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Department of the Environment,
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Energy Research

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Energy Discourses in Switzerland

Prerequisites for change

Authors:
Peter Stücheli-Herlach, ZHAW, peter.stuecheli@zhaw.ch
Maureen Ehrensberger-Dow, ZHAW, maureen.ehrensberger@zhaw.ch
Maren Runte, ZHAW, maren.runte@zhaw.ch

Project team:
Dominik Batz, Alice Delorme Benites, Selena Calleri, Philipp Dreesen, Matthias Fluor, Julia Krasselt, Thoralf Mildenberger, Lorenza Pescia De Lellis, Romina Schaub-Torsello and Natalie Schwarz, with input for this report from Michaela Albl-Mikasa, Noah Bubenhofer, Raffaele Desiante & Marcel Eggler

The authors of this report bear entire responsibility for its contents and conclusions.

Summary

The project "Energy discourses in Switzerland" investigates the communication field that has emerged since 2011 in the course of the Swiss federal government developing and implementing its "Energy strategy 2050". The basis for the research is the digital Swiss Applied Linguistics corpus (Swiss-AL-C) from which the theme-specific, multilingual Swiss Applied Linguistics Energy Discourses corpus (Swiss-AL-ED-C) has been drawn. With the latter corpus, the project has modelled the discourses of interest in the project in order to measure and interpret them. An initial in-depth study carried out with internal funding from the ZHAW on discursive actor networks supplements the second-year project results by describing a network of organisations that frequently refer to each other and have crystallised into the "stars" of energy discourses. The second in-depth study focusses on the multilingualism of energy discourses, and the third on the international dimension of Swiss energy discourses in that it explores the use of English as a lingua franca.

Zusammenfassung

Das Projekt „Energiediskurse in der Schweiz" erforscht das Kommunikationsfeld, das im Zuge der Entwicklung und Umsetzung der „Energiestrategie 2050" seit 2011 entstanden ist. Grundlage der Forschung ist das digitale Swiss Applied Linguistics Corpus (Swiss-AL-C), aus dem im Projekt ein themenspezifisches, mehrsprachiges Swiss Applied Linguistics Energy Discourses Corpus (Swiss-AL-ED-C) entwickelt worden ist. Mit diesem Korpus modelliert das Projekt die im Fokus stehenden Diskurse, um sie dann vermessen und interpretieren zu können. Eine *e*rste Vertiefungsstudie der ZHAW zu diskursiven Akteurnetzwerken beschreibt zudem ein Netzwerk von häufig aufeinander verweisenden Organisationen, die sich als gewichtige „Stars" der Energiediskurse erweisen. Die zweite Vertiefungsstudie ist auf die Mehrsprachigkeit der Schweizer Energiediskurse fokussiert, die Dritte widmet sich der internationalen Dimension von Schweizer Energiediskursen, indem sie den Einsatz von Englisch als *Lingua Franca* untersucht.

Résumé

Le projet de recherche « Les discours sur l'énergie en Suisse » explore le domaine de communication qui s'est établi à partir de 2011, émergeant du développement et de la mise en œuvre de la « Stratégie énergétique 2050 » par l'administration fédérale. Il s'appuie sur le corpus numérique Swiss-AL-C (*Swiss Applied Linguistics Corpus*), dont est extrait un corpus thématique multilingue : Swiss-AL-ED-C (*Swiss Applied Linguistics Energy Discourses Corpus*). C'est ce dernier qui a permis de modéliser les discours étudiés afin de les mesurer et de les interpréter. Une *première* étude d'approfondissement, financée par la ZHAW, se penche sur les réseaux d'acteurs du discours énergétique en Suisse, permettant ainsi la description concrète d'un réseau d'organisations se référant fréquemment les unes aux autres, si bien qu'elles occupent le devant de la scène en matière de discours énergétique. Une *seconde* étude d'approfondissement se concentre sur la dimension plurilingue des discours énergétiques en Suisse, et une *troisième* est consacrée au rôle de l'anglais comme Lingua Franca dans ces mêmes discours.

