Empowering Electricity Consumers in the Digital Age

Recent trends and challenges

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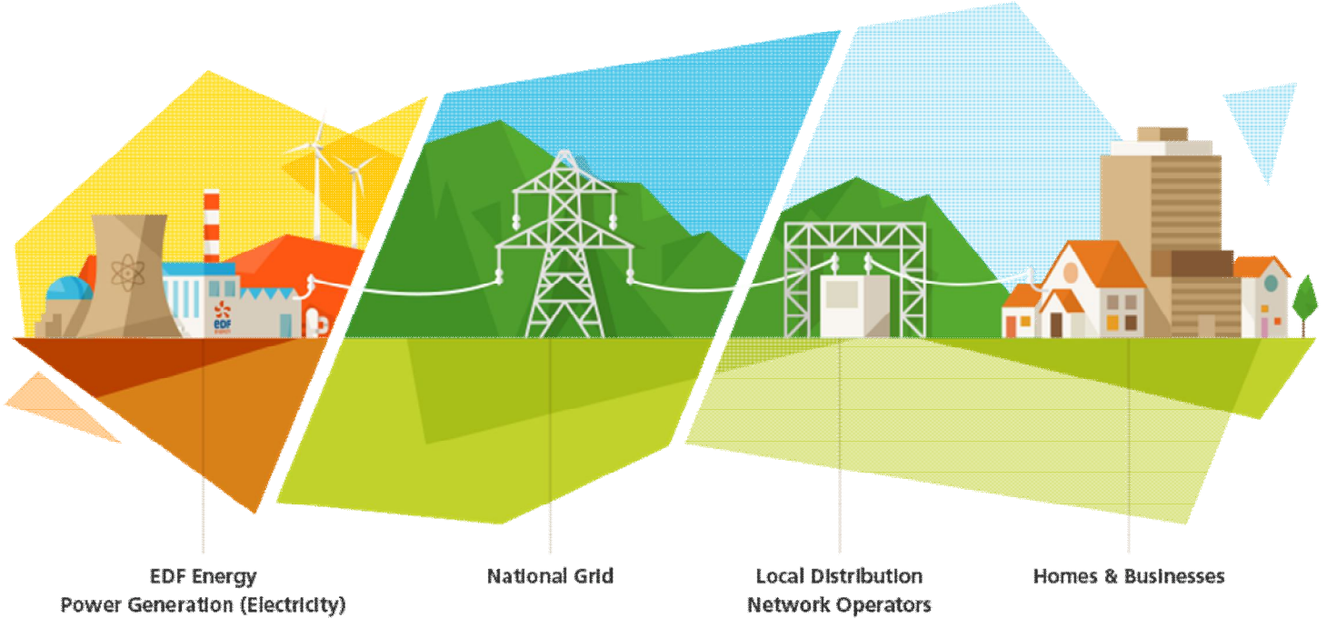
Outline of the Presentation

1. **Introduction**
2. **Recent trends and business model innovation**
3. **New consumption paradigm in the Digital Age**
4. **Pricing Strategies**
5. **New Regulatory Challenges**
6. **Conclusion**

Introduction

Going from a unidirectional value chain….



Source: EDF

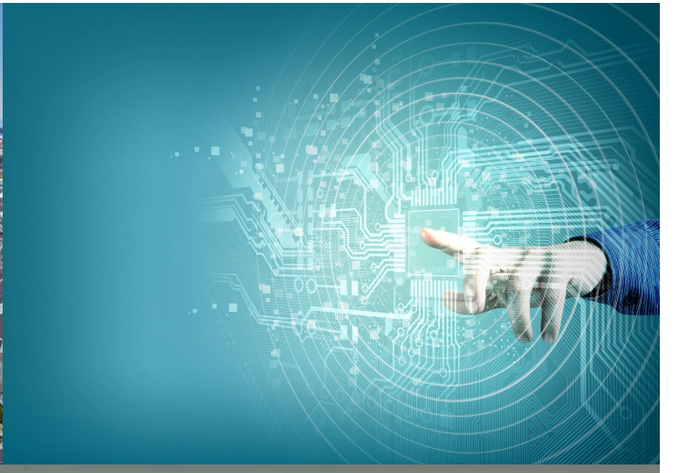
Introduction

… to a smart grid system based on Distributed Energy Resources

SUSTAINABILITY

DECENTRALIZATION

DIGITIZATION



BUSINESS MODEL INNOVATION

Recent trends and Business Model Innovation

Recent trends

New Electricity Paradigm

- More Sustainable (RES)
- More efficient (e.g. DSM)
- Decentralized
- Storage
- Electric Mobility
- Digital
- New business players

- Digital Grid Management+ Smart Meeters = Unprecedented sets of *Real Time* Data
- Shift in the operative management paradigm
- Shift in the key resources (human capital, data management, cybersecurity)

