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Challenges to environmental policies in Russia: The case of APG flaring

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Growing concern over the impact of climate change has led to numerous commitments, especially among members of the Paris Agreement, to reduce greenhouse gas emissions. The implementation of environmental laws is explored through the lens of public policy theory with a case study on the implementation of legislation to combat the flaring of associated petroleum gas in Russia (Decrees 7 and 1148 of 2009 and 2012). The increase of flaring volumes from 2010 to 2020 reveals that the legislation did not reach compliance. The authors rely on a qualitative study based on 22 expert interviews and the triangulation of findings with secondary sources to offer new interpretations of the reasons for 'policy-failure', yielding new insights on the structural and organizational factors that compromise the implementation of environmental legislation and policy recommendations on overcoming enforcement inconsistencies. The findings highlight the necessary balance between participatory mechanisms and top-down enforcement, the risks associated with a lack of community involvement and the specific challenges associated with environmental governance. While the existing literature places a pronounced emphasis on the demobilization of social actors in explaining poor policy compliance, this paper argues that other factors, such as the internal organization of oil companies, enforcement inconsistencies and structural market problems, may be more influential in determining policy outcomes.

Keywords: *climate change; policy-making; policy failure; flaring; Russia*

JEL codes: *Q28, Q01, Q35, P48*

Вызовы экологической политике в России (на примере сжигания попутного нефтяного газа)

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Растущая обеспокоенность последствиями изменения климата породила множество обязательств, особенно среди участников Парижского соглашения, по сокращению выбросов парниковых газов. Мы исследуем реализацию природоохранного законодательства через призму теории государственной политики на примере законодательства о борьбе со сжиганием попутного нефтяного газа в России (постановления № 7 и № 1148 от 2009 и 2012 гг.). Увеличение объемов сжигания на факелах газа с 2010 по 2020 год свидетельствует о том, что законодательство не было соблюдено. Мы провели качественное исследование, основанное на 22 экспертных интервью. Триангуляция результатов проведена с использованием вторичных источников. Предложена новая интерпретация причин «провалов политики», которая даёт новое представление о структурных и организационных факторах, ставящих под угрозу выполнение природоохранного законодательства. Сформулированы политические рекомендации по преодолению рассогласованности в правоприменении. Выводы исследования подчеркивают необходимость баланса между формами вовлечённости и внешним принуждением к соблюдению правовых, а также риски, связанные с отсутствием вовлечённости участников сообществ, и конкретные проблемы, связанные с управлением окружающей средой. В то время как в имеющейся литературе при объяснении несоблюдения правовых норм делается явный акцент на недостаточной вовлечённости представителей соответствующих сообществ, в данной статье утверждается, что более весомое влияние на результаты конкретной политики могут оказывать другие факторы, такие как внутренняя структура, организация деятельности нефтяных компаний, непоследовательность правоприменения и структурные проблемы, связанные со структурой рынка.

Ключевые слова: *изменение климата; государственная политика; провалы политики; сжигание газа; Россия*

Introduction

Growing concern over climate change has prompted academics and policy-makers alike to seek viable ways to contain greenhouse gas emissions. Although countries have varying degrees of commitment to transitioning to renewable forms of energy, the goal of curbing CO2 emissions remains a policy priority on most governments' agendas. One of the most cost-effective ways for oil producing countries to reduce their carbon footprint is to utilize rather than flare associated petroleum gas

(APG). Flaring is typically understood as the controlled burning of APG which is a byproduct of oil production. Traditionally, when there are no facilities to store or utilize it on site, APG is burnt, releasing carbon dioxide, methane and various carcinogens into the atmosphere. In the face of rising awareness about the environmental costs of flaring and in order to meet the commitments it took on as part of the 2015 Paris Agreement, the Russian government set out to crack down on flaring in the country with the promulgation of Decrees 7 and 1148 of 2009 and 2012 which require 95% of APG to be utilized. However, flaring data for the years 2010 through 2020 puzzlingly points to a gradual increase both in flared volumes and in flaring intensity, revealing that the decrees have not been successfully implemented.

The literature on policy implementation sheds a light on some of the reasons for policy-failure (Volker, 2014), indicating that policy issues are 'wicked problems' (Gunn, 1978) that call for a balance between participatory mechanisms and top-down enforcement.

Studies of democratic versus authoritarian environmentalism suggest that non-participatory approaches to policy-making in the environmental sphere may be effective at producing policy outputs but that outcomes remain uncertain inasmuch as policy aims may frequently be undermined at the implementation stage due to low social concern (Gilley, 2012). While the existing literature places a pronounced emphasis on the demobilization of social actors and the lack of community involvement in explaining poor policy compliance, this paper identifies other factors, such as the internal organization of oil companies, enforcement inconsistencies and structural market problems, in accounting for said policy outcomes.

Our paper addresses the following research question: What are the factors that disrupt the implementation of high-level environmental legislation and how can they be mitigated? In so doing, the authors have drawn on a single case study and 22 expert interviews concerned with the flaring of Associated Petroleum Gas in Russia and compliance with Decrees 7 and 1148. Qualitative research approaches, together with process-tracing, are best suited to establish causes behind overdetermined social phenomena (Creswell, 2014). The findings are deemed applicable beyond the case of flaring to larger environmental issue areas and beyond Russia to other oil producing countries.

This paper proceeds in 5 parts: the article opens with a literature review on policy enforcement in the environmental sphere, it then describes the context of the case-study on flaring, the third section explains the methodology and research design, the fourth presents the findings, and the fifth part is the discussion section, which situates the results of the case study in the context of the existing literature.

