Knowledge power Europe
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ABSTRACT
In the longstanding debate over how to characterize the EU as a global actor, knowledge is conspicuously missing. We introduce the term Knowledge Power Europe to emphasize the importance of knowledge for the EU’s foreign policy efforts, particularly as they relate to addressing the urgent and complex global challenges that have become central to the EU’s global strategy. Conceptually, we show how considering the EU as a knowledge power can help overcome the limitations of other EU power concepts, and empirically, we justify our characterization by providing evidence of the use and role of knowledge in terms of what the EU is, says, and does. We conclude by discussing how a knowledge power approach can help advance an understanding of the EU’s capacity for global leadership and power in global governance efforts.

KEYWORDS
EU external policy; Europe as a power; knowledge policies; global leadership; global challenges

Introduction
Power is back as a key topic on the EU agenda. Josep Borrell, the High Representative for Foreign Affairs and Security Policy, has repeatedly called for Europe to ‘learn to use the language of power’ (Weiler 2020). However, as the Europe-as-a-power debates over the past two decades have shown, what is important is not only how to use power but also what sort of power can be used; in other words, on what basis should the EU be taken seriously in international affairs? Over the past two decades, many different types of European power have been proposed, but knowledge has never been one. In this article, we make a case for treating knowledge as one of the EU’s bases of power and show how it can be particularly useful in efforts to shape global governance around global challenges. We introduce the term Knowledge Power Europe (KPE) as a way to situate our discussion within the discourse of Europe-as-a-power and emphasize the importance of knowledge for the EU’s external policy.

The current global context in international relations forks in two distinct directions: on one hand, there are growing tensions that arise from a resurgence of raw power politics, nationalism, authoritarianism, geostrategic competition, a diminishing commitment to liberal values, and an emerging USA-China bi-polar order; on the other hand, we find increasing efforts to establish forms of global governance to address common problems on the global level that are commonly referred to as global challenges. This latter area is...
the focus of this article. We define global challenges as complex, planetary-scale issues that are knowledge-dependent and not resolvable by individual countries; they include climate change, sustainable development, food security, and public health. The EU has sought to make these central to its external actions, and its new strategic agenda states that ‘The EU will use its influence to lead the response to global challenges’ (European Council 2019, 11). This foreign policy objective raises two key questions: On what basis does the EU derive its purported capacity for leadership in the area of global challenges? And conceptually, what sort of power backs these efforts? The answer, we argue, requires a re-conceptualization of the relationship between knowledge and power and how it is mobilized in international affairs, something that the international relations literature has largely ignored (Mayer, Carpes, and Knoblich 2015). What is puzzling is why knowledge has been neglected in relation to the external dimension of the EU when it has been central to the internal dynamics of the Union (Chou and Gornitzka 2014; Sørensen, Bloch, and Young 2016).

Our argument is based on the idea that knowledge and power are intimately intertwined. The linkage can be traced back to Francis Bacon’s famous assertion that ‘knowledge is power’ in the 16th century, while more recent literature has shown that knowledge is important for the development, structuration and transformation of contemporary societies (Adolf and Stehr 2016). The EU has claimed that: ‘Economic and social development will depend essentially on knowledge in its different forms’ (European Commission 2000, 5). We use the term knowledge to refer to scientific and technological knowledge, primarily knowledge that is codified through the practices of research, education and development, but include also tacit knowledge that is inextricably linked to the coincident processes of discovery, dissemination, innovation and application. In this sense, we follow the political-sociological understanding of knowledge found in the discourses of the knowledge-based economy and knowledge society, which argues that knowledge is constitutive of our economic and social activities. This approach treats knowledge as a ‘capacity to act’ (Adolf and Stehr 2016, 1) and is interested in the performativity of knowledge, that is, how it functions to shape actions and decisions within society. Knowledge power, as we use it, is about a capacity to act in global affairs that allows an actor to affect both relationships and contexts of global governance by mobilizing knowledge.

