



Catalysts for Change? Policy Recommendations in Research on Renewable Energy and Climate Change

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Motivation

- Importance of **research based policy**
 - For **researchers** (Oliver and Cairney, 2019; Gleditsch, 2023)
 - For **policymakers**

“research and associated expertise must be much easier to identify and to access in order for it to become an integral element of public policy development” (Department of Further and Higher Education, Research, Innovation and Science, 2022)

Motivation

- Even more important for pressing issues e.g. **climate crisis**
- **Policy relevance summaries** (Energy Policy, Climate Policy, PNAS)
- **Abstracts** most visible and accessible part of our research

Research Questions

1. **How often do policy recommendations appear in journal abstracts in energy and climate research?**
2. **How do rates of policy recommendations vary over time and by discipline?**

Bibliometric Research and Policy Advice

- Wide range of environmental **bibliometric research** using topic models and citation analysis (Akbari et al., 2020; Qin et al., 2022; Tan et al., 2021; Perga et al., 2023)
- **Low levels of policy recommendations** in epidemiologic and pollution research (Jackson et al., 1999; Begier and Samet, 2002)
- But some evidence of **trend towards more actionable policy advice** in specific sub-fields (Hagerman and Pelai, 2018; Cady et al., 2023; Heller and Zavaleta, 2009; McLaughlin et al., 2022; Ranius et al., 2023)

Data

Scientific research

- Elsevier SCOPUS database (rscopus R package)
- Academic publications between 2000-2022
- Keyword search filter
- Text abstracts

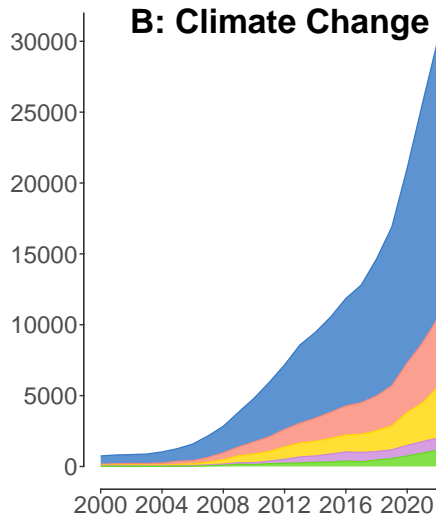
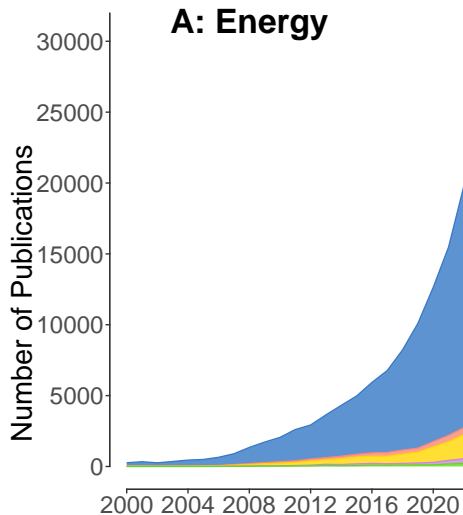
Keywords:

climate change, climate crisis, global warming, renewable energy, net zero, climate neutral, and carbon neutral

Data

- Search returned **627,583** initial results
- **Filtered publications for:**
academic journal articles, valid DOI, title and abstract text, author information, and institutional affiliation
- Final working dataset of **356,022 articles**
- Merged in **ASJC codes** for subject area classification
(All Science Journal Classification)

Figure: Publications over time by field



Physical Sciences Social Sciences & Humanities Health Sciences
Life Sciences Multidisciplinary

Policy Recommendations

Definition: Sentences that offer explicit suggestions or proposals for best courses of action

Examples:

1. "We conclude by providing some policy recommendations for higher educational institutes to speed up their ambitions in the area of sustainable biosphere management."
2. "Accordingly, this paper puts forward corresponding policy recommendations."
3. "The empirical results of this paper provide policy recommendations and empirical insights for China's energy security."

Method – Classification of policy recommendations

- **Manual coding of 600 abstracts**
 - split sample of 300 with/out policy keyword
 - imbalanced categories (9% policy mentions)
- **Fine-tune transformer based classifier (DistilBERT)**
 - 80/20 train/test split
 - Trained using Flair NLP framework (flaiR)
 - Predict mention of policy recommendation

Model Evaluation

Table: Model Performance of Confusion Metrics

Class	Precision	Recall	F1-Score	Support
Non Policy Recommendation	0.9469	0.9727	0.9596	110
Policy Recommendation	0.5714	0.4000	0.4706	10
Accuracy			0.9250	120
Macro Avg	0.7592	0.6864	0.7151	120
Weighted Avg	0.9156	0.9250	0.9189	120

Table: Top 20 Keywords Derived from Keyness Analysis in Climate and Energy Research