Literature review on policy-making and implementation in the environmental sphere

General concern about climate change has universally led to the adoption of international agreements and to national governments drastically stepping up their efforts to reach carbon neutrality, particularly to meet the commitments made within the framework of the 2015 Paris Agreement. While a number of countries, western European ones in particular, have pledged to effect a "green transition" to renewable forms of energy, large fossil fuel producers and exporters like Russia are focusing on reducing the carbon footprint of the oil and gas industry by adopting targeted, rather than sweeping measures. One of the most cost-effective means to reduce CO2 emissions linked to oil production is the utilization rather than flaring of associated petroleum gas (APG). Flaring is defined as "the process by which natural gas is burned off in a controlled manner when extracting oil"[1]. Gas is an automatic byproduct of oil production and when there are no facilities to store or utilize it, the APG is burnt, releasing carbon dioxide, methane and various carcinogens into the atmosphere. While safety and non-routine flaring may be necessary to ensure no accidents take place after an accumulation of gas to dangerous levels or to ensure the safe setting up of activities on an oil plant, routine flaring that takes place under usual circumstances represents significantly larger volumes than the two other categories. Flaring levels can be measured on site with flow meters and can be visualized and numerically estimated based on satellite data[2]. Like most environmental problems, flaring is a negative externality resulting from an economic activity, and has a damaging effect on society as a whole (Banerjee and Toledano, 2017). Various laws to combat flaring and utilize APG have been adopted worldwide, with the burden of enforcing change shifted onto different actors: from oil and gas corporations, to local governments and dedicated agencies.

[1] Donev, J. et al. (2018). Energy Education – Flaring. https://energyeducation.ca/encyclopedia/Flaring

[2] World Bank (2022). Global gas flaring data. https://www.ggfrdata.org/

Environmental legislation remains itself a highly 'unruly landscape' (Scotford, 2021), due to the rapid change of perceptions of the environmental threat. The overdetermined nature of climate change is linked to the fact that environmental problems are collective, they result from activities that most of the population undertakes without premeditation of their consequences, they are dynamic and to some extent surrounded by scientific uncertainty (Fisher et al., 2009). As the desired policy goals themselves are contentious and rapidly evolving, the means of achieving them are equally uncertain. The first-generation environmental laws that emerged in the 1970s in Western Europe and the United States were designed following the premise that ecosystems have an inherent balance and mechanisms that lead it to an equilibrium (Garmestani et al., 2019). The idea that ecosystems could be restored with mitigating policies was discredited in the 2000s and new approaches came into focus on repairing and rebuilding (Craig and Ruhl, 2014). However, there remains a considerable mismatch between the incremental changes in the legislation and our evolving understanding of socio-ecological systems (Garmestani et al., 2019). Environmental legislation also frequently challenges existing laws in other spheres and different environmental regimes may clash between themselves, with targets in air quality control not always coinciding with rules on greenhouse gas emissions trading and climate change regulation. Environmental laws are also characterized by their dependence on policymakers' decisions rather than legal reasoning (Scotford, 2021).

Environmental governance is affected not only by legal difficulties but also by enforcement challenges, particularly in developing countries (Heim et al., 2022, Li et al., 2019). Limitations in the administrative capacity of environmental agencies frequently result in poor enforcement (Zhan et al., 2014). Policy implementation is one of the key determinants of policy effectiveness and conflicts between top-down environmental measures, and local social and economic interests frequently hinder the implementation of environmental legislation (Tosun, 2012). Policies 'do not succeed or fail on their own merits' and the top-down view that assumes that the selection of an appropriate design and instruments in the right timeframe can ensure successful implementation has been discredited, although some policy-making authorities still give it some credit (Hudson et al., 2019; Hill and Hupe, 2015). Although as early as the 1970s the 'policy-implementation gap' was identified and public policy problems were described as 'wicked problems' (Rittel and Webber, 1973; Gunn, 1978), the complexity of the factors impacting policy implementation are still being explored. Governments have begun to recognise the social and reputational costs of policy failure (Volker, 2014) and to understand their responsibility to ensure intended policy outcomes are reached, particularly in the environmental sphere. Policy failure is located at the extremity of the spectrum of outcomes as it indicates 'absolute non-achievement' which is an unusual situation (McConnell, 2015). However, exaggerated expectations characterized by an underestimation of the time, costs and risks associated with the delivery of a project frequently threaten its viability (Hudson et al., 2019).

The local context plays a significant part in determining policy outcomes, and successful interventions in one region may not deliver comparable results elsewhere (Braithwaite et al., 2018, Crowley-Vigneau and Baykov, 2020). When aggregated, individual decisions on the ground may reshape policy intentions, and a lack of coordination between administrative decision-making layers of different levels could result in mutually-cancelling effects (Hudson, 1993). The political temptation to achieve short-term results and the fact that politicians are rarely held accountable for the long-term effects of their policies are major policy challenges, particularly in rentier-states and states under foreign sanctions (Kazantsev et al., 2022, Sidorova, 2016, Weaver, 2010). Unsuccessful policy-making has been associated with inadequate clarity in goals and discourse, blockages in inter-governmental relations, and poverty (Li et al., 2019). Furthermore, non-participatory approaches to policy-making in the environmental sphere may be effective at producing policy outputs but policy aims are frequently undermined at the implementation stage due to low social involvement (Gilley, 2012). A study of climate change policy in China demonstrates that the demobilization of social actors and lack of community engagement led to poor compliance, even when implementation was directly handled by the central government (Gilley, 2012). On the other hand, democratic environmentalism in which different levels and types of governmental agencies have authority to design policies and supervise their implementation and which promotes direct public participation may struggle to reach a policy compromise but may lead to a stronger social internalization of policies (Fischer, 2018, Humphrey, 2007). Most environmental policies have features from both models, informal participation and social awareness campaigns are frequently coupled with regulatory enforcement to ensure maximum efficiency (Gilley, 2012).

