

Bhatta, Bibek

Working Paper

SDG7 and the systematic downplaying of affordability in discourses on energy prices

QMS Working Paper, No. 2023/08

Provided in Cooperation with:

Queen's University Belfast, Queen's Business School

Suggested Citation: Bhatta, Bibek (2023) : SDG7 and the systematic downplaying of affordability in discourses on energy prices, QMS Working Paper, No. 2023/08, Queen's University Belfast, Queen's Business School, Belfast

This Version is available at:

<https://hdl.handle.net/10419/280744>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



**QUEEN'S
UNIVERSITY
BELFAST**

**QUEEN'S
BUSINESS
SCHOOL**

Working Paper Series - QMS Working Paper 2023/08

**SDG7 and the systematic downplaying
of affordability in discourses on energy prices**

Bibek Bhatta

Queen's University Belfast

12 December 2023

Series edited by Philip T. Fliers and Louise Moss.
To submit forward your paper to qbs.rps@qub.ac.uk.

SDG7 and the systematic downplaying of affordability in discourses on energy prices

Bibek Bhatta *

Abstract

This study examines whether the current discourses and debates at international level are aligned with Sustainable Development Goal (SDG) 7 for i) affordable energy and ii) clean energy. Guided by the overarching vision of SDG7, this study assumes that both “affordably energy” and “clean energy” are of equal importance and examines their prevalence along two dimensions: parliamentary debates and news cycle. Results suggest that “clean energy” is used significantly more compared to “affordable energy” in both parliamentary debates and newspapers in the UK, US and Ireland. This is the first study that we are aware of that examines the possible incongruity between international discourses and SDG7. It also adds to the emerging debate on whether affordable energy and clean energy are of equal importance or whether one is superior to the other. It also points towards the need for a macroeconomic evaluation and cost consideration when it comes to creation of ‘green jobs’. Finally, given that this incongruity is most severe in the US congress, this study also points to geopolitical implications for other countries.

Keywords: SDG7; clean energy; affordable energy; green jobs; sustainable development

JEL Classification: Q40, Q42, Q43, Q48, Q58

* Queen’s Business School, Queen’s University Belfast, Belfast, BT9 5EE

*Corresponding author (email): b.bhatta@qub.ac.uk

1. Introduction

In 2015, all United Nations Member States adopted The 2030 Agenda for Sustainable Development which provides a shared design for global peace and prosperity. At the core of this agenda lie 17 Sustainable Development Goals (SDGs) that require urgent and collaborative action from all 193 member states. “Affordable and Clean Energy” is one of these 17 SDGs envisaged by the United Nations (UN). Dubbed as SDG7, it aims to “ensure access to affordable, reliable, sustainable and modern energy for all”. Given that the headline statement of SDG7 explicitly focuses on ‘clean’ and ‘affordable’ energy, all member countries are to be expected to make a concerted effort to produce not just clean but affordable energy as well.

But anecdotal evidence suggests that while efforts are focussed towards producing clean energy with certain determination, the importance of affordability has been downplayed at least in news articles. A quick glance at the most recent 1500 news articles having “energy”¹ in the title from newspapers in the UK, Ireland and USA shows that the word ‘clean’ is used more than four times (231 times) than the word ‘afford’ (50 times) in the contents of the news articles (see Figure 1). Similarly, the usage of clean plus energy together in a sentence (154 times) is about twice the number of times for affordable plus energy (78 times). This comes at a time when “growing energy prices disproportionately impact those on lower incomes” ([ONS, 2022](#)). A quick survey conducted by the author on 10 November 2023 among 31 postgraduate students in a UK university show that 28 (90%) think that both affordable energy and clean energy are equally important, while the remaining 3 (10%) believe that affordable energy is more important than clean energy. None of the students chose the option that clean energy was more important than affordable energy. A [recent exchange](#) in May 2023 between US Senator Kennedy (of Louisiana) and US Deputy Secretary of Energy - where the former asks how much the global temperature would be lowered if US spent USD 50 trillion – also highlights the disconnect between cost and affordability of energy amidst environmental concerns.

This provides motivation to examine how policymakers are engaged in debates around the issue of “affordable and clean energy”, especially when the poorer households in the UK are more severely impacted by the rising energy prices recently. It can be argued that such debates are influential in shaping the laws and regulations of a country which in turn have long-term

¹ We select most recent 500 news articles from newspapers in English language from UK on 06 Nov 2023 from Nexis UK¹ and 500 each from Irish and US newspapers on the following day.

consequences for not just energy prices but also for people's daily lives and living standards. As we discuss later using a ragtag economic model, SDG7 is strongly related to multiple other SDG goals related to poverty, hunger, health, education, and economic growth (SDGs 1,2,3,4,8).

Also important is the goal congruence of member states vis-à-vis SDG commitments. If the policies and actions of member states are not properly aligned with the goals of SDGs, the aims of The 2030 Agenda will be in jeopardy. Hence, this paper also aims to examine if the policies/debates at country level are aligned with the commitments made back in 2015 in relation to the SDG goals, especially SDG7.

This study finds that national debates around energy in three English-speaking countries viz UK, US and Ireland have systematically downplayed the importance of affordable energy compared to clean energy in the past two decades. This effect is more pronounced after 2015 when the member countries adopted The 2030 Agenda for sustainable development. More specifically, the focus on clean energy is about twice than that of affordable energy in the UK; and six times more in the US. In Ireland, though the focus on clean and affordable seems to be more balanced, "sustainable energy" trumps both clean and affordable energy in parliamentary debates.

This paper exposes the goal incongruity in national debates vis-à-vis SDG7 goals for three English-speaking developed and democratic countries at a time when the poorest members of society are disproportionately being impacted by rising energy prices. This study highlights the inherent shortcomings in national energy-related debates that have remained somewhat hidden for the past two decades. Since national debates are held to shape long-term energy policies, this paper serves as a polite reminder to people's representatives to better align their discourses with the SDG7 goals. Considering that all three countries embrace democratic governance structure, concerns can also be raised regarding accountability on the part of policymakers to the electorate. A way forward would be to put cost considerations at the heart of clean energy policies internationally and to identify the most cost-effective sources of clean energy from the different alternative sources of such energy (e.g. hydropower, solar, wind, nuclear, etc).











The remainder of this paper proceeds as follows: section 2 discusses why cost matters; section 3 discusses the methods and data; section 4 presents the results; and section 5 provides wider discussion on implications, limitations of this study, and concluding remarks.












2. Why cost matters: a ragtag economic model

In this section, we present a simplistic economic model to illustrate the importance of cost of clean energy and what it means for maintaining production (and consumption) in a society. Assumption of a simplistic market or a perfect market is not new in academic research (e.g. see Modigliani and Miller, 1958).

Let us consider a society with just 10 households (Figure 2) where the households specialise in producing specific products/services. Since money is not used by this society, the households exchange the goods/services so produced to consume all items proportionately.

Let us also assume that in a given year, 10% of the households (i.e. one household) produce clean energy (Figure 2) when the ‘cost’ of such energy is ‘normal’²; and 90% of the GDP in the society is produced by the remaining 90% (9) households.

Products	Producers	% of GDP
Energy		10%
Food	 	20%
Housing	  	30%
Clothing		10%
Education, Health, and Leisure	  	30%
Total	10 households	100%

Products	Producers	% of GDP
Energy	 	20%
Food	 	20%
Housing	  	30%
Clothing		10%
Education, Health, and Leisure	  	20%
Total	10 households	100%

If the ‘cost’ of clean energy were to double from the normal level, two households would be needed to create/maintain the technology to produce the same volume of energy (see Figure 3); as such, only 80% of the households are now available to produce the remaining goods/services for the society. While the volume and quality of energy produced remain the same, the society experiences cuts in other essential products/services like food, health, education, housing etc. In this example, this society experiences a negative shock in education, health and leisure since this segment had to devote one additional household towards producing the clean energy for the society.

² During April 2021 to March 2022, average households in the UK spent around 10% of their weekly expenditure on energy (based on Family Spending survey of [Office for National Statistics](#))

In terms of general employment however, the overall employment level remains the same while the energy sector can now claim to have created additional jobs. Assuming one household has five working members, the employment in energy sector rose from 5 to 10, a 100% increase.

In this simplistic model, though the employment in clean energy sector doubled, the society overall loses in that its non-energy production (and consumption) declined by 11% (from 90 to 80). If this society has adopted SDG goals, its goals related to poverty, hunger, health (e.g. SDG1, 2, 3) will also be severely impacted.

On the contrary, if the 'cost' of energy were to fall below the 'normal' level, a full household will not be needed to meet the energy demand and the freed-up members of the energy household can now contribute to the rest of the economy, thus uplifting the production and consumption of other items (like leisure, education, health, etc.).

Hence, cost of production of clean energy is of paramount importance not just to meet the goals of SDG7 but also of other associated SDG goals. Hence, it is crucial that the discourse on energy and SDG7 give due consideration to cost of clean energy.

For the above model, to keep things simple, we made a number of assumptions including:

- a) There is full employment.
- b) The determinants of production (e.g. labour, technology, equipment, experience) remain constant.
- c) Household spending in specific items remain constant.
- d) All households consume same level of products and services though they might produce different products/services.
- e) All sources of clean energy produce clean energy but the cost of production for different sources vary.
- f) For this model, 10% is the share of energy in GDP based on the average expenditure of households on energy, as stated in [ONS website](#) .

