

DEMAND RESPONSE

**WHERE DO WE STAND, WHERE DO WE GO AND HOW DO WE GO
CHALLENGES, OPPORTUNITIES AND PERSPECTIVES**

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**CIGRE – DEMAND RESPONSE SEMINAR
SÃO PAULO DECEMBER 15, 2016**

ROADMAP

- 
- Disrupting the Use-of-Energy Markets
 - Demand Response Business Models
 - Informing DR Through Economics
 - Final Remarks

DISRUPTING THE USE-OF-ENERGY MARKETS

FROM ASSET-BASE & ENERGY VALUE CHAIN TO USER-CHOICE SERVICES

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DISTRIBUTED ENERGY RESOURCES: SETTING THE SCENE

Key Facts

- Emerging technologies are disrupting the energy supply chain
- Consumers' behavior have changed and actively exercising choice
- Utilities & regulators remain applying "old framework" in how to react to DER disruptions

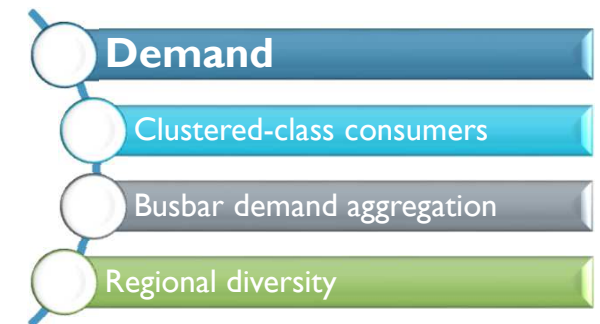
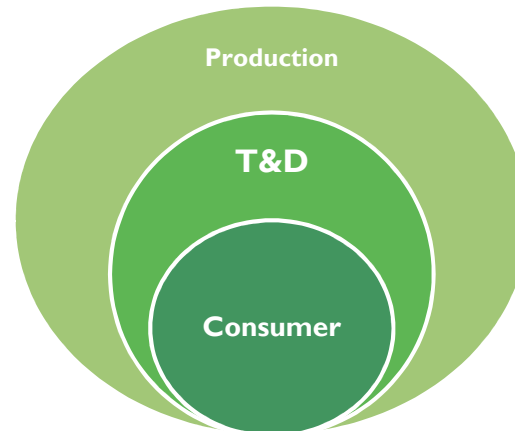
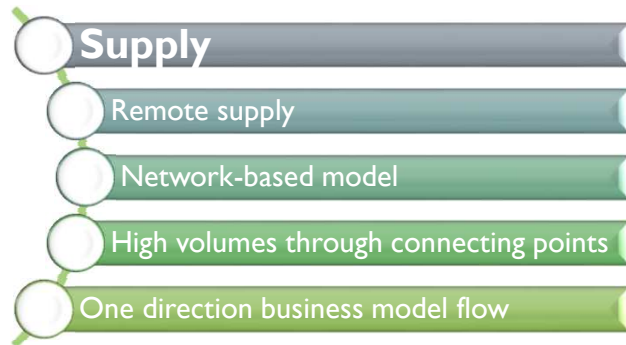
Three emerging questions in this energy landscape:

What are the new business models & players in the markets?

What are the (expected) policies guiding the market?

What to regulate: subject, role and how regulators will adapt?

