



Transitioning to hydrogen homes in a trustless environment: Who should pay for the costs of the transition?

Presented by Joel A. Gordon

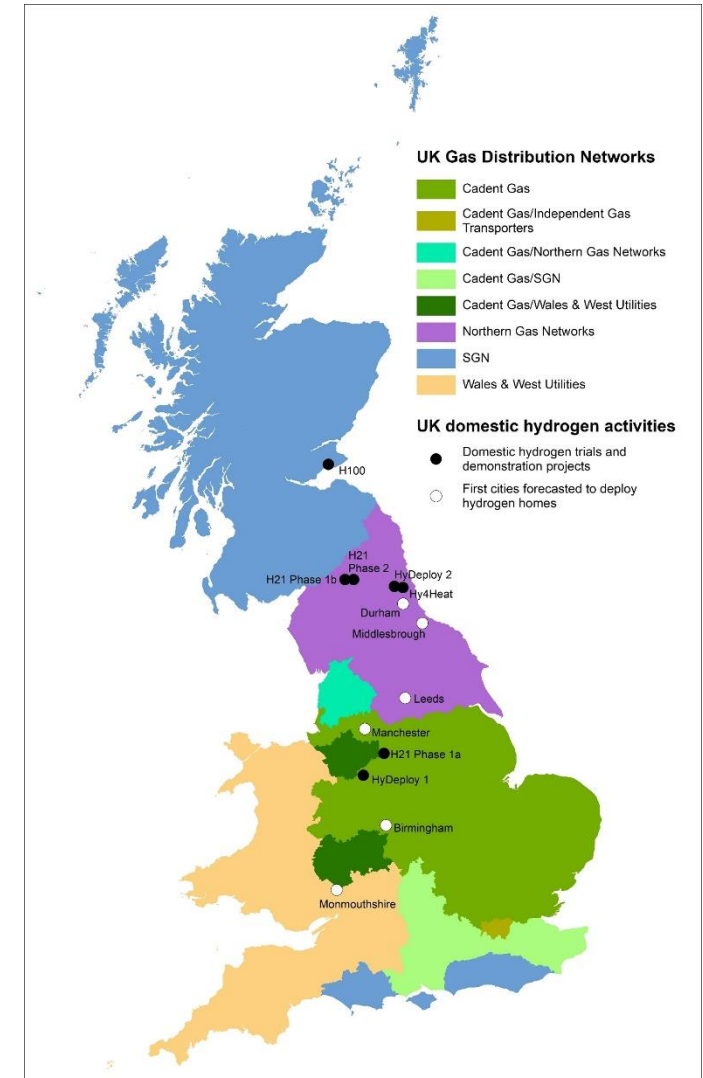
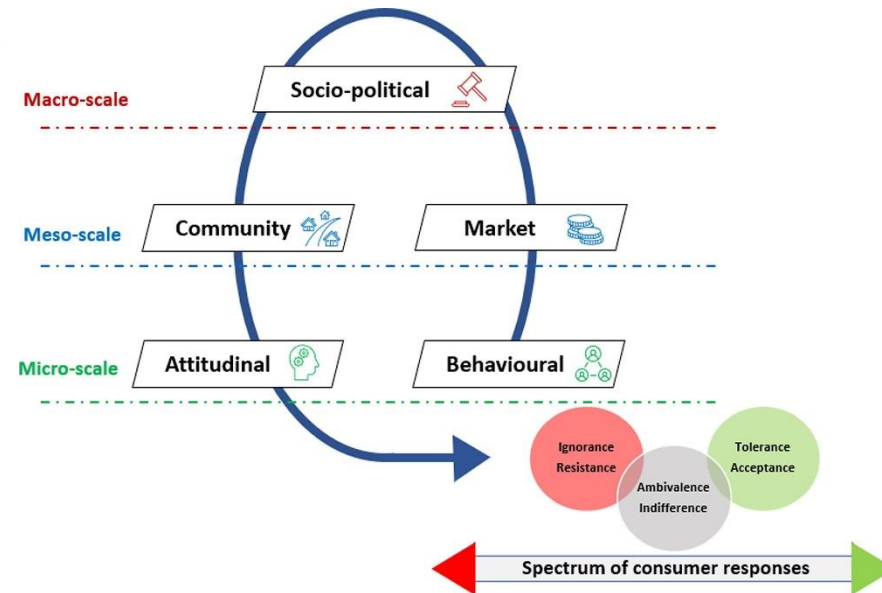
Supervised by Prof. Nazmiye Ozkan and Dr. Ali Nabavi

