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Innovation Process in the Brazilian Electric Sector

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Summary

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ANEEL R&D PROGRAM

ANEEL R&D PROGRAM is one of the main driver for innovation in the Brazilian Electrical Sector

The law 9.991 of 2000 created the ANEEL R&D program, the **main regulatory tool to promote innovation in Brazilian electric sector**

Investment program that obligates companies from Generation, Transmission and Distribution segments to **invest in innovation projects**

- Companies **must invest 1% of its NOI in projects to promote R&D**. Such resources are managed as follows:
- 40% regulated by ANEEL
- 40% by the Science, Technology and Innovation Ministry
- 20% by the Mines and Energy Ministry

Between 2000 and 2007 the program **allocated approximately USD 900 Million in its first stage** and around **USD 2.5 Billion in its second stage** (from 2008 to 2014)

The **main challenge** that emerges is how to **establish a systemic environment to increase the efficiency and efficacy of the R&D projects** and to promote innovation in the Brazilian Electric Sector

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Introduction

A Motivation

a) **Innovations in generation and transmission** segments are triggering changes in the electric sector

b) New technologies of energy usage and **IT systems**

c) Conditions to create and consolidate a **Sectorial Innovation System**

B Hypothesis

a) There is an eminent necessity to promote a **deep and critical assessment of the ANEEL R&D program**

b) Opportunities for improvements regarding **regulatory innovations** for the electric sector **based on the regulatory framework**

C Goals

a) Present the **preliminary results of the assessment conducted for ANEEL R&D program, between 2008 and 2014**

