

Science-Policy Interactions in a Neo-corporatist System:

Knowledge Brokerage in Austrian Climate Policy

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Abstract

Climate change policy is a prime example for the growing importance of expert advice to inform decision-making. Consequently, a plethora of advisory bodies and processes have emerged around the world. However, there are marked differences in the way the interactions between science and politics are organized and practiced depending on a country's political system and culture. The degree of political competition, the role of state vis-à-vis non-state actors and the dominant modes of interest mediation provide specific conditions for the ways expertise is consulted and used in decision-making.

Against this background, the paper presents the landscape of scientific advice in Austrian climate policy and asks in how far the traditionally strong culture of corporatism in Austrian politics manifests itself in practices of climate policy advice. Conceptually, the paper draws on analytical dimensions derived from the concepts of “national styles of policy-making” and “civic epistemology”. Methodically it bases on an interview series and a workshop with representatives from science, politics, and intermediary organizations. Our analysis provides a differentiated picture: the neo-corporatist culture still leaves its imprint in Austrian climate policy advice. But at the same time, the emergence of a new policy field, such as climate policy, undoubtedly opens up possibilities for new actors and forms of policy advice.

Keywords: scientific policy advice; climate policy; political culture, corporatism, Austria

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A. Introduction

The increasing complexity of political and societal challenges has raised the relevance and amount of scientific expert advice for policy-makers. Climate policy is a prime example for the growing importance of scientific expert advice to inform decision-making. Consequently, a plethora of advisory bodies and processes as well as targeted public research funds have emerged on the national, regional, and international levels (Jasanoff and Wynne 1998, 2; Arquit Niederberger 2005; OcCC 2012; Viciska 2012, 43). Diverse scholarly analyses have detected marked national differences between modes of science-policy interaction in environmental policy. Those varieties are attributed to the nationally specific context in which they are established and perform (Lentsch and Weingart 2011). The science-policy interfaces differ with respect to the actors engaged in the interaction, the organizational modes and institutions of scientific policy advice, the utilization of scientific expertise, the role of the public within the interaction, or the perception of what is credible, legitimate, and acceptable scientific expertise.

The paper contributes to this strand of scholarly work. It asks how and to what extent the Austrian political culture manifests in science-policy interactions in the case of climate policy. Austria seems to be a particularly interesting case due to its neo-corporatist tradition which has strongly shaped decision-making processes for decades. However, at least since the early 2000s a range of authors states a 'gradual decline' in neo-corporatist structures and influence. Our research draws on conceptual approaches from the fields of policy science and science and technology studies, concretely on the concepts of "national styles of decision-making" (Renn 1995) and "civic epistemology" (Miller 2004; Jasanoff 2005; Miller 2005), in order to investigate the landscape of Austrian climate policy advice. On the basis of an interview series and a workshop with decision-makers from administration and politics, climate scientists, and representatives of various interest groups, we ask whether even in the emerging field of climate policy neo-corporatist actor networks, traditions, and institutions have a significant influence on the science-policy interface. Furthermore, we analyze how sectoral specific characteristics of climate policy shape the integration of scientific expertise in Austrian policy-making as well.

B. Politico-cultural imprints on science-policy interaction

Science has become a global endeavor, which is reflected in the increasing number and importance of international conferences and peer journals, the emergence of global epistemic communities (Haas 1992) and the recognition of universal standards for scientific procedures. However, when it comes to the organization of the science-policy interface a range of scholars forward the idea that there exist marked differences between countries or political cultures. Renn (1995, 151), for example, states that "[n]ational culture, political traditions and social norms influence the mechanisms and institutions for integrating expertise in the policy arenas". He identifies five types of "national styles of policy-making" and the respective integration of scientific expertise in decision-making processes: an adversarial, a fiduciary, a consensus-oriented, a neo-corporatist and a mediative style (Renn 1995). The adversarial style is characterized by a strong emphasis on pure, formally proven scientific evidence which has to be clearly demarcated from political judgments. In the fiduciary style scientists'

pivotal role is to provide enlightenment and background information in closed circles of 'patrons'. In the consensual style policy-making processes rely to a considerable extent on expert judgment, which becomes part of negotiations behind closed doors. In the neo-corporatist style invited scientific experts are typically asked to offer professional judgment, but they are often not requested to present formal evidence (Renn 1995, 151-153). The mediative style is a synthesis of the four other styles and typically "opens the debate to public input, but requires stringent rules for presenting and providing claims for evidence" (Renn 1995, 153).

While Renn's analysis and typology is anchored in a rational actor paradigm, Jasanoff argues from a social constructionist perspective that "culture – more particularly political culture – matters in shaping the politics of science and technology" (Jasanoff 2005, 21). Jasanoff (2005) introduces the concept of "civic epistemologies" to focus on the role of the public in the construction, (re-)production, validation, deployment and contestation of (scientific) knowledge claims (Miller 2008). Jasanoff defines "civic epistemology," which she sees as an integral part of political culture, as "the institutionalized practices by which members of a given society test knowledge claims used as a basis for making collective choices" (Jasanoff 2005, 258). Based on a study on biotechnology governance in the US, the UK, and Germany she identifies three distinct forms of civic epistemology: a contentious, a communitarian and a consensus-seeking civic epistemology (Jasanoff 2005, 21). The contentious civic epistemology is characterized by pluralism and interest-based reasoning. The communitarian civic epistemology relies on embodied, service-based styles of public knowledge-making. The consensus-seeking model of civic epistemology refers to neo-corporatist, institution-based modes of reasoning (Jasanoff 1986, 259-269).

The concepts of national policy styles and civic epistemology differ in various respects, for example as regards their epistemological backgrounds, their varying degrees of emphasis on formal institutions versus less explicit cultural practices, and the role they ascribe to the public as relevant agent. Both concepts, however, similarly point out how and to what extent political culture affects the relationship between science and decision-making in policy (Campbell Keller 2009, 4-5; Lentsch and Weingart 2011, 10). A large body of scientific research, for instance, on the fields of risk management (Brickman and Jasanoff 1980; Brickman, Jasanoff et al. 1985; Jasanoff 1986; Renn 1995), biotechnology (Jasanoff 2005), nuclear power (Hellström 2000), regulation of environmental hazards (Halffman 2005), environmental policy (Campbell Keller 2009) or health (Bauer 2008; Wieser 2010; Wieser 2011), reveals that nationally specific political culture shapes patterns of science-policy interaction to a considerable extent.

Yet, another strand of literature criticizes these nationally bound concepts for not appropriately considering "intra-national variations" (Campbell Keller 2009, 5). Instead of assuming national uniformity a range of authors emphasizes sector-specific variations and the policies' development over time (Halffman 2005; Bijker, Bal et al. 2009; Campbell Keller 2009). Sectoral-national and international regulatory regimes may have considerable influence on the science-policy interactions (Halffman 2005; Bijker, Bal et al. 2009; Campbell Keller 2009; Lentsch and Weingart 2011, 10). With respect to the temporal dimension of policy development, Halffman (2005, 463-465) suggests paying attention to policy windows as well as to institutional isomorphism.

For the present paper, we selectively draw on all three theoretical strands presented above, i.e. national policy styles, civic epistemologies and sectoral patterns of science-policy interactions. For our analysis of Austrian climate policy, we have deduced the following five dimensions: (1) actors and organizational modes, (2) selection criteria and rules for scientific expertise, (3) the relational relevance of scientific expertise, (4) interaction patterns, and (5) the functions of expertise in decision-making. For each of those five dimensions, scholars have already reported on a number of pertinent patterns, which shall be summarized below.

