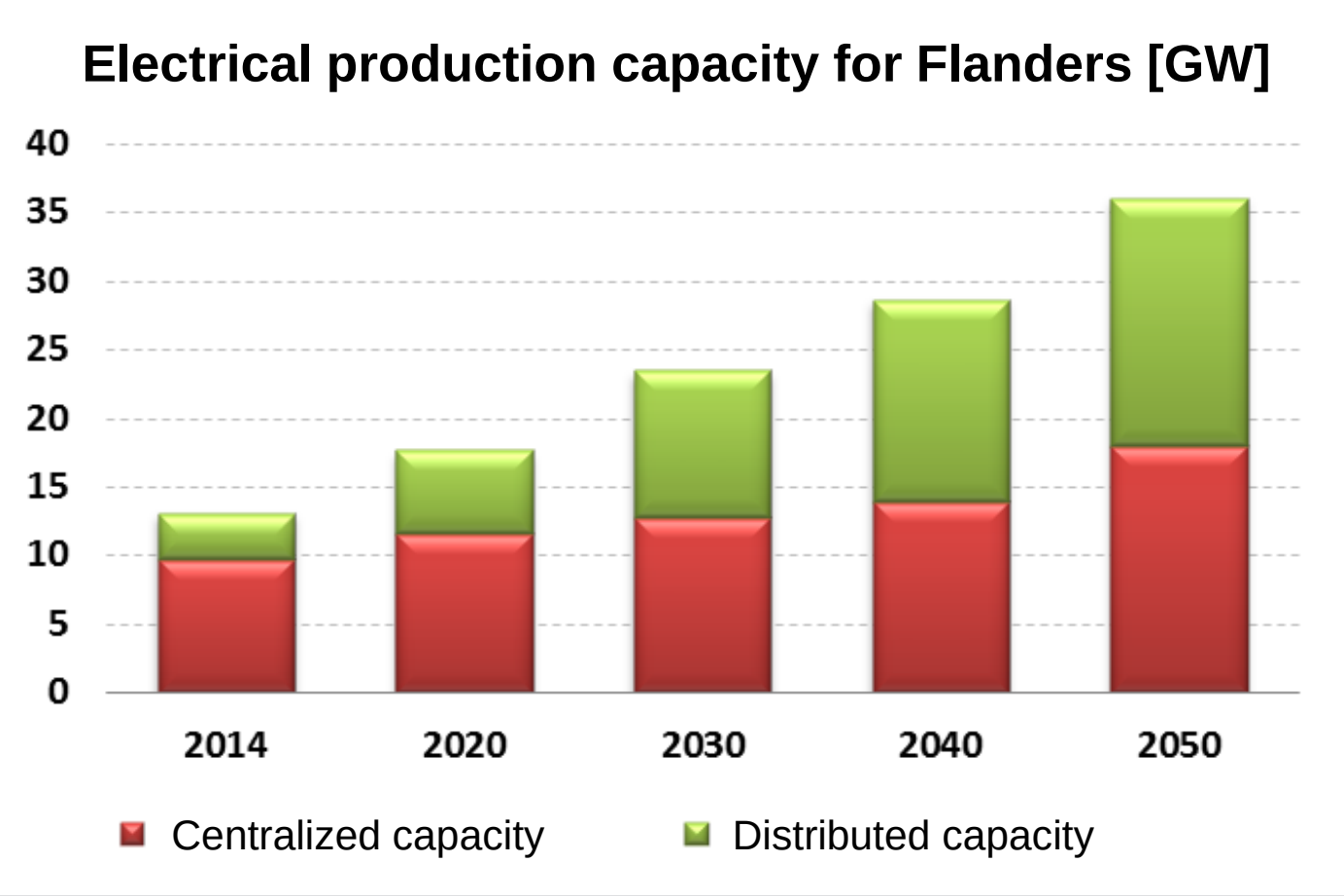
Renovation pact and stricter energy efficiency obligations

