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Finnish Environment Institute

SMART ENERGY
TRANSITION

Public policy and energy transitions

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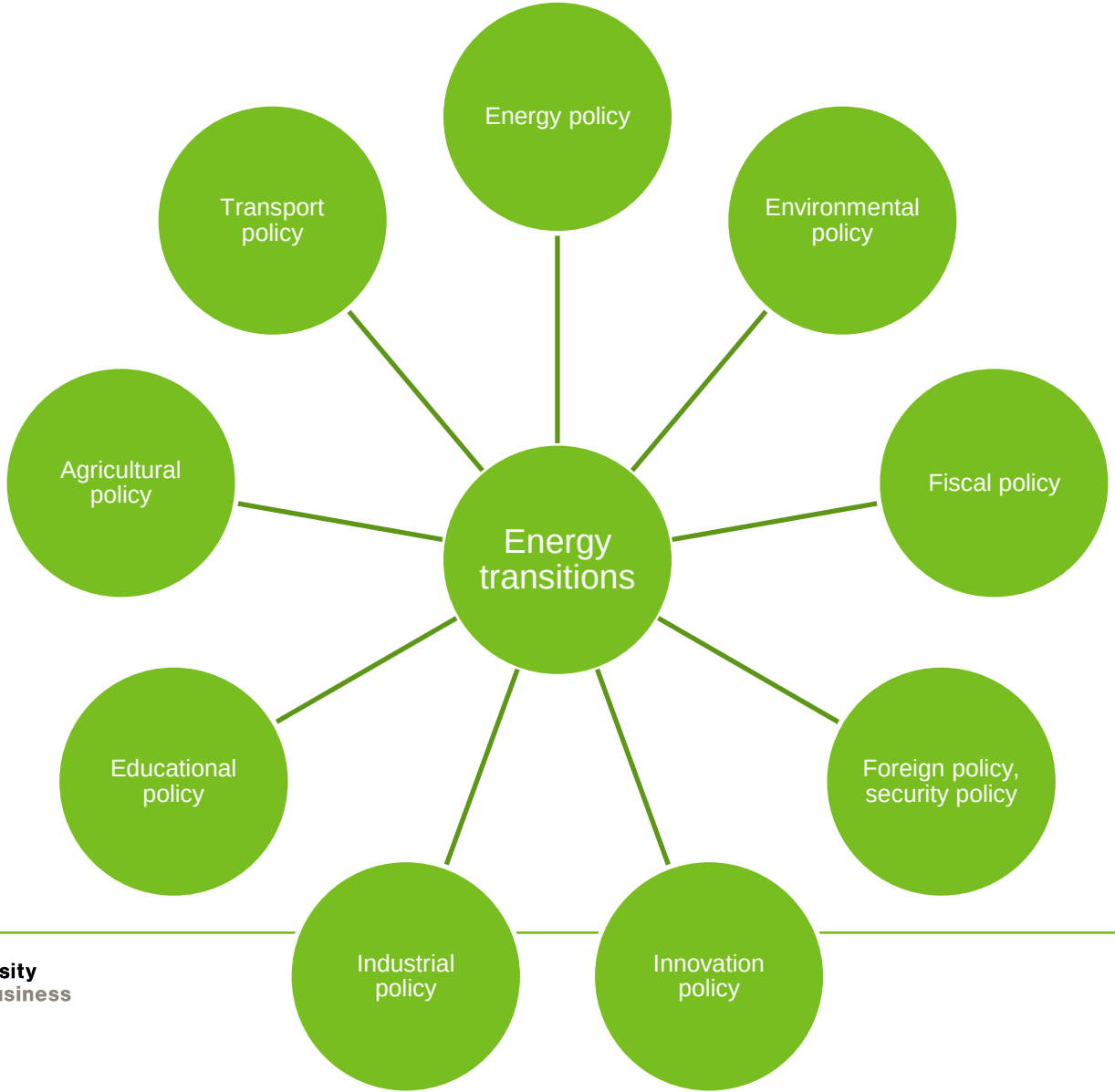
Contents of the lecture

- **Public policy**
- **Energy policy – EU and Finland**
- **Policy mixes for energy transitions**
- **New policy challenges for energy transitions**

Introduction

- ***Transitions imply not only the development of disruptive innovations but also of policies aiming for wider change in socio-technical systems*** (Kivimaa and Kern, 2016)
- **Government interventions, i.e., public policy, have an important role in energy transitions**
  - *They can facilitate transitions by setting goals, targets and specific policy instruments to support change* (e.g., EU Green Deal; EU Recovery & Resilience Facility)
  - *Changes in public policies and institutions are essential to catalyse and orient systemic changes in cooperation with businesses and civil society (EEA, 2019)*
- **Public policy can also hinder transitions**
  - *E.g., prevent diffusion of new innovations, subsidise fossil fuel industry, or otherwise support the incumbent system*
  - *Also, policy conflicts/contradictions may undermine the influence of a transition-oriented policy (e.g., fossil fuel subsidy vs. renewable energy subsidy)*

What do you think as relevant policies for energy transitions?


Energy policy
Transport policy
Environmental policy
Agricultural policy
Energy transitions
Fiscal policy
Educational policy
Foreign policy, security policy
Industrial policy
Innovation policy

Public policy

Public policies with differing levels of importance and influence

- **Overarching policy strategies**
  - *E.g. White Papers, Government Programmes*
- **Sectoral strategies**
  - *E.g. EU 2030 Climate and Energy Framework, national energy strategies*
- **Framework laws**
  - *E.g. the energy market act*
- **Specific regulations**
  - *Acts, directives, on emissions trading, building energy efficiency, etc.*
- **Specific policy instruments**
  - *Regulatory requirements (e.g. on emissions), taxation, subsidies, R&D support, voluntary agreements, information and labelling*

Policy strategies

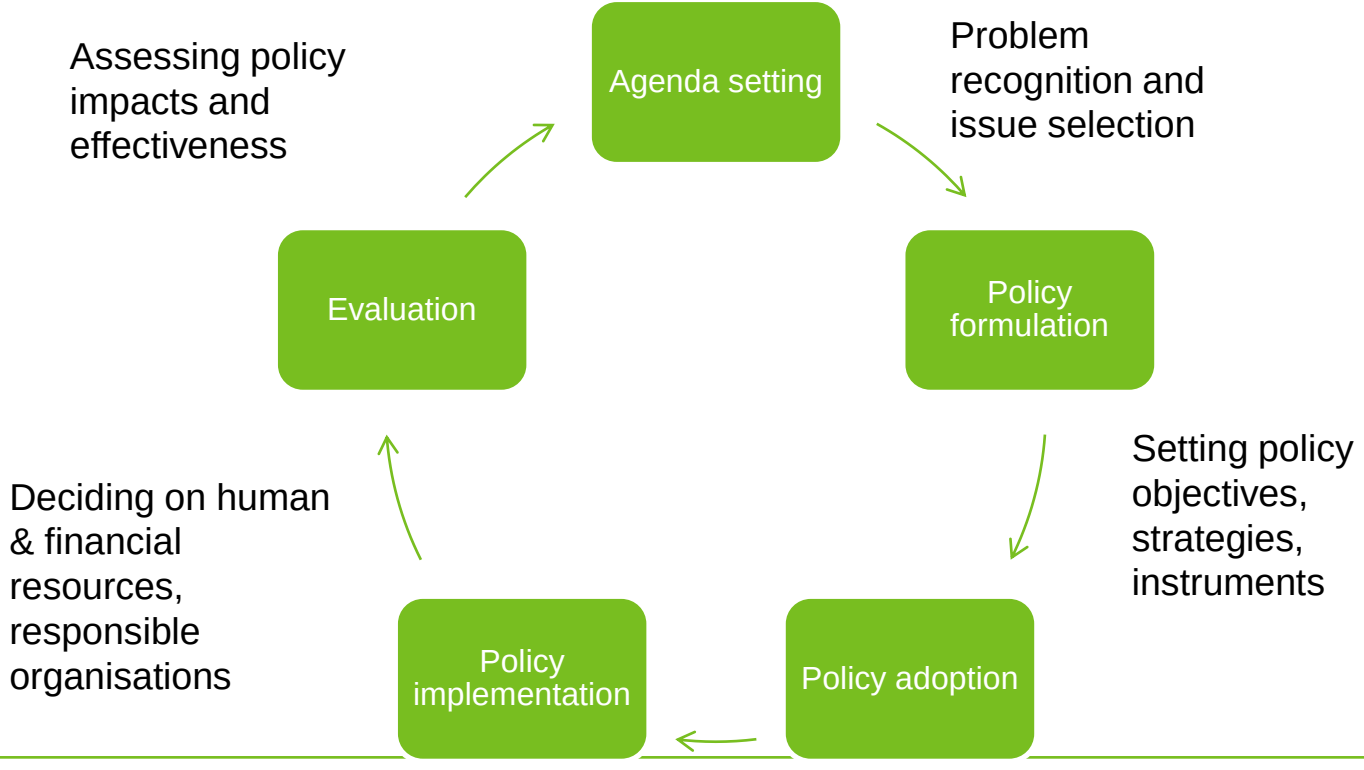
- **Contain a description of context and objectives**
- **Propose/outline a policy instrument package for a sector**
  - *In practice instruments sometimes pre-exist or are introduced outside a strategy*
- **Contain promises of policymakers to stakeholders**
  - *Influencing what stakeholders expect from future policy development, and e.g. what investments or other choices they make*
  - *Inconsistent policy strategies with incompatible objectives are also common*
- **Frame technological options**
  - *"policy strategies can describe the favoured or 'optimal' technological solutions or system components that may or may not be supported through targeted mixes of policy instruments" (Kivimaa & Mickwitz, 2011)*
  - *Supported by specific policy goals (but the justifications may change)*