We take the concept of knowledge power to be one which complements, not replaces, other approaches; power is multidimensional and global affairs involve a complex interplay of different types of power. In the article, we show how knowledge-based power is distinct from the other types of power that have been identified in the Europe-as-a-power debate and describe how it helps address the limitations of these other approaches. In order to legitimize knowledge power as a viable concept in the Europe-as-a-power debate, we follow the model of past contributions to the debate by seeking to ‘identify particular characteristics that may contribute to the EU as a power and prioritize questions about what kind of power the EU is, what the EU says as a power and what the EU does as a power’ (Damro 2015, 1338). We show how knowledge has become both an essential part of the identity of the EU and, increasingly, part of its external policy discourses and policy instruments. We conclude by explaining how knowledge as power can advance our understanding of the EU’s capacity for global leadership and power in global governance efforts.
Knowledge in the Europe-as-a-power debates

The question of what kind of a power the EU is has produced a rich debate beginning with Duchêne’s (1972) concept of ‘Civilian Power Europe’ and, particularly in the past two decades, introducing a wide range of concepts that attempt to characterize the type of power the EU has and can wield in international affairs. A content analysis of this literature reveals that knowledge is distinctly missing. We identified 15 significant attempts to coin the EU as a particular type of power: Civilian power (Duchêne 1972), Normative power (Manners 2002, 2006, 2011, 2013), Trade power (Meunier and Nicolaïdis 2006), Market power (Damro 2012, 2015), Regulatory power (Young 2014), Quiet Superpower (Moravcsik 2009), Soft power (Michalski 2005), Integrative power (Koops 2011), Ethical power (Aggestam 2008), Liberal power (Wagner 2017), Pragmatic power (Wood 2011), Imperial power (Spos 2013), Green power (van der Heijden 2010), Smart power (Cross 2011), and Realist power (Zimmermann 2007). Within these texts, a search was conducted for the words ‘science’ and ‘knowledge’. The only text which used the word ‘science’ is Green Power Europe (van der Heijden 2010), and while the text also discusses knowledge, its argument is based on a normative (not technoscientific) framing of green power. The word “knowledge” appears in five other texts, but again not in the way that we use it: for some, it refers to learning about the EU or its norms (Michalski 2005; Manners, 2011), i.e. the knowledge of external actors about the EU, for others, it appears only in a footnote (Koops 2011; Moravcsik 2009) or passing remark (Zimmermann 2007). In the Normative Power Europe (NPE) literature, Ian Manners (2002, 2013) suggests that knowledge is connected to the mechanism of diffusion he calls the “cultural filter”; however, as Forsberg (2011, 1196) argues, this mechanism is theoretically underdeveloped and “unspecified”. To the extent we can extrapolate Manners’ intended meaning, he understands knowledge as a purely ideational cultural artefact that shapes social and political identity, not, as we discuss below, a scientific one that is rooted in a physical and natural context.

The neglect of knowledge as a form of power is problematic, not simply for its own sake, but because it deprives us of the opportunity to make sense of power dynamics that are not captured in other conceptualizations of European power. All but one of the 15 concepts mentioned above were coined prior to the development of the EU’s global strategy, and it is time that we incorporate those political developments into the EU-power discourse more directly. In particular, we need a conceptualization of European power that is adequately suited to addressing global challenges, and for that, it should incorporate the following three elements: multilateralism, global leadership, and the physical world context. These elements come from the expressed aims of the EU and the definitional conditions of global challenges. Multilateralism, as discussed in more detail below, is both central to how the EU understands itself and frames the model by which it aims to achieve results internationally. Leadership, likewise, is recognized by the EU as crucial for multilateral efforts around global challenges and is explicitly called for in the A new strategic agenda for the EU 2019–2024 quoted earlier. Finally, the physical world context is our way of expressing the uniqueness of global challenges within international relations; as they are knowledge dependent, addressing them requires an engagement, through science, with the natural, material, and physical context in which they are situated.
The literature on Europe-as-a-power is dominated by the NPE approach; the establishing article in that approach (Manners 2002) had 1777 citations at the time of writing, and the next four most cited articles also relate to NPE; Chad Damro’s (2012) Market Power Europe appeared fifth with 229 citations.