3. Data and Method/methodology

We download textual data from the parliamentary/congressional debates from three English-speaking countries: UK, US and Ireland. The data is collected slightly differently given the different nature of the websites and accessibility; we discuss the data collection in brief below.

For UK, the parliamentary debates are publicly available from [Hansard website](#). We download all debates in the House of Commons during 2007 to 2023 October³ that contained “energy” in the title. We collected 833 such debates held over 441 unique days, [the most recent one](#) being held on 25 October 2023

For the purpose of examining parliamentary debates in Ireland ([Houses of the Oireachtas](#)), we initially focus on the lower house (Dail) for the period from 1924 to March 2023 and check for all debate titles containing the word “energy” in the titles. The earliest bill with ‘energy’ in the title was from 1971 in the form of Nuclear Energy (An Bord Fuinnimh Núicléigh) Bill, 1971. The second earliest one we could find was from 1998 in the form of Energy Conservation Bill, 1998. Hence, we take 1998 as the start date for analysing the debates; the end date is 2022-06-02. This date range yields 9 bills which were debated over 35 unique days. For example, “Fuel Poverty and Energy Conservation Bill 2008” was debated on a single day on 14 May 2008 while “Energy (Biofuel Obligation and Miscellaneous Provisions) Bill 2010” was debated over 11 unique days (from 2010-02-09 to 2010-12-16). We note the exact date on which these selected bills were debated and download the entire debates for those days for analysis purposes. As such, the debates for Ireland also contain debates where the title may not have “energy” in the titles.

For the US Congress, we use all “Congressional Hearings” in both the Senate and Lower House where the title contains “energy” from US [Congressional Record](#) website from year 2000 to 2023 October. This yielded 987 hearings which took over 791 unique days (due to multiples hearings in some days). The [most recent hearing](#) was held on 14 June 2023.

We specifically focus on the usage of “clean” and “affordable” in such debates with the assumption that the frequency of usage of these words/phrases reflect the perceived importance of that particular aspect by the policymakers. We also focus on the usage of “clean + energy” and “afford + energy” in the same sentence within 150 characters of each other in such debates/hearings; for this purpose of examining sentences, we use three additional synonyms for energy in ‘fuel’, ‘electricity’, and ‘power’ interchangeably. This is to ensure that relevant

³ Debates for 2004-2006 are not available on this website; hence 2007 is used as the starting point.

sentences are not ignored while doing textual analysis. Variants of such words (e.g. afford, affordable etc) are treated as “affordable” for the purpose of this exercise. In this sense, this analysis is similar to “bag of words” approach in linguistic analyses (see Loughran and McDonald, 2016 for a survey).

Additional three words in the form of “reliable”, “sustainable” and “modern” are also considered for usage in sentences along with “energy” in line with the secondary statement of SDG7 which states “...affordable, reliable, sustainable and modern energy for all”.

For example, US congressional hearing on “[Energy Supply and Prices](#)” held on 5 March 2000 uses “clean” 19 times (including with hyphen) and “affordable” 7 times. Further, “clean” is used in the same sentence with either “energy” or “fuel” or “electricity” 12 times while such usage of “affordable/afford” with energy/ fuel/electricity is for 6 times.

Computer-aided linguistic analysis is done using [Python](#) programming language with the focus of presenting the findings mainly through data visualization.

4. Results

In the UK, the results show that the word “clean” is used nearly three times more (3.7 times on average) than “affordable” (1.3 times) in the debates related to “energy” in the house of commons. However, sentences containing terms “clean + energy” (2.8 times) are used nearly twice as much compared to “affordable + energy” (1.4 times) (see Table 1).

The usage of “clean” in parliamentary debates overshadows the usage of “affordable” both individually and in sentences (see Figure 4 and Figure 5).

For ease of comparison, the usage of “affordable” and “clean” as an annual average both severally and in sentences with “energy” or “fuel” or “electricity” or “power” are shown in Appendix 1 and Appendix 2. “Clean” and “affordable” were used in a more balanced manner prior to 2015. During the three years ending in 2015, “afford + energy” was used more in sentences than “clean + energy”. For example, on debate held on Wednesday 26 March 2014 entitled [Energy Markets \(Competition\)](#), “clean” was used in the same sentence twice while “afford” and “reliable” were used just once each. “Sustain” and “modern” were not used at all during this debate.

However, starting in 2015, the same year as the SDG goals were adopted, this trend reversed and usage of “clean” became much higher (compared to “affordable”) in 2015 (Figure 5 and Appendix 2. This disparity, though subdued in 2016, remains pronounced for the remainder of the study period (see Figure 4 and Figure 5) .

During 2023, usage of “sustainable” takes second place and “affordable” gets pushed further down to third place (Appendix 2). The cleaned dataset showing numbers of words used individually and in sentences for specific debates is provided as an [online appendix](#) . The graphs showing annual averages (instead of daily counts) are also provided in Appendix 1 and Appendix 2.

In Ireland, the word “affordable” (7.9 times) is used three times more frequently than “clean” (2.6 times); however, closer inspection shows that this is due to discussion of “affordable housing” during the period. It is to be noted that the debates in our sample for Ireland contains not just the debates with “energy” in the titles but also other debates that may have been held on the same day in the lower house.

When we consider the usage of “clean” and “afford” along with “energy” or “fuel” or “electricity” or “power” in the same sentence, usage of “afford” is more prevalent at least prior to 2016 (see Figure 7).

After 2016, the usage of “afford+energy” has been subdued compared to “clean+energy”. Throughout the sample period in Irish dail, “sustain + energy” is predominantly used in sentences while discussing debates around climate and energy. For illustration, debate held on [07 December 2006](#) contained the word “clean” once whereas it was used in a sentence with “energy” or “fuel” or “electricity” or “power” three times ⁴; whereas “affordable” was used eight times but was used in a sentence along with “energy” or its synonyms only twice. Overall, “sustainable + energy” is more frequently used in Ireland compared to either “clean” or “affordable” energy.

In the US, the debates are predominantly tilted towards the usage of “clean” and “ clean + energy” compared to “affordable”. Over the sample period, “clean” has been used 32.2 times on average while “affordable” has been used 4.8 times on a given day of hearings (see Table

⁴ Clean + energy is used more than “clean” itself because we strictly check for “clean” while checking for individual word (thus “cleaner” would not be counted) whereas “cleaner” would be considered in a sentence.

3). Similarly, usage of “clean” in a sentence with “energy”, “fuel”, “electricity” or “power” is 23.7 times while that for “afford” is 4.2 times. In this respect, the usage of “clean” is about six times more than that of “affordable” in a given sentence in the hearings. Further, on average, “reliable” and “sustainable” energy are discussed more than “affordable” energy. The graphs depicting the daily usage of these terms and phrases for US congress are shown in Figure 8 and Figure 9.

Throughout the study period, “clean+energy” remains a very dominant theme in the US while “affordable+energy” seems subdued even when compared to “reliable + energy” (yearly averages for US are shown in Appendix 5 and Appendix 6 for ease of reference.

The highest number of times clean + energy was used in the same sentence was on [May 17 2012](#) when it was used 592 times in the same sentence while affordable + energy was used only for 23 times on that day. The highest number of times affordable + energy was used on the same day is 61 times on March 5, 2003 when clean + energy was used 144 times. There were four congressional hearings related to energy on that day.

5. Further discussion and concluding remarks

This paper has implications for policymakers, lawmakers and the wider society.

SDG7 embedded within The 2030 Agenda for Sustainable Development puts a strong emphasis on both “affordable and clean energy”. However, this paper documents, for the first time to our belief, that the discourse on energy in the international context is focused more on ‘clean energy’ and less so on ‘affordable energy’; this is difficult to understand given the disproportionately harsh impact faced by mostly low-income households (at least in the UK) due to the rise in energy prices recently in the UK and abroad. While the focus on clean energy is commendable, it is somewhat concerning that policymakers are exhibiting lower level of keenness towards affordable energy. This phenomenon has severe implications from the standpoint of SDG as well as economic welfare in modern societies.

From the standpoint of purely meeting SDG goals, this study shows incongruity in national goals of UK, US, and Ireland vis-a-vis goals of SDG7 for “affordable and clean energy”. Parliamentary debates and social discourse should be aimed towards identifying the most cost-efficient sources of clean energy to meet the goals related to SDG7. Various challenges remain in this regard including, but not limited to, project appraisals ([see](#) Bhatta, 2022 for a

discussion), finding the levelized cost per unit⁵ of different sources of energy, finding the cost of capital for different energy projects, and so on. Not giving due consideration to the affordability of various sources of energy (e.g. solar, wind, hydropower, nuclear etc.) can lead to goal incongruity and may hinder society's progress towards achieving SDG goals including SDG goals 1, 2, 3, 7 and 8 [*1: No Poverty; 2: Zero Hunger; 3: Good Health and Well-being; 4: Quality Education; and 8: Decent Work and Economic Growth*] among others.

From social welfare perspective, downplaying the importance of affordability of energy could lead to devastating consequences throughout the world. As we show in our basic economic model, doubling the price of energy from its normal prices could lead to reduction in production (and consumption) of non-energy products/services by about 11%. In economic terms, this foreshadows disastrous consequences for the global community.

From the perspective of democracy and accountability, people's representatives should be more focused on various aspects of SDG goals as envisaged by the UN. It is important to note that affordability of energy has gained crucial importance at least recently from a societal perspective as poor households are suffering more from high energy prices. Being more focused on one aspect of SDG goals while downplaying the other aspect is questionable and should not be done without proper engagement with the stakeholders.