BIEE Research Conference, Oxford

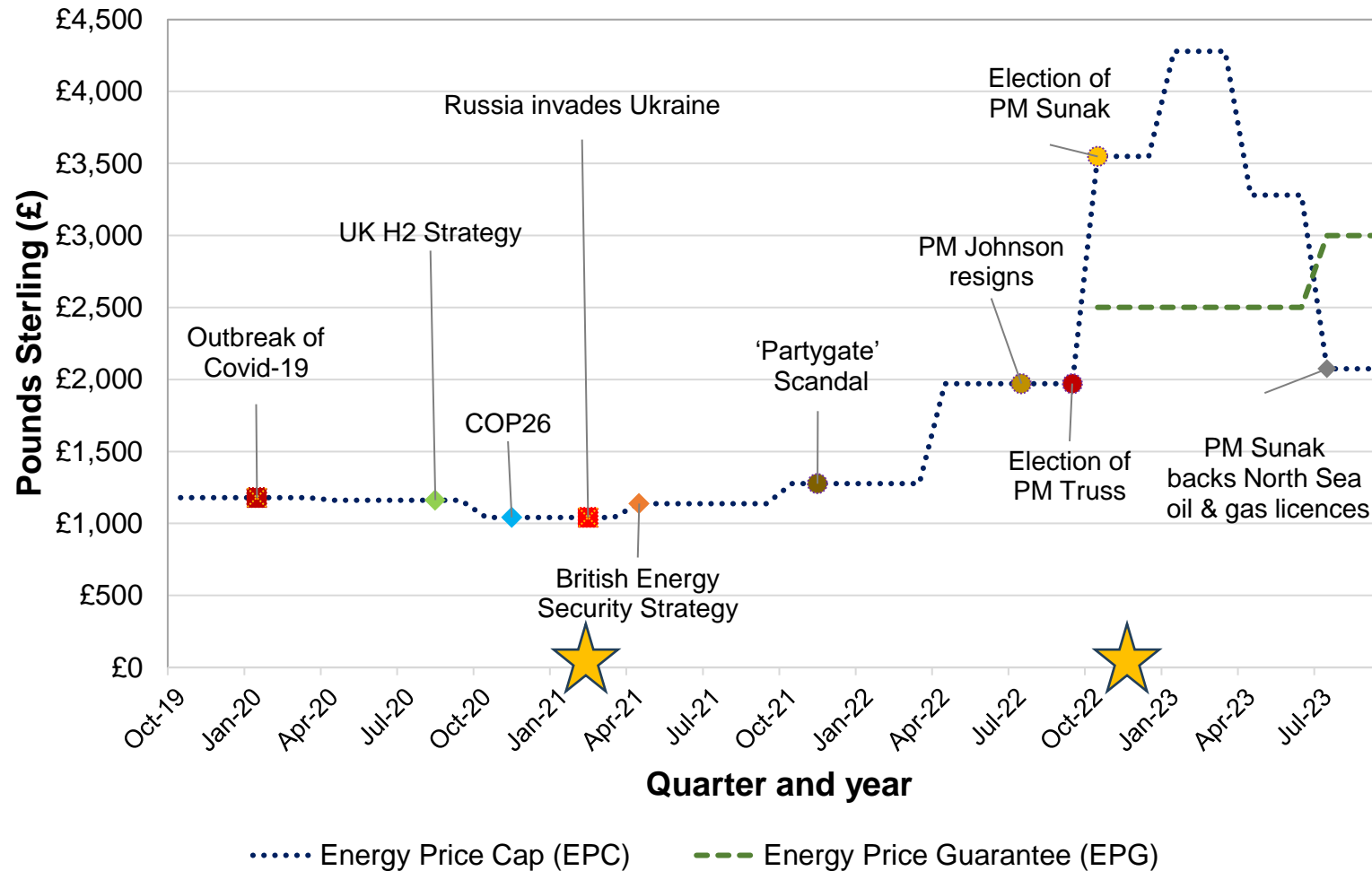
September 20th 2023

Presentation agenda and research materials

- Background and context
- Overview of social acceptance
- Hydrogen village trials in the UK
- **Trust dynamics** of the domestic hydrogen transition
- Modelling results and visualisations
- Public perceptions of funding the transition
- Concluding remarks
- Q&A



UK political and economic landscape, 2019-2023





A hybrid decarbonisation pathway calls for social acceptance

Sustainable
Energy & Fuels



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The curious case of the conflicting roles of hydrogen in global energy scenarios

Christopher J. Quarton,^a Olfa Tlili,^b Lara Welder,^{cd} Christine Mansilla,^b Herib Blanco,^e Heidi Heinrichs,^e Jonathan Leaver,^f Nouri J. Samsatti,^g Paul Lucchese,^h Martin Robinius^e and Sheila Samsatti^{g*}



“The uptake of new technologies is not only driven by cost or efficiency-based metrics for the entire energy system, but also by consumer choice, dependent on social factors and personal preference”

One Earth



Volume 6, Issue 4, 21 April 2023, Pages 337-340

Commentary

Demand-side emission reduction through behavior change or technology adoption? Empirical evidence from UK heating, mobility, and electricity use

Frank W. Geels,¹



- Low-carbon technologies (i.e. heat pumps and district heating) continue to face several technology diffusion and policy barriers, which have offset market penetration
- **A mix of technologies** are needed to fulfil market expectations and decarbonisation mandates



Energy Research & Social Science

Volume 104, October 2023, 103204

Original research article

Divergent consumer preferences and visions for cooking and heating technologies in the United Kingdom: Make our homes clean, safe, warm and smart!

Joel A. Gordon, Nazmiye Balta-Ozkan , Seyed Ali Nabavi



- Based on historical, recent and emerging trends, achieving large-scale residential decarbonisation and strengthening energy security will call for **a combination of stringent policies and easy-to-deploy, non-disruptive technologies** which support consumer expectations for making homes ***“clean, safe, warm and smart...”***

The collapse of the Whitby Hydrogen Village Trial: the trust deficit looms large



'Manipulation, misinformation and deceit' | Hydrogen heating trial dropped by government after fierce public opposition

'We didn't sign up to be lab rats' | Rebellion brewing against 'futile' hydrogen heating project

Local groups within Cadent's planned Whitby Hydrogen Village in UK demand public debate and independent advice amid fears about cost and safety

'No strong local support': Government rejects plans for Whitby 'Hydrogen Village' trial

Efficiency & Environment, Top Stories

Hydrogen village trial in Whitby rejected

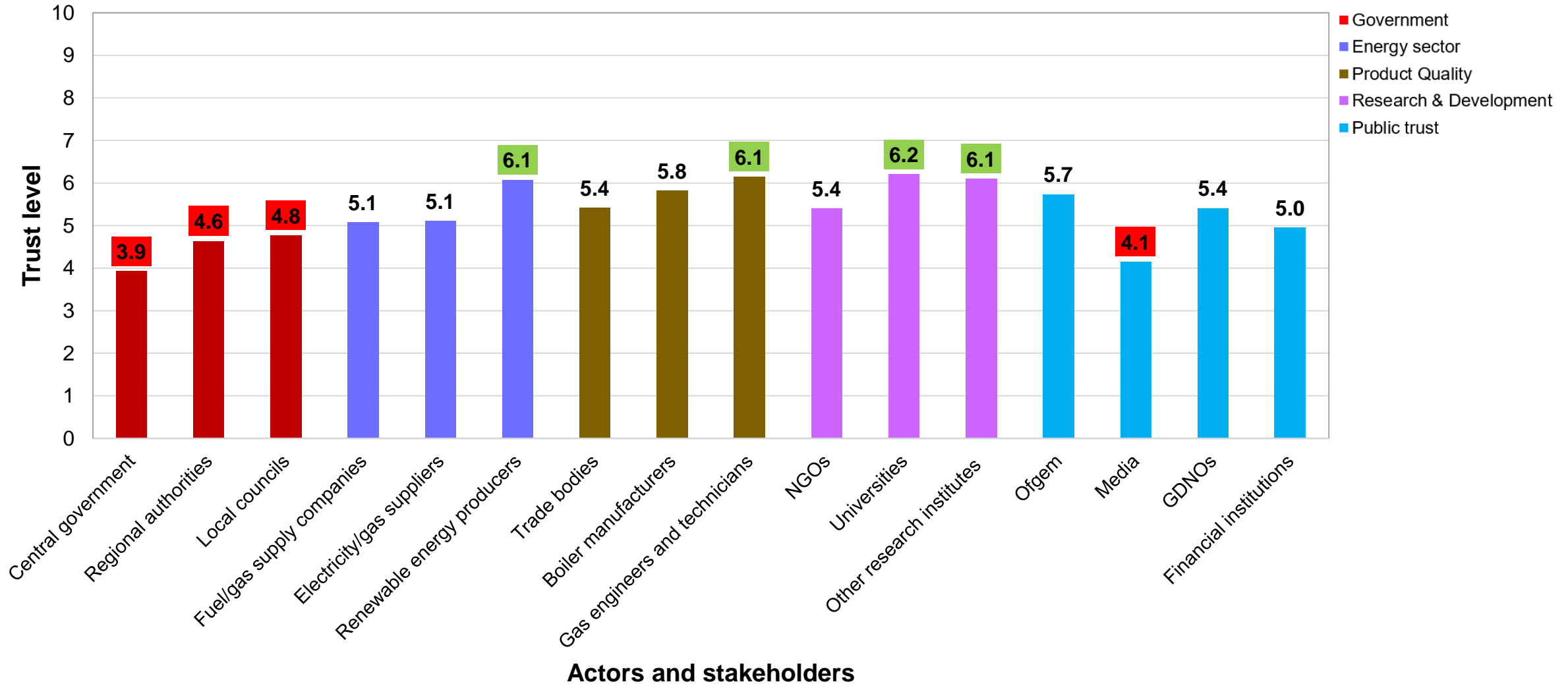
The Minister for Energy Efficiency and Green Finance has announced that Whitby will no longer be considered for the UK's first hydrogen village trial, citing a lack of local support





