

# Supplementary Materials: Strengthening the Energy Policy Making Process and Sustainability Outcomes in the OECD through Policy Design

Andrew Chapman <sup>†,\*</sup>, Benjamin McLellan <sup>†</sup> and Tetsuo Tezuka <sup>†</sup>

Table S1. Research Questions 1–3 QCA Raw Data.

Nation	Q1. Key Govt. Bodies	Q2. Identification	Q3. Tool Development
UK	<ul style="list-style-type: none"> <li>Parliament is the supreme legislative body and the government is drawn from and answerable to Parliament, which is bicameral, consisting of the House of Commons and the House of Lords.</li> <li>Draft bills are issued for consultation before being formally introduced to Parliament. Following consultation Bills are introduced into either house for examination, discussion and amendment.</li> <li>Once a bill is agreed in both houses, it is presented to the Monarch for royal assent, becoming an Act [5].</li> </ul>	<ul style="list-style-type: none"> <li>Policies to deal with GHG emissions were first introduced in the early 2000's with the Climate Change Agreement and Climate Change Levy coming into effect in 2001.</li> <li>EU directives: RE and emissions trading scheme [5].</li> <li>Govt sets out clean energy and environmental policy priorities at the establishment of their govt [31].</li> </ul>	<ul style="list-style-type: none"> <li>Govt White Papers set out details of future policy on a particular subject. They allow the govt to gather feedback before it formally presents the policies as a bill.</li> <li>Devolved Govts develop their own policies and targets.</li> <li>Govt Plans for Energy Market Reform [5,7].</li> </ul>
Australia	<ul style="list-style-type: none"> <li>Westminster-based Parliamentary system.</li> <li>Bills can be introduced into upper or lower house of parliament.</li> <li>Upper house (Senate) can block bills from becoming Acts even with a govt majority in the lower house.</li> <li>Royal assent is required for all Acts (formality) [5].</li> </ul>	<ul style="list-style-type: none"> <li>Climate change identified as an issue in the late 1990s.</li> <li>Govt agencies are established to provide advice for environmental policy (GHG emissions, climate change mitigation etc.).</li> <li>Kyoto Protocol signee 1998, ratified in 2007 [5].</li> <li>Currently the RE Target is administered by the Clean Energy Regulator—an independent statutory authority [33].</li> <li>The Department of the Prime Minister and Cabinet provides policy advice on priority matters of public and govt administration [6].</li> </ul>	<ul style="list-style-type: none"> <li>Govts provide an integrated Australian energy policy framework (Energy White Paper) which sets out the policy vision [34].</li> <li>Statutory bodies given responsibility for market instruments [32,33].</li> <li>State Govts implement additional policy tools to meet internal goals [5].</li> </ul>

Table S1. Cont.

Nation	Q1. Key Govt. Bodies	Q2. Identification	Q3. Tool Development
Canada	<ul style="list-style-type: none"> <li>• Parliament is based on the British model, with a lower house (House of Commons) and upper house (Senate).</li> <li>• Bills can be introduced in the House of Commons or the Senate as public or private bills which are based on a petition. Hybrid bills also possible.</li> <li>• Bills become law following post-debate and amendment agreement in both houses through a series of three readings. Committees from both houses examine legislation and hear testimony on specific points.</li> <li>• The Sovereign of the United Kingdom formally enacts all laws.</li> <li>• Constitution divides legislative ability and responsibility between the federal and provincial govts based on topic [5,6].</li> </ul>	<ul style="list-style-type: none"> <li>• No comprehensive federal climate change legislation in place.</li> <li>• Attempts made at a parliamentary level since 2006, but unsuccessful in both houses.</li> <li>• Provinces have been active in passing their own climate legislation [5].</li> <li>• 75% of Canada's electricity already comes from non-emitting sources (RE &amp; Nuclear) [6].</li> </ul>	<ul style="list-style-type: none"> <li>• Energy issues are a shared responsibility between federal and provincial governments, specifically the environmental regulation of energy projects.</li> <li>• Federal departments of Environment Canada and Natural Resources Canada regulate GHG and renewable resources, and set federal policy on clean energy supply [6].</li> </ul>
Japan	<ul style="list-style-type: none"> <li>• Parliamentary cabinet system. More than half of Cabinet members are MP's selected by the Prime Minister. The Prime Minister is elected by MP's.</li> <li>• National Diet is the law-making organ of the state, consisting of the House of Representatives (lower house) and House of Councillors (upper house).</li> <li>• MP's and Cabinet can submit bills, which are passed to a committee for deliberation which can include open hearings before voting—approval is given in a plenary session of the Diet. Compromise is often sought where agreement cannot be made, via committee.</li> <li>• Passed laws are promulgated by the Emperor, before gazetting [5].</li> </ul>	<ul style="list-style-type: none"> <li>• Oil shocks in the 1970's exposed Japan's weak energy self-sufficiency and lead to a 40% energy efficiency drive [39].</li> <li>• The Act on Promotion of Global Warming Countermeasures was enacted in 1998 as the first climate-dedicated law—arising from the Kyoto Protocol process [5].</li> <li>• The Cabinet formulated the Strategic Energy Plan, 2014 based on issues, long-term measures and basic policy approach to energy supply and demand, strategic technology development and communication with society [7].</li> </ul>	<ul style="list-style-type: none"> <li>• Strategic Energy Plan developed by the Cabinet in 2014 [39].</li> <li>• Long-term Energy Supply and Demand Outlook is derived from this document, developed by the Ministry of Economy, Trade and Industry specifying future RE technology generation targets [7,40].</li> </ul>

