Comparative Renewable Energy Policy: New Zealand in global perspective

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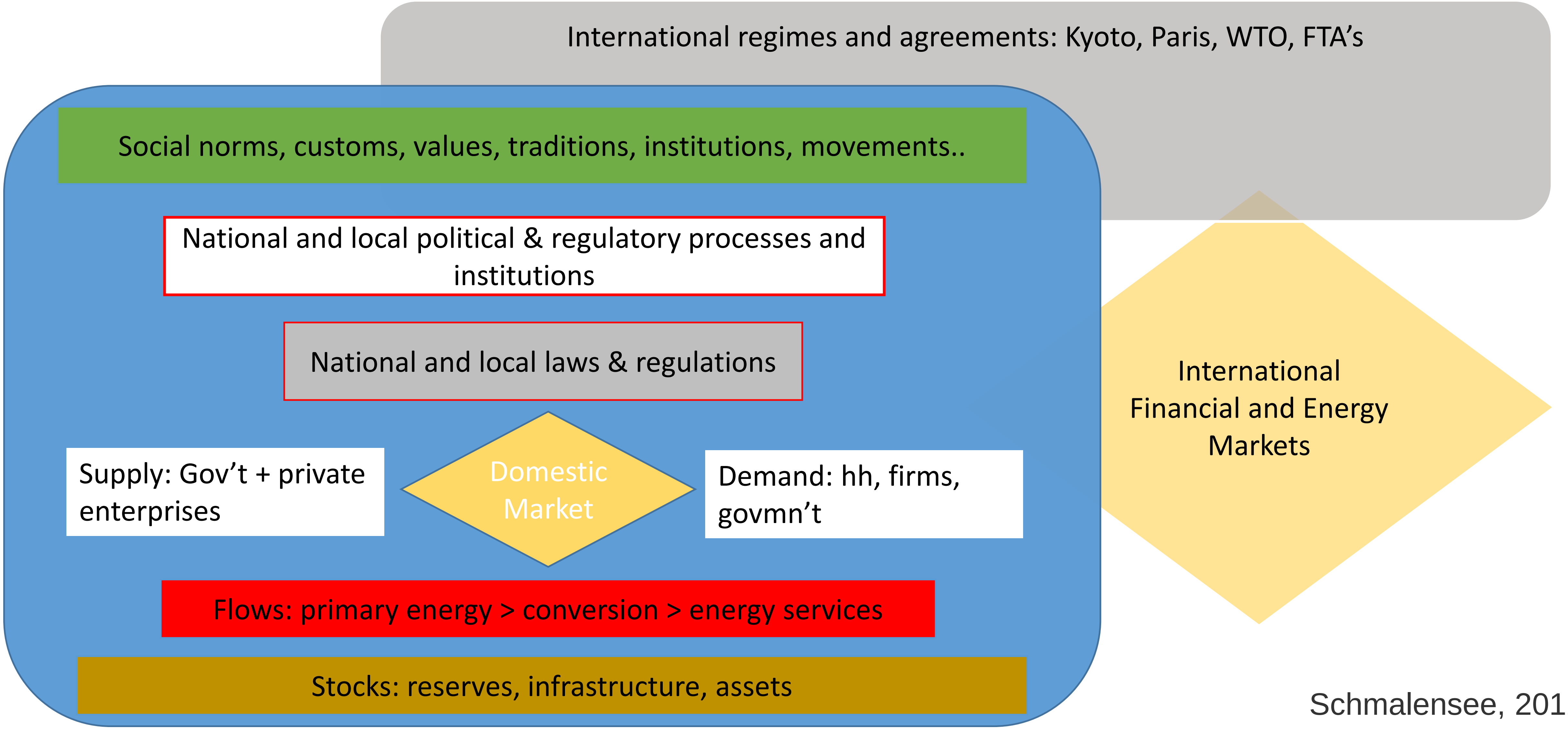
Preamble: *What shapes country level differences in energy systems?*



International regimes and agreements: Kyoto, Paris, WTO, FTA's

Social norms, customs, values, traditions, institutions, movements..