NPE was coined by Ian Manners (2002) and then expanded on in a series of further publications. As with Duchêne’s (1972) ‘Civilian Power Europe’, it is grounded in a non-military understanding of power in international relations, the foundation for which comes primarily from the identity of the EU: ‘the most important factor shaping the international role of the EU is not what it does or what it says, but what it is’ (Manners 2002, 252), though in later writings he addresses also what it ‘does and should do’ (Manners 2006, 184). In his early work, Manners argues that identity defines action: ‘not only is the EU constructed on a normative basis, but importantly that this predisposes it to act in a normative way in world politics’ (Manners 2002, 252). For NPE, this identity is based on five ‘core’ norms: peace, liberty, democracy, human rights and the rule of law; and an additional four ‘minor’ norms: social solidarity, anti-discrimination, sustainable development, and good governance (Manners 2002, 242), and it is enacted through six mechanisms of diffusion: contagion, informational diffusion, procedural diffusion, transference, overt diffusion, and cultural filter; with the exception of transference, which can include coercion, these mechanisms are non-coercive.

NPE has justifiably drawn significant interest, but also criticism. Authors have identified a gap between the EU’s normative discourse and its actual interest-based actions and decisions (Zimmermann 2007), its failure to adequately address more traditional aspects of international relations such as underlying interests (Hyde-Price 2006), and the difficulties with applying norms that are in conflict with each other (Damro 2015; Wagner 2017). Perhaps the strongest critique of NPE, for our purposes, is that its impact may be limited to those countries that share its norms: Normative power, as the ability to diffuse norms, dissipates when norms are not shared or desired by other countries. Taken to its extreme, some have even argued that NPE is less suited for exerting external influence than for internally consolidating the identity of the EU as a global actor among the Member States (Gordon and Pardo 2015).

The second major approach in the Europe-as-a-power debate grounds itself in economic terms. Meunier and Nicolaïdis (2006) established this line of argument by examining the EU as a trade power. They distinguished between power in trade and power through trade, the former being a reflection of the size and strength of the European market while the latter has to do with the fungibility of power and the EU’s ability to use trade power to impact non-trade policies. Building on this, the concept that is presently ascendant in European external policy discourses is ‘Market Power Europe’ (MPE), which Chad Damro coined in 2012. He argues that, beyond its normative identity, the EU ‘is fundamentally a large single market’ (Damro 2012, 682), and the market confers the power that the EU wields externally. The MPE argument reframes the debate over Europe’s power from a soft power paradigm of norm diffusion to a hard power-like paradigm of externalized interests. The difference between hard and soft power is understood as the existence (or not) of coercive capabilities. Damro argues that the size of the single market, relative to the global economy, confers power that is exercised by allowing or denying access to the market and by setting the conditions of access. This makes it feasible for the EU to extend or externalize its regulations to any state that wishes to sell in
the European market. In line with the ‘fungibility of power’ mentioned above, we can thus refer to the EU as a global regulatory power (Young 2014). Like with the distinction between power in and through trade, Damro argues that the market in itself is not enough to explain the EU’s power. It needs to be explained in conjunction with two other elements of its identity: regulation and interest contestation (Damro 2015). Drawing on the concept of the EU as a regulatory state, Damro argues that the EU externalizes power with a regulatory approach that parallels its internal policymaking approach and institutional arrangements. Additionally, its external power emerges from interest group contestation shaped by societal pressures; this third element is necessary for explaining why market power is exercised in a way that goes beyond economic interests to include regulations, standards, and guidelines that support societal interests and public goods. However, while there are many examples of the EU coercing or persuading others to follow its regulatory regimes, there are also examples of failure, where, despite its market power, the EU has not been able to externalize its standards, particularly when engaged in multilateral global standard-setting efforts (Young 2014).

**Limitations of NPE and MPE and the case for KPE**

As argued earlier, in order for a concept of European power to undergird the EU’s capacity to act on global challenges, it needs to be able to integrate three key elements: multilateralism, leadership, and the physical world context. Yet it is in precisely these three areas that we find limitations in both the NPE and MPE approaches.