Policy instruments

- **Core instruments in energy policy:**
  - *Energy market regulation*
  - *R&D and investment support*
  - *Taxation (including exemptions and rebates)*
  - *Information provision*
  - *Emissions trading (but goes beyond the scope of energy policy)*

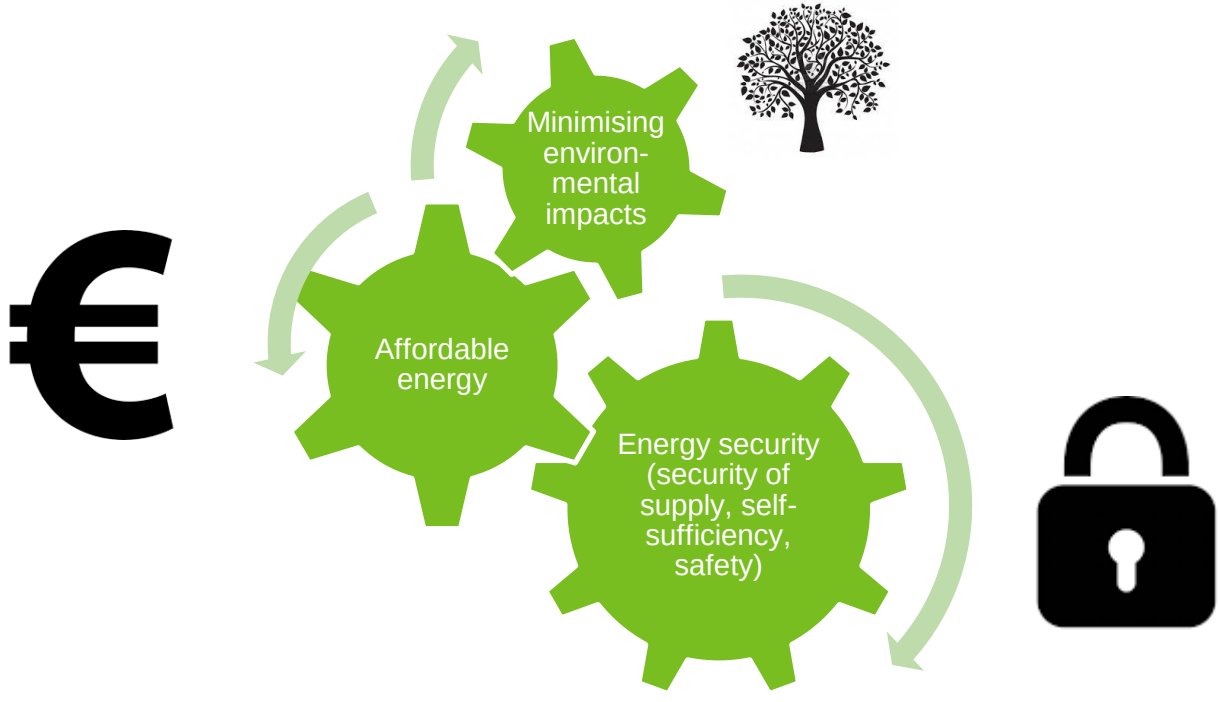
- **But a large range of instruments exist**
  - *Over 30 national instruments on building energy efficiency (FI, UK) alone*
  - *E.g. energy performance requirements in building regulations, energy audit programmes, energy improvement subsidies, low-interest loans for renovation, energy certificates, voluntary energy efficiency agreements with industry/cities, energy advice systems, R&D programmes, planning requirements*

Policy cycle – policy can also influence before its implementation



Energy policy

Core goals of energy policy



International policy and governance

- **Paris Climate Agreement (adopted in 2015)**
  - *All countries set their own ambition levels in the form of non-legally binding 'nationally determined contributions'*
  - *Emphasises informal governance approaches and experimentation*
  - *Energy is at the heart of Paris agreement – energy efficiency and renewable energy important (UN Deputy Secretary General Amina Mohammed)*
- **The Organisation for Economic Co-operation and Development**
  - *Mission to promote policies that will improve the economic and social well-being of people around the world*
  - *International Energy Agency (IEA) is an autonomous intergovernmental organization established in the framework of the Organisation for Economic Co-operation and Development in 1974 in the wake of the 1973 oil crisis*
  - *OECD/IEA reports are influential in many parts of the world*
  - *In 2021, OECD initiated work on sustainability transitions and covid-recovery*

EU Energy Policy

- **Three main goals**
  - *Security of supply, competitiveness and sustainability*
- **EU Energy Union policy**
  - *(1) Security, solidarity and trust, (2) Fully integrated energy market, (3) improved energy efficiency, (4) decarbonising the economy, and (5) research, innovation and competitiveness*
- **Energy security strategy**
  - Increasing energy efficiency and reaching 2030 energy & climate goals
  - Increasing energy production in EU & diversifying supplier countries & routes
  - Completing the internal energy market & build missing infra
  - Speaking with one voice
  - Strengthening emergency mechanisms & protecting critical infra

EU Energy Policy

- **Clean Energy for All Europeans package (2019)**
  - *(1) putting energy efficiency first,*
  - *(2) achieving global leadership in renewable energies, and*
  - *(3) providing a fair deal for consumers*
- **Energy Roadmap 2050**
  - *set out four main routes to a more sustainable, competitive and secure energy system in 2050: energy efficiency, renewable energy, nuclear energy, and carbon capture and storage*
- **The European Green Deal**
  - *boost the efficient use of resources by moving to a clean, circular economy*
  - *restore biodiversity and cut pollution*
  - *E.g. the Renovation Wave, Boosting offshore renewable energy, European batteries alliance*

European Climate Law

- **Entered into force 29 July 2021**
  - *enshrines the EU's commitments*
- **Targets**
  - *reducing net greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels*
  - *a process for setting a 2040 climate target, taking into account an indicative greenhouse gas budget for 2030-2050 to be published by the Commission*
  - *reaching climate neutrality by 2050*
- **Some other conditions**
  - *the establishment of European Scientific Advisory Board on Climate Change, that will provide independent scientific advice*
  - *stronger provisions on adaptation to climate change;*
  - *strong coherence across Union policies with the climate neutrality objective;*

REPowerEU: Joint European action for more affordable, secure and sustainable energy

- **A policy shift required in response to Russia's invasion of Ukraine in February 2022**
  - *40% of European gas, and 30% of oil ang coal used in the EU were imported from Russia in 2021*
- **Policy decisions 8 March 2022**
  - *plan to make Europe independent from Russian fossil fuels well before 2030*
  - *diversify gas supplies, speed up the roll-out of renewable gases and replace gas in heating and power generation (estimated to cover 2/3 of imports)*
  - *a legislative proposal requiring underground gas storage across the EU to be filled up to at least 90% of its capacity by 1 October each year*
  - *reducing faster the use of fossil fuels in our homes, buildings, industry, and power system, by boosting energy efficiency, increasing renewables and electrification, and addressing infrastructure bottlenecks*

Case 1: Finnish energy policy

Finland's energy policy

- **Originated in 1972 by Pertti Paasio's II Government**
  - *But first national energy policy plan not published until 1979*
- **A series of energy policy strategies since**
  - *Energy Strategies 1992, 1997*
  - *Action Plan for Renewable Energy 1999*
  - *Climate and Energy Strategies 2001, 2005, 2008, 2013, 2016, 2022 (draft)*
  - *Climate and Energy Roadmap 2050*
- **Cross-sectoral groups of ministers and civil servants**
  - *Coordinated by Ministry of Employment and Economy*
  - *Influenced significantly by Ministries of Finance; Environment; Transport and Communications*
  - *Powerful, stable and homogeneous energy elite in Finland (Ruostetsaari, 2010)*