CURRENT WISDOM: OLD FASHIONED ENERGY SUPPLY CHALLENGES



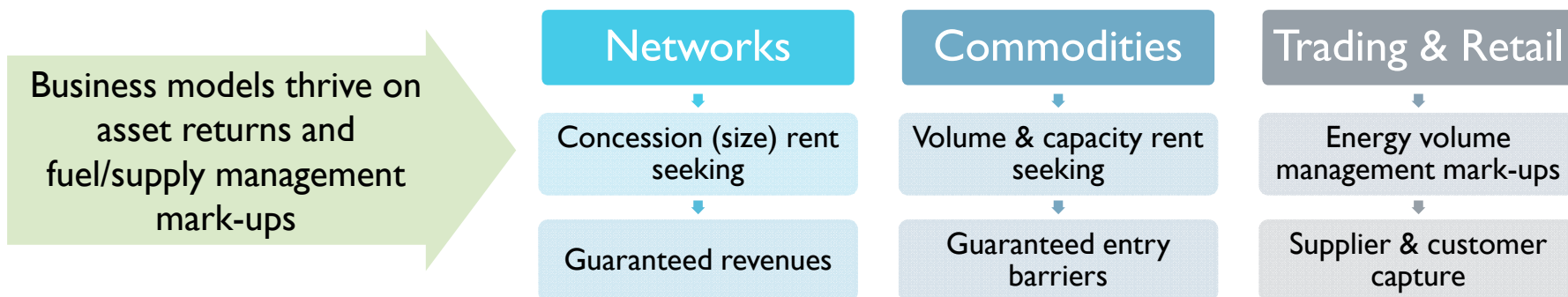
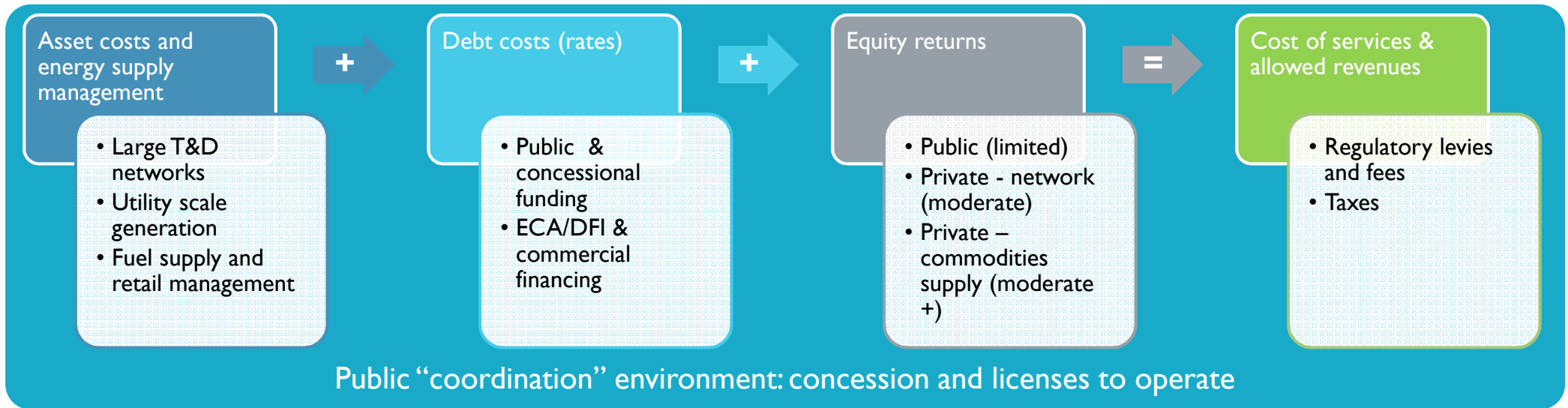
Legal Framework

- Rigid system planning
- 100 years old value chain model
- Asset-based regulations
- Tariff-based services

Ownership Structure and Funding

- Public ownership
- Concession-based PPP structures
- Mortgage-based on public, concessional and commercial financing

CURRENT WISDOM: MORE EFFICIENT '100 YEARS OLD' BUSINESS MODELS



DISRUPTING THE CURRENT WISDOM: TECHNOLOGY AND BEHAVIORAL CHANGES LEADING TO “NEW” BUSINESS MODELS

Technology Disruptions

- Fast, reliable & Mobile Telecoms
- Web-based IT
- Bounded demand systems efficiency
- Smart grid-customer interface
- Small size renewables generating & storage
- Big data