Interest has grown in identifying the factors that contribute to strengthening the implementation phase, including managing the problem of 'dispersed governance' (or the reshaping of national policies at a local level)

which may threaten the initial goals of environmental policies (Hudson et al., 2019). Several factors have been shown in the literature to enhance policy-making and implementation: first, by raising the salience of a policy issue and enrolling popular support for a cause, second, by creating building blocks and rallying a support coalition in administrations, and, third, by embedding the new policies in routinized social practices (Ilott et al., 2016).

The need for robust policy designs, capable of overcoming uncertainty and applicable in various contexts, has come to the fore in all spheres, particularly environmental protection since it is particularly characterized by urgency. Climate change is, indeed, an area surrounded by profound uncertainty as we not only ignore what the future level of greenhouse gas emissions may be (with policy and demographic factors creating important variations), but we are also unsure how an evolution in these levels may impact the climate and how the climate's natural variables will evolve. Forecasts and predictive tools designed to assist policymakers in decision-making are seriously constrained by our inability to imagine unexpected events. The Covid 19 crisis make the vast majority of prognosis models of the last few years vastly inadequate. Likewise, our inability to predict key environmental events or to time the 'tipping point' of climate change make policy-decisions on decarbonization and climate mitigation highly vulnerable to criticism. Deep uncertainty complicates decision-making and policy design as it fosters profound disagreements not only about the ways to solve a problem but also about the nature of the problem itself (Kwakkel et al., 2016). Recommendations about overcoming uncertainty in policy-decisions in the environmental sphere focus on prioritising resilience over optimality (Walker et al., 2013), suggesting that it is more productive to privilege a solution which is adaptable to a range of predictive scenarios than to develop a strategy only fitting for a particular set of circumstances. Assessing the outcomes of policy-decisions in a dynamic setting has become a best practice, with 'policy mix frameworks' that are stable under various sets of circumstances being prioritised over alternative options. Theoretical considerations on policy-making and implementation in the environmental sphere help to shed a light on the challenges encountered in designing and implementing policies to reduce the flaring of associated petroleum gas in Russia.

Context of flaring in Russia and decrees 7 and 1148

Russia flared the largest volumes of APG globally in 2020, according to World Bank data, followed by Iraq, Iran, the United States, Algeria, Venezuela and Nigeria[3]. This position can be accounted for by the fact that Russia is one of the top oil extracting countries globally, producing 9.9 thousand barrels a day in 2020, second only to the United States (11.3 kB/day). Russia flared in 2020 24.8 bn cubic meters of APG, 23.2 in 2019, 21.3 in 2018, 19.9 in 2017, 22.4 in 2016, 19.6 in 2015, and 18.3 bn cubic meters in 2014[4]. The steady increase in flaring results from an increase in oil production volumes. Russia's flaring intensity also rose from 5.8 cubic meters flared per barrel of oil produced in 2016 to 6.9 in 2020. However, when considering flaring intensity, Russia comes behind a number of countries, including Iran (13.6), Algeria (22.7), Mexico (9.24), Hungary (19.1), and Australia (7.6), testifying to APG being utilized in a number of oil production sites.

A host of factors explain why APG flaring remains high in Russia: the historical focus on industrial development in the Soviet Union, the geography of the country that makes it inefficient to utilize APG in many cases, and the suboptimal use of natural resources in the production process. The oil and gas industry is being recognized as having a significant negative impact on the environment in Russia (Sheveleva, 2013). APG had been considered a waste product since the systemized extraction of oil for many decades, which explains the long running tradition of venting or flaring it. The conceptual and organizational separation between oil and gas activities makes it more complicated to utilize APG as oil companies do not have systematic access to gas pipelines, typically controlled by different companies.

Russia's main flaring sites coincide with the oil producing regions of the country: The North-West, the Volga, Ural and Siberia. The bulk of the flaring traditionally took place in Western Siberia, which has for years accounted for most of the oil production. The Khanty-Mansiysk Okrug has over 220 active fields like Priobskoye, Samotlor and Krasnoleningskoye with huge daily outputs. These traditional oil production sites have over time devised different solutions to utilize their APG, though not in full. A progressive decline in oil production in mature fields has had for consequence a decrease in APG output (Eder et al., 2019), while a number of new fields in this region (Russkoe and Novyi port) have counterbalanced this trend.