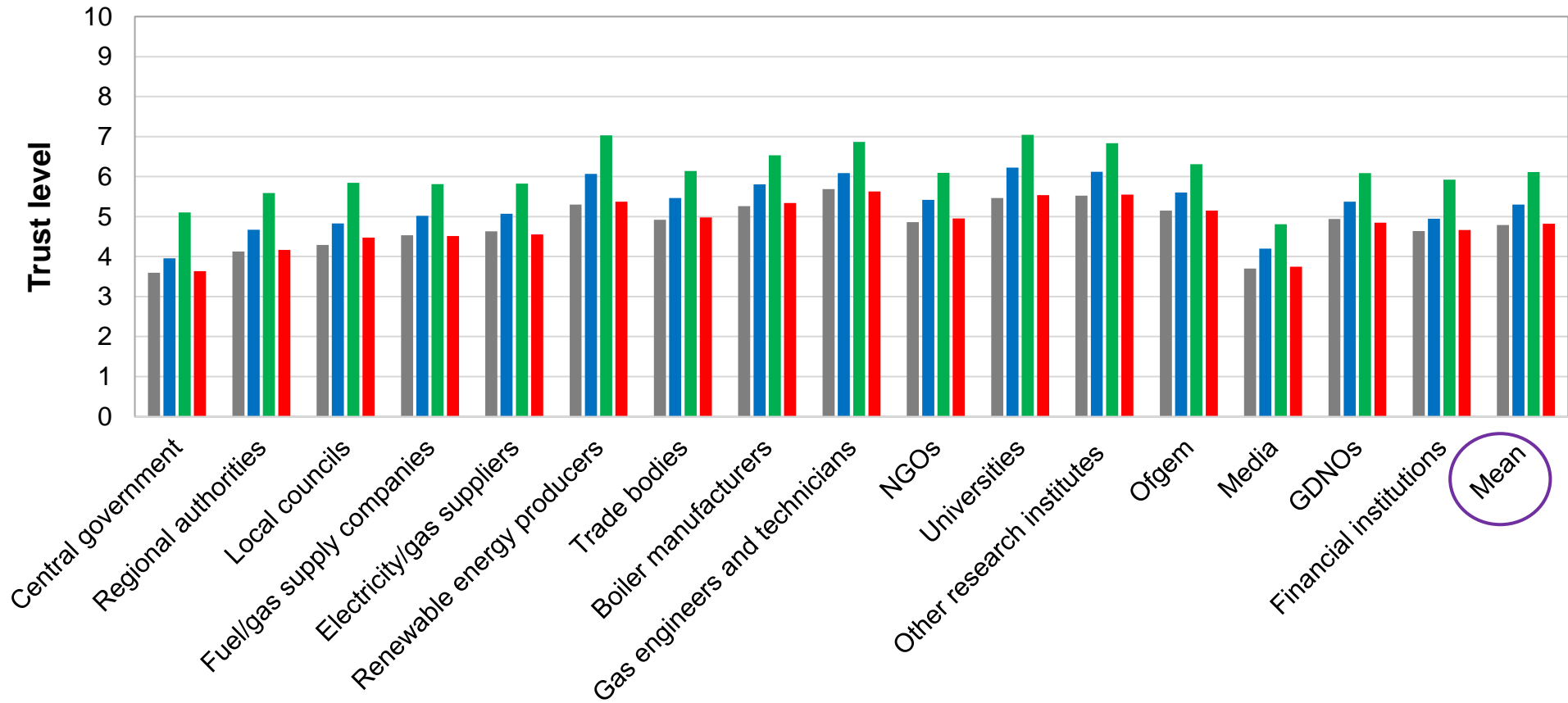
Overview of trends in social trust

Results for full sample: N = 1845





Overview of trends in social trust by consumer sub-group



Actors and stakeholders

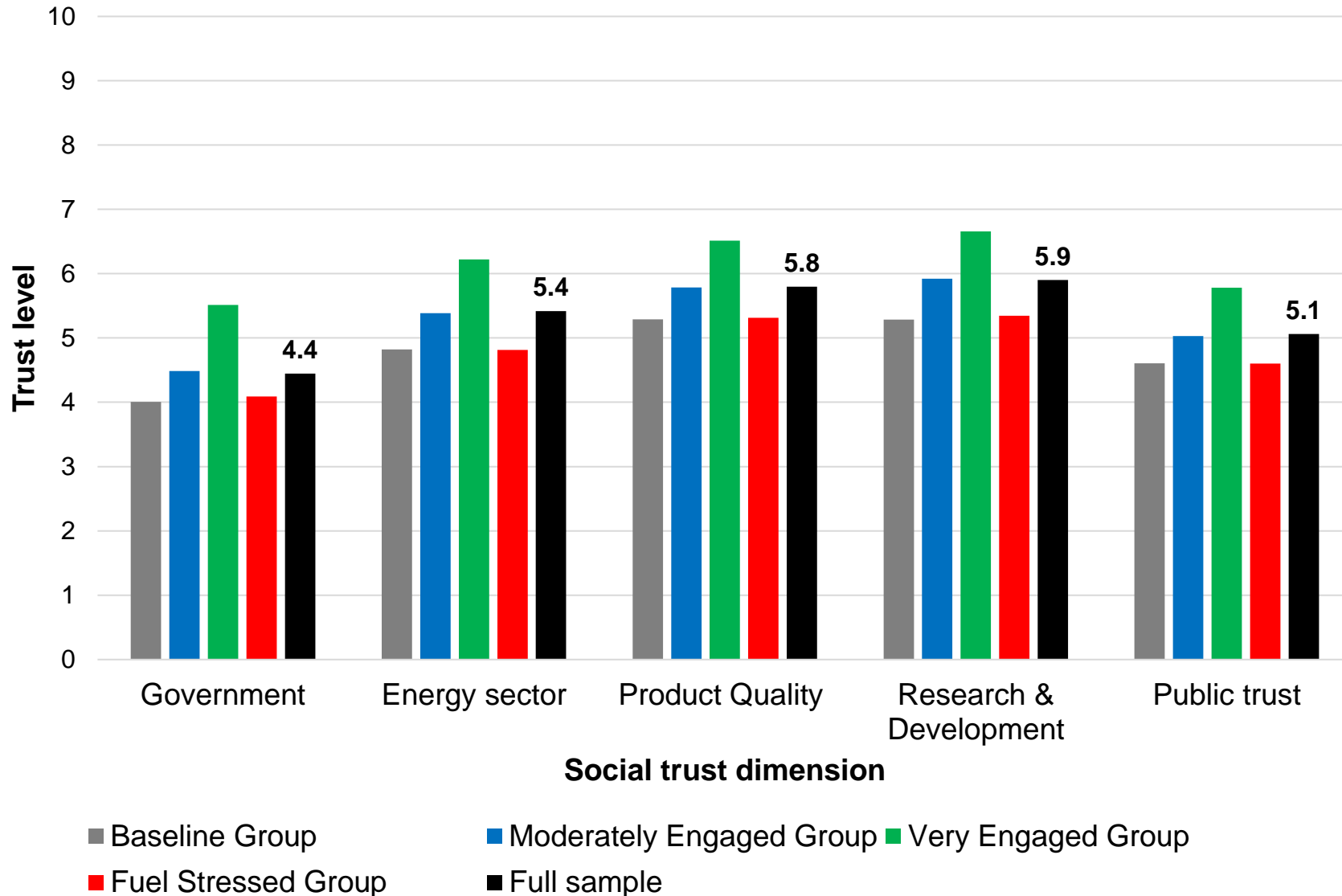
■ Baseline Group (BLG)
 ■ Very Engaged Group (VEG)