National and local political & regulatory processes and institutions

National and local laws & regulations

Supply: Gov't + private enterprises

Domestic Market

Demand: hh, firms, govmn't

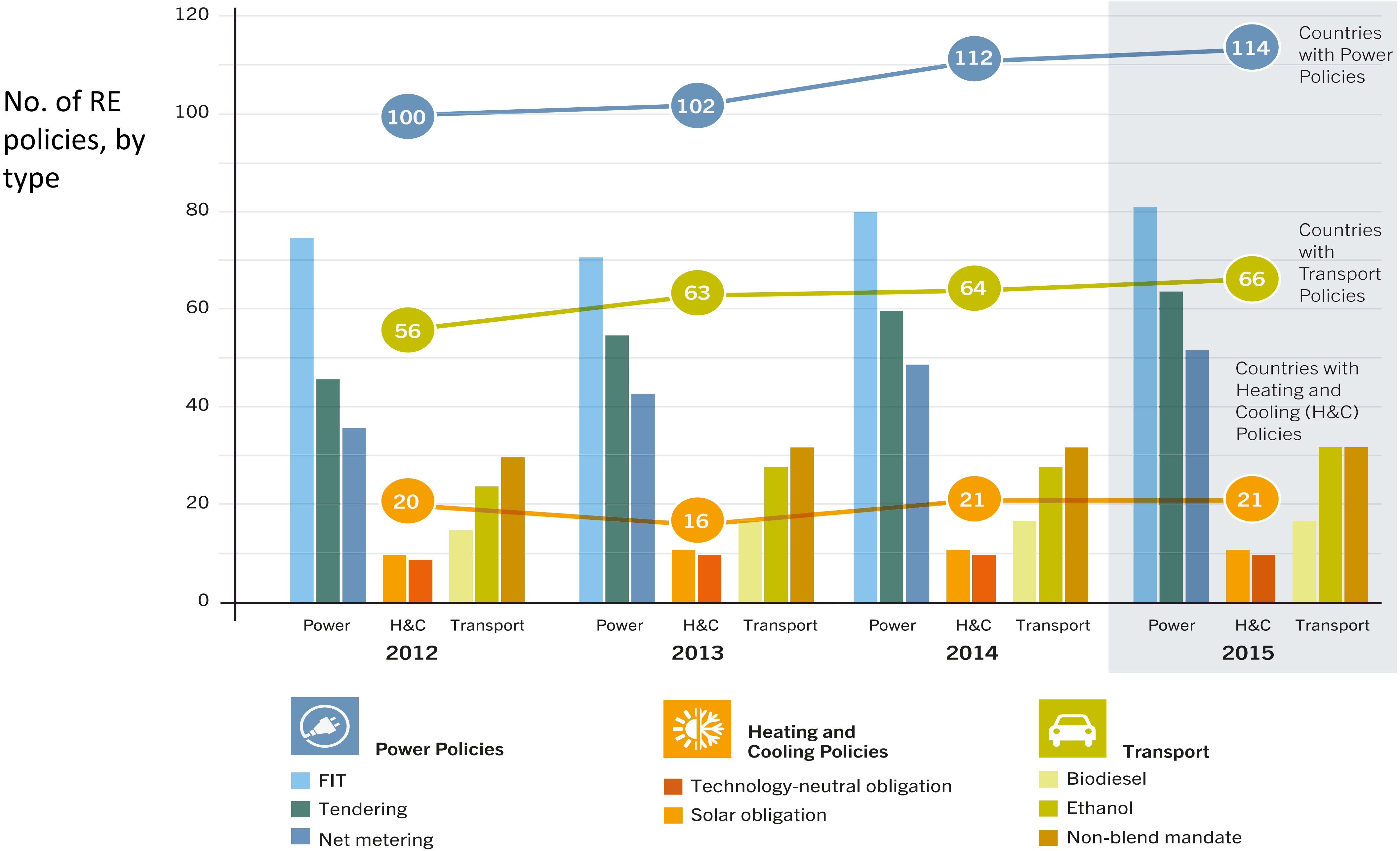
Flows: primary energy > conversion > energy services

Stocks: reserves, infrastructure, assets

International Financial and Energy Markets

Schmalensee, 2012

Number of Countries with Policies, by Type, 2012–2015



REN21, 2016

The question

Given NZ’s

….historical legacy,

….policy context,

….current energy / emissions profile,

….2030 and 2050 targets and its policy objectives,

- Is there anything NZ can learn from the successes and failures of energy policy elsewhere?