The development of other sites in Eastern Siberia was accompanied by an onset of flaring there, with fields scattered across a large geographical area and far from existing infrastructure. This region, which

[3] World Bank (2022). Global gas flaring data. https://www.ggfrdata.org/
[4] World Bank (2022). Global gas flaring data. https://www.ggfrdata.org/

includes Tomsk, Krasnoyarsk and Irkutsk, rapidly became one of the main flaring regions of Russia, with a limited number of fields responsible for the majority of the flaring. The European part of Russia accounts for around 18% of the APG extracted in Russia (Eder et al., 2019). In the Komi Republic and the Nenets Autonomous District (Timan-Pechora region, North), new oil development activities have been generously funded, while gas processing has been neglected, leading to a rise in flaring. The fields in Orenburg have better infrastructure and more available options to utilize their associated gas[5]. In the Far-East, APG production is limited but two production sites stand out: Yakutia and the Sakhalin Island. The effects of flaring through global climate change are visible in different Russian regions. Meteorologists have recorded an increase in average temperatures all over the country. While different studies expect some parts of Russia to benefit from the warming, environmental authorities point to the risk of floods, hunger and epidemics in the major cities[6]. In an official report, the Russian Ministry of Natural Resources and the Environment noted that Russia is warming faster than the global climate, that the melting permafrost in the Russian Arctic could result in radioactive substances being released, that Siberian forests were becoming more vulnerable to fires and the Far East to unexpected floods threatening people's lives and livelihoods[7]. The Russian Deputy UN envoy Dmitry Chumakov confirmed this in a UN General Assembly Session on Climate Change in March 2019, by saying "The pace of warming in Russia is 2.5 times higher than the world average"[8]. The arctic and sub-arctic regions are the most susceptible to climate change, the rise in average summer and winter temperatures leading to a meltdown of the snow, permafrost and sea ice, itself affecting the ecosystems in place. The local effects of flaring in Russia are visible in areas of oil-production. The temperature pollution from flaring in Russia leads to forest fires, damage to vegetation and to soil cover, which in turn adversely impacts the biodiversity of animals and plants (Shevchenko et al., 2016).

Russia is the first flarer globally for geographical and historical reasons and the development of the O&G industry took priority for many years over environmental issues for economic reasons. The government's growing awareness of the negative effects of flaring led to the adoption of national legislation to increase APG utilization (Crowley-Vigneau, 2022).

Over the last four decades, Russia has adopted a stringent environmental regime, with governmental decrees and federal authorities' orders regulating emissions, the use of natural resources, waste management, wildlife protection and nuclear power (Zemtsov and Suzdaleva, 2018). The Presidential decree No. 666 of November 4th 2020 on reducing greenhouse gas emissions requires the government to ensure that the level of GHG emissions be reduced by 2030 to 70% the level of 1990. A dedicated Federal law No. 296-FZ of the 2nd of July 2021 allows for a systematic collection of data and marks the launch of a number of new GHG emission reduction projects[9].

The first laws concerned with the problem of APG flaring appeared in Russia at the end of the 1990s, but the economic and social hardships faced by the country delayed attempts to implement the legislation. While flaring was being banned or severely regulated in a number of European oil-producing countries such as Norway or the UK, Russia considered flaring to be a national matter and refused to take on international commitments to curb flaring. The multitude of cross-cutting laws dealing with APG utilization had little influence on actual practices, as there was a lack of monitoring or punishment for infractions[10]. While the representatives of oil companies were aware in the 1990s and early 2000s of the flaring practices and official documents specifically referred to the problem of flaring, (though more in passing than as a real challenge to be overcome), not only was it consistently viewed as a national matter, but also all data surrounding flaring was regarded as confidential. During the early 2000s the volume of APG flaring did not change and no practical steps were taken to reduce it (Eder et al., 2019).

[5] Haugland, T. (2013). *Associated Petroleum Gas Flaring Study for Russia, Kazakhstan, Turkmenistan and Azerbaijan*. Carbon limits EBRD report. https://www.ebrd.com/downloads/sector/sei/ap-gas-flaring-study-final-report.pdf; Haugland, T., Saunier, S., Pederstad, A., Holm, T., Darani, H., Kertesheva, A. (2013). *Associated Petroleum Gas Flaring Study for Russia, Kazakhstan, Turkmenistan, and Azerbaijan, Carbon limits and EBRD*. Online report. https://www.ebrd.com/downloads/sector/sei/ap-gas-flaring-study-final-report.pdf

[6] Kiselyov, S. (2018). Moscow winters are becoming warmer due to climate change top meteorologist says. *The Moscow Times* https://www.themoscowtimes.com/2018/11/30/moscow-winters-are-becoming-warmer-due-to-climate-change-top-meteorologist-says-a63667

[7] Natural Resources and Environment Ministry (2017). *Report UDK 504.064.2 on Environmental Protection in the Russian Federation*. http://www.mnr.gov.ru/upload/iblock/4c6/%D0%93%D0%BE%D1%81%D0%94%D0%BE%D0%BA%D0%BB%D0%B0%D0%B4_2017.pdf

[8] Novoderezhkin, A. (2019). *Russian climate gets warmer 2.5 times faster than world average*. https://tass.com/society/1051300

[9] Omelchenko, E., Serebrennikova, A., Gumenyuk, D., Chivragova, M., Anichkin, A., Mikhaleva, A. (2021). *Environmental law and practice in the Russian Federation: Overview*. https://uk.practicallaw.thomsonreuters.com/w-013-5609?transitionType=Default&contextData=(sc.Default)&firstPage=true

[10] Røland, T. (2010). *Associated Petroleum Gas in Russia: Reasons for Non-utilization*. FNI Report 13/2010. https://www.fni.no/getfile.php/132059-1469870063/Filer/Publikasjoner/FNI-R1310.pdf

The decision of the Russian government to forcefully address the problem of flaring in 2009 with decree 7 requiring a 95% utilization rate for APG (completed in 2012 with decree 1148) reflects a change in the perception of flaring from a national to an international issue and the recognition of the potential benefits to be reaped from utilizing APG. Enforcement was entrusted to Rostecknadzor and the fines were calculated based on the volume of APG released as well as an estimation of the proportion of harmful substances contained. Several factors may have brought about the Russian government's decision to legislate on flaring: the diffusion of satellite images revealing the country was the first flarer globally created some embarrassment; pressure from international partners in the oil and gas industry was rising, and, more importantly, Russia realized that cutting down on flaring was an effective way for the country to meet the targets it has committed to within the framework of the Kyoto protocol.