■ Moderately Engaged Group (MEG)
 ■ Fuel Stressed Group (FSG)

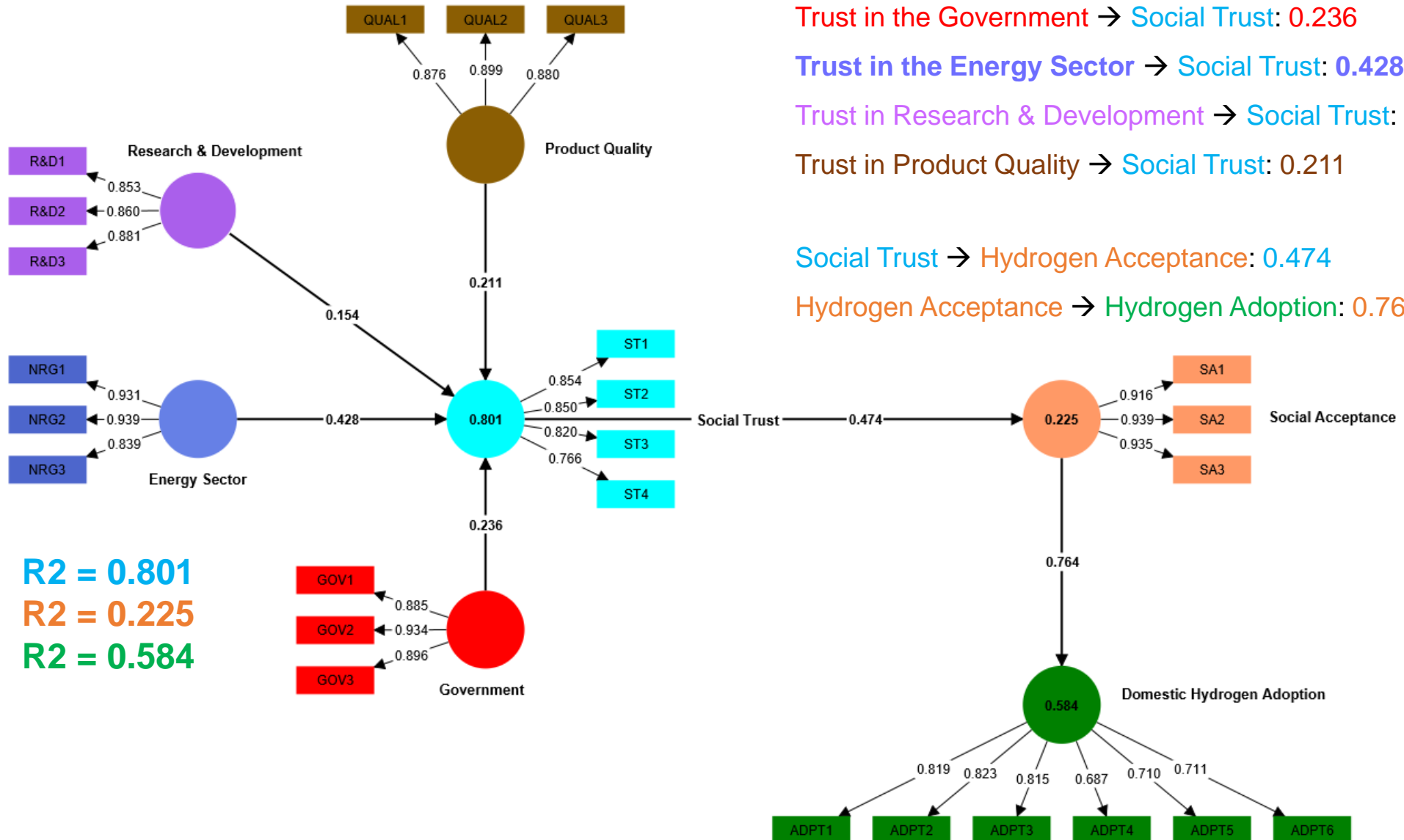
BLG: N = 677
 MEG: N = 458
 VEG: N = 331
 FSG: N = 379