Desire for autonomy

Rise of small scale heat distribution projects

Increased number (156) of local energy companies in The Netherlands

Uncontrollable production increases



Distributed, intermittent production

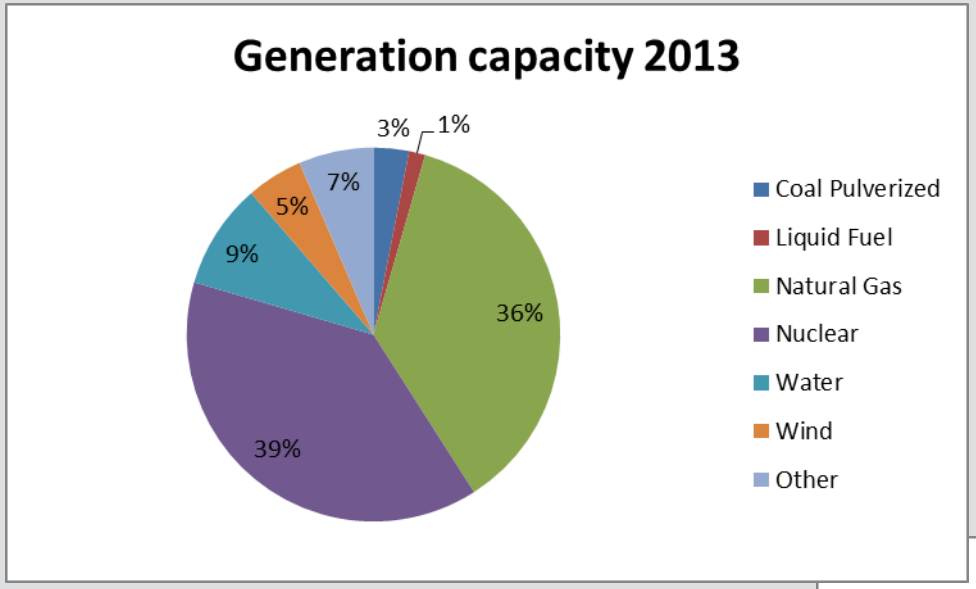
Electricity and Heat

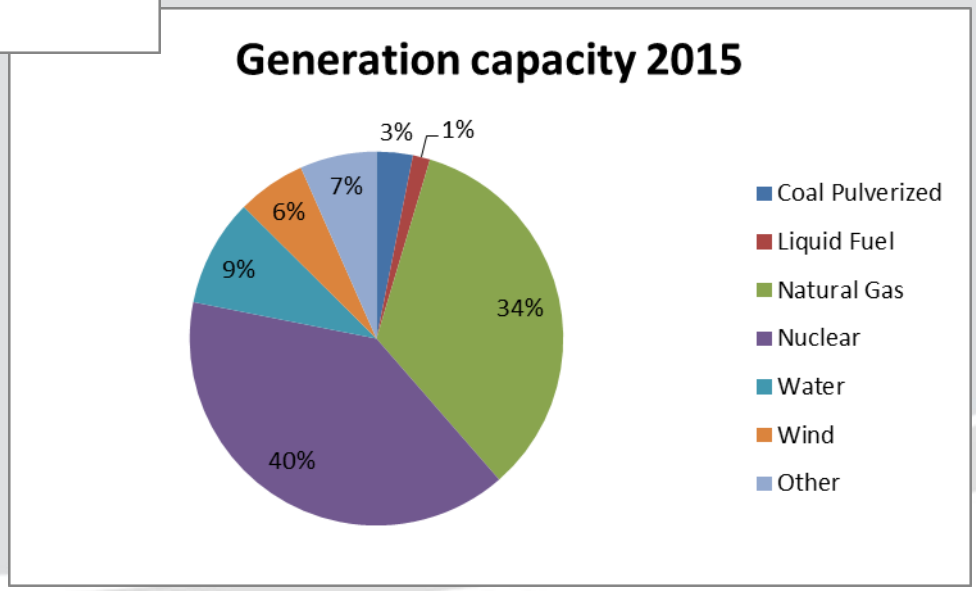
PV stagnates but only temporarily

2014: record year for on-shore wind

More CHP

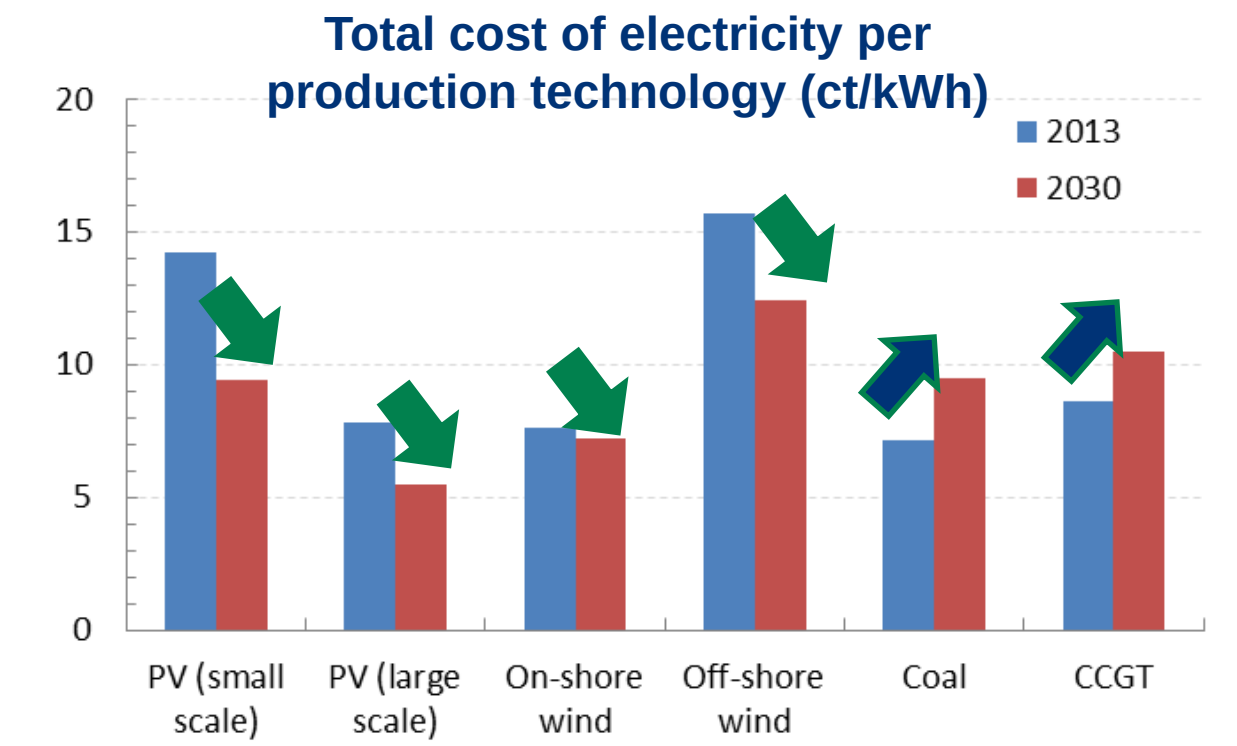
Composition production park





Source: Elia – installed power historical data

Production cost evolution

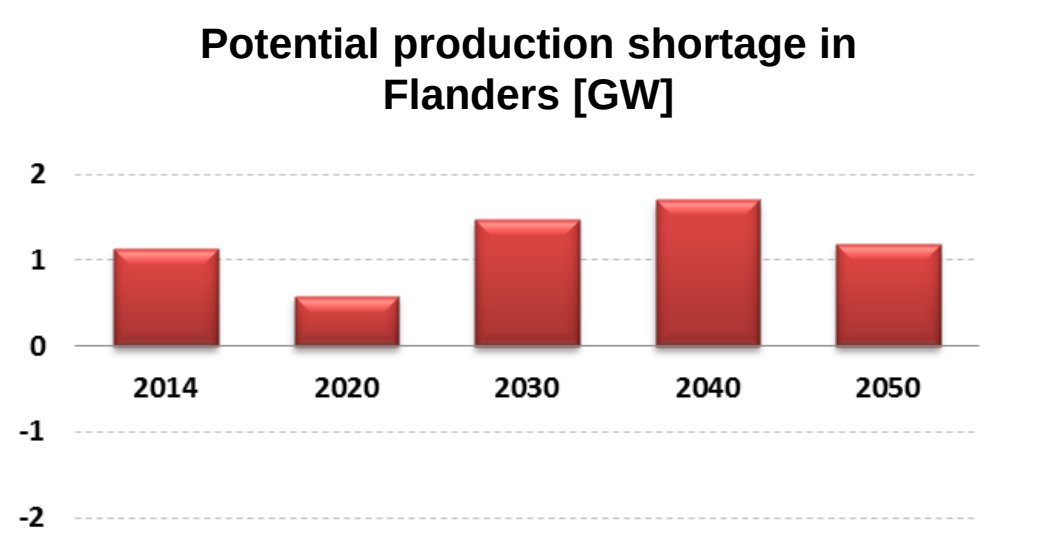


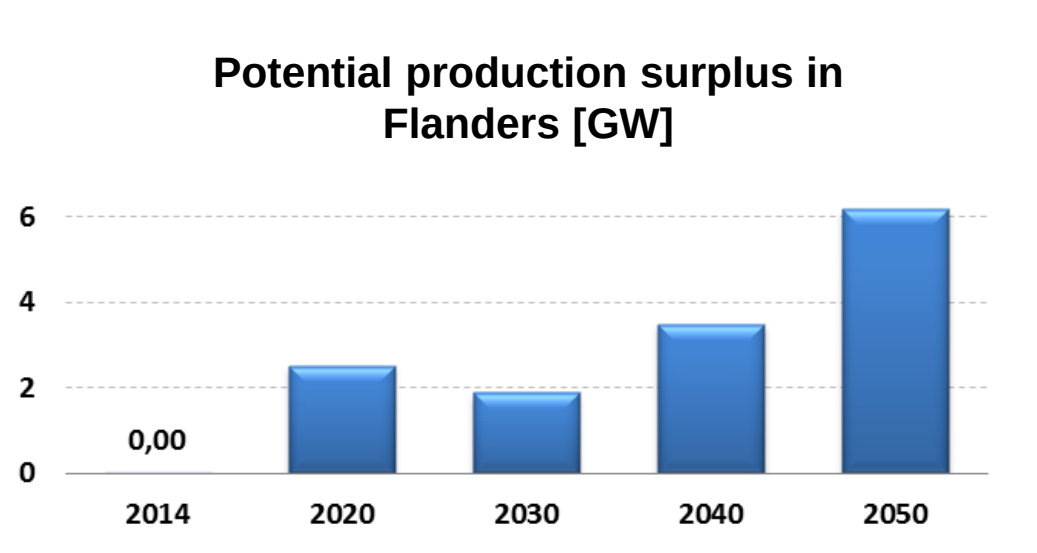
Source: Fraunhofer ISE (Germany, November 2013)

Distributed production gets cheaper

Central production gets more expensive

Potential electricity shortage and surplus

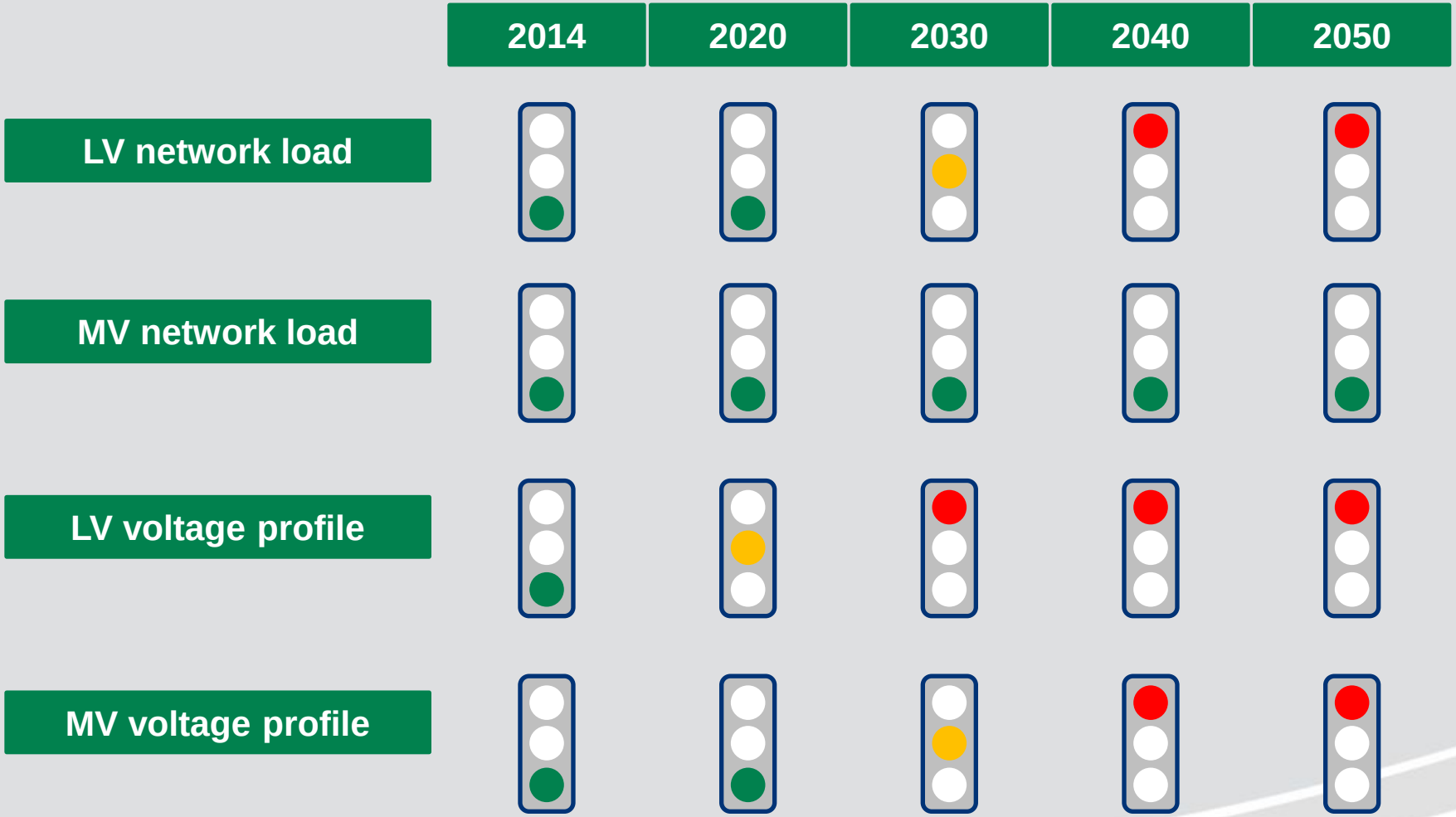




Potential shortage expected to remain fairly stable

Potential surplus is not an issue today but is expected to increase signifcantly

Evolution in grid impact (*)



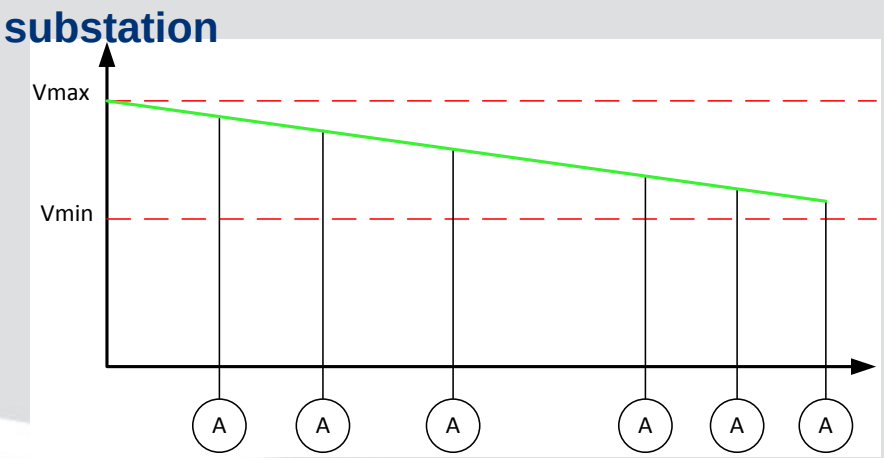
(*) Indicative – evolution in impact in case no action is taken

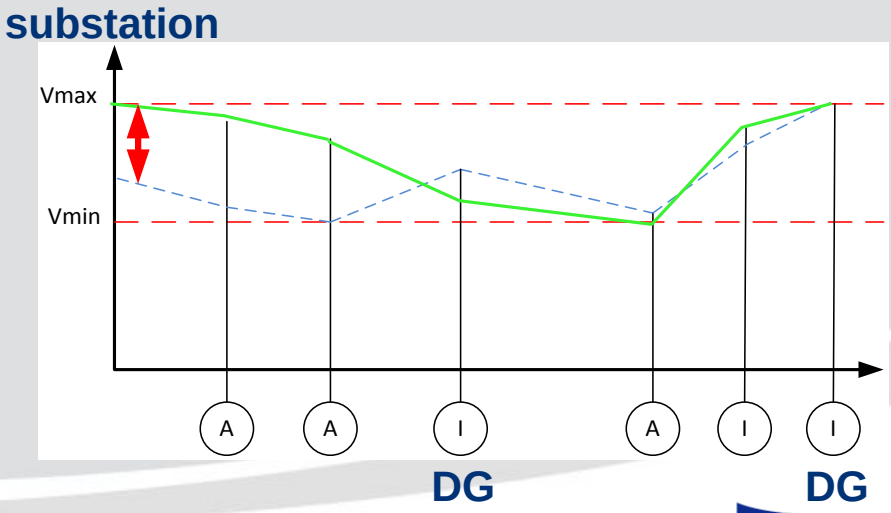
Grid impact

- **Network load: current must not exceed nominal current carrying capacity of grid elements (for long)**
- **Voltage profile: distributed generation can locally push voltage beyond allowed boundaries**

Traditional profile:
- No distributed generation
- Linear voltage drop → maximum voltage in substation

New profile:
- Voltage rise @ distributed generation (DG)
- Voltage drop depends on DG location → how to set voltage in substation?





DSO functions become more similar to TSO

Source: Think Topic 12, table 3

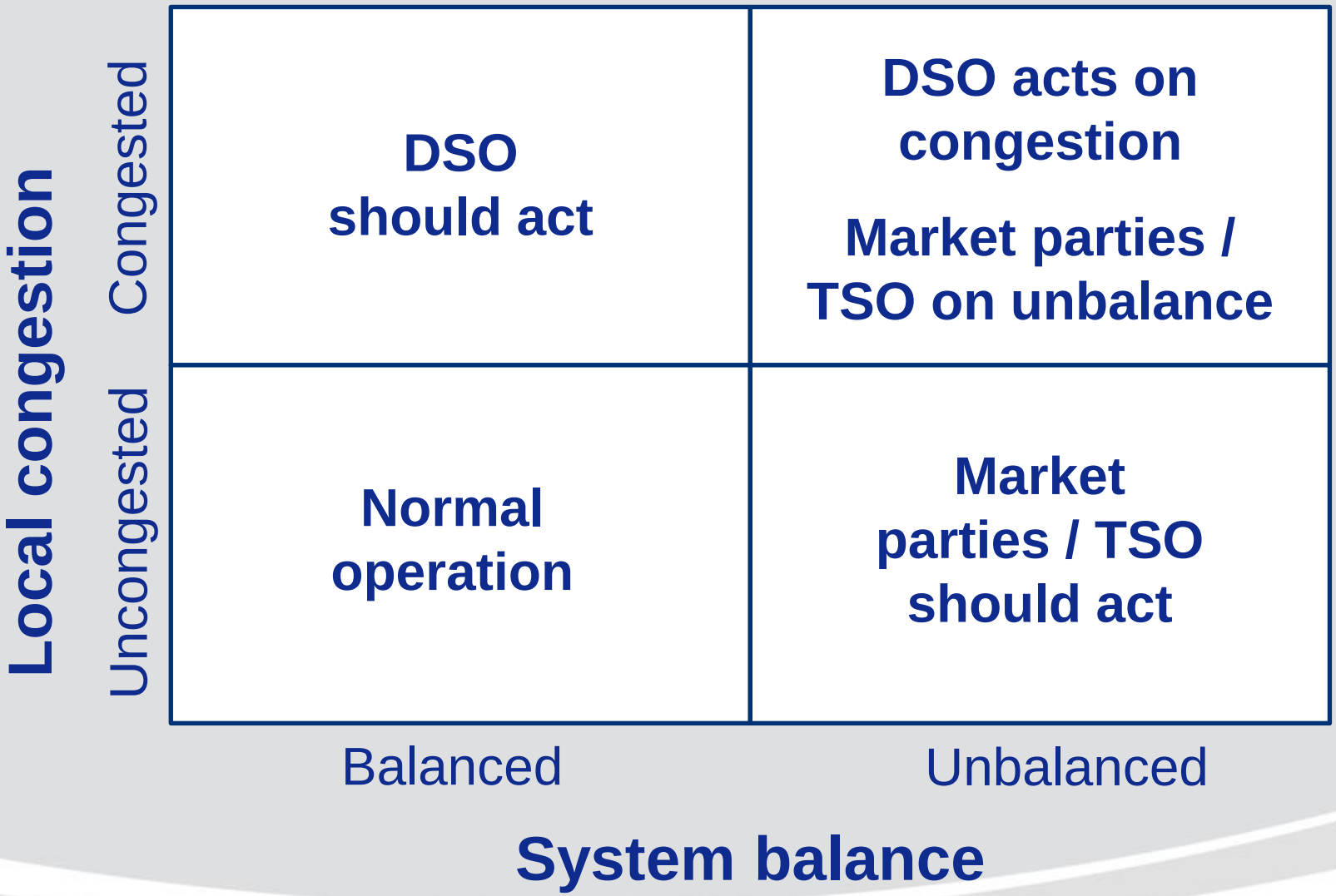
DSO	TSO
Long-term distribution grid planning and grid development (including the connection of load and DG and guaranteeing efficient access and use of the grid)	Long-term transmission grid planning and grid development (including the connection of bulk generation (and load) and guaranteeing efficient access and use of the grid)
Grid operation, in particular: • Voltage control • Load/DG curtailment in case of emergencies	Grid operation, in particular • Frequency containment • Frequency restoration • Replacement of generation

