What's Keeping Energy Executives Awake at Night?

BusinessNZ Energy Council
Member of the World Energy Council

Your Energy Issues Map and how it compares

John Carnegie
ETNZ Spring Conference
Oamaru

7 November 2014

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CONSEIL MONDIAL DE L'ÉNERGIE

Outline

- the World Energy Council and the BusinessNZ Energy Council
- New Zealand Energy Issues Map
  - what is it
  - why have we done it
  - how can it be used
- the ETNZ Energy Issues Map
  - what's keeping Trustees awake at night?
- the BEC2050 Energy Scenarios project
  - the World Energy Council scenarios
  - New Zealand in 'Jazz' and 'Symphony worlds

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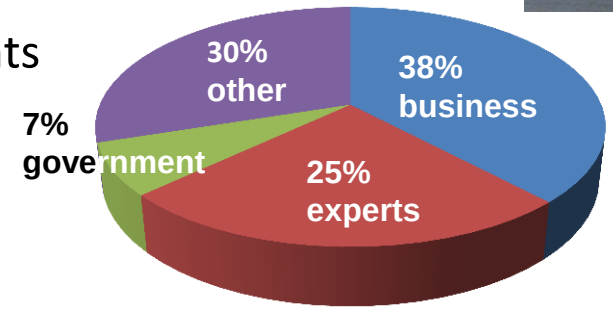
World Energy Council (WEC)

- the principal international network of energy leaders and practitioners
- promoting an affordable, stable, and environmentally sustainable energy system for all since 1923
- UN accredited
- truly global
  – 90+ country member committees
- inclusive and impartial
  - OECD & non-OECD
  - 3000+ member organisations from governments, industry, academia, & NGOs
- Informs global, regional, national strategies
  - authoritative studies
  - high-level network & events

10. Executive Council der World Power Conference.



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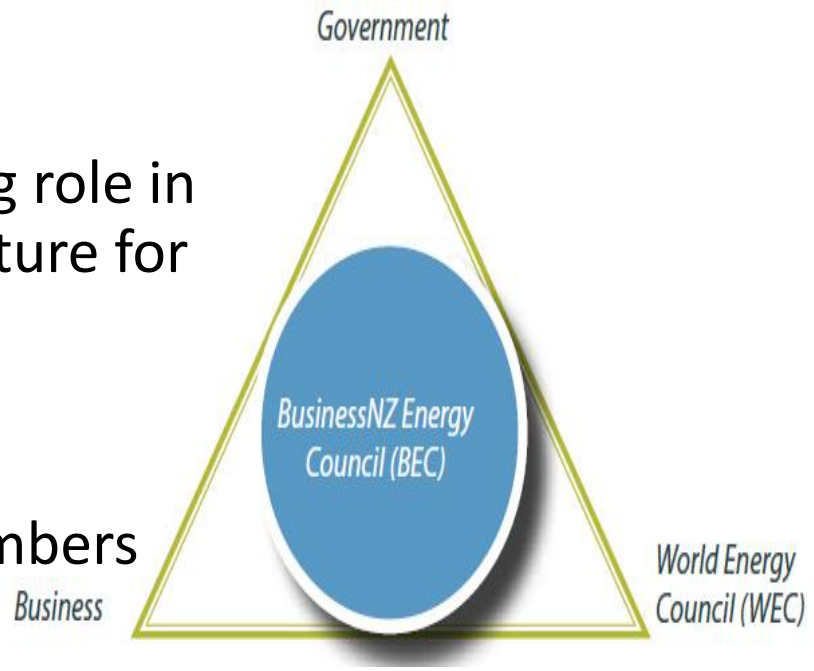
WEC Analytical Insights

The BusinessNZ Energy Council

- the BusinessNZ Energy Council ('BEC'):
  - is a group of New Zealand organisations taking on a leading role in creating a sustainable energy future for New Zealand
  - is the New Zealand Member Committee of the WEC, all BEC members are automatically members of the WEC
  - brings together the memberships of BusinessNZ and the former Energy Federation of New Zealand



BEC Energy Briefing 2014

- recommendations across
  - improving the electricity market
  - permitting and consenting of natural resources
  - fuel security
  - sector governance arrangements
  - ‘big data’ and innovation
  - access to a skilled workforce
- canvasses the role of lines businesses in a competitive and changing electricity market

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The New Zealand Energy Issues Map

- has its origins in the WECs annual 'Global Issues Monitor'
  - New Zealand was chosen as one of 25 national committees to do a 'deep-dive'
  - incredibly versatile tool, easy to pick up and use
  - allows us to demonstrate WECs value proposition to our members
  - helps create new connections across business, government and academia

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The New Zealand Energy Issues Map [cont]

- the map has a number of benefits
  - allows us to test our assumptions about priorities
  - provides energy executives with their own ‘voice’
  - validates/reinforces the messages from the WEC Trilemma ranking and score (8 / 129 countries)
  - gives us a place in the world
    - global and regional comparator delivers us as a small country at the bottom of the world an interconnected richness and context
  - influences the detail of the 2050 stories we will tell
- 2014 New Zealand map based on 50 responses from across business government, and academia