b) Identify and mitigate bottlenecks for new technologies diffusion

c) Present the methodology to be used in the **next phases of this project**

Methodology and conceptual framework

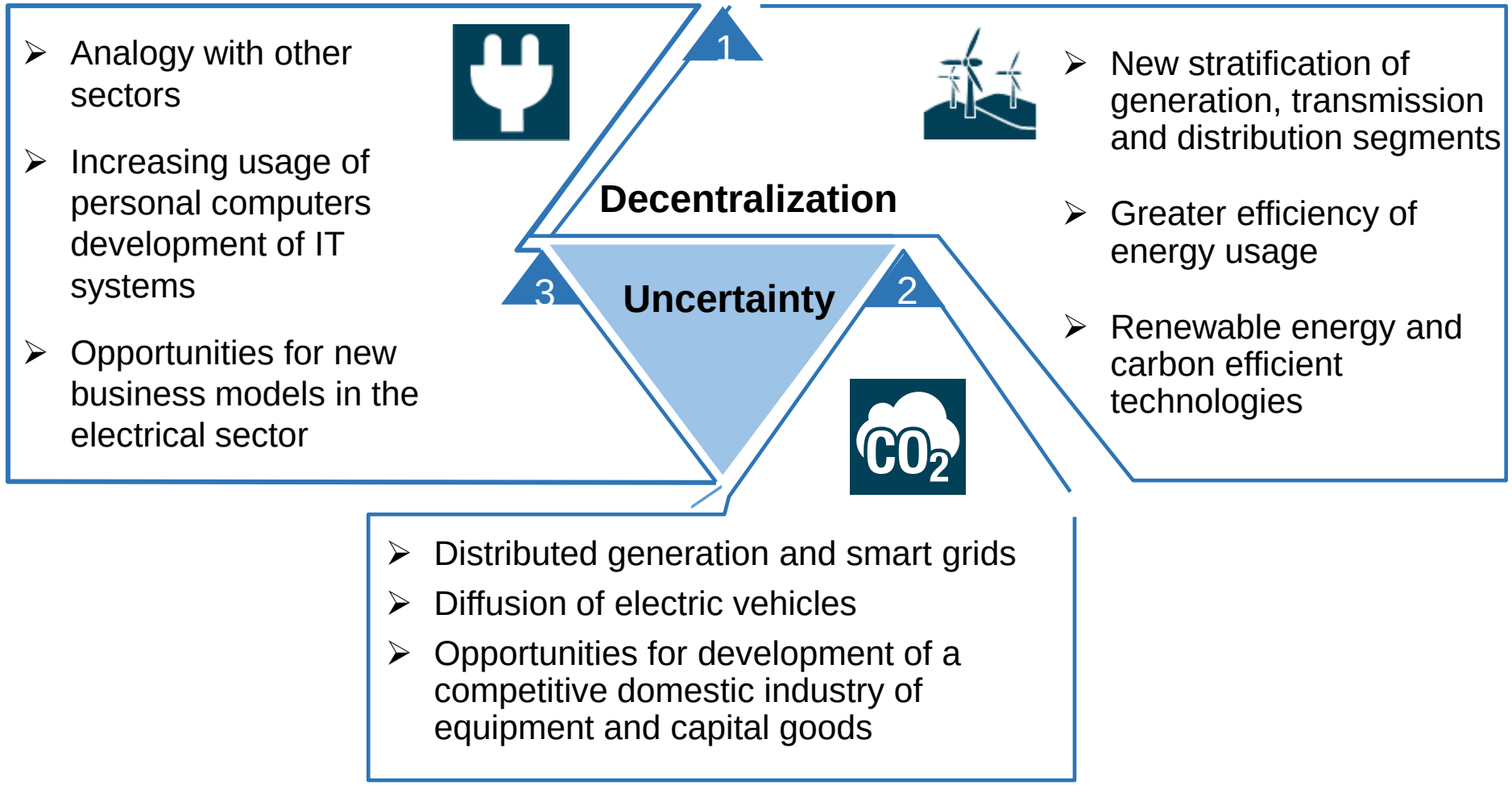
Background

- Assessment of the previous study conducted by ANEEL that assessed the R&D projects benefits - cycle 2000 and 2007:
  - Such study triggered several improvements in ANEEL Program, which originated a second cycle of project development
  - Need to conduct a formal, critical and systematic assessment of the impacts engendered by these improvements
- Study developed by the Strategic Studies and Management Center, which assessed the ANEEL project public database

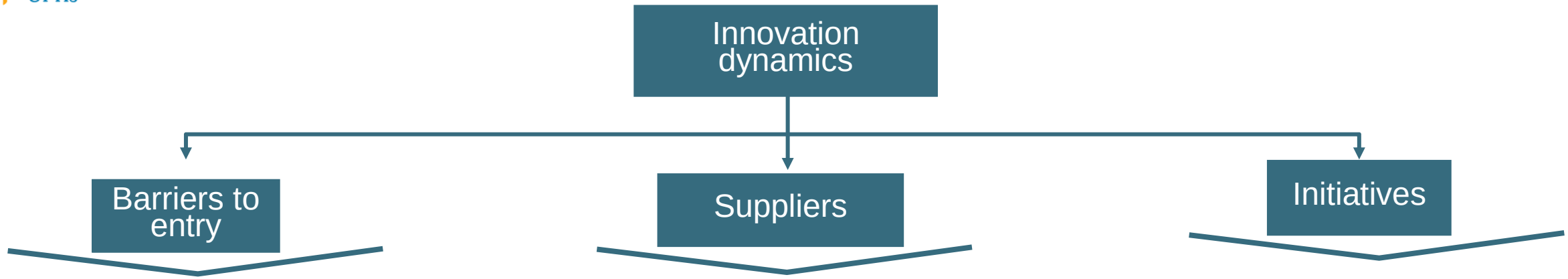
Objectives

- Propose regulatory innovation, in order to maximize the R&D project value creation potential
  - The regulatory innovation will consider the international experience and standards and the innovarion strategy in several countries

Methodology and conceptual framework



Methodology and conceptual framework



- High barriers to entry for national companies
- High-tech solutions but tested in different markets
- Capital-intensive investments with long-time horizon

- Traditionally the main responsible for promoting innovation in the supply chain
- Innovation takes place in systems and equipment upgrading
- Highly internationalized agents