Summario

Il progetto di ricerca «Il discorso energetico in Svizzera» esplora l'area della comunicazione che è emersa a partire dal 2011 con lo sviluppo e l'attuazione, da parte del Consiglio federale, della «Strategia energetica 2050». La ricerca si basa sul corpus digitale Swiss-AL-C (Swiss Applied Linguistics Corpus), dal quale è stato creato il corpus tematico multilingue Swiss-AL-ED-C (Swiss Applied Linguistics Energy Discourses Corpus). Grazie a questo corpus tematico è stato possibile individuare dei modelli dei discorsi studiati, con lo scopo di misurarli e interpretarli. Un primo studio d'approfondimento, finanziato dalla ZHAW, è incentrato sulle cosiddette reti di attori nel discorso energetico e ha portato alla descrizione di una rete di organizzazioni che si rifanno frequentemente l'una all'altra. Di fatto, queste organizzazioni occupano un posto di primo piano nell'ambito del discorso energetico. Il secondo studio d'approfondimento si concentra sulla dimensione multilingue del discorso energetico in Svizzera, mentre il terzo si occupa della dimensione internazionale, vale a dire del ruolo dell'inglese, impiegato come Lingua Franca proprio in questo ambito.

Contents

List of abbreviations

DE	*Deutsch* (German)
FR	*Français* (French)
IT	*Italiano* (Italian)
PAB	Politikadressaten und politikbetroffene Akteure (industry-related)
PBV	Politikbeobachtende und -vermittelnde Akteure (media-related)
PEB	Politikentwickelnde und -beratende Akteure (academia-related)
PFU	Politikformulierende und -umsetzende Akteure (policymakers)
Swiss-AL	digital texts publicly available on Swiss internet domains that have been collated in a general corpus by the ZHAW School of Applied Linguistics
Swiss-AL-ED	digital texts publicly available on Swiss internet domains that are related to energy discourses and have been collated in a corpus by the ZHAW School of Applied Linguistics
Swiss-AL-ED-DE	sub-corpus of Swiss-AL-ED comprising all German language texts
Swiss-AL-ED-FR	sub-corpus of Swiss-AL-ED comprising all French language texts
Swiss-AL-ED-IT	sub-corpus of Swiss-AL-ED comprising all Italian language texts
ZHAW	*Zürcher Hochschule für Angewandte Wissenschaft* (English: Zurich University of Applied Sciences)

1   Introduction

In the project "Energy discourses in Switzerland", researchers in the ZHAW School of Applied Linguistics are investigating the communicative prerequisites for the anticipated changes in energy supply and consumption over the next few years. In multilingual Switzerland, discourse takes place in three different languages that enjoy equal official status as well as in English. Because of the importance of multilingualism to Swiss identity, the project work is carried out in the three official Swiss languages of German, French and Italian unless otherwise indicated below.

This report outlines results of the project work in the second year of the project, with its focus on quantitative measurements of energy discourses in Switzerland. Examples are provided to demonstrate how energy discourses can be modelled through the derivation of sub-corpora, how keywords and energy concepts can be measured, and how interpretations are possible through techniques developed within the framework of the project The focus of the third and final project year will be on interpretations and simulations of energy discourses in order to provide insights for various stakeholders.

2   Context

2.1 Background and motivation for the project

Issues surrounding the production, supply, and use of energy will continue to be of great concern to Switzerland over the next few years and decades to come. Adequately describing such societally important issues ('wicked problems') requires modelling discourses and accounting for the interactions within and between policy networks that include government, business, society, and academia as well as the journalistic, organizational, and social media that decisively frame the interactions through ongoing, location-independent interventions (cf. Rosenberger & Kleinberger 2017; Stücheli-Herlach 2013; Stücheli-Herlach et al. 2015). The project investigates the communication field that has emerged since the introduction and implementation of the Swiss government's "Energy Strategy 2050" (cf. Stücheli-Herlach et al. 2018a). The specific focus is on current discourses, with the timeframe of interest from just before the Fukushima Daiichi nuclear disaster up to the final year of the project (i.e. from 2010 to 2019). Patterns of language use can be understood as indices of a common sense and common ground that are worth exploring because they are fundamental to the functioning of political dialogue and acceptance of socio-technical innovations in democratic societies.