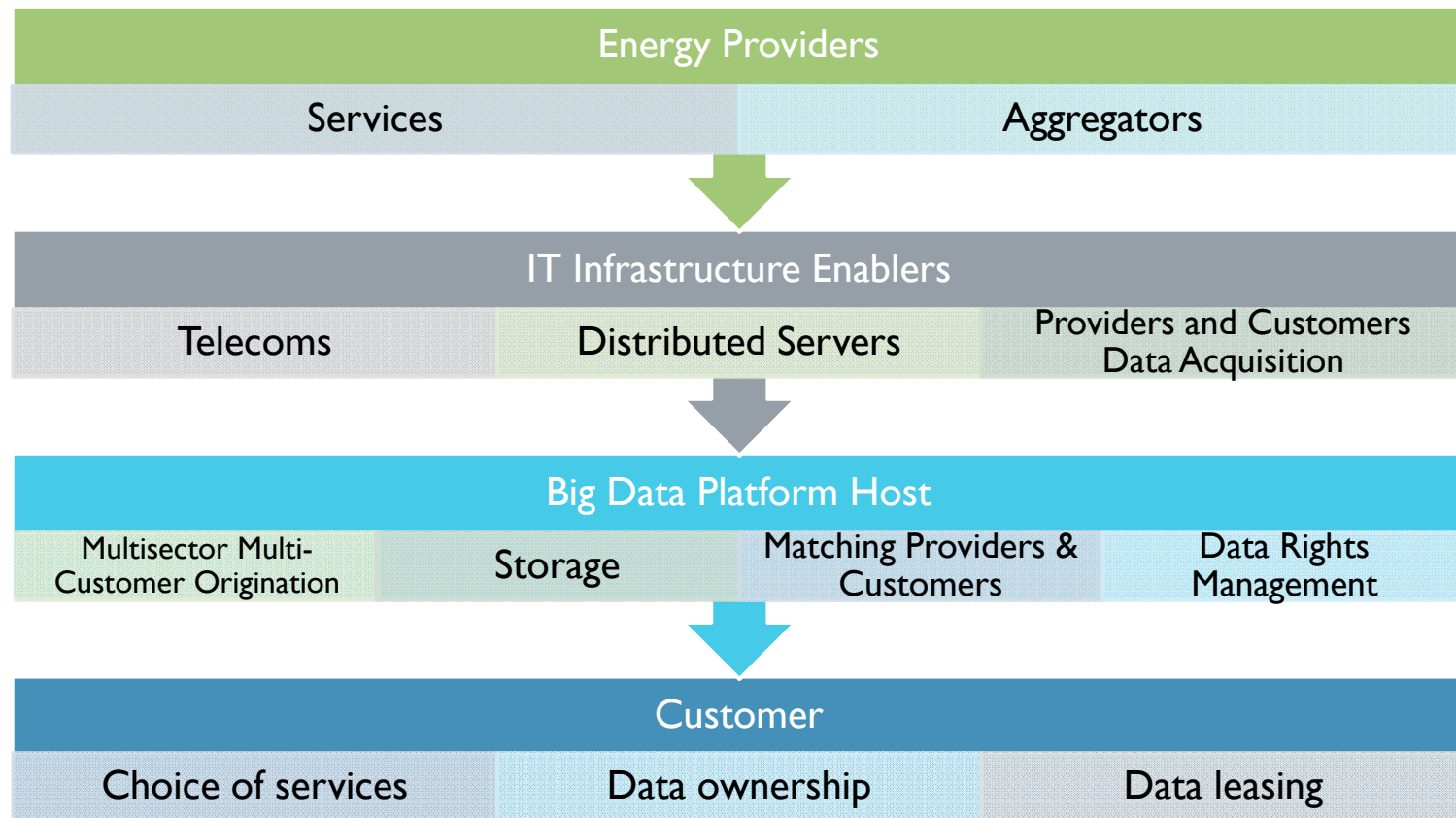
Behavioral Changes

- IT Services Platform
- Predominance of customer's choices, not consumer
- Clustered energy services, not supply
- Millennium investor approach

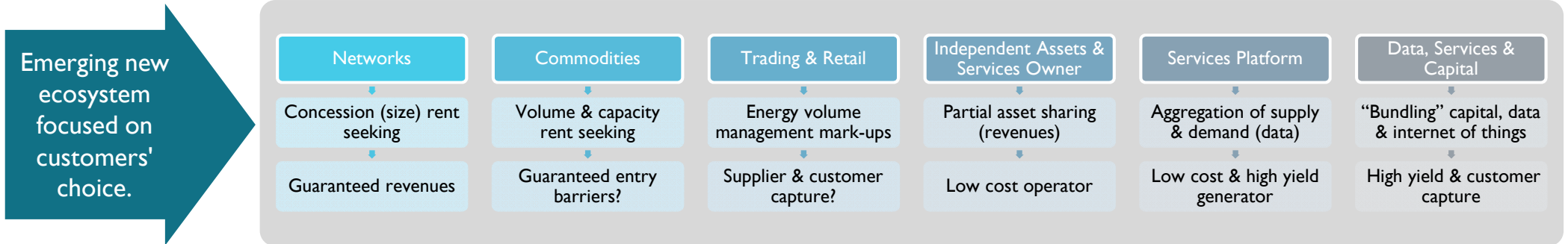
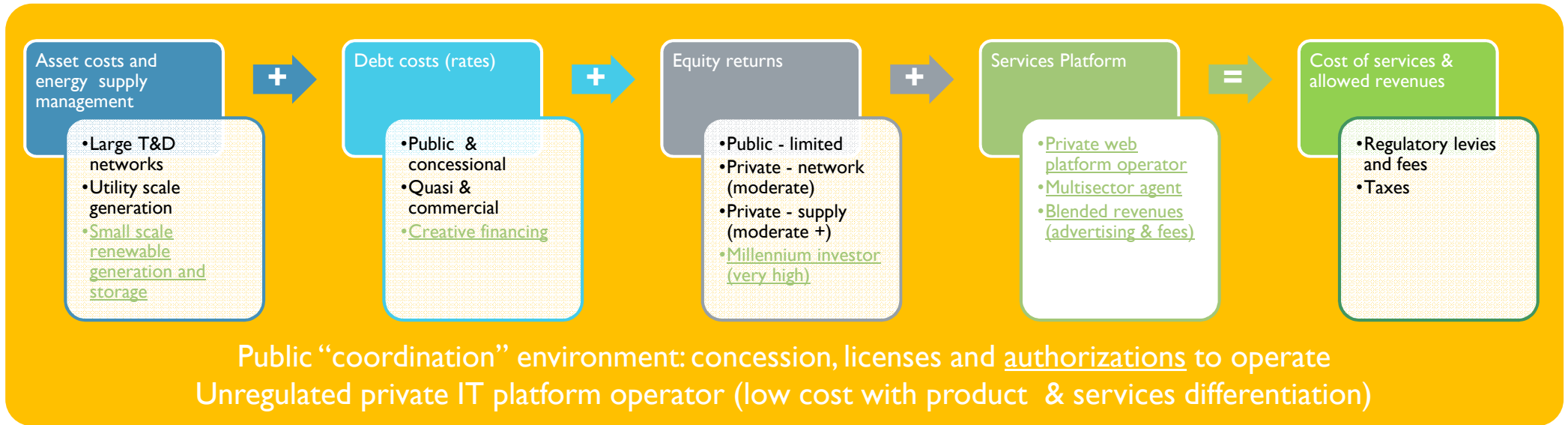
New Business Models