Nonetheless, even though a political motivation to reduce flaring appeared in the government, the implementation of Decrees 7 and 1148 proved largely unsuccessful due to compliance problems on the ground. Russian oil companies failed overall to reach compliance with the target to utilize 95% of their APG. Table 1 reflects the failure to contain the growth of the flared volumes, which increased over the whole period, albeit not every year.

Table 1

Russian Gas Flaring 2000–2020

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Russian gas flaring volumes in billion cubic meters	9	10	11	15	14	17	15	15	15	15	16	16	18	16	18	20	22	20	21	23	25
Yearly change in %	/	11%	10%	36%	-7%	21%	-12%	0%	0%	0%	7%	0%	13%	-11%	0.13	0.11	0.1	-0.1	0.05	0.1	0.09

Source: Author illustration with GGFR satellite data[11]

Methodology

The research has been designed to address a gap in the scientific literature and in public debates about the reasons why environmental policies do not reach compliance. While the literature explicates some reasons for 'policy failure', they are limited to general frameworks such as 'authoritarian environmentalism' versus 'democratic environmentalism' and focus on the challenges of non-participatory policy implementation. This paper sets out to answer the following research question: What are the factors that disrupt the implementation of environmental legislation and how can they be overcome? In order to do so, we employ qualitative research methods to investigate the reasons behind non-compliance. This study is based on the constructivist assumption that through the study of individual opinions a researcher can identify broader patterns of thinking, and ideational structures. One of the advantages of qualitative research is that it offers a more realistic insight into the real world than mathematical, numerical or statistical methods would (Creswell, 2014). The study is guided by a "what" research question and the gathering of information to answer it needs to be inter-personal and based on interactions with people on the ground. Rather than confirming a well-defined hypothesis, this study tries to understand which factor is key in explaining the factors that impact the implementation of environmental legislation. When analysing research methodology, Kothari (2004) suggests among others the following categories: descriptive vs analytical, applied vs fundamental, conceptual vs empirical. This study is analytical because it uses information gathered in the case-studies to establish a causal relationship between what is happening and the different actors involved. This study falls into the applied research category because it aims to present the reasons why legislation can be challenging to implement. The research performed is empirical as the analysis is based on a bottom-up approach, going from the detailed identification of problematic issues to the ways in which they impact the legislation.

Our single case study focuses on the flaring of Associated Petroleum Gas in Russia and is based on 22 expert interviews. This case was selected over others in the sphere of environmental protection because the government had a clearly identifiable interest in implementing the legislation, thus allowing us to exclude mimicry (symbolic legislation the government has no intention to enforce) as a reason for policy failure. The problem of flaring is representative of environmental challenges of a larger scale which similarly require new infrastructure and social processes to be overcome (such as the green transition to renewable energy). The

[11] World Bank (2022). Global gas flaring data. https://www.ggfrdata.org/

expert interviews were conducted between 2018-2021 with experts in energy and environmental issues. Respondents include managers of different Russian and international oil and gas corporations and representatives of NGOs involved in combatting flaring. The complete list of interviews can be found in Appendix 1. Respondents were selected from different types of organizations to provide maximum representativeness and a standard semi-structured questionnaire was used for all interviews in order to render respondents' answers comparable. Interviews were carried out following ethical best practices, with the research project being presented to respondents before the interview and consent forms being signed by all participants. Interviews were all transcribed on the day they were carried out, anonymized and manually coded to identify overarching themes. Results are presented along with illustrative quotes in the findings section of this paper. The authenticity of the findings was ensured using different methods including triangulation with secondary sources, member checking, clearing the bias and peer debriefing.

Findings

The expert interviews and background research conducted by the authors revealed several reasons behind the implementation problems of decrees 7 and 1148. The main findings are: (1) that the text of the legal documents themselves partly led to confusion, (2) that there was no political consensus or acceptance on the business side of the new rules, (3) that there were major monitoring problems, and (4) that there was no incentive on the business side to invest in the necessary infrastructure.

The ***first*** implementation challenge resulted from **uncertainty about decrees 7 and 1148**. The legislation regulating flaring is complex and there is no document that would cover all of its aspects. While decree 1148, which remains in effect today, states the maximum levels of flaring allowed; the procedure for calculating these fines is cumbersome and refers to several other documents. As a consequence, firms may not know whether they will be fined for a given year or not. A number of other cross-cutting laws, including the 2002 decree "On environmental protection" require that firms obtain permits for polluting and for any activities, which are harmful to the environment, thus further complicating the calculation process. As noted by respondent 1 *"Some 21 laws and 37 decrees regulated APG utilization in 2011, leading to all over confusion at the time the decrees were first being enforced"*.