Assessment of social trust dimensions by consumer sub-group



Results from partial least squares structural equation modelling



Trust in the Government → Social Trust: 0.236

Trust in the Energy Sector → Social Trust: 0.428

Trust in Research & Development → Social Trust: 0.154

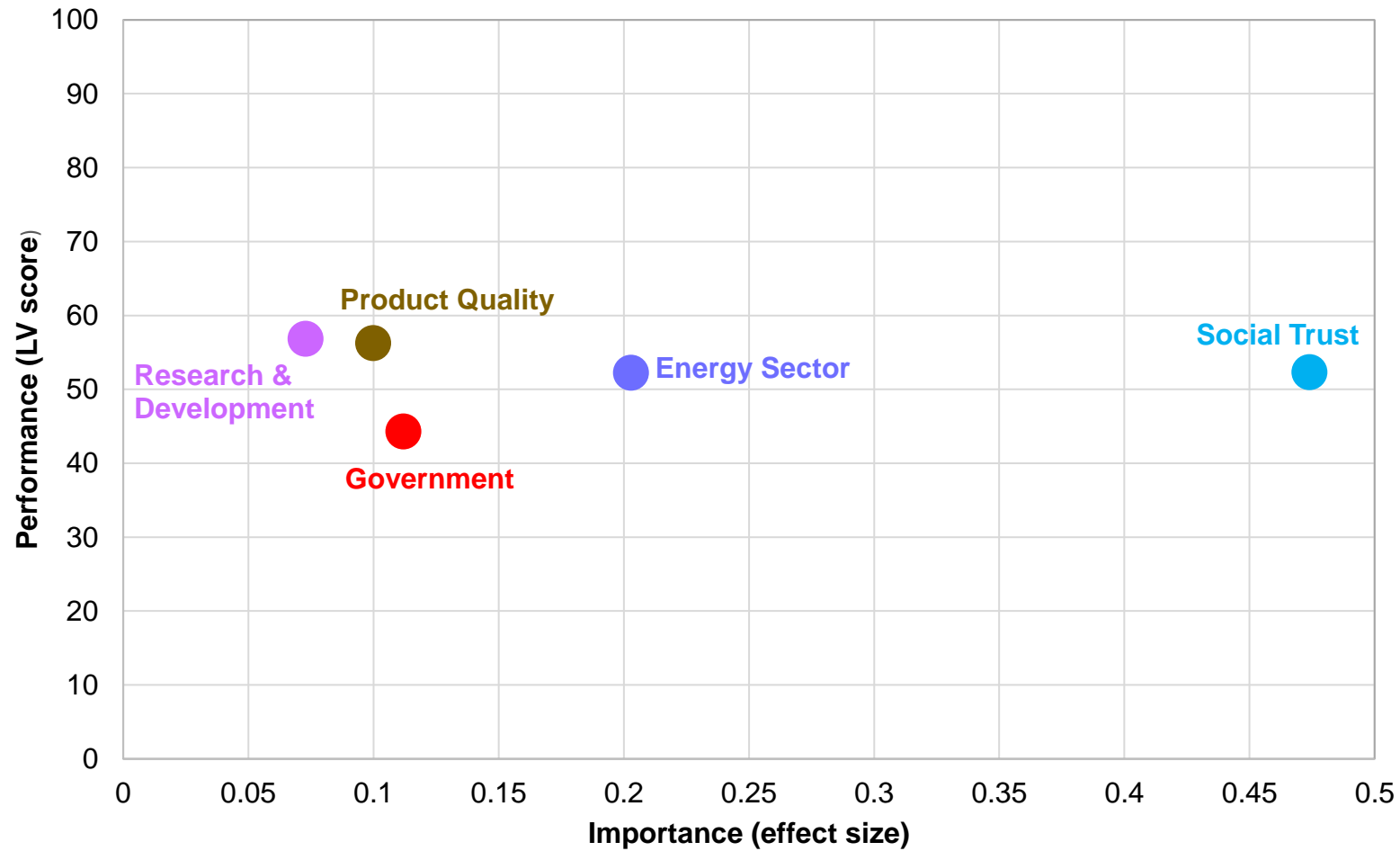
Trust in Product Quality → Social Trust: 0.211

Social Trust → Hydrogen Acceptance: 0.474

Hydrogen Acceptance → Hydrogen Adoption: 0.764



Importance performance-map analysis (full sample): Predictors of Hydrogen acceptance

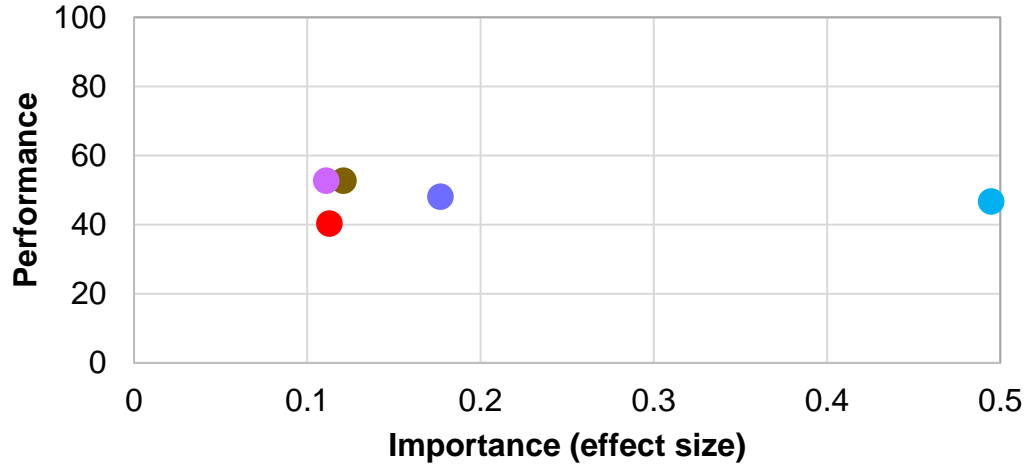




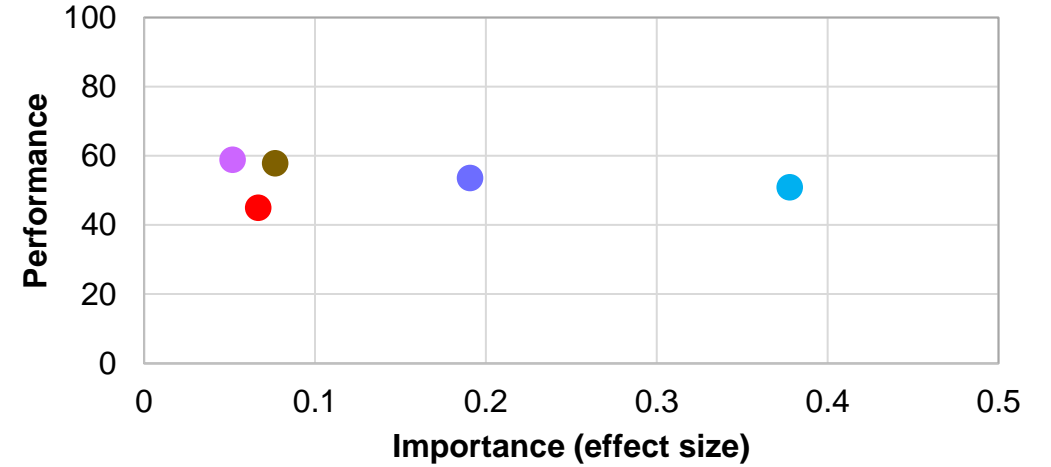
Importance performance-map analysis (full sample)

- Government
- Energy Sector
- Product Quality
- Research & Development
- Social Trust

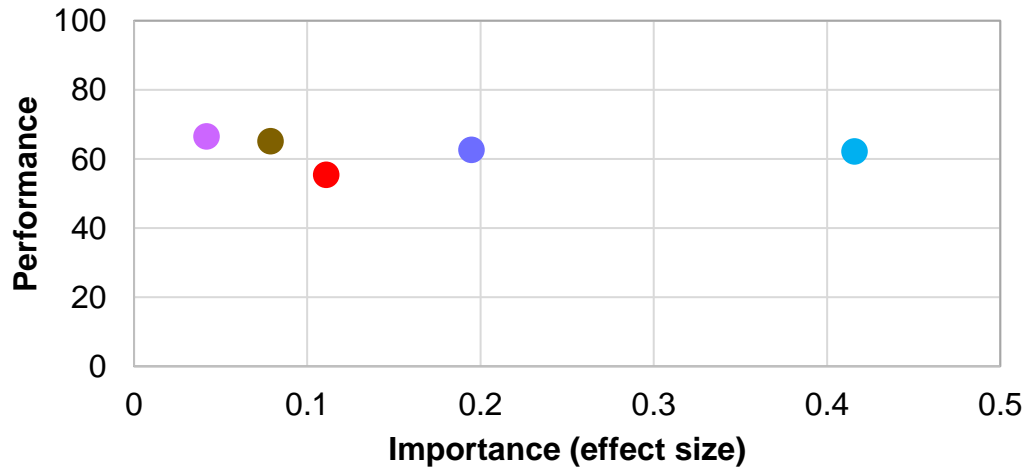
Baseline Group (N = 677)