Outline

1. Energy policy – 1.0 versus 2.0
2. Current trends in energy policy
3. Lessons learnt
4. NZ renewable heat & electricity policy in comparative perspective
5. Some conclusions

Energy policy tools – 1.0

Type	*Examples*	*Pro's and con's*
Command and control		
Market access guarantee	Power purchase guarantee, Net metering, Priority dispatch, Grid connection guarantee, Grid upgrade / congestion management systems	+ Removes offtake, ST price and imbalance risks.
Demand guarantee	Renewable energy mandates / Obligations/ Portfolio standards / Quota Systems	+ Removes offtake risk. Removes policy risk where embedded in RE electricity targets, EU/ international agreements.
Market-based		
Q- based incentives	Green Credits/ Renewable Energy Credits/ Renewable Energy Certificates	- More complex, risky for small generators, does not remove LT/ST price/imbalance risk, does not support most expensive technologies + Control over expenditures and deployment rates.
P- based incentives	Feed-in-tariffs / Renewable Heat Incentive / Environmental premiums	- Real cost unknown, Costly on p/kWh basis, less control over expenditures + Straight forward, low investor risk, allows distributed ownership and public support for renewables.

Energy policy tools – 1.0

Indirect support mechanisms
Emissions trading
Carbon levy, CO_2 tax, energy taxes
Energy efficiency certificates
Command and control
Emissions performance standards
Public procurement
Mandated RE systems in new construction
Local ownership mandates
Resource viability mapping / siting facilitation
Permit exemptions

Soft instruments
Voluntary standardisation, agreements eg. shared ownership guidelines
Codes of conduct
Public-private partnerships
Campaigns, public communication instruments
Networking, incubator platforms, R&D resources
Direct investment support
Tax relief
Low interest public loans
Capital subsidy
Grants

Meckler, 2015; Fisher and Preonas, 2010

Energy policy tools – 1.0

- Enter whole system costs:
  - Increased reserve requirements
  - Capacity to meet peak demand at all times
  - Renewal and expansion of transmission networks
  - Curtailment
  - Efficiency losses from de-charging conventional power stations
  - Reduced inertia

➢ Surge in retail prices

➢ Scramble for policy instruments that can value time, location, flexibility and quality of generation.