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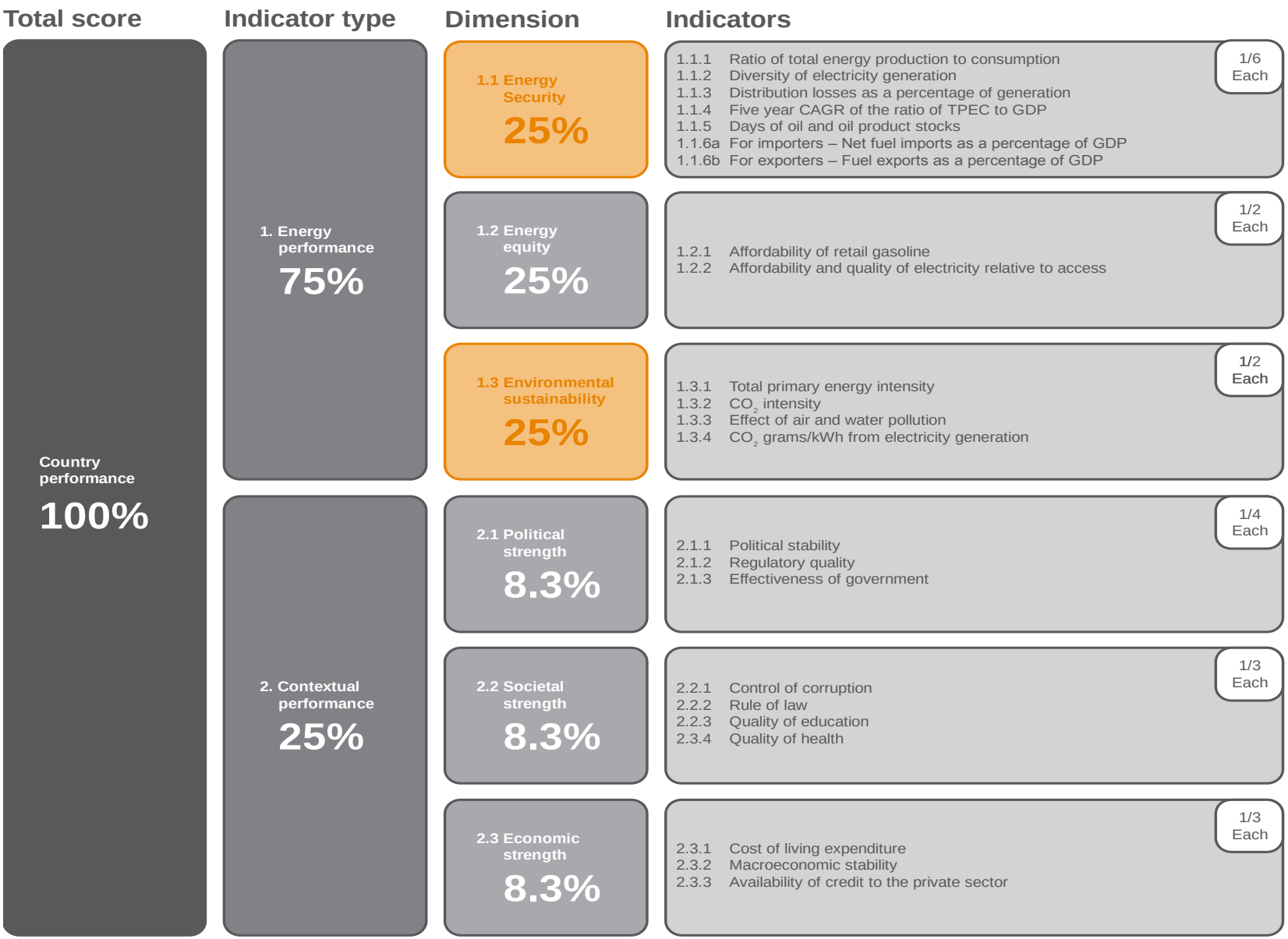
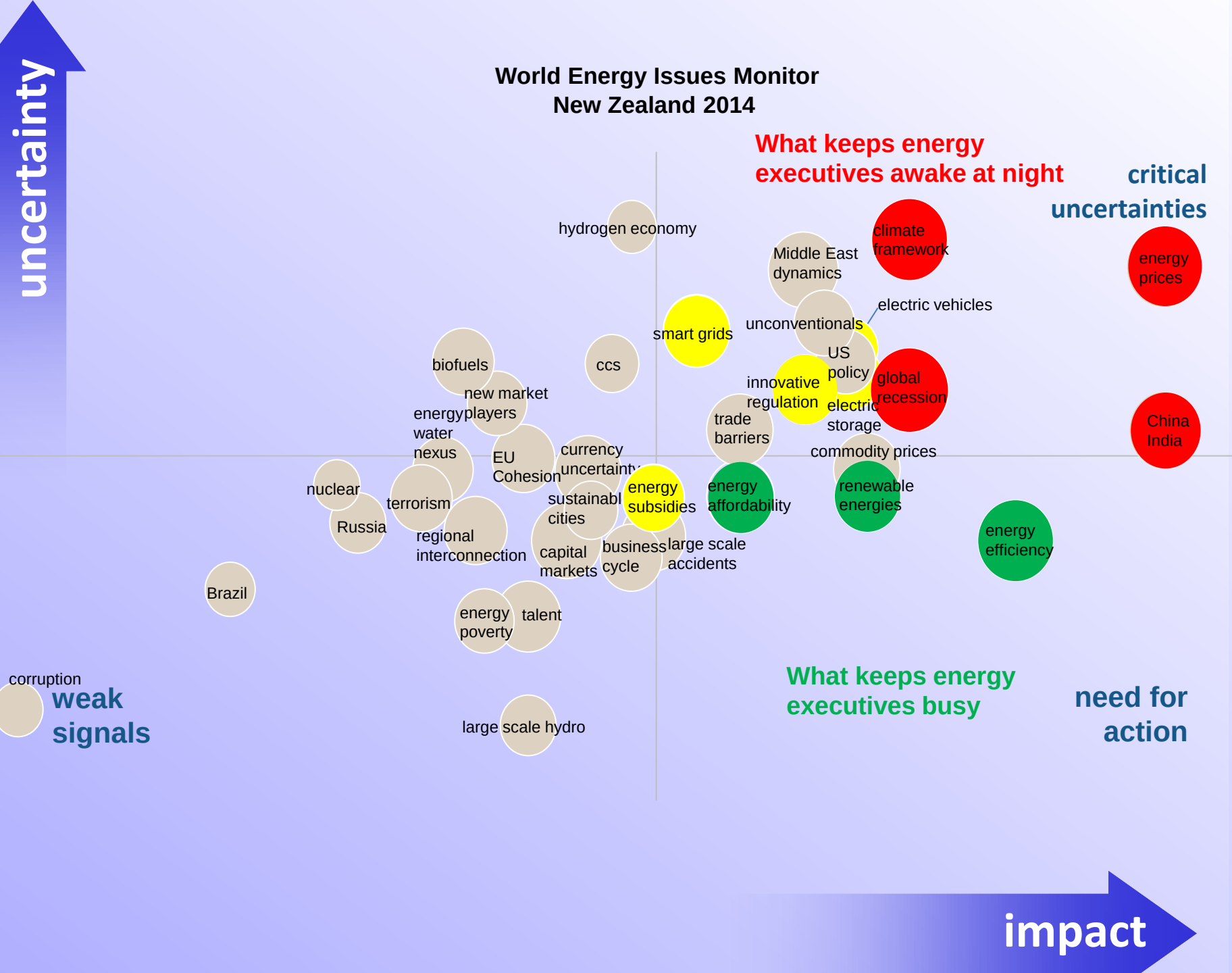
Energy Sustainability Index Structure

