Coordination Capacity for Mission-Oriented Innovation — Brazil's Solar PV 'Transition'

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1. INTRODUCTION

Brazil is one of the 'greenest' economies in the world[1], with higher average sunshine hours than Europe[2]. Yet, Brazil is producing **less than 1%** of its electricity through **solar PV** (Fig. 1). At the same time fossil fuel use for electricity generation has increased to satisfy the still rising demand (Fig. 2). Why is this the case?

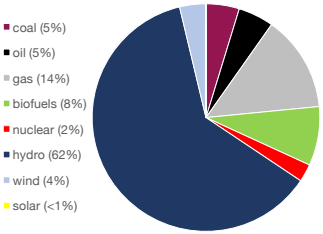

Fig. 1: Brazil's electricity mix 2015[3]

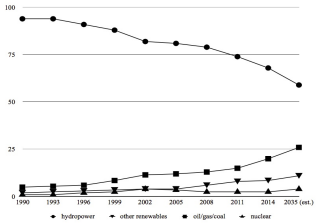

Fig. 2: Brazil's electricity mix over time in %[4]

Energy policy is embedded in **trade-offs** between energy supply security, energy access, and environmental sustainability, but also influenced by the craving for economic growth and industrialization. Innovations, such as solar PV, can be shaped by mission-oriented policies of an active **'entrepreneurial state'** [5] [6] and depend on the **coordination capacity** of the state[7].

Hence, the research question: To what extent and how can governance arrangements coordinate innovation networks to ensure that emerging technologies benefit missions in the public interest?

2. METHODOLOGY & LITERATURE

The project uses primarily **qualitative** data gathered from semi-structured **interviews**. To triangulate information, some quantitative data (from Brazil's Government and International Organizations) has been used.

The research project informs two bodies of literature:

- in innovation science: the **sustainability transitions** literature (adds to discussions about agency within governance arrangements that guide transitions towards sustainability)
- in public administration: the **coordination capacity** literature (bridging policy design coordination and implementation coordination).

3. PRELIMINARY FINDINGS

The energy sector in Brazil is shaped by an **institutional black box** (Fig. 3). Three crucial dynamics were unveiled:

- The **rigid energy regime** can obstruct innovation. The political system, administrative traditions, and the institutional constraints create a lack of accountability, jurisdictional overlaps, and limited capacity, further curtailed by vested interests.
- **Low funds** slow knowledge creation through R&D and universities. This causes an imple-mentation gap and increases stakeholder influence/power (e.g. Petrobras) on subjects with low resilience.

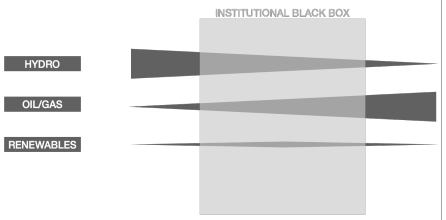

Fig. 3: development of energy sources passing through 'institutions'

- The **'Brazil Cost'**[8] (such as red tape or the cost to 'do business') disincentivizes niche development and solar firm growth. Competition in and for the market is distorted and market regulation is not independent.

An example is the converter 'trap': solar PV modules are mostly imported, due to limited domestic experience and local content requirements, making them extremely costly – 236% of the US market price[9] – and hence, uncompetitive.

The root of all three dynamics is a **lack of coordination in policy design and implementation**: too many organizations partake in both processes (Fig. 4).

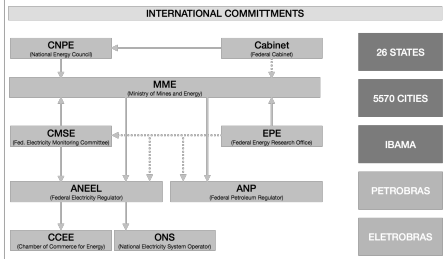

Fig. 4: energy policy coordination in Brazil (non-exhaustive)

A new approach: solar PV **auctions**, based on the fossil fuel example, provide new funds, trigger competition, and shift the objective towards environmental sustainability[10]. A model that can work, but needs refinement.

4. POLICY RECOMMENDATIONS

The following policy recommendations can be derived from these results:

1. Short-term: coordinate **regulation** – resolve conflicting/incoherent rules
2. Medium-term: coordinate **funding** – ensure financing models with a vision
3. Long-term: coordinate **organizations** – create a central innovation body

In addition, further research should look at similar cases in renewable energy but also regarding other technologies, comparing mechanisms that work best.

5. CONCLUSION

The organizational arrangement in Brazil promotes **path-dependence and lock-out** of solar PV. The lack of coordination is its primary cause. A coherent approach to **coordinate both policy design and implementation** based on mission-oriented innovation policies is required to innovate in the public interest. This could then turn Brazil's 'transition' around, towards a more sustainable direction – not just regarding renewable energy technologies.

Fig. 5: Brasilia's uncoordinated ministries![11]

Fig. 5: renewable energy implementation (wind/solar)[12]

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