Recent trends and Business Model Innovation

Recent trends

New Electricity Paradigm

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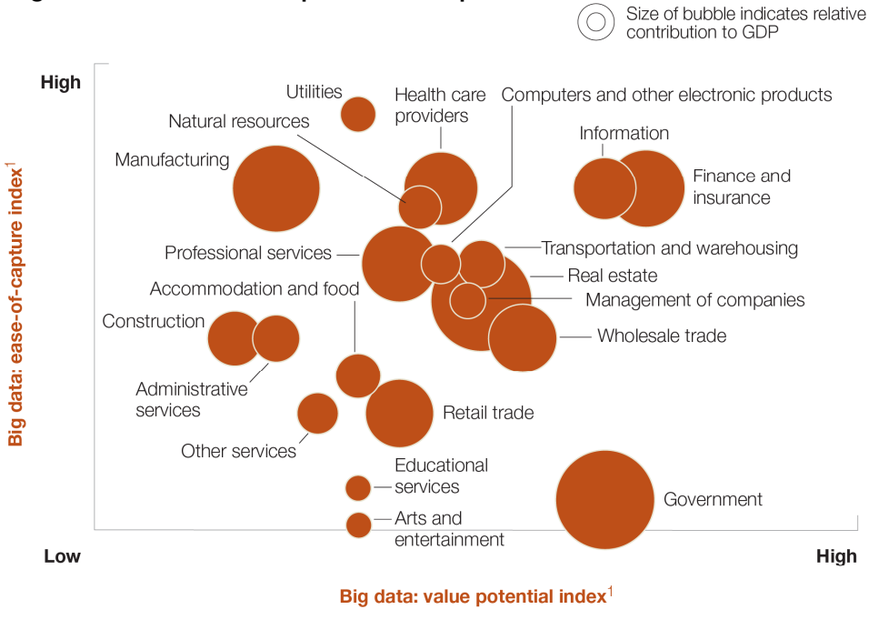
- **Digital**
- New business players

Big data: ease of capture and potential value



[1]For detailed explication of metrics, see appendix in McKinsey Global Institute full report *Big data: The next frontier for innovation, competition, and productivity*, available free of charge online at mckinsey.com/mgi.

Source: US Bureau of Labor Statistics; McKinsey Global Institute analysis

Source: McKinsey

- New business lines (downstream)
  - Decentralized production services/ technologies
  - Energy efficiency services
  - Big Data & Internet of Things – New business Models

Recent trends and Business Model Innovation

Recent trends

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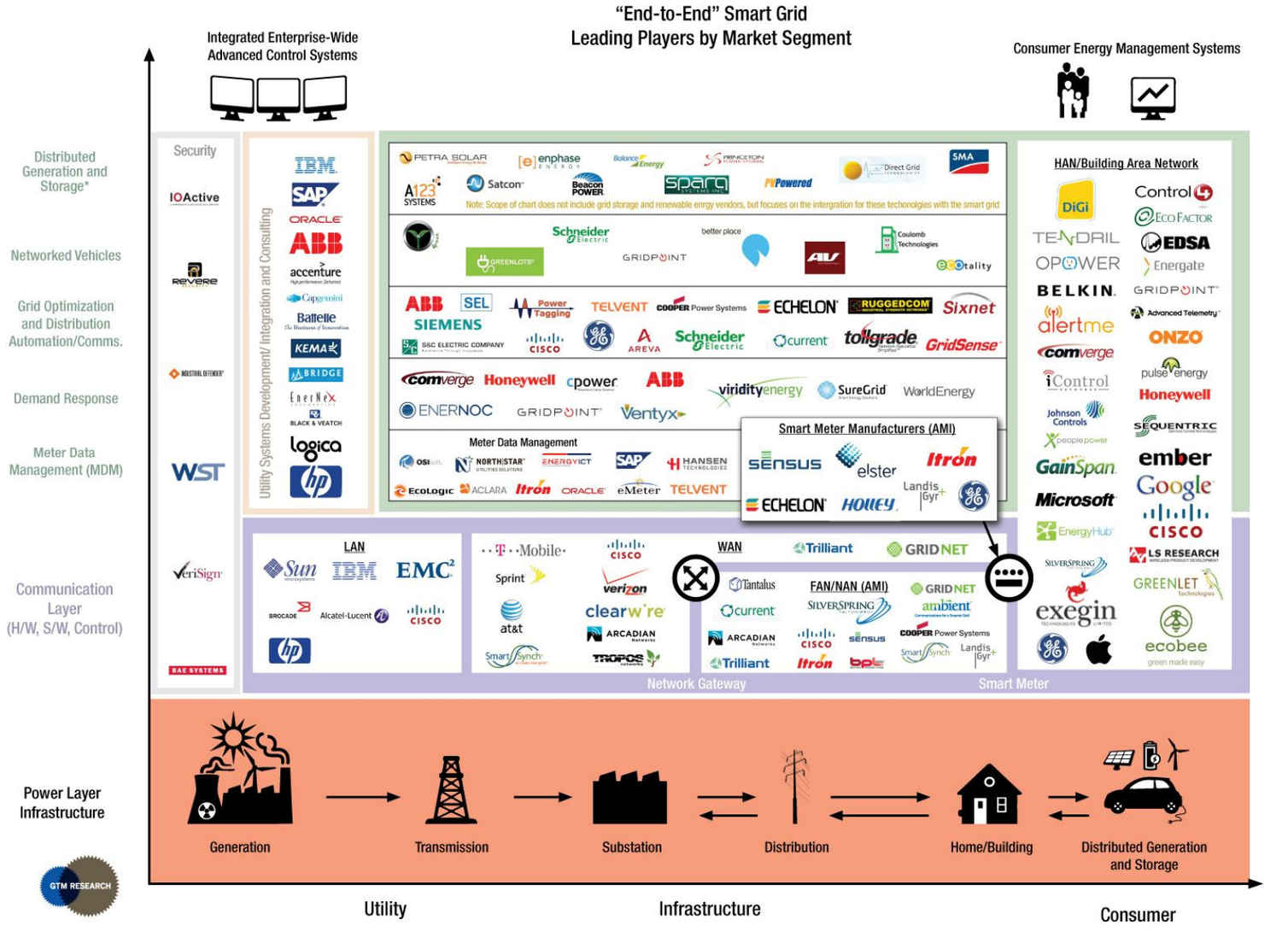
- **New business players**



