Assessing Turkey's Climate Change Commitments: The Case of Turkey's Energy Policy

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Abstract

Climate change is increasingly recognized worldwide as a growing threat. The UN's sustainable development goals and the Paris Conference (COP 21) attest to this. Countries confront the challenge of managing the trade-off between energy-intensive growth and climate change effects. In this historical juncture, a renewable energy- based third industrial revolution is underway. In the post-COP 21 period, it is now imperative to analyze the (non)-compliance of signatories to their commitments towards climate action. Turkey is no exception to this trend. In this light, this paper examines the credibility of Turkey's compliance with its commitments at the COP 21 with special focus on the public attitudes in Turkey towards climate change and the government's (non)-adoption of climate action as a norm in its energy strategy documents and its energy policy practices. It concludes that regardless of Turkey's COP 21 commitments and public perceptions on climate change, Turkish policy makers prioritize availability in its energy policy to foster economic growth.

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Key Words

Sustainable Development, Climate Change, Energy Policy, Public Opinion, Turkey.

"A more immediate danger [than asteroids and nuclear war] is runaway climate change. A rise in ocean temperature would melt the ice-caps, and cause a release of large amounts of carbon dioxide from the ocean floor. Both effects could make our climate like that of Venus, with a temperature of 250 degrees."[1] *Prof. Stephen Hawking*

Introduction

As the globe confronts a "trilemma of energy challenges" [2] (fossil fuel based energy systems, soaring energy consumption, and energy availability concerns), countries confront the daunting task of ensuring their "energy securities"[3] by carefully managing the trade-off existing between energy-intensive growth and its environmental degradation effects (i.e. climate change).[4] Actually, many scholars evaluate this debate on sustainable energy under

the topic of "the third industrial revolution".[5] In this parallel, renewable energy supplies and technological advancements in efficiency (i.e. smart grids) in energy systems have been offering prospects for countries to decouple economic growth and carbon emissions.[6] It should be noted that strategies to decarbonize economic growth do not solely address energy usage (e.g. coal consumption, energy efficiency, etc.), but also sustainability problems directly/indirectly related with carbon emission levels such as industrialization,[7] urbanization,[8] transportation,[9] agriculture,[10] and live animal stocks.[11] For sure, a cross-country comparison of those factors' changing emission levels through a longitudinal perspective would be meaningful, but due to the scope of this special issue and objectives, this paper mainly focuses on energy (particularly coal as the largest emitter) policy.

Renewable energy supplies and technological advancements in efficiency (i.e. smart grids) in energy systems have been offering prospects for countries to decouple economic growth and carbon emissions.

Sustainable energy related debates and policies at the domestic level have increasingly been embedded within the international energy agenda.[12] Indeed, a paradigm shift has been taking place among domestic actors towards a sustainable energy future. Particularly domestic actors in advanced democracies (e.g. Germany, Australia, etc.) have been enquiring sustainability of energy sources and they have been deliberatively requesting future energy alternatives to fossil fuels from their governments. Mainly due to governments' difficulty to come up with economically acceptable policies for the whole society, those public preferences for low-carbon economy have been translated into policy outcomes with different levels of success.[13] Germany is one of the success stories in this regard. In December 1985, it was *Science* that introduced climate change into the public (media) discourse, and after its media coverage "success", the issue has been translated in German politics, culminating in the phasing-out from nuclear and "*Energiewende*" (energy transition) policy aims to accelerate the country's energy transition to a low carbon economy.[14]

In this context, the credibility of Turkey's commitment to fighting climate change in its energy policy is the focus

of our critical approach in this paper. We assess the credibility of Turkey's COP21 commitment with reference to public opinion on climate change and the adoption of climate action as a norm in Turkey's energy policy strategy documents and practices.[15] Although historically the impact of public opinion on foreign policy has been dismissed in the International Relations literature, recent studies point out that public opinion has significant influence on foreign policy, although political elites also influence public opinion.[16] At a minimum, the public is considered as a constraining factor for the government during international negotiations.[17] From a rational choice perspective on compliance, one can argue that in a regime with regular elections, the incumbent government complies with international norms if there is public support for that particular international norm to get re-elected.[18] Hence, the expectation is that the more the public and constituency support for compliance with Turkey's COP-21 commitments, the higher the compliance of the government to be re-elected. In what follows we assess Turkey's case in this light and argue that public opinion does not lead to compliance as evidenced by Turkey's energy policy strategy and practices.

In this context, it can be argued that if the public views climate change as a security threat it may enable the issue to gain political salience, or in some cases allow the government to take military or non-military measures against climate change.[19] Notwithstanding emerging international academic literature on assessing the social impacts of energy policies,[20] there are few academic studies on Turkish public attitudes towards climate change and their implications for Turkey's energy policies.[21] In this regard, this paper aims to contribute to the scant literature by examining the credibility of Turkey's climate change commitments with reference to its energy policy. The paper hinges on the expectation that public acceptance of climate change as a security threat would lead to a higher potential of compliance with the COP 21 commitments by Turkey.