2.2 Project goals

The project focuses on the communicative prerequisites for energy-relevant transition processes and innovations in Switzerland. The principle interest lies on thematic structures and linguistic patterns in the democratic dialogue about energy. The objective of the project is to identify how patterns of language use surrounding energy issues develop across institutions, media, and societal sectors in the three official Swiss languages (German, French, Italian) as well as in the international lingua franca (English). The knowledge gained from the analyses and interpretations of the results will be actively communicated to and discussed with various actors involved in energy issues and topics in Switzerland as well as being disseminated to the national and international academic community.

3 Approach and methodology

3.1 Theoretical framework

The starting point for the theoretical framework for the project developed out of work done in the area of discourse linguistics and in particular the so-called DIMEAN model that distinguishes three levels or layers of analysis: texts, knowledge and actors (e.g. Warnke & Spitzmüller 2008). The project can be understood as a sequence of research modules embedded in a transdisciplinary context (see Figure 1) which *model* the relevant discourses relevant to energy issues in Switzerland by the creation of a meaningful corpus of texts. The next step is to *measure* the linguistic patterns in those discourses, then to *interpret* the results of those measurements and map extracts of the discourses from various perspectives in *simulations* to make them accessible to stakeholders (cf. Dreesen & Stücheli-Herlach 2019/submitted).
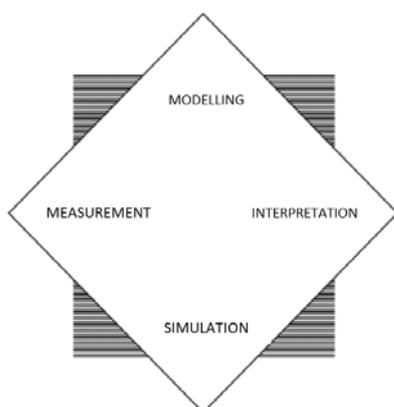

Figure 1. Research modules overlaid on a common platform allow researchers and actors from practice to interact (adapted from Dreesen & Stücheli-Herlach 2019/submitted)

3.2 Description of corpus

The project draws on a large digital corpus of publicly available texts from a broad spectrum of participants and analyzes it as a whole as well as carefully selected parts (i.e. subcorpora) with a view to identifying interlinked discourse processes related to energy issues. In the first year of the project, the focus was on substantially expanding the existing multilingual corpus of digital texts (i.e. Swiss-AL-C) with respect to both volume and breadth in order to adequately model publicly accessible Swiss discourses on energy. The sampling criteria were linguistic, geographic, thematic, and situative (e.g. related to political, societal, or natural events). The defining characteristics of the most recent release of the Swiss-AL-C (Jun2018) are:

- multilingual (German, French, Italian, English)
- Swiss-specificity (over 360 .ch domains as sources of the texts)
- size (~1.5 billion tokens across all four languages)
- linguistic and other annotations (e.g. parts of speech, actors, geo-collocations)

A procedure called 'topic modelling' (Blei 2012) was applied to the Swiss-AL-C to derive the more specific corpus to model energy discourses (i.e. Swiss-AL-ED-C). The topic modelling procedure generated two types of output per language: a list of topics (set at a maximum of 500) and a table with

the topic correspondence in percent per article. The next, qualitative step involved coding (cf. Mey & Mruck 2011; Strauss & Corbin 1997) by the native speaker team members of the respective languages to sort the topics into project-relevant themes. Three axes related to energy issues and discourses emerged during the axial coding: 1) actor-action; 2) production-consumption; and 3) benefit-problem. Texts were selected for inclusion in the Swiss-AL-ED-C on the basis of the proportion of the energy-specific topics they contained. A random sample test in the German sub-corpus revealed an accuracy rate of 97% for this method combining computer algorithms with qualitative coding. A language recognition algorithm makes it possible to create separate sub-corpora: the size of the Swiss-AL-ED-C for each language is provided in Table 1: Descriptive statistics of the three Swiss-AL-ED sub-corpora by language in terms of number of tokens and sampled .ch internet sources.