First, studies suggest that science-policy interfaces differ with respect to the *actors* engaged in and the *organizational modes* of policy advice. University and non-university research institutions may be found quite homogeneously as important providers of knowledge but the role and relevance of other actors, for example think tanks, differs considerably from one country to another (Stone, Denham et al. 1998; Stone 2000; Abelson 2002; Braml 2006; Jochem and Vatter 2006; Karlhofer 2006). In addition, as Brickman et al. (1985) point out, policy-makers in different countries to varying degrees draw either more on internal or on external sources of expertise. Moreover, scientific policy advice may be requested by various actors: the government and administrative decision-makers, the parliament, interest groups, etc. But also the organization of science-policy interactions may take a variety of forms, including scientific or rather mixed advisory bodies, permanent or more ad-hoc committees, departmental research, contract research, expert reports and informal contacts (Pregernig 2007). With respect to cross-cultural variations, Renn (1995), for example, argues that pure scientific advisory bodies play a special role in the adversarial policy-making style but are of less importance in others.

Second, several authors highlight the cultural embeddedness of the perception of what is credible, legitimate, acceptable and helpful scientific expertise (Renn 1995; Jasanoff 1997; Pelinka 2003; Miller 2004; Halfman 2005; Jasanoff 2005). In order to trace these varying perceptions the *criteria and rules for the selection of scientific expertise* provide a good indication. Following Renn (1995, 151-152) in the adversarial style scientific advisors are selected according to their scientific credentials and public standing while in a neo-corporatist style scientists are often selected by proportional assignment of the parties involved. Similarly, Jasanoff (2005, 260-269) finds that in the contentious civic epistemology personal skills of scientists and the transparency of the formation of policy advice play an essential role while in the consensus-seeking civic epistemology credibility and legitimacy of expert bodies and experts mainly refer to the institution they represent, their training, skills, and experience. The relevance that objectivity plays in the selection of experts is a further source of cross-cultural variation (Halfman 2005). Moreover, science-policy interfaces may differ regarding the type of evidence called for. For instance, in some policy cultures exclusively quantitative evidence is taken into consideration while others rely on qualitative information for decision-making as well (Jasanoff 1991; Renn 1995, 151; Hellström 2000, 506-507).

Third, while there is consensus that scientific expertise is not the only knowledge type available to decision-makers and by far not the only basis for decisions, comparative studies still carve out remarkable differences with respect to the *relative role and influence of scientific expertise* on policy content in comparison to personal or group interests, intuition, anecdotal evidence, or strategic maneuvering. For example, in some policy cultures decision-makers mainly draw on legal-rational criteria and per-

ceive academic expertise as the only legitimate input into policies, while in other policy cultures the nimbus of 'objectivity' is not so important to legitimize political decisions (Pregernig 2005). In a similar vein, Brickman et al. (1985) highlight the variable acquisition of expertise, as well as differences concerning the role of the civil service and interest groups in policy making. Jasanoff (2005) draws attention to the role of the public and the dominant participatory styles of public knowledge-making.

Comparative studies on expert policy advice also point out differences in the respective *interaction patterns*. National styles can be found in terms of the orientation towards consensus or competition, the role and position of experts in advisory processes and decision-making, and the transparency and visibility of advisory bodies and processes. The orientation towards consensus or competition is one of the most prominent distinctions between policy cultures or civic epistemologies, which is often already mirrored in the names of the respective types. Jasanoff (2005, 260-269), for example, shows that the contentious civic epistemology is characterized by pluralism, interest-based reasoning and adversarial processes, while the communitarian civic epistemology relies on a consultative, negotiated way of generating policy advice, and the consensus-seeking civic epistemology refers to neo-corporatist, negotiated and reasoned policy advice. Similarly, Renn (1995) distinguishes between two confrontational policy-making styles, i.e. the adversarial and the fiduciary style, and two consensus-oriented styles, i.e. the consensual and the corporatist policy-making style. The role and position of experts in advisory processes and decision-making gives further indication for the influence of the political culture on policy advises as do the practices of boundary drawing between scientific experts and other actors. Following Renn's (1995, 151-152) analysis in the adversarial style experts' input is restricted to pure scientific judgments that must not conflate with personal judgment. In the neo-corporatist style invited scientific experts are typically asked to offer professional judgment, but they are often not requested to present formal evidence while in the consensual style scientists can be rather influential in providing compromises and are not confined to only provide evidence (Renn 1995, 151-152; Hellström 2000, 509). The transparency and visibility of expert bodies and advisory processes is a further indicator for the prevalence of a specific policy style or civic epistemology. With respect to the public validation and deployment of scientifically based knowledge claims the visibility of expert bodies plays an important role. Besides the composition of expert bodies the operational environment of expert bodies varies from country to country. This too has important effects for what the public perceives and knows about the basis of public decision-making. Hence, Jasanoff (2005, 269) argues that in a consensus-seeking civic epistemology policy advice is mostly generated behind closed doors and consequently shows a high degree of non-transparency.

Last distinguishing criteria are the overall importance and the specific *functions of scientific input into policy-making*. The role of scientific expertise can oscillate between a marginalized position and a situation where experts have considerable sway on policy development and implementation (Renn 1995, 151; Hellström 2000, 507; Heinrichs 2005). Renn (1995, 147-156) identifies four different functions scientific expertise may have for policy-makers and decision-making processes. First, policy-makers use scientific expertise for 'enlightenment' i.e. for "providing [them with] factual insights to help identify and frame problems and to understand the situation". Second, academic knowledge can have a "pragmatic or instrumental function". That is, when expertise provides decision-makers with instrumental knowledge which allows

the assessment and evaluation of different, likely effects of policy options. The “interpretative function” of scientific expertise can be described as offering “arguments, associations and contextual knowledge to help policy-makers to reflect on their situation and to improve and sharpen their judgment”. A fourth function is the “catalytic function” of scientific expert knowledge. In these cases scientists provide “procedural knowledge to help design and implement procedures for conflict resolution and rational decision-making” (Renn 1995, 147-156).

C. Case, methods and data

Many studies on science-policy interactions choose a comparative design to study differences across political cultures (Brickman and Jasanoff 1980; Brickman, Jasanoff et al. 1985; Jasanoff 1986; Renn 1995; Halffman 2005; Jasanoff 2005). The comparison allows for contrasting different patterns in the selection, processing and use of scientific expertise in decision-making. However, the examination is often limited to a rather general description and does not allow for in-depth analysis of how the political culture actually manifests in science-policy interactions. In order to provide such an in-depth analysis, we opted for a single case study. Austria serves as an extreme case because it is one of the most clear cut instances of neo-corporatism in liberal democracies. Hence, we expect that the traditions and institutions of neo-corporatist political culture strongly influence the organization and processes of science-policy interactions. Climate policy, however, presents a relatively “young” policy field which is, in comparison to Austrian economic and social policy, not at the center of neo-corporatist actors’ exertion of influence and shaped by more pluralist forms of interest mediation. Therefore, we assume to reveal a certain extent of pluralism manifesting in Austrian scientific policy advice as well.

1. Austrian neo-corporatism

Austria has exhibited a relatively pure form of neo-corporatist political culture after World War II. The institutional arrangements and cultural-behavioral patterns of neo-corporatism aimed at mediating divergent interests of stable political-ideological “*Lager*”. In the scholarly literature, strong manifestations of neo-corporatism are even often summarized under the term “Austro-corporatism” or “Austro-Scandinavian-corporatism” (Schmitter and Lehbruch 1979; Lehbruch and Schmitter 1982; Bischof and Pelinka 1996; Markovits 1996; Siaroff 1999; Molina and Rhodes 2002; Karlhofer 2006). Austrian political culture has found its expression in a specific set of actor groups engaged in decision-making, in unique principles of neo-corporatist interaction, and in conspicuous characteristics of the political process (Markovits 1996, 8; Pelinka and Rosenberger 2007).