- Aggregator platform (yields seeker)
- Shared-asset usage (joint & part-time)
- Convergence of services trading
- Blending financing

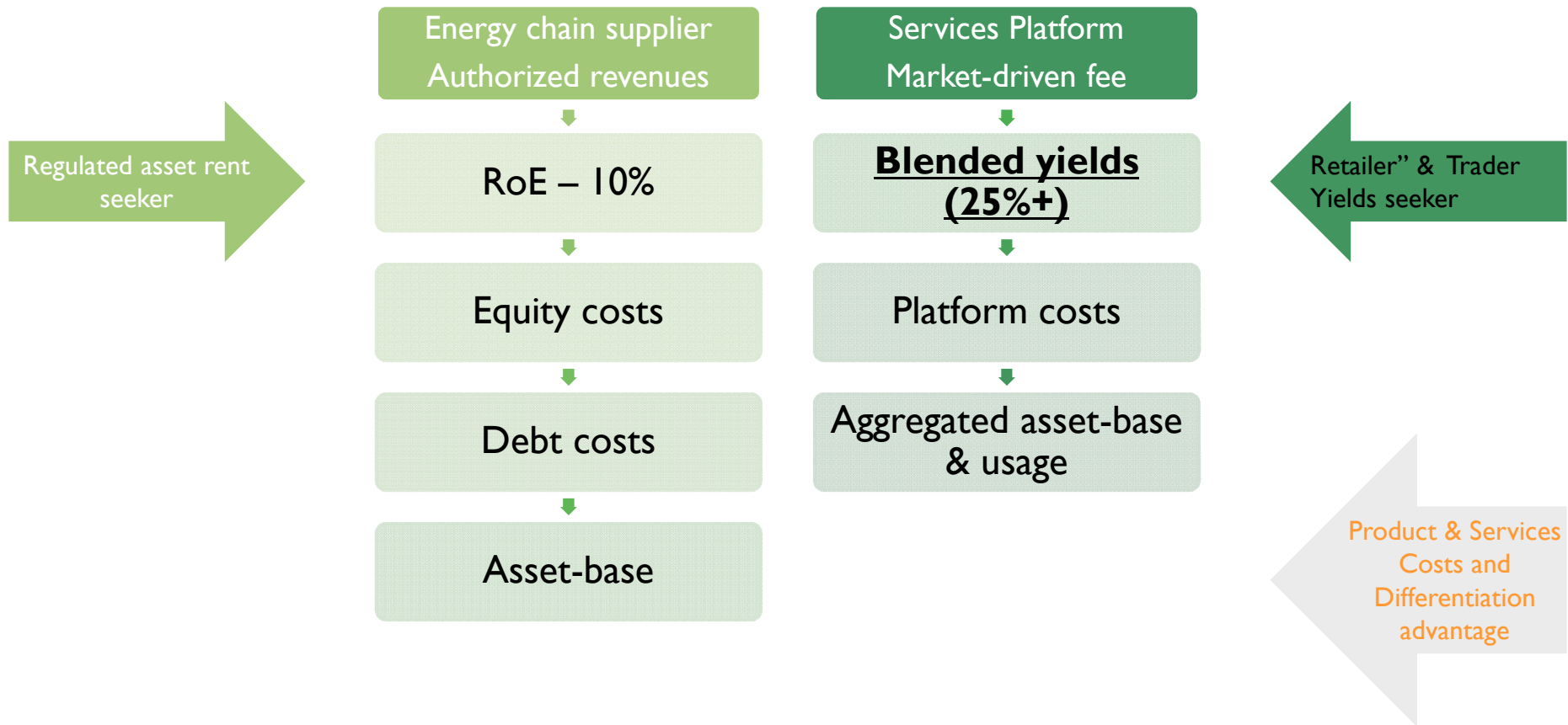
INTRODUCING “NEW” BUSINESS MODELS WRAPPED BY BIG DATA AND THE INTERNET OF THINGS: NAVIGATING IN UNCHARTERED WATERS