Language	Number of tokens	Number of sources
DE	17,969,979	189
FR	8,669,507	128
IT	2,473,807	60

Table 1: Descriptive statistics of the three Swiss-AL-ED sub-corpora by language

As with the Swiss-AL-C, all of the actor categories are represented in each of the language-specific sub-corpora (see Figure 2). In all three sub-corpora, the percentages of tokens from industry-related (PAB) texts is the highest, suggesting that energy discourses are driven primarily by actors in this category. In the German and French sub-corpora, this is followed by those from policy-makers (PFU) and media-related texts (PBV). In the Italian sub-corpus, the relative weighting of those two categories is reversed. The percentage of tokens from academia-related texts (PEB) is low in all three sub-corpora, possibly reflecting the relative importance to date of actors from this category in Swiss energy discourses.
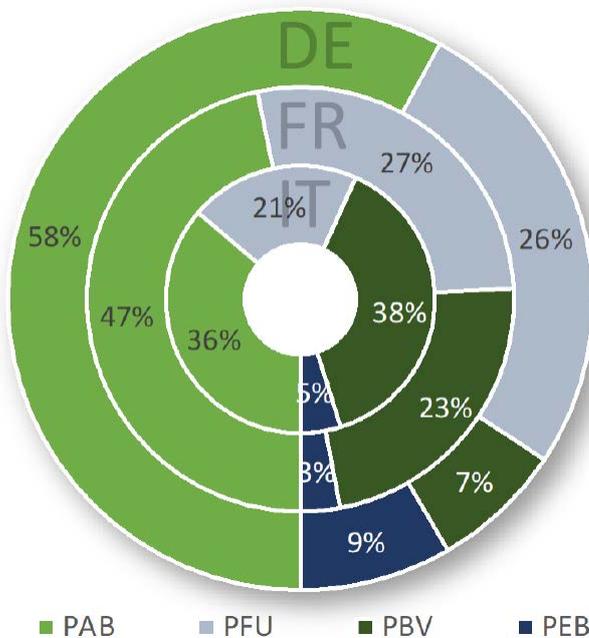

Figure 2: Structure of the Swiss-AL-ED-C according to actor categories and languages (in % of tokens)

3.3 Mixed-methods approach

The mixed-method approach developed in the project involves corpus-based and corpus-driven quantitative analyses of digital texts from the communicative fields of interest. In-depth qualitative analyses of patterns of the language use and texts in Swiss energy discourses thus identified contribute to mapping the interconnections among and to the various actors involved in the transition to sustainable energy systems and in the democratic dialogue.

4   Selected results

4.1 Keywords in the Swiss energy discourses

Words become keywords in energy discourses when they occur more frequently and therefore are more typical of these discourses than other types of discourses and other topics. In this project, the keywords for the three language sub-corpora were calculated as follows: the expected frequency of tokens in the Swiss-AL-ED-C were calculated on the basis of the much larger Swiss-AL-C in the respective languages and compared to the observed frequency. The likelihood ratio test was used to determine whether the distribution of the tokens was significantly difference from normal random variations. It is important to note that the 'keyness' of the words in the word clouds in Figure 3 is based purely on quantitative statistical measurements. Typical of Swiss energy discourses are technical terms related to energy issues (e.g. energy efficiency, consumption, reactor) but words associated with institutional and ideological vocabularies are also represented (e.g. energy city, energy transition, renewable) as well as important energy companies in Switzerland.
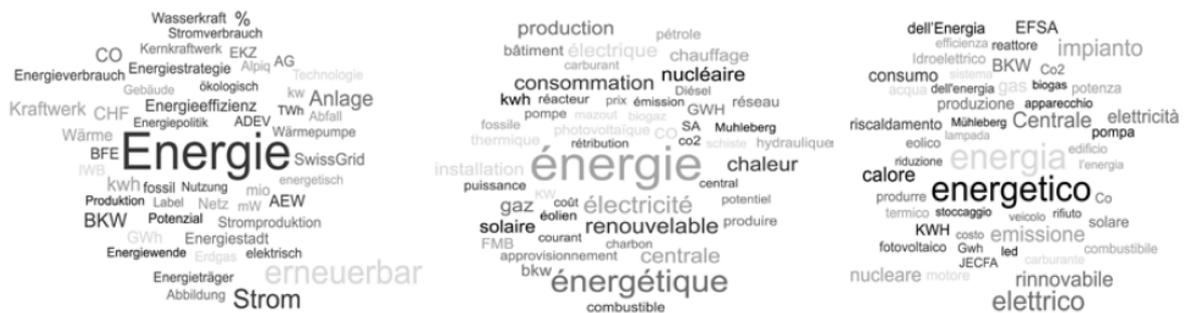