Responsible for local congestion

Responsible for overall system balance

Ancillary services

DSO-TSO activities – 4 cases



Solutions – the Energy Transition

Smart infrastructure

End customer involvement

Flexibility

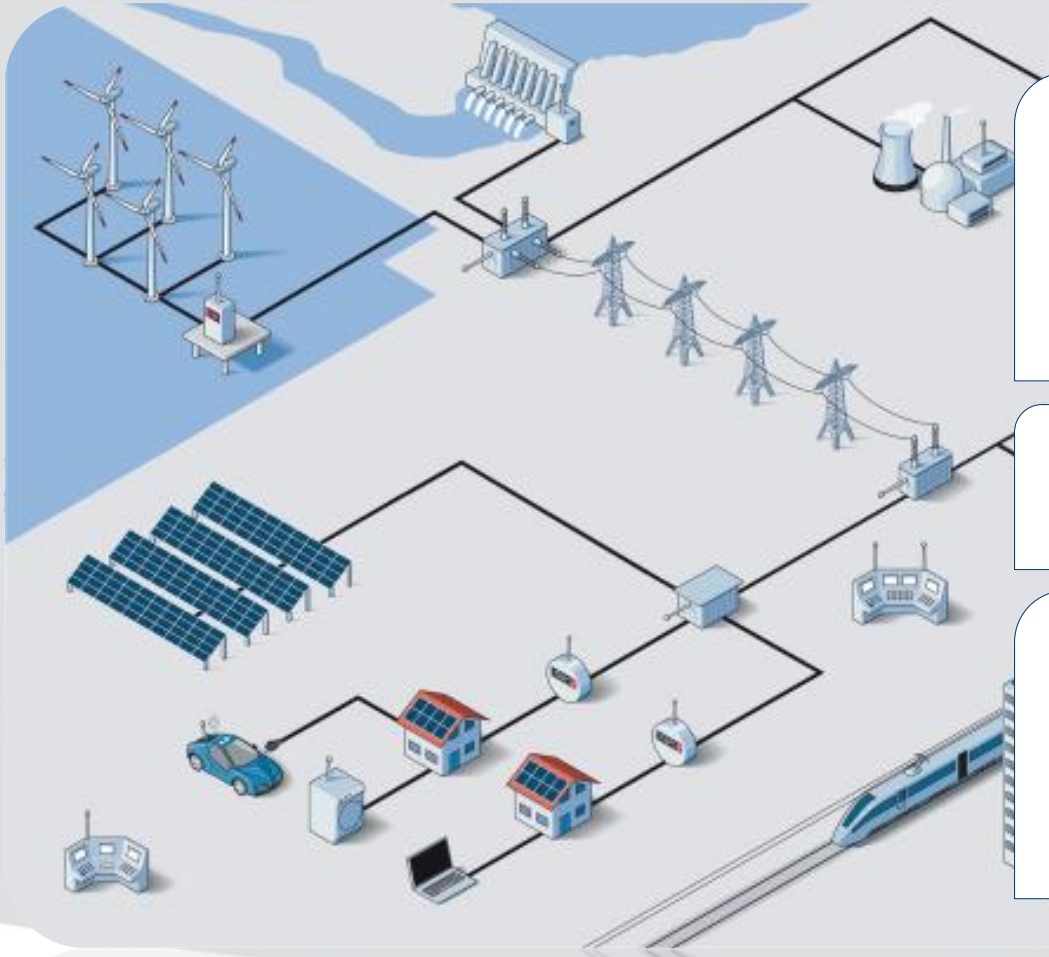
Role of the DSO

European infrastructure integration

Integrated Energy Market and increased interconnection at transmission level

Several interconnection projects in Europe

Public network infrastructure



Smart grids: monitoring and smart control of wind mills (Left bank Antwerp harbour)

Smart cities: complete integration

Smart technology: DC-networks, open access ‘fiber to the home’, ‘near real time data’ …

Challenge for the electricity sector

- **More local production**
  - Local injection creates upstream energy flow
  - Local production is intermittent and inflexible
  - Distribution grid becomes bidirectional
  - Possible injectiion into the transmission grid

- **Shift from fossil fuels to electricity:**
  - Larger share of electrical consumption
    - Electric vehicles
    - Electric heat pumps

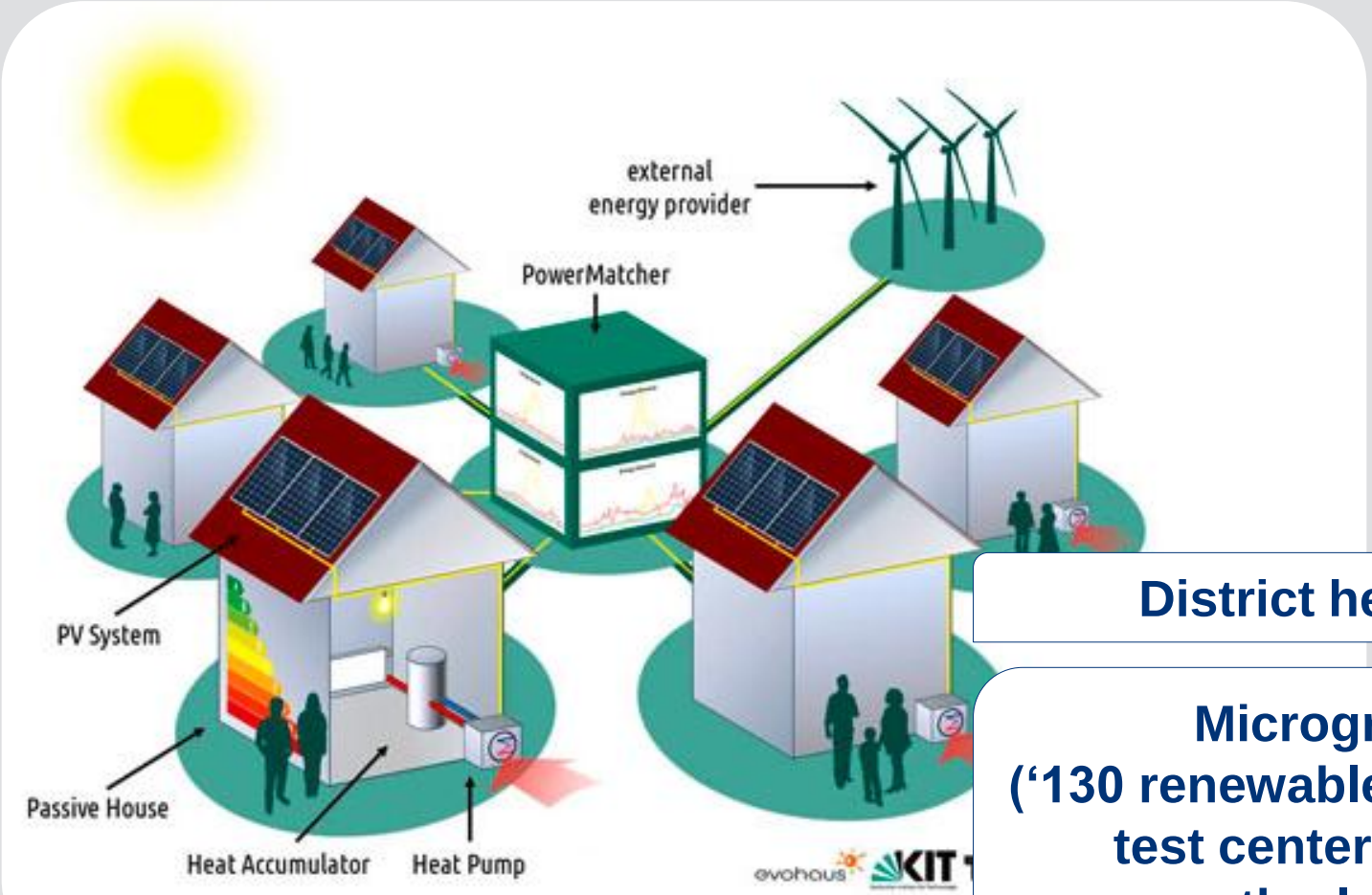
Problem of simultaneity and utilization

Impact on processes

Specific economic models

Tariffs, contracts …

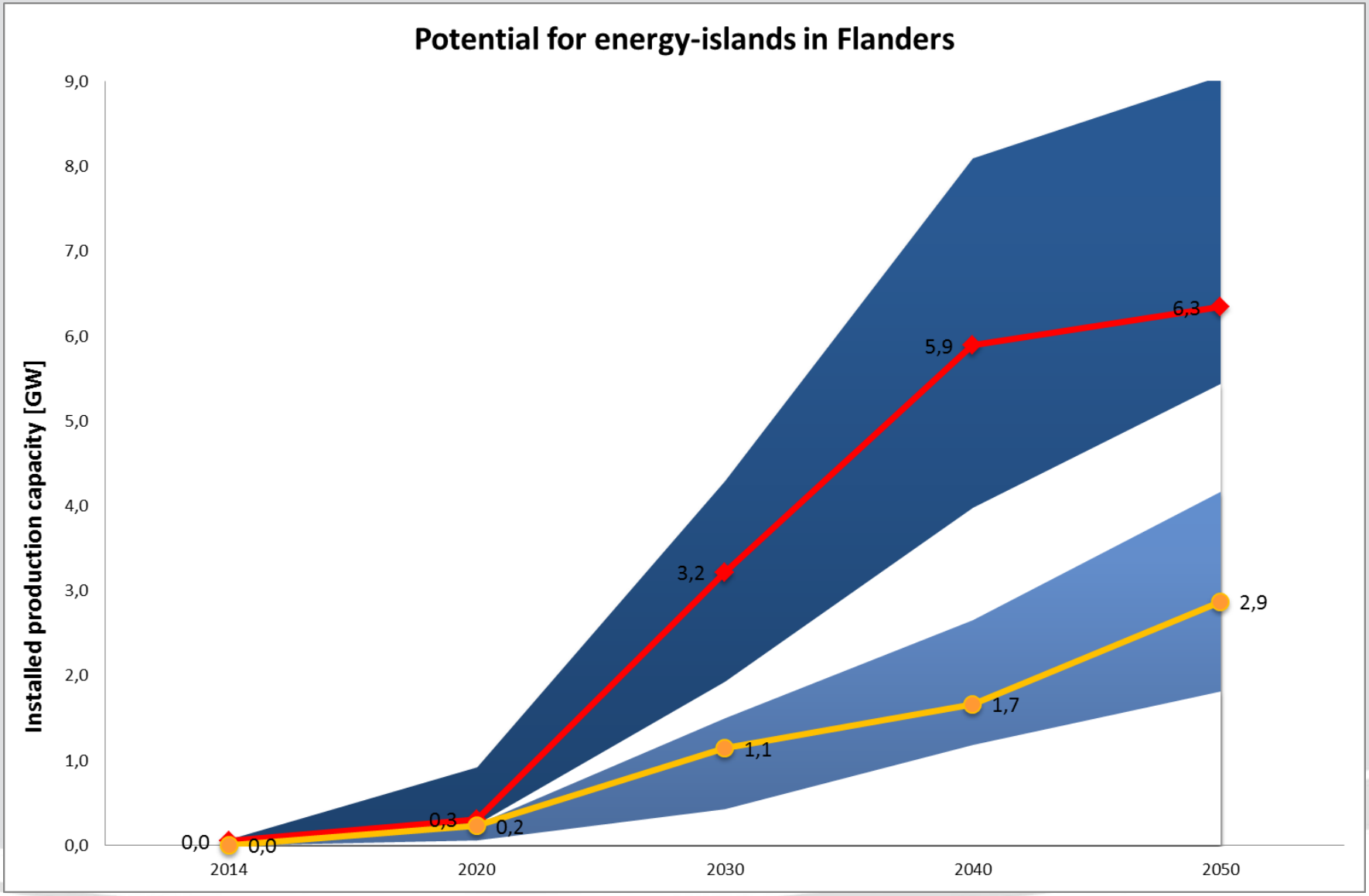
Network infrastructure at district level