Multilateralism is central to the EU’s external strategies and goals, as can be seen in the current strategic documents of both the European Commission and the Council: the EEAS’s 2016 strategy states that ‘The EU will promote a rules-based global order with multilateralism as its key principle’ (European Commission 2016b, 8) and the European Council’s 2019 new strategic agenda reiterates that ‘The EU will remain a driving force behind multilateralism’ (European Council 2019, 10). The 2021 *Joint communication on strengthening multilateralism* reinforces this in the context of global challenges: ‘growing global challenges call for more multilateral governance and rules-based international cooperation’ (European Commission 2021, 1). However, both NPE and MPE have limitations in terms of their multilateral potential, and that may in part account for a shift in the EU’s pursuit of effective and institutionalized multilateralism to an acceptance of a more limited, ad hoc and informal ‘selective multilateralism’ (Drent 2014). As discussed above, the power of norms dissipates when they are not shared, and for that reason, NPE faces a problem in the current international context. Some major global actors (particularly China, Russia, and Brazil) have renounced many of the ‘universal’ norms on which NPE is grounded, which forces the EU to expend other types of power to promote and defend them. While Manners suggests that this can be done through transference, that begs the question of what type of power is transferred. Market power is a possibility, but MPE faces a different issue. While the EU can use economic hard power to shape and regulate externally without shared values, it does so by controlling access to its market. The single market, being one of the world’s largest, gives the EU disproportionate negotiating power in most bilateral contexts. However, MPE has a logical limitation in this regard: as the number of countries involved in a negotiation increase, the relative power of the EU’s market diminishes. Notwithstanding that multilateral negotiations include bilateral
discussions and engagements in which this power can be partially exercised, in the overarching multilateral context, there is an inverse relationship between European market power and multilateralism.

The second limitation is one of leadership. As expressed simply by Joseph Nye, leadership is deeply intertwined with power: ‘you cannot lead if you do not have power’ (Nye 2008, 27). We argue that power, for the purposes of addressing global challenges, is often exerted through leadership, but that NPE, MPE and KPE are rooted in different types of global leadership that are based on different power dynamics.

Research on leadership in international negotiations tends to depict leadership in three-fold typologies which rest on different modes or bases of power (Young 1991; Underal 1994; Malnes 1995). The first two types base leadership on either ‘coercive’ or ‘directional’ power, the former relating to structural power and resources that are exploited to force a country to accept something that it otherwise would not, the latter working through a mechanism of attraction, setting an example that others would wish to emulate. These types of leadership correspond well to both NPM and MPE which combine aspects of both to varying degrees. It is the third type of leadership that distinguishes KPE. It has its basis in the promotion of solutions to collective problems and is variously termed intellectual (Young 1991) or problem-solving leadership (Malnes 1995). As the labels imply, this sort of leadership is rooted in the ability to have and apply knowledge. While some ideational aspects of NPE might appear at first glance to fit into this category, a deeper look reveals a critical distinction. Knowledge and norms, while both being intellectual, are rooted in different sources of legitimacy. Norms are legitimized by shared internal beliefs, whereas knowledge is legitimized by establishing shared credibility about the external world. John French and Bertram Raven in their classic work on the bases of social power, distinguish between what they call referent power and expert power. Referent power is based on providing something with which the subject identifies, and in that way links to the logic of co-option or attraction, which relates to NPE; whereas expert power is based on being perceived to have ‘special knowledge or expertness’ (French and Raven 1959, 263). Leadership through expert power is possible because it provides the ability to solve a problem, which captures the type of leadership that KPE embraces.

The third limitation we have called the physical-world context. Global challenges involve natural, material, and physical phenomena that exist outside of ourselves and our minds; they involve ‘problems that combine intellectual and practical aspects’ (Hicks 2016). If we are to address global challenges, we need to be able to understand, explain, and affect those external physical realities. This entails going beyond a purely ideational approach, a limitation for NPE which Manners confirms is a ‘form of power that is ideational rather than material or physical’ (Manners 2011, 309). John Ziman, a physicist and philosopher of science, while accepting that science is deeply shaped by cultural and mental subjectivities, argues that it is essentially grounded in a shared world that is non-constructivist:

It is abundantly clear that a generally realist orientation is basic to all the paradigms of rationality embodied in the scientific culture. In effect, the norms of academic science require scientists to behave as if they believed in a shared external world which is sufficiently uniform that they can usefully exchange information with one another about it (Ziman 2008, 319).
Herlin lies the key to overcoming this third limitation: we need something akin to ‘objective performativity’, that is, a basis of power that can exert a predictable effect on the real world. To be clear, we are not arguing for absolute truth, rather we accept that ‘the social stability of scientific knowledge is a reasonable indicator of its objectivity’ (Ziman 2008, 6). Though knowledge may be constructed, broad agreement on its credibility allows us to treat it as true. In a manner of speaking, knowledge allows us to construct a reality that is shared and can be addressed across normative divides. KPE provides the basis for shaping, manipulating and leading in a context where actors seek to address the objective rationality of the physical world.