Sustainable energy related debates and policies at the domestic level have increasingly been embedded within the international energy agenda.

On the other hand, in order to come up with coherent domestic sustainable

energy policies to address serious risks not only for current but also future generations, it is obligatory to consult all domestic stakeholders, thereby, reach a consensus on energy politics. Otherwise, it will not only create "legitimacy deficit",[22] but also, problems associated with implementation as revealed in the context of China's "authoritarian environmentalism".[23] Indeed, environmental sustainability and gaining public consent have become criteria for successful energy policies. Hence, as the focal actor in energy policies, public opinion and preferences, just like the sectors' other players, have gained prominence in the decision-making process.[24]

To this end, the paper first briefly overviews Turkey's energy policy. Secondly, it gives an account of how the emerging international norm of climate action is putting pressure on countries all around the world, Turkey is not an exception, while formulating their energy policies. Then we survey public opinion on climate security in Turkey, followed by an analysis of the energy strategy papers as well as Turkey's energy policy practices to understand whether they comply with climate norms. It concludes that regardless of the Turkish public's preference for environmental stewardship on climate change and Turkish policy-makers' COP 21 commitments, those have not been transformed into credible energy policy outputs by Turkey, which continues to prioritize energy availability in order to foster the country's high carbon-intensive growth.

Turkey's Energy Policy at a Crossroads

In terms of primary energy, Turkey heavily relies on hydrocarbons (about 70-75%) to meet the country's increasing energy needs. As of September 2016, in the electricity sector, Turkey's generation mix is as follows: 32,44% coal (lignite and hard coal), 32,40 % natural gas and liquefied natural gas (LNG), 26,20% hydro, and 8,96 % renewables (primarily wind 5,56%).[25] Together with its pipeline politics,[26] Turkey has prioritized the exploitation of all types of energy resources (nuclear,[27] coal,[28] and hydro[29]).

Energy policies in Turkey have been largely shaped by concerns related to supply component of energy security, mainly due to paramount importance attributed to economic growth.[30] Despite the fact that Turkey has set an energy efficiency target of 20% energy intensity reduction in electricity

generation by 2023,[31] compared to the attention paid to energy supply policies, energy efficiency for sustainable growth has received relatively less attention.[32] Based on the report prepared by the Energy Charter Secretariat, Turkey's energy intensity is higher than the OECD and the EU average implying that Turkey is not doing well with regard to efficient use of energy resources.[33] Concretely, the same report, using World Bank 2013 statistics, illustrates that whereas Turkey's energy intensity is 0.18 koe (kg of oil equivalent) per unit of GDP, the EU and OECD have 0.11 and 0.14 respectively. Such energy intensity based on hydrocarbons is challenged by the emerging climate change regime, which is briefly explained next.

Climate Change as a Security Threat

Since the industrial revolution, global fossil fuel related carbon dioxide emissions (CO_2)- the largest of anthropogenic (human-made) greenhouse gas (GHG) emissions- have been incrementally increasing in the atmosphere.[34] Among those fossil fuels, meeting 29% of the world's primary energy needs, coal is responsible for 46% of CO_2 emissions in 2013. According to the International Energy Agency (IEA), coal combustion is responsible for the 70% of CO_2 emission increase in the period of 2012-2013.[35] A strong scientific consensus has been reached that unless humanity can restrict warming of the climate system to 2 degrees Celsius above pre-industrial levels, this will have detrimental implications for our environment and humanity.[36]

Guided by this authoritative evidence, there has been a burgeoning literature exploring climate change as a new security threat, namely "human security," defined by Ogata and Sen as the protection of "the vital core of all human lives in ways that enhance human freedoms and fulfilment."[37] Meanwhile, an international norm concerning climate change has emerged and become consolidated as the norm building process occurred, due to three elements: the 1992 United Nations Framework Convention on Climate Change (UNFCCC); its 1997 Kyoto Protocol and its ratification by most states; and the 2009 Copenhagen Accord setting out a political framework.[38]

On the other hand, there is a correlation between energy availability and economic growth. This is particularly important for 1.2 billion people - 17% of the global population