Gross and Heptonstall, 2017

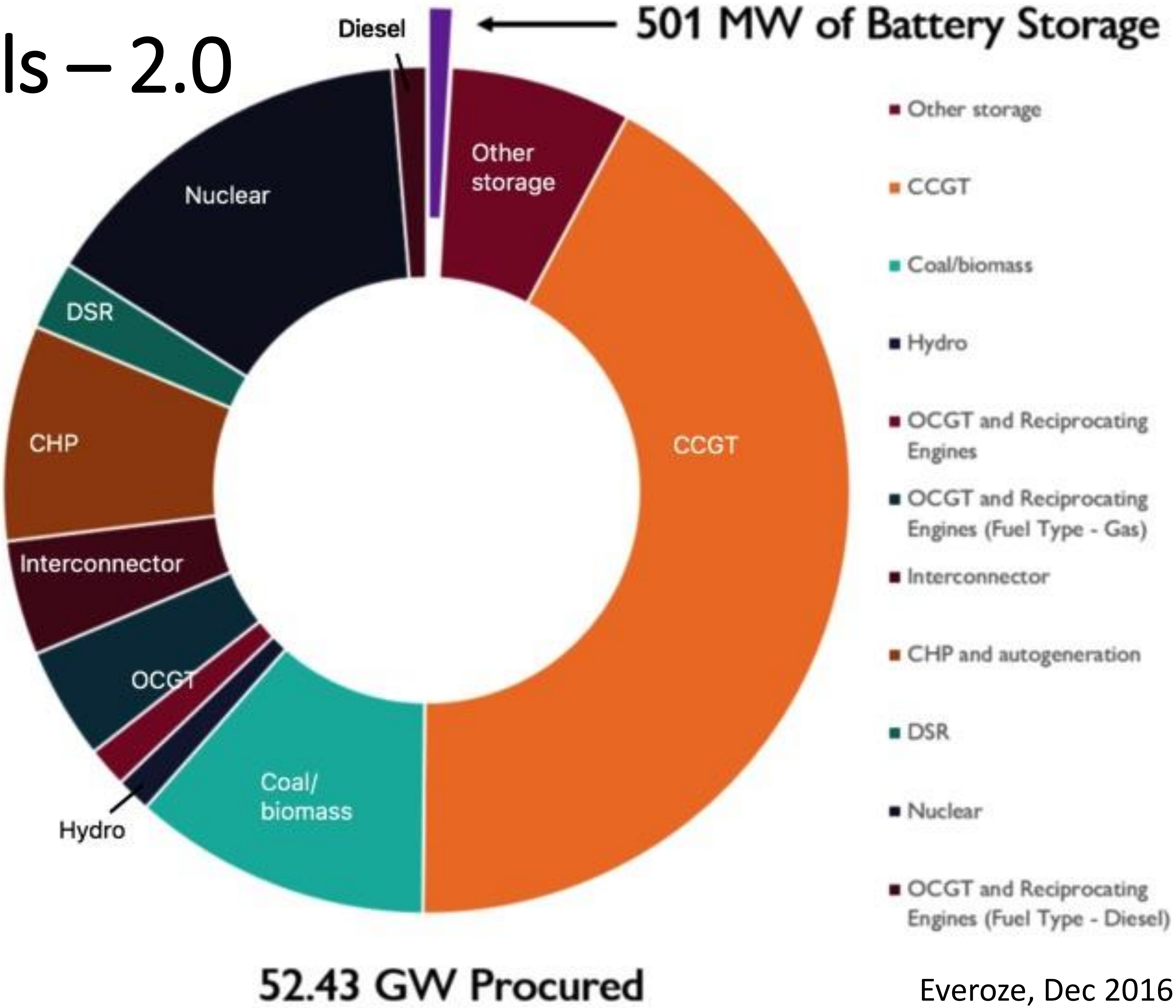
Energy policy tools – 2.0

Type	*Examples*	*Pro's and con's*
Market-based		
Both P and Q based incentives	Auctions, Contracts for difference, Capacity markets (generation, interconnectors)	- Very complex, time/resource intensive, strategic bidding, biased towards mature technologies, existing (more polluting) capacity, and large developers + Cost-efficient, removes long-term price risk, consumers protected from rising prices.
Demand side response incentives	Short Term Balancing Reserve, Demand Turn-Up, Dynamic Frequency Response, Capacity markets (DSR and storage)	- Extremely complex. [very little on performance evaluation published]

Energy policy tools – 2.0

“[Using capacity markets to solve flexibility problems] is like using a hammer to crack a nut”

– Jon Ferris, Utilitywise



Everoze, Dec 2016

Current trends in energy policy

1. From ‘levelling the playing field’ to ‘picking winners’
    - Competitive technology-neutral bidding - BRICS, Latin Am., UK and Germany

2. FiTs remain in places for less mature / small-scale projects
    - 75 countries

3. Long predicted balancing problems and ‘utility death spirals’
    - Reactive and counter-effective policy decisions
    - Subsidisation of low-MC high-C reserve power – UK, Germany, Australia
    - Regional integration of electricity markets – Denmark, Energy Union

4. From ‘feed and forget’ to internalising balancing responsibility
    - Resist: Taxes/fees on self-generators – Spain, US states, UK
    - Direct marketing: Germany
    - Curtailment compensation: Denmark, EU?
    - Low cost storage and grid defection: South Australia

Current trends in energy policy

5. Ongoing policy shift reduces actor diversity
   - Germany, UK, Denmark

6. Small players left behind by policy reforms turn to behind the meter storage & DSM innovation
   - Combined generation/storage
   - Renewed interest in locally managed microgrids eg. offloading excess wind capacity locally behind the meter
   - Limited to niches (high power price/ poor access OR grant funded / international projects)
   - Not scalable unless grid-tied and aggregated by intermediaries

7. Meanwhile: network industries preempting reforms for DG ‘fractal grids’
   - Based on developments in IT, low-cost storage & generation

     eg. Australia Electricity Network Transformation Roadmap, GB Smart Grid Forum, REV NYS