Additionally, peoples' representatives in the UK, Ireland and US owe an explanation to the electorate on whether their apparent indifference towards affordability of energy is merely happenstance or whether it is driven by other factors including unawareness, ambiguity, or even conflict of interests. Agency problems in firms have been highlighted by (Jensen and Meckling, 1976); such agency problems also exist in democratic states if we take the whole of a country as a firm. The electorate generally may not have the time or the resources to scrutinize the small print related to energy policies, or the national debates on such issues; but peoples' representatives are entrusted with the responsibility of acting in the best interest of the electorate (at least in democratic countries). If the representatives fall short in their fiduciary duty of acting in the interest of the electorate, accountability and explanation are warranted.

Though not the main objective of this study, we also point towards a meticulous examination of rhetoric of "green jobs" vis-à-vis reality of such green jobs. As demonstrated in our ragtag economic model, the discussion on "green jobs" without proper appreciation of cost is

⁵ See [BEIS Electricity Generation Costs \(2020\)](https://www.gov.uk/government/statistics/beis-electricity-generation-costs-2020) - GOV.UK (www.gov.uk)

meaningless at best; and could be detrimental to society. If the shift is towards a more expensive form of clean energy from a less expensive form of clean energy, the society suffers even though the number of “green jobs” might flourish. Hence, politicians boasting about “green jobs” should go beyond the rhetoric and offer a meaningful discussion on how such “green jobs” are not just about numbers but how they bring net benefits to societies. This is indeed possible if such green jobs are the result of a shift towards a less expensive form of clean energy. As such, identifying the most cost-effective source of clean energy should be the cornerstone of debates around energy policies. This in itself is another challenge towards achieving SDG7 goals as such cost efficiency could be very much dependent on country characteristics (e.g. countries rich in hydropower like Nepal could benefit from hydropower while this benefit may not accrue to other countries). In a similar vein, the rise of ‘green bonds’ requires fresh assessment to ensure that societies stand to benefit, and not lose, from such financing arrangements. Hence, a macroeconomic perspective is warranted especially when it comes to job creation and ‘green financing’.

From a geopolitical standpoint, this study reveals that the gap between focus on ‘clean’ vs ‘affordable’ energy is most severe in US congress (compared to UK and Ireland). Given the arsenal of financial carrots and military sticks at the disposal of the US government (and lawmakers and bureaucrats), it can be argued that the ideas born in the halls of congress will ultimately make their way to other parts of the world. This warrants a careful review of all energy-related policies being deliberated or implemented in rest of the countries throughout the world (including those in the EU).

This study has its limitations in that, inter alia, it takes a simplistic view that ‘bag of words’ approach can identify the hidden trends in national discourses; whereas a more detailed and nuanced approach including sentiment analysis could also be helpful. This study also carefully avoids any non-English-speaking developing country for its assessment; perhaps the insights provided in such research could be more fruitful in addressing energy-related issues in developing world where such issues would be more pressing.

Further, the impetus towards clean or affordable energy may not be perfectly captured in our approach. For example, words like ‘poverty’ or ‘financial difficulty’ or ‘hardship’ could have been used in debates to raise concerns about affordability. By the same token, more enthusiasm towards clean energy than shown in this study could be prevalent in national discourses through the use of terms like ‘green’ energy and ‘renewable’ energy, and other related terms. We

implicitly treat the use of such words on both sides of the debate as random. In our study, we have chosen words/terms strictly from the headline statements of UN for our analyses, with addition of few synonyms (electricity and fuel) for energy. But inclusion of wider set of words/phrases, especially if the language of debate is not in English, might unearth interesting results. This remains a matter of further research.

This study also opens up new avenues for further research to understand this hitherto unexposed phenomenon. A similar study in developing countries, examining their alignment with SDG goals, would be interesting in that the priorities - as reflected in national debates - could differ from those of developed ones. However, this will be a challenging endeavour not least because of data availability but also because of different languages other than English. It remains to be seen whether the observed downplaying of affordability in energy and climate debates, as revealed through this study, is a deliberate act or something more benign. There also seems to be a marked difference in the gap between focus on affordability and clean energy over time; unearthing the influence behind such a phenomenon will no doubt be beneficial for our understanding and in our attempt to achieve the sustainable goals as set forth in the 2030 Agenda.

References

- Bhatta, B., 2022. Common Pitfalls in Capital Budgeting [WWW Document]. URL [https://www.cpaireland.ie/CPAIreland/media/Education-Training/2022/Examinations/Articles 2022/SL-SCF-Common-Pitfalls-in-Capital-Budgeting.pdf](https://www.cpaireland.ie/CPAIreland/media/Education-Training/2022/Examinations/Articles%2022/SL-SCF-Common-Pitfalls-in-Capital-Budgeting.pdf)
- Jensen, M.C., Meckling, W.H., 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3, 305–360. [https://doi.org/http://dx.doi.org/10.1016/0304-405X\(76\)90026-X](https://doi.org/http://dx.doi.org/10.1016/0304-405X(76)90026-X)
- Loughran, T., McDonald, B., 2016. Textual Analysis in Accounting and Finance: A Survey. *Journal of Accounting Research* 54, 1187–1230. <https://doi.org/https://doi.org/10.1111/1475-679X.12123>
- Modigliani, F., Miller, M.H., 1958. The Cost of Capital, Corporation Finance and the Theory of Investment. *American Economic Review* 48, 261–297.

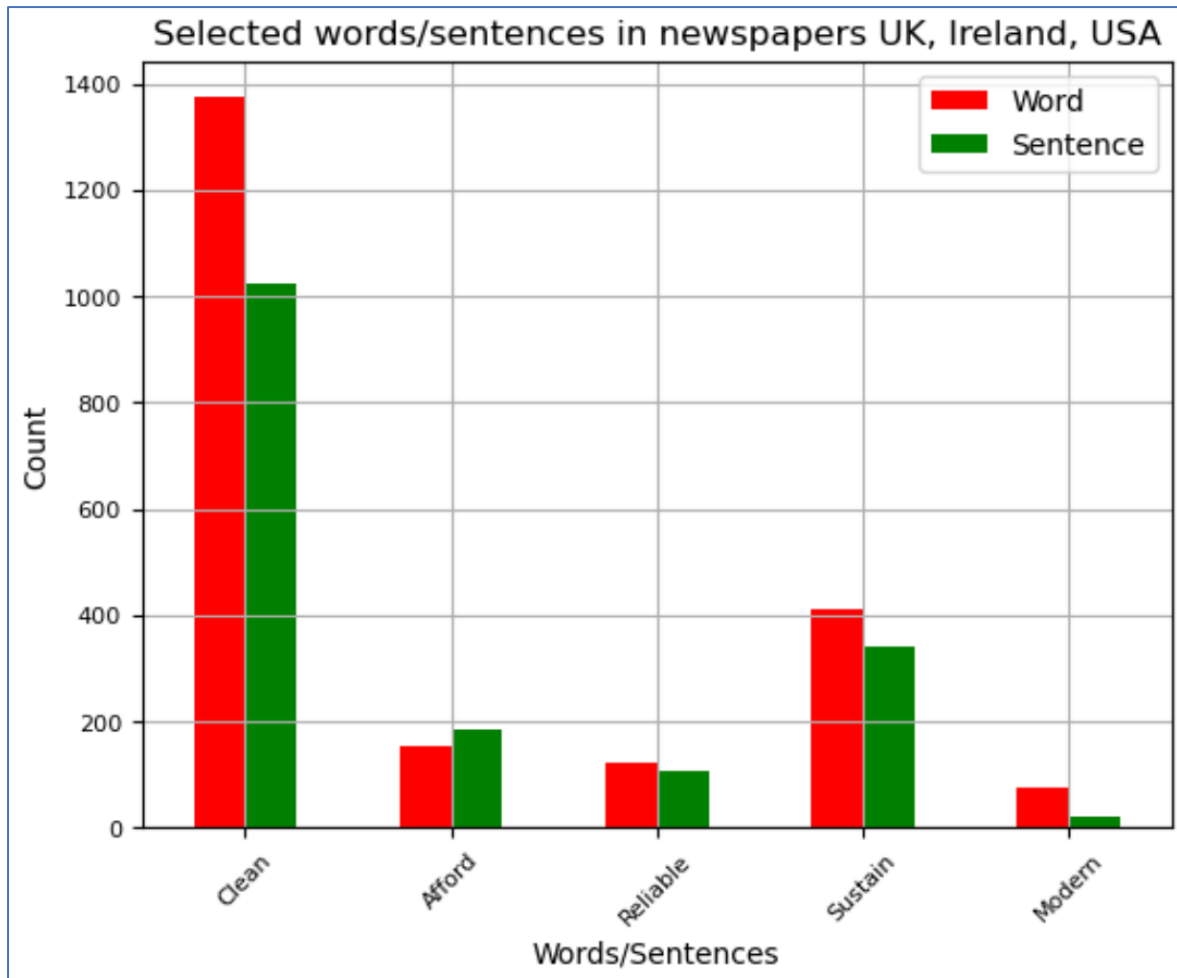












Figure 1: Selected words and word combination with 'energy' in the most recent 1500 news articles related to energy in the UK, USA, and Ireland.

Products	Producers	% of GDP
Energy		10%
Food	 	20%
Housing	  	30%
Clothing		10%
Education, Health, and Leisure	  	30%
Total	10 households	100%

}

}

}

}

}













}

10%

90%

Figure 2: Production in an economy when cost of energy is normal.