DER PARADIGM: A NEW ECOSYSTEM FOR BUSINESS MODELS



COEXISTENCE OF BUSINESS MODELS?



DEMAND RESPONSE (BUSINESS MODELS)

DEMAND RESPONSE BUSINESS MODELS

Demand Response Encompasses a Large Category of Technologies and Applications

Different BM emerge in each category

Automatically activated in response to price signals

Manually in response to requests from the DR business

Via alternative dispatch signals.

PRICE - BASED DEMAND RESPONSE

(TOU, CPP, RTP)

Does not require the load to be verifiable.

Dynamic Pricing (CPP, RTP):

Trade-off: more accurate prices

Pilot programs

technological constraints

institutional constraints (absence of spot prices reflecting short-run marginal costs on a real-time basis).

Complexity, higher transaction costs

Efficiency



How reliable it is as a dispatchable load?



Pilot programs tailored to critical areas?

INCENTIVE-BASED DR

INCENTIVE-BASED



Demand-side bidding, interruptible demand, and direct load

More fit to deal with sudden contingencies.

How to define the value of reduction?

EFFECTIVENESS



Rate of adhesion policy

Complementary technologies

Market mechanisms

Consumer engagement

DEMAND RESPONSE (DR) IN BRAZIL AS A RESOURCE

Potential for becoming a cost-effective source of flexibility for the system in the short, medium and long-term

IN BRAZIL:



Time Of Use Tariffs
(ToU)

Interruptible
Contracts (Past)

Tariff Flags (Low Voltage)

Blue and Green Flags (High Voltage)

White Tariffs:

Voluntary adhesion

Requires smart meter



Who will be the contracting party of DR programs?

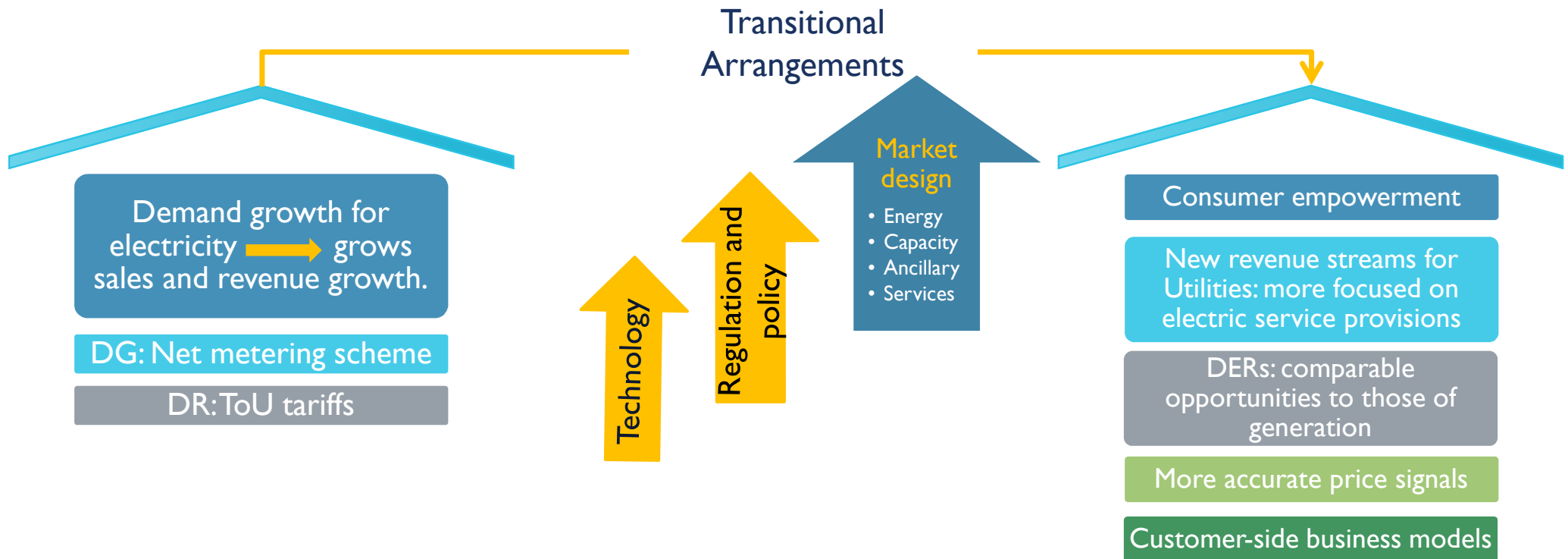


How will the provider be remunerated?