Organisation of climate and energy policy

- ***Ministry of Economic Affairs and Employment leading the coordination of cross-sectoral energy and climate strategies***
  - *Energy department: domestic energy policy, emissions trading sectors, renewable energy*
  - *Innovation department: R&D and innovation linked to energy*
- ***Ministry of the Environment have tasks linked to long-term planning for climate***
  - *Emissions of non-emissions trading sectors, building energy efficiency; coordinator of Finland's Climate Change Panel*
- ***Ministry of Transport and Communications***
  - *Energy use and emissions of transport (Mobility as a Service an important initiative)*
- ***Ministry of Agriculture and Forestry***
  - *Emissions from agriculture, use of biomass sources for energy*

Key policies for energy and climate *(currently under revision)*

New draft for comments 4/2022

National Energy and Climate Strategy 2030 (2016)

Goals for RES, self-sufficiency; goals for biofuels in transport, electric vehicles; coal phase out

New Medium-Term Climate Plan for comments 1/2022

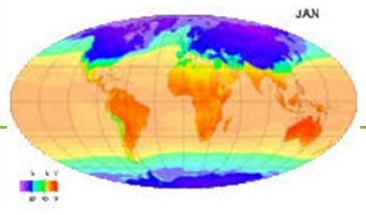
Energy and Climate Roadmap 2050 (2014)

Guide to carbon-neutral society, analysis of means to achieve 80-95% GHG reductions

Climate Change Act (2015)

Revision proposed HE 27/2022

Planning system for climate policy, monitoring, 80% reduction target by 2050
Focused on administrative procedures



From ‘energy policy’ to ‘climate and energy policy’

- **In the late 1990s, reduction of CO2 emissions became a specific environmental goal in energy policy (in Finland and elsewhere)**
  - *Gradually increasing importance, gaining priority in the new millennium*

- **Significant influence of the European Union in bringing in the climate agenda**
  - *Finnish energy policy has focused a lot on implementing EU requirements unlike e.g. Germany or the UK that have more actively created their own policies*
- **The latest government programme in 2019 increasing the importance of climate policy further – but implementation challenges**

Example: Finnish bioenergy policy

	Support for domestic energy sources 1970-1991	Support for wood industry-based bioenergy 1992-1998	Diversified bioenergy in the context of climate change in the 2000s	Return to wood based strong bioenergy policy 2015 onwards
Main energy policy goals	Security of supply Inexpensive supply Employment Regional concerns	Security of supply Competitive supply Self-sufficiency Environmental acceptability Regional concerns	Climate commitments Security of supply Reasonable supply Self-sufficiency	Climate commitments and “energy transition” Security of supply Cost-efficiency
Sub-system emphasised	Resource supply	Resource supply Parts of conversion and use	Resource supply Conversion Use	Resource supply Conversion Use
Purposes of use	Non-commercial use within industrial plants, on farms, or in waste management	Industrial processes Heating (small plants and district heating) (Transport fuels)	Transport fuels Heating Electricity Industrial use	Transport fuels Heating Electricity Machinery

Linking strategies and instruments

- **Cross-ministry working groups**
- **Creation of broader programmes with stakeholder involvement, e.g. ERA17, Roadmap for fossil free transport**
- **BUT**
  - Sometimes new instruments introduced without changing policy goals – or vice versa
  - Some inconsistency in the mix of instruments used (strong sectoral division & coherence between different elements missing)
- **In 2021, new developments via sectoral roadmaps, and increased cross-sectoral collaboration**
  - But strategic lines and coherence between elements still lacking in the 2022 strategy draft; conservative scenarios about electrification

Elements of ‘transition’

- **Explicit plans for phasing out coal**
  - Changing plans for phasing out peat (?)
- **Attention to smart grids & electrification has potential**
  - if connected to renewable energy sources and energy efficiency
- **Roadmaps for systemic change in energy and transport sectors**
- **Green transition as part of EU recovery package implementation,**
  - which Finland has implemented with intent for transitions, e.g. upscaling technological innovations & reforms to phase out oil-based heating of buildings

Question on energy policy

- **What do you think Finland could learn from other countries to improve its energy policy?**

- **What do you think other countries could learn from Finland?**

Policy mixes

What are policy mixes?

Combination of policy goals, instruments (and processes)

Porfolios of purposefully designed mixes in a given area (e.g. energy efficiency)

Mixes of ”real world” policies influencing a given sector or a phenomenon

’Real world’ policy mixes

Complex arrangements of multiple objectives and instruments which, in many cases, have developed incrementally over many years” (Kern and Howlett, 2009: 395).

- *“Real-world” policy mixes (Flanagan et al., 2011)*

Multiple objectives (example of energy systems)

- *security of domestic supply, access to and reasonable price of energy, decarbonization and reduction of other environmental impacts*

Variety of instruments (example of energy efficiency)

- *building codes, smart metering, education and information, appliance standards and labelling, voluntary agreements, deployment subsidies, energy audits, etc.*

Policy coherence (1)

- **”An attribute of policy that systematically reduces conflicts and promotes synergies between and within different policy areas to achieve the outcomes associated with jointly agreed policy objectives” (Nilsson et al., 2012: p. 396)**

- **Measurement of synergies and conflicts between policy objectives, instruments and outputs**

Policy coherence

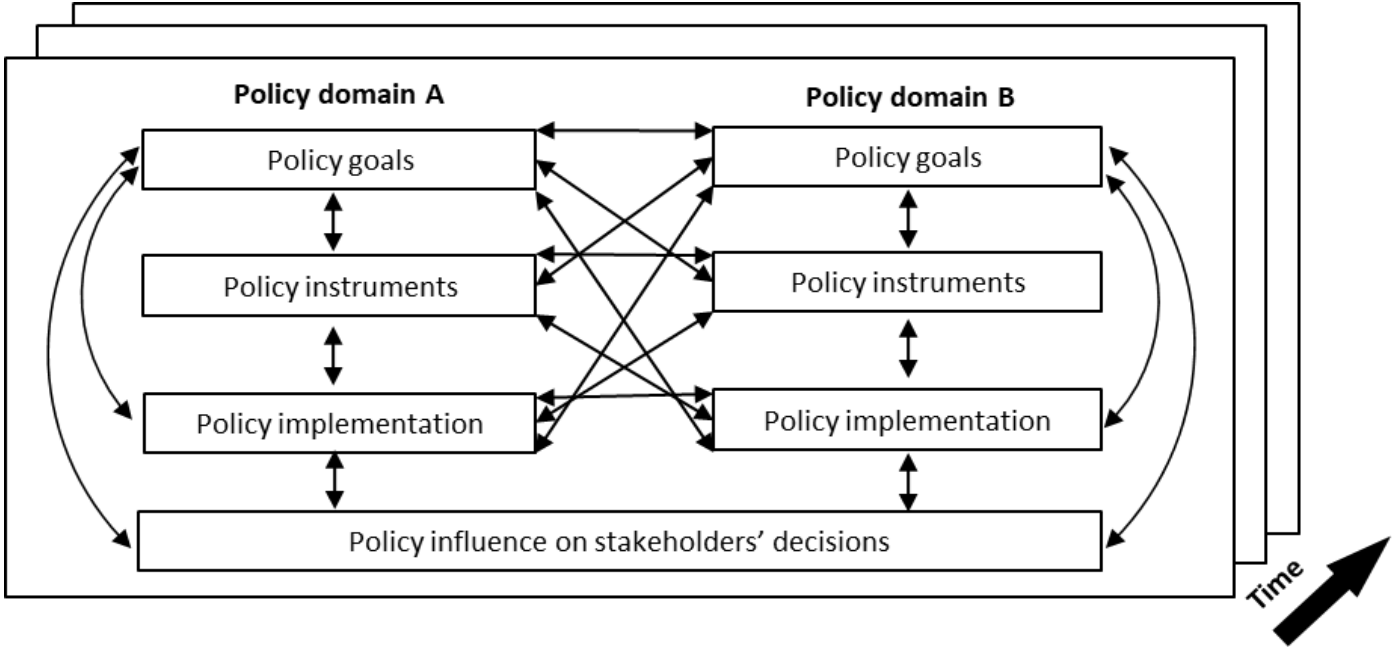
***Coherence is not a natural state of affairs in bureaucratic political systems, whether at national administration or the EU level* (Furness and Gänzle, 2017: p. 478)**

“in the real world" policy instruments carry “quite different meanings from time to time, place to place and actor to actor” (Flanagan et al., 2011, p. 706).