District heating

Microgrids ('130 renewables': off-grid test center in The netherlands

Off-grid – potential in Flanders



More systems for local control

Home automation enables ‘soft 6A’ connection (6 amps)

Remotely controllable thermostats

Remotely controllable plugs (Smappee)

Breakthrough of residential battery storage (Tesla, SMA - connected to PV)

End customer as investor

Local cooperations (Wase Wind, Campina Energie, Ecopower …)

Ghent ‘crowdfunding and participation platform’

Solar PV park Breda (7 000 panels) financed by individual net users

End customer as market player

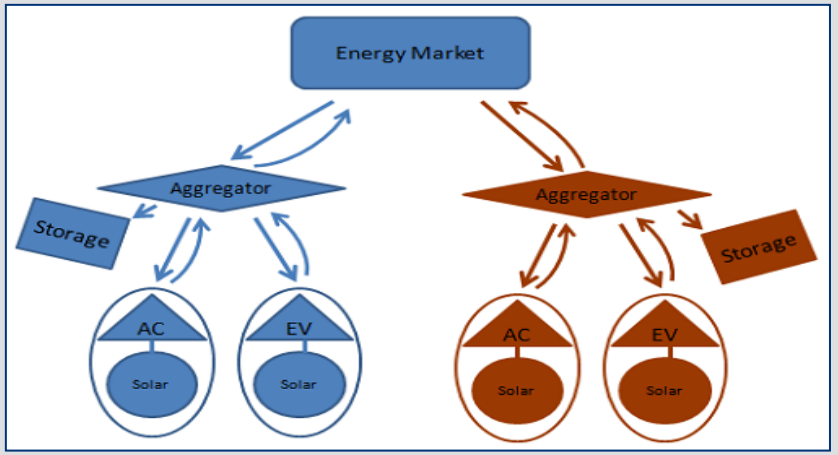
OFF / ON campaign

OFF
& we blijven
ON

Districts with peak-shaving for all-electric operation (Hoog Dalem district)

New market models for flexibility

Market flexibility (USA: Ohmconnect.com)



Aggregators / Storage providers

Universal Smart Energy Framework (USEF)

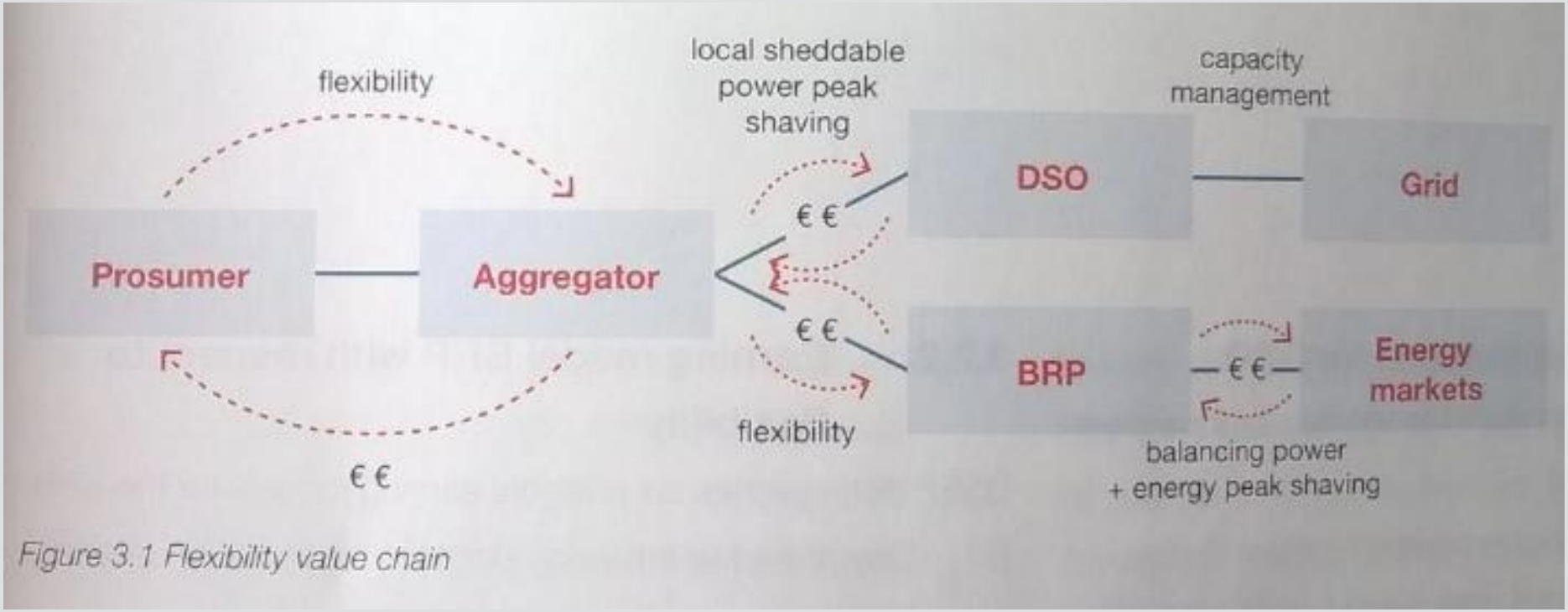


Figure 3.1 Flexibility value chain

Source: USEF review session (April 2015)

USEF operations scheme

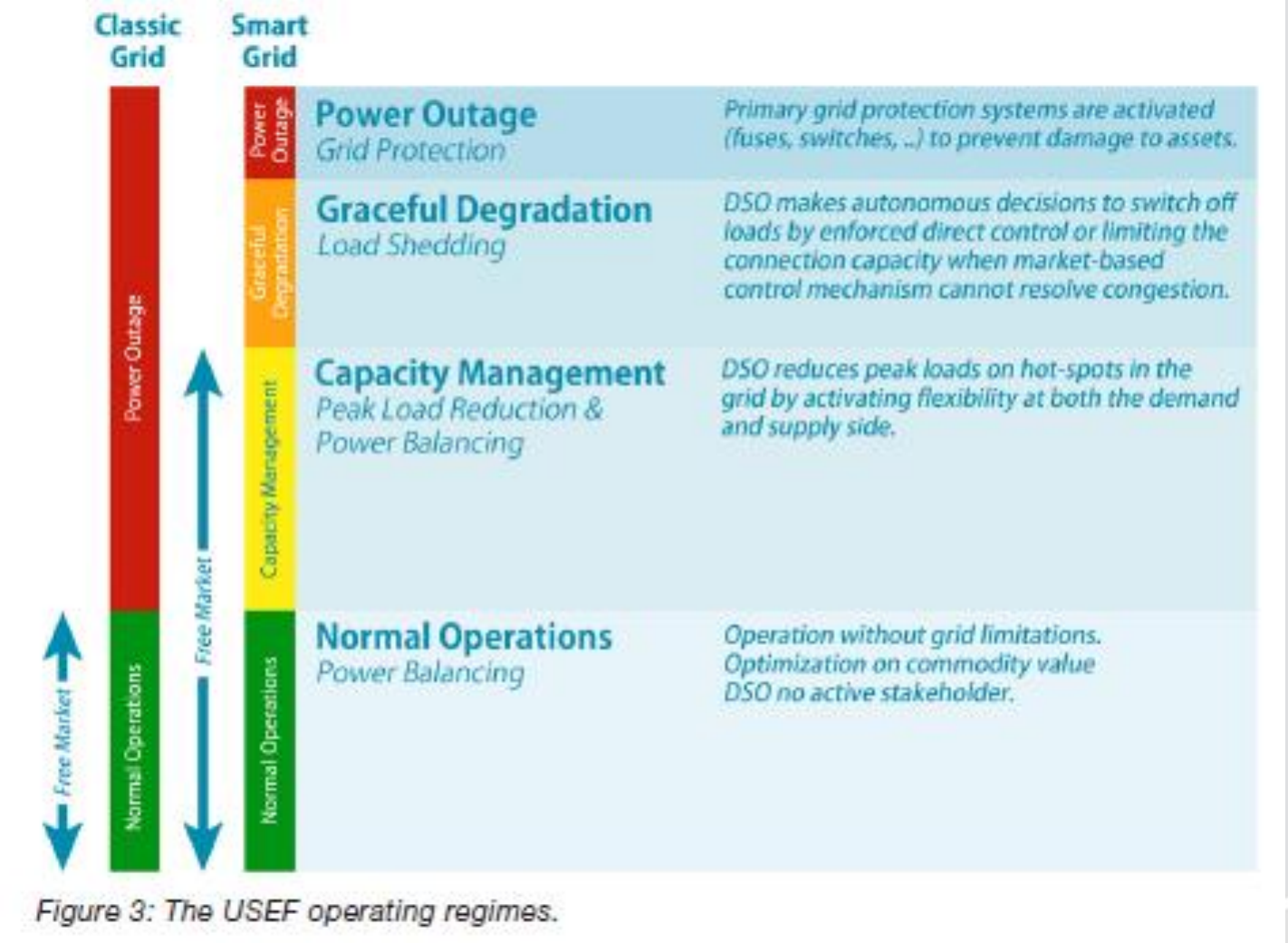


Figure 3: The USEF operating regimes.

Source: An introduction to the Universal Smart Energy Framework

Increased awareness about growing DSO role

DSO supports TSO to maintain system stability (Linear: demand response project)

Targetted investment in flexibility and market facilitation (Atrias, MIG6, common data platform)

New DSO positioning

E.On separates in 2 businesses

- **Integrated energy system operation**
- **Customer solutions**

Alliander goes beyond traditional DSO activities (Allego (Alliander) focuses on mobility)

Electricity Distribution System Operators

- Current organisation of the electricity market
- Changing environment – 3 step evolution
- **Future role(s) of the DSO**

Think Topic 12 – Rethinking DSO regulation

Basic DSO tasks

- Planning, operating and maintaining the distribution grid
- Natural monopoly
- Regulated activities

Commercial activities

- Ownership and management of metering equipment
- Data handling
- EV charging infrastructure

Other activities

- Public service obligations, supply of last resort, public lighting, billing, compensation for losses

Source: Think topic 12

Ownership and management of metering

- **Commercial ownership (retailer) risks**
  - Barrier for supplier switching
  - High investment risk if lack in standardization
- **Arguments for a regulated monopoly**
  - Potential economies of scale (lower cost)
  - Economies of scope with other DSO activities
  - Uncertainty about best suited technological solutions
  - Most appropriate to achieve a fast mass rollout
- **Also dependent on number and size of DSOs per country**

Data handling

- Data supports 3 categories of activities
  - Commercial operations
  - System stability and quality of supply
  - Efficient grid planning
- Three data handling models (SGTF EG3)
  - DSO as a neutral market facilitator
  - Central data hub
  - Data access-point manager
- Key question: cooperation and synergy between DSOs and ICT companies while maintaining level-playing field in the market?