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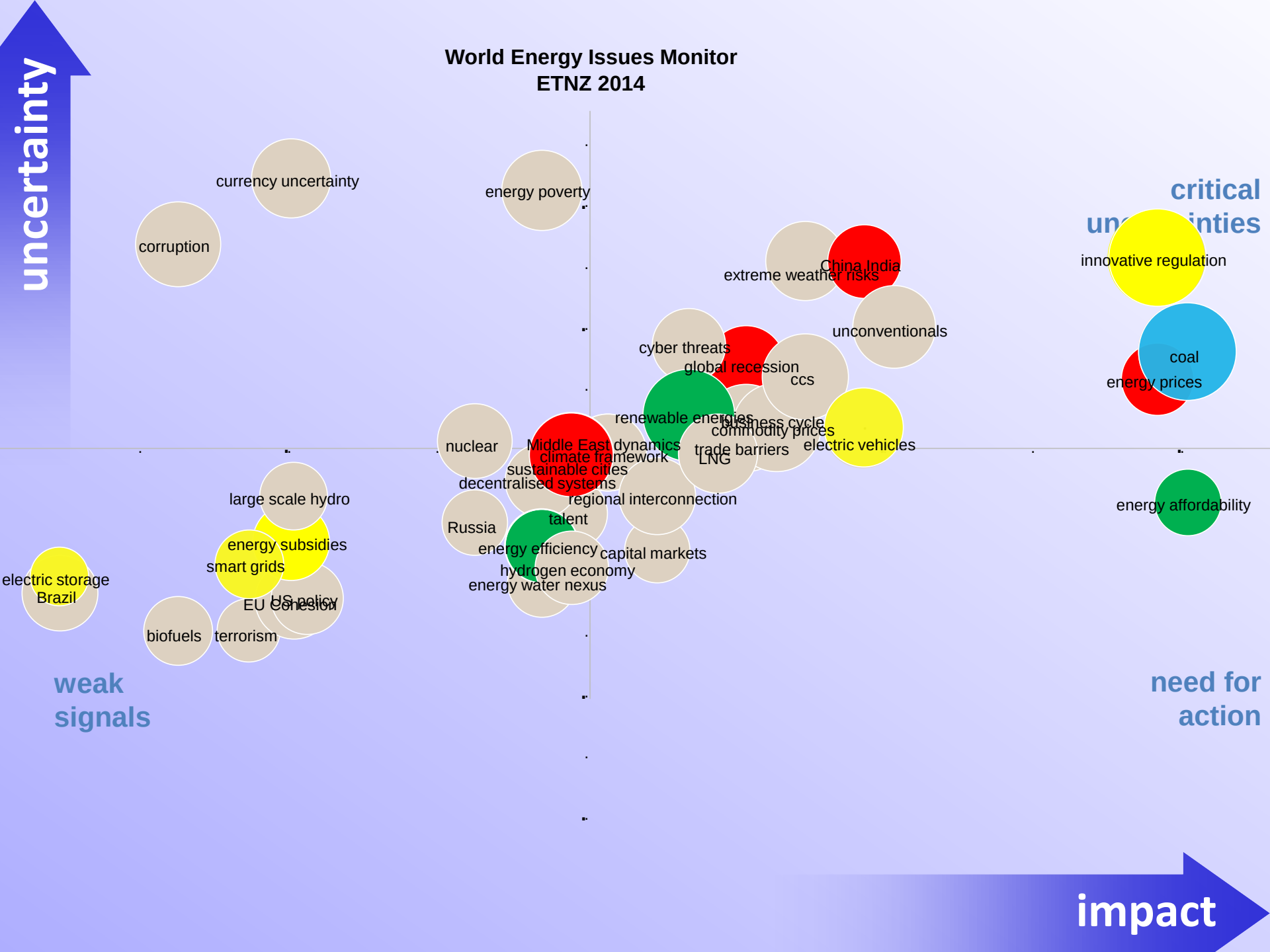
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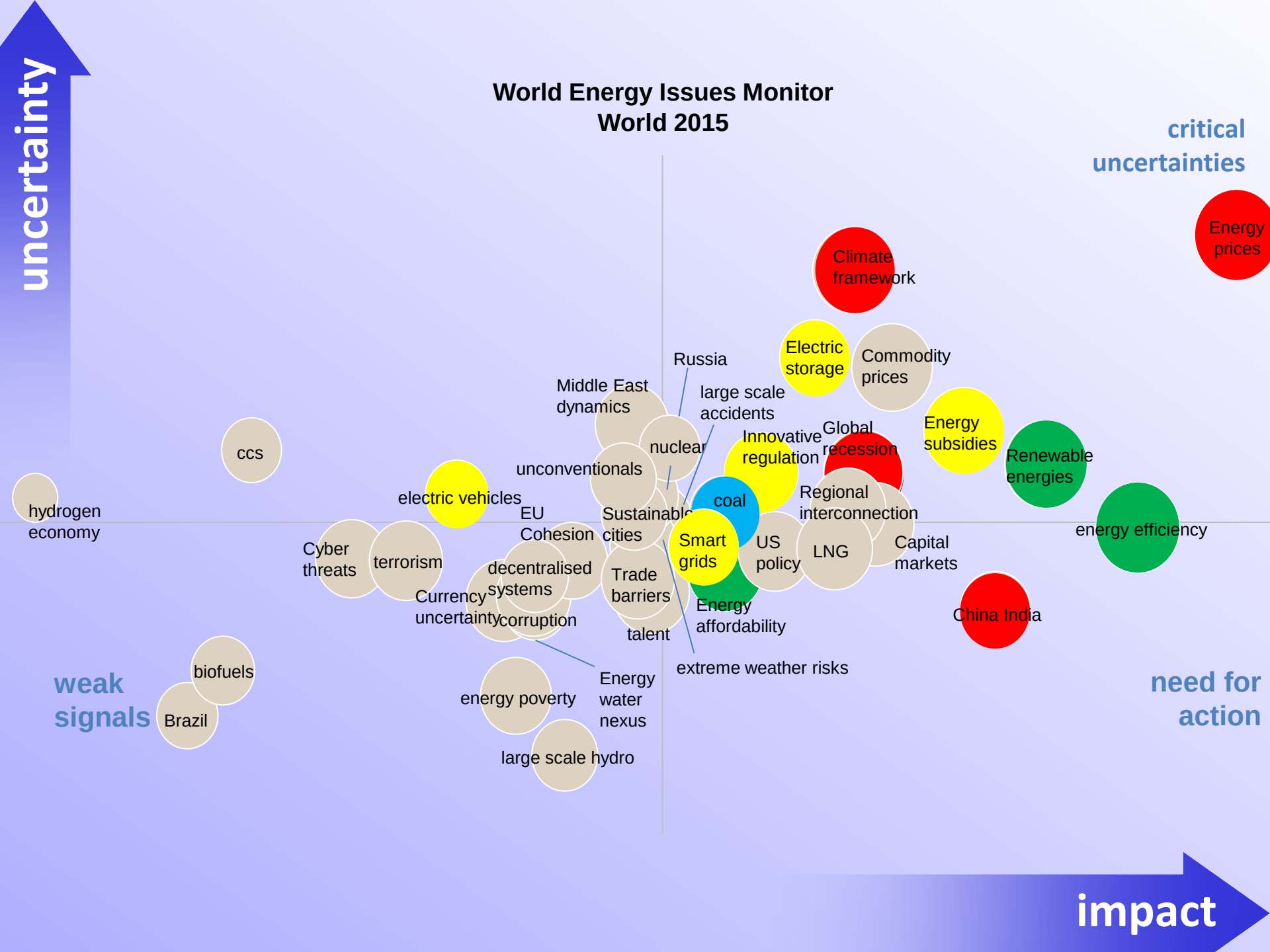
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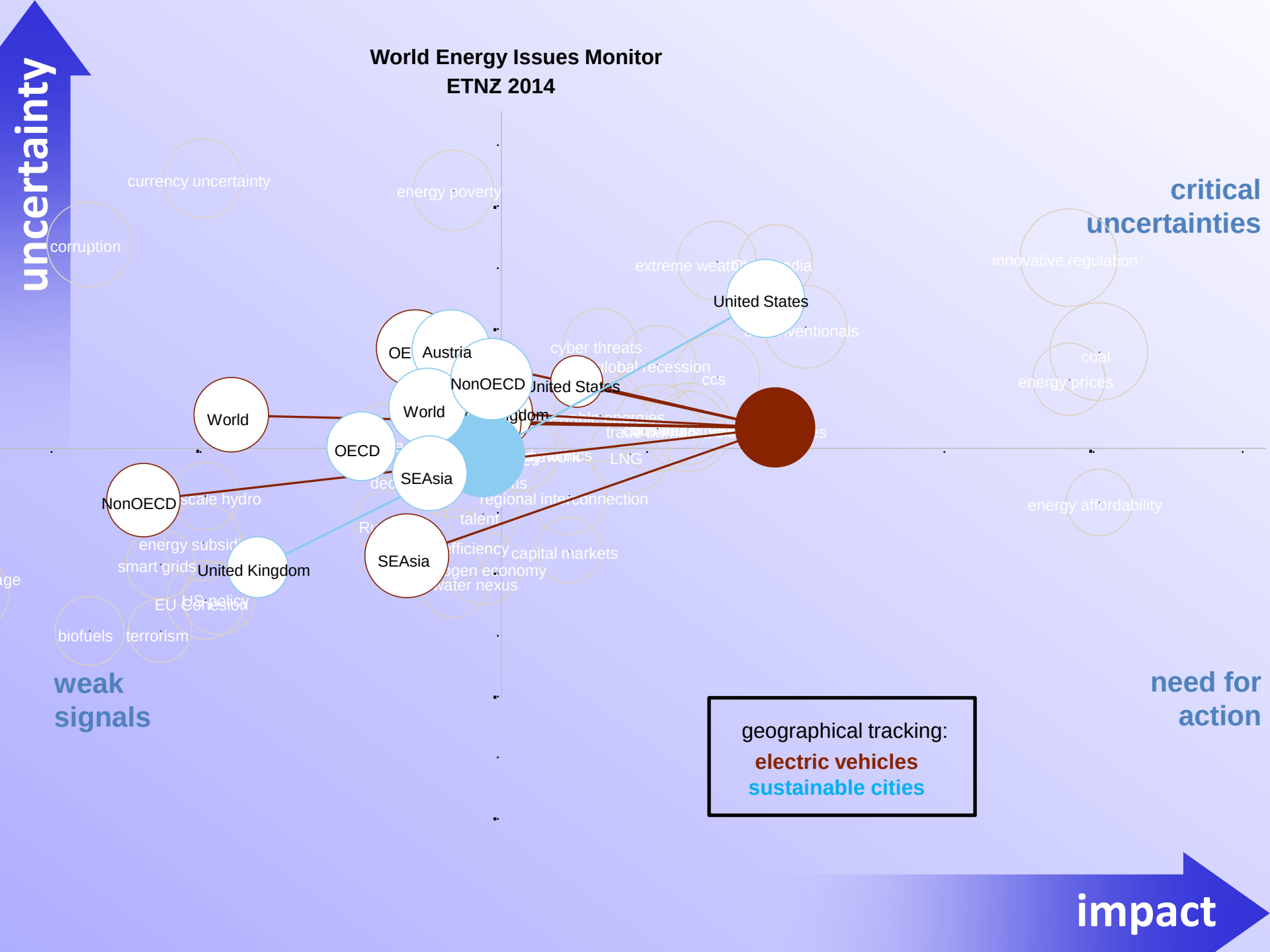
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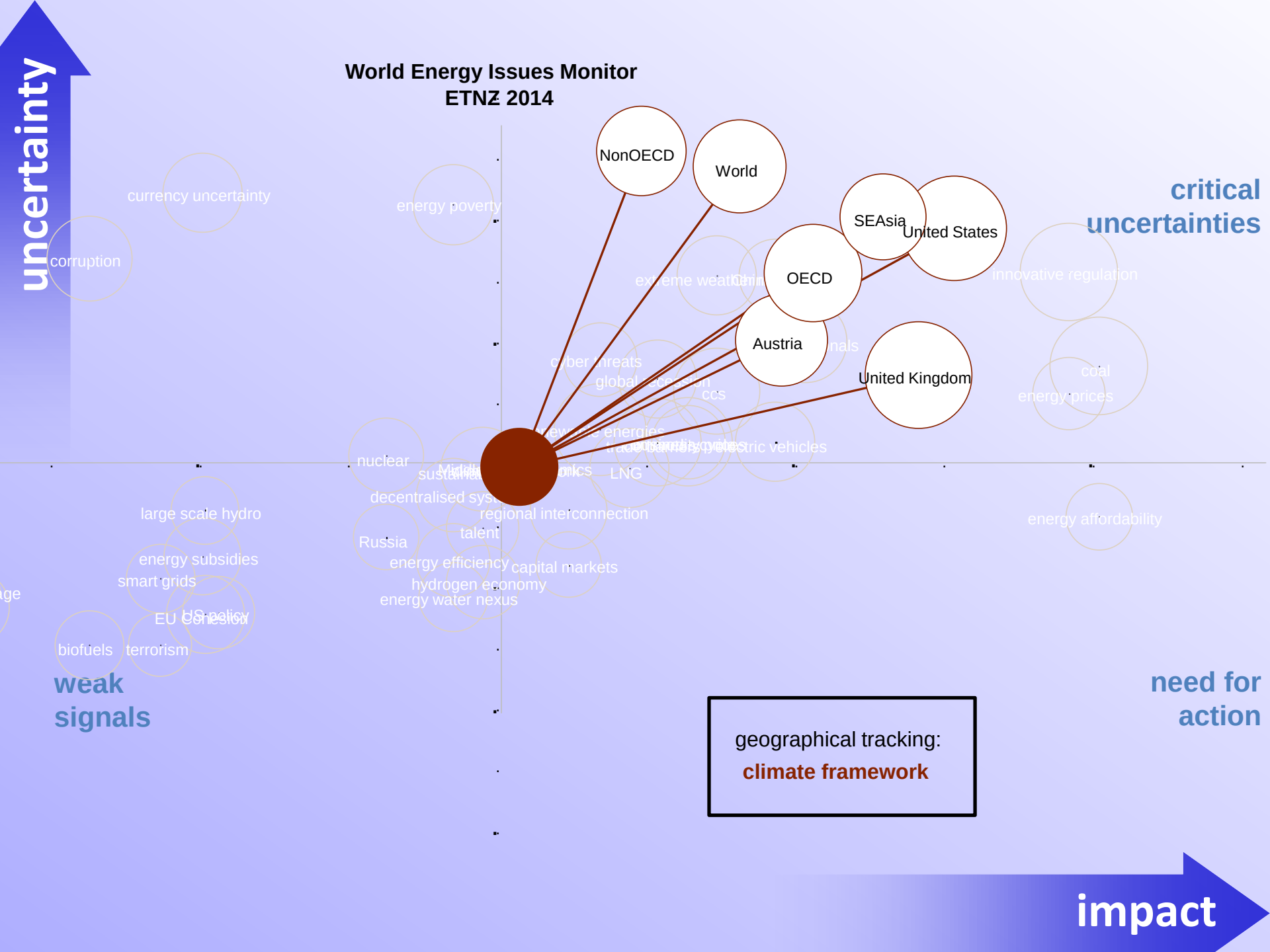