Table S1. Cont.

Nation	Q1. Key Govt. Bodies	Q2. Identification	Q3. Tool Development
USA	<ul style="list-style-type: none"> <li>• Bicameral legislature (Congress) consisting of Senate and House of Representatives.</li> <li>• Bills can be introduced in either house, usually following approval by a committee.</li> <li>• Once a Bill is approved in one chamber it is sent to the other for amendment, rejection or passing. Both houses must agree on an identical version of the Bill for it to be presented to the President.</li> <li>• To become law, Bills must be signed by the President, who has veto power.</li> <li>• Presidential veto can be overturned by a 2/3 majority in both houses [5].</li> </ul>	<ul style="list-style-type: none"> <li>• No dedicated climate change legislation [5].</li> <li>• The Clean Power Plan outlines the Environmental Protection Agency (EPA) role to reduce GHG emissions through the Clean Air Act and provisions on GHG emission limits for generators [7].</li> <li>• Presidential statements outline congress term plans: the President's Climate Action Plan of 2013 outlines responsibility to future generations to meet the challenge of climate change and outlines mostly aspirational and some concrete policy plans [42].</li> <li>• Development of a national RE policy is impeded by divided government—different parties controlling different houses of congress [56].</li> </ul>	<ul style="list-style-type: none"> <li>• Govt Act Based: Federal facility RE requirements: the Energy Policy Act, extended by the Energy Independence and Security Act requiring solar hot water and a phased reduction in fossil fuel consumption [6].</li> <li>• The EPA has a role applying laws to reduce GHG in the current and future energy supply system [7].</li> <li>• Govt manages GHGs through The Clean Air Act, executive orders and partnership programmes.</li> <li>• In 2015, 32 individual States had their own legislation on climate change and the reduction of GHG [5].</li> </ul>
Mexico	<ul style="list-style-type: none"> <li>• Bicameral legislature (Congress)</li> <li>• Bills can only be introduced by the President or a member of Congress—however in practice most originate within the executive.</li> <li>• Lower house is the Chamber of Deputies and Upper house is the Senate</li> <li>• Approval in both houses is required for a bill to become law [5].</li> </ul>	<ul style="list-style-type: none"> <li>• National Climate Change Strategy first adopted by Govt in 2007.</li> <li>• Active participation in international GHG emission inventories and submission of Climate Action Plans [5].</li> <li>• Public Presidential support for passage of law and achievement of global warming mitigation objectives by incorporating clean energy [45].</li> </ul>	<ul style="list-style-type: none"> <li>• Ministry of Environment and Natural Resources administers the General Law of Climate Change and establishes entities to oversee GHG mitigation targets and incentives.</li> <li>• Energy Secretariat implements the National Energy Strategy with RE generation goals.</li> <li>• Guidelines for establishing and issuing Clean Energy Certificates are overseen by the Regulatory Commission of Energy [7].</li> </ul>

Table S1. Cont.