THE NEED OF A NEW REGULATORY FRAMEWORK TO LAUNCH DEMAND RESPONSE AS A RESOURCE



OUR APPROACH



GOVERNANCE OF THE TRANSITION

Challenge: disruptive changes, pace of technology innovation, a new paradigm.

A dynamic framework for assessing priorities and recommendations, and acting on them to provide a sound regulatory and competitive environment must be drawn.

Requires a comprehensive and integrated strategy

- active engagement of external stakeholders.
- interagency dialogue

The executive power: leadership role in orchestrating the interaction of multiple stakeholders

- Acknowledge all stakeholders as strategic players.

Integrated view of short, intermediate, and long-term objectives involving various actors and sectors.

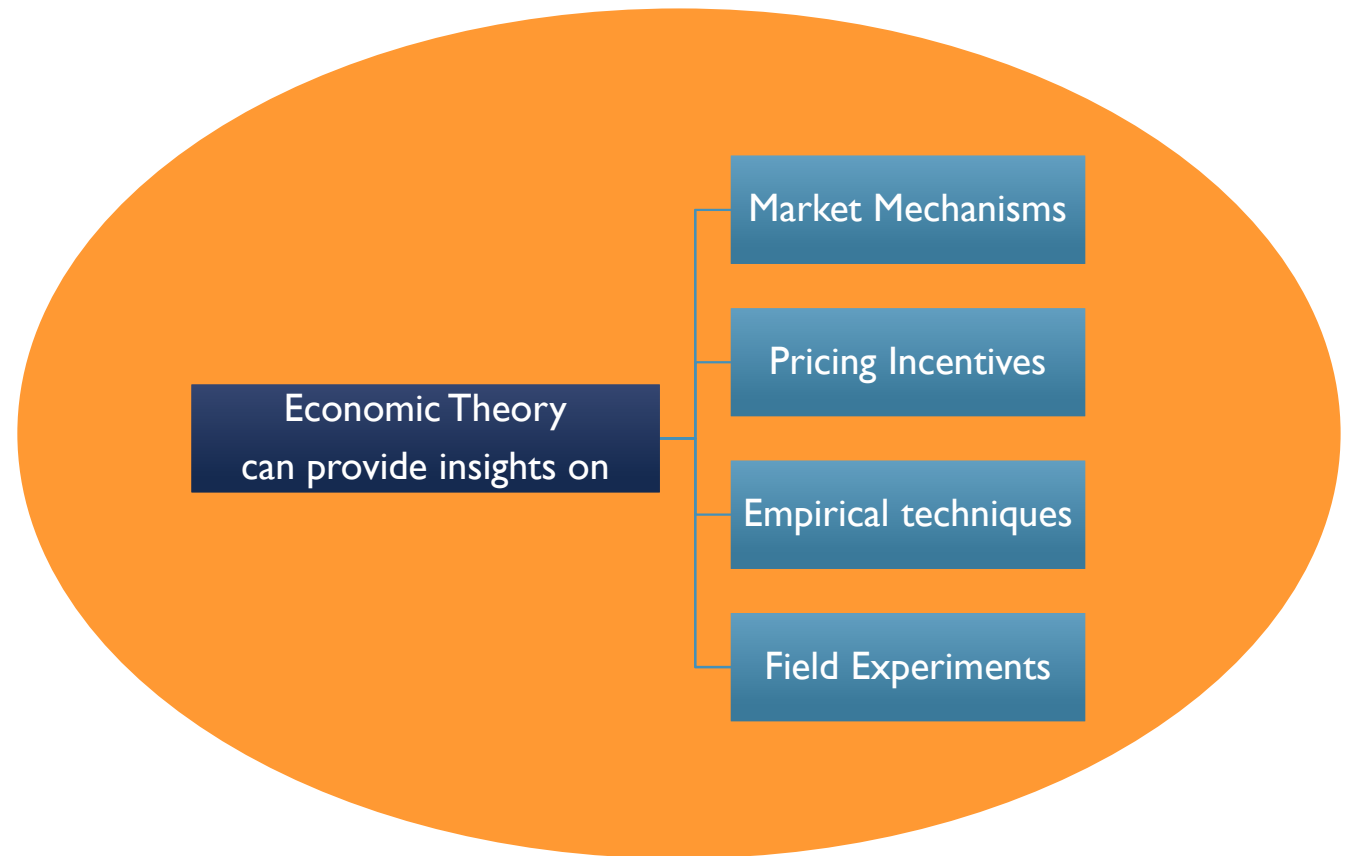
Aneel “Chamada 20” R&D is an important step in this direction – necessary but not sufficient.