If the society decides to shift to another form of carbon-neutral energy that is twice as costly, two households (instead of one) would be needed to create the same level of energy, as shown in Figure 3.

Products	Producers	% of GDP
Energy	  	20%
Food	 	20%
Housing	  	30%
Clothing		10%
Education, Health, and Leisure	  	20%
Total	10 households	100%

}

}

}

}

}

}

20%

↑

80%

↓

Figure 3: Production in an economy when cost of energy is twice as normal.

Table 1: Summary statistics of parliamentary debates in the House of Commons (UK) for debates having the word “energy” in the title (2007-2023 October). Words is the number of words in the debate/hearing. Words of interest are ‘Clean’, ‘Affordable’, ‘Reliable’, ‘Sustainable’ and ‘Modern’ which are the actual words counted in the debates. Prefix of ‘Sentence’ denotes occurrence of words of interest within 150 characters of energy (or electricity or fuel or power) in a given sentence.

	Days	Average	std	min	P(25)	P(50)	P(75)	max
Words	441	11,080.1	12,343	7	1417	9091	13824	62908
Clean	441	3.7	6.5	0	0	1	5	63
Affordable	441	1.3	2.5	0	0	0	2	21
Reliable	441	0.7	1.6	0	0	0	1	10
Sustainable	441	1.9	3.9	0	0	0	2	37
Modern	441	0.5	1.6	0	0	0	0	25
Sentence Clean	441	2.8	4.5	0	0	1	4	40
Sentence Afford	441	1.4	2.3	0	0	0	2	14
Sentence Reliable	441	0.5	1.4	0	0	0	0	9
Sentence Sustain	441	1.3	2.9	0	0	0	2	34
Sentence Modern	441	0.2	0.5	0	0	0	0	4

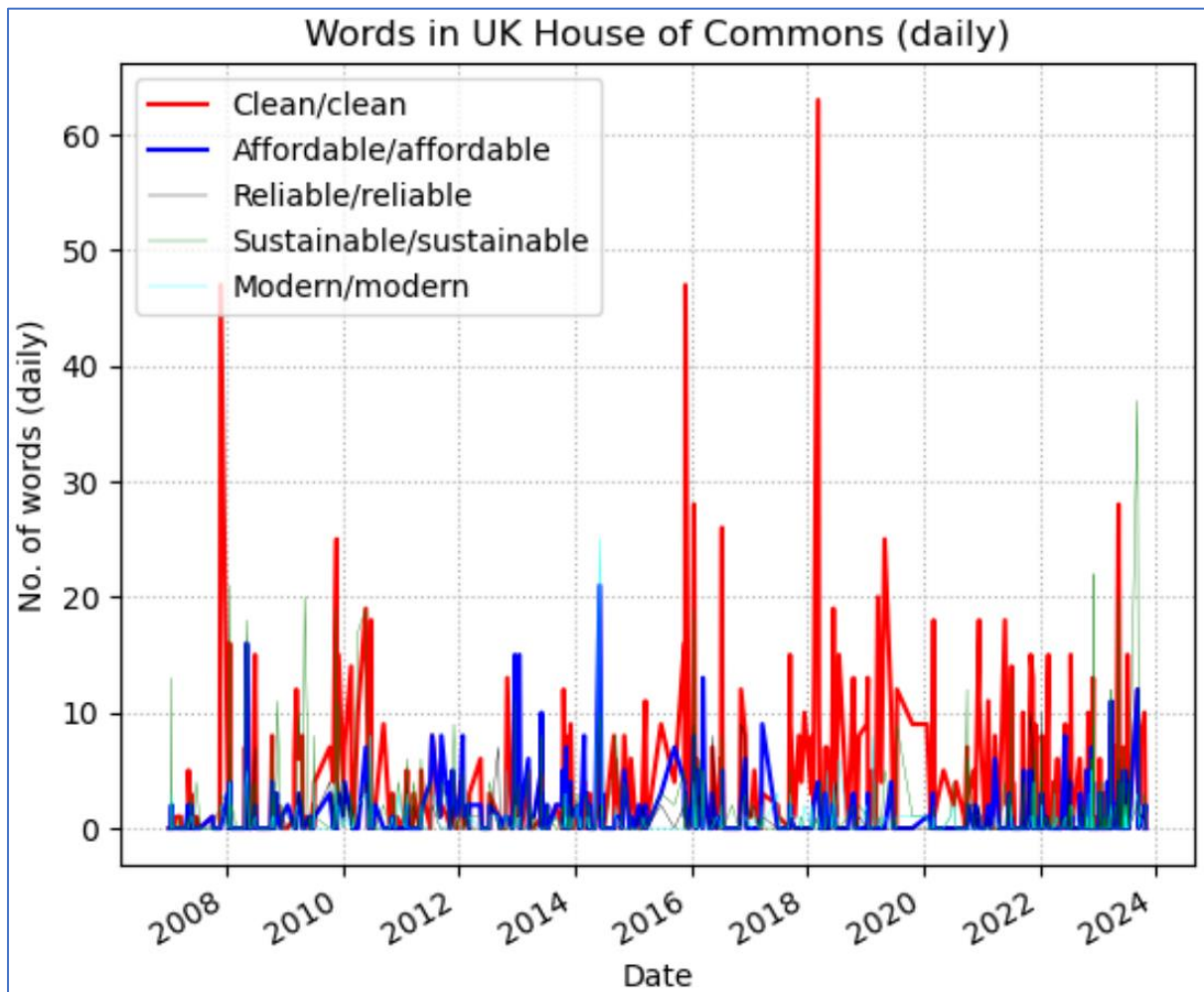


Figure 4: Number of times selected words were used in UK parliament for all debates having the word “energy” in the title (2007-2023 October).

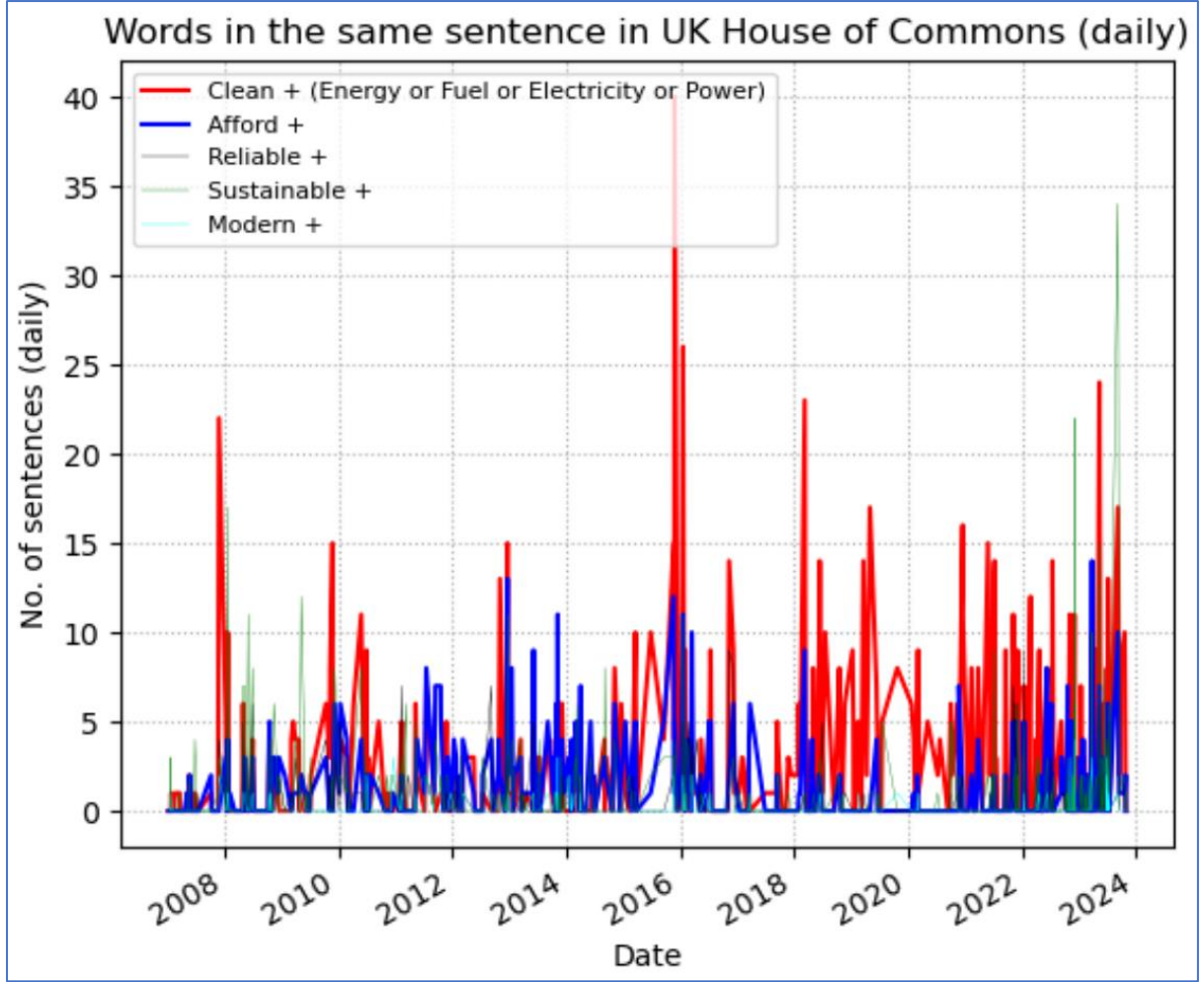


Figure 5: Number of times combination of words occurred in the same sentence in the UK parliament for all debates having the word “energy” in the title (2007-2023 October).