Electric vehicle charging infrastructure

- **Possible ownership structures**
  - DSOs or similarly regulated entities
  - Commercial actors and private investors (including retailers or aggregators)
  - Public entities
- **Possible market models**
  - Integrated infrastructure market model
  - Separated infrastructure market model
  - Independent e-mobility market model
  - Spot operator owned charging stations market model

DSO procurement of DER services

- **DSO's ensure system reliability through**
  - **Network investments, maintenance and reinforcement**
  - **Voltage control**
  - **Load/generation curtailment**

- **DER offer additional instruments to**
  - **Manage short-term problems in the grid**
  - **Optimize the cost of maintaining quality of service**
  - **Reduce grid losses**
  - **Reduce or postpone future investments**

CEER conclusions – Future role of DSO's

Framework to analyse and determine future DSO activities

- Guiding principles
- Categories

Grey areas

- Energy efficiency activities
- Flexibility and storage
- Engagement with end customers

Special attention for

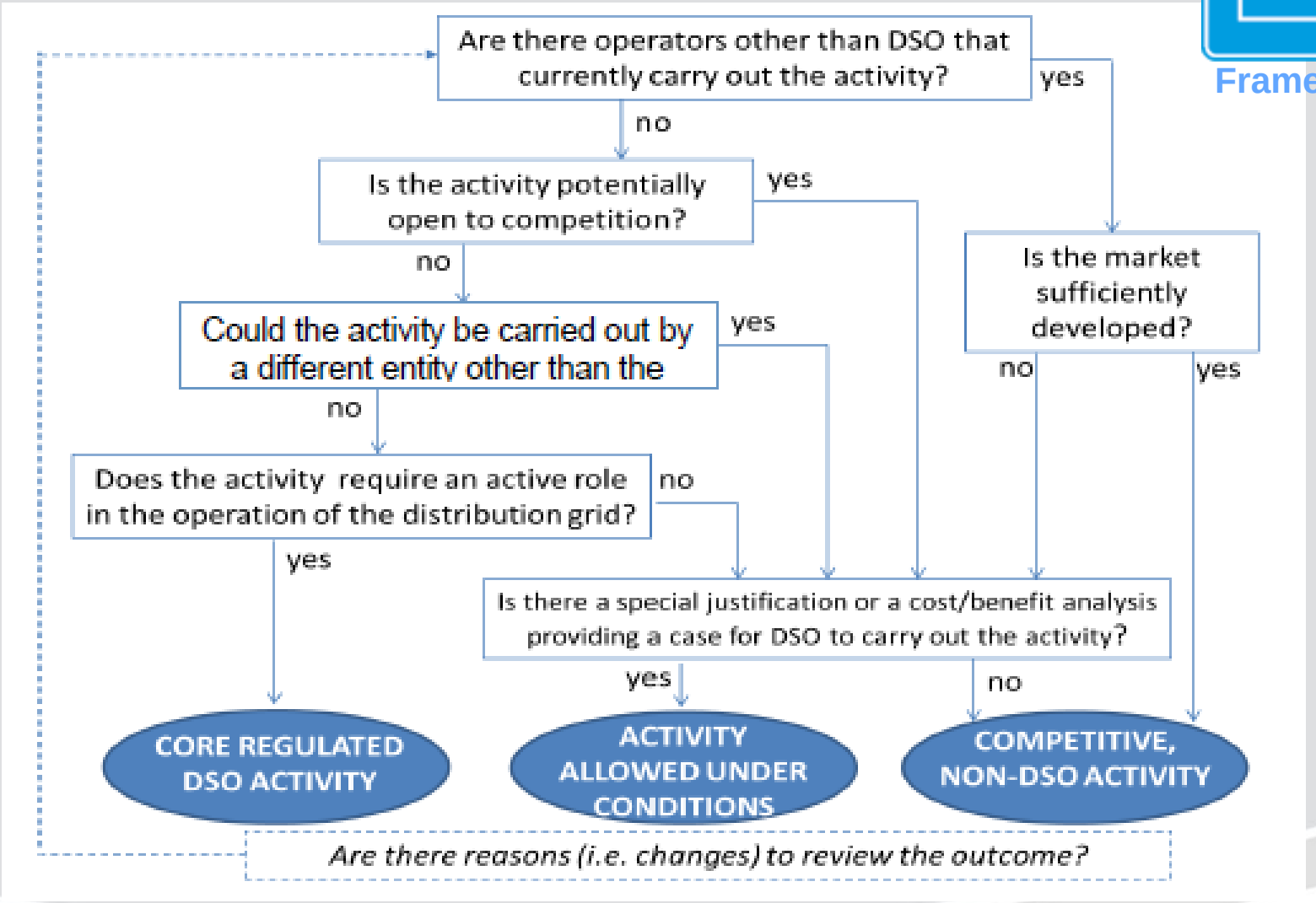
- Data handling
- DSO / TSO relationship
- Economic signals and contractual arrangements

Guiding principles

- **Core activities**
  - Safe and secure operation and management of the distribution system
  - Network planning, development and investment
  - Data management
- **Guiding principles for DSO regulation**
  - Meet reasonable expectations of network users
  - Act as neutral market facilitators in core functions
  - Act in the public interest
  - Safeguard consumer ownership of data

Categories of DSO activities

Framework



Energy efficiency activities

Based on earlier CEER consultation paper on Future DSO role

Grey area

- **Activities to improve energy efficiency of the network**

CORE REGULATED DSO ACTIVITY

- **Activities reaching beyond-the-meter**

COMPETITIVE, NON-DSO ACTIVITY

- **Providing advanced devices (e.g. displays) and added-value services for energy efficiency**

COMPETITIVE, NON-DSO ACTIVITY

Flexibility and storage (1)

Based on earlier CEER consultation paper on Future DSO role

- **CEER focus on (only) procurement by DSO (not all DSO's agree)**
- **5 types**
  - **Portfolio optimization: arbitrage between generation and demand response**
  - **Preventive congestion management: before closure of wholesale market**
  - **Curative congestion management: after closure of wholesale market**
  - **System balancing: guarantee system frequency (TSO task)**
  - **Ancillary services: guarantee system security (voltage control ...)**

Flexibility and storage (2)

Based on earlier CEER consultation paper on Future DSO role

Risks & barriers

Separate procurement by DSO's and market actors

- Freeriding issues
- Inefficient allocation of scarce flexibility
- Conflicting signals to consumers

Coordinated procurement by DSO's and market actors

- Reduced gaming possibilities
- Higher system efficiency
- More complex market structure and potential liquidity issue (DSO price)

Policy implications

- Measures to secure transparency, non-discriminatory & efficient procurement by DSO's & market actors
- Provide incentives for DSO's to choose the best option in network planning

Engagement with end customers

Based on earlier CEER consultation paper on Future DSO role

Grey area

- **Engagement with end customers related to network operational issues**

CORE REGULATED DSO ACTIVITY

- **Commercial relationships with small end-consumers**

COMPETITIVE, NON-DSO ACTIVITY

- **Facilitate retail market functioning and competition**

ACTIVITY ALLOWED UNDER CONDITIONS

CEER conclusion on data handling

- Need for greater standardization of data, and strong data protection measures
- Distinction between commercial and technical data
- Need for a neutral data coordinator or data hub to manage and provide access to data
- CEER will develop a set of guiding principles with NRAs and DSOs at a European level

CEER conclusion on DSO/TSO relation

- **Current conclusions**
  - System perspective
  - High level principles at EU level and detailed regulations at a national level
  - DSO requirement to develop and publish long term plans for their networks
- **Under analysis (2016)**
  - Responsibilities for flexibility
  - Need for clear cost separation
  - DSO role in balancing, ancillary services and information provisions mandated by TSOs
  - Exchange and cooperation platform needed?

Regulation

- 4 areas to be reviewed
- Eandis

Four regulatory areas to be reviewed

- **Allowed DSO remuneration**
- **Distribution grid tarification**
- **Potential new infrastructure tasks of DSOs vis-à-vis energy market actors**
  - **Advanced meter data**
  - **EV charging stations**
- **Potential new roles and functions of DSOs in system management vis-à-vis TSOs**

Source: Think Topic 12

Policy and regulation

Translate European policy to a pragmatic national approach

European climate objectives, Energy Efficiency Directive, Alternative Fuels Directive

Translate to national policy (e.g. Energieakkoord)

Support schemes (e.g. climate action plan Ghent with support for sustainable districts)

Regulatory framework for new market roles (e.g. DSO for district heating networks)

New tariff structure

Injection charge and capacity tariff

Financial compensation for curtailment

Economic signals and contractual relations

- **Regulatory incentives and innovation**
  - **Innovative smart grids investment mainly OPEX rather than CAPEX <> RAB-based compensation for invested capital**
    - **→ need to adapt compensation model for innovative investment**
      - **» Shorter depreciation period**
      - **» Higher compensation for risk**
      - **» Specific funds or incentives**
    - **→ preference for TOTEX-based regulatory schemes**
  - **Second thoughts about output-based regulation (hard to find meaningful, measurable and controllable outputs)**

Economic signals and contractual relations (2)

- **Network tariffs - no consensus → further analysis**
  - **Should distribution network tariffs include a time of use element? How to coordinate this with other parts of the final price?**
  - **Should charges be based more on consumption or capacity? Should they reflect different services offered by DSOs?**
  - **Allow financial signals to incentivize behaviour of (some) users?**

Economic signals and contractual relations (3)

- **Contractual arrangements and relationships between DSOs and consumers**
  - **Implicit connection agreement**
  - **Commercial contract**
    - **Directly with customer**
    - **Via aggregator**
    - **Via supplier**

Contractual relationship	Customer type	Category
Implicit via Connection Agreement DSO-Customer or grid tariff	Domestic Customer	CORE REGULATED DSO ACTIVITY / ACTIVITY ALLOWED UNDER CONDITIONS
	Commercial and Industrial Customer	
	Distributed Generation Customer	
Explicit additional and commercial DSR contract DSO-Customer[15]	Domestic Customer	ACTIVITY ALLOWED UNDER CONDITIONS / COMPETITIVE, NON-DSO ACTIVITY
	Commercial and Industrial Customer	
	Distributed Generation Customer	ACTIVITY ALLOWED UNDER CONDITIONS
Explicit Additional and commercial contract with customer via aggregator	All Customers	
Explicit Additional and commercial DSR contract with customer via supplier	All Customers	

Economic signals and contractual relations (4)

- **Innovation and ICT**
  - **Cyber security**
  - **Telecom innovation and services for third parties?**

Eandis – 4 value propositions

1. Safe, affordable and reliable **management of networks**
2. Support the operation of the energy market as an independent **data manager**
3. Help achieve climate goals as a Flemish **energy knowledge center**
4. Fulfill our role as **social supplier** in the context of energy poverty (specific for Belgium and not discussed further)

VP 1 “Safe, affordable and reliable management of networks”

Key Partners

- Partners and intermediaries linking us to different customer segments
- Partners and intermediaries linking us to installation companies
- Suppliers and subcontractors
- Market parties (suppliers, aggregators, TSO, …)
- Synductis and other utilities
- De Stroomlijn

Key Activities

- Build and maintain energy networks according to good asset management and within regultory constraints
- Guarantee energy flows 24/7
- Connect consumers and producers to the network

Key Resources

- Traditionally built high-quality networks
- Competent personnel with limited change readiness
- IT/OT

Value Proposition

- Connect consumers and producers over a public energy network
- Guarantee that consumers can obtain energy 24/7
- Guarantee that producers can inject energy 24/7

Customer Relationships

- Strategic partnership with local authorities
- Technical, solution-oriented relationship with industry customers (LRB / partners and intermediaries)
- Uniform transactional relationship with residential customers

Channels

- Personalized channel for local authorities
- Personalized channel for industry customers
- Efficient transactional channels for residential customers (avoid, click, call, face)

Customer Segments

- Local authorities that are also shareholders
- Producers, industry
- Consumers, industry
- Producers, residential
- Consumers, residential

Cost Structure

- Capital-intensive, high investment and financing cost

  (long term depreciation, fair compensation for capital)
- Large staff, historically with high salary compared to new entrants

Revenue Streams

- Connection charge (regulated)
- Injection charge (regulated)
- Distribution tariff (kWh based, regulated)

VP 2 “Support the operation of the energy market as independent data manager”

Key Partners

- Atrias
- All market actors

Key Activities

- Register relations between market actors
- Capture consumption and injection data and provide them to suppliers and producers
- Process consumption and injection data for market processes with multiple actors (flex, structuring, settlement)

Key Resources

- Very complex ICT applications
- Knowhow on complex markt processes
- Mainly traditional and some smart meters
- (Smart) metering knowhow

Value Proposition

- Provide required data (consumption and injection on the public distribution net) for proper market functioning

Customer Relationships

- Procedural, formal

Channels

- Smart meter
- Communication flows for market operation (MIG4-6)

Customer Segments

- Consumers
- Producers
- All market actors

Cost Structure

- High ICT cost
- High development cost

Revenue Streams

- Distribution tariff (kWh based, regulated)

VP3 “Help achieve climate goals as a Flemish energy knowledge center”

Key Partners

- Bond Beter Leefmilieu

Key Activities

- Pay subsidies for RUE
- Valorize GSC
- Sensibilise population
- Studies and advice
- Project implementation

Key Resources

- Administrative back-office
- Expert engineers

Value Proposition

- Make known the opportunities and treats of the energy transition
- Giving support for adequately anticpating the transition

Customer Relationships

- Transactional for producers and consumers
- Personalized for local authorities

Channels

- Personalized channel for local authorities
- Efficient transactional channels for residential customers (avoid, click, call, face)

Customer Segments

- Flemish government
- Local authorities
- Renewable energy producers
- Consumers

Cost Structure

- High overhead

Revenue Streams

- Distribution tariff
- Revenue from local authorities

References

Reference documents

1) Think topic 12 – “From Distribution Networks to Smart Distribution Systems: Rethinking the Regulation of European Electricity DSOs”, Final Report (June 2013)
2) Ernst&Young – “Mapping power and utilities regulation in Europe” (2013)
3) CEER conclusions paper – “Future Role of DSO’s” (C15-DSO-16-03, July 2015)
4) PwC – “The road ahead: Gaining momentum from energy transformation” (2014)
5) FOD Economie – “Studie inzake de mogelijkheden tot opslag van elektriciteit” (2014)
6) CREG – “De rentabiliteit van de elektriciteitsopslag in België“ (150423-CDC-1412, April 2015)
7) Think topic 11 – “Shift, Not Drift: Towards Active Demand Response and Beyond”, Final Report (June 2013)
8) An introduction to the Universal Smart Energy Framework
9) Eandis Corporate Social Responsibility report (2014)

Eandis Corporate Social Responsibility report

2014







Corporate Social Responsibility Report

sustainability partner for cities and municipalities

Appendix 1 – Value proposition and business model canvas

Background – Value proposition

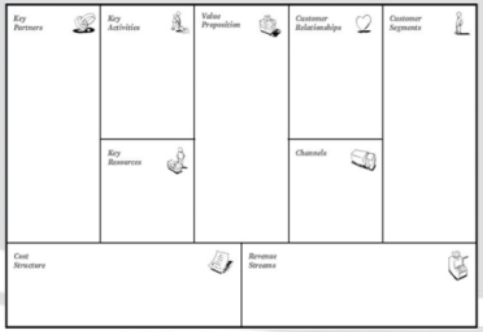
Value proposition(s)

Unique added value for stakeholders

Business model

How will the organisation create, deliver and maintain value?