Supportive policies in one sector can be made inefficient by unsupportive policies, instruments and practices in others (Huttunen et al. 2014)

- *But sometimes trigger innovation!*

Policy mixes across policy domains, e.g. A=energy, B=environment

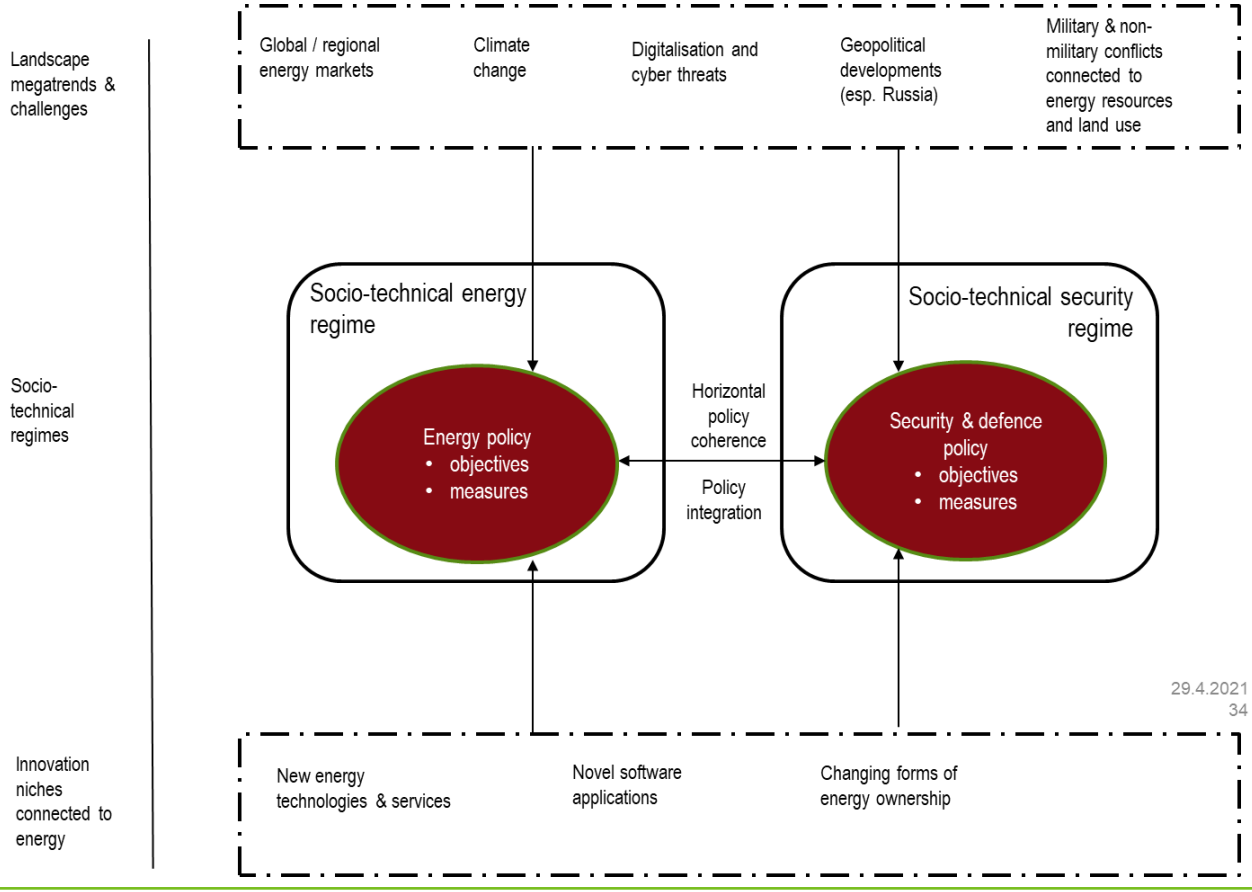


Internal coherence (vertical) = within policy domain

External (horizontal) coherence = between policy domains

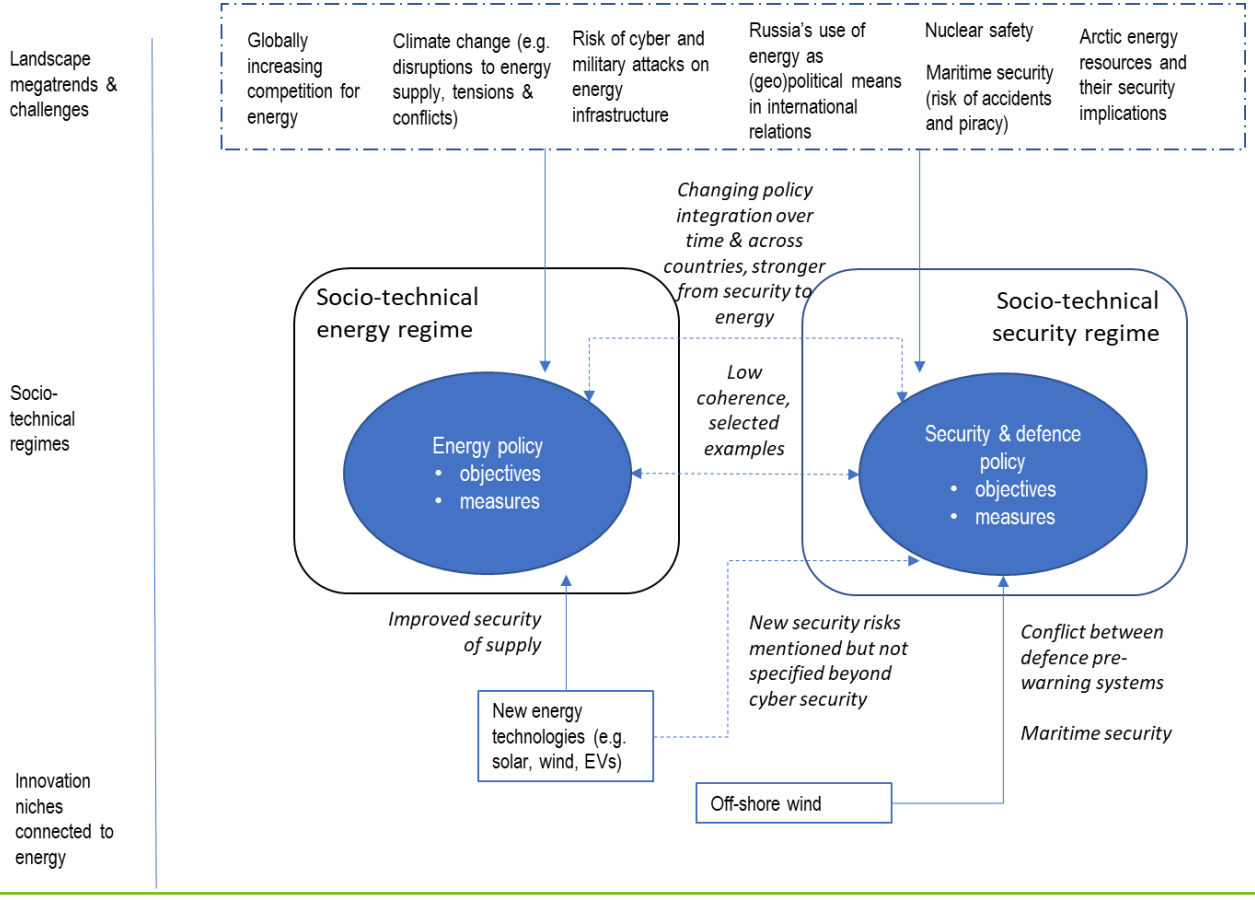
Temporal coherence = consistency over time