Nation	Q1. Key Govt. Bodies	Q2. Identification	Q3. Tool Development
Chile	<ul style="list-style-type: none"> <li>Multi party Republic Presidential System. Congress consists of the Senate and Chamber of Deputies.</li> <li>Bills are approved first in the Chamber of Deputies, then the Senate and finally approved by the President. Once endorsed the Bill is promulgated and sent to the Comptroller-General for constitutional review. If declared constitutionally sound, the President publishes the bill as law.</li> <li>The President has sole authority to introduce bills which are concerned with spending, public sector administrative entities duties, and modifying he political-administrative configuration. The President can also grant initiatives priority status, requiring action from congress in 3, 10 or 30 days depending on urgency – giving the President exclusive power to set the legislative agenda [5].</li> </ul>	<ul style="list-style-type: none"> <li>Established a National Advisory Committee for Global Change in 1996.</li> <li>National Strategy for Climate Change was adopted in 2006.</li> <li>Climate Change is one of the five thematic focuses of the Ministry [5].</li> <li>Explicit policies that promote the use of non-conventional RE originate in 2005 [8].</li> </ul>	<ul style="list-style-type: none"> <li>National Energy Strategy 2012–2030 was developed by the Ministry for Energy and outlines strategic options to address energy challenges and the transition to a developed nation [50].</li> <li>Centre for RE Development established in 2009 [8].</li> <li>The Ministry of the Environment has a special mandate to propose and develop national climate policy [5].</li> </ul>
Greece	<ul style="list-style-type: none"> <li>Unicameral legislature consisting of Members of Parliament and State Deputies.</li> <li>Parliament elects the President of the Republic by a majority of two-thirds for a five-year term.</li> <li>Government Ministers can introduce Law Proposals; MPs can introduce Draft Laws as bills.</li> <li>Bills are passed through a two stage process in the Parliament before promulgation by the President of the Republic and publication in the Official Gazette of the Hellenic Republic [5].</li> </ul>	<ul style="list-style-type: none"> <li>First National Climate Change Programme adopted in 1995.</li> <li>Ministry of Environment, Energy and Climate Change established an Inter-Ministerial Committee on Climate Change in 1996.</li> <li>Ratified Kyoto Protocol in 2002 [5].</li> <li>The development of RE sources in Greece first started to a significant degree in the 1990s with the development of solar thermal systems stimulated by a sizable tax deduction for final users [29,58].</li> </ul>	<ul style="list-style-type: none"> <li>National RE Action Plan outlines bodies, roles and tool administration for Greek targets as part of an EU approach.</li> <li>Minister of Environment, Energy and Climate Change was established in 2009 to bring under a single administrative structure, the licensing function and considerations for energy, environment and the economy.</li> <li>The Centre for RE Sources and Saving, supervised by the Minister of Environment, Energy and Climate Change, facilitates national energy planning and the formulation of energy policies [29].</li> </ul>

**Table S2.** Research Questions 4–6 QCA Raw Data.

Nation	Q4. Consultation	Q5. Implementation	Q6. Evaluation
UK	<ul style="list-style-type: none"> <li>The Office for RE Deployment works closely with delivery partners and stakeholders to help accelerate deployment.</li> <li>Great Britain also works with devolved Governments of Wales, Scotland and Northern Ireland who contribute to the overall target.</li> <li>The National RE Action Plan was developed following an extensive consultation exercise with the Devolved Administrations, regional and local Govt, other public groups, the private sector and members of the public [29].</li> <li>UNFCCC Annex I nation.</li> </ul>	<ul style="list-style-type: none"> <li>Ofgem the Office of Gas and Electricity Markets: a non-ministerial govt department and an independent National Regulatory Authority implements the feed in tariff for small scale renewables generation and Contracts for Difference (CfD) for large scale generation.</li> <li>CfDs are concluded between the renewable generator and Low Carbon Contracts Company (LCCC), a govt-owned company [7].</li> <li>Department of Energy and Climate Change’s Office for RE Deployment is responsible within Govt to ensure RE targets are met [29].</li> </ul>	<ul style="list-style-type: none"> <li>Department of Energy and Climate Change responsible for monitoring and reporting.</li> <li>Independent UK Committee on Climate Change to review the renewables target and provide advice on increasing the level of ambition. Govt has committed to make an Annual Energy Statement to the UK Parliament [29].</li> <li>Annual Energy Statement to Parliament to set strategic energy policy and guide investment [31].</li> </ul>
Australia	<ul style="list-style-type: none"> <li>Council of Australian Govts (COAG) collaborate over energy market reforms [34].</li> <li>Climate Change Authority provides independent advice [54].</li> <li>Department of the Environment conducts stakeholder consultation [33].</li> <li>Reporting to the UNFCCC (Annex-I) [5].</li> </ul>	<ul style="list-style-type: none"> <li>The Clean Energy Regulator oversees the Operation of the RET scheme according to the RET legislation.</li> <li>This includes the REC Registry [33].</li> </ul>	<ul style="list-style-type: none"> <li>Legislated to have a biennial review by the independent Climate Change Authority [54].</li> <li>The Act was revised in 2015 to replace the mandated biennial consultative review with regular status updates by the independent statutory authority, the Clean Energy Regulator [33].</li> <li>Climate Change Authority</li> <li>Department of the Environment modifies the RET over time based on consultation feedback and Govt policy direction [33].</li> </ul>
Canada	<ul style="list-style-type: none"> <li>As a UNFCCC Annex I country, Canada signed and ratified the Kyoto Protocol (2002) but has subsequently withdrawn from the agreement in 2012.</li> <li>Pursue formalised participation of provinces and territories in international energy relations by working towards a consistent approach and formal mechanisms with the federal government while giving a clear role for provinces (provinces directly engage in COP negotiations [5,6].</li> <li>The federal government collaborates with provincial governments on issues of Pan-Canadian interest [6].</li> </ul>	<ul style="list-style-type: none"> <li>Shared between province and federal govts.</li> <li>Environment Canada and Natural Resources Canada administer programmes on clean energy and regulate GHG and pollutant emissions [6].</li> <li>British Columbia Hydro and Power Authority administer the BC Clean Energy Act [36].</li> <li>Ontario: Independent Electricity System Operator implements the FiT [37].</li> <li>Ministry of Sustainable Development, Environment and the Fight against Climate Change administer the Quebec Climate Change Action Plan [38].</li> </ul>	<ul style="list-style-type: none"> <li>Status Reports submitted to the minister [36].</li> <li>Environment Canada and Natural Resources Canada administer programmes on clean energy and regulate GHG and pollutant emissions [6].</li> <li>Fit Review in Ontario to provide policy certainty [9].</li> </ul>