Source: GreenTechMedia

New consumption paradigm in the Digital Age

- Decentralization & Environmental Awareness

→ Consumer in charge of production decisions (prosumer)

- Digitization of the electricity system

and

Product Innovation

→ More complex consumption decisions:

-From product-based industry to services-oriented market

-Increasing number of players and solutions

-Efficiency and demand-side management

-Privacy concerns and cybersecurity

- Market liberalization

→ Commercial strategies increasingly flexible:

Price & product personalization

→ **Consumers' increasing empowerment**

New consumption paradigm in the digital age

Consumers' empowerment

Consumers' empowerment <=> Much more sophisticated consumers

- Consumers in charge of production decisions

  - Investment decisions:
    - Which DG solution is bettert?
    - Up-front investment? Renting? PV solar?
    - Production levels (and timings)

- Consumers in charge of demand-side management

  - Access to technology and Digital Literacy may act as entry barrier
    - Older generations & low income consumers;
  - Need to adjust real-time consumption in order to absorb full benefits of DSM (may be problematic to consumption prices with low demand elasticity)

New consumption paradigm in the digital age

Consumers empowerment

Consumers' empowerment <=> Much more sophisticated consumer

New consumption paradigm in the digital age

Consumers' empowerment

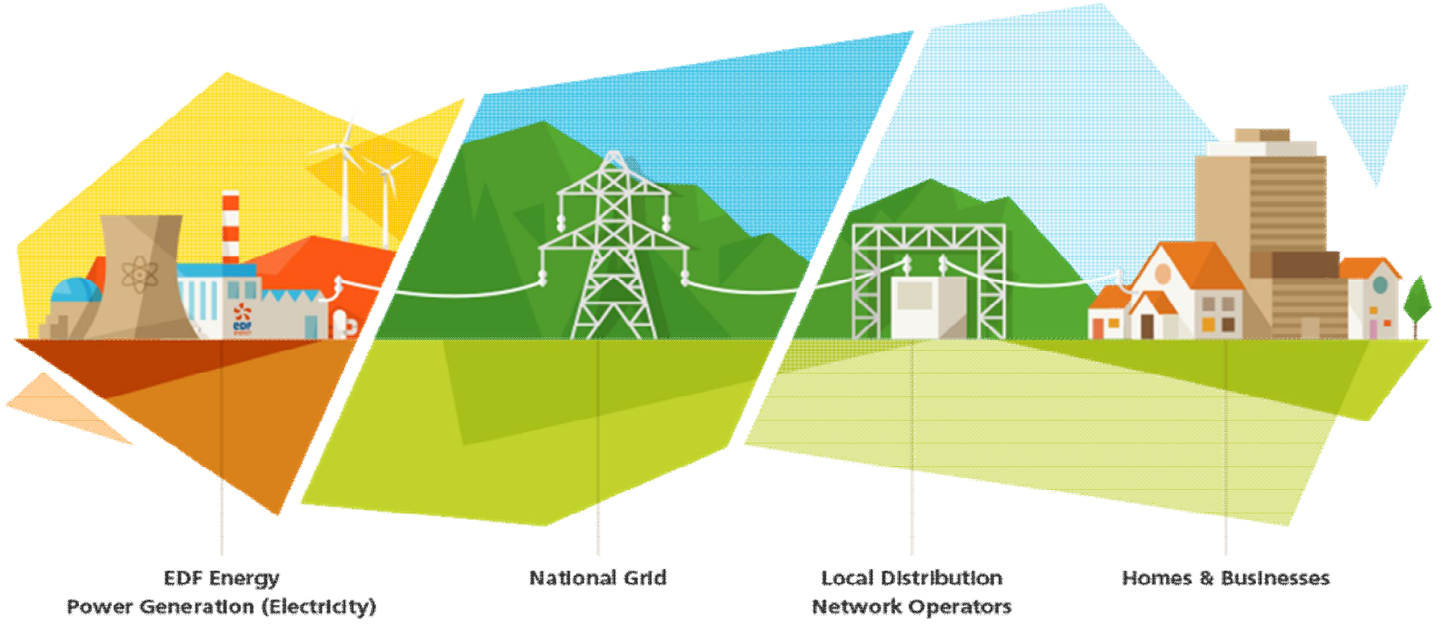
Consumers' empowerment <=> Much more sophisticated consumer