Policy coherence in the MLP context: Example of energy & security policies



Kivimaa & Sivonen 2021

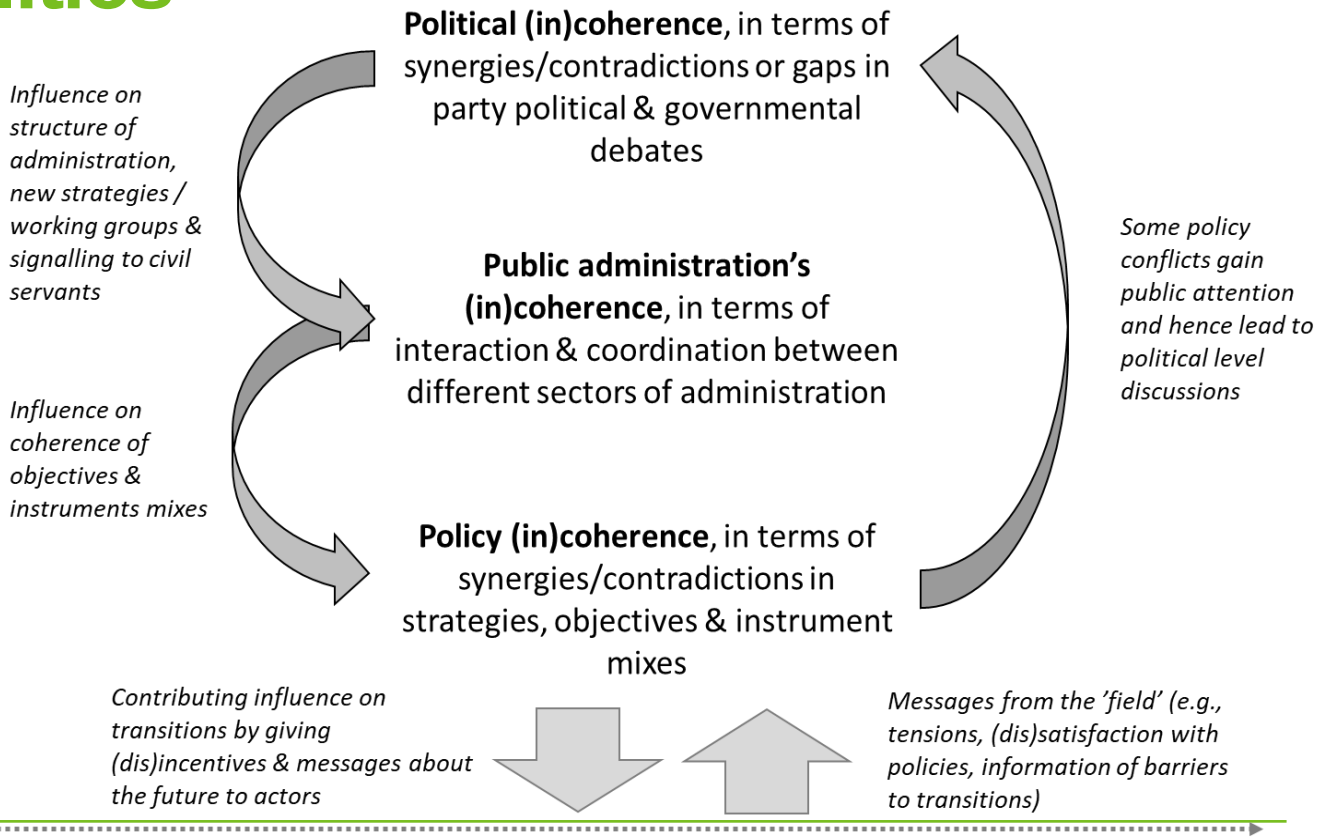
Policy coherence, landscape and niche influences in four European countries (ES, FI, UK)



Policy incoherence may be explained (partly) by party politics

Russian energy companies regarded as market actors

Importance of oil to national economy



Kivimaa, 2022

Challenges for policy coherence

Differing values, interests, and perceptions in different policy domains/sub-systems (Carbone, 2008)

- *E.g., in energy policy, energy security (geopolitical realism), market deregulation (liberalism), low price for all (socialism) (Kuzemko et al., 2016)*
- *Difficult for bureaucratic actors to act collectively (Furness and Gänzle, 2017) – overarching government programmes / white papers a possible solution*

Policy mutation during implementation (Urwin and Jordan, 2008)

- *Reinterpretation of policy by the implementing officials that operate on the ground (described as a tendency of policy to mutate),*
- *May avoid potential conflicts but also create conflicts that were unforeseen at the higher level*
- *E.g. decision premises for allocating energy efficiency subsidies*

Creative destruction

A process where an innovative entrepreneur challenges existing firms and technologies that makes the existing technology old – forcing incumbent to withdraw from markets (Soete & ter Weel, 1999) or renew (Bergek et al., 2013)

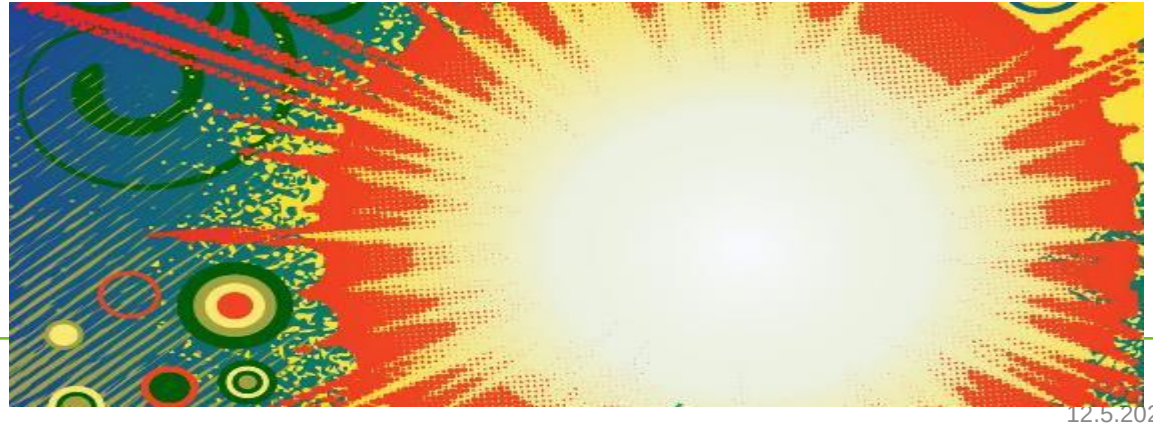
Competence destroying (Tushman & Andersen, 1986) or disruptive (Christensen, 1997) innovation that reduces the value of existing sills (Abernathy and Clarke, 1985)

In a policy context, competence destroying policies can reduce the value of environmentally/socially harmful practices and technologies

Innovation policy mixes for “creative destruction”: key ideas

- Sustainable transformative change = systemic/architectural/modular innovations AND disrupting unsustainable systems (creative destruction)

- Innovation policy mixes should also contain disruptive policy measures (goals & instruments)

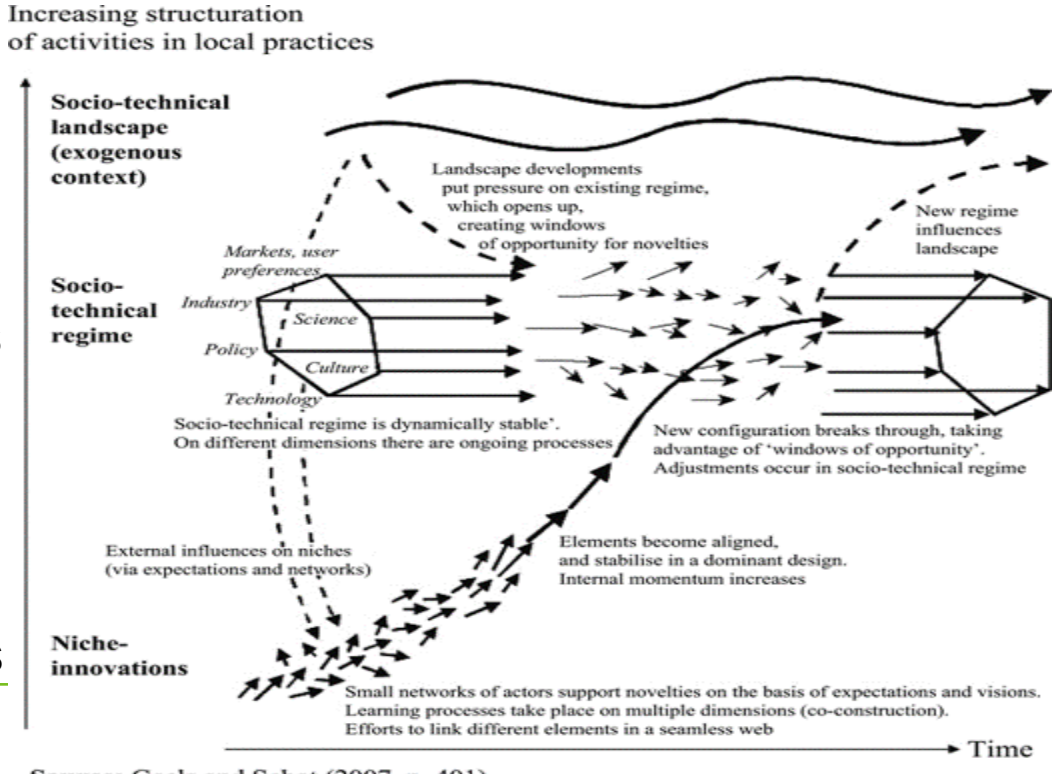


Policies from the perspective of creative destruction & transitions

Destabilising / disruptive policies

POLICY MIXES

Innovation stimulating policies



Source: Geels and Schot (2007, p. 401)

Building blocks

- C*reative destruction* and *disruptive innovation*
  - Process where innovation challenges existing firms and technologies, reducing the value of existing competences
  - Competence destroying policies could reduce the value of environmentally/socially harmful practices