The EU as a knowledge power

In this section, we turn to the task of justifying why the EU should be considered a knowledge power. The test of validity for any concept of Europe-as-a-power is that it encompasses, as Chad Damro (2015) succinctly expresses it, what the EU is, says and does. In other words, it should link not only to the identity of the EU but also to the empirical record showing that the EU has expressed the intent to mobilize and exercise that form of power in its discourse and strategies, and that it has acted on it in its policymaking and policy instrumentation. The sections below discuss these three aspects in turn.

What the EU is

Discursively, we can say that since the advent of the Lisbon strategy in 2000, the EU’s identity has been deeply tied to knowledge. Knowledge policies (higher education, research and innovation policies) have moved from the margins of European policymaking to its core (Chou and Gornitzka 2014). This can be seen both politically and legally. The Lisbon Strategy set a goal of making Europe the ‘most competitive and dynamic knowledge-based economy in the world’ (European Council 2000, 2), and the European Commission has called for creating a ‘Europe of Knowledge’ (European Commission 1997, 2003), with the European Council proposing knowledge as the ‘fifth freedom’ of the internal market (European Council 2008). These objectives are incorporated legally into the TFEU (paragraph 1 of Article 179).

This newly established centrality of knowledge to the European project can be understood as part of a new EU governance architecture, i.e. a ‘strategic and long-term political initiative[s]’ that ‘entail[s] a renewed approach to the raison d’être of the international organization in question’ (Borrás and Radaelli 2011, 465). As with the Single Market in the 1980s and the Economic and Monetary Union in the 1990s, Borrás and Radaelli argue that the Lisbon Strategy is a governance architecture in that: ‘… the competitiveness focus of the agenda has been conceptualized as the raison d’etre of the EU’ (Borrás and Radaelli 2011, 466). Competitiveness, as seen in the quote above, is understood as being knowledge-based.

In order to make knowledge power credible, appropriate capabilities and resources are needed. These material aspects of knowledge power relate directly to what we might call the weight of the knowledge system, which comprises higher education, research and innovation resources, capabilities and outputs (Below, Herweg, and Knoblich et al. 2014; Strange 1998). While there are good reasons not to be overly trusting of indicator-based
measures (Sørensen, Bloch, and Young 2016), for our purposes here, the well-tread set of knowledge indicators (publication outputs, university rankings, and patents) can be used to illustrate the weight of the EU’s knowledge capabilities and resources.

In terms of performance in scientific knowledge production, the EU produced 20.8% of the world’s publications compared with 20.9% for China and 16.9% for the USA. However, counting publication quantity doesn’t capture quality or perceived usefulness; here, highly cited papers do a slightly better job: the data for the top 10% most-cited publications reverses the order, the USA first with 25.7% followed by the EU at 22.7% and China at 18.9% (European Commission 2020b). In terms of institutional knowledge resources and diffusion structures, university rankings are a common proxy. The Shanghai university rankings show that in 2019 the EU had 179 of the top 500 universities, followed by the USA with 139 and China with 58; the top 100 included 46 from the USA, 27 from the EU, and four from China (Shanghai Ranking, n.d.). Finally, in terms of innovation, international patent applications show the EU with a 20% global share, the US 23.5% and China 18% (European Commission 2020b). In sum, the EU has both the material and the ideational capacities and identity to be considered a knowledge power.

What the EU says

The EU strategies and communications that address knowledge in external action can be grouped into two categories: those related to global strategies and the external policy of the EU (coming from the European External Action Service (EEAS), European Council and Commission), and those that are part of the knowledge and science strategies (coming from the Directorate-General for Research and Innovation). In the first category, we seek examples of how these global strategies include knowledge and whether they focus on knowledge-intensive global challenges. In the second category, where knowledge is more explicitly addressed, we seek evidence to show how knowledge policy is being externalized and used in foreign policy.