Further, decrees 7 and 1148 had not been inspired by international 'best practices', which resulted in their **suboptimal design**. *"The decrees institute penalties for flaring in isolation of other supporting measures, leading to an increase in the operator's costs and in the government's revenues, while flaring and venting continues"* (Respondent 13). Even though the decree allows oil companies to deduce from their fines the investments they have made in infrastructure to utilize APG, the incentive arrives too late, when they are already actively flaring. Another expert noted that *"the incentive system is very complicated, and if a firm is not sure whether it will be fined for flaring, then it sees little advantage in the fact it may be able to deduct from its potential fines the money it invested in infrastructural innovation to reduce flaring"* (Respondent 10). Effectively reducing flaring requires measures aimed at incentivizing and sustaining new APG utilization projects, with a special emphasis on averting flaring at new sites. The dispensations made by decree 1148 for oil sites operating for under 3 years and for those located in remote areas reflect the priority accorded to developing new oil fields over that of reducing flaring. Indeed, it is a 'best practice' to only allow new developments to go forward once an effective solution to utilizing APG has been found, as was the case in the UK and Norway. Fiscal incentive measures are efficient if they create motivation amongst all players to reach compliance; indeed, it is key to have the technical support and necessary funding, else, gas companies often resort to paying the fines. One respondent summarized the problem quite succinctly, remarking in relation to decree 1148 that *"It's the wrong measure, at the end of the chain and there are just not enough solutions around it"*, and *"you get away with flaring for a certain period and then the policy meets the road and immediately runs into a brick wall"* (Respondent 5). Policies have to be designed in such a way that oil producers have the tools, incentives and funds to prepare for when the decree enters into force. *"Strong opposition meant that no one really believed that decree 7 from 2009 would not come into effect until it was too late"* (Respondent 5).

Yet another issue in implementing the decrees was **lack of political consensus** and popular approval. From an aborted attempt to restrict flaring in the early 2000s to the adoption of decree 7, legislating on utilizing APG has been a sensitive issue at many levels, with representatives of the oil industry trying to strong-arm the government into relaxing the system of fines. The lobbies and policymakers who promoted the adoption of the legislation on flaring were neither stronger on the ground nor more numerous than

those countering change, but they had the advantage of being close to power, embedded in the governmental system and having powerful proponents on their side. While their power was sufficient to get the decree adopted, it was insufficient to deal with the contestation on the ground. The leaders of oil companies asked the President to relax the conditions of decree 7 in 2012, when large fines (16.5 billion rubles) were announced for almost all oil companies. Decree 1148 was a partial response to their demands as the dispensations for new and remote sites lightened the financial burden. In February 2015, a lobby group including the management of Surgutneftegas, LUKOIL, Tatneft, Bashneft and Gazprom Neft asked the Russian President to review the coefficient for calculating the penalties, without any result so far. The oil business was supported by various academic institutions that noted that the new decrees could harm business by creating losses on some sites and leading to a shutdown in activities[12]. As noted by respondent 3: *"The opposition to the decrees was so powerful on the ground that the government made significant concessions and allowances"*.

Another hurdle faced when implementing the decrees was **inconsistencies in their enforcement.** *"To be efficient, any measure to reduce flaring needs a timetable and dispensation rules, which have to be enforced"*, noted one respondent, underlining the futility of laws, which are not applied (Respondent 5). The decrees make no specific provisions regarding enforcement, implying that by default Rostechnadzor, the Federal Service for Ecological, Technological and Nuclear Supervision will be in charge of ensuring compliance. "Subsoil activities may be regulated by other departments leading to a certain amount of confusion regarding who is responsible for what" (Respondent 6). A specialist also noted that the fines, which are linked to the new legislation against flaring are too small and companies find it easier to pay them than to change their current operations. *"There is always the idea that they may not get caught out, that the inspections may not take place this year and that in the end, if need be, the fines will be paid"* (Respondent 10). Oil producers in some regions do not have in their licenses explicitly the obligation to utilize APG leading to a number of court cases to see their fines for flaring waved. *"Corruption is also an explicative factor why only a fraction of the calculated fines ended up being paid"* (Interview11).

The question of **measurement of flaring** also remains a problematic issue. While the decrees require all sites to have measuring equipment, and penalizes those without them with a severe fine multiplier, many sites remained from 2012 to 2020 without meters. In effect, when the decrees entered into force according to the Russian Accounts Chamber, only 50% of sites were equipped for measuring flaring (Loe and Ladehaug, 2012). *"It should also be noted that not all meters are reliable, some may be switched on and off, and some fields may go from flaring to venting ahead of an inspection"* (Respondent 4). The sites, which are not equipped, may struggle to understand the scope of their flaring problem and to find a solution to it.

Alongside the difficulties with the decrees themselves and their enforcement, some **structural problems** were major blocking points to reducing flaring. The lack of innovation in Russian oil companies made it impossible to develop in time new solutions to utilize the associated gas. The oil market is dominated by a small number of vertically integrated companies, some of which are state-owned or -run, and others that are private. And yet, regardless of their ownership, all companies have to transfer a large proportion of the profits to the state in the form of taxes. This considerable levy handicaps the firm's future development and little is left after taxation to be reinvested in operational and research activities. *"While it is a public opinion shared by many citizens that oil and gas firms are incredibly rich, the reality of the situation is that they struggle to finance and attract investments for new projects"* (Respondent 10). While small and medium oil and gas firms are known to drive innovation, Russia has relatively few of these. Reducing flaring requires investments in infrastructure, which cannot currently be done. The structural problem linked to the over-taxation of the oil and gas industry is related to the fact the share of oil and gas in Russia's budget revenue has been around 50% for several decades. Hopes to see that proportion fall have been backed by new policies to diversify economic activities in the country but the dependence continues.