Table 2: Summary statistics of parliamentary debates in the Dail (Ireland) for debates having “energy” in the titles (1998 –2022). Words is the number of words in the debate/hearing. Words of interest are ‘Clean’, ‘Affordable’, ‘Reliable’, ‘Sustainable’ and ‘Modern’ which are the actual words counted in the debates. Prefix of ‘Sentence’ denotes occurrence of words of interest within 150 characters of energy (or electricity or fuel or power) in a given sentence.

	Days	Average	std	min	P(25)	P(50)	P(75)	max
Words	35	113,815.2	47,437	18751	83432	113210	143373	220580
Clean	35	2.6	2.7	0	1	2	4	13
Affordable	35	7.9	16.0	0	1	3	7	86
Reliable	35	1.3	1.4	0	0	1	2	5
Sustain	35	14.8	9.1	0	9	14	20	38
Modern	35	5.5	3.3	0	3	5	7	13
Sentence Clean	35	1.0	1.5	0	0	0	2	6
Sentence Afford	35	1.1	1.8	0	0	0	2	6
Sentence Reliable	35	0.3	0.6	0	0	0	0	2
Sentence Sustain	35	4.1	4.1	0	1	2	7	14
Sentence Modern	35	0.3	0.7	0	0	0	0	4

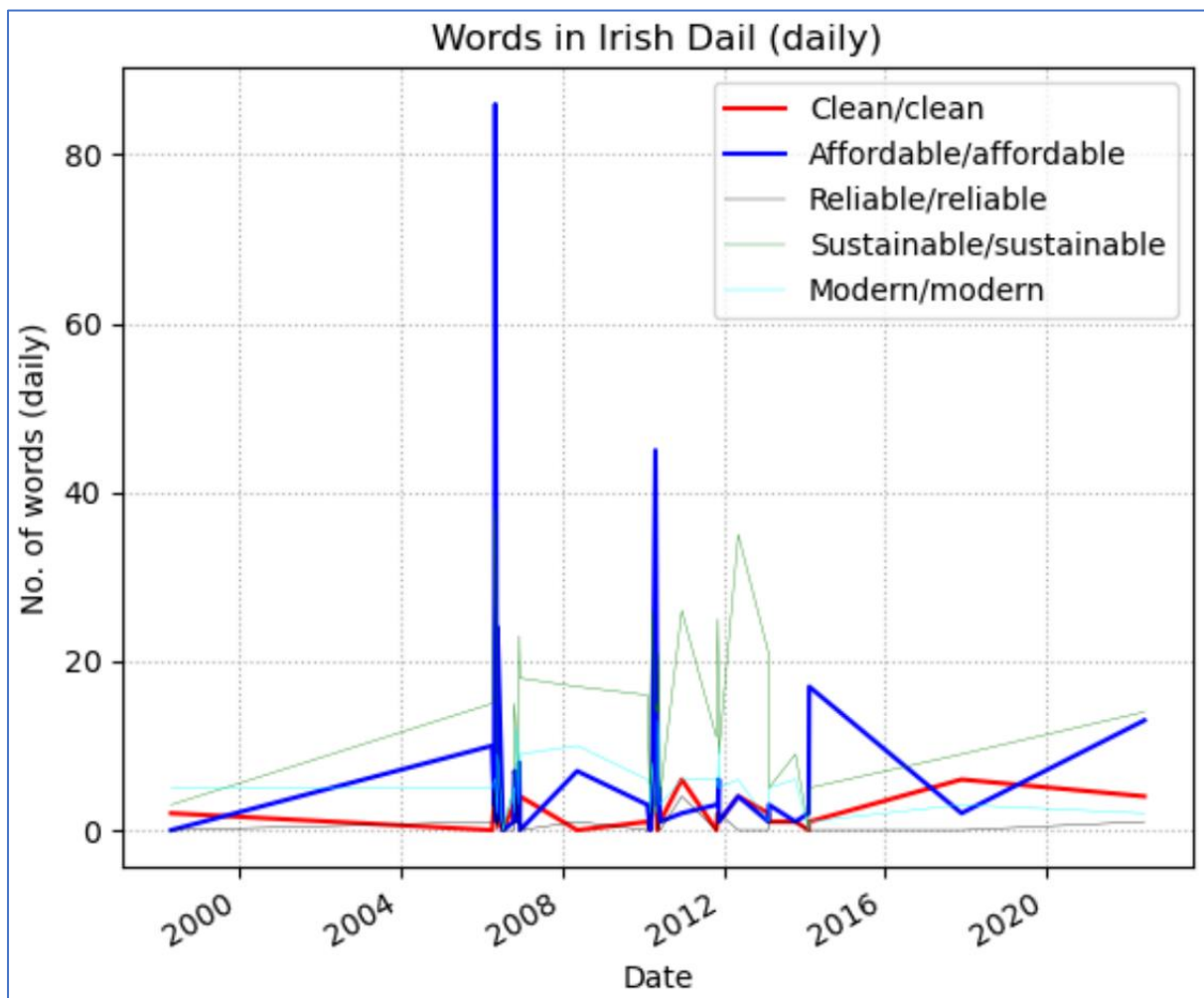


Figure 6: Number of times selected words were used in the Irish parliament for all debates having the word “energy” in the title.

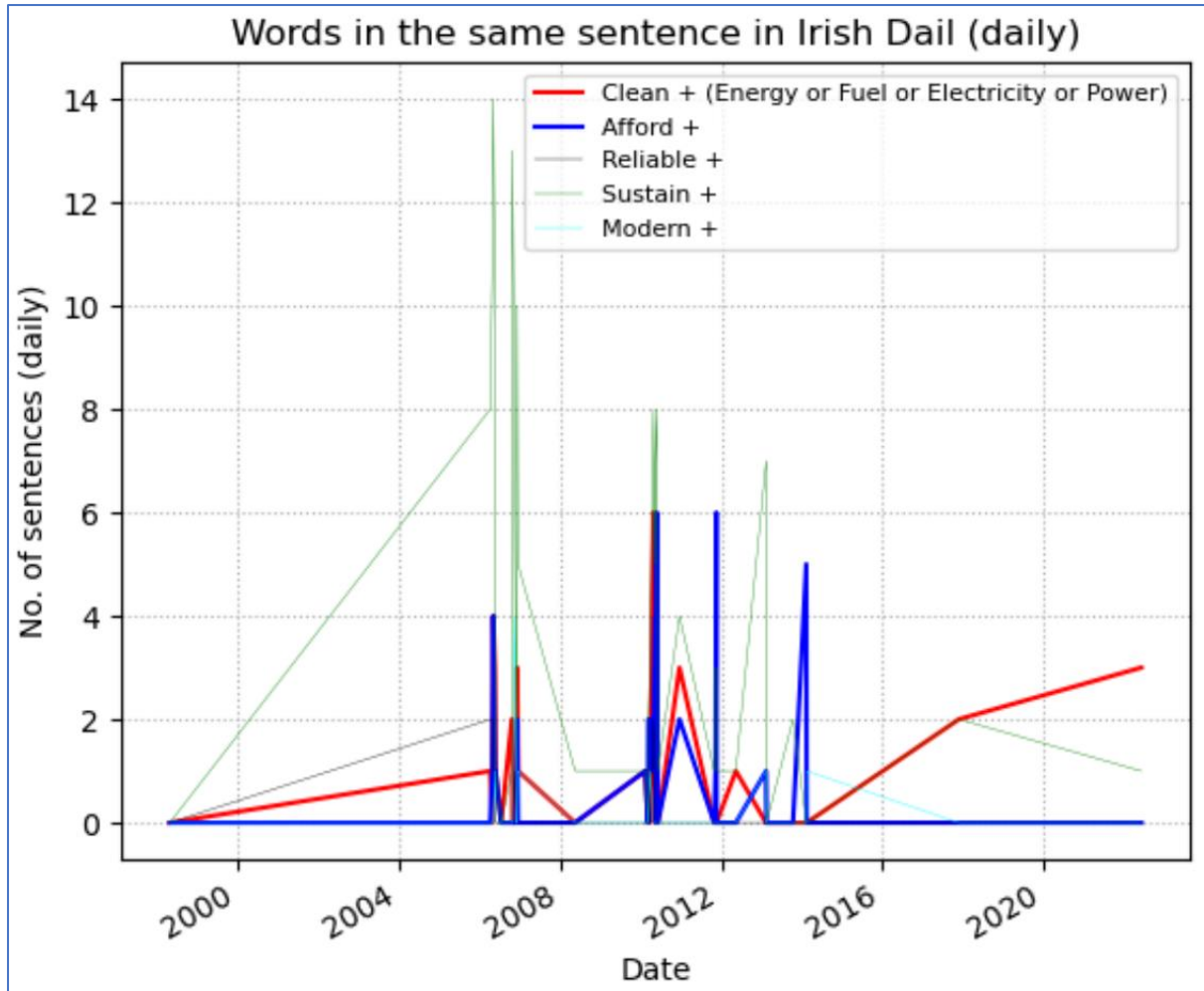


Figure 7: Number of times combination of words occurred in the same sentence in the Irish parliament for all debates having the word “energy” in title.

Table 3: Summary statistics of hearings for US Congress (2000 –2023 October). Words is the number of words in the debate/hearing. Words of interest are ‘Clean’, ‘Affordable’, ‘Reliable’, ‘Sustainable’ and ‘Modern’ which are the actual words counted in the debates. Prefix of ‘Sentence’ denotes occurrence of words of interest within 150 characters of energy (or electricity or fuel or power) in a given sentence.