With respect to actor groups, the Second Austrian Republic has been characterized by a “hyperfunction of the political parties” (Pelinka 2006, AH), i.e. the influence of parties has exceeded their “usual” role in comparison to other liberal democracies. For instance, political parties not only influence the recruitment of the political leadership but their recruitment function reaches beyond the political system (e.g. to banks, public enterprises, schools, constitutional court) (Pelinka 2006). On the side of administrative actors, experienced ministry officials and their established advisory bod-

ies play a central role for decision-making. Representatives of the administration are equipped with great political leeway: they have a substantial scope for negotiations and usually maintain a broad spectrum of informal contacts with advocacy groups (Pregernig 2005, 274). They also assert substantial claims towards politicians and, therefore, are significant political players on their own. Especially in the fields of economic and social policy, interest mediation and representation have taken place within strong neo-corporatist patterns (Lederer and Neugschwandtner 2006, 577). On the side of societal actors, the social partnership is the most significant feature of Austrian political culture (Bischof and Pelinka 1996). It is an informal council comprising two organizations which represent employees' interests and two organizations which represent labor interests. These chambers and associations are assumed to hold "a monopoly in representing their respective socio-economic groups" (Karlhofer 2006, 348) as well as to capture and organize all relevant societal interests (Karlhofer 2006; Lederer and Neugschwandtner 2006, 577; Pelinka 2006; Pelinka and Rosenberger 2007).

With regard to the policy process, the formation of a Grand Coalition between the two leading parties is rather the rule than an exception in Austrian politics. It restricts parliamentary rights of scrutiny and, thus, the balance of powers is limited (Markovits 1996, 14; Pelinka and Rosenberger 2007). The weakness of the Austrian Parliament in decision-making is reinforced by the "*Rollenverzicht*" of the Austrian Federal President, which moves the Austrian Federal Chancellor to the center of the political system, and by the strong role of the social partners in decision-making processes (Markovits 1996, 7-8; Pelinka and Rosenberger 2007). The majority of legislative processes takes place within relatively narrow networks to which only few key organizations enjoy privileged direct access (Pregernig 2005; Lederer and Neugschwandtner 2006, 577). The chambers and peak associations are centrally involved in decision-making via informal processes, advisory bodies, representatives in the parliament, and the mandatory, pre-parliamentary review process of laws. Furthermore, informal "[b]ack-room deals in parapublic institutions which presented the public with faits accomplis came to be regarded as acts of statesmanship safeguarding stability and tranquility" (Markovits 1996, 16). Participation, debate, and choice beyond the public represented by the social partners are only possible to a restricted extent (Markovits 1996, 16).

A particular behavioral principle of Austrian neo-corporatism, constitutes the orientation towards political consensus (Markovits 1996, 15). Accordingly, institutions and approaches have mainly been committed to continuity and the principles of agreement and unanimity (Markovits 1996, 15; Pregernig 2005; Pelinka and Rosenberger 2007, 16). Austrian elites aimed, furthermore, at establishing "an accommodationist atmosphere" (Markovits 1996, 15) as the very basis of the Second Republic. One important component was to develop "a pragmatic method of conflict resolution and crisis management" (Markovits 1996, 15) which is often referred to as "muddling through" (Markovits 1996, 15).

Table 1 - Features of Austrian Neo-corporatist Culture

	Features of Austrian neo-corporatist culture
Actor groups	<ul style="list-style-type: none"> - “hyperfunction” of political parties - Central role of public administration - Pivotal role of social partners
Political process	<ul style="list-style-type: none"> - Grand Coalition - Weak parliament - Proportionally composed advisory bodies - Representatives of the social partners in Austrian Parliament - Pre-parliamentarian review process of laws - Legislative processes take place in relatively narrow networks - Informal contacts and “back-room deals”
Interaction principles: interest mediation	<ul style="list-style-type: none"> - Representation - Consensus-orientation - Pragmatic conflict resolution - Aspiration towards stability and calculability

However, two scholarly observations on Austrian politics qualify neo-corporatism’s leverage: On the one hand, the authors have pointed to the fact that, at least, a “gradual decline” (Karlhofer 2007) of Austrian neo-corporatist political culture over the course of time can be stated (Pelinka 2003; Karlhofer 2006; Lederer and Neugschwandtner 2006; Pelinka 2006; Karlhofer 2007). This observation is tied to several recent changes of the features of Austrian political culture, such as the decline of the degree of concentration of the party system, the degree of organization of people in political parties, chambers, associations, and unions, or the decline of the predictability of political behavior of people, and a loss of the binding force of the social partners. Pelinka and Rosenberger (2007, 72) comment on these tendencies of transition from a „consensus- to a conflict-orientation“ that Austrian consociational democracy “has passed its peak”. On the other hand, Talós and Kittel (2001) highlight that economic and social policy have always been the domain of the Austrian social partners. In other policy fields, like environmental policy, further actors and actor groups have always had a say (Tálos and Kittel 2001). Particularly climate policy as a new area of decision-making, and especially adaptation policy, could yield new, more pluralist forms of science-policy interactions. Similar results have been highlighted by Pregernig (2007) for the field of environmental policy.

Neo-corporatist advisory structures have been shaped by a strong role of administration and the Austrian social partners since the beginning of the Second Republic. Against this background we raise the question to what extent researchers’ academic expertise is able to exert influence on decision-making processes. However, in newer fields, like climate policy, also more pluralist patterns of interest mediation and advice manifest themselves. Therefore, we also ask to what extent pluralist characteristics affect scientific climate policy advice.

2. Methods and data

The analysis of the Austrian case draws on a triangulation of document analysis, semi-structured expert interviews, qualitative content analysis, and a stakeholder workshop. The *document analysis* provided information about Austrian climate policy in general and a basis for selecting the relevant actors for the interviews. It comprised the examination of primary documents, like federal laws (e.g., the Austrian Law on Climate Protection) and political strategy papers (e.g., the Austrian Adaptation Strategy), as well as the few existing academic studies on science-policy interaction in Austrian decision-making. In a second step, 23 *semi-structured expert interviews* with key actors from climate science, politics, administration, and advocacy groups were conducted. The guiding questions concerned the most important actors, institutions and processes as well as the strengths, weaknesses, challenges, and potentials of science-policy interactions. The analysis and interpretation of these interviews was carried out on the basis of *qualitative content analysis* (Gläser and Laudel 2010) in order to reduce the interviewees' statements to those aspects relevant to the dimensions described in chapter 2. The findings from document and interview analysis were validated and complemented by a *workshop* with participants from university and non-university research institutes as well as administration. The attendees were confronted with the first research findings and conceptual reflections on the effective organization of the science-policy interface. Participants discussed the strengths and weaknesses of selected interaction forms that were identified as most important in Austria. In addition, challenges and potentials of a prospective effective integration of scientific expertise were discussed from a science, a decision-making, and a mutual perspective.

D. Science-policy interactions in Austrian climate policy

The following sections present the empirical findings of the analysis along the five dimensions presented in chapter 2. In the beginning an overview of the Austrian landscape of climate policy advice, i.e. the most relevant actors and the organization of the science-policy interface, is given (1.). Afterwards, we outline on the basis of which criteria scientific knowledge is considered being policy-relevant expertise and, thus, researchers are selected (2.). We then explore the relative role and influence of scientific expertise compared to other types of expertise as well as interest representation (3.). Concerning the interaction patterns we particularly point to the initiative of scientific policy advice, the degree of co-operation, and the transparency of climate expert advice (4.). Finally, we indicate in which ways scientific expertise is used in Austrian climate policy decision-making (5.).