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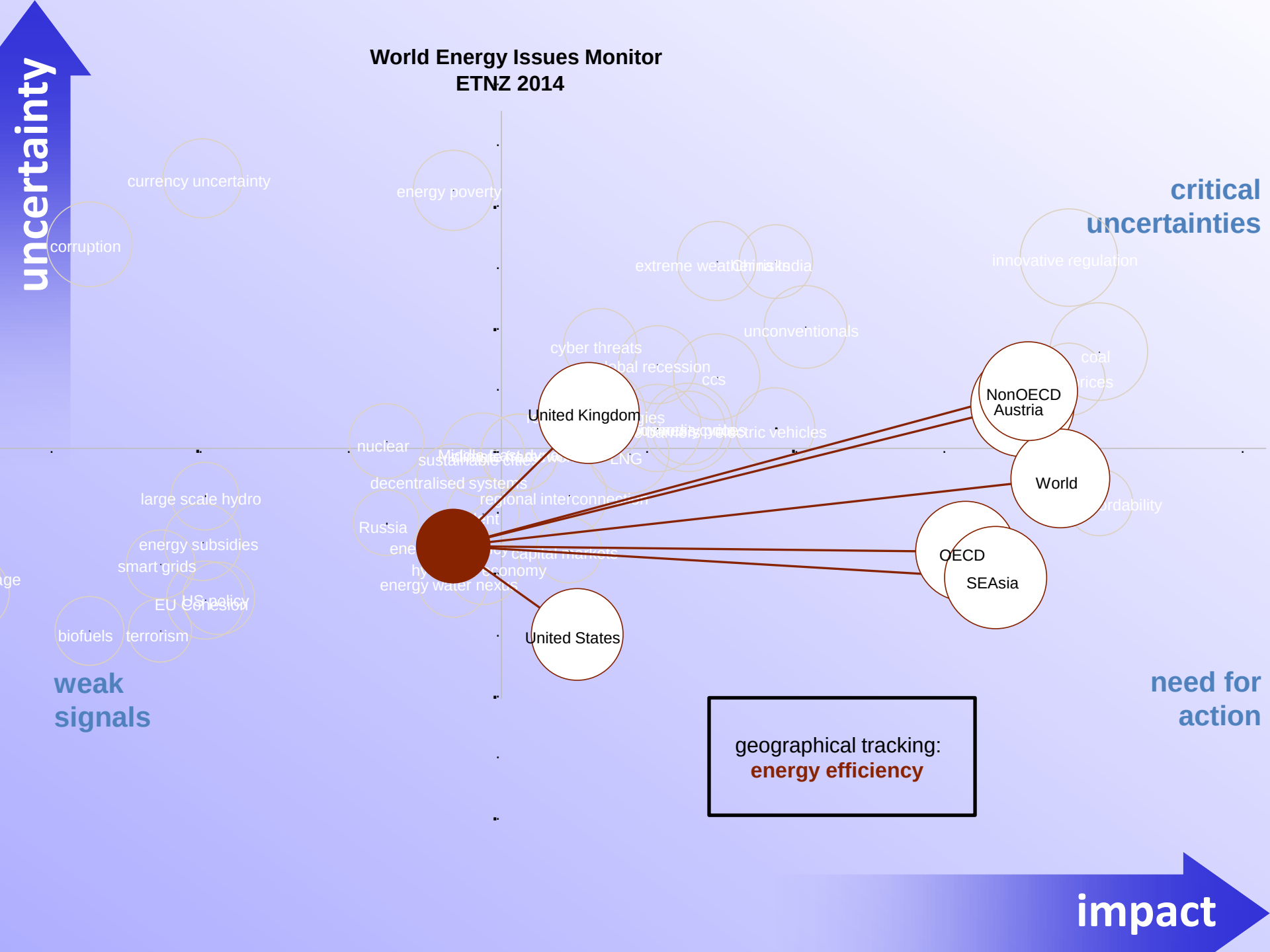
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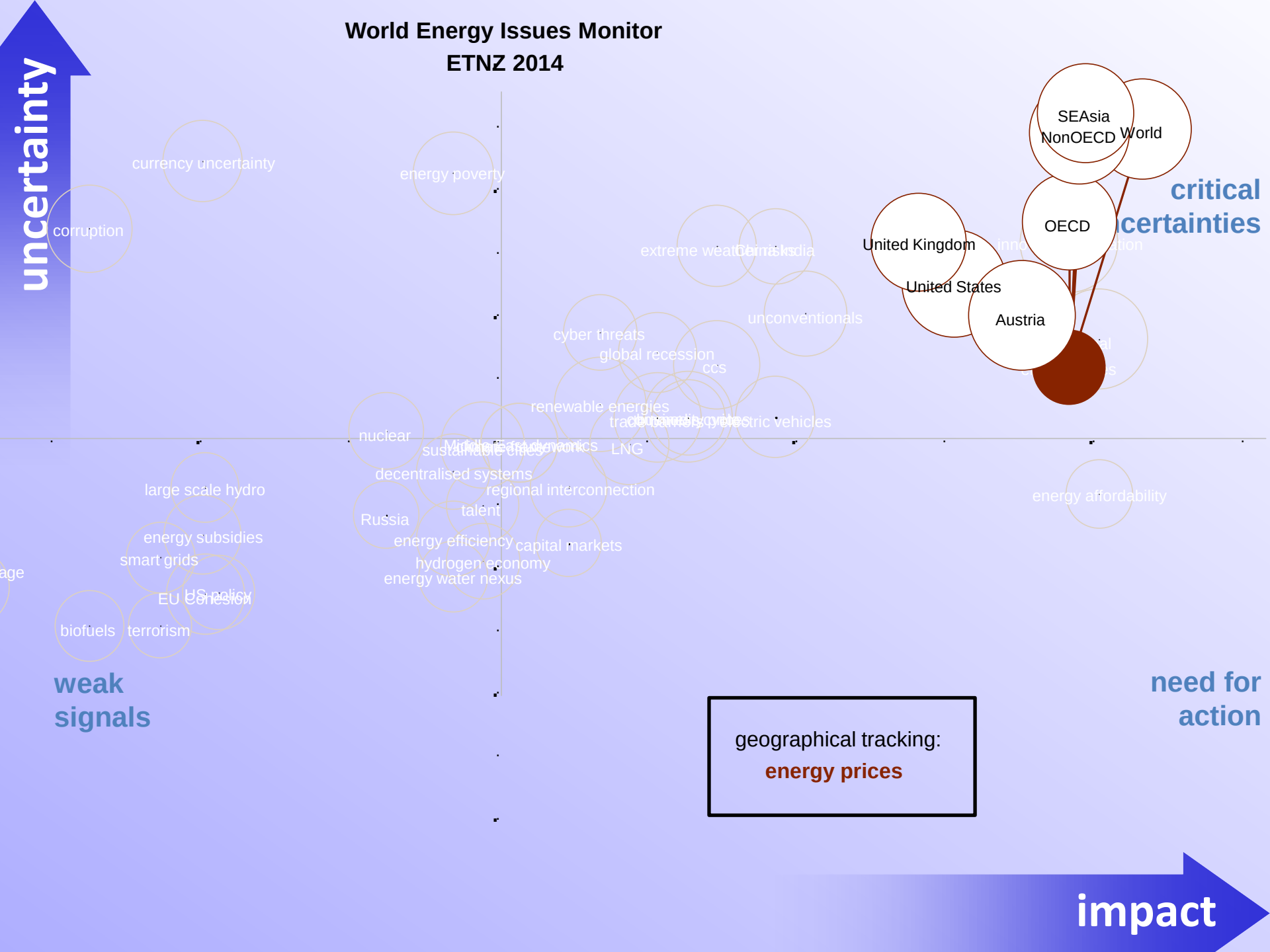
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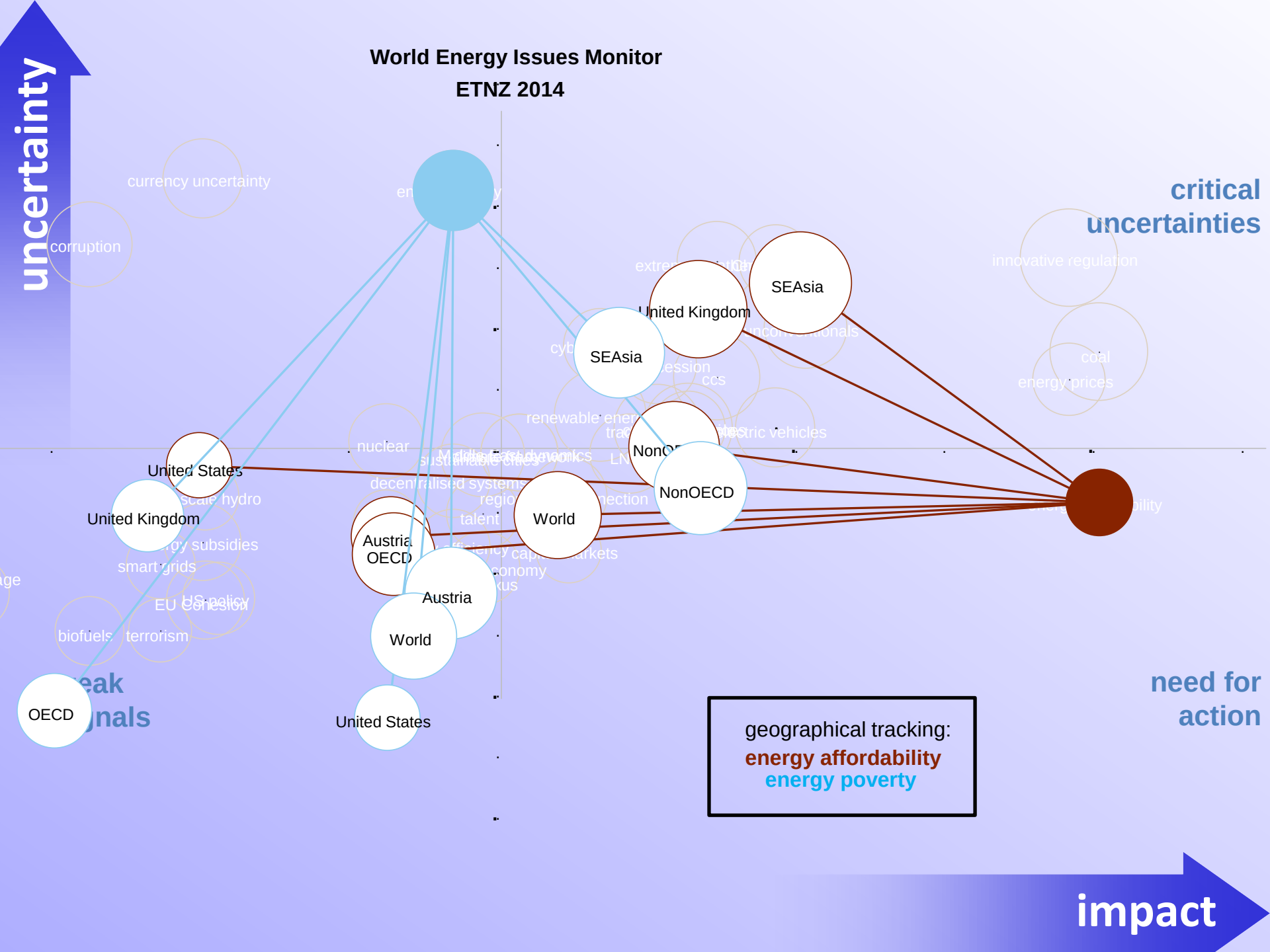