8. Bilateral contracts between TSO’s and wide range of DSR agents
   - Virtual power plants

Poulter, 2017; Ohlhorst, 2017

Lessons learnt

1. Optimal support scheme changes across technology learning curve
    - Avoid technology neutral Q-based incentives where you have steep/ uncertain MC curves
    - “Cost-efficient” deployment versus higher learning rates for pre-commercial technologies
2. Plan for adaptive policy making
    - P-based incentives were often ‘too successful’
    - Bypassing targets and overspending > policy uncertainty and policy and market reform
    - RE investment outpaced necessary investments in network infrastructure, market reforms
    - Better channels for early warning signals

Kitzing et al (2016)

Lessons learnt

3. Leading tech producers coupled early and consistent:
    - Climate and energy strategies
    - Support mechanisms for deployment
    - Industrial development / employment strategies and R&D support

4. Subsidies for deployment of pre-commercial small-scale technologies can pay off
    - Less policy risk = lower cost of finance
    - Technological learning, cost reduction, employment, export.

5. Local support goes hand-in-hand with actor diversity & civic ownership
    - “Fair distribution of costs and benefits of renewable energy projects”
    - Has been largely limited to low-risk small-scale investment
    - Does not emerge / endure in competitive mature technology markets w/o legislation
    - Not clear whether storage/DSR is an opportunity

Lauber and Jacobsson (2016).

NZ energy policy in comparative perspective

- Giant headstart on clean power generation
    - Most hydropower investment in 1880 – 1985

- Less immediate need for capital investment in power generation
    - Less need for market reform

- Early centralisation of generation & transmission
    - Subsidised state-led electrification as a means of supporting farm settlement, agricultural development, economic growth and recovery post - ‘Gold/Wool Era’ (1890- 1920)
    - Relatively minor role of pre-existing local authorities
    - Large players, small margins (except retail?)
    - Barriers to entry

NZ energy policy in comparative perspective – CO$_{2eq}$

	Climate pledges	
Country	**CO$_{2eq}$ 2030 target excl LULUCF**	**CO$_{2eq}$ 2050 target excl LULUCF**
New Zealand	**-11 to -24$\%_{1990}$**	**-50$\%_{1990}$**
Brazil	+99$\%_{1990}$	-
India	+458$\%_{1990}$	-
Mexico	+26-56$\%$ $_{1990}$	-31$\%_{1990}$
Australia	-1% to +9$\%_{1990}$	-
Denmark	-40$\%_{1990}$ EU	-80 to -95$\%_{1990}$ EU
Germany	-40$\%_{1990}$ EU	-80 to -95$\%_{1990}$ EU
Netherlands	-40$\%_{1990}$ EU	-80 to -95$\%_{1990}$ EU
UK	-57$\%_{1990}$	-80$\%_{1900}$

UNFCCC NDC, Climate Action Tracker

NZ energy policy in comparative perspective – elect.

Country	**%Δ 1990-2014**	**%RE in 2014**	**%RE target**	**Market access guarantee** (Grid connection/upgrades, Priority access/dispatch)	**Demand guarantee** (Mandates/ obligations)	**Investment incentives 1.0** (FITs, ROCs)	**Investment incentives 2.0** (Auction/ CfD)	**Capacity market**	**DSR / Storage / Flexibility incentives**
New Zealand	-0.98	79.12	$90\%_{2030}$						✓
Brazil	-11%	78.4	$86\%_{2023}$	✓	✓	✓	✓	✓	
India	+7.5%	32%	$40\%_{2030}$	✓	✓	✓	✓		
Mexico	+0.4	25%	$35\%_{2026}$	✓		✓	✓		
Australia	+5.2	14.9	$20\%_{2020}$	✓	✓	✓	✓	✓	✓
Denmark	+53.0	56.2	$52\%_{2020}$	✓		✓	✓		
Germany	+22.8	26.2	$45\%_{2020}$	✓		✓	✓		✓
Netherlands	+9.9	10.0	$37\%_{2020}$	(✓)		(✓)			
UK	+17.6	12.9	$20\%_{2020}$	(✓)	✓	✓	✓	✓	✓

IEA (2015), IEA/IRENA Joint Policies and Measures Database

NZ energy policy in comparative perspective

Result:

- Piecemeal and inconsistent renewable energy policy as late as 1993 onwards
- Little wider engagement of diverse actors
- Barriers to entry = barriers to innovation

Does this leave NZ with less institutional capacity for kiwi-led transitions in transportation, heavy industry, buildings, EE, and power sector reform?