	Days	Average	std	min	P(25)	P(50)	P(75)	max
Words	791	46,039.5	54,714	80	19720	31815	54280	699712
Clean	791	32.2	56.0	0	4	13	36	678
Afford	791	4.8	7.6	0	0	2	6	76
Reliable	791	7.6	12.9	0	1	4	9	136
Sustain	791	5.4	9.5	0	0	2	6	94
Modern	791	2.3	4.8	0	0	1	3	48
Sentence Clean	791	23.7	43.6	0	2	9	26	592
Sentence Afford	791	4.2	6.2	0	0	2	6	61
Sentence Reliable	791	8.8	16.2	0	1	3	10	152
Sentence Sustain	791	4.9	9.0	0	0	2	6	118
Sentence Modern	791	1.9	3.5	0	0	1	2	28

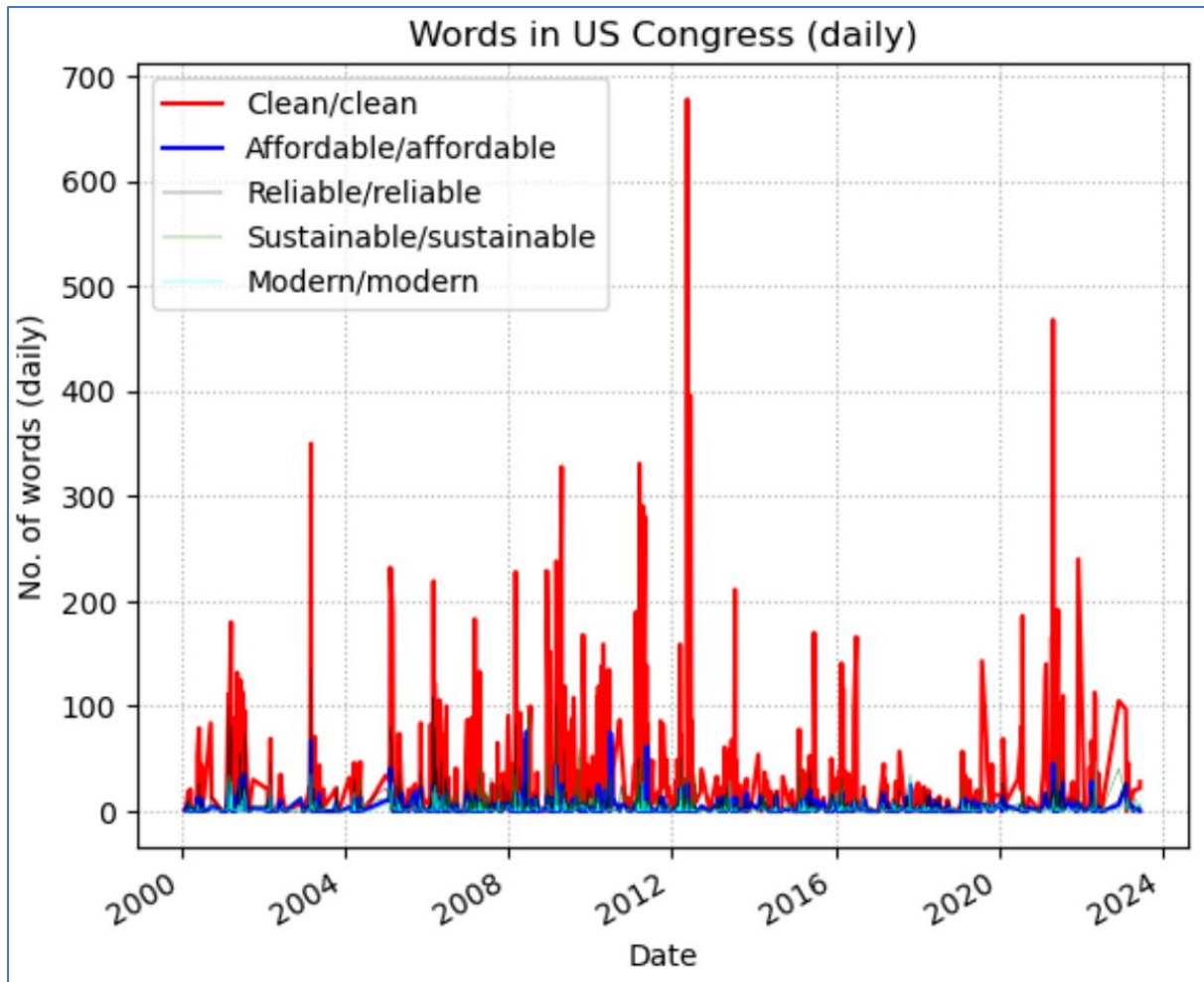


Figure 8: Number of times selected words were used in the US congress (daily) for all hearings having the word “energy” in title.

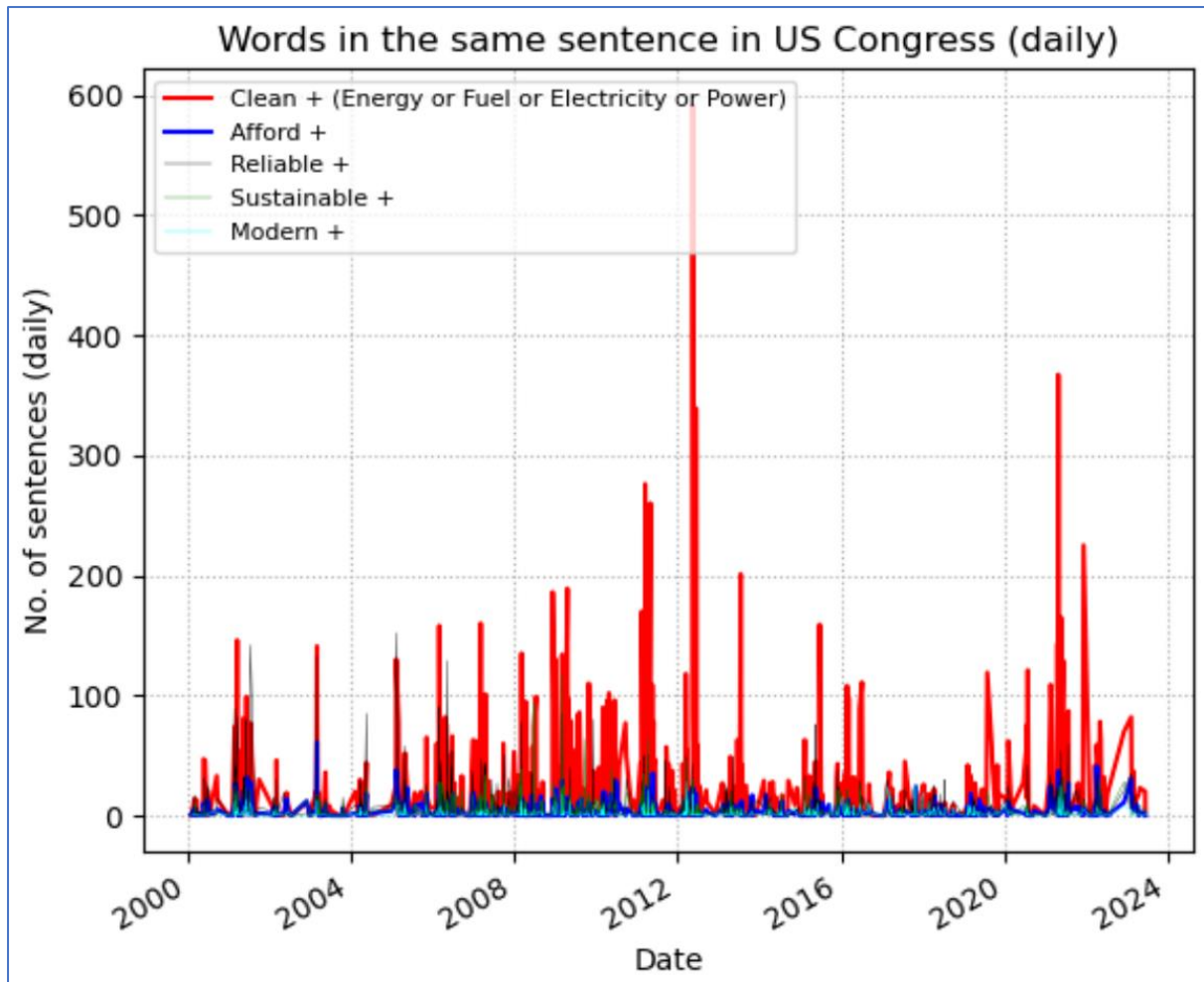
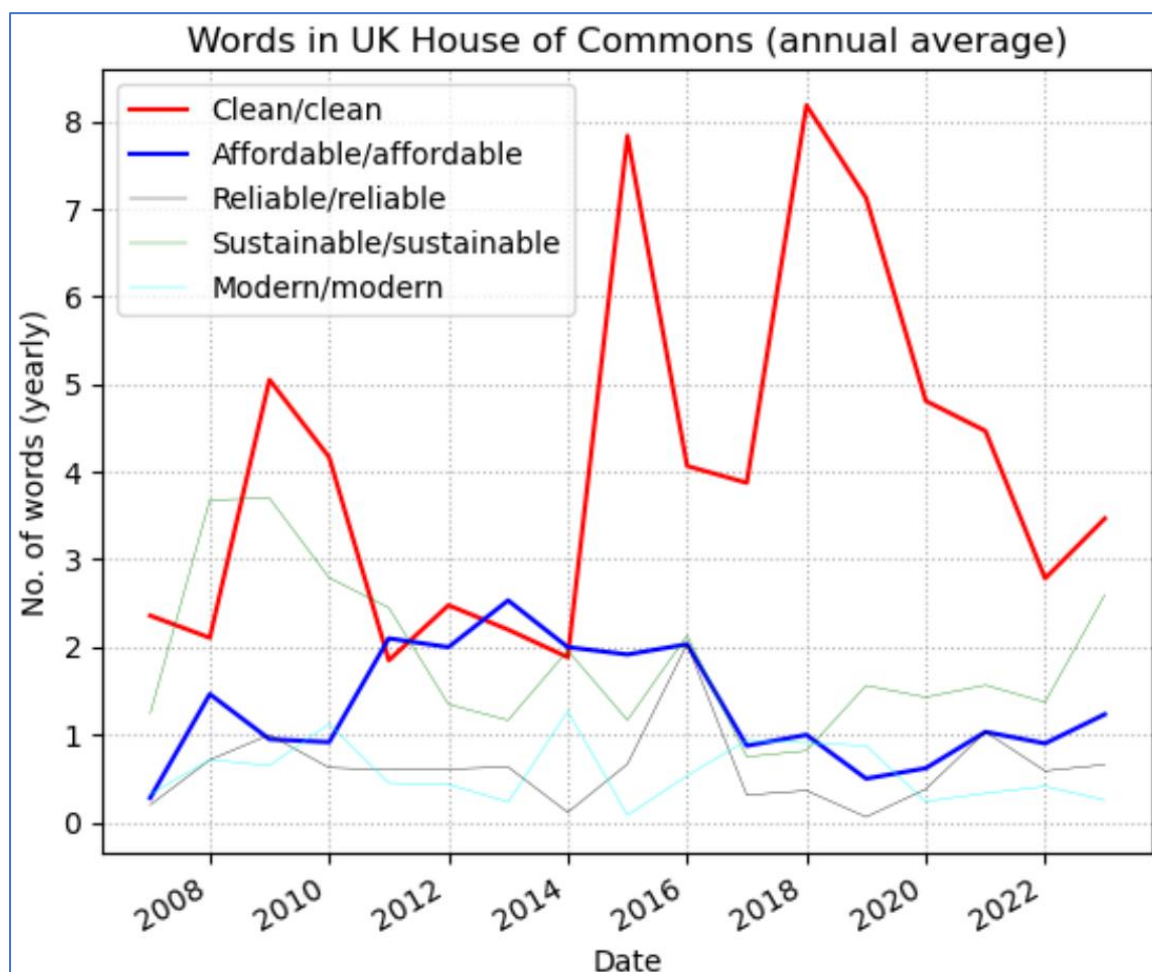


