THE ANATOMY OF SHIFTING RENEWABLE ENERGY TARGETS: A GLOBAL PERSPECTIVE

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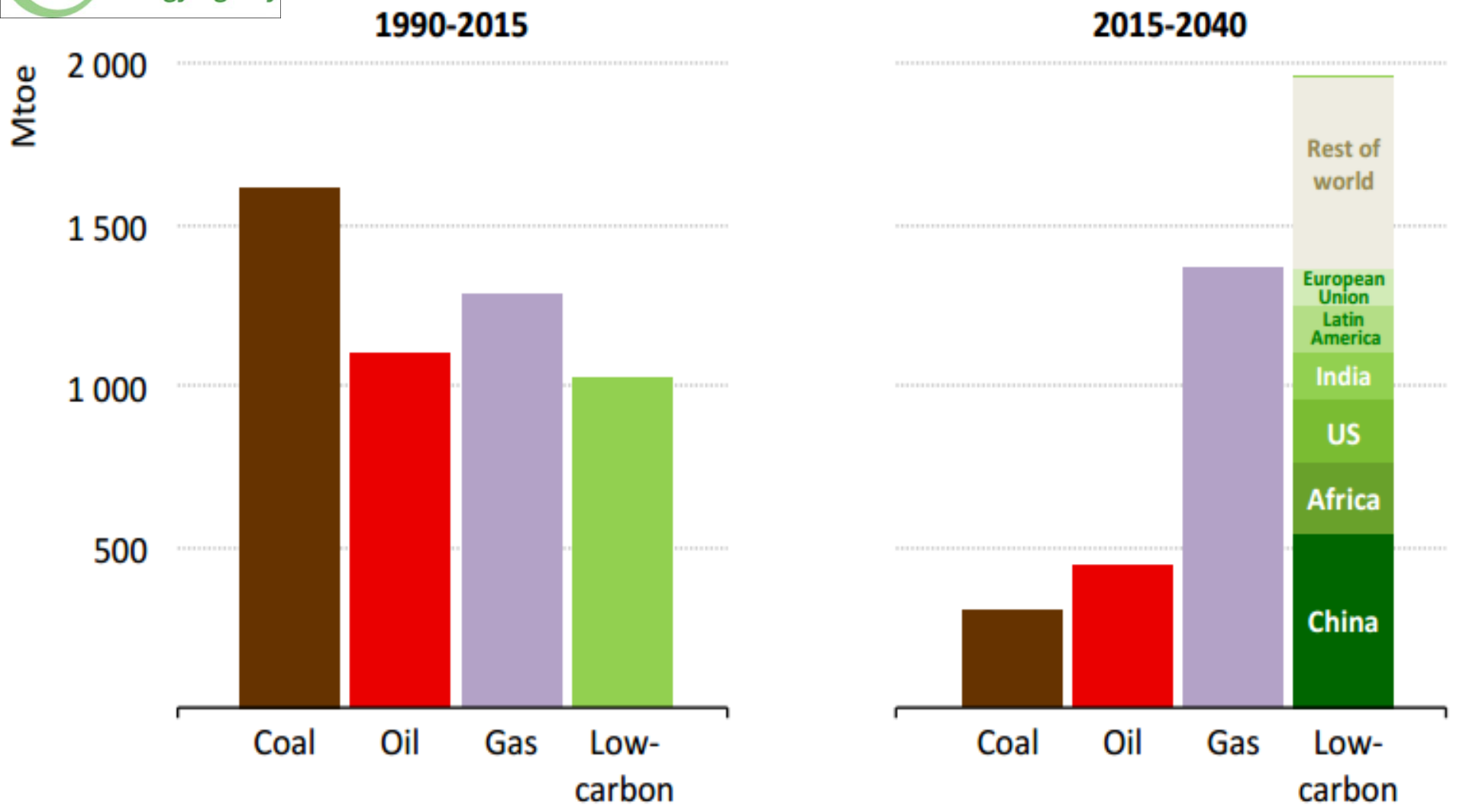
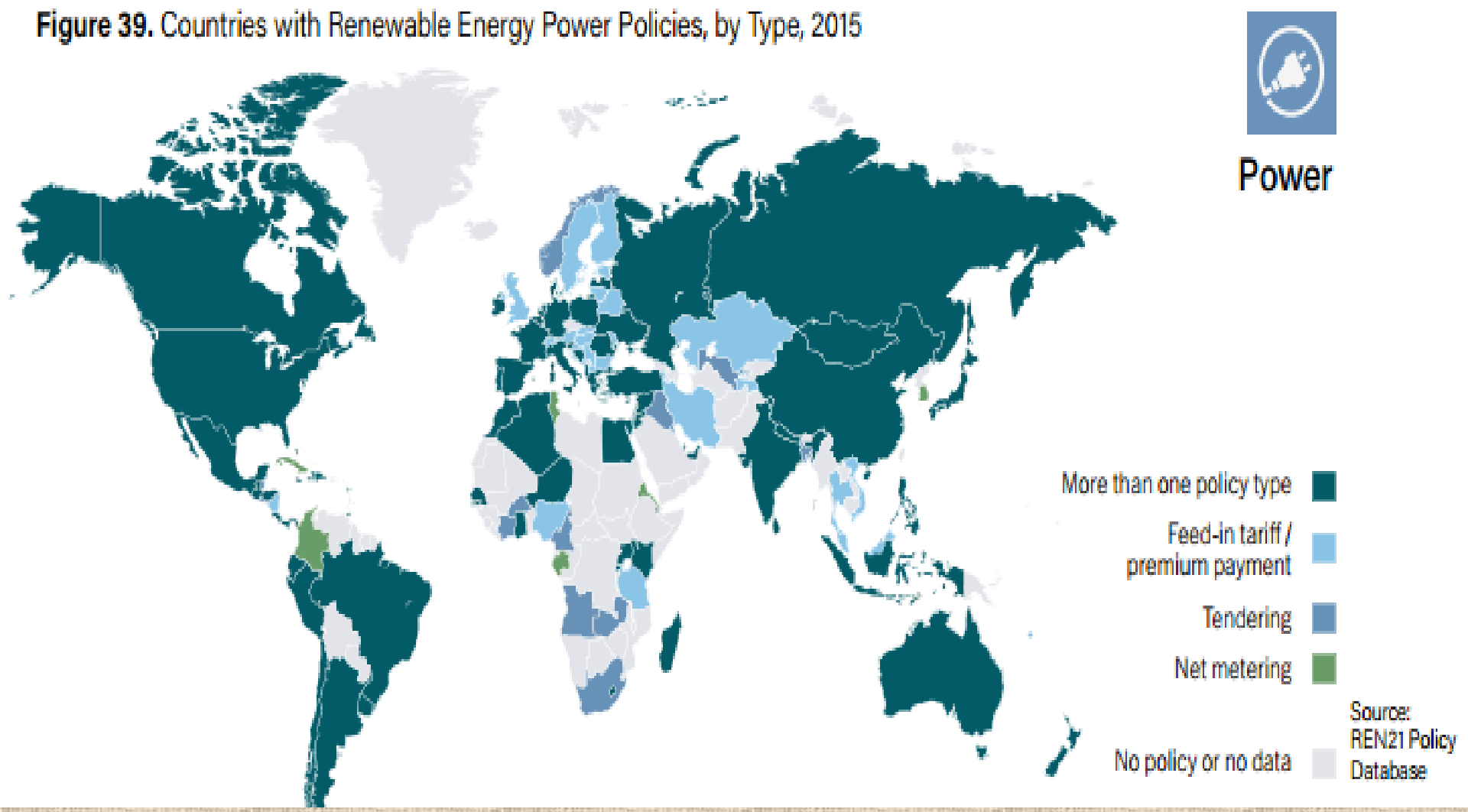
"We have entered a new era of clean energy growth that can provide greater prosperity for every person on the planet. We all are realizing that the progression to low-emission, climate-resilient growth is inevitable, beneficial and already under way". *(Ban Ki-moon, U.N. Secretary-General, 2016).*