- Importance of ANEEL R&D program to overcome the lack of research and development initiatives and the dependence scenario

As Pavitt (1984) pointed out, dynamics innovation in a sector relies on global players, from the implementation of new plants and equipment to maintenance and expansion of generation, transmission and distribution systems

ANEEL R&D Projects and the IC

Quantity and cost of projects according to their stage in the innovation chain 2008-2014

Stage in innovation chain	Quantity	Total (MM USD)	% of total value
Basic research	72	31	3,0
Applied research	682	553	53,0
Experimental Project	368	384	36,7
Head of series	86	54	5,2
First batch	26	22	2,1
Market insertion	1	0	0,0
Total	1235	1044	100

Source: ANEEL

Investments in R&D projects by phase of assessment

Quantity of projects and value invested in R&D projects 2008 - 2014

Year of beginning	Initiated projects		Concluded projects		Assessed by ANEEL			
	Quantity	Value (MM USD)	Quantity	Value (MM USD)	Quantity	Value (MM USD)	Recognized value (MM USD)	% Recognition
2008	30	9	20	5	15	3	2	46,2
2009	102	89	74	66	49	49	34	70,3
2010	293	180	151	63	82	36	22	61,0
2011	301	205	94	41	43	20	10	50,6
2012	255	290	33	145	21	98	60	61,3
2013	98	101	2	0	1	0	0	100,0
2014	156	174	0	0	0	0	0	-
Total	1.235	1.048	374	320	211	206	504	62,1

Source: ANEEL

Investments in R&D projects by area

Quantity and value of investments in R&D projects under ANEEL regulation, by area 2008 – 2014

Year	2008 a 2011		2012		2013		2014		Total	
Issues	Quantity	Total (MM USD)	Quantity	Total (MM USD)	Quantity	Total (MM USD)	Quantity	Total (MM USD)	Quantity	Total (MM USD)
Alternative sources	70	83	40	135	11	23	17	30	138	271
Supervision and controlling	141	87	44	27	15	9	15	11	215	133
Operation	77	49	32	16	12	9	16	10	137	83
Environment	51	28	29	24	10	10	19	9	109	71
Planning	56	28	20	14	4	8	14	13	94	64
Energy quality	58	43	17	9	5	2	10	4	90	58
Measurement and billing	62	32	14	9	6	3	14	7	96	52
River basin management	18	18	14	24	4	2	5	2	41	46
Security	48	24	12	5	8	6	9	7	77	42
Energy efficiency	49	23	16	9	6	6	5	5	76	41
Thermal power	17	5	4	3	3	2	12	16	36	26
Others	79	62	13	13	14	22	20	59	126	156

Source: ANEEL

Enhancing the ANEEL R&D Program Value

1 Economic and technological impacts on Brazilian electric system

2 Qualitative impacts on BES

3 Impacts of the program on academic sector

Recommendations of Regulations and Public Policies for R&D and Innovation
Course II
Seminar/Conference
Book
Seminar

4 Impacts of the program on goods and services development for the electric sector

5 Value creation potential of the program and applicable suggestions

6 International best practices (regulatory and policies) to maximize the value creation of innovation programs

Conclusions

The great number of projects developed and the great amount of money allocated demonstrate the **success of the program in allocating resources for R&D**

An important alternative to promote evolution of R&D projects in the innovation chain is the possibility of **articulation with public and private promotion agencies** in order to use the **resources mobilized by ANEEL R&D program that are managed by the Ministry of Science, Technology and Innovation;**

A very important outcome of this study was the **low participation of major suppliers** of the sector, which also affects adversely the performance of the program

Acknowledgements

The proposed study is part of a two year project that has started in February 2016 and aims to provide a deep, formal and critical assessment of the ANEEL R&D Program between 2008 and 2015 as well as provide regulatory suggestions. We would like to give special thanks to ENERGISA and EDP for supporting this study