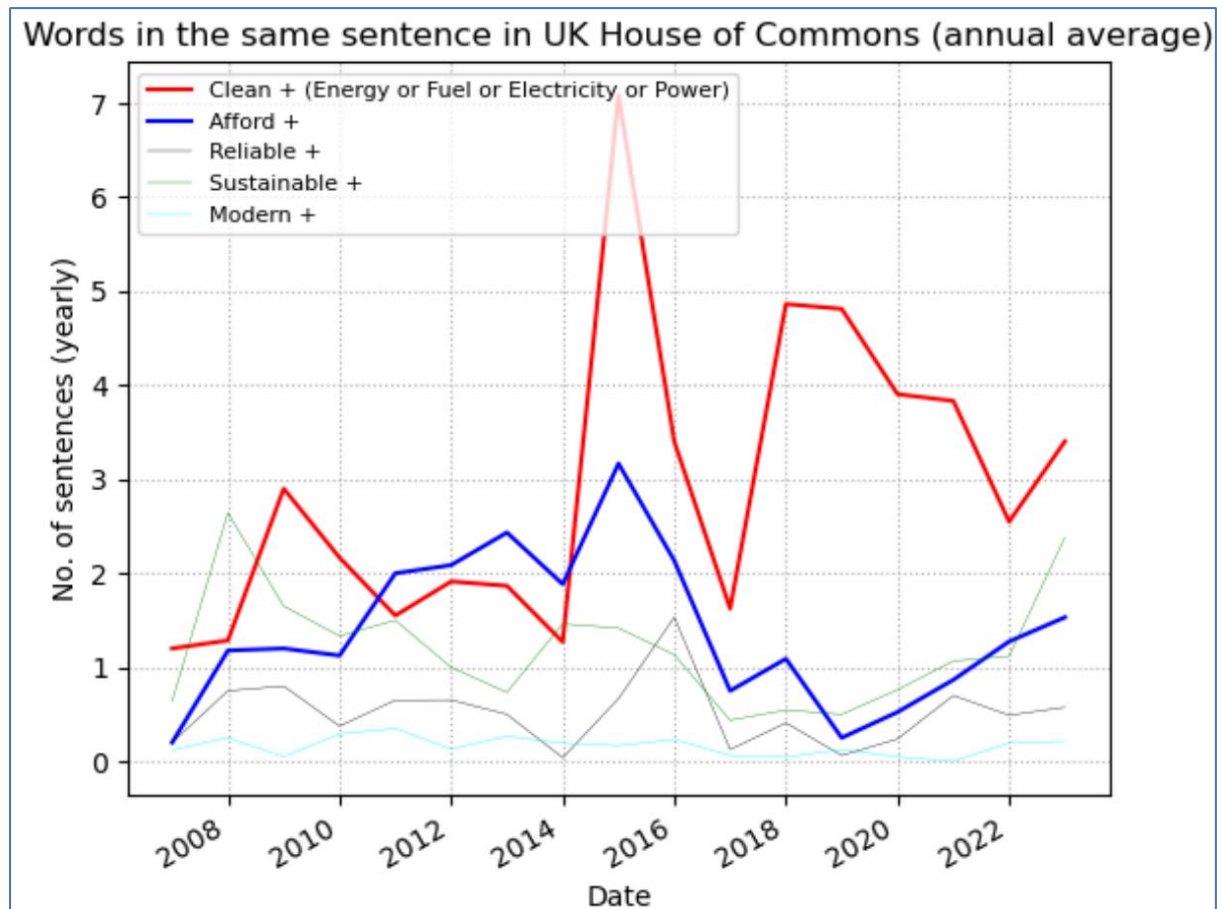
Figure 9: Number of times combination of words occurred in the same sentence in the US congress (daily) for all hearings having the word “energy” in the title.

Appendices

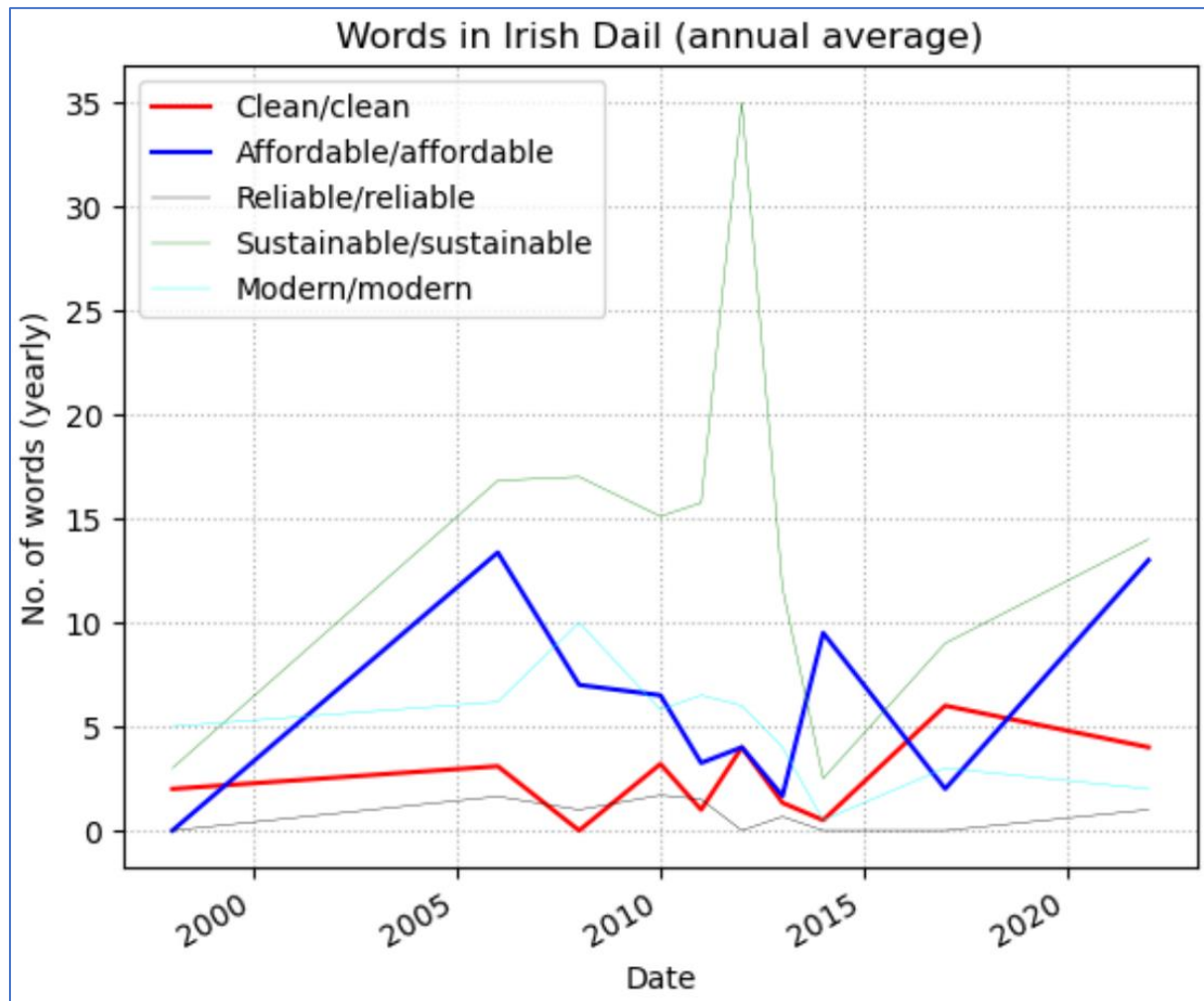
Appendix 1: Number of times selected words were used (annual average) in UK parliament for all debates having the word “energy” in the title (2007-2023 October).