Business model canvas



Mission

Vision

Strategy

values

Role, purpose of the organisation

Long term objectives

Way of implementing mission and vision

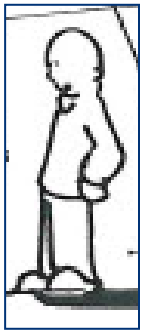
Strategic initiatives

Performance measures

Business model canvas

Key Partners	Key Activities	Value Proposition	Customer Relationships	Customer Segments
	Key Resources		Channels	
Cost Structure		Revenue Streams		

Business model canvas (2)



Customer segments

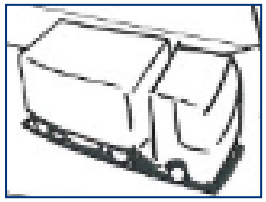
- Which groups of people or organisations do we want to reach and serve?
- What is important to them?

(Underlying) value proposition(s)

- Which products and services do we offer to each customer segment?
- Which customer problem(s) do we help solve by doing this?
- What is the associated added value?

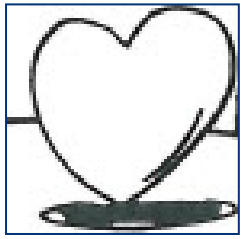
Business model canvas (3)

Channels



- How do we interact with our customers?
- What are the best / most efficient channels to reach them?
- How do we reach the customers?

Customer relationships



- What kind of relation do we have / want with each customer segment?
- How do we maintain these relations?

Business model canvas (4)

Core activities

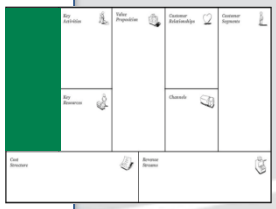
- What are the most important activities to deliver our value proposition(s)?

Resources

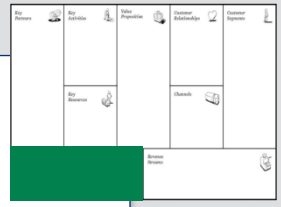
- Which resources (people and infrastructure) do we need for this (level of education, FTE, buildings, ICT, assets …)?

Partners

- Which partners are required?
- What do these partners add to our value proposition(s)?



Business model canvas (5)



Cost structure

- Which costs do we incur when realising our value proposition(s)?
- Are they fixed or variable?
- Which cost benefits do we enjoy (scale, scope)?

Revenues

- What do our customers pay for?
- How are we paid (provision, fee, subscription …)?
- How would our customers like to pay?

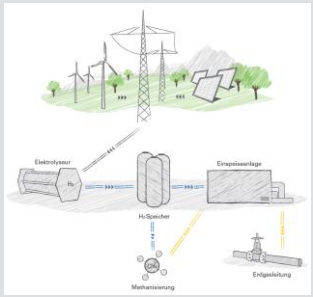
Appendix 2

Gas

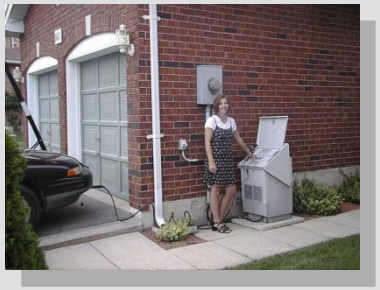
Gas-specific evolutions

Developments affecting gas DSOs

Energy efficiency



Power to gas



CNG Vehicles

Factors

Decentralised generation

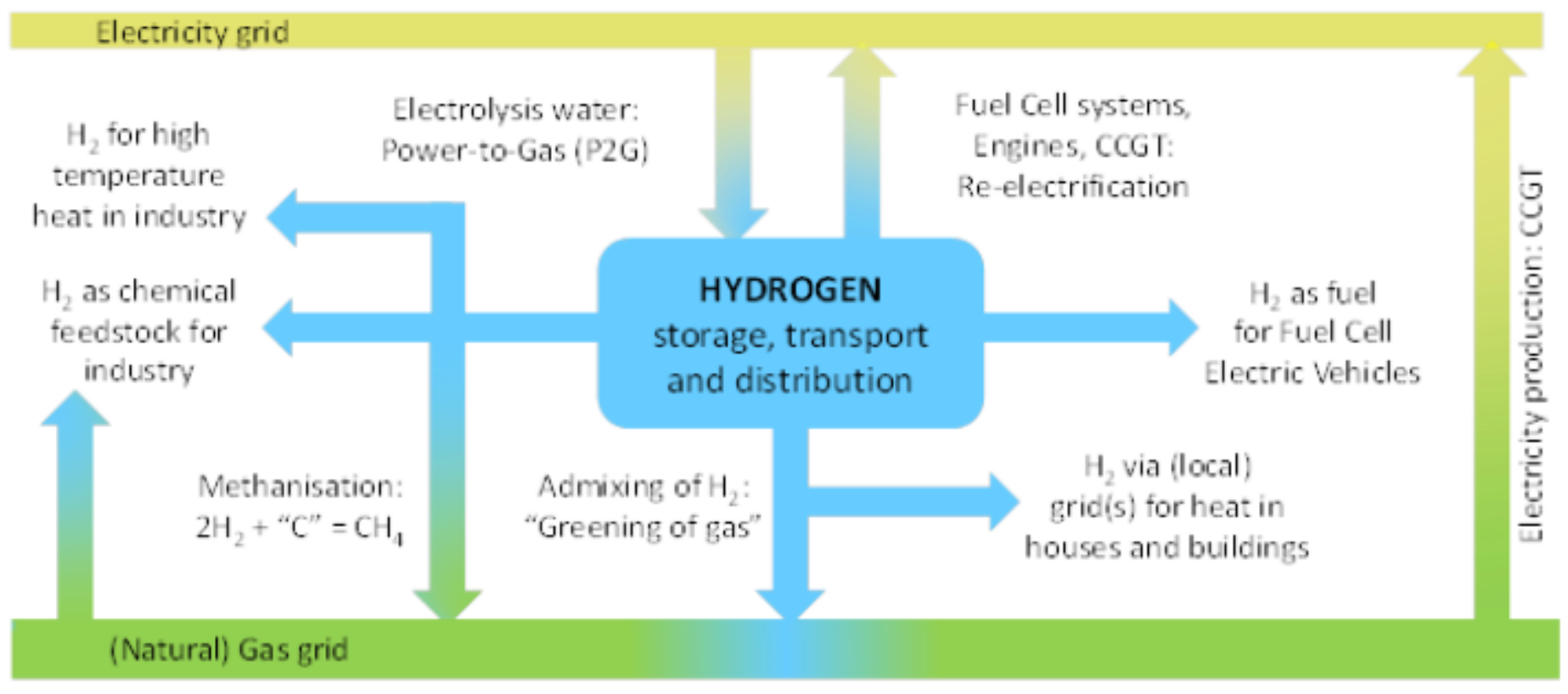
Biomethane

www.ihb-trapperkamp.de

Micro CHP

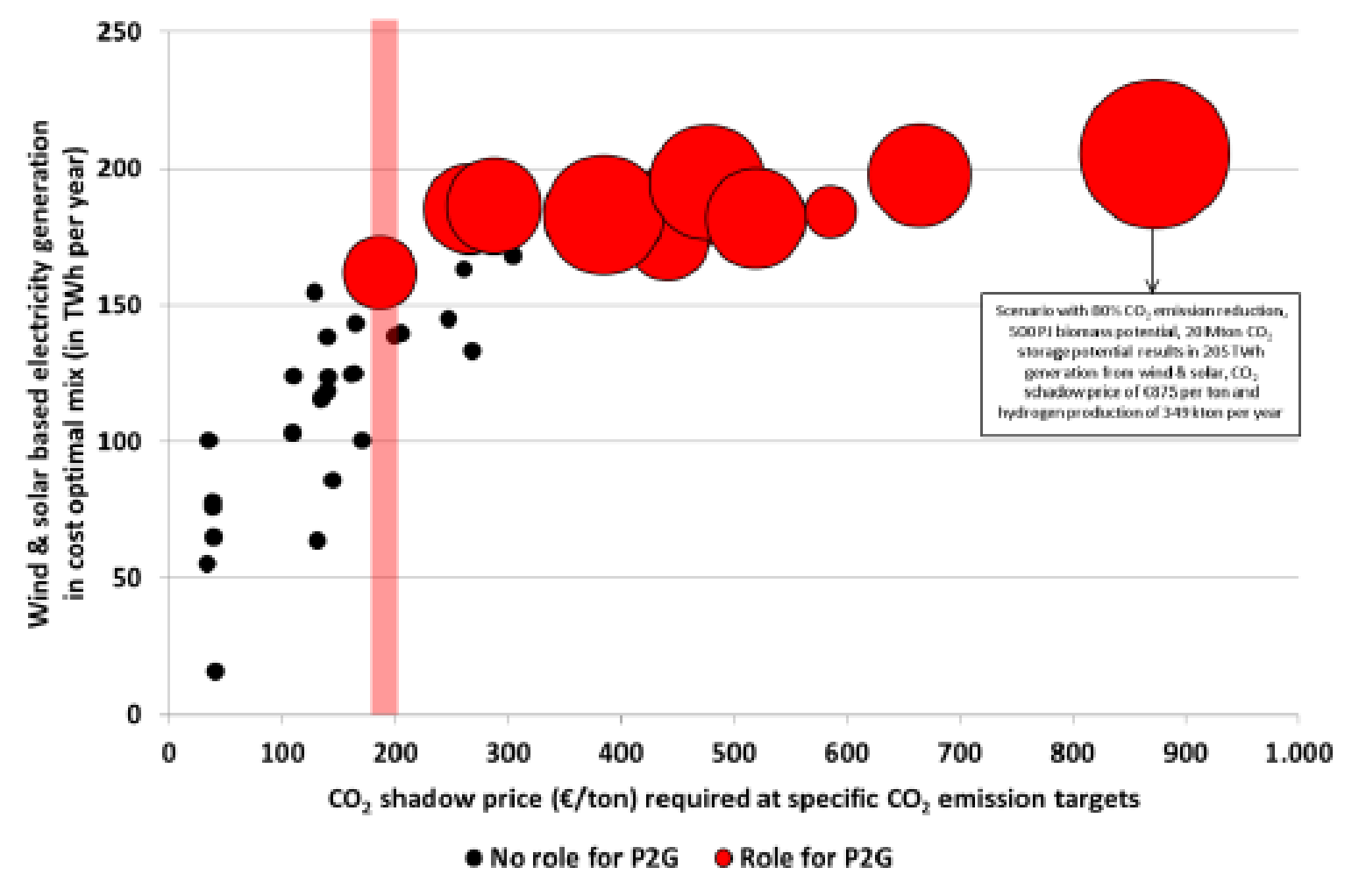
Source: Gas grid opportunities (DBI Gut, GERG PCD september 2013)

Power-to-Gas (P2G)



Source: ECN, DNV GL Kema - Exploring the role for power-to-gas in the future Dutch energy system (2014)