- Consumers must be sufficiently sophisticated to compare the costs and benefits of an increasing number of price alternatives available in the liberalized electricity market:
  - Dynamic tariffs – prices change in time according to the networks' congestion
  - Cost-reflective price scheme – from current volumetric system to a fixed flat rate (which does not need to be the same for all consumers)?
  - New forms of price discrimination?
- Consumers need to be more stratategic:
  - Product portfolio choices;
  - Information disclosure decision.

Pricing strategies

Conventional concerns on consumers' perspective

Level playing field & Competitive Dynamics



Level playing field & Competitive Dynamics

Source: EDF

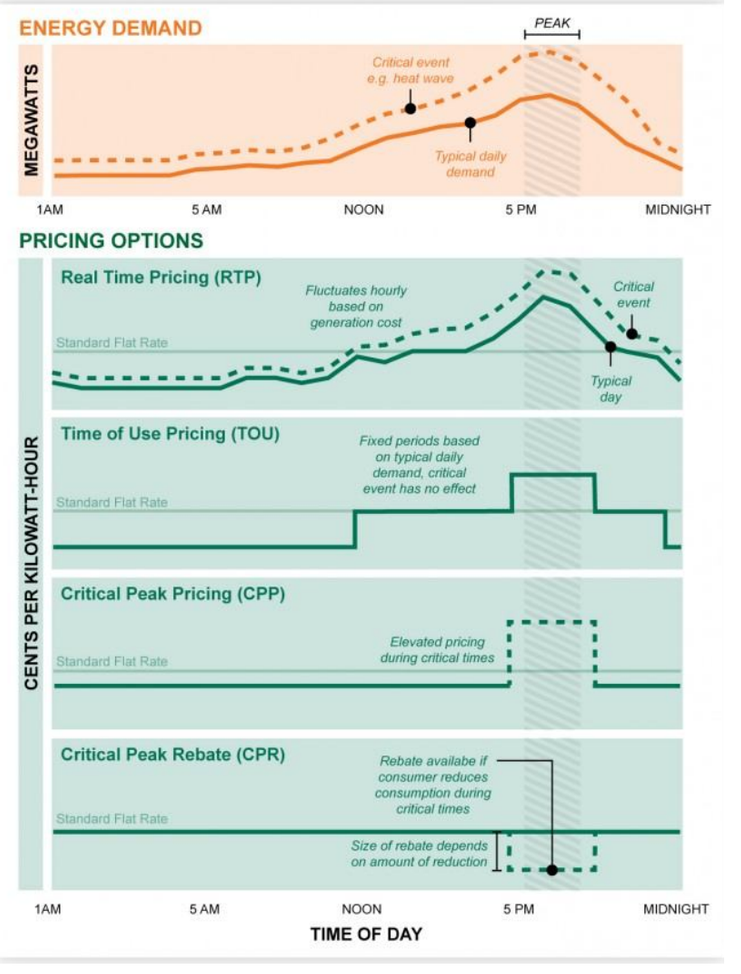
Assessment of regulated tariffs

Pricing strategies

Towards increasing price flexibility: dynamic pricing

- **Dynamic tariffs**
  - Critical peak pricing
  - Critical peak rebate
  - Real time pricing…

- Cost-effectiveness
- Complexity of the tariff design process
- Sophisticated metering/ communication systems
- Sophisticated and Tech-savvy consumers