- *Multi-level perspective* (MLP) and *regime destabilisation*
  - Process of destabilisation weakens core regime elements and enables upscaling of niche innovations

- *Technological innovation systems* (TIS)
  - Seven supporting functions for emergence of new technologies, and identification of system weaknesses
  - Motors of innovation, but little insight on how regimes destablise

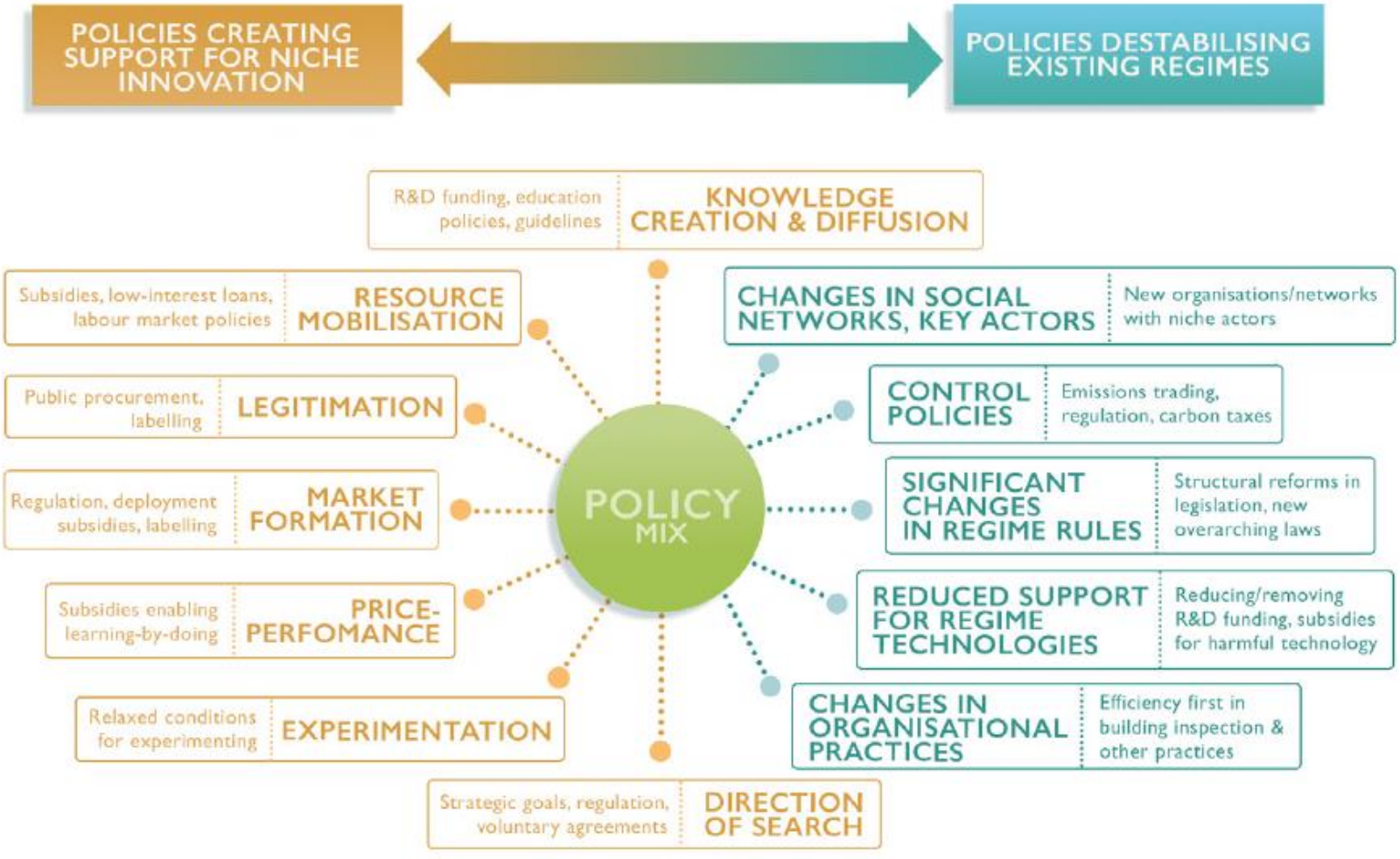


Figure 9. Policy mix for promoting low-energy transitions
(based on Kivimaa & Kern, 2016 with an elaboration from Kivimaa et al., 2017)

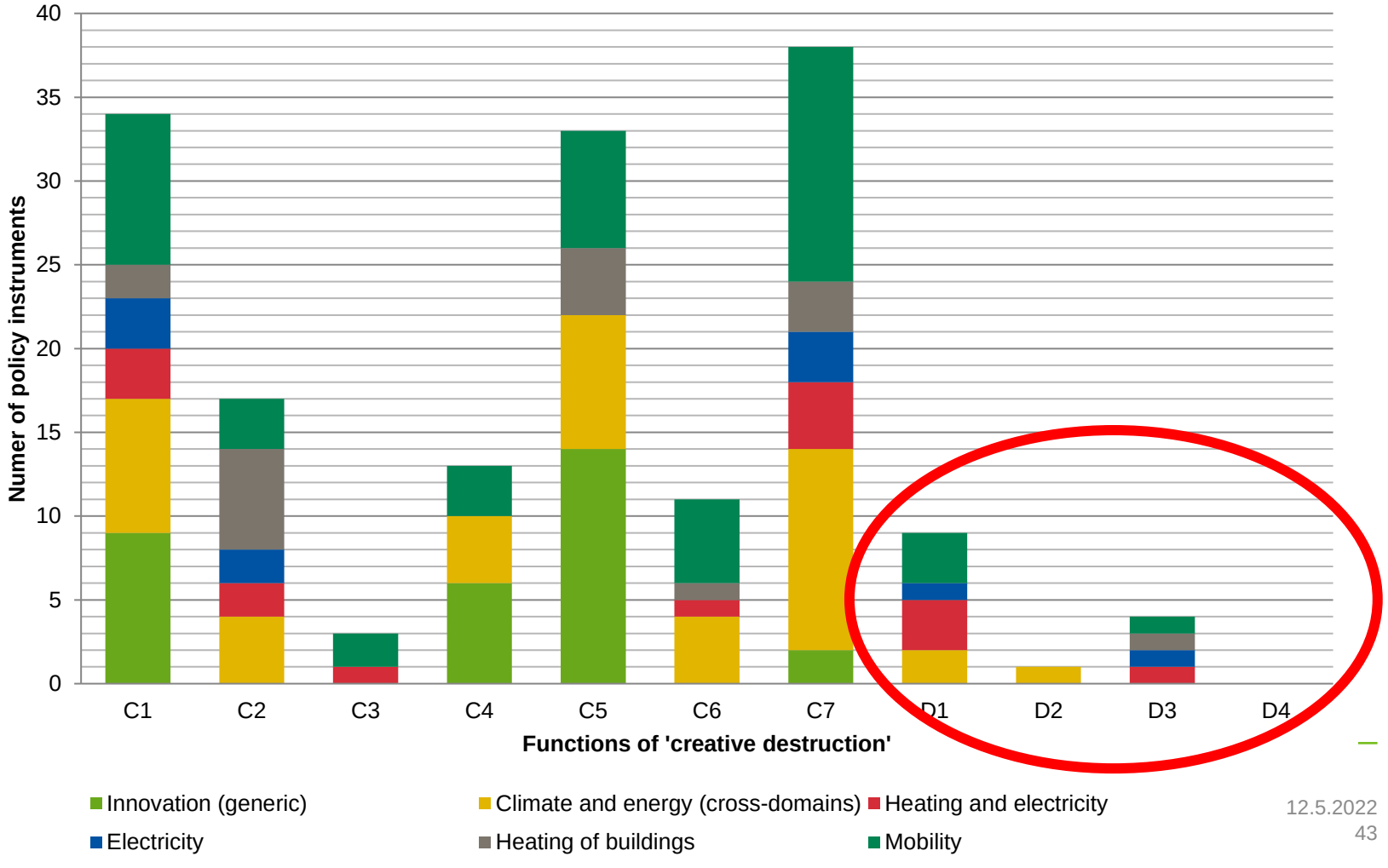
Example: Policies for ‘low energy’ transitions in Finland and the UK

- **Finnish and UK policy instruments potentially influencing *’low energy’ innovation*, i.e. innovations for energy efficiency and energy demand reduction**