P2G relevant for high decarbonisation targets

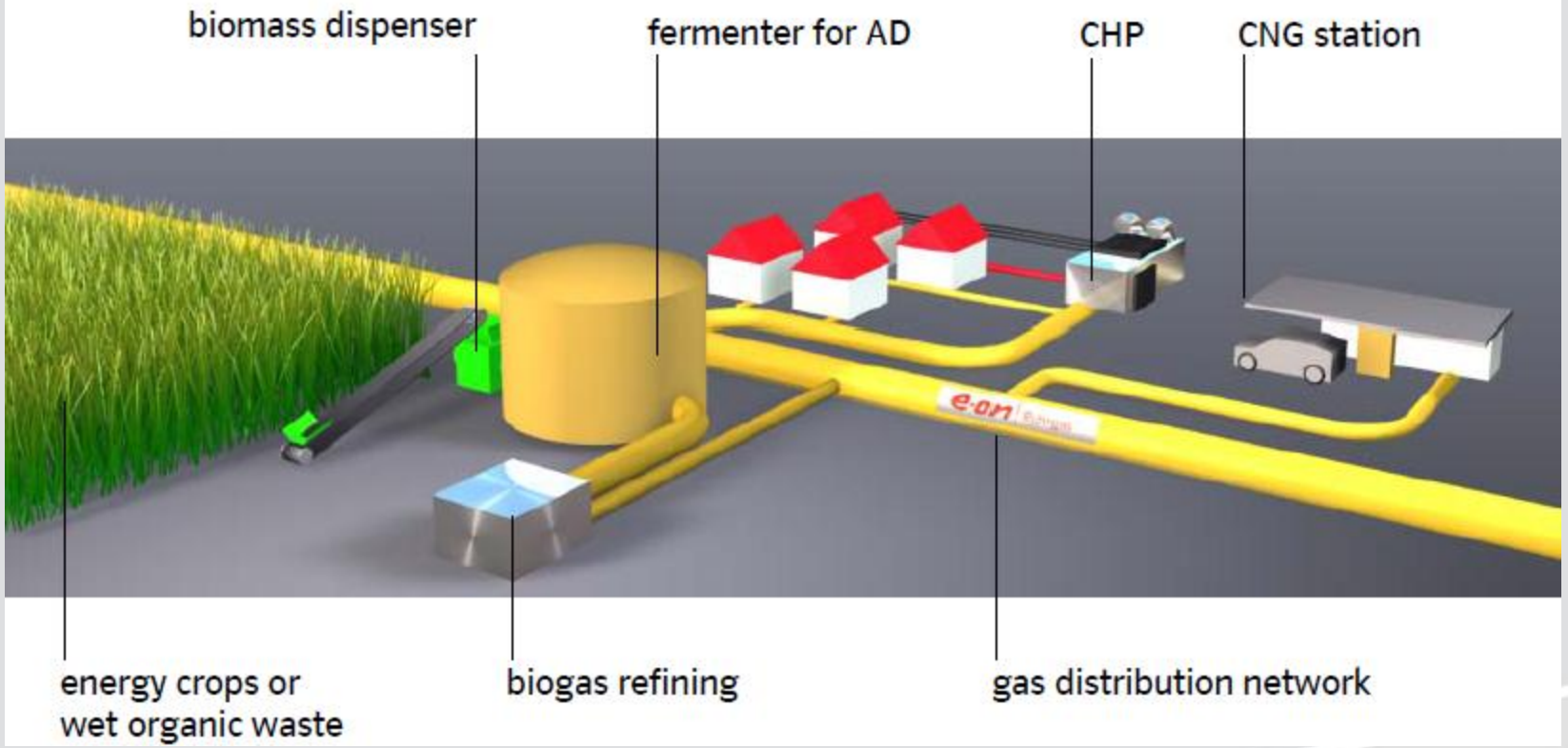


Source: ECN, DNV GL Kema - Exploring the role for power-to-gas in the future Dutch energy system (2014)

Biomethane

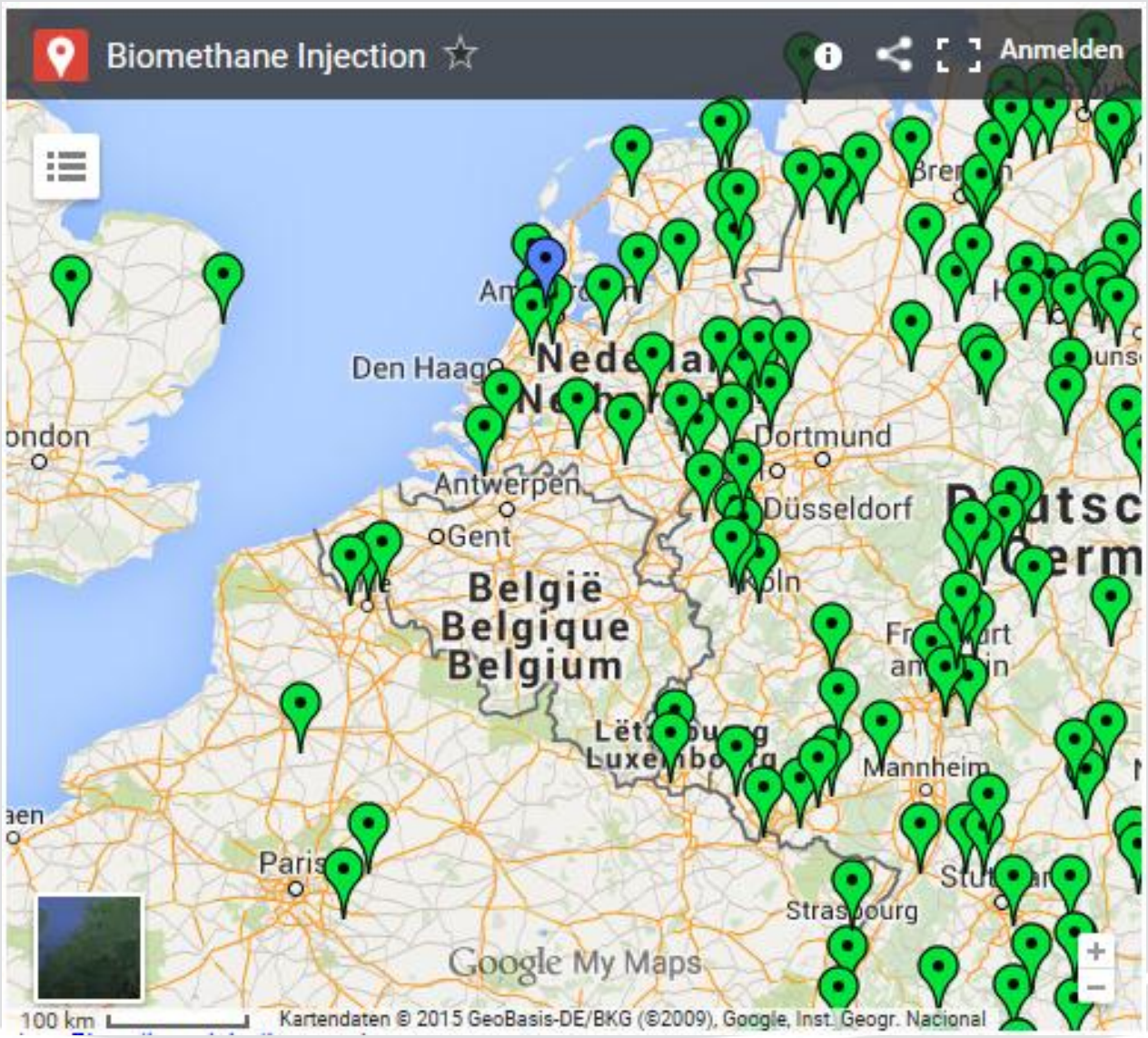
Production of biomethane

- Biomethane injection uncouples the production and usage of bioenergy
- Biomethane injection enables usage of bioenergy even in metropolitan areas



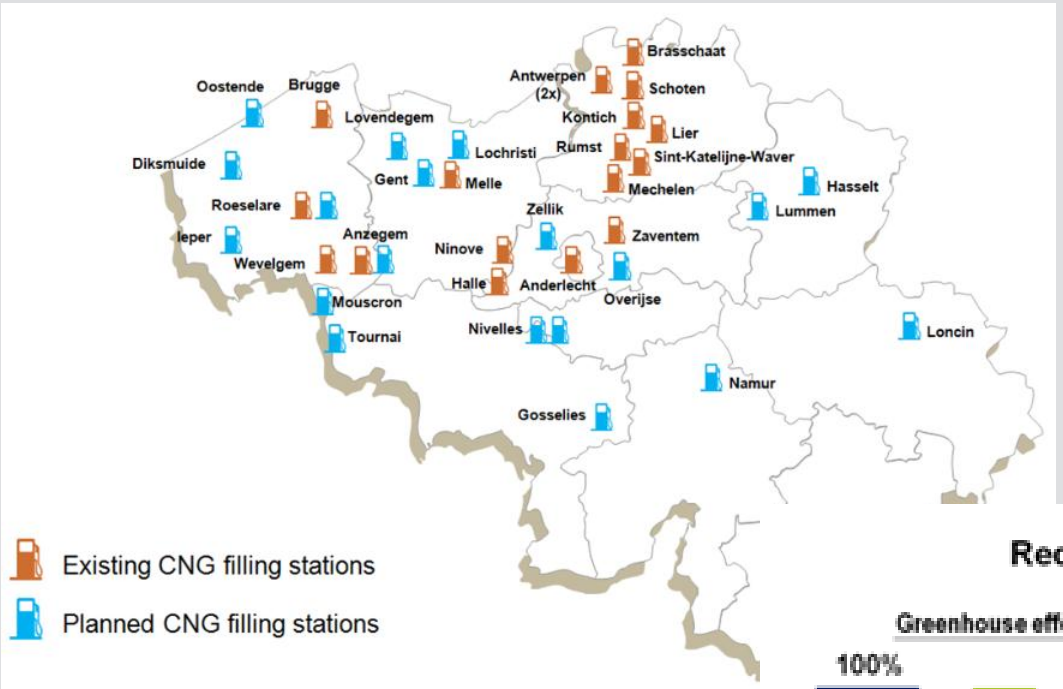
Source: E.On – Biomethane the climate-friendly substitute for natural gas (2011)

Biomethane – current projects

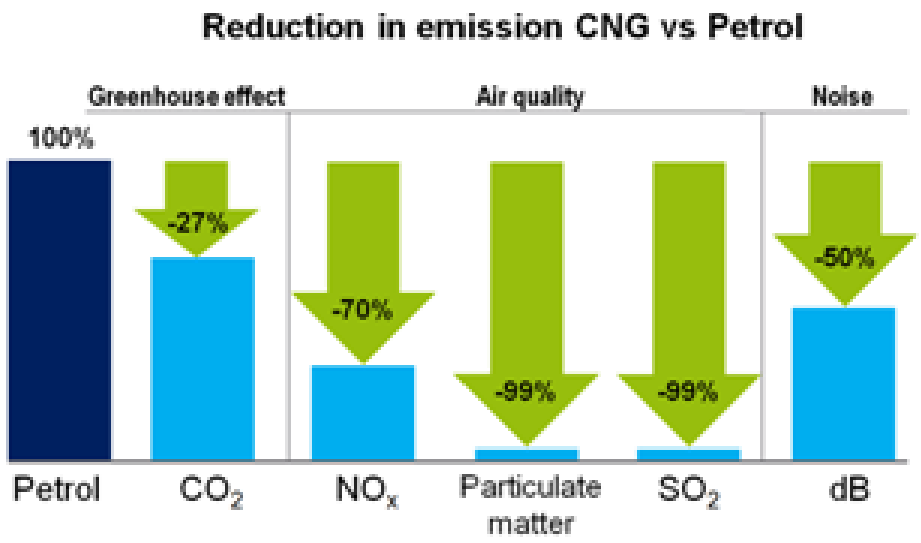


Source: biogaspartner.de

CNG vehicles



Source: www.fluxys.com



(μ)CHP economics

Belgium	Micro		Small & Medium		Large		
	up to 50kWe		*up to 10 MWe*		*more than 10 MWe*		
	NG	RES	NG	RES	NG	Coal	RES
Industry							
District heating							
Services							
Households							

Table 5: CHP economics matrix[6]

Legend:

- normal — Cogeneration Investment has good economic benefits, return on investment acceptable for the investors, interest for new investment exists; there are no significant economic barriers for the implementation.
- modest — Cogeneration Investment has modest/limited economic benefits and return on investment, limited interest for new investments.
- Poor — Cogeneration Investment has poor or negative return on investment or is not possible due to other limitations, no interest/possibilities for new investments.