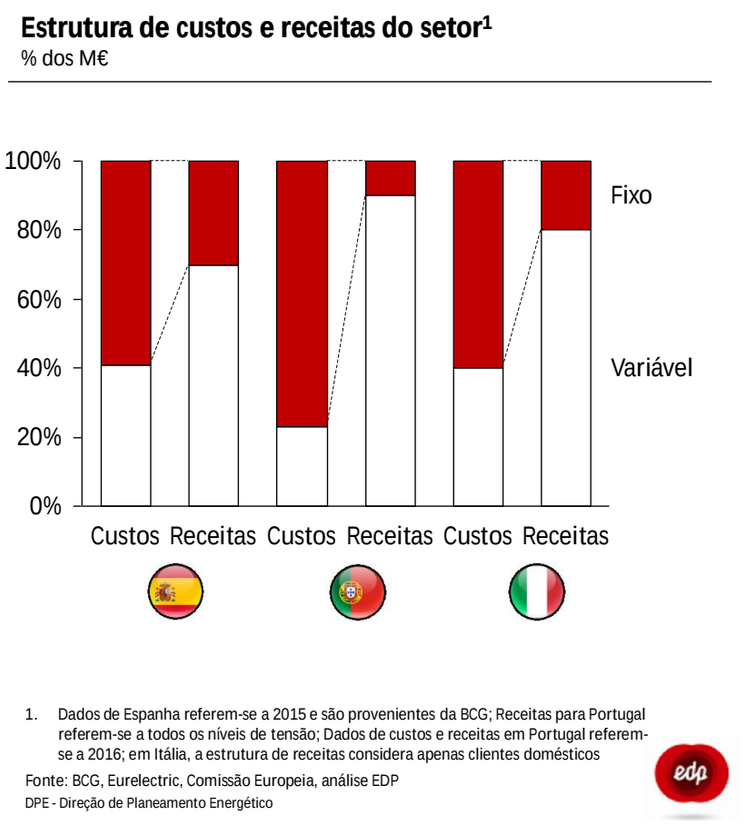
Source: Environmental Defense Fund (blog)

Pricing strategies

Towards increasing cost-reflectiveness

- Cost-reflective price scheme
  - Towards non-linear **pricing schemes**:
    - Change the current (mostly) volumetric system
    - **Cost-reflective system** (that accounts for the different costs imposed on the network by different profiles of users)… the case of telecoms?

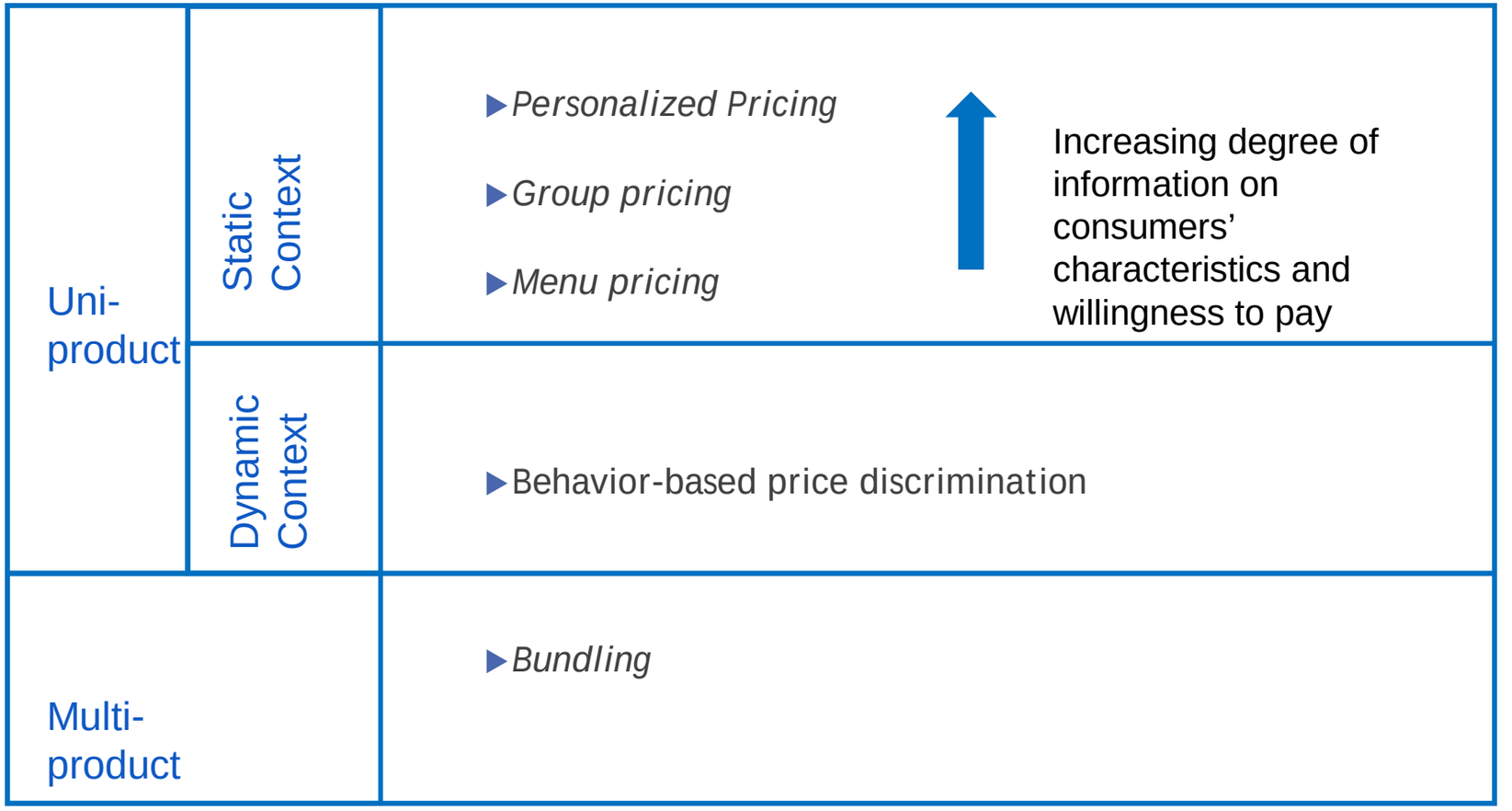
Cost and Revenue structure in the Power Sector