Figure 3. Keywords in Swiss-AL-ED-C in German, French and Italian: the size of the words in the 'clouds' reflects their keyness values

4.2 Relative dominance of renewables and non-renewables in discourses

An area of particular interest in understanding Swiss energy discourses is the way in which central concepts concerning the exploration, production, distribution, and consumption of sources of energy are usually expressed. In order to investigate this in a corpus of texts, a clear delineation has to be made between primary sources of energy (e.g. water, wind, sun, nuclear, coal) and secondary sources, which result from some type of technical conversion of primary sources (e.g. electricity, fuel). The aggregation of all technical terms for primary sources of energy into the generic categories of 'renewables' or 'non-renewables', respectively, shows that the former are generally referred to less

frequently than the latter except in the immediate aftermath of the Fukushima Daiichi nuclear disaster that occurred in 2011 and in current discourses (see Figure 4).
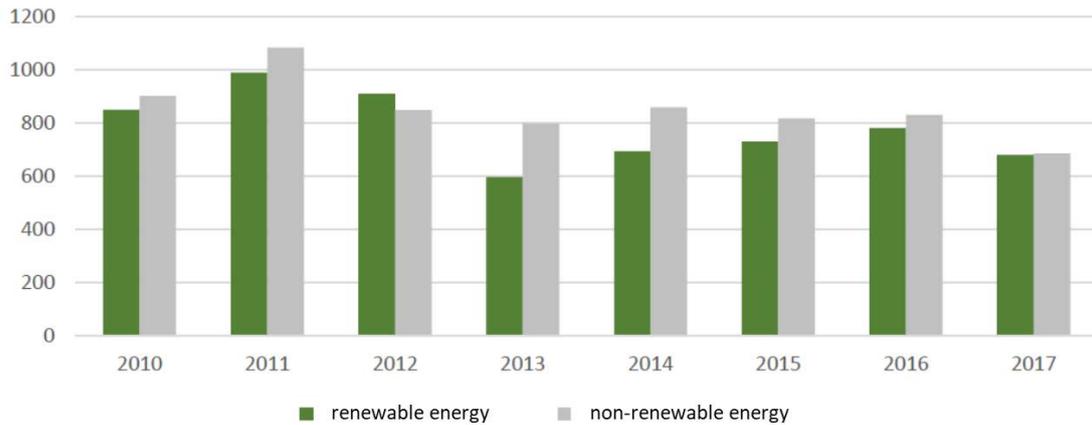

Figure 4. Relative frequency of German terms related to renewable and non-renewable primary sources of energy in the Swiss-AL-ED-DE