Table S2. Cont.

Nation	Q4. Consultation	Q5. Implementation	Q6. Evaluation
Japan	<ul style="list-style-type: none"> <li>Govt established "Related Ministers' Cabinet Meeting on RE" for policy coordination &amp; to promote cooperation among related ministries.</li> <li>COP and UNFCCC (Annex I) are consultation partners for energy and climate change issues [39].</li> <li>Strategic Policy Committee of the Advisory Committee for Natural Resources and Energy and subcommittees (including calls for public comment) decided the Long-term Energy Supply and Demand Outlook [40].</li> </ul>	<ul style="list-style-type: none"> <li>The feed in tariff is revised each year by the Ministry of Economy, Trade and Industry's Agency for Natural Resources and Energy, for each technology.</li> <li>Subsequently an electricity surcharge for all households is derived based on the tariff regime and combination of generating technologies [7].</li> </ul>	<ul style="list-style-type: none"> <li>A Periodic Review of Long-term Energy Supply and Demand Outlook is scheduled to occur at least once every three years, considering the Strategic Energy Plan. Most recently delivered in 2015 [40,55].</li> <li>The feed in tariff is revised each year by the Ministry of Economy, Trade and Industry's Agency for Natural Resources and Energy, for each technology.</li> <li>Subsequently an electricity surcharge for all households is derived based on the tariff regime and combination of generating technologies [7].</li> </ul>
USA	<ul style="list-style-type: none"> <li>UNFCCC/COP (Annex I) [7].</li> <li>Presidential announcement, direction of agencies [6,43].</li> <li>EPA negotiates with the fossil fuel electricity generating industry to establish standards for GHG emissions from power plants and States then develop and implement plans to achieve the goals by 2030.</li> <li>Clean Plan was negotiated through outreach to states, tribes, utilities, stakeholders and the public [43].</li> </ul>	<ul style="list-style-type: none"> <li>The EPA is responsible for implementing the Clean Power Plan (implementation is currently stayed, pending judicial review).</li> <li>The EPA aims to Reduce GHG emissions through 3 building blocks: 1—improving the performance of existing power plants, 2—switching to natural gas or low carbon alternatives, and finally 3—transitioning to emission-free RE generation [43].</li> <li>RPS are implemented at State level [7].</li> </ul>	<ul style="list-style-type: none"> <li>A quadrennial Energy Review led by the White House Domestic Policy Council and Office of Science and Technology Policy, supported by a Secretariat established at the Department of Energy, and involving the robust engagement of federal agencies and outside stakeholders—to ensure that federal energy policy meets economic, environmental, and security goals [6,42].</li> </ul>
Mexico	<ul style="list-style-type: none"> <li>Inter-party negotiation in the Congress of the Union.</li> <li>UNFCCC/COP consultation (Non-Annex I) [5].</li> <li>Legislation drafters consulted widely to develop the Energy Transition Law, learning from newly industrialized and high petroleum nations [46].</li> <li>Energy Ministry collaboration with domestic and international bodies [57].</li> </ul>	<ul style="list-style-type: none"> <li>Energy Regulatory Commission administers Clean Energy Certificates obligation and acquisition.</li> <li>Application of the law is the responsibility of the Ministries of Energy, Environment and Natural Resources, the Energy Regulatory Commission and the National Commission for the Efficient Use of Energy [44].</li> </ul>	<ul style="list-style-type: none"> <li>Energy Regulatory Commission and Environmental Protection Agency are responsible for monitoring electrical industry members [44].</li> </ul>

Table S2. Cont.