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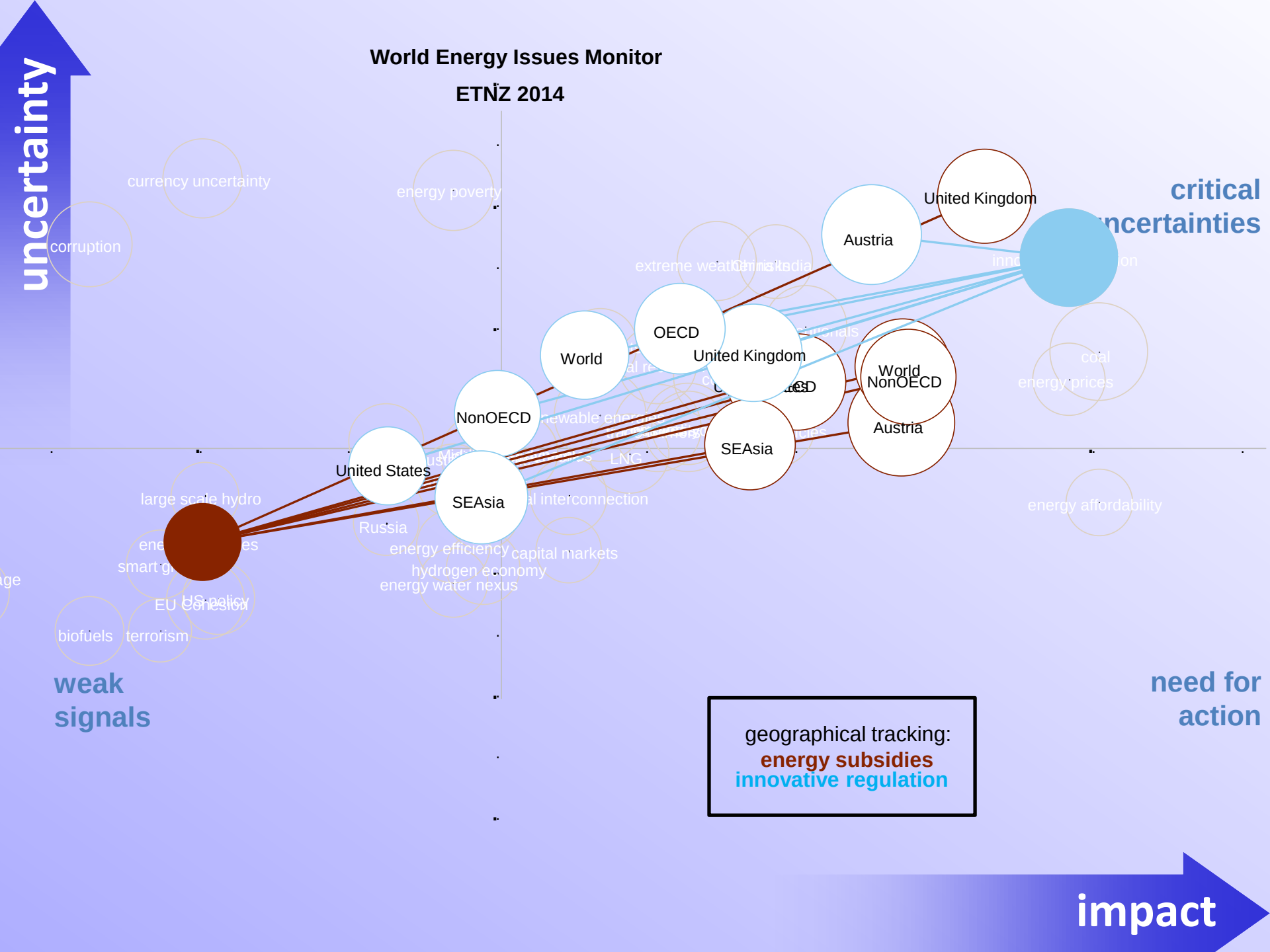
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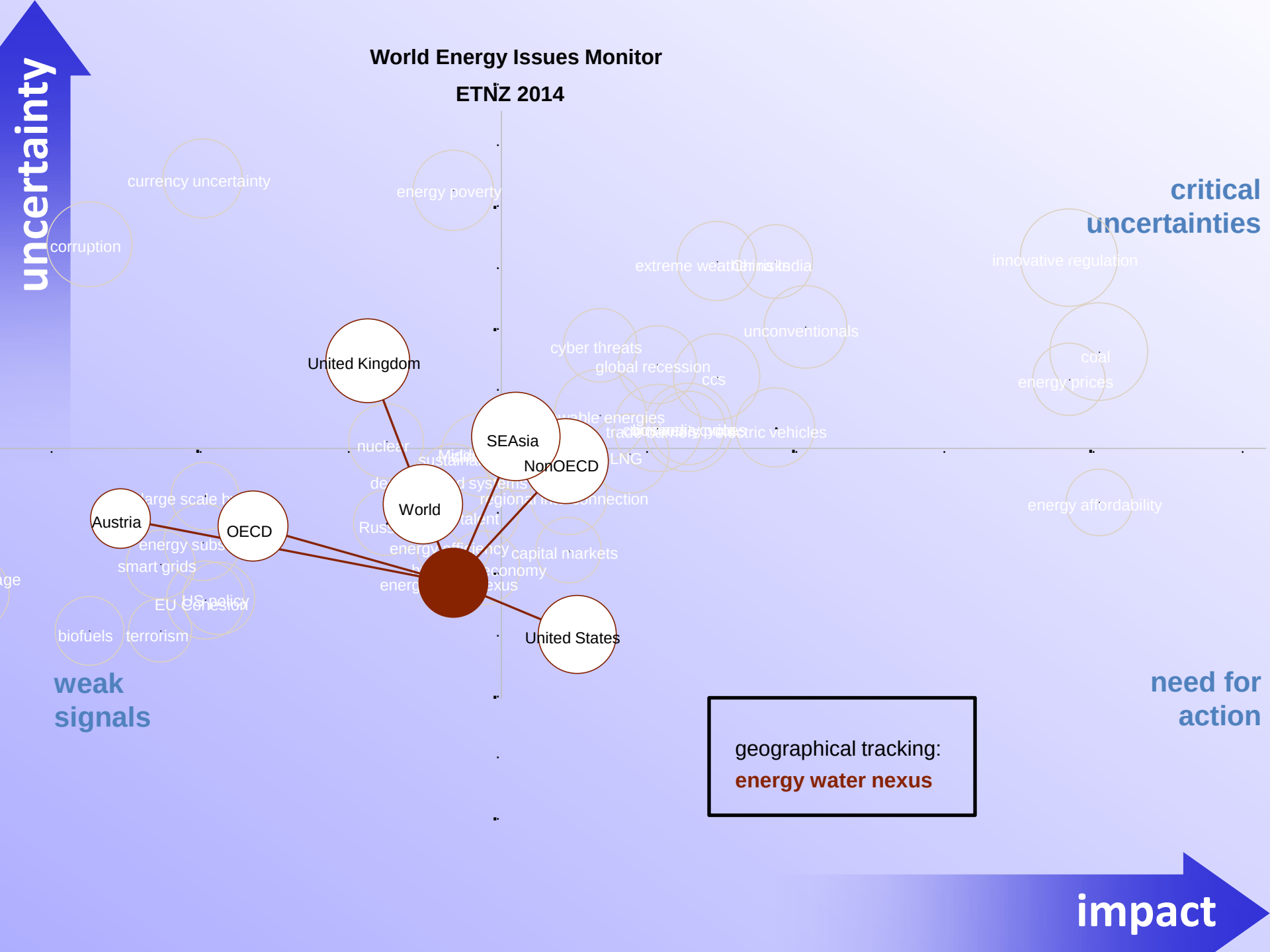
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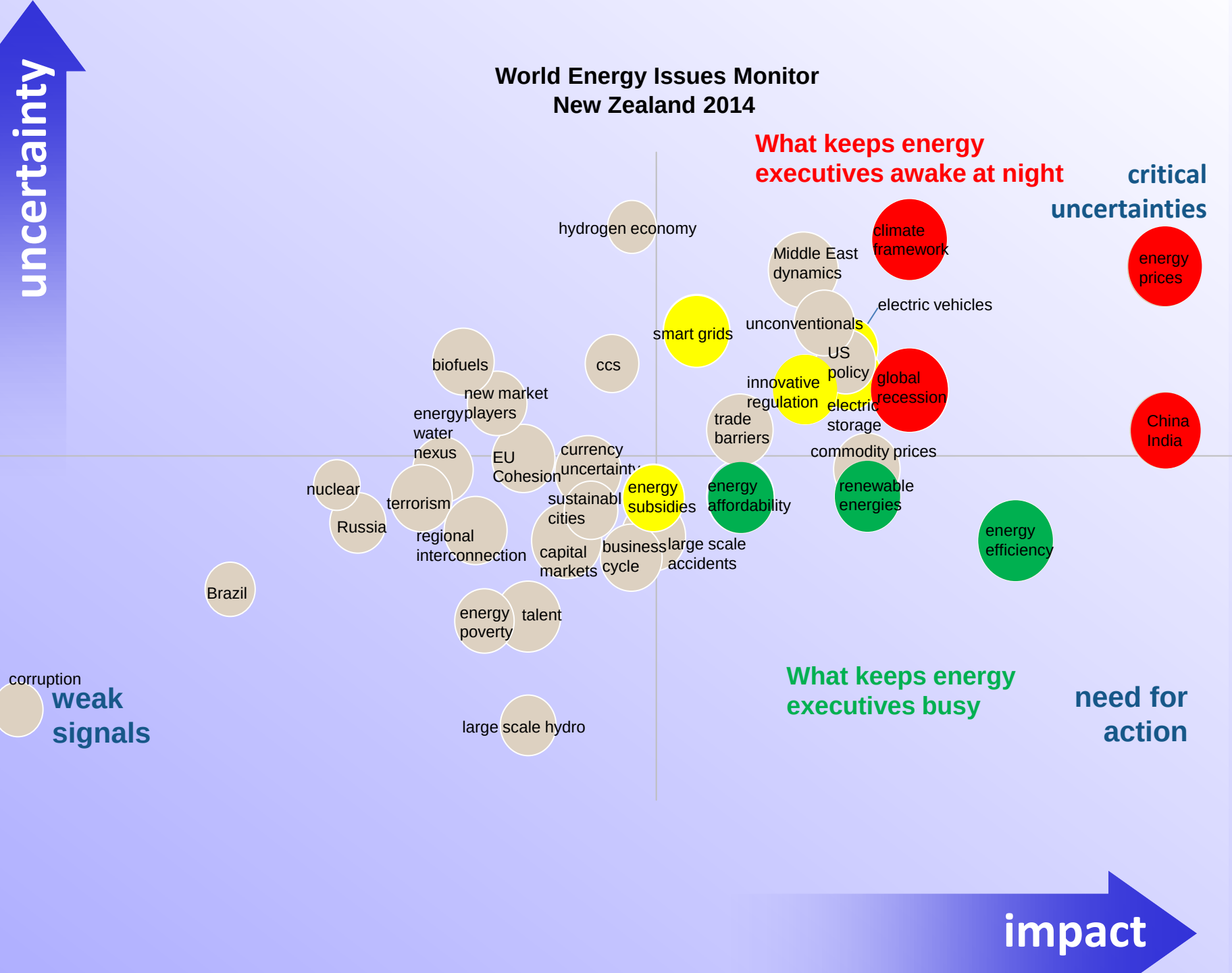
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Key 2015 Energy Issues