By contrast, terms related to non-renewables have dominated the French-language discourse, relative to those related to renewables, since before the Fukushima disaster (see Figure 5). This raises interesting questions that will be explored in interpretative-qualitative modules of the project, such as whether this discrepancy compared with the German discourse is attributable to closer interconnections between the French-speaking part of Switzerland and France (where nuclear energy is more prominent) or whether particular stakeholders are decisively driving the discourse.
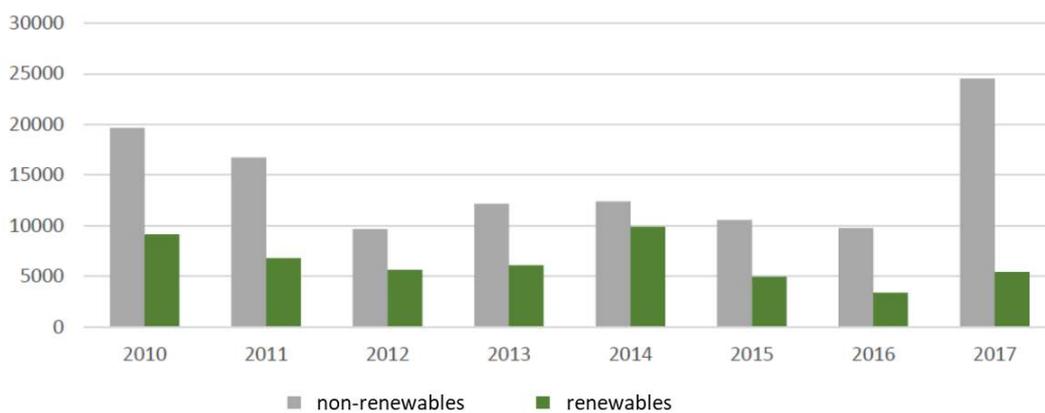

Figure 5. Relative frequency of French terms related to renewable and non-renewable primary sources of energy in the Swiss-AL-ED-FR

The general predominance of terms related to non-renewables is also apparent in the Italian-language sub-corpus (see Figure 6). Despite a noticeable jump in mentions of renewables in 2012, immediately after the Fukushima disaster, the focus of the discourse was on non-renewables until the year of the referendum on Energy Strategy 2050 (i.e. 2017), in which mentions of both types of energy are practically balanced. This may reflect a shift towards the patterns in the German discourse, perhaps by virtue of the importance of German-speaking Switzerland to the Italian-speaking regions and/or the influence of translations into Italian of German texts concerned with energy issues.
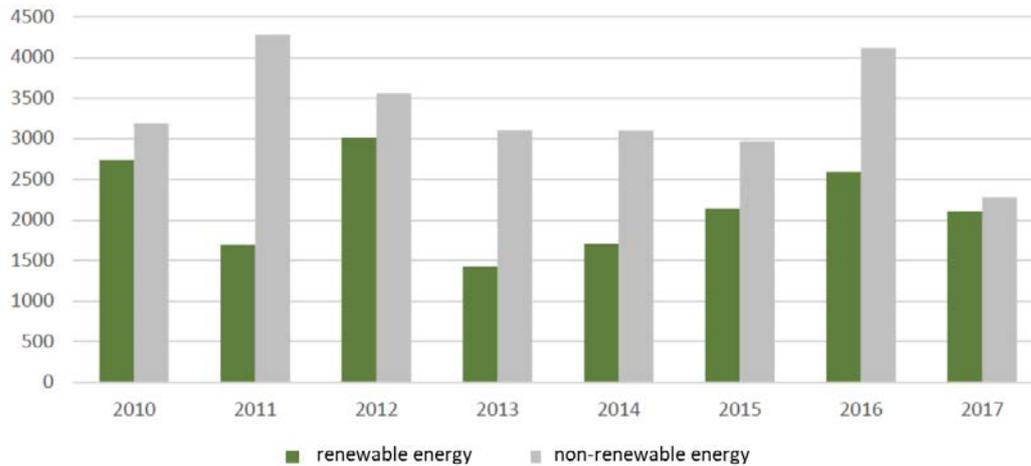
Figure 6. Relative frequency of Italian terms related to renewable and non-renewable primary sources of energy in the Swiss-AL-ED-IT