Some conclusions

- Current policy trends at disjunction with transition to DG
  - ➢ Network industries and high-level government working towards opposing objectives
  - ➢ Actor diversity under threat, smaller players stranded?

- By virtue of its historical legacy, NZ is short on:
  - Political coalitions and commitment
  - Established intermediaries / service industry
  - Advocacy coalitions
  - ‘Reflexive governance’ arrangements

….that facilitate robust policy instruments, investment and learning for kiwi-led transport, heat (and power) reforms

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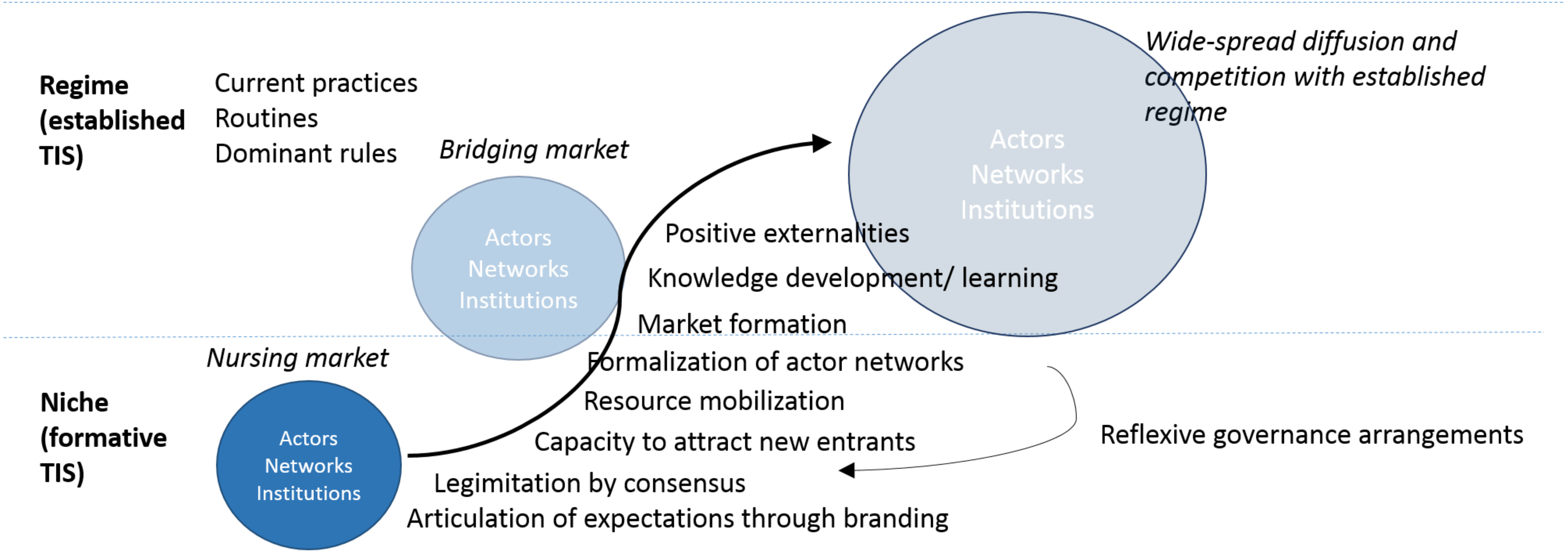
NZ energy policy in comparative perspective

Socio-technical landscape

International climate change frameworks and associated policy instruments
Donor policy
Infrastructure
National/regional energy policy
Technological standards and certification



Regime (established TIS)

Current practices
Routines
Dominant rules

Bridging market

Actors
Networks
Institutions

Wide-spread diffusion and competition with established regime

Actors
Networks
Institutions

Positive externalities
Knowledge development/ learning
Market formation
Formalization of actor networks
Resource mobilization
Capacity to attract new entrants
Legimitation by consensus
Articulation of expectations through branding

Reflexive governance arrangements

Niche (formative TIS)

Nursing market

Actors
Networks
Institutions