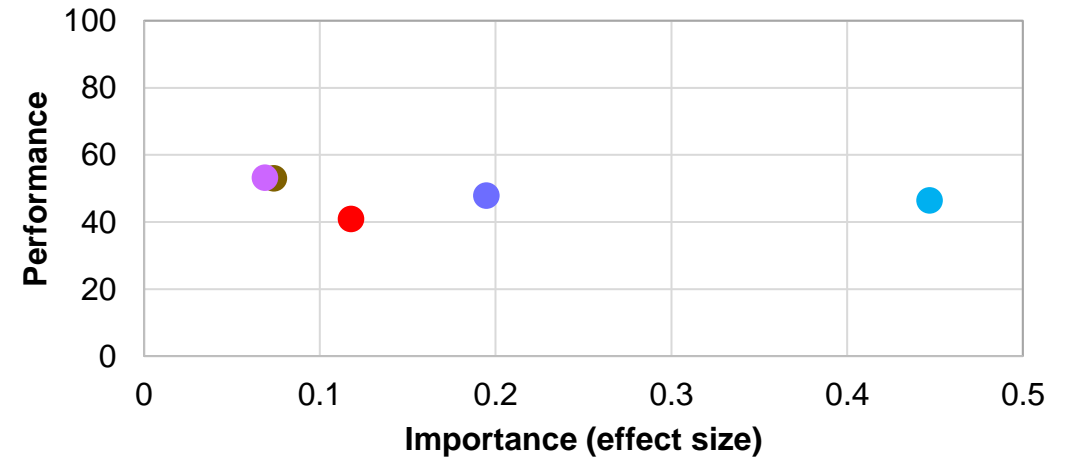
Moderately Engaged Group (N = 458)



Very Engaged Group (N = 331)

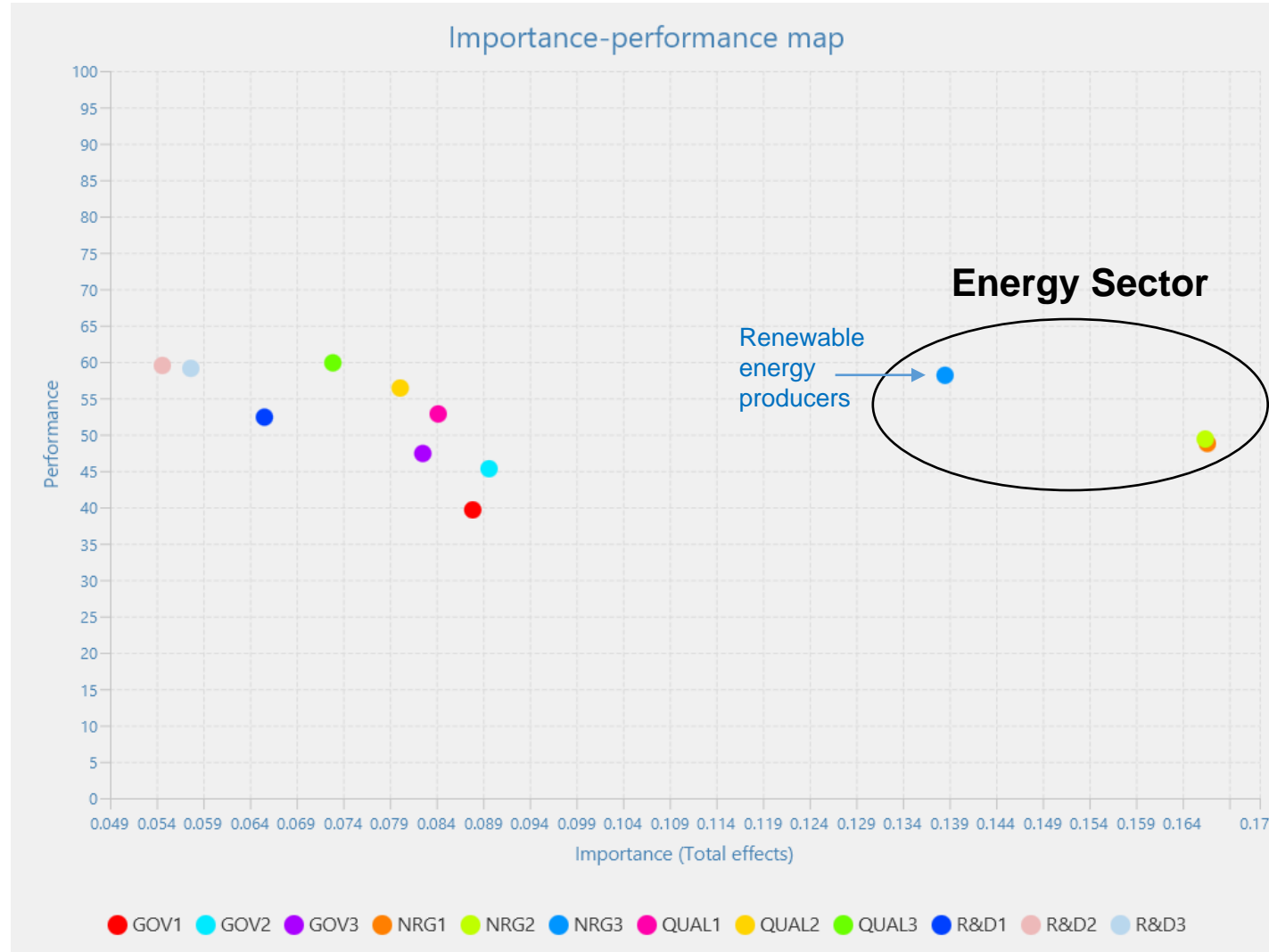


Fuel Stressed Group (N = 379)