4.3 Relative dominance of key concepts by actor category

Using corpus linguistic techniques, it is possible not only to measure not only the development of discourses over time (see Figures 4-6) but also to investigate which stakeholders or actor categories seem to be concerned with various aspects of the discourses. An issue that has emerged at various conjunctures related to international events and political constellations in the past few years and is becoming increasingly important in discussions about energy in Switzerland is security of the supply of energy. Analyses of the language sub-corpora reveal that this concept is being mentioned by actors of various categories (i.e. industry-related, media, academia, and policy-makers) but the proportions of mentions by category differs greatly (see Figure 7). The concept seems to be of much more concern in German and Italian texts produced by industry-related actors, relative to the texts produced by the other actors, whereas in the French sub-corpus the issue is more prominent in the media texts. This raises interesting questions about the role of the media in energy discourses conducted in the respective Swiss national languages that can be addressed in qualitative analyses.
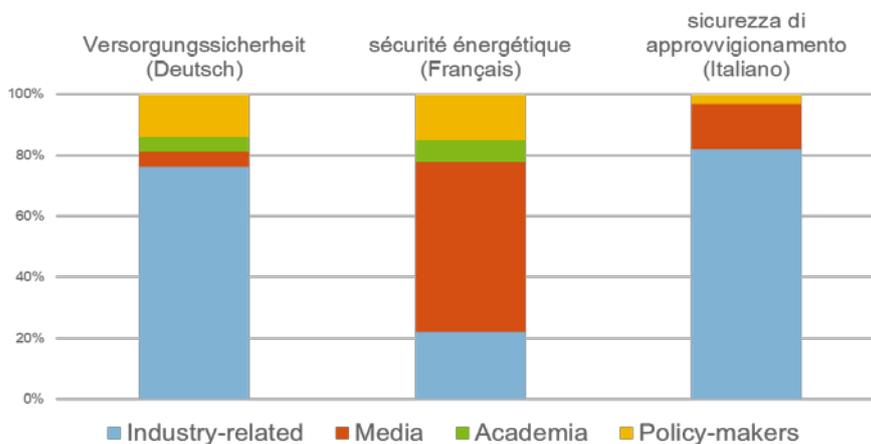

Figure 7: Proportion of occurrences of the concept 'security of supply' by language in Swiss-AL-C (Mar18-release)

5 Discussion of in-depth studies

In addition to the work funded by the SFOE grant, in-depth studies continued to be supported in the second project year by the ZHAW School of Applied Linguistics, which allowed researchers to explore various aspects of energy discourses using complementary methodological approaches and theoretical frameworks. The results of these studies will be disseminated in the respective academic communities at conferences and in journals, but brief summaries are provided below to highlight the main contributions.

5.1 In-depth study: Actor networks

The simulation of relationships between and networks of actors in Swiss energy discourses is the focus of the first, ongoing in-depth study. Of particular interest was to gain an understanding of the reception of texts (i.e. which texts by which actors are being referred to by which actors?) as well as their distribution in discourses (i.e. in which media and sources are which actors mentioned?). The assumption is that the status of an actor in discourse depends on the quality and degree of intertextuality and can be understood as a position in the discourse network. The nodes in the network stand for the sources included in the respective corpus whereas the strength and reciprocity of the relationship are reflected in the quality of the connecting lines. The networks can reveal the so-called stars of energy discourses, depending on the intensity of their connections with other members (see Stücheli-Herlach et al. 2018b for more details and preliminary analyses).

5.2 In-depth study: Mono- and multilingualism of energy discourses

In the first year of the project, we reported on preliminary explorations of the German, French, and Italian sub-corpora of the Swiss-AL-C to determine whether there were discernible differences between patterns of language use in texts from multilingual sources (which may inform supra-regional discourses) and those from monolingual sources (which may reflect the local discourses in the respective languages). This assumption was supported by the patterns identified qualitatively in the explanatory pamphlets issued by the federal government in advance of the popular vote on the Energy Act in 2017 and by the triangulation with the quantitative results from the Swiss-AL corpus. In the current reporting year, additional in-depth analyses revealed that there are similarities and differences between the language sub-corpora of the Swiss-AL-C with respect to references to regions, countries, and other political-cultural circumstances. In particular, an examination of the references to the countries with the longest borders with Switzerland (i.e. Germany, France, and Italy) showed that proximity with the language region is not the best predictor of discourse dominance (see Stücheli-Herlach et al. 2018b for more details).