–without access to electricity today.[39] Acknowledging those two issues, the United Nations (UN) declared 2012 as the year of "Sustainable Energy for All" (SE4ALL).[40] In this parallel, the UN has more recently declared climate action- along with the one pertaining affordable and clean energy- as one of the Sustainable Development Goals (SDGs) in 2015.[41] On December 12, 2015, in the same vein, 195 nations' representatives reached a landmark accord at the UN Convention on Climate Change Conference (COP 21) in Paris. Some pundits even presented the COP21 as "the world's greatest diplomatic success".[42] Indeed, for the first time, nearly every country affirmed to decrease planet-warming GHG emissions to make their contributions to combat climate change. In this light, those countries pledged to limit global temperature increase to below 2 degrees Celsius, while taking steps to limit the increase to 1.5 degrees. Moreover, both developed and developing countries committed to making "intended nationally determined contributions" (INDCs) and to pursue domestic measures aimed at achieving them.[43] Despite initial euphoria on the COP21's success, many countries' INDCs were prepared in a hurry for Paris, with limited public consultation, weakly integrated with the rest of the economy, business, politics and other sectors. Differently put, now the challenge is to integrate climate change into national priorities of economic growth, employment and poverty reduction.[44]

Public Opinion on Climate Change in the World and in Turkey

While parliaments offer formal support, public opinion gives moral support to climate security policies.[45] Therefore, public opinion on climate security is an important but understudied aspect of the emerging climate change regime. This paper primarily utilizes data from the PEW Research Center Global Attitudes Survey (2015) exploring global public opinion towards climate change, which was based on 45,435 face-to face and telephone interviews in 40 countries- including Turkey- with adults 18 and older, conducted from March 25 to May 27, 2015.[46] The survey includes questions that deal with various aspects of climate change as a source of (human) security. For our purposes, we will place our focus on 1) the level of concern, and 2) responsibility of respective states. In order to operationalize it, we rely on the following Pew survey questions:

"The level of concern about different international issues" (Table 1), "Which one of these climate change effects concern you most?" (Table 2), and "Do you support or oppose (survey country) limiting its greenhouse gas emissions as part of such an agreement [in Paris]?" (Table 3).

Pertaining to our first inquiry, "the level of concern about different international issues", publics in 19 of 40 countries considered climate change as the top threat, among widespread global concerns (i.e. global economic instability, ISIS, Iran's nuclear program, cyber-attacks, tensions with Russia, territorial disputes with China) prior to the COP21. This is particularly the case for societies in Latin America and Africa, where majorities declare that they are very concerned about this issue. At a time of heightened concern on the so called Islamic militant group ISIS in Iraq and Syria, most frequently Europeans and Middle East cite ISIS as their main concern among international issues. As the question places climate change within the same framework as traditional and emerging security issues such as terrorism, the nuclear programme, and territorial and military tensions, we can argue that an affirmative response to this question indicates the level of agreement that climate change is a threat to security. As the second biggest concern in around half of the countries, global economic instability was among the top concerns in a number of countries.

Among those global concerns, despite Turkish mass media's indifference to environmental concerns in their coverage,[47] the top concerns for the Turkish public was climate change (35%), yet this percentage was lower than most of the countries studied as part of the survey (Table 1). Due to Turkey's economic vulnerability to external shocks with significant negative implications for its working class[48] and immediate proximity to Middle Eastern turmoil, it is understandable for the Turkish public to be concerned about global economic instability (33%) and ISIS (33%) as well.

When it comes to perceived consequences of climate change, the possibility and/or existence of drought/water shortages, followed by severe weather conditions (storms/floods), is the most worrisome (Table 2). In this parallel, Turkish public is concerned most about those two effects with a rate of 70% in total. Indeed, TEMA's (The Turkish Foundation for Combating Soil Erosion for Reforestation and the Protection of Natural Habitats) report

on Local Implications of Climate Change (2015) verifies these findings that the Turkish public perceives more frequent droughts and floods along with desertification as negative effects of climate change.[49]

Pertaining to climate change action, even when in doubt, publics in general embrace the precautionary principle and act out of prudence. In 37 of 40 countries surveyed, participants expressed willingness for their country to limit its GHG- exceeding their rate of their climate change as a very serious concern - as a part of an international agreement such as the COP21 in Paris. With a support rate of 56%, the Turkish public declared their wish for Turkey to curb the country's carbon emission levels (Table 3).[50] The PEW findings have been verified by EDAM's 2015 survey, with a sample size of 1508, which reveal that most of the Turkish public respondents give conditional support for Turkey to take on responsibility in the struggle against climate change.[51] According to the EDAM survey, 47,5% of the supporters of the incumbent governing political party give conditional support to the government to take action to fight climate change, while 32,1% of the remaining declare they do not have an opinion and 20,4% supported the government not to take any action on climate change. Overall, the surveys show there is broad public support for the government to take climate action. Next, we discuss if Turkey is taking such action to fight climate change in its energy policy with reference to energy strategy papers and energy policy practices.

The Mismatch between Turkey's Energy Policy and Climate Action Commitment

Turkish policy makers have historically opted for energy policies to bolster industrial and economic growth at the expense of environmental degradation. With its fossil fuel based energy profile, above global average energy intensity,[52] and incrementally increasing carbon emissions, Turkey has continued its unsustainable energy trajectory and refrained from binding emission mitigation targets.[53] In this light, it is not