Nation	Q4. Consultation	Q5. Implementation	Q6. Evaluation
Chile	<ul style="list-style-type: none"> <li>Energy Strategy outlines the need to Work together with the public and private sectors, researchers and public representatives [50].</li> <li>UNFCCC Non-Annex I country.</li> <li>Inter-ministerial Committee on Climate Change was set up, including the Ministers of the Environment, Foreign Affairs, Agriculture, Transport and Telecommunications, Energy, Economy, Finance, Mining and Public Works and two dialogue platforms, one for public-private partnerships and one for the civil society.</li> <li>International research and cooperative agreements [5].</li> </ul>	<ul style="list-style-type: none"> <li>Ministry of Energy (Strategy, Consultation, Centre for RE Development (Funding) [50]).</li> <li>National Energy Commission enforces existing energy legislation [8].</li> <li>Ministry of the Environment, set up as the State body in charge of cooperating with the President in the design and implementation of environmental policies, plans and programmes [5].</li> </ul>	<ul style="list-style-type: none"> <li>Center for Economic Load Dispatch (CDEC) keeps a public record of all RE injections into the Grid as directed by the Law [47].</li> <li>Strategic Energy Plan outlines the need to review instruments over time [50].</li> <li>Limited post implementation evaluation [8].</li> </ul>
Greece	<ul style="list-style-type: none"> <li>UNFCCC Annex I country.</li> <li>Bills submitted to Parliament must include a report outlining the findings of public consultation [5].</li> <li>EU member, targets based on (extended) EU obligations.</li> <li>Consultation for development of the National RE Action Plan included regional and local authorities, scientific and RE development associations, NGOs, and the general public and institutional/market actors through a two stage consultation process in 2010 [29].</li> </ul>	<ul style="list-style-type: none"> <li>Regulatory Authority for Energy issues licenses to produce electricity from RE—except for small scale RE and non-grid connected RE.</li> <li>The Ministry of Environment, Energy and Climate Change created an independent office for RE which assists investors and RE generators to install RE and deal with any legislative/regulatory issues [52].</li> </ul>	<ul style="list-style-type: none"> <li>Decision on the desired proportion of installed capacity and distribution among RE technologies is to be reviewed at least every two years by the Minister of Environment, Energy and Climate Change.</li> <li>An annual report is provided to the Ministry of Environment, Energy and Climate Change and the Regulatory Authority for Energy outlining issues with RE investment, along with proposed solutions [52].</li> <li>Tariffs are reviewed annually and adjusted as needed [7].</li> </ul>