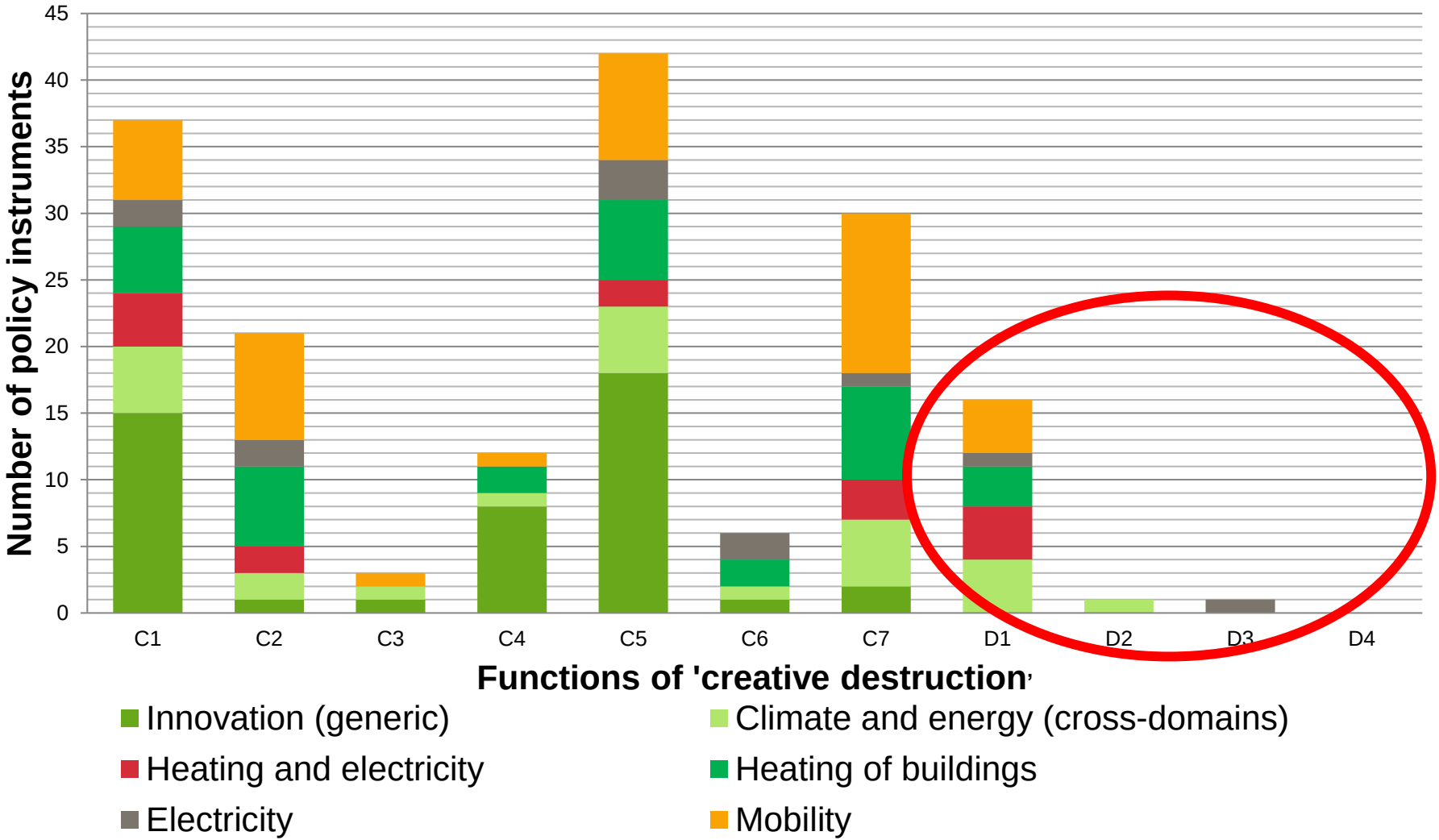
- **Policy mapping excersise**
  - *Four international policy measures databases (IEA, EEA, EC Erawatch, BEEP)*
  - *Divided in categories & coded in excel, one instrument can address several functions*
  - *Draft list of instruments sent for validation to national experts*

- **Focus on relative importance of creation vs. destruction; important gaps**

Policy mix for low energy innovation in Finland (n=64)



Policy mix for low energy innovation in UK (N=72)



Destabilising policies for low energy innovation in transport

Function	Finland
Control policies	Emission performance standards for new cars, Amendment of Car Tax and Annual Vehicle Tax Regimes, Amendment of fuel taxation, Revision of the Land Use and Building Act
Significant changes in regime rules	Revision of the Land Use and Building Act; Transport Service Act (2017)
Reduced support dominant regime technologies	Amendment of fuel taxation
Changes in social networks, replacement of key actors	Climate Change Panel, including multiple stakeholder groups in a transport roadmap process in 2021

Other examples of disruptive policies focused on reduction of support

- Removing of subsidies for coal mining operating costs (UK)
- Decisions to close down nuclear power (Germany, Sweden)
- Decision to limit the tax deductible share of commuting costs by private vehicles (Finland)
- Decisions (or consultations) on coal phase out (multiple countries)

- But such political decisions can also be reserved before they result in destabilising influence

Destabilisation and phase out

Relying on innovation alone is not quick enough

Lessons drawn from the destabilisation of coal regimes (Turnheim and Geels, 2012; 2013)

Calls for destructive, distruptive and phase out policies (Kivimaa and Kern, 2016; David, 2017; Rogge, 2017)

Attention to tensions and conflicts of destabilisation and the need to compensate losers → just transitions

Case: UK energy policy

UK zero carbon homes transition

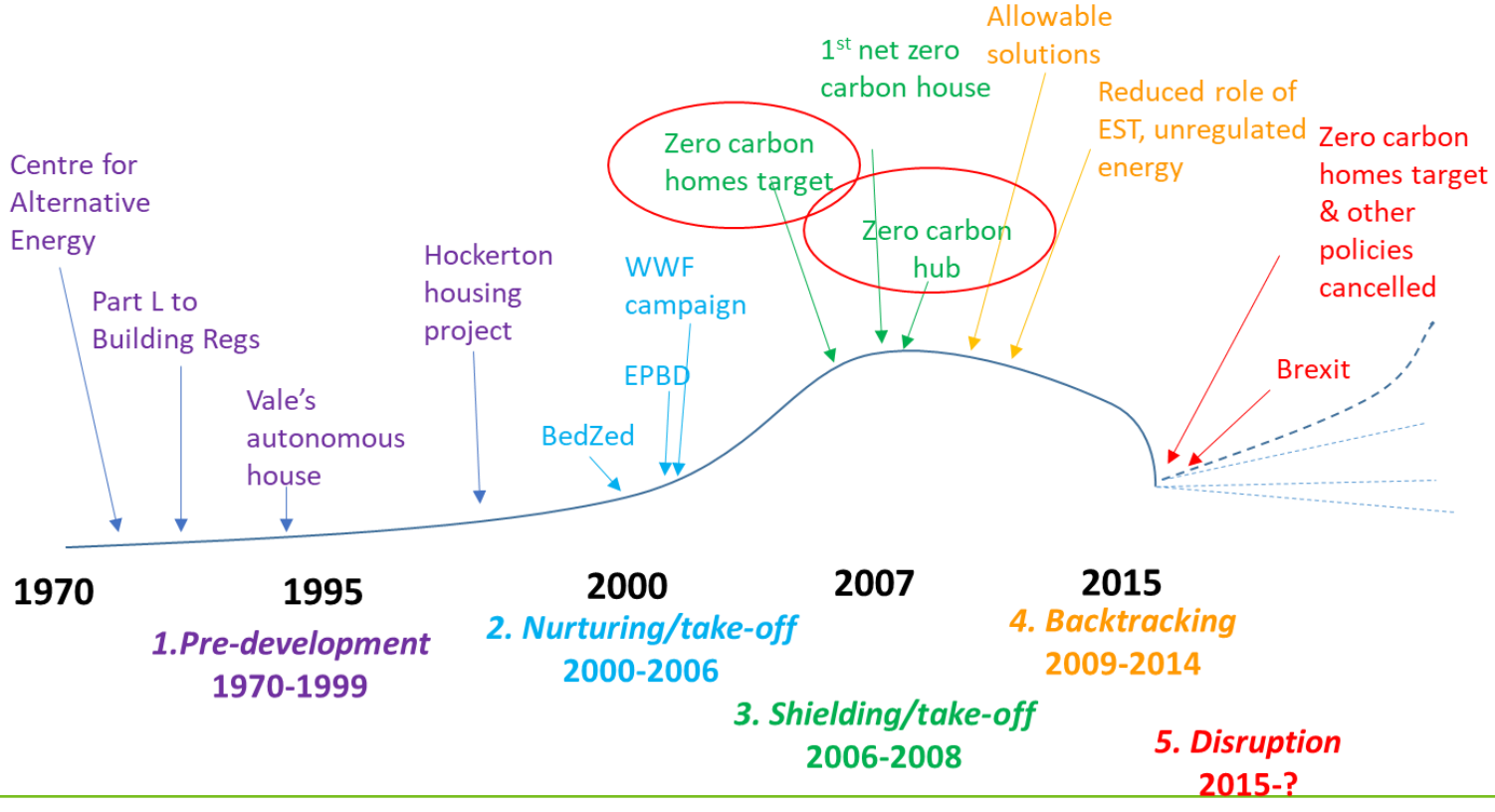
Transitions to low energy buildings & related policy trace back to 1970s