Source: EDP (2017)

Pricing strategies

New forms of price discrimination



Source: Own Ellaboration based on Belleflamme and Peitz (2015)

Pricing strategies
New forms of price discrimination

- Monopolist market structure : Price Discrimination boosts firms' profit at the expenditure of consumers' welfare
- Oligopoly markets (with perfect information & best-response asymmetry – Corts 1998),
  - Price Discrimination benefits consumers
  - Firms' profit is lower with Price Discrimination (e.g. Personalized pricing or BBPD) than with Uniform pricing
    - Thisse & Vives (1988) – In each point of the Hotelling line, there is Bertrand competition (with asymmetric firms) – Prisoners' Dilemma
    - Fudenberg & Tirole (2001) – price strategies to poach consumers in the rival's turf end up hurting firms

Pricing strategies
New forms of price discrimination

"Economic reasoning suggests that differential [personalized] pricing, whether online or offline, can **benefit** *both buyers and sellers...Thus, we should be cautious about proposals to regulate online pricing – particularly if we believe that online markets are particularly competitive."*

in "Big Data and Differential Pricing", February 2015, Executive Office of the President of the United States

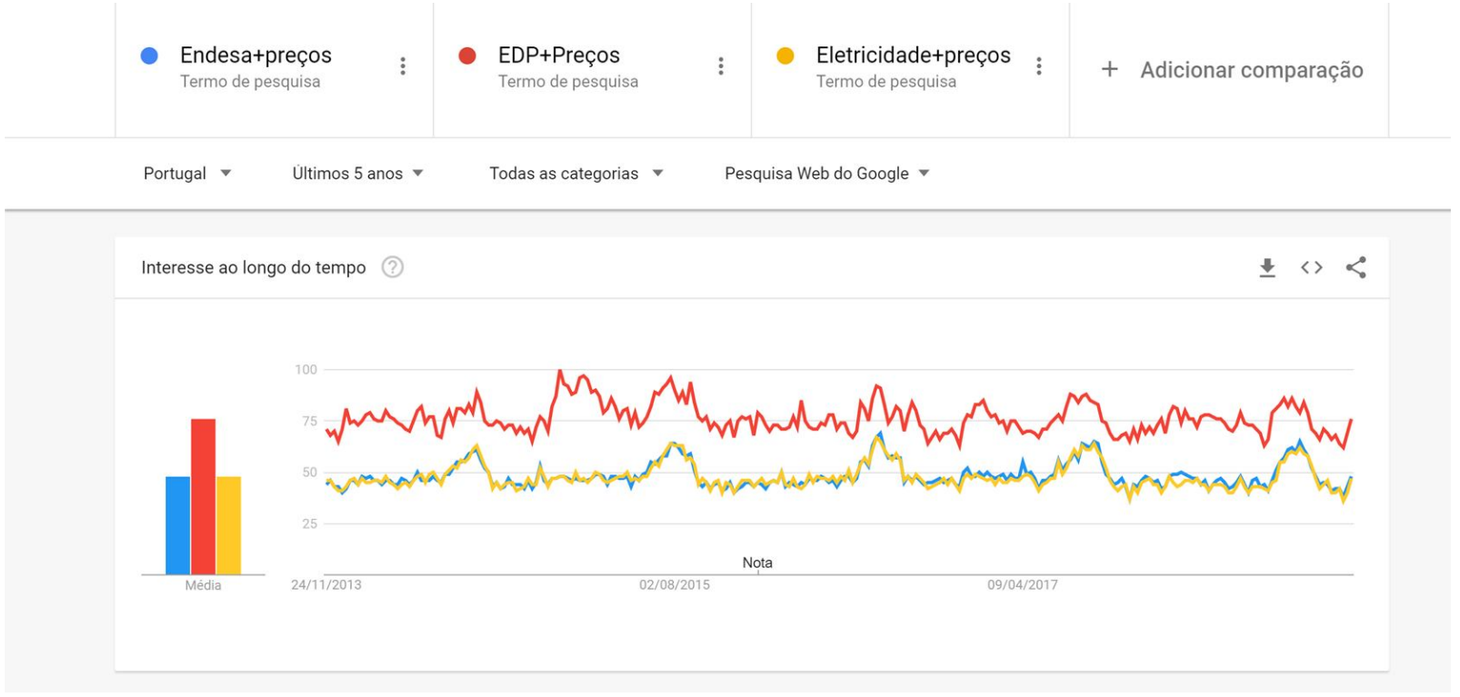
"Price discrimination under customer recognition ... is by and large **unlikely to raise significant antitrust concerns**. *In fact, as the economics literature suggests, such pricing practices in oligopoly markets often intensify competition and potentially benefit consumers."*

in Chen (2005), "The Pros and Cons of Price Discrimination", The Swedish Competition Authority