Quadriennial Energy Review (QER): An interagency Task Force, which includes members from all relevant executive departments and agencies (agencies) to develop an integrated review of energy policy that integrates all of these perspectives.

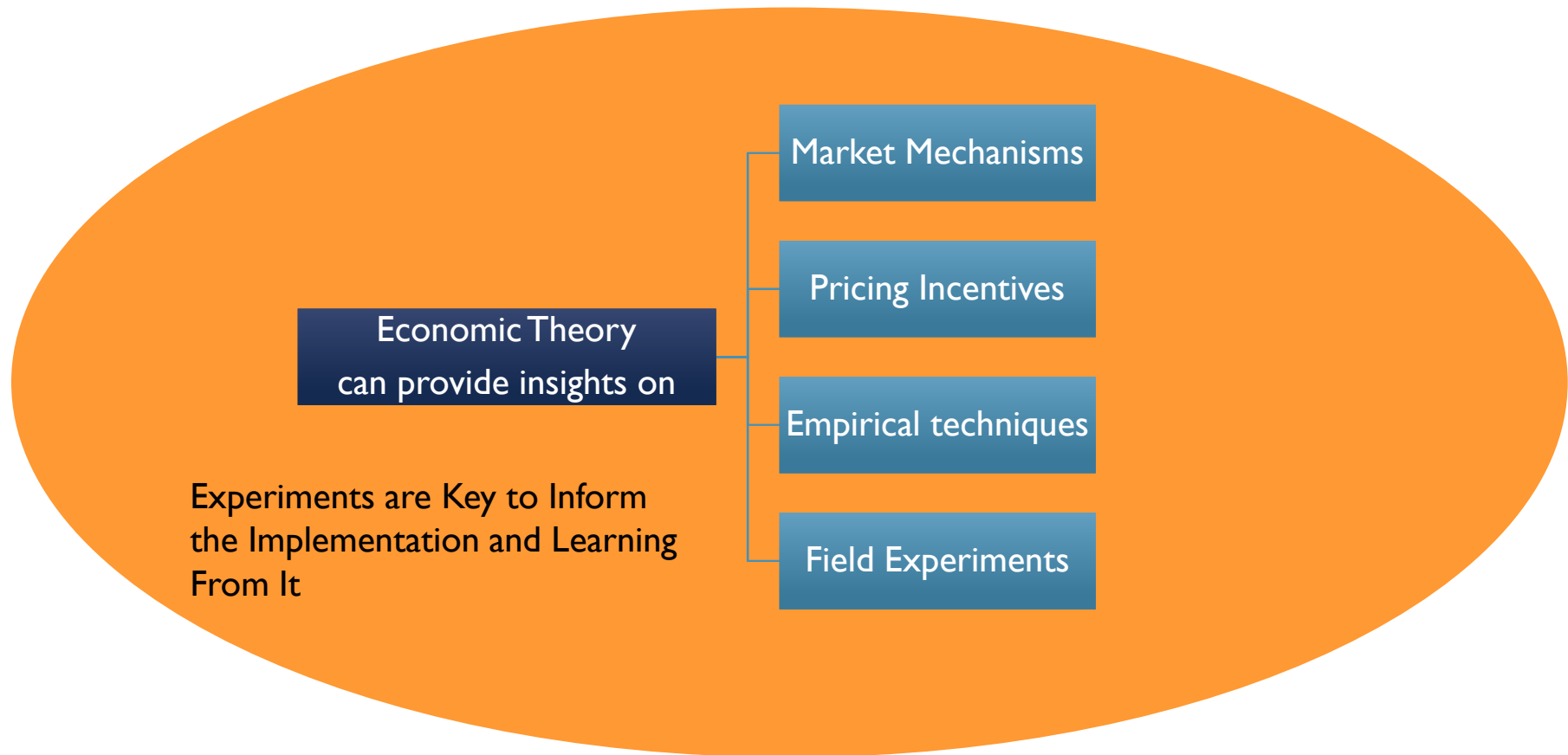
INFORMING (AND IMPROVING EFFECTIVENESS OF) DR THROUGH ECONOMICS

CONSUMER ENGAGEMENT CAN BE FOSTERED BY INSIGHTS COMING FROM ECONOMIC THEORY

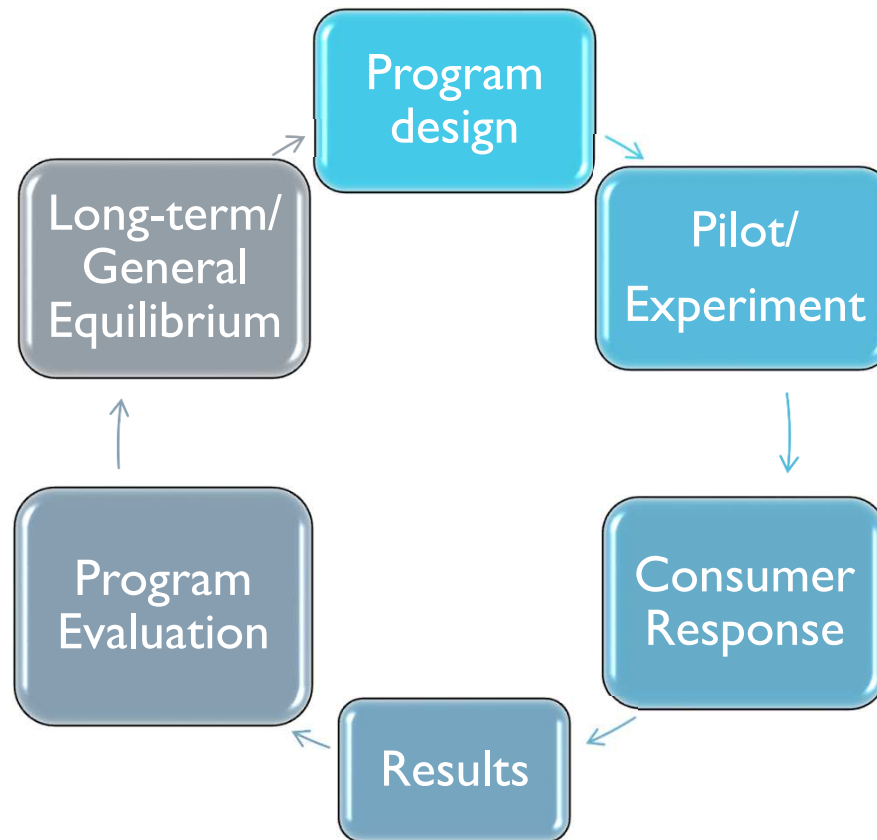
- Understanding Consumer Elasticity is key for unlocking the potential of DRs and SG Technologies.
- Behavior Science can shed some (a lot!) light.



CONSUMER ENGAGEMENT CAN BE FOSTERED BY INSIGHTS COMING FROM ECONOMIC THEORY



ECONOMICS + BEHAVIORAL SCIENCE



BEHAVIORAL SCIENCE HELPS TO UNLOCK DR POTENTIAL

Economic Theory, network engineering and behavior science can help unlock the full potential of SG technologies

Economics: In a general equilibrium setting peak and off-peak prices will depend on consumer adhesion and response rate.

How will consumers react to incentives? Price is not the main determinant of electricity demand.

Behavior Science is crucial in understanding and engaging end-users for an optimal program design and evaluation.

FINAL REMARKS

KEY MESSAGES

The (ongoing) process of weakening the traditional value chain barriers expose incumbents and leads to a cream skimming process

The entitlement of franchise(e) to supply energy is ending

Isolated perspective myopia: new businesses involving multiple sectors are evolving and capturing profitable mark-ups/margins

New business models ecosystem is emerging as key feature of demand response

Value is being squeezed through the emergence of combined low cost operator and service differentiation

Incompleteness of regulations and unwillingness of regulators to evolve

Positioning, rivalry and tension could characterize relationship among stakeholders

Coexistence of "Old" and "New" models are expected to stay for a while

FGV CERI AND WORLD BANK ENERGY, LATIN AMERICA AND CARIBBEAN (LCR) PARTNERSHIP

- This presentation is part of a series of works being developed under a collaboration between FGV CERI (the Center for Studies in Regulations and Infrastructure-CERI at Fundação Getulio Vargas) and the World Bank (WB) to address key topics related to infrastructure investments in Brazil.
- The ideas discussed in these slides were presented by Prof. Joisa Dutra in São Paulo during the Demand Response event sponsored by CIGRE in São Paulo (December 15, 2016). They capture some of the thinking & perspectives current in discussions at FGV/CERI and the WB.



GRUPO BANCO MUNDIAL



*Centro de Estudos
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THANK YOU!

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