**Table S3.** Research Questions 7–9 QCA Raw Data.

Nation	Q7. Current Goals	Q8. Goal Setting	Q9. Tools in Place
UK	<ul style="list-style-type: none"> <li>15% of energy consumption from RE sources, meaning approximately 30% of electricity from renewables, with 2% of this to come from small scale sources.</li> <li>EU wide greenhouse gas emission cut of 30% by 2020 [29].</li> </ul>	<ul style="list-style-type: none"> <li>European Union nation, supports the EU emissions reduction target of 30% [29].</li> <li>Devolved Govts have introduced their own targets [5].</li> <li>Parliament develop and update the Energy Act, which states the targets set out in the regulations for each mechanism [30].</li> </ul>	<ul style="list-style-type: none"> <li>Feed in Tariffs for small scale renewables.</li> <li>CfD for large scale renewables introduced in October 2014, aiming to replace the previous Renewable Obligations system. Awarded for 15 years.</li> <li>Energy Market Reform tools: Capacity auctions to set a market for future capacity. Emission Performance Standard, Carbon Price Floor (CPF) designed to be gradually increased, to augment EU carbon price [7].</li> <li>European Investment Bank funding for onshore wind projects [29].</li> </ul>
Australia	<ul style="list-style-type: none"> <li>20% of all electricity by 2020.</li> <li>Reduce GHG emissions [35].</li> <li>Large-scale RE Target (LRET) 33,000 GWh by 2020. (Reduced from 41,000 GWh), the majority of the goal.</li> <li>No specified target for small-scale RE [32].</li> </ul>	<ul style="list-style-type: none"> <li>Negotiated in Parliament.</li> <li>Targets vary according to Govt policy priorities and are reflected in amendment to Acts.</li> <li>In 2015 the Australian Parliament amended the RE (Electricity) Act 2000 to reduce the RE generation goal from 41,000 GWh to 33,000 GWh by 2020 [35].</li> <li>Some States have their own emission reduction and RE generation goals, while others align with Federal targets [5].</li> </ul>	<ul style="list-style-type: none"> <li>RE Certificates (REC), administered by the Federal Govt: Large scale RECs created in relation to generation of electricity by accredited power stations. Small scale RECs created in relation to installation of solar hot water and small generation units [32].</li> <li>Oversight of the market supply and demand conducted by the Clean Energy Regulator using a REC registry to match supply and demand and to meet Govt targets [35].</li> <li>Feed-in tariffs administered by the States [5].</li> </ul>
Canada	<ul style="list-style-type: none"> <li>No Federal goal. Aspirational goals only [6].</li> <li>BC: Generate at least 93% of electricity from clean or renewable sources by 2020 and reduce GHG emissions by 33% compared to 2007 [36].</li> <li>Quebec: Reduce GHG by 6% below 1990 levels [38].</li> </ul>	<ul style="list-style-type: none"> <li>At Province level [5,36–38].</li> <li>Overarching administration provided by Federal departments of Environment Canada and Natural Resources Canada [6].</li> </ul>	<ul style="list-style-type: none"> <li>Feed-in tariff for small (&lt;10 kW) and large RE systems, guaranteed for 20 years [37].</li> <li>Cap and trade schemes [5].</li> <li>Federal level tax and depreciation concessions [6].</li> </ul>
Japan	<ul style="list-style-type: none"> <li>CO<sub>2</sub> emissions from energy sources to be 21.9% lower than FY2013 levels by 2030.</li> <li>Energy self-sufficiency to increase to 24.3% by 2030, this includes 10%–11% nuclear and 13%–14% RE based electricity generation.</li> <li>Reduce energy demand to 13% below FY2013 levels by 2030 through energy conservation measures [40].</li> </ul>	<ul style="list-style-type: none"> <li>The Strategic Energy Plan outlines Japanese Govt energy goals, however these are aspirational, not concrete [39].</li> <li>The Long-term Energy Supply and Demand Outlook sets specific goals for GHG reduction compared to FY2013 levels and energy security levels including generation from renewable sources [40].</li> </ul>	<ul style="list-style-type: none"> <li>Feed in Tariff for electricity generated from RE.</li> <li>The purchase price per kWh is revised each year by the Ministry of Economy, Trade and Industry &amp; the Agency for Natural Resources and Energy, for each technology [7].</li> </ul>

Table S3. Cont.