Pricing strategies
New forms of price discrimination

"In the online environment, price targeting may be much **less transparent** *which may mean that* **consumers do not shop around** *sufficiently or find it harder to compare prices. The use of online tracking also raises the same privacy objections as targeted advertising."*

in Office of Fair Trading, OFT1231, 2010



Source: Google Trends (November, 2018)

Pricing strategies

New forms of price discrimination

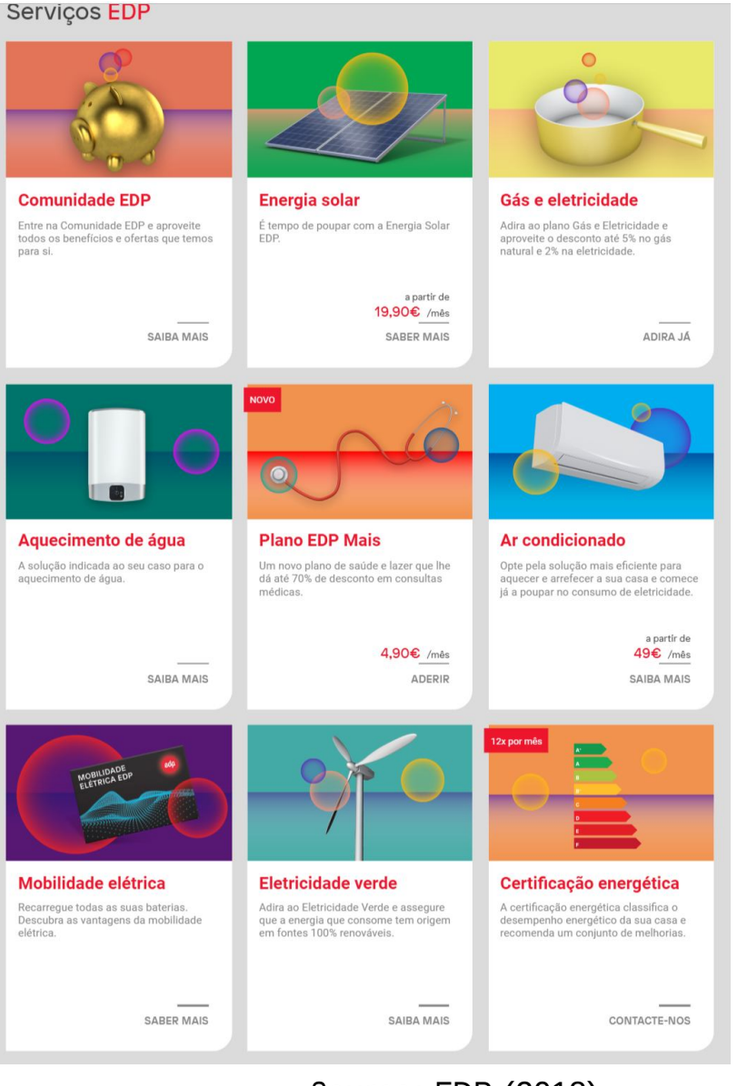
"On the one hand, consumer groups may push for legislation to require public posting of prices or transparent description of prices. They might push for adoption of technology that would aid in price search. On the other hand, sellers could engage in a number of ***obfuscation techniques*** *that would make price search more difficult. They could encourage manufacturers to proliferate model numbers, making comparison of essentially identical models across retailers difficult. They might make prices hard to find on a website or in a physical store. They might engage in strategies such as add-on pricing and upselling, where the efficient quality to be selling to most consumers is actually an upgrade of the advertised product and therefore potentially more difficult to search for"*

Ellison (2016), Handbook on the economics of retailing and distribution

Pricing strategies

New forms of price discrimination

Source: ERSE (2018)



Source: EDP (2018)

Pricing strategies
New forms of price discrimination

- Consumers may actually be harmed by new forms of price discrimination

  - Firms' heterogeneity (e.g. Shaffer e Zhang, 2002);
  - Multi-dimensional product differentiation (e.g. Esteves, 2009b);
  - Possibility of doing retention offers to consumers who switch between rival retailers (Esteves, 2014)
  - Optimal product placement (Choe *et al*., 2017) and too much variety to relax price competition (Ghose and Huang, 2009);
  - Targeted information about the characteristics of the products (Esteves e Resende, 2016 and 2018).