- **critical uncertainties -** issues that keep energy executives awake at night
  - climate framework, energy prices, global recession (W), China and India (NZ)
- **need for action -** issues that keep energy leaders most busy at work:
  - renewable energies, energy efficiency, energy affordability
- **watch this space -** clustering of opportunities
  - smart grids (including embedded generation), energy storage, electric vehicles, innovative regulation
- **issues since last year**
  - that **increased** in uncertainty/need for action: energy affordability, energy water nexus, energy poverty
  - that **decreased** in uncertainty/need for action: trade barriers, China India, unconventionals, terrorism
- **controversial issues**
  - **most -** hydrogen economy, energy water nexus, energy poverty, decentralised systems
  - **least -** business cycle, corruption, terrorism, Brazil

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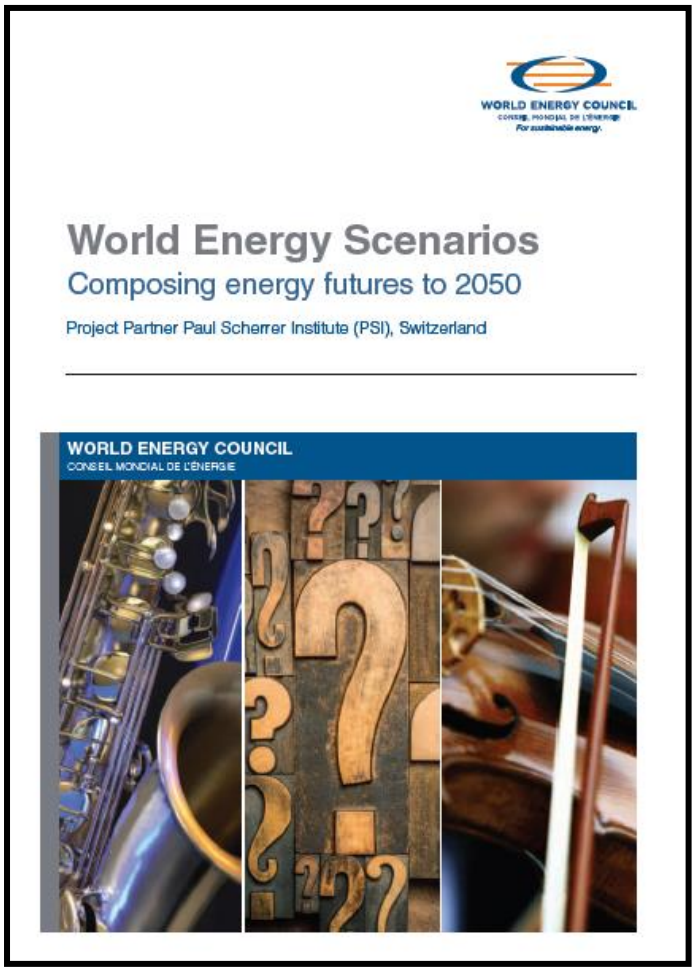
WEC's Scenarios Study