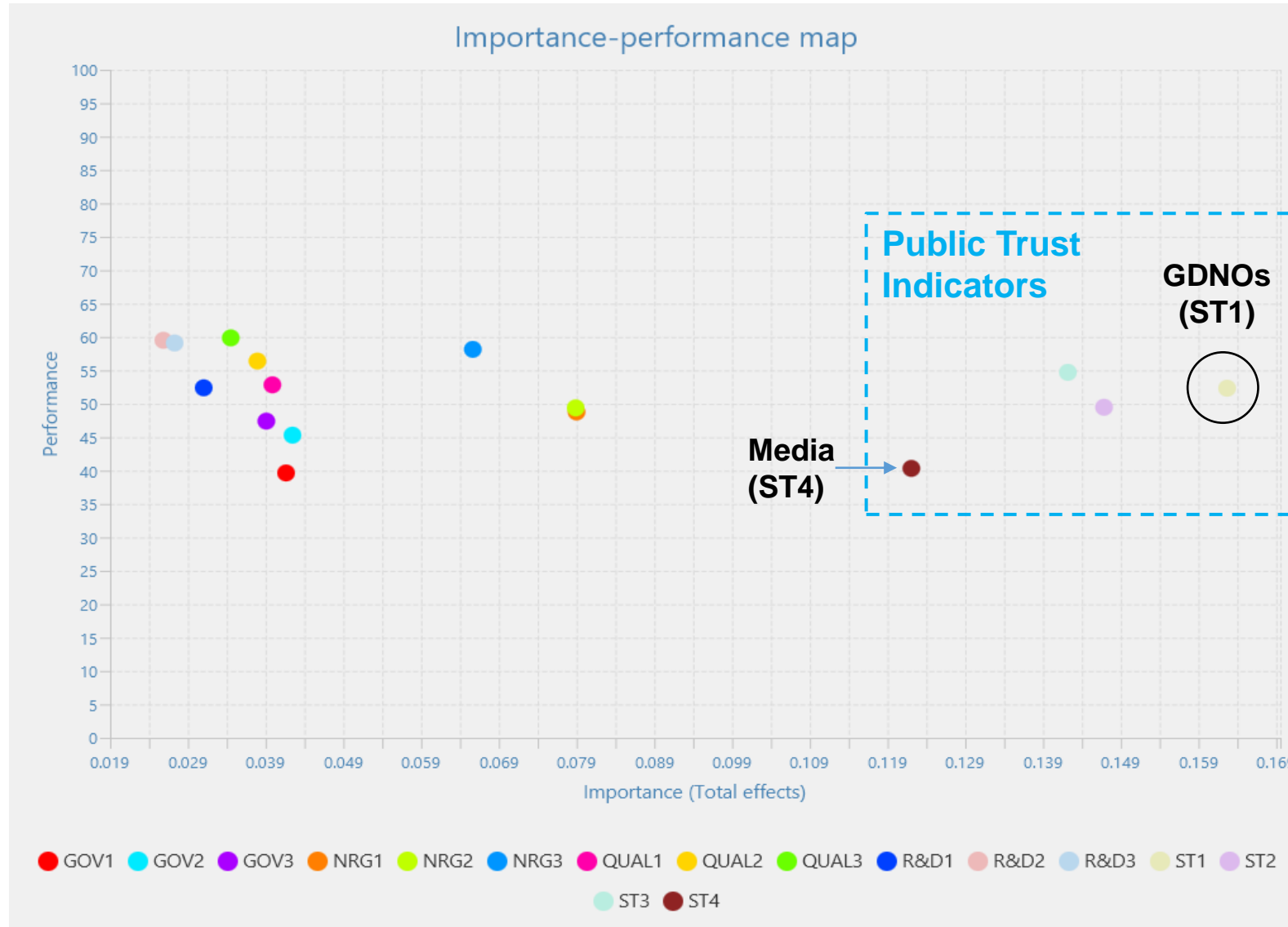


IMPA: Trust dimensions → Social Trust (full sample)



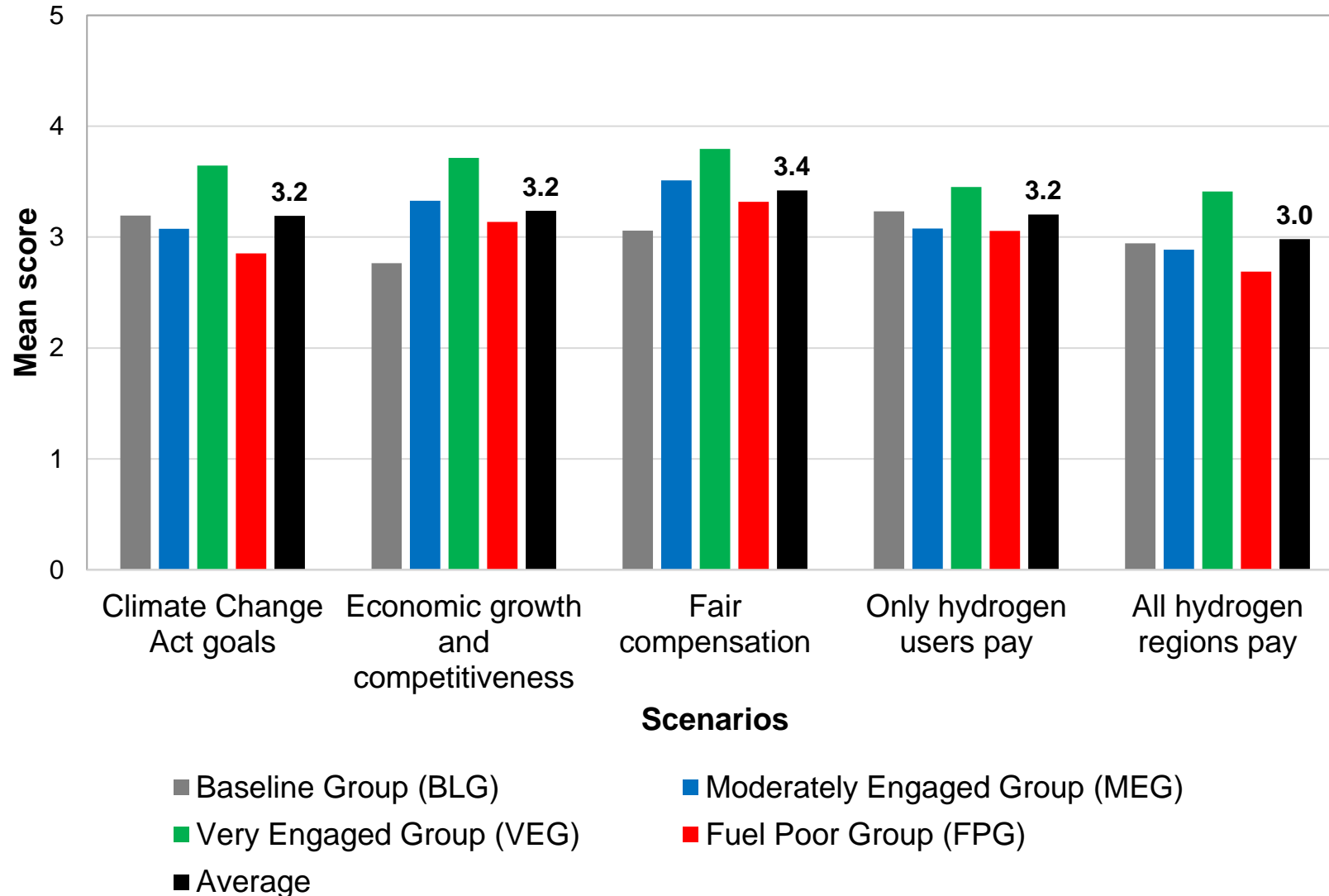


IMPA: Social Trust → Social Acceptance (full sample)