1. Actors at the science-policy nexus and organization of science-policy interaction

Various actors and actor groups are involved in science-policy interactions in Austria, including researchers from university and non-university research institutes, decision-makers from politics and administration as well as representatives of the Austrian social partners and environmental ENGOs.

Several university research institutes, including mainly meteorological institutes but also economic and technical sciences institutes, are engaged in providing scientific policy advice. These institutes are often represented by and associated with a few high profile and well-known scientists. On the other hand, we also found research institutes which are highly relevant in climate research but deliberately do not engage in climate policy advice. *Non-university research institutes* encompass a few academic think tanks, the *Federal Meteorological Service* (ZAMG) and the *Environment Agency Austria* (UBA). Especially the environment agency has a crucial role due to its strong connection to federal administration. While important in other environmental policies (Pregernig 2007) the ministries' research units only play a minor role for climate policy and are predominantly consulted for specific mitigation and adaptation questions. Moreover, two *networks of Austrian climate scientists*, the *Climate Change Center Austria* (CCCA) and *AustroClim*³, have been established in the last decade. These networks bring together most university and non-university research institutes dealing with climate change issues from different disciplinary perspectives. Since the Austrian research landscape is characterized as a rather small one, scientific policy advice is, furthermore, provided by foreign researchers, mainly from the German language area. The researchers generate expert advice for decision-makers from *politics and administration*. Among them, the main addressees are ministry officials. By comparison, the Austrian parliament and particularly its Committee on the Environment play a negligible role with respect to science-policy interactions. Moreover, climate scientists interact with Austrian advocacy groups and the *media*. The *Austrian social partners and environmental NGOs* are another important addressed audience which is regularly provided with comprehensive academic knowledge. Besides their role as knowledge users, ministry officials, politicians, and representatives of interest groups also broker scientific knowledge and even provide non-academic expert advice to inform decision-making (see 4.).

Science-policy interactions in Austrian climate policy predominantly take place in the following forms and settings: contract research, strategy processes, research programs, and informal contacts.

Particularly administration but also interest groups frequently commission *reports, studies or projects* to university and non-university research institutes. However, the amount and importance of contract research commissioned by federal ministries markedly decreased during the last decade due to budget cuts and stricter guidelines for awarding public service contracts. Contract research was at least partially substituted by two *applied research programs*, *StartClim* and the *Austrian Climate Research Programme* (ACRP), which both explicitly focus on climate change questions. *StartClim* is concerned with the effects of and adaptation to climate change, whereas the *ACRP* addresses mitigation as well as adaptation issues. The two programs are, at least in part, publicly funded. In both cases different ministries co-finance the respective programs, in contrast to contract research which is often primarily assigned by single federal ministries. *StartClim* has a budget of about 100.000 to 200.000 € per year and is conceptualized in order to conduct research projects which provide the basis for subsequent *ACRP* projects. The *ACRP*, which represents the Austrian

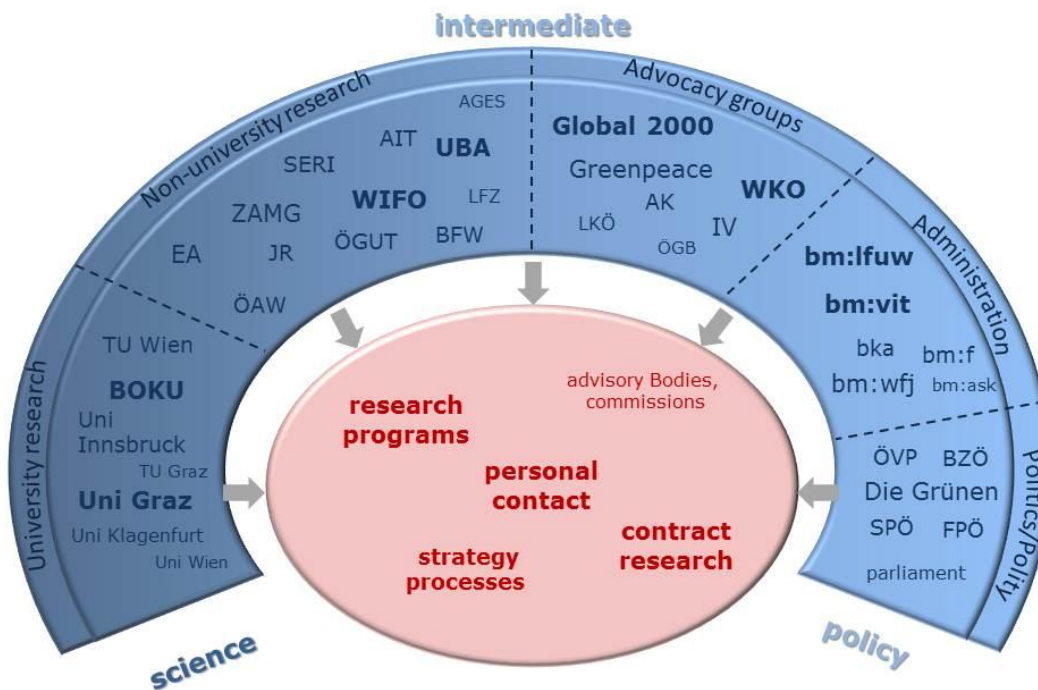
³ AustroClim had been integrated in the CCCA in July 2012.

flagship of applied climate research, is equipped with four million € per year. Both programs are oriented towards the demands of the funders to a considerable extent. The *ACRP* explicitly encourages stakeholder integration in the respective projects as well. In a few cases, researchers are directly involved in the formulation of policies, most notably in the *development of strategies* such as the *Austrian Adaptation Strategy* or the *Austrian Energy Strategy*. Scientists provide their expertise to these, often participatory, processes by targeted studies, including policy-relevant recommendations, as well as by their participation in working groups and workshops that serve the elaboration of the strategies. Several studies conducted within the frame of the above presented research programs were commissioned with the intention to inform the *Austrian Adaptation Strategy* process. Interestingly, this conjunction of interaction modes seems to aim at substituting formerly stronger contract research. Besides these rather formalized interactions, *personal contacts* among researchers and other relevant actors play a significant role. This can be the case at events, organized by scientists, political parties, administration, or interest groups as well as during personal conversations, by telephone or in regular informal meetings.

By comparison, *advisory bodies* have only minor relevance for scientific policy advice. Scientists are one among many representatives in “mixed advisory bodies” or they are consulted on an ad hoc basis in purely “political advisory bodies”. “Mixed bodies”, like the National Climate Protection Council, usually consist of politicians, ministry officials, representatives of various economic and societal interest groups, and scientists. In permanent or temporary “political bodies”, like the Interministerial Committee “Climate”, researchers are solely consulted occasionally when particular political issues require distinct scientific advice. According to the interviewees the latter occurs only rarely. There are currently no pure scientific advisory bodies for climate policy. The *Austrian Council on Climate Change*, a standing scientific advisory body established in 1996, which had the task to explore the effects of climate change on Austria and to identify CO₂ reduction measures, is no longer operational. The workshop participants named a concatenation of factors which contributed to the council’s cessation in 2003: First, the body had to cope with a variety of diverging expectations and positions of science and policy-makers. Second, the council had fulfilled its major task of substantiating an Austrian anthropogenic climate change by conducting a range of studies. Third, the new Austrian environmental minister was not willing to be scientifically advised.