Climate Change

recommendations, policies, farmers, implementation, government, Paris Agreement, adoption, developing countries, countries, households, legislation, climate change, need, regulations, economic growth, smallholder farmers, study recommends, policymakers, livelihoods, women

Energy

recommendations, policies, economic growth, CO2 emissions, China, Renewable energy consumption, government, policymakers, countries, Carbon emissions, policy recommendations, ecological footprint, financial development, long run, environmental quality, country, regulations, trade openness, environmental degradation, 1990

Results

Table: Distribution of Policy Recommendations Across General Subject Areas

General Field	Energy			Climate Change		
	Total Abstracts	Policy Mention	%	Total Abstracts	Policy Mention	%
Social Sciences & Humanities	8,927	1,173	13	21,082	2,278	11
Health Sciences	1,268	115	9	6,355	583	9
Multidisciplinary	1,727	102	6	7,448	277	4
Physical Sciences	90,803	5,272	6	127,994	7,341	6
Life Sciences	3,541	113	3	32,532	939	3

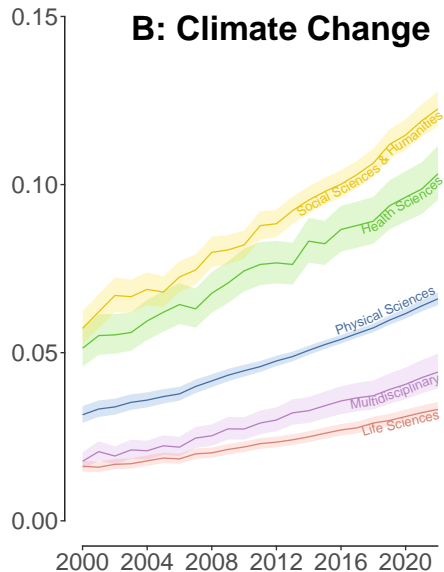
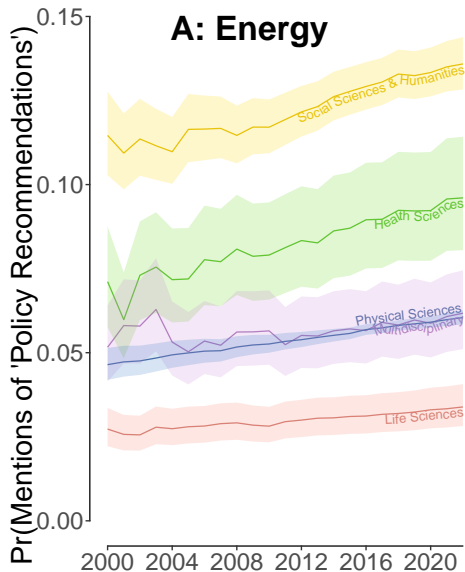
Policy Mention indicates that an abstract contained at least one policy recommendation.

Table: Distribution of Policy Recommendations Across Subject Fields

Subject Field	Energy			Climate Change		
	Total Abstracts	Policy Mention	%	Total Abstracts	Policy Mention	%
Social Sciences	8,681	1,157	13	19,312	2,217	11
Environmental Science	22,668	2,709	12	59,904	4,814	8
Medical Sciences	1,526	123	8	7,119	603	8
Arts and Humanities	246	16	7	1,770	61	3
Multidisciplinary	1,727	102	6	7,448	277	4
Agricultural and Bio Sciences	2,897	102	4	29,643	902	3
Engineering	51,042	2,129	4	17,939	1,086	6
Natural Sciences	10,200	358	4	46,729	1,355	3
Life Sciences	386	3	1	2,125	17	1
Materials Science	3,533	35	1	1,304	25	2
Mathematics and Computing	3,360	41	1	2,118	61	3

Policy Mention indicates that an abstract contained at least one policy recommendation.

Figure: Predicted Probability of Policy Recommendation in Articles by Year and Field



Summary

- **Policy recommendations relatively rare in academic journal abstracts (<10%)**
 - More common in renewable energy vs climate research
- **Clear variation between and within disciplines**
 - Most common in social and environmental sciences
- **Recommendations becoming more frequent over time**
 - Especially for climate research

Conclusion and Next Steps

- **Policy relevance** should be explicitly stated and accessible (**Article abstracts** and **impact summaries**)

Next Steps

- Code sample of full-text articles for presence of policy recommendations
- Mentions of scientific research by policymakers

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Keyword Indexing

Constructed four sets of concepts based on our selected keywords:

1. environmental-related concepts, such as GHG emissions and El Niño
2. policy tools, such as investments, policies, and technology
3. actors, such as advocates, authorities, and policymakers
4. action verbs, such as develop, implement, and introduce.

Selection criterion whereby an abstract must mention at least one term from each of the four concept categories to be considered relevant.