Another structural problem is that the Russian population has **subsidized gas prices**. In order for it to be economically worth it for an oil producer to utilize its APG, the prices for the gas have to be sufficiently high to cover processing and/or transport costs. The domestic price level is set by the state and is kept much lower than export prices (Loe and Ladehaug, 2012). This stems from the governmental desire to keep peace and social stability, as the population historically has come to expect that the country's natural resources belong to the entire population. While plans were made a decade ago to bring domestic prices up to the level of netback parity, meaning "the same price as exports after adjusting for export taxes, transportation costs

[12] Kelley, P. (2012). Oil Companies' Fines for Gas Flaring to Hit $500M in 2012. *The Moscow Times*, June 27. https://www.themoscowtimes.com/2012/06/27/oil-companies-fines-for-gas-flaring-to-hit-500m-in-2012-a15809

and transit tariffs" (Loe and Ladehaug, 2012: 512), the prospect of its implementation is far off. *"Even moderate increases in gas prices lead to strong popular discontent, even to a sense of betrayal"* (Respondent 21).

Additionally, the **gas market is dominated** by three large companies: Gazprom which has the monopoly on the gas pipelines and two independent companies Rosneft and Novatek. The struggle between these three players is focused on the access to export markets and assuming responsibility for provisioning the domestic market at reduced prices, with Gazprom insisting that independent companies should not obtain rights to export gas if they do not provide for the Russian market (Henderson and Moe, 2017). Because of their dominant position on the market, the three companies negotiate prices to their advantage when buying APG from oil producers. Some oil companies may turn to smaller regional players in the hope of obtaining higher prices, however their needs in electric generation vary greatly from one period to the next. Oil companies may decide to compress their APG and send it into the Gazprom pipelines, indeed since 1997 oil companies are entitled to rent space in the pipelines on the condition that they are not full and the quality of the gas meets international standards[13]. *"The absence of external checking means that Gazprom can decide at any given time whether to grant access or not to the pipelines. The adoption of legislation requiring Gazprom to open up its pipelines has had little effect and it remains a major barrier to the effective utilization of associated gas"* noted respondent 14. Gazprom also has a legal monopoly on the export of gas abroad since 2006, and independent gas producers have no direct access to foreign markets. Their only options remain to utilize APG themselves for local power generation, re-inject it (which yields no financial value), or sell it to Novatek, Rosneft or Gazprom at low prices. None of these solutions is economically viable, let alone profitable, especially in times of low gas prices. *"Investing in infrastructure alone or with a specialized business partner requires a strategic vision and many efforts; although the results can be worth it as illustrated by the case of Rosneft opening its own petrochemical facilities to process APG"* (Respondent 7). In November 2013, the Ministry of Energy made some amendments to the Law on Export of Gas allowing firms to export LNG. The goal was, rather than one of general liberalization, to support the production of Yamal LNG being developed by Rosneft and Novatek (Morozova, 2019).

The **internal organization of oil companies** also indirectly complicates the utilization of associated gas. "The organizational structure of oil companies is standard, with a vice-president in charge of each different part of the production process: there is one for extraction, one for transport etc. But there is no vice-president responsible for the oil and gas between the time it has emerged from the ground and the time it is stored for transport" (Respondent 10). And this is precisely the production stage, when the oil and gas are separated, flaring takes place and the oil is filtered. The quality of the oil and gas depends on this part of the production process for which no vice-president is formally responsible, and this explains why there is little motivation to change this stage. *"The vice-presidents engage in vivid discussions at monthly management meetings, blame each other for the quality of the product"* (Respondent 11). The problem of the quality of the associated gas is a major one, as Gazprom will not allow access to its pipelines to low quality gas, as its clients require constant high gas quality. *"Identifying the problem has not led to its resolution and the vested interests of different participants slow down the process of change as do the inertia of large integrated oil and gas companies and the administrative load linked to minor changes of any nature"* (Respondent 12).

The **tax system** does not make it advantageous to re-inject APG as taxes are paid based on the volumes extracted, regardless of whether the gas is later re-injected. Worse even, if the company later decides to extract this gas again for utilization, it would have to pay tax once more on it. *"The prospect of double taxation makes oil and gas companies reluctant to re-inject"* (Respondent 10). Some progress was made on this front in 2011 when the State Duma approved an amendment to the tax code setting a zero mineral extraction tax rate for natural gas which is re-injected into a reservoir to maintain pressure with the objective of yielding more oil[14]. The legal change did not however cover re-injecting practices for any other purposes and the tax improvements considered in 2011-2014 by the Russian Government focused on the fiscal function of taxation, while some experts (Ponkratov, 2015) suggest that for hydrocarbons, the taxation of end results of a firm's activity is a sounder principle. Other suggestions include creating incentives for a rational use of natural resources, simplification of administration and a full utilization of all the products of extraction.

Discussion

The results of this inquiry into the reasons for the low level of compliance with decrees 9 and 1148 on combatting the flaring of APG in Russia provide new insights into the difficulties of implementing environmental legislation.

[13] Gazprom Sustainability Report 2017. https://www.gazprom.com/f/posts/12/255042/sustainability-report-en-2017.pdf

[14] Kutepova, E., Knizhnikov, A., Kochi, K. (2011). *Associated gas utilization in Russia: issues and prospects*. WWF-Russia-KPMG Annual Report, 3.

The findings allow the authors to make a novel contribution to the academic literature on risk factors for policy failure and offer policy recommendations which go beyond the scope of flaring to address much larger issues.