Concluding, the Austrian landscape of scientific policy advice is shaped by forums and processes of different *degrees of formalization*. On a spectrum of *formalized and informal contacts* we are able to locate interactive forms like contract research and strategy processes on a rather formalized edge. Advisory bodies can take the shape of formal and informal advisory bodies. Furthermore, a broad range of informal contacts among scientists and important actors of Austrian climate policy are significant for scientific policy advice as well.

Figure 1 - The Austrian landscape of climate policy advice



Source: (Hermann, Bauer et al. 2012, 11)

2. Selection criteria for scientific expertise

Scientific knowledge has to meet a range of specific requirements and expectations in order to be considered relevant and helpful by Austrian decision makers. Interviewees frequently differentiated between “good” and “bad” science or “good” and “bad” scientists for policy advice. The criteria for which scientific expertise is considered valuable, helpful and relevant and, consequently, which scientists are consulted are manifold: the most important ones include scientificity and personal credentials, the usability of research findings as well as strategic considerations. Nearly in all cases the selection of scientific expertise draws on a mix of cognitive, relational, personal, usability, and strategic criteria.

Academic competences and the researchers’ reputation are kind of a precondition for being consulted as an expert. Specialized disciplinary competences on climate change topics as well as the reputation of researchers in their respective scientific community, and beyond, influence their choice as policy advisors. Regarding scientific knowledge utilized in decision-making processes we revealed a broadening of demand from quantitative analyses of natural sciences and economics to increasingly also including qualitative social science expertise. In the early days of Austrian climate policy decision-makers and interest groups primarily resorted to models or scenarios which addressed the prospective evolution of climate change and its likely ef-

fects. Increasingly, social sciences are demanded and incorporated, particularly in the context of applied research programs. Decision-makers as well as representatives of advocacy groups draw on researchers who represent the scientific consensus on climate change and neither question the anthropogenic climate change nor its effects for Austria. This is due to the scientific consensus being the absolute basis for action of administration as well as advocacy groups (I1, I19).

A ministry official stressed this point: “Well now, I certainly just need results which I can politically make use of. I cannot work with things in which is written that [anthropogenic] climate change is nonsense and does not take place” (I1, AH).

A further indicator for policy-relevant scientific competence is the appropriate *reflection on research findings’ uncertainties and insecurities*. Though decision-makers and advocacy groups search for recommendations for action some of them highlighted that only a researcher who reflects on uncertainties is considered being a “real scientist” (I14, I19).

Regarding concrete policy-recommendations from researchers, which are required by decision-makers and interest groups, the representative of an advocacy group highlighted: “I meanwhile learned and internalized that science, if it is fairly reliable, says at this point: Yes, but this is only partly possible” (I19, AH).

The selection of scientific experts draws, furthermore, on the *reputation of the academic institution* that the researchers represent. For instance, advisory bodies are composed of researchers due to their institutional affiliation. Accordingly, dependent on the specific question the actors consult different institutes. Credibility and legitimacy of scientific expertise, moreover, draws on the *personal integrity and credentials of researchers*. A few high profile researchers play outstanding roles in brokering scientific knowledge and advising Austrian climate policy. They are perceived as experts not only because of their professional skills, but also due to their experience and long-term engagement in climate policy. Those scientists are esteemed for their ability to communicate and to derive policy-recommendations. A long tradition of cooperation has been established. The interview partners told that most of them work together with specific researchers or policy actors on a regular basis for a long time and, in this way, established mutual trust (I1, I9). Moreover, prestigious *foreign scientists* are sometimes consulted in order to secure scientific objectivity against the background of the small Austrian climate research and policy-making landscape. Another purpose for the consultation of foreign academic experts is to learn from different foreign conceptual policy approaches and experiences.

Furthermore, the *usability* of research findings plays an important role for academic knowledge being considered as policy-relevant scientific expertise. This refers to the results’ relevance, applicability as well as comprehensibility. Decision-makers and advocacy groups demand knowledge which is tailored to their needs. Policy-makers as well as representatives of advocacy groups call especially for *cross-linked and applied academic knowledge* which also provides them with *options and/ or recommendations for action*. The guidelines for project proposals of the research program ACRP mirror the demand for “usable results”: “Interdisciplinary research teams are encouraged, but focused disciplinary research, especially if it is particularly innovative or useful, are eligible. [...] Research proposals should specify their “user value”, either to the greater (also international) research community or to the Austrian policy”

(ACRP 2012, 10). Furthermore, the *ACRP's* calls for proposals always encompass a thematic area "Responding to Austria's policy community" (ACRP 2012, 4).

Frequently politicians, ministry officials, and interest groups demand qualified opinions and assessments of distinct options from the researchers, not only "pure science". Thus, the interviewees' statements pointed out that in the context of politically composed advisory bodies especially representatives of the non-university research institutes *UBA* or *Austrian Institute of Economic Research* (WIFO) are consulted more frequently than those of university research institutes (I8). They are assumed to provide more applied research.

Furthermore, policy-makers and interest groups require academic knowledge being presented in an *understandable way*. Understandable in this context mostly referred to the communication of research findings to administration and advocacy groups in an appropriate length and depth as well as comprehensible language. The research findings are required to be adapted to the shorter time horizon policy-makers and advocacy groups work with. The interviewees in this context highlighted problems caused by researchers thinking in longer time frames, whereas the knowledge "users" only having in mind periods of five to ten years (I14, I17). Preliminary results of the respective level of research are, furthermore, expected to be available and presentable whenever customers need them (I19).

Scientific experts are, moreover, chosen by decision-makers and representatives of advocacy groups due to *strategic considerations*. One criterion is the *predictability of the respective research findings*, i.e. the expected outcome of the studies. In many cases the customers already know who they want to assign a study or project to because they already know what to expect from a distinct research institutes' work. Ministry officials and representatives of interest groups confirmed that they approach those researchers who deliver results which are *connectable to and needed in order to support their positions and interests* (I1, I17, I19).

The statement of a representative of an interest group mirrors the predictability of findings and need for connectivity to their position: „Obviously, the selection of scientists which are consulted for certain questions is considerably determined by what the result will be. [...] We are clearly able to say: this is our lobbying task. We pursue this. And we consult scientific expertise for this purpose [...].“ (I22, AH)

The strategic selection of expert advice is connected to the attribution of a range of scientists to particular advocacy groups by the interviewees. In this respect a ministry official criticized: "And unfortunately there are enough scientists who sell themselves for this. [...] Mostly they [, i.e. the researchers and the advocacy groups,] have common perspectives. In the realm of Austrian science there are climate change denier, or at least skeptics" (I1, AH).

Moreover, the representative of an advocacy group told us: „Science also is partly entangled. [...] I would not regard them completely independent.“ (I21, AH)

Furthermore, the relevance of scientific knowledge for decision-making in Austria is related to its *potential to create political consensus*. Especially with regard to commissioned studies scientific experts are selected according to the researchers' acceptance by the clients themselves and by other political and/or economic interest groups. Sometimes conglomerates, which consist of different university and non-

university research institutes, get the order for contracted research in order to generate a basis for consensus in advance of political decision-making processes (I1, I2, I7). Another example is the corporate selection of scientific consultants for political advisory bodies. In these cases decision-makers and the social partners come to a mutual agreement on the researchers to invite.