The EU’s New strategic agenda 2019–2024 has four priority areas, including ‘Promoting Europe’s interests and values in the world’ where we find an emphasis on global challenges as an avenue by which the EU can exert leadership globally (European Council 2019). The EU Global Strategy coming out of the EEAS (European Commission 2016b) focuses mainly on security and defence; still, one of the five priorities for external action is ‘global governance for the 21st century’ and therein global challenges (also referred to as SDGs) have a prominent role, particularly those related to food, water, health, and climate, which alone is mentioned more than 25 times. The strategy states that ‘Responsive external action must be underpinned by a strong knowledge base’ (European Commission 2016b, 48). Regarding global governance, it calls for the EU to ‘act as an agenda-shaper, a connector, coordinator and facilitator within a networked web of players’ (European Commission, 2016b, p. 43) or, as stated in a later document, ‘a global point of reference’ (European Commission 2019c, 4). In other words, the EU intends to position itself to be at the centre node of networks forming around global challenges (see also nodality in the section below). In the 2019 review of the strategy, the centrality of global challenges is emphasized: ‘Finding solutions to such challenges represents the most consequential policy quest of our age’ (European Commission 2019c, 8). In the 2021 joint communication, we find
the most explicit yet claims related to the knowledge power of the EU: ‘Moreover, the EU should leverage its role as a global powerhouse in research and innovation to ensure that multilateral action is informed by the best possible scientific evidence’ (European Commission 2021, 11). In sum, we see in the global strategies that the perceived importance of global challenges and knowledge is growing and becoming more explicit.

In its knowledge and science policies, the expression of European knowledge power is more pronounced than in the foreign policy documents. For more than 30 years, the external element of the EU’s knowledge policies has been treated as a strategic aim, as can be seen in this statement from 1990: ‘Scientific and technological cooperation with third countries has become a matter of increasing importance for and an essential part of the external relations of the Community … Science and technology thus emerge with a key role in international relationships’ (European Commission 1990, 2). Closer to the present, the 2008 Communication, A strategic European Framework for International Science and Technology Co-operation, aims to ‘put the European Research Area on the global map’ (European Commission 2008, 3). It also addresses the centrality of science for working on global challenges: ‘Major global challenges … highlight the need for effective global S&T cooperation to promote sustainable development (European Commission 2008, 2). These points are reinforced in the 2012 Communication, Enhancing and focusing EU international cooperation in research and innovation: A strategic approach, which includes several explicitly foreign-policy related objectives: ‘tackling global societal challenges,’ and ‘supporting the Union’s external policies’. This publication also introduces the term ‘Science Diplomacy’, which is depicted as an ‘instrument of soft power and a mechanism for improving relations with key countries and regions’ (European Commission 2012, 4).

The 2016 report, Open Innovation Open Science Open to the World, lays out the European Commission’s approach to internationalizing science policies, beginning with a forward from Jean-Claude Juncker that states: ‘Most of the political priorities set for my mandate as President of the European Commission depend to a greater or lesser extent on research and innovation’ (European Commission 2016a, 5). The document itself makes a case for fostering international cooperation in research and innovation and doing so in a way that ensures that the EU is at the focal point of these activities. The idea of a ‘global research area’ based on the European Research Area is one example. The SDGs are also highlighted, as is the concept of Science Diplomacy, for which it is stated: ‘Science diplomacy should be used more broadly as an influential instrument of the EU’s external policy … As such, science diplomacy should become an element of the renewed Global Strategy on the EU’s Common Foreign and Security Policy’ (European Commission 2016a, 75). In the 2020 communication, A New ERA for Research and Innovation, the geopolitical use of the ERA has been made more explicit: ‘International cooperation through ERA will take into account the EU external relations priorities contributing to the Sustainable Development Goals and to the implementation of the Next Generation EU by supporting a Stronger Europe in the World’ (European Commission 2020a, 18). In sum, we find that in the knowledge and science policies, knowledge is becoming more deeply connected to geopolitical objectives.
What the EU does

Finally, we turn our attention to what the EU does by examining the policy tools with which the EU mobilizes knowledge power. Rather than try to create an exhaustive listing (see Prange-Gstohl 2018), we instead map key substantive and procedural instruments onto a well-established four-fold typology that classifies tools by the government resource upon which they draw: treasure, authority, nodality, or organization (Hood and Margetts 2007). The advantage of applying a generic policy tools approach, is that, in the words of Hood and Margetts (2007, 11), it allows us ‘make sense of what seems at first sight to be the bewildering complexity of modern government’s operations’. As can be seen in the sections below, the EU has created and deployed an array of policy tools under various DGs. While the mere number of such activities might be sufficient proof of the EU’s seriousness in acting on its knowledge strategies, the generic policy tools approach shows that the EU’s approach is also wide-ranging and comprehensive.