This study on flaring contributes to the literature on optimal policy design by exposing the risks of adopting symbolic targets to assess policy outcomes, such as in this case the 95% utilization of APG. Policy failure can be forecasted from the outset if the timeline and target of a policy is unrealistic. While targets need to be clear in order to avoid misunderstandings, setting overly ambitious objectives increases the chances of 'absolute non-achievement' of a policy, which is described as an unusual situation (McConnell, 2015). Policy success is measured up against targets, which benefit from being qualitative as well as quantitative and multidirectional. Alongside flaring reduction targets, policies should focus on the development of infrastructure and investments in utilization technologies. Symbolic targets compromised the assessment of the efficiency of a project when it is being evaluated against exaggerated expectations characterized by an underestimation of the time and price of bringing about the necessary changes. Clarity and consistency are important features of optimal policy-making.

Short-term targets represent an important threat to compliance. Decree 7 allowed under three years for oil companies to comply with the required 95% utilization rate, a time period sufficient for some simple utilization solutions to be implemented in a number of regions but not long enough for real solutions to flaring to be developed on far-off and off-shore sites. The short-term focus of politicians described by Weaver (2010) finds its natural continuation in policy-making and in corporate attitudes to environmental protection.

Project viability is also determined by mobilizing the necessary enforcement capacities. The incertitude surrounding the organs responsible for monitoring and punishing infringers for flaring led to poor enforcement of decrees 7 and 1148. The administrative capacity for supervising policy compliance should be calculated from the outset with the allocation of appropriate funding and trained personnel.

This study also confirms the limitations of top-down environmentalism presented by Gilley (2012), as low levels of social awareness surrounding flaring led to suboptimal policy outcomes. Community involvement makes policy-making less controllable and organized but created support nodes for policy-implementation at a grass-root level. The mobilization of different levels of actors is most effective during the policy-making stages as the perception of having contributed to and been heard during policy design makes corporations and citizens more amenable to sacrifices required further down the line.

Policy designs need to be robust, capable of overcoming uncertainty and applicable in various contexts. This is particularly relevant for environmental protection measures, which are characterized by urgency. Different contexts require specific measures and allowing regional authorities to adapt policies to local circumstances may be the most productive way of approaching policy-making. Flaring varies in volume, frequency and content across Russia and the selection of a solution (from reinjecting APG, powering local buildings, to developing a petrochemical industry or using existing pipelines) is best left in most cases to local authorities.

Some of the policy recommendations emerging from this work are that governments should strive to take into account international best practices, and ensure the need for multi-level participation in developing the infrastructure to process APG is met. The international structure of oil companies should be reviewed to ensure the flaring phase is under the responsibility of a high-level supervisor. This recommendation applies beyond flaring to all environmental problems: having a dedicated person responsible for tracking environmental damage creates an additional incentive for corporations to be environmentally-friendly. Overcoming the oil company versus gas company divide would help promote shared responsibility for environmental protection, even beyond the problem of flaring. Expanding efforts to liberalise the fossil fuels market and reducing oil and gas subsidizing will increase the value of APG, once considered a simple externality of the oil extraction process. The development of green and participative finance may help promote carbon free and environmentally friendly approaches (Streimikiene and Kaftan, 2021).

Conclusion

This paper considers through one specific case, the challenges encountered by states in implementing environmental legislation. The authors have identified, based on a case-study on compliance with flaring regulation in Russia, the main factors that compromise policy implementation. The findings both confirm some of the main premises advanced by the expert literature on policy-making, such as the necessary balance between participatory mechanisms and top-down enforcement, as well as the risks associated with a lack of community involvement, but also points to some new factors to explain poor policy compliance. Policies developed by governments to improve environmental conditions and reduce global warming face a number of additional challenges

related to structural issues such as the internal organization of oil companies, enforcement inconsistencies and structural market problems. The identification of different categories of challenges suggests that some of the difficulties may be easier to overcome than others. Solving problems linked to the structural organization of the oil and gas industry, contradictions in legislation and taxation specificities may be an easier way to make progress in implementing environmental legislation than addressing straight on large scale difficulties such as the organization of enforcement. Further research could investigate the impact of solving 'low-level' difficulties on implementation outcomes in the environmental sphere.

Annex

N	Gender	Place of work	Job	Nationality	Interview Language
1	M	MGIMO/ International Institute of Energy Policy and Diplomacy	Lecturer	Russian	Russian
2	F	"Gubkin" National University of oil and gas	Associate Professor	Russian	Russian
3	F	Rosneft	Director	UK	English
4	M	Gazprom	Special Advisor	US	English
5	M	Gazprom	Director	Russian	Russian
6	F	World Bank	Consultant	UK	English
7	F	Rosneft	Analyst	Russian	Russian
8	M	Tatneft	Manager	Russian	Russian
9	F	WWF	Environmental Specialist	Russian	Russian
10	M	World Bank	Manager	US	English
11	M	Russian Gas Society	Executive Director	Russian	Russian
12	F	University/ NGO	Associate Professor	Russian	Russian
13	M	BP	Communication Director	UK	English
14	M	BP	Financial analyst	UK	English
15	F	ENI	Environmental Expert	Italian	Russian
16	M	ENI	Project manager	Italian	Russian
17	M	Total	Risk analyst	French	French
18	F	Total	Director	French	French
19	M	Lukoil	Lawyer	Russian	Russian
20	F	Lukoil	Project manager	Russian	Russian
21	M	Union of oil and gas producers of Russia	Director	Russian	Russian
22	F	Greenpeace	Researcher	Russian	Russian

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