- Comprises of two scenarios
  - designed to help a range of stakeholders address the 'energy trilemma' – of achieving environmental sustainability, energy security and energy equity
  - bottom up – a cast thousands

Stories quantified by Paul Scherrer Institute (project partner)

GMM (**Global Multi-regional MARKAL** model)



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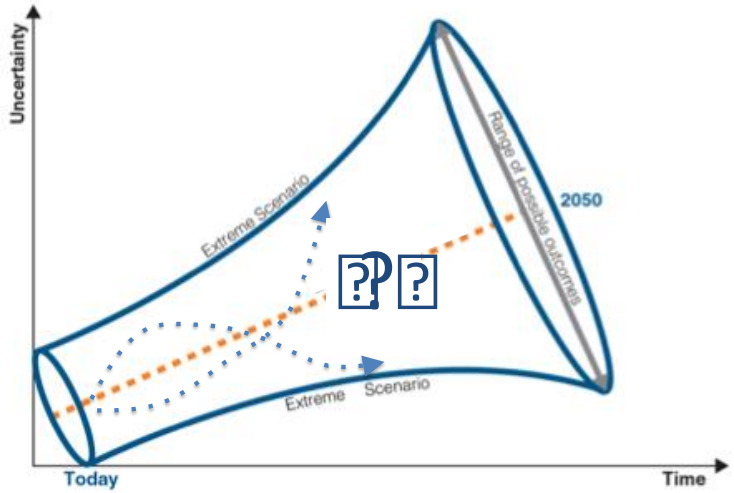
The Approach

- the WEC approach was to develop two scenarios that are at the same time
  - *plausible* – not a prediction, but a believable scenario
  - *distinct* – to succeed, the narratives have to be different
  - *coherent* – the narratives have to hang together



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Outline of the Two Scenario Stories

Jazz	Symphony
Price-conscious consumers	Environmentally-minded voters
Competitive markets pick technologies	Governments pick technology winners
Higher GDP due to efficient market practices	Lower GDP due to non-optimal economic policies
Increased exports due to free-trade strategies	Reduced exports/imports due to nationalistic strategies
Main players are multi-national companies, banks, venture capitalists	Main players are private- and public sector companies, local governments, NGOs
Carbon market grows more slowly from bottom up, based on regional, national and local initiatives	Carbon market is top down based on an international agreement, with commitments and allocations

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Scenario Quantification Assumptions

	Jazz	Symphony
GDP growth	**Higher** (3.54% pa CAGR, PPP)	**Lower** (3.06% pa CAGR, PPP)
Population	**Lower** (2050 = 8.7 billion)	**Higher** (2050 = 9.3 billion)
Efficiency/ Intensity	**Increasing** (-2.29% pa (primary, PPP))	**Increasing more strongly** (-2.44% pa (primary, PPP))
Climate policy	**Limited** Prices (2050): 23-45 USD/tCO_2	**Stronger** Prices (2050): 75-80 USD/tCO_2
Resources	Better access to **unconventional** resources	More expensive unconventionals
Technology support	Limited; energy choice based on free markets	support for **nuclear**, **large hydro**, **CCS** and **renewables**
Technology innovation	Further development of CCGT decentralized power (Solar PV)	Focused R&D programs (esp. CC(U)S, solar PV)