Treasure-type tools are based on financial resources and spending. Given the limited budget of the EU, this resource of power is often not emphasized; however, the funds devoted to research, innovation, and educational mobility are the third largest in the EU budget and exert a broad impact (Young 2015). Much of this spending occurs under the framework programmes, the recently completed one, Horizon 2020, was ‘open to the world’, meaning that non-member states could join as associated countries (see also ‘authority’ tools below) or even participate without any agreement. There have been over 9000 participations in Horizon 2020 from the 16 associated countries and over 4300 participations from more than 110 other non-associated countries (European Commission 2019b). The Article 185 instrument, likewise, brings together Member States and third countries to deal with common challenges; several are considered best practices of science diplomacy, i.e. European and Developing Countries Clinical Trials Partnership (EDCTP), and Partnership for Research and Innovation in the Mediterranean Area (PRIMA). Horizon 2020 also dedicated significant resources to developing international research cooperation as well as an understanding of the concept and practice of science diplomacy. The 2014 work program supports the idea of knowledge power in framing the rationale for research. It states, ‘Europe is confronted with major socio-economic challenges’ which ‘call for a common European approach, based upon shared scientific knowledge’ (European Commission 2014, 2). The 2017 call, fittingly titled Strengthening Europe’s position in the global context, introduced the need to ‘better prepare and employ “science diplomats”’ (European Commission, 2017). By funding three Horizon 2020 projects on science diplomacy (EL-SCID, InSciDe, and S4D4C), the EU supported the development of training materials and courses to support the preparation of science diplomats (who are also part of the organizational tools discussed below), as well as case studies (historical and contemporary), policy papers and governance frameworks to guide the further implementation of science diplomacy.

Authority-type tools relate to the ability of the government to exercise legal power and regulate. The EU uses its authority to sign science and technology cooperation agreements; 20 have been concluded under the TFEU (European Commission 2019a). These texts are legal instruments that are published in the Official Journal of the European Union and specify the principles, means, and modalities of implementation of the bilateral cooperation. Authority can also be exerted coercively through sanctioning, or denying
access to knowledge structures, as the EU did by suspending Swiss participation in the Horizon 2020 program after the 2014 Swiss referendum ‘Against Mass Migration’ broke free movement treaties; this example shows the fungibility of science power in diplomatic disputes. Finally, authority can be used to leverage access. Horizon Europe will intensify the demands for becoming an associated country, requiring not only scientific competence, but also ‘a commitment to a rules-based open market economy, including fair and equitable dealing with intellectual property rights, backed by democratic institutions … [and] … active promotion of policies to improve the economic and social well-being of citizens’ (European Commission 2018, 34), which relate not to science per se, but are examples of the transference of knowledge power to other global objectives of the EU.

Organization-type tools involve the direct action of government through its bureaucracy and can be seen in the creation of positions for science advising and science diplomats in foreign policy. The European Commission has established its own network of S&T attachés in a number of countries (Brazil, China, Egypt, India, Japan, Russia and the USA). The counsellors provide science advice to the Ambassador of the Delegation of EU. Within EEAS, a new position of Science & Technology Advisor was created in 2020. Finally, the EU has created a Science Advisory Mechanism (SAM) which has the responsibility to ensure quality scientific input into policy processes and is made up of a group of chief scientific advisors, a unit at the Joint Research Centre (JRC), and the Science Advice for Policy by European Academies (SAPEA) consortium. The JRC itself is an example of an organizational tool; as a Directorate General of the EU, it functions organizationally as a science and knowledge service providing independent scientific advice and support to EU policy.

Nodealty-type tools are based on centrality in information and social networks. Examples of EU tools in this regard include The Strategic Forum for International S&T Cooperation (SFIC), an advisory group co-led by the European Commission and the EEAS aimed at facilitating the further development of the international dimension of the ERA. The SFIC mandate is to make recommendations to mainstream the international dimension in all ERA activities. Knowledge for Policy is another initiative of the European Commission that has been implemented through the JRC by creating a set of Knowledge Centres that consolidate knowledge resources in vital areas, many corresponding to global challenges, the contents of which are accessible to anyone worldwide.