New regulatory Challenges
Towards a new regulatory paradigm

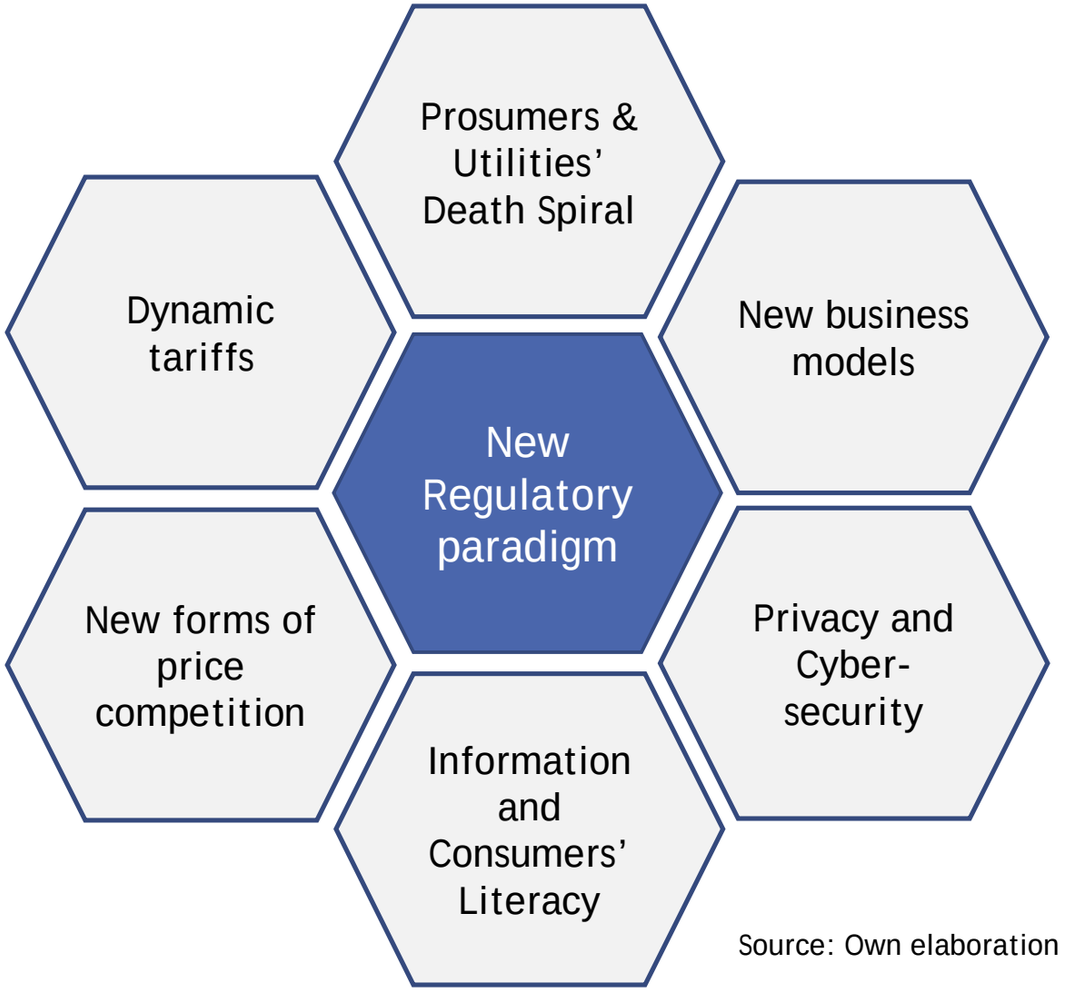
- Conventional regulation:
  - Focused on cost/ revenue control (natural monopoly phases of the value chain):
    - Transportation;
    - Distribution;
  - Focused on quality of service (within the context of the conventional electricity value chain)

New electricity paradigm:

- Adapt conventional regulatory tools (E.g. implemente dynamic tariffs that sponsor demand-side management through appropriate price signals)
- Design new regulatory tools in order to promote:
  - Appropriate investment incentives;
  - Efficient production and consumption decisions within a decentralized network;

New regulatory Challenges

Towards a new regulatory paradigm



Source: Own elaboration

Conclusions

- New electricity paradigm: more sustainable, more decentralized, storage, demand-side response, electric mobility, digital, new business lines and market players …
- The new paradigm empowers consumers but it also calls for more sophisticated consumers
  - Production decisions (prosumers) in a decentralized market
  - Ability to deal with increasingly complex and sophisticated product offers and pricing schemes:
    - Dynamic pricing
    - Cost-reflective pricing schemes
    - New forms of price discrimination
  - **Regulatory innovation** is key to allow a smooth transition to the new electricity paradigm and take full advantage of the economic benefits generated by the digital transformation within the electricity sector:
    - Multi-disciplinary approach to deal with new service-based products (growing importance of IT and computer-science skills);
    - Shift from cost/ price regulation towards consumers' empowerment and market monitoring;
    - Privacy and cybersecurity at the heart of regulation of the new electricity systems.

THANK YOU!!!

OBRIGADA ☺

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