Nation	Q7. Current Goals	Q8. Goal Setting	Q9. Tools in Place
USA	<ul style="list-style-type: none"> <li>no national RE target, however the policy environment is broadly supportive of RE [6].</li> <li>Reduce GHG emissions by 32% by 2030 through building blocks: improving the performance of existing power plants, switching to natural gas or low carbon alternatives, and finally transitioning to emission-free RE [7].</li> <li>20 GW of RE on public land, 100 MW of installed RE capacity on subsidized housing stock by 2020, and 3 GW of RE on military installations by 2025.</li> <li>Federal Govt to consume 20% of its electricity from RE sources by 2020.</li> </ul>	<ul style="list-style-type: none"> <li>States, who regulate their own electric utilities, introduce their own Renewable Portfolio Standards (RPS) [56].</li> <li>State Based RPS outlines individual generation/GHG reduction goals [7].</li> <li>Presidential announcement, direction of agencies [6,43].</li> <li>Presidential Action Plan [42].</li> </ul>	<ul style="list-style-type: none"> <li>Incentive payments per kWh of renewables based electricity generation [41].</li> <li>State-level RPS [7].</li> <li>Residential tax credits: 30% tax credit (up to \$2,000) for solar PV and solar hot water installation, and 30% (up to \$500 per 0.5 kW) for fuel cell installation [7].</li> </ul>
Mexico	<ul style="list-style-type: none"> <li>25% of electricity from RE by 2018, 30% by 2021 and 35% by 2024 [44].</li> <li>Reduction in emissions of 30% by 2020 and 50% by 2050 compared to 2000 levels [5].</li> </ul>	<ul style="list-style-type: none"> <li>International climate change negotiations in Paris (COP21) around Mexico's Climate Action Plan set the basis for domestic policy to meet goals.</li> <li>Energy Transition Law passed in Congress in 2015, clear majorities in both houses after more than a year of debate [45].</li> </ul>	<ul style="list-style-type: none"> <li>Clean Energy Certificates are issued at the rate of 1 certificate per MWh generated post August 2014 with Penalties for non-compliance.</li> <li>Certificate market is monitored by the Regulatory Commission of Energy [7].</li> <li>Legal provisions, regulatory and tax conditions [44].</li> </ul>
Chile	<ul style="list-style-type: none"> <li>20% of electricity from renewable sources by 2025 (for electric utilities with more than 200 MW operational capacity, Hydro above 20 MW not included) [47].</li> <li>A target for traditional hydroelectricity to achieve 45% to 48% share of the electricity mix over the next decade [5].</li> </ul>	<ul style="list-style-type: none"> <li>Ministry of Energy Strategic Energy Plan sets out high level goals for the energy industry [50].</li> <li>Centre for RE Development sets goals for deployment of non-conventional RE and facilitates funding.</li> </ul>	<ul style="list-style-type: none"> <li>Quota System with auctions for capacity and a "Green Certificate" system [5,51].</li> <li>Feed-in tariffs and exemptions from transmission costs for small scale RE generation [48,49].</li> <li>Economic support for Non-Conventional RE Development. Invest Chile Program for RE [5,51].</li> </ul>
Greece	<ul style="list-style-type: none"> <li>20% of gross final energy consumption, and 40% of gross electrical consumption to be produced by RE by 2020 [52].</li> <li>GHG levels to be 10% below 1990 levels in 2020 [58].</li> </ul>	<ul style="list-style-type: none"> <li>European Union Nation, submitting a National RE Action Plan to the EU [29].</li> <li>Parliament develops the RE Laws which outline goals, technologies and mechanisms to achieve them by target dates [52].</li> </ul>	<ul style="list-style-type: none"> <li>Feed in Tariffs for small scale solar, wind, geothermal, biomass, landfill gas and biogas [7,52].</li> <li>Tax concessions for household consumers and producers of RE.</li> </ul>

**Table S4.** Research Questions 10–12 QCA Raw Data.

Nation	Q10. Environmental	Q11. Economic	Q12. Social Equity
UK	<ul style="list-style-type: none"> <li>Maintain energy security by utilising renewable resources to reduce depletion of fossil fuels.</li> <li>climate change is one of the gravest threats we face, and urgent is required using a wide range of levers to decarbonise the economy.</li> <li>The development of RE sources, alongside nuclear and carbon capture and storage, will also enable the UK to play its full part in international efforts to reduce the production of harmful greenhouse gases [29].</li> </ul>	<ul style="list-style-type: none"> <li>A new “challenge group” is being established in the Cabinet Office to come up with innovative approaches to achieving environmental goals in a non-regulatory way.</li> <li>Provide opportunities for investment in new industries and technologies [29].</li> <li>Financial support for renewables [7].</li> </ul>	<ul style="list-style-type: none"> <li>A new “challenge group” is being established in the Cabinet Office to come up with innovative approaches to achieving social goals in a non-regulatory way [29].</li> <li>Promote community based renewables that benefit the local people [31].</li> </ul>
Australia	<ul style="list-style-type: none"> <li>To encourage the additional generation of electricity from renewable sources, to reduce emissions of greenhouse gases in the electricity sector, and to ensure that RE sources are ecologically sustainable, integrating environmental considerations.</li> <li>If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be reason for postponing measures to prevent environmental degradation.</li> <li>The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making [32].</li> </ul>	<ul style="list-style-type: none"> <li>Effectively integrate both long-term and short-term economic considerations.</li> <li>Improved valuation, pricing and incentive mechanisms should be promoted [32].</li> <li>Stimulate investment in RE power stations [35].</li> </ul>	<ul style="list-style-type: none"> <li>Effectively integrate social and equitable considerations.</li> <li>The principle of inter-generational equity: that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations [32].</li> </ul>
Canada	<ul style="list-style-type: none"> <li>Limit global warming by reducing GHG [38].</li> <li>Recognize the importance of socially and environmentally responsible development, transportation and use of energy [6].</li> </ul>	<ul style="list-style-type: none"> <li>To encourage economic development and the creation and retention of jobs [36].</li> <li>Investing in RE through Green Fund duty collected from gasoline and fossil fuels [38].</li> <li>Maintain a market-oriented approach to energy policies governed by effective, efficient and transparent regulatory systems [6].</li> </ul>	<ul style="list-style-type: none"> <li>Encourage Aboriginal and community participation [37].</li> <li>Public health and safety [38].</li> <li>Recognize the importance of socially and environmentally responsible development, transportation and use of energy [6].</li> </ul>

Table S4. Cont.