**Conclusion**

Global challenges have become central to global politics and the EU’s strategic agenda; however, the capacity to understand and address them requires a revision in how we think about power: knowledge needs to be included explicitly as a distinct type of power. By drawing its legitimacy from scientific knowledge, KPE provides a different approach to understanding Europe-as-a-power, one that is particularly helpful for framing the EU’s capacity to shape global governance efforts around global challenges; it aligns well with the need for multilateralism, leadership and a complex scientific understanding of the physical world context which these issues demand.

Current trends in international affairs expose new cleavages and shifts in relative economic strength for which NPE and MPE approaches are not entirely well suited. The contracting liberal world order presents a serious challenge to the NPE approach, as
illiberal and authoritarian actors undermine, and even expressly reject, the range of rules-based, liberal, and democratic norms that form the shared foundation of normative power. Drawing on science, which as a global institution has broader legitimacy than those norms, provides a means to bridge emerging global cleavages. China, as we show above in the section on knowledge structures, has, in particular, bought into the importance of knowledge. While MPE derives its power basis in something that remains more universal, the globalized marketplace, the rapid growth of developing economies around the world, particularly China and India, means that the EU’s share of the global economy is shrinking and with it, at least to a degree, the power that derives from economic strength.

Knowledge power, however, is not intended as a universal answer to all foreign policy issues. It is most likely to be effective for problems that have a strong scientific dimension. While there are many of these, and the Covid-19 pandemic reminds us that more will likely emerge, there are issues, such as the death penalty or human rights, which may be better served through other approaches, such as NPE. Likewise, MPE provides a coercive power mechanism that is mostly lacking in both NPE and KPE. KPE itself is tested by the contestation of knowledge, particularly as it is (mis)used by external actors to politicize and undermine the ‘social stability’ on which the credibility of knowledge rests. Though science rests on a norm of organized scepticism that prevents truth claims from ever being entirely absolute, it also embeds norms of consensus-building and paradigm creation that form a basis for cooperative global governance efforts. The misuse of contestation by political and economic actors is a threat, but one which emphasizes as well the importance of knowledge power, which works as an antidote to disingenuous attempts to manipulate the credibility of science. In sum, the sphere of global governance is too complex to think that one key will unlock all the doors of cooperation and coordination needed to address the myriad range of problems that the world faces; it is useful, instead, to think of NPE, MPE and KPE as different tools in a toolbox of powers which can be mobilized both independently and in conjunction with each other according to the situation.

Through knowledge power, the EU projects an international identity that is characterized by a commitment to objective and rational bases for global governance rooted in knowledge about the physical world. In a way, this is a parallel to the rules-based world order, but here the rules (laws) are grounded in nature and science. Secondly, it projects itself as an expert, that is, having answers, understanding, and know-how. Expertise-based leadership is directly applicable to global challenges, and like other forms of leadership, it is at least partially fungible. Third, it externalizes a key aspect of internal integration: the idea of the EU as a competitive knowledge-based society. While much of the competitiveness discourse focuses on utilizing knowledge economically, KPE reveals the broader potential for knowledge in global governance and puts forward the knowledge-based society as a global standard.

The concept of KPE provides a platform for dialogue and articulation between the fields of European foreign policy and European knowledge governance and public policy. Further research is needed to theoretically refine the concept and empirically study how the EU is using its knowledge power to address particular issues and challenges. Nevertheless, it is clear that knowledge power is something that the EU has and is learning to mobilize and exploit. Global challenges provide unconventional opportunities for global leadership, and we believe that the EU is particularly well-suited to exploit them.
Notes

1. A search of the Scopus database for the keywords Europe AND Power within the article title and restricted to the category of social sciences produced 419 results. Results with at least 10 citations were manually searched for texts that focused on international relations and the type of power Europe has. Several additional texts were identified through a general literature review.
2. We do not count mentions of ‘political science’.
3. This meaning of knowledge is the basis of an article by Ian Manners that looks at the sociology of knowledge and normative power (Manners, 2015).
4. SCOPUS, February 2021
5. This data excludes the UK.
6. More details can be found on the project web sites: www.el-csid.eu, www.insscide.eu, www.s4d4c.eu

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