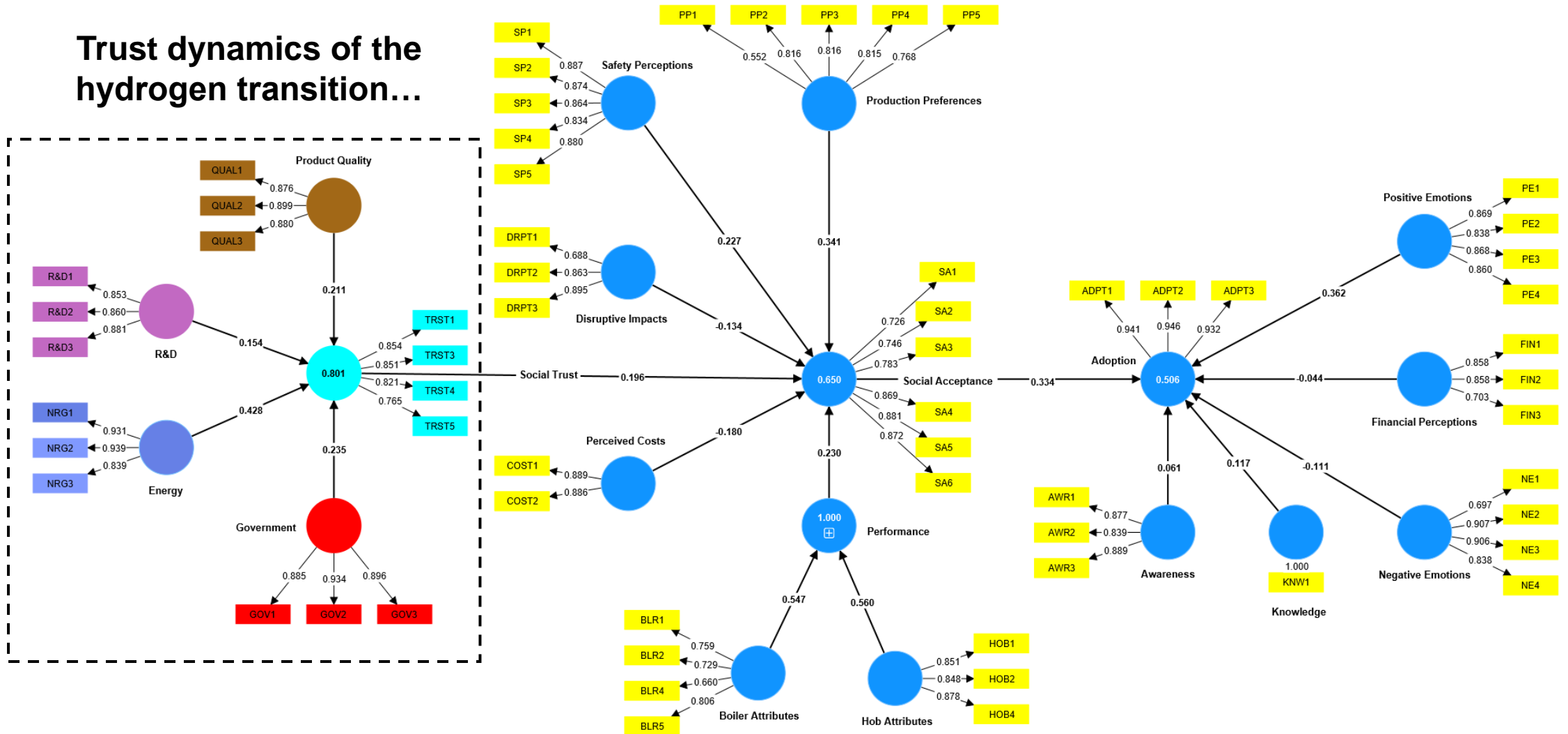


Public perceptions of H2 transition prospects: Environmental, economic and equity dynamics



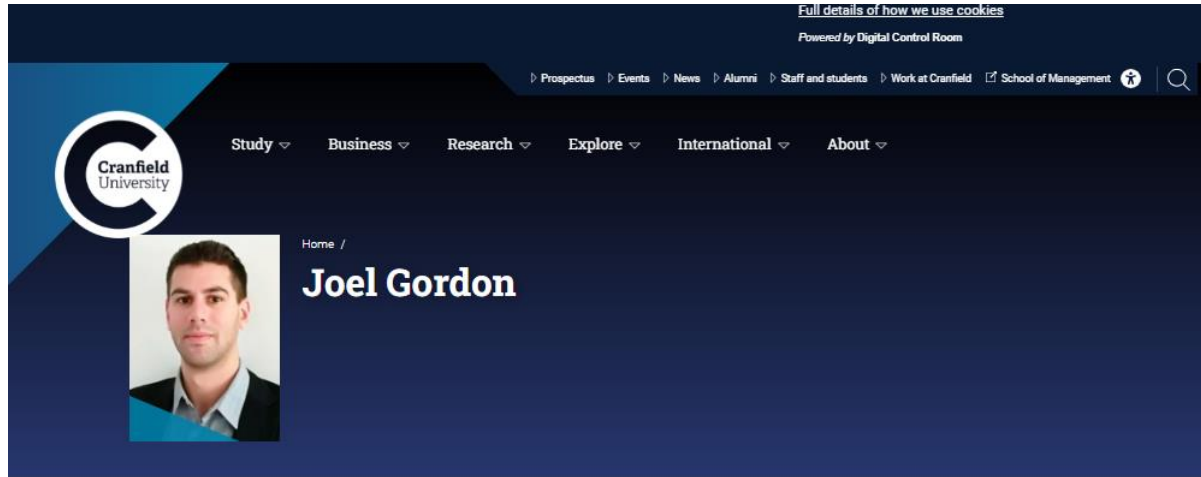
Conclusion: integrating social trust into acceptance models

Trust dynamics of the hydrogen transition...





Link to project outputs and research supervisors



Background

Joel graduated from the Erasmus Mundus Joint Master Degree in Environmental Sciences, Policy and Management (MESPOM) in 2020, having previously completed an MA at the Porter School of Environmental Studies. During his MSc, Joel specialised in energy transitions and climate change, writing his thesis on the European offshore wind power transition. He also worked as a research assistant within the Central European University's (CEU) Energy Policy Research Group (EPRG), undertaking research on the geopolitics of natural gas and nuclear power in Europe. Joel is now pursuing his PhD at Cranfield University's Centre for Energy Systems and Strategy (CESS), housed in the Department of Energy and Power.

Current activities

Joel's research is focussed on investigating the decarbonisation of gas networks via the use of hydrogen to develop roll out strategies that are socially acceptable and fair to support the UK's meeting of Climate Change Act goals. This involves analysing past and ongoing national energy transitions, communicating with stakeholders and assessing the underlying factors which determine the acceptance of a transition to hydrogen homes.

Clients

Joel's research is sponsored by EPSRC through the Doctoral Training Partnership (DTP) scheme and industrial partners Cadent Gas Ltd and the Committee on Climate Change.

Publications

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Research supervisors



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