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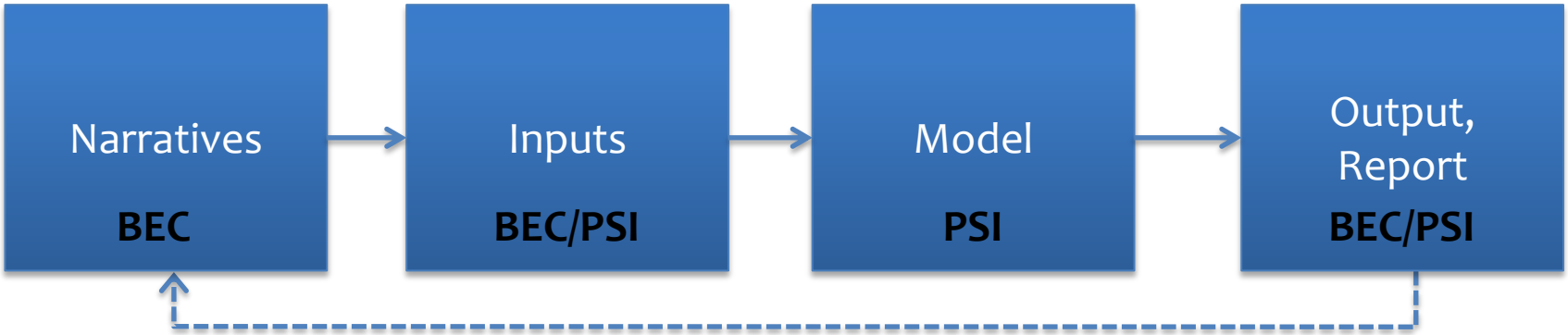
BEC2050: the Project Opportunity

- saw benefits of applying the Jazz and Symphony scenario framework in New Zealand
  - using WEC scenarios to grow domestic understanding
- the novelty of WEC/BEC approach
  - an ability to integrate unique New Zealand scenarios into global model
  - to explore the critical uncertainties that we face in New Zealand's energy future

Overview of BEC2050 Approach



- need to create two narratives, unique to NZ
- embed them within global WEC model, hence:
  - Narrative 1 » NZ in a “rest-of-world Jazz”
  - Narrative 2 » NZ in a “rest-of-world Symphony”
- need to satisfy consistency check (“boundary conditions”) in each
  - some inputs are determined for us (e.g. global trade of oil, most technology costs, carbon price)

BEC2050 Project So Far

- have raised $200,000 from 23 sponsors across business, government and academia plus more ‘in-kind’
- held two scenario development workshops with a third to be held in February 2015
- working closely with WEC and PSI
- have started narrative drafting and expect first modelling results back in February

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BEC 2050 CRITICAL UNCERTAINTIES	1 OF 2 TWO POSSIBLE SCENARIOS	1 OF 2 TWO POSSIBLE SCENARIOS
Impact of climate change on NZ economy and society's resilience	2 degrees - adaptation, manageable change	4 degrees - wholesale mitigation, but risk of vulnerability
International agreement including pricing carbon	Low price (no global acceptance)	High Price (global acceptance)
Extracting hydrocarbons for domestic consumption	No finds	Large finds, extracted
Smart infrastructure, incl domestic scale generation and battery	Low uptake	Full penetration
Vehicle fleet transformation to non-fossil fuels	Total substitution across domestic, commercial and heavy fleet	Low uptake of domestic vehicles
Renewables	0% Carbon	Current trend of mixed thermal vs renewable
Energy efficiency	energy efficiency	Low uptake
International energy markets	NZ self-sufficient	Reliant on imported energy
Econo	International energy markets	NZ self-sufficient
Disrupted world ec… stability	…tten dov… hatches ("Fortress NZ")	…d economy, trade etc.
NZ's economic structure	…nomic growth	Prosperity
Population growth	…tant rate of growth	Massive immigration
Urban form/sustainability	Heavily built urban environment	Lifestyle living dispersed
Energy affordability	Affordable for whole community	High level of fuel poverty
Community acceptance of large infrastructure development and resource utilisation	Everything goes	Limited ability to develop large infrastructure
Governance and decision making	Extreme deregulation	"Big Brother"
Nature of digital technology and security	Knowledge economy, universal access	Manipulative control
Environmental standards	Total land/water degradation	"100% pure"

High uptake (manda… makes sense, Green consci…

Reliant on imported energy

Aust…

Climate

Energy System

Economy

Society and Government

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Getting our stories straight

BEC 2050 CRITICAL UNCERTAINTIES	1 OF 2 TWO POSSIBLE SCENARIOS	1 OF 2 TWO POSSIBLE SCENARIOS
Impact of climate change on NZ economy, ecology and society's resilience	2-3 degrees – low impact, adaptation, manageable change	3-4 degrees – high impact, but risk of vulnerability
International agreement including pricing carbon	No global agreement, low ambition	Global agreement, high ambition
Extracting hydrocarbons for domestic consumption	No finds	Large finds, extracted
Energy system related technology development, breakthroughs and adoption	Evolutionary	Revolutionary
Vehicle fleet transformation to non-fossil fuels	Total substitution across the whole vehicle fleet, rail & public transport	Low uptake of light passenger vehicles only
Primary energy	0% Carbon	Current trend of mixed thermal, hydrocarbon and renewable energy
Energy efficiency	Low uptake	High uptake (mandated standards, RoI makes sense, Green consciousness)
International fuel markets	NZ self-sufficient	Reliant on imported energy
Economic growth	4%	1%
Global stability	Stable global landscape, high NZ integration	High instability low New Zealand integration (Fortress NZ)
NZ's economic structure	Higher energy intensity (industrial, primary)	Transformation to low energy intensity (knowledge – weightless)
Population growth	5,700,000 (see Stats forecast or +1% compound)	10,000,000 (+4% compound)
Urban form/sustainability	Heavily built urban environment	Building out – low intensity
Energy equity	High equity	Low equity
Community acceptance of large infrastructure development and resource utilisation	Everything goes	Limited ability to develop large infrastructure
Governance and decision making	Light handed regulation and intervention	Intervention, command and control
Nature of digital technology and security	Productivity transformation	Poor utilisation of potential, high sovereign risk
Environmental standards	Declining air/land/water quality	Towards world class environmental standards
Allocation of natural resources esp. water	Generally locked up, high cost and tradable	Common good generally accessible and low cost

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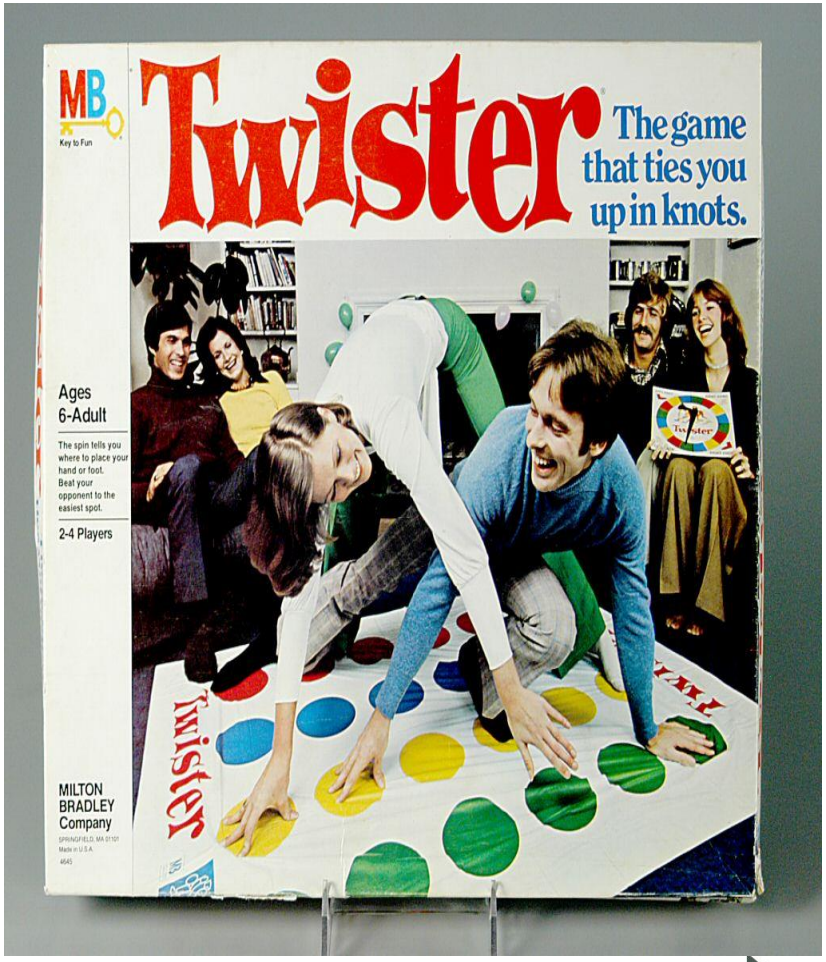

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BEC2050 – What Next?

- project launch around June 2015
- we hope the scenarios exercise will help to
  - mature and depoliticise the energy debate in New Zealand
  - test investment and policy decisions
  - provide us with a thought leadership opportunity

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Questions?

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