5.3 In-depth study: Lingua franca of energy discourses?

The third ZHAW-financed in-depth study focused on the use of English by the actors represented in the Swiss-AL corpus and in particular whether there was evidence of features characteristic of the English used as a lingua franca (ELF). A qualitative and quantitative analysis of the languages of the texts published online by the sources in the corpus confirm English plays a prominent role in Swiss energy discourses (i.e. more so than Romansh, the fourth official language of the country). After exhaustive work defining ELF parameters suitable for corpus analysis, it was found that searches for features typical of ELF texts yielded few very results. This is most likely because the actors active in Swiss energy discourses who place value on reaching an international audience invest in having their texts written/edited by native speakers and/or translated by professionals to ensure that they are of standard English quality.

6   Evaluation 2018 and outlook for 2019

The focus of the first reporting year was the expansion and extension of the project corpus, and that of the current reporting year was on quantitative and qualitative measurements. The plan discussed and adjusted regularly in consultation with SFOE has been observed and good progress made. The value-added of meta-data, linguistic, and non-linguistic annotation, including more reliable language identification prior to tagging for multilingual sources, has allowed for the sophisticated queries that are crucial to addressing discourse linguistic questions. Methodological developments and detailed results are documented in publications, including the research reports from the first and second reporting year that have been delivered to the SFOE. Because of the exposure that the project received from the participation of project members in several international and national academic and transdisciplinary events and workshops in the reporting year (see Section 7 and Appendix 9.1), the dedicated transfer workshop originally foreseen for 2018 has been postponed until the final year of the project.

In the second project year (2018), the results of corpus and discourse analyses have been triangulated as significant topics are identified in the language-specific sub-corpora (i.e. German, French, Italian) and indications of discourse controversies and coalitions are ascertained. In the third reporting year (2019), project work will intensify in the areas of interpretation, visualization and mapping of interconnections in order to make the findings more accessible to the various actors involved in energy discourses in Switzerland. Academic dissemination will continue as the project progresses (see Appendix 9.2 for planned presentations early in 2019).

7   Academic dissemination of project results

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9 Appendix

9.1 Appendix 1: Transfer activities in 2018

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https://www.zhaw.ch/de/ueber-uns/aktuell/news/detailansicht-news/news-single/die-sprachen-der-energiewende/

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Energiediskurs in der Schweiz, Powertage 2018 Communication Forum. Meeting of communication officers of Swiss organizations involved with energy issues. Zurich, 6 Jun 2018
https://www.powertage.ch/de-CH/besuchen/veranstaltungskalender.aspx/session/95FC200F9A384A798387A54600E1AD1B

Workshop with communication officers, *Powertage 2018* Communication Forum. Zurich, 6 Jun 2018

Energy discourses in Switzerland – Hints of change, Swiss-US Energy Innovation Days, Sion, 19-22 Aug 2018

Auf dem Weg zum *Common Sense* in der Energiepolitik, Swiss Federal Office of Energy, Bern, 8 Nov 2018.

9.2 Appendix 2: Conference contributions planned for 2019

«Wer Energie spart, schont die Umwelt und senkt die Kosten». – Analyse von vager Lexik mit quantitativen Methoden im multilingualen Energiediskurs der Schweiz. Tagung «Digitalität – Medialität – Diskursivität». Darmstadt (Deutschland), Feb 2019, abstract submitted by Selena Calleri & Maren Runte.

Vergleichende Diskurslinguistik mit Wordembeddings: Analyse semantischer Felder im multilingualen Energiediskurs der Schweiz. Tagung «Methoden kontrastiver Medienlinguistik», Stockholm (Schweden), March 2019, presentation by Selena Calleri & Philipp Dreesen.

9.3 Appendix 3: Updated project plan

Reporting year	2016				2017				2018				2019			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Corpus development																
Operationalization																
Corpus analysis																
Discourse analysis																
In-depth studies																
BFE reporting																
Transfer																

Table 2. Updated project plan adjusted in consultation with the project steering committee.