3. Scientific expertise compared to other forms of expertise and interests

Our analysis shows that scientific knowledge partly competes with and partly complements other forms of expertise as well as personal or group interests. The interviewees locate expertise on climate change issues not only in the scientific realm. Other forms of expertise, like “practical” knowledge which is particularly provided by administration and interest groups, are considered being valuable and policy-relevant as well. Besides their role as users of scientific knowledge these actor groups are often ascribed an additional double role, as holders of policy-relevant expertise and brokers of scientific expert advice.

The interviewees attribute a particularly important role in climate policy to *ministry officials* as practical experts in the field of climate policy. Climate change is perceived being a cross-cutting issue with shared responsibilities and authorities by the interviewees. Accordingly, a range of federal ministries and their staff were referred to. A particularly central role is attributed to officials of the *Federal Ministry of Agriculture, Forestry, Environment and Water Management* (bm:lfuw). They are ascribed different roles and, accordingly, positions at the science-policy interface: They own in-house expertise and, thus, are providers of policy-relevant knowledge. At the same time, they are initiators of studies and research programs and, therefore, represent the demand side of scientific policy advice. Ministry officials, furthermore, provide the framework for science-policy interaction by initiating and organizing advisory processes and bodies. They can, moreover, be considered as important brokers of scientific knowledge by hosting different venues of exchange and communicating expertise to politicians. However, the interview partners also attributed a restricting role for the influence of academic knowledge to administration in general. On a political level the key ministries obstruct an effective climate policy and, thus, marginalize the role of academic knowledge for decision-making.

Advocacy groups play a special, partially ambivalent role at the science-policy interface as well. The interview partners distinguished between the Austrian *social partners and environmental NGOs*. They ascribed profound, comprehensive practical in-house expertise to representatives of the chambers, associations, and unions which they steadily introduce in political decision-making. The Austrian social partners, from the employers’ side as well as from the employees’ side, have established strong formal and informal ways of selectively inducing scientific knowledge in climate policy decision-making processes. This role was frequently affiliated to their interest and expertise being mostly oriented towards economic aspects which contradicts the implementation of more comprehensive mitigation and adaptation measures.

ENGOS’ expertise is positively attributed by interviewees from science, administration, and some political parties. ENGOS draw on both in-house expertise from academics they employ and the expertise of university and non-university research institutes which is acquired through commissioned studies or personal contacts with re-

searchers. They bring in this expertise in societal debates and political decision-making processes by formal and informal means. In more recently set up advisory bodies and processes, like the *National Climate Protection Council*, and the development of the *Austrian Adaptation Strategy*, ENGOs are increasingly incorporated. Hence, the indirect participation of civil society has been extended by formally including the expertise of ENGOs as well. Another important way of inducing academic knowledge in policy processes is public relations. Within the framework of campaigns these advocacy groups broker knowledge as well.

Overall, a simple dichotomization between science as knowledge producer, on the one hand, and politics and administration as knowledge users, on the other hand, does not adequately reflect the landscape of science-policy interaction. Policy-relevant expertise is not only assigned to research institutes. The expertise of ministry officials and advocacy groups is regarded as another most valuable source of knowledge by many interviewees. The non-academic experts' knowledge competes with and marginalizes the influence of scientific expertise on decision-making. However, we pointed out the ambivalent character of these actors: Besides their contribution of valuable policy-relevant knowledge especially the Austrian social partners selectively bring in academic expertise in decision-making processes. Due to the strong role of ministry officials and representatives of advocacy groups, as the interviewees stressed, one is able to find only a minor tradition of consulting scientific expertise in political processes. In Austrian climate policy prevails the perspective that "mixed" expertise, i.e. scientific knowledge conflated with the expertise of administrations, advocacy groups etc., provides the best possible basis for decision-making.

The role and relative relevance of scientific expertise for Austrian policy-making is not only dependent on its relation to other forms of expertise and interests. Whether and to what extent scientific expertise is integrated into climate policy-making and the relative role researchers' are able to play depends on the *degree of politicization* of the particular issue under debate. For instance, scientific expertise was intensively integrated in the development of the *Adaptation Strategy*. The relevant actors explained this with the *politically non-binding* nature of the document. In comparison, with respect to the elaboration of the *Austrian Energy Strategy* academic knowledge was integrated to a lesser extent due to the strategy's stronger *political framing*. Furthermore, scientific expertise does not play an important role for the development of federal *laws*.

A ministry official argued that he has other priorities to cope with, like economic and political interests in this respect: "Laws are pragmatic issues. [T]here is no direct influence. [...] This is all interest-driven politics, interest mediation. I have to negotiate and agree with other departments, the Länder, the advocacy groups. Science has actually no role there. It is important and good for argumentation, but there cannot be a direct influence. This is an absolutely different level" (I1, AH).

Similarly, representatives of the social partners and of the federal administration regarded a stronger incorporation of scientists in political bodies as not necessary because these are areas where political decisions are made.

4. Patterns of science-policy interactions

We identified several patterns of science-policy interactions in Austrian climate policy. We indicate that the initiative of scientific policy advice can be demand- as well as supply-driven and that science-policy interactions can be located at different stages of the spectrum of interactive modes and sequential forms. Furthermore, we point out that most modes of science-policy interaction are non-transparent but that indicators toward a slight transformation can be revealed.

With regard to the *initiative for scientific policy advice* we found two different patterns, a *demand-driven* and a *supply-driven* one. On the one hand, scientific experts are mainly consulted in a targeted, demand-driven way. Administration as well as interest groups purposefully commission contract research. Both actor groups have also considerable sway over advisory bodies and research programs. Many mixed and political advisory bodies are chaired by and located at the ministries. Administration also holds a strong position in the design and processing of applied research programs. For instance, science-policy interaction within the development of the *Austrian Adaptation Strategy* was organized and supervised by the federal administration. Furthermore, personal contacts often emanate from ministry officials and representatives of advocacy groups. These informal contacts do not only aim at purposeful consultation of scientific expertise in a unidirectional way, but also they serve as an instrument for the coordination of research interests and activities with needs for knowledge stemming from politics, administration, and interest groups. Demand-driven scientific expert advice sometimes seeks for consensus on the level of customers when studies are commissioned in common for instance by administration, social partners, and further interest groups (I7, I21).

On the other hand, scientists proactively supply scientific policy advice as well. The interviewees' statements clearly pointed out that the interaction not just starts out from politicians, ministry officials or the interest groups' representatives. Scientists actively approach the relevant political actors in Austrian climate policy to give them a deeper understanding of aspects or topics politically important from their point of view. Besides informal ways of fostering a stronger integration of scientific expertise in decision-making, the networks of climate scientists actively advocate academic policy advice by organizing events and information platforms. The network CCCA aims, inter alia, at proactively supplying policy-makers with focused scientific contributions. Moreover, for instance, an interviewee told that the anchoring of the *Austrian Adaptation Strategy's* development in the current government program was effectively lobbied by *AustroClim*, one of the climate scientists' networks (I9). Thus, the exchange of policy-relevant scientific expertise is not confined to the decision-makers' or interest groups' initiative.