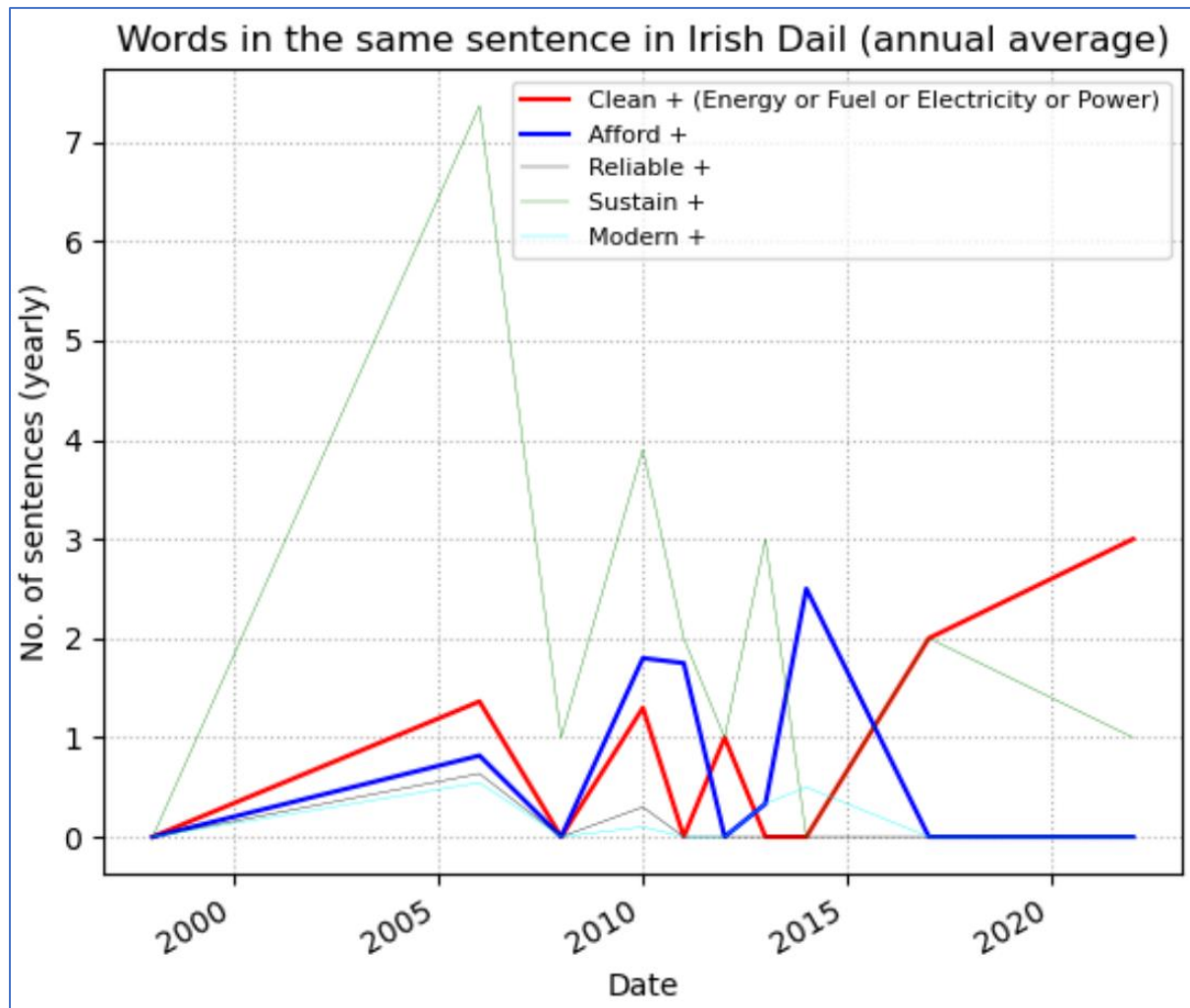
Appendix 2: Number of times combination of words occurred (annual average) in the same sentence in the UK parliament for all debates having the word “energy” in the title (2007-2023 October).



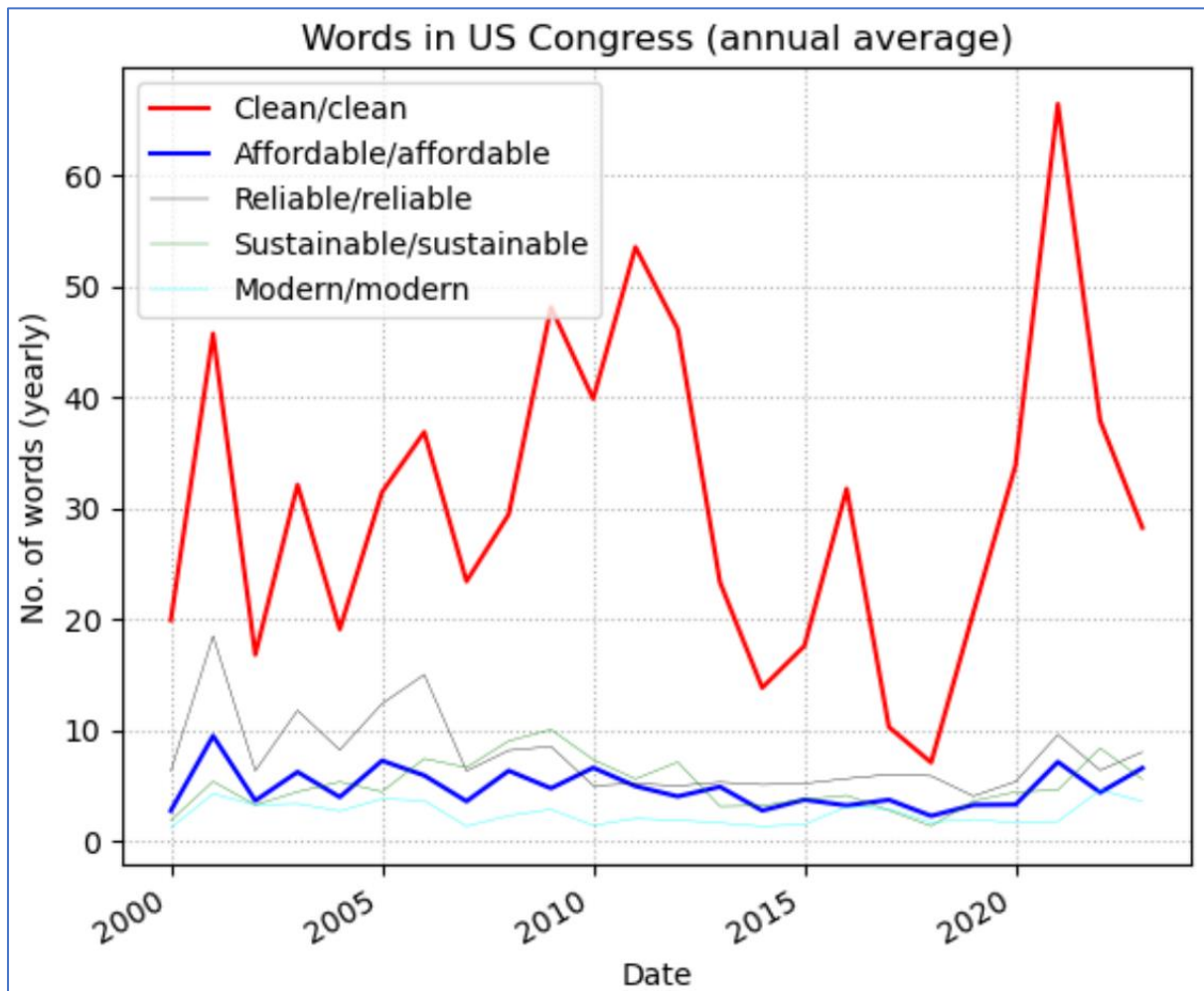
Appendix 3: Number of times selected words were used (annual average) in the Irish parliament for all debates having the word “energy” in the title (1998 – 2023 March).



Appendix 4: Number of times combination of words occurred (annual average) in the same sentence in the Irish parliament for all debates having the word “energy” in title (1998 – 2023 March).



Appendix 5: Number of times selected words were used in the US congress (yearly) for all hearings having the word “energy” in title (2000 to 2023 October).



Appendix 6: Number of times combination of words occurred in the same sentence in the US for all congressional hearings having the word “energy” in the title (2000-2023 October).