Source: Code2 - CHP roadmap Belgium (September 2014)

µCHP potential

Household systems (±1 kWe) ***Boiler replacement technology***	*SME & Collective systems (±40 kWe)* ***Boiler add-on technology***
Present market (2013) Boiler stock: 2 200 000 units Boiler sales: 174 000 units/year	**Present market (2013)** Boiler stock: 450 000 units Boiler sales: 35 000 units/year
Potential estimation	***Potential estimation***

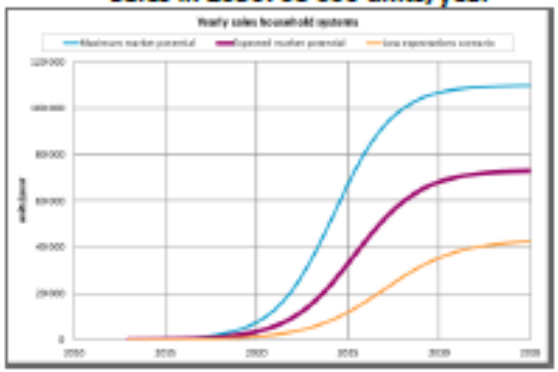
Indicator	*Score*
Market alternatives	1
Global CBA	4
Legislation/support	2
Awareness	0
Purchasing power	2
Total	8 out of 12

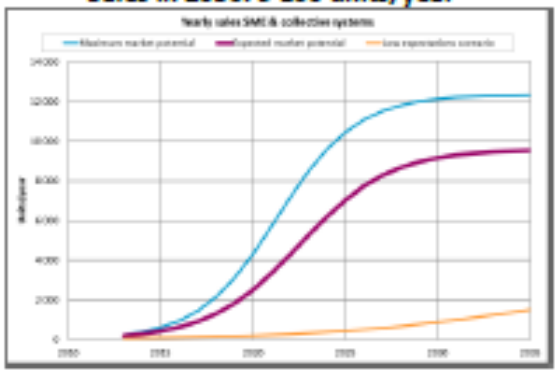
Expected final market share: 42% of boiler sales in Household sector

Indicator	*Score*
Market alternatives	1
Global CBA	4
Legislation/support	2
Awareness	1
Total	7 out of 9

Expected final market share: 27% of boiler sales in SME & Coll. sector

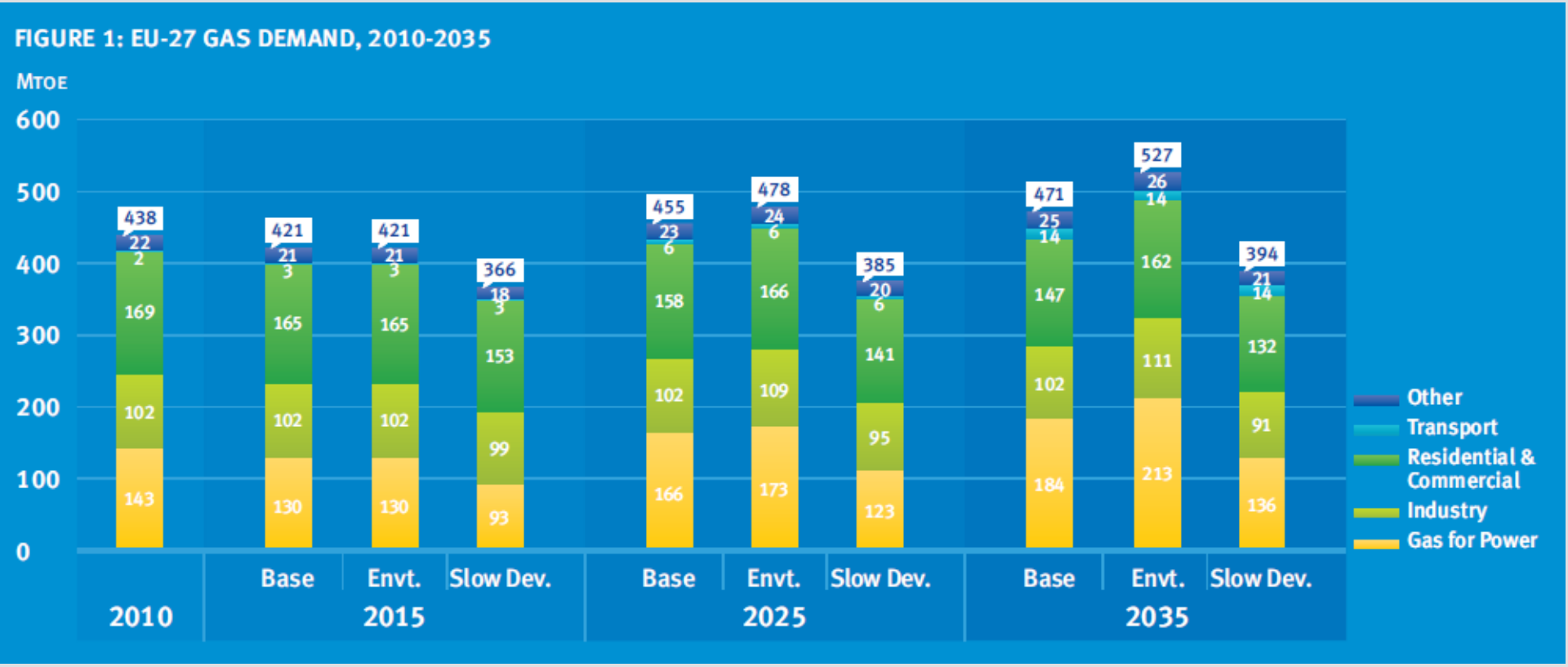
Yearly sales	***Yearly sales***
Sales in 2020: 3 500 units/year* Sales in 2030: 68 000 units/year*	Sales in 2020: 2 500 units/year* Sales in 2030: 9 100 units/year*





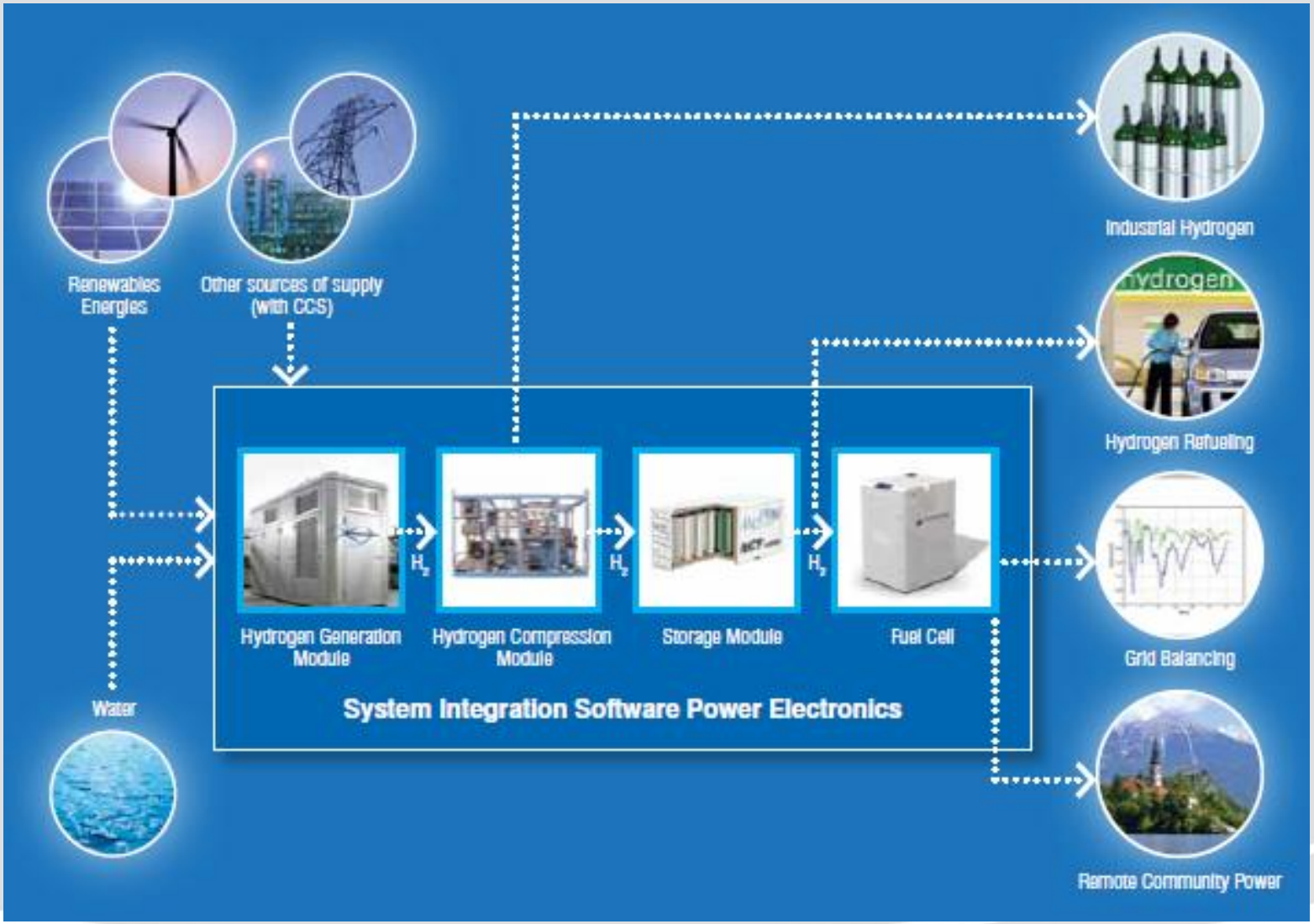
Source: Code2 - CHP roadmap Belgium (September 2014)

Energy-efficiency



Source: Eurogas – Long-term outlook for gas to 2035 (2013)

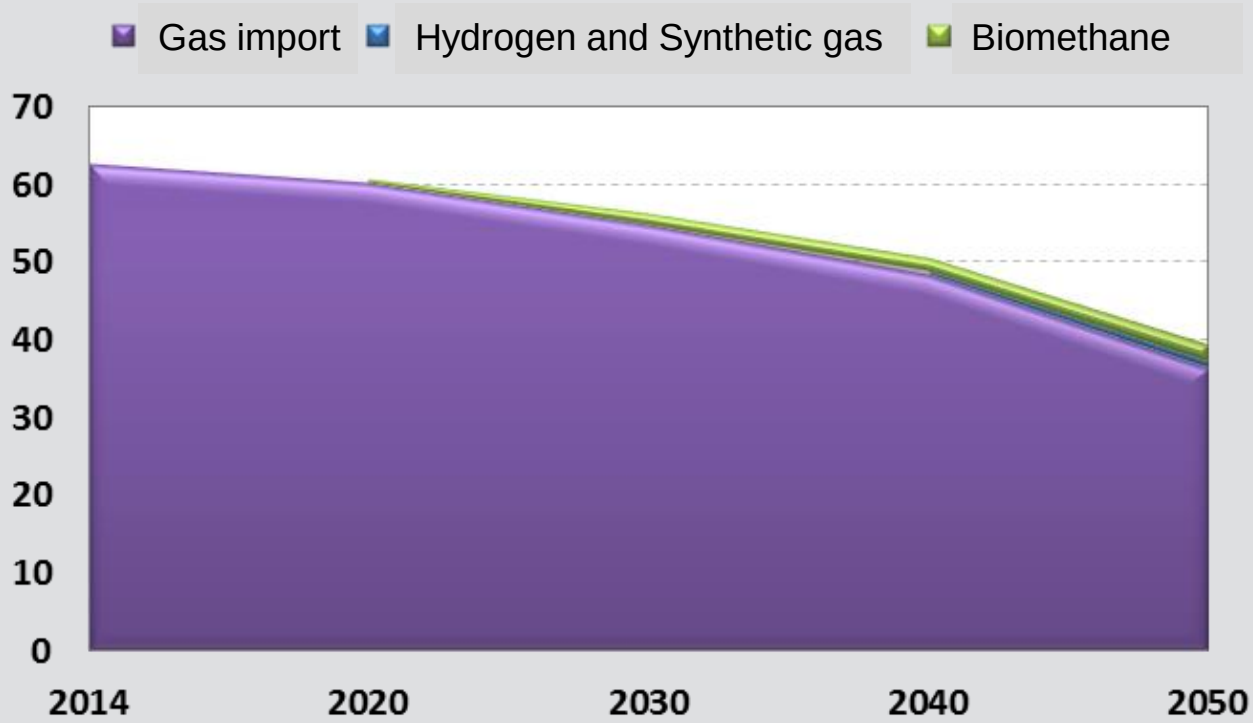
CCS and hydrogen



Source: New-IG - Fuel Cell and Hydrogen technologies in Europe (2011)

Consequences – expected gas volume* (TWh)

*Via gas distribution grid



Gas import and production is expected to decrease

Biomethane and hydrogen injection remains marginal

CEER – role of DSO in smart gas grid

- **No clear vision on roll out of smart G-meters but clear synergy when co-installing with E-meters**
- **Stakeholder views: Limited potential for smart gas grids**
  - **Smart gas meters: limited remote (re)activation, biogas will not develop rapidly**
  - **Filling infrastructure and development of smart appliances are not DSO tasks**
  - **No need for a flexible capacity tariff for gas**
  - **Limited potential of load shedding due to storage possibilities**
  - **Limited potential value of smart gas grids to avoid new grid investments**