The *degree of cooperation and coordination* in Austrian science-policy interaction varies among the different fora in which the actors converge. On a continuum of interactivity we detected *stronger interactive* interactions whereas other modes link scientific expertise and decision-making in rather *sequential ways*. Contract research, traditionally a rather linear interaction form, has become much more interactive as especially the workshop participants pointed out. When co-ordination takes place during the research process scientists and customers often strive for consensus. Project meetings, which regularly take place, enable client and contractor to co-ordinate or even synchronize research interests and scientific knowledge as well as the prin-

cipals' interests and knowledge needs. This could reach until highly concrete guidelines by policy-makers or advocacy groups. Furthermore, with regard to research programs a close interaction can be revealed. The exchange of science and administration either over programs' or projects' advisory boards provides a framework for the mutual steering and coordination of interests as well as knowledge. For instance, agenda setting for the research program *StartClim* takes place in cooperation of the open consortium of financiers, which usually encompasses representatives of several federal ministries, and the internationally constituted scientific advisory board. In the framework of the *Austrian Climate and Energy Fund* one is able to identify reconciliation of the scientific advisory board and the presidium, which consists of ministry officials, with respect to the annual program and the annual determination of the thematic priorities for the distribution of the projects. The strategy of coordination and negotiation can also be pointed out with reference to bodies of science-policy interaction in Austrian climate policy, like the Kyoto Forum. Researchers' findings shall mainly provide the framework in which decision-makers and advocacy groups negotiate and agreements are to be reached. Hence, scientific, political, and economic perspectives are adapted to each other during negotiation processes within the advisory bodies and at different stages of contract research process.

The increasing involvement of stakeholders in projects (as in particular favored by the ACRP) intends to serve the knowledge integration and usability of the project results. However, it also provides opportunities for ministries and other stakeholders to influence the research process in their interests. For example, one researcher told that a ministry representative pushed for the use of a particular set of scenarios to use in the modeling of economic effects of climate change which are more compatible with the ministry's position and interests.

A rather sequential incorporation of scientific expertise was observed with respect to the Austrian Adaptation Strategy. Researchers were asked to provide a comprehensive study on adaptation measures in Austria which was equipped with policy-relevant conclusions and recommendations for action. The study provided the basis for the following negotiation processes among representatives of all relevant actor groups. Notably, scientists were explicitly excluded from the participatory process with the argument that they had already given their input. This kind of incorporating researchers' expertise in climate policy, which follows a sequential understanding of science-policy interactions, leaves rather little room for direct exchange and negotiation with other actor groups.

The significant role of informality as a characteristic of the Austrian science-policy interaction landscape is closely related to the dominant non-transparency of scientific policy advice. In Austrian climate policy we revealed a mix of *non-transparent, variable, and transparent modes* of science-policy interactions. Invisibility and, thus, non-transparency of scientific policy advice can be found in many different modes of science-policy interaction. Not only informal personal contacts are non-transparent, but also formalized modes of interaction are not transparent with regard to the awarding, the results, and the utilization of scientific policy advice. Especially with respect to contract research some interviewees criticize invisibility. On the one hand, the interviews revealed a partially informal assignment of contract research, i.e. studies and projects, by administration. On the other hand, commissioned studies which are used in order to argue with political opponents and/or the social partners are often not made publicly accessible. Accordingly, the representative of an advocacy group

questioned the practices of contract research commissioned by the federal ministries: “[M]ost of the UBA studies, which I know, end up in the drawer because they are not allowed to be published. A great many. Let’s say a lot. There are several which are not allowed to be published“ (I22, AH).

Variable visibility and transparency can be found with respect to “mixed” and “political advisory bodies”. The few advisory bodies in Austrian climate policy are usually able to determine on their own if they are willing to make their debates and results accessible to the public. However, in practice most of them do not make the processing of scientific expertise publicly accessible and visible. This was especially found with respect to “political bodies”. But even formal advisory bodies, like the *National Climate Protection Council* which is responsible for advising the coordination of climate protection measures, are non-transparent. It is only known which organizations are represented in the body. However, it is not entirely clear who represents these organizations. Furthermore, the results of the bargaining process and the subsequent recommendations for the *National Climate Protection Committee* are not made publicly accessible. The non-transparency is further strengthened due to the consensus-seeking notion of advice bodies. Scientific and non-scientific experts represent a result, once they have achieved consensus on one topic, in common.

For a long time, non-transparency dominated the Austrian climate policy advice. Lately policy-makers as well as scientists themselves started initiatives in order to raise the visibility of scientific expertise and its engagement with policy-making. Recent processes, like the development of the *Austrian Adaptation Strategy*, which are made more accessible to further actor groups as well as to the public, could indicate a slight change. Nearly all mechanisms and steps of the strategy’s development have been open to public access. Furthermore, as kind of a bottom-up process, scientists formed the network *CCCA* which aims at fostering the visibility of coherent scientific policy advice.

5. Functions of scientific expertise

Decision-makers from politics and administration as well as advocacy groups, like the social partners and ENGOs, use scientific knowledge for various purposes.

Decision-makers as well as interest groups consult researchers’ expertise as a source for *strategic reasoning in political negotiations and public debates*. For that purpose, they select the scientific arguments which provide the greatest compatibility to their organization’s position. Thereby they aim at pointing out alternatives to other actors or to substantiate their own position, for instance in advisory bodies or for statements on federal laws. In doing so, the actors engaged in Austrian climate policy assure themselves autonomy against other groups or institutions. The external scientific advice is also meant to confine space for negotiation processes.

A ministry official emphasized the strategic role of scientific expertise for negotiation processes among ministries with respect to a current topic: “This was rather an inglorious episode. There were studies and counter-studies. [...] This was commissioned work. Everybody how he wants to read it. The ministry of economy commissioned something and tried to leverage us. And the other way around we tried this as well.” (I1, AH)

The statement of a staff member of an interest group also highlighted the instrumentalization of academic expertise: “Scientific works provide the basis for dealing with certain issues. If certain contents do not match our political point of view, then, it is clear, that we do not use them in this form or [...] that we search for [academic] counter statements. If, in our opinion, certain aspects are not reasonable [...] then we utilize this [new counter-] information as a basis for argumentation for our daily work” (I18, AH).

Additionally, scientific expertise serves as an instrument *to justify and legitimize positions and decisions*. Especially Austrian decision-makers sometimes consider researchers’ knowledge as an opportunity to legitimize decisions already made due to non-scientific rationalities.

The interviewees told, furthermore, that researchers’ knowledge is often used by politics, administration, and advocacy groups in order to solve conflicts of interest. In this case scientific expertise can be considered as a way *to neutralize, to coordinate, and to reconcile interests* among the parties involved. Hence, especially studies are often commissioned by administration when political negotiations, amongst the federal ministries as well as beyond administration, do not lead to an agreement. The new framing of the political problem as a scientific one hands over the solution of the problem to researchers.

A representative of administration stated in this regard: “However, basically it is the case that, when one notices that it gets difficult to achieve a consensus among ministries with respect to certain question or problem. [T]hen it can increasingly happen that one decides to commission a study” (I7, AH).

Furthermore, decision-makers, especially from politics, use the incorporation of climate science knowledge as a means to raise their *credibility and reliability*. Scientists are frequently selected, by ministry officials and politicians, according to their social and scientific reputation in order to raise the advisory bodies’, the informal events’ and organizations’ credibility and prestige (I3).

Scientific expertise is as well taken into account in order *to detect problems, to provide early warnings, and to support decisions* in Austrian climate policy. This applies in particular to technical questions and new emerging political challenges. When new scopes of duties occur and/or are increasingly addressed, politics, administration, and advocacy groups often search the contact with scientists. Furthermore, scientists are considered as providing instrumental knowledge for measures and political instruments. For the purposes of generating background information, detailed information or evaluating distinct issues specifically for the Austrian case the different actor groups frequently commission purposeful studies or projects to university and non-university research institutes.

To sum it up, the utilization of academic knowledge draws on direct and indirect as well as strategic and conceptual considerations. In many cases we are able to detect a mixture of different functions of scientific expertise.