Change in total primary energy demand

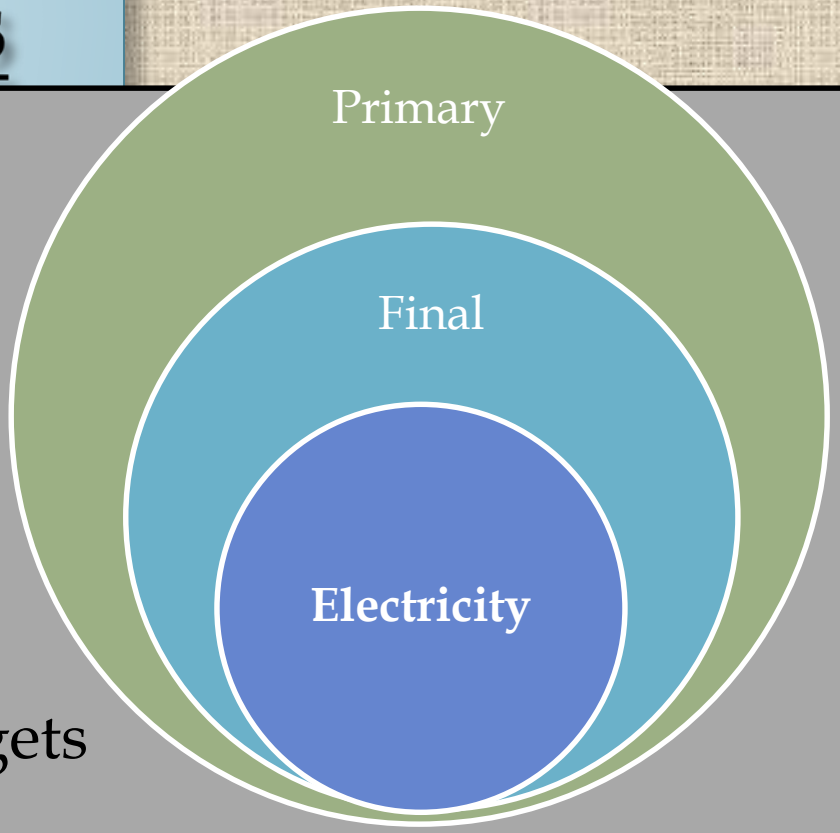


Low-carbon fuels & technologies, mostly renewables, supply nearly half of the increase in energy demand to 2040

What is driving this growth in renewables?



Types of targets



- **1. Share of primary, final, or electricity targets** ***("family" of targets)***
- 2. GHG/CO2 reduction targets
- 3. Energy efficiency targets
- 4. Technology specific targets (solar, wind, etc.)
- 5. Sector-specific targets (housing, transport, etc.)

Features of Renewable Energy targets:

- Relative (%) or absolute (GWh) target
- Future reference year
- Binding or non-binding target
- Discrete vs. Package target
- Cascading target

Shifting targets

:**signal risk and uncertainty in the market** (Clean Energy Council, 2014).

:**risks future investment**. (The Conversation, 2015)

:**discourage states to develop green technologies** (European Biogas Association, 2013)

"Targets should be legally binding, stable over time, and resilient to outside forces." *(Rutter and Knighton, 2012, IRENA, 2015)*

"Renewable energy targets that are stable create predictability in the market, security and willingness to invest, and keeps energy prices down". *(Government of Sweden, 2014)*

Shifts in targets:

1. Target only
   - Albania primary target: 40% by 2020 to 18% by 2020
2. Future reference year only
   - Mexico electricity target: 35% by 2025 to 35% by 2026
3. Target and future reference year
   - Argentina: electricity target of 8% by 2016 to 20% by 2025
4. Binding/non-binding
   - Vermont (US) 20% by 2017 (2005) to 55% by 2017 (2015)

Research motivation

While there are many studies that focus on why targets matter and why targets should be set high, they overlook the phenomena that targets often *shift*

"Big questions"

1) What are the features and types of targets adopted by countries?

2) Where do we find shifting targets and what is the nature of change?

3) What are the variables that drive a change?

What is coded:

1. **"Family" of targets** *(share of primary, final, and electricity from renewables)*
2. **Target (in "%/relative" terms)**
3. **When a target is set**
4. **Future reference year**
5. **Whether a target changes or not**
6. **Cascade target or not**
7. **Change to another type of target**
8. Dividing the data to Group 1 and 2

What constitutes a shift in our data set?

- Case by case basis (primary, final, electricity) by country
- A shift is only:
  - when either 1) percent % or 2) year changes