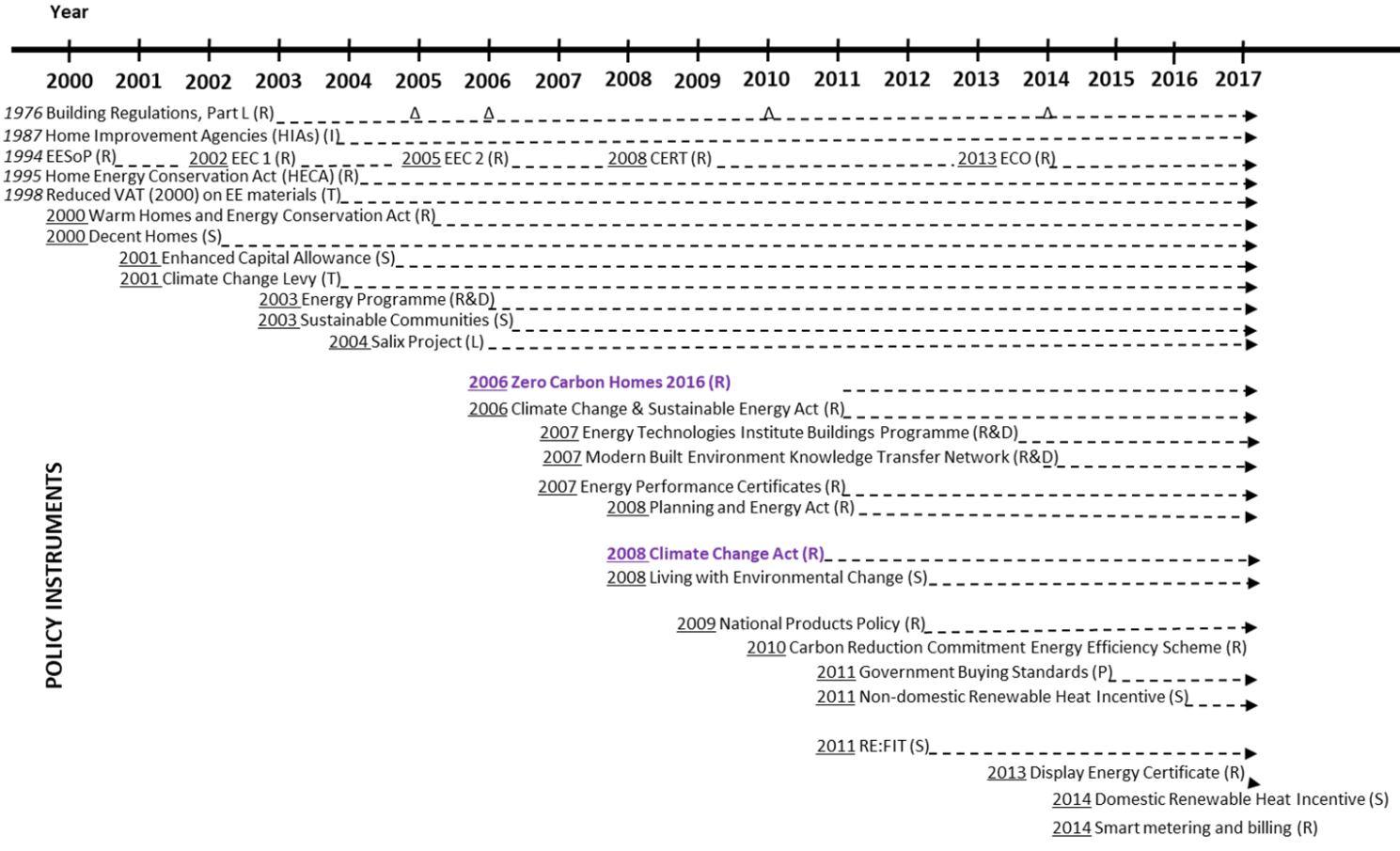
> 50 years later, residential building stock still a significant source of CO2 emissions

Variety of innovations around low energy, low carbon and ecologically sustainable buildings – but difficulties to become part of the regime

A relatively ambitious policy mix from early 2000s was dismantled in 2015

UK zero carbon homes transition





LEGEND: Δ = Update of policy, ■= End of policy, - - -→ = policy continues

I = Information, L = Loans, P = Public procurement, R = Regulation, R&D = Research and Development, S = Subsidy, T = Tax, V = Voluntary

CERT = Carbon Emissions Reduction Target, ECO = Energy Company Obligation, EE = Energy efficiency, EEC = Energy Efficiency Commitment, EESoP = Energy Efficiency Standards of Performance

Coal phase out in the UK

- **Coal contributes 22% of electricity generation**
  - *Electricity produced in 8 coal power stations.*
- **Coal mining historically important**
  - *Role reduced through market reforms and removal of mining subsidies*
  - *But plans for a new coal mine in Cumbria (for steel production)*
- **Natural closing of power stations**
  - *Due to age, inefficiency, and costly modifications to comply with air quality standards.*

Previous influence on recent rapid decline of coal use

- Low gas prices
- Expansion of renewables
  - Supported by Renewables Obligation, Feed in Tariffs
- One of the biggest driving forces has been the **UK's carbon price floor**, which tops up the tax paid on carbon emissions

”Phase out” consultation carried out during Nov 2016 – Feb 2017

- Coal Generation in Great Britain. The pathway to a low-carbon future: consultation document
- *“This consultation seeks stakeholder feedback on proposals to put into effect **an end to unabated coal generation by 2025**. It also tests proposals for a constraint on coal generation in the years ahead of that, in order to manage closures in an orderly way.”*
- Consultation does not propose a full phase out but phasing out unabated coal.

Gas as alternative to coal

- Greg Clark, the energy secretary: *"Taking unabated coal power out of our energy mix and replacing it with cleaner technology, such as **gas**, will significantly reduce emissions from the UK's energy use."* (Guardian 9.11.2016)

- Other options presented in the consultation: Biomass co-firing, utilization of CCS

- Energy demand reduction and renewable energy not explicitly considered

Picture source: https://commons.wikimedia.org/wiki/File:British_Parlament.jpg

Lack of ambition

- Consultation confirmed transition is happening anyway
- Most likely scenario estimate: coal power plants are shut down by 2022
  - But uncertainty – if price low without action can run until 2030.
  - Stakeholder calls for bringing the 2025 target forward

Recent policy developments

- **No coal to be used in electricity generation from Oct 2024**
  - Follows development, where wind power has replaced much of coal-power generation in the electricity markets anyway (in 2020 less than 2% of electricity was produced with coal)

- **From 2025, new built homes will not be allowed to install gas boilers (the main heating source in the UK)**
  - Yet slow change, as in 2020, 220,000 new homes were built in England, while the whole country's residential building stock was 24,66 million dwellings (i.e. less than 1% of renewal per year

Lessons from UK energy policy

Long-term overarching policies (Climate Change Act, Zero Carbon Homes target) important for transition to take-off

- *destabilising effect & some coherence over time*

Otherwise too frequently changing policy mix slowed transition

- *weak temporal coherence overall*
- *termination of several policies including a regime destabilising policy - Zero Carbon Homes Target – finally halted progress*

Policy mixes for low carbon transitions extend over multiple domains (e.g. innovation, climate, energy, buildings, finance)

- *policy coherence challenge*
- *should aim to maximise synergies and reduce conflicts in the mix*

Discussion and conclusions

Discussion on energy policy, policy mixes & phase out

- **What kind of policies are most important for energy transition and why?**
  - *If you were an energy minister for a European country, what kind of policy mixes would you promote*

- **Can you think of 'phase out policies' that would influence energy consumption?**
  - *Example from city, national or international level*

Conclusions

- **Change in energy policy is needed as part of sustainable energy transitions**
  1. *Sustainability is officially one of core goals of energy policy in many places*
  2. *Complete policy overhaul is difficult as energy policy is intertwined with other policy domains and their goals*
  3. *Even when 'sustainability transition' policies exist, their effect may be reduced by other policies*
- **Policy mixes for transitions aim to highlight**
  1. *How a diverse mix of goals, instruments and processes are needed for transition*
  2. *That more explicit attention need to be paid to destabilising and phase out of non-sustainable energy production and consumption*
  3. *That decarbonisation and environmental sustainability needs to be a priority when policies conflict*