E. Discussion and conclusions

The paper started out from the assumption that a country's political culture considerably influences the way scientific policy advice is organized. Since Austria shows a particularly strong manifestation of neo-corporatist political culture, we expected this specific policy style to manifest in science-policy interaction in climate policy as well. At the same time, scholars working on Austrian politics have pointed to the fact that, at least in some sectors, policy processes are increasingly shaped by more pluralist forms of interest mediation. Accordingly, one could also expect pluralist imprints in Austrian science-policy advice, especially in the comparatively "young" policy field of climate change. Table 2 synthesizes the results of our analysis with instances for neo-corporatist inscriptions being brought together in the left-hand column and instances for pluralist inscriptions being compiled in the right-hand column. The following discussion will first reflect on neo-corporatist pathways and then trace the existence of pluralist ones.

Table 2 - Characteristics of the Austrian science-policy interface

Analytical dimension	Neo-corporatist patterns	Pluralist patterns
<i>Actors & organization</i>	<ul style="list-style-type: none"> - Administration and social partners as main addressees - Negligible role of the parliament - Relevance of informal contacts - Incorporation via mixed and political advisory bodies 	<ul style="list-style-type: none"> - Foreign researchers consulted - Environmental NGOs and media as addressees - Research programmes partly substitute contract research
<i>Selection criteria for scientific expertise</i>	<ul style="list-style-type: none"> - Institutional affiliation - Personal integrity - Connectability and support of positions and interests - Potential to create political consensus 	<ul style="list-style-type: none"> - Disciplinary academic skills and the reflection on uncertainties and insecurities - Researchers reputation - Foreign researchers to secure objectivity
<i>Role and relevance of scientific expertise</i>	<ul style="list-style-type: none"> - Strong role of administration and social partners - Incorporation of societal actors' expertise mainly along neo-corporatist patterns 	<ul style="list-style-type: none"> - ENGOs as holders of policy-relevant practical expertise and brokers of scientific expertise
<i>Patterns of science-policy interactions</i>	<ul style="list-style-type: none"> - High degree of co-operation and co-ordination - Non-transparency 	<ul style="list-style-type: none"> - Supply-driven initiatives of scientific policy advice - Tendency towards more transparency
<i>Functions</i>	<ul style="list-style-type: none"> - Strategic reasoning in political negotiations - Neutralization, coordination, and reconciliation of interests 	<ul style="list-style-type: none"> - Justification and legitimization of positions and decisions for competitive processes - Raising credibility and reliability

As outlined in section C.1, in Austrian neo-corporatism the public administration and social partners play a central role in the political process. Our analysis showed that those two actor groups also take a prominent position in science-policy interactions: They are the main commissioners and addressees of policy advice but, at the same time, they also play an active role as important knowledge brokers. Likewise, the

weak role of the parliament in the decision-making process in Austria is reflected in our results: The legislative body plays an almost negligible role as demander and addressee of scientific policy advice.

Regarding the organization of the science-policy interface neo-corporatist patterns appear in the significant role of contract research and informal, personal contacts. In addition, there is no pure scientific advisory body but academic expertise is incorporated via “mixed” and “political advisory bodies,” if at all. This contrasts with a competitive, pluralist political culture or Renn’s (1995) “adversarial policy style,” in which scientific advisory bodies, representing “objective knowledge,” play a pivotal role.

Also the analysis of the selection criteria revealed an influence of neo-corporatist thinking. Researchers are not mainly consulted because of their objectivity and competence. In our interviews, representatives from administration and advocacy groups quite openly referred to neo-corporatist selection criteria, like experts’ institutional affiliation, their personal integrity and experience, the expectation that their findings might support pre-defined political positions or might at least help to forge political consensus. We found many cases where the selection of academic experts has been negotiated and coordinated among representatives of administration and advocacy groups. Studies or projects are often commissioned to conglomerates of research institutes or by conglomerates of clients, which may encompass different federal ministries as well as a range of advocacy groups. Furthermore, the selective choice of academic knowledge leads to the attribution of a range of scientists to particular actor groups.

A further finding of our analysis is that scientific expertise has less overall importance than in “adversarial” or “pluralist” systems (Renn 1995; Jasanoff 2005). Academic expertise has to compete with and, in the end, is mostly marginalized by neo-corporatist actors. Scientific arguments are frequently just able to set the framework for negotiations due to the consensus-orientation among several interests and positions of administration and social partners. Furthermore, no comprehensive participatory processes, which incorporate a broader public, could be identified during our research.

Consensus-orientation and negotiation processes manifest in patterns of science-policy interaction as well. The high degree of cooperation and negotiated coordination among scientists as well as administration and advocacy groups, for instance with respect to contract research or research programs, points to the pursuit for consensus. The boundary between science and non-science is often blurred in neo-corporatist systems. We revealed this with reference to “mixed” and “political advisory bodies” as well as contract research where researchers are required to provide “qualified opinions” instead of “pure scientific findings”. In this respect no distinct separation of “facts” and “values” is striven for.

The non-transparency of formal and informal modes of scientific policy advice is closely connected to negotiation and consensus-orientation. Particularly with regard to contract research and advisory bodies the awarding, the results, and the utilization of scientific expert advice are not made publicly accessible. These observations match with Jasanoff’s *consensus-seeking style* of public policy-making which is characterized by a comprehensive low visibility of expert advice.

Finally, when looking at the way how scientific expertise is utilized in political processes, one sees strong neo-corporatist patterns as well. On the one hand, researchers' expertise is considered for strategic reasoning in political negotiations. On the other hand, the use of scientific expertise aims at neutralizing, coordinating, and reconciling different interests among administration but also beyond ministries. Scientific advice, of course, also performs a cognitive function in Austrian politics, but the more strategic rationales are very prominent.

Altogether, the previous discussion has shown that the neo-corporatist political culture strongly affects all dimensions of science-policy interaction analyzed in this paper. However, Austrian climate policy advice also shows patterns which cannot be explained with reference to neo-corporatism but which rather reflect pluralist tendencies (see Table 2, column 2).

Besides neo-corporatist actors also foreign scientists, ENGOs, and the Austrian media engage in science-policy interactions. ENGOs particularly function as addressees and brokers of scientific knowledge in Austrian climate policy. We furthermore revealed that national and foreign scientists are selected on the basis of their disciplinary skills as well as of their reputation in the respective scientific community. Foreign scientific expertise is sometimes consulted in order to secure scientific objectivity as well. This observation points to efforts expended in order to broaden and diversify the homogeneous epistemic culture.

A trend toward more pluralist patterns can also be found with regard to the organization of the science-policy interface: The shift from contract research to research programs goes hand in hand with the introduction of more competitive selection processes. Whereas contract research was commissioned on a more informal basis for a long time, the selection of research proposals needs to meet formally defined criteria today.

The initiative for science-policy interactions increasingly emanates from ENGOs and scientists themselves. Researchers proactively encourage scientific climate policy advice, e.g. in the form of climate researchers' networks. Another indicator which points to a pluralization of scientific policy advice is the tendency towards more transparency and visibility which emanate from scientists, decision-makers as well as advocacy groups.

The utilization of academic expertise revealed indicators which suggest pluralist patterns as well: Scientific policy advice is used in order to generate justification, legitimacy, credibility and reliability for rather competitive ways and fora of policy-making.

In summary, the concepts of "national styles of policy-making" and "civic epistemology" have proven helpful in order to more deeply examine and comprehend how nationally specific political culture manifests at the Austrian science-policy nexus. We showed that neo-corporatist actors and patterns have considerable sway over science-policy interactions. Our findings, however, also suggest tendencies toward a stronger pluralization and a slight departure of neo-corporatist imprint in this newer policy field climate change.

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