Nation	Q10. Environmental	Q11. Economic	Q12. Social Equity
Japan	<ul style="list-style-type: none"> <li>• Contribution to global warming countermeasures for reducing global greenhouse gas emissions.</li> <li>• Environmental acceptability is a criterion for energy sources introduced into the electricity market.</li> <li>• Environmental assessments to be streamlined [39].</li> <li>• Pursue environmental suitability [40].</li> <li>• GHG emission goals in line with the US and Europe [55].</li> </ul>	<ul style="list-style-type: none"> <li>• Stimulate new investment by introducing a competitive electricity market, liberalized and with the introduction of superior technologies.</li> <li>• Energy policies should consider economic growth as an important factor [39].</li> <li>• Ensure stable supply—energy security, and realize a low-cost energy supply by enhancing its efficiency [40].</li> <li>• Economic efficiency—reduce the cost of electricity [55].</li> </ul>	<ul style="list-style-type: none"> <li>• Reduce costs of RE, reduce electricity prices from current levels to inhibit public burden resultant from the new energy system.</li> <li>• The risk of an increase in public burden through one-side installation of solar power is recognized.</li> <li>• Review the system so as to allow well-balanced introduction between RE technologies [39,40].</li> <li>• Future generations should not be burdened [39].</li> <li>• Including safety in 3E+S [55].</li> </ul>
USA	<ul style="list-style-type: none"> <li>• Carbon pollution standards for new and existing power plants [42].</li> <li>• Protect Americans from harmful air pollution, reduce carbon and air pollution [43].</li> </ul>	<ul style="list-style-type: none"> <li>• \$7.9B investment funding clean energy technology.</li> <li>• Reduce barriers to investment in energy efficiency [42].</li> <li>• Driving investment in clean energy strategies that can reduce CO<sub>2</sub> emissions [43].</li> </ul>	<ul style="list-style-type: none"> <li>• Improve public health.</li> <li>• Reduce energy bills for families [42].</li> <li>• Ensure opportunities for communities, particularly low-income, minority and tribal communities [43].</li> </ul>
Mexico	<ul style="list-style-type: none"> <li>• Recommends the incorporation of social and environmental externalities into energy project evaluations.</li> <li>• To promote the use of RE sources and biofuels in economically, environmentally and socially responsible forms [57].</li> <li>• Reducing polluting emissions in the electric power industry [44].</li> <li>• Mitigate the increase of GHG emissions.</li> </ul>	<ul style="list-style-type: none"> <li>• Economic viability.</li> <li>• Promote regulatory and tax conditions to facilitate achievement of goals [44].</li> <li>• Clean Energy Certificate’s objective is to help Mexico achieve its goals for clean energy participation, while minimising costs as much as possible.</li> <li>• Increase public and private investment in generation, construction and extension of RE infrastructure [7,45].</li> <li>• To promote the use of RE sources and biofuels in economically, environmentally and socially responsible forms.</li> <li>• Creation of a fund to transition to clean and RE and a future green economy [57].</li> </ul>	<ul style="list-style-type: none"> <li>• Recommends the incorporation of social and environmental externalities into energy project evaluations [44].</li> <li>• To promote the use of RE sources and biofuels in economically, environmentally and socially responsible forms [57].</li> </ul>
Chile	<ul style="list-style-type: none"> <li>• Health and environmental protection [50].</li> </ul>	<ul style="list-style-type: none"> <li>• Sustainable economic growth.</li> <li>• National energy security and independence, promotion of a market with greater levels of competition and lower prices [50].</li> </ul>	<ul style="list-style-type: none"> <li>• Reduction of poverty, social growth and progress.</li> <li>• Efficiency and social commitment</li> <li>• Access and equity for everyone in Chile [50].</li> <li>• Fairness: the introduction of non-conventional RE should include both regulated and non-regulated customers [47].</li> </ul>
Greece	<ul style="list-style-type: none"> <li>• The protection of the climate, through the production of electrical energy from RE sources [52].</li> <li>• Reducing national GHG emissions [29].</li> </ul>	<ul style="list-style-type: none"> <li>• Boosting the competitiveness of the economy, attracting investment capital—“Green” development.</li> <li>• Economic improvement of conditions in rural areas [29].</li> </ul>	<ul style="list-style-type: none"> <li>• Socio-economic and demographic factors should be taken into account when choosing RE technologies [29].</li> </ul>