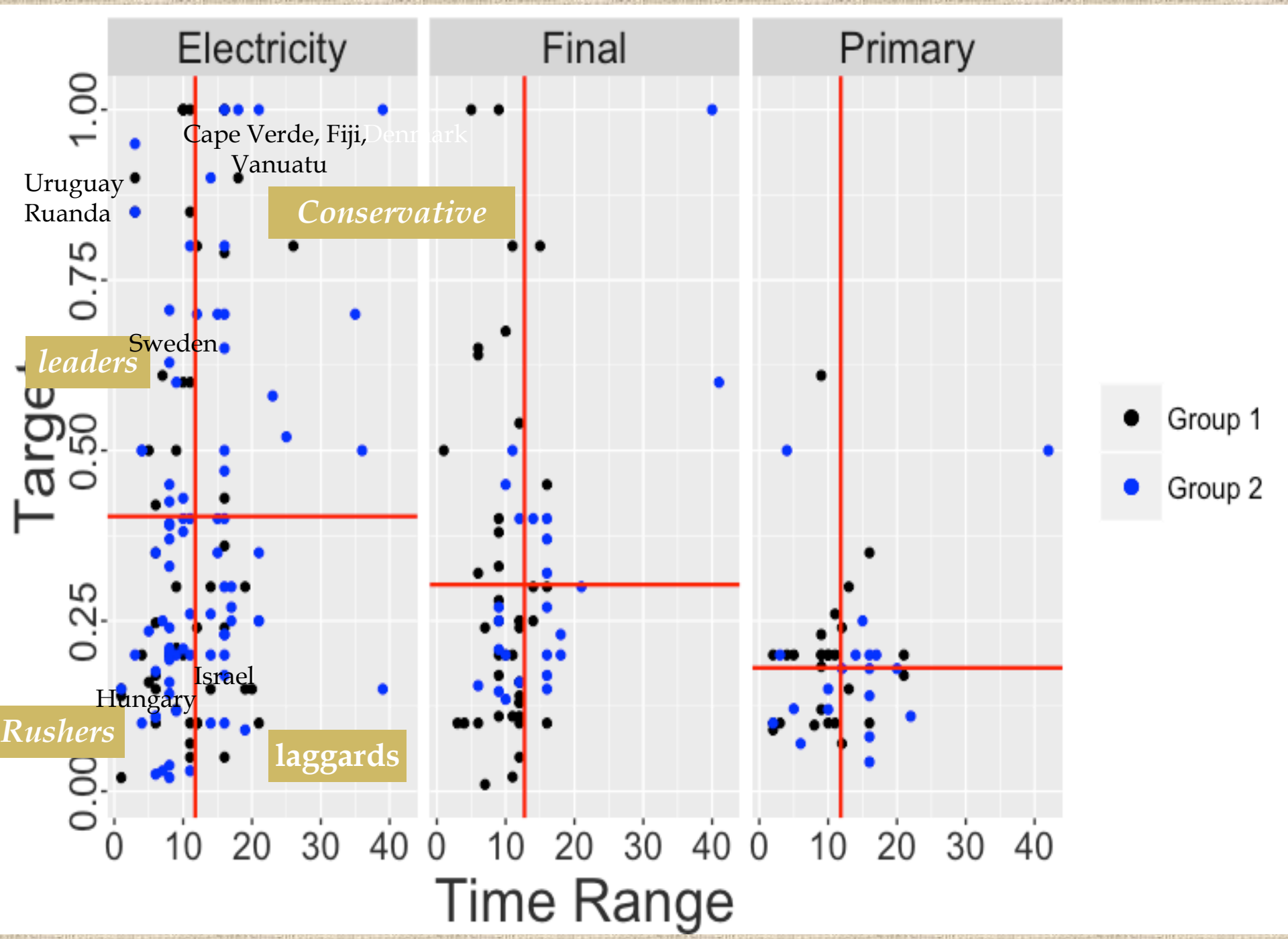
- **Example**:

  Lebanon 12.00% (2009set) 2020 **Final**

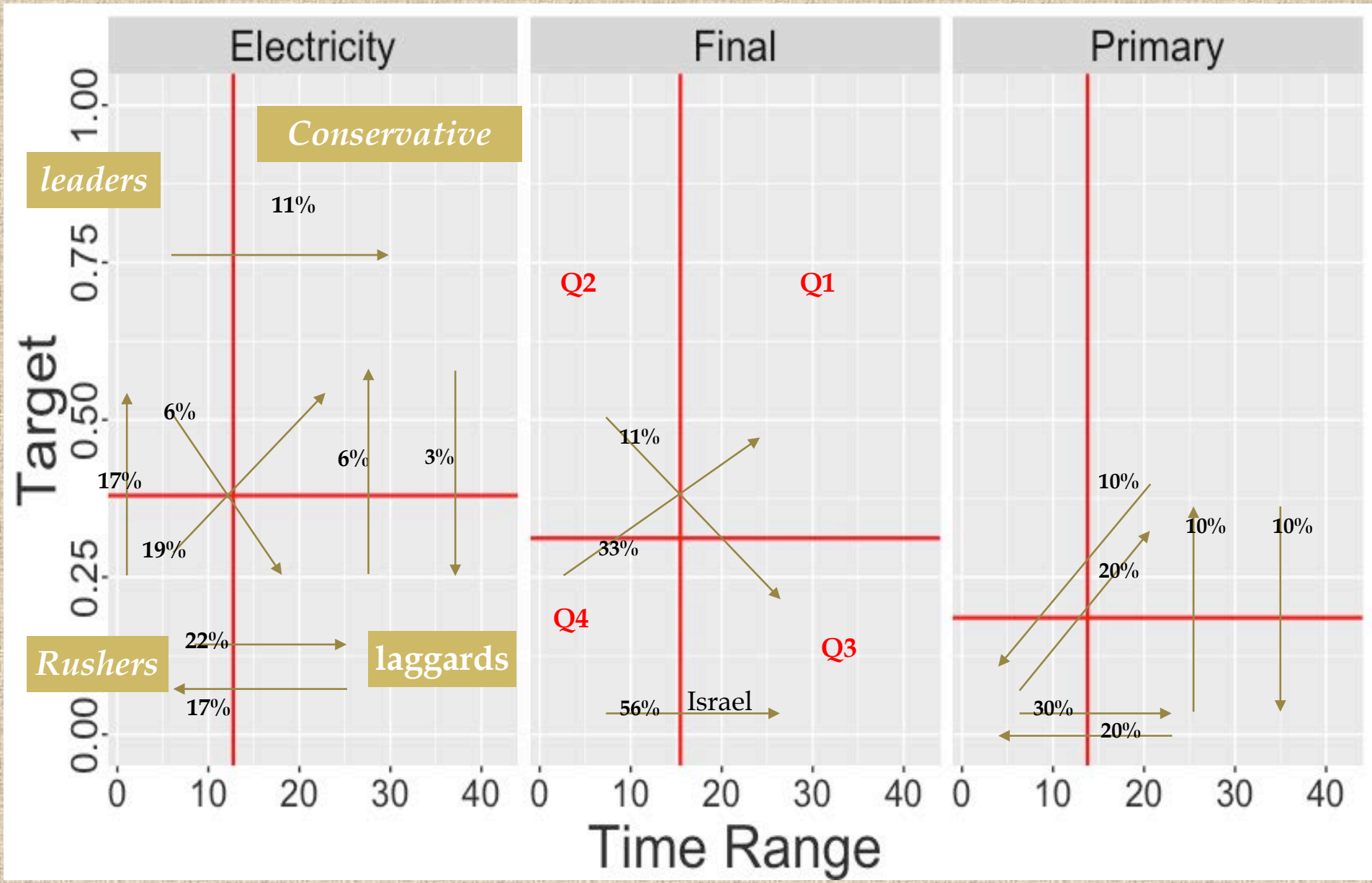
----------Shifted to----------

  Lebanon 15.00% (2014set) 2030 **Final**

RESULTS…


Electricity
Final
Primary
Cape Verde, Fiji, Vanuatu
Uruguay
Ruanda
Conservative
leaders
Sweden
Israel
Hungary
Rushers
laggards
Target
Time Range
0.00
0.25
0.50
0.75
1.00
0
10
20
30
40
Group 1
Group 2

Movement patterns between quadrats



What next: targets as a research agenda

- How targets are set and why?
  - -Tradeoff between design features
  - -Power struggle between players
  - - one time shot VS incrementalism
- how do targets change?
  - - costs and benefits of change
- What derives a change?
  - - External VS internal forces
- Measuring ambition and what does it mean

Expl. Variables and Indicators

Variable:	*Indicators:*	*Source:*
1) The economic impact on targets	GDP per capita	World Bank Index
	Index of Globalization	Index of Globalization
2) The 'free-rider problem'	Population	World Bank Index
	Co2 emissions	World Bank Index
3) External stakeholder influence	Civil society participation	V-Dem Varieties Democracy Index
	Government effectiveness	Government effectiveness
	Share of green seats in government	Gov't:share of green seats
	Polity Score	Polity IV Project
4) Fluctuation in demand/supply/cost	GDP per capita	World Bank Index
	Renewable energy consumption	World Bank Index
	Energy use (kg oil/capita)	World Bank Index
5) Energy security	Renewable energy consumption	World Bank Index
	Energy use (kg oil/capita)	World Bank Index
	GDP per capita	World Bank Index
	Net oil import/export	Stanford J.D. Fearon Research

Environmental Leaders or Laggards

- Accounting for 'level of economic development'
- Accounting for " degree of renewables before Targets were set"

Ambition= (% target - % of targets already achieved) x inverse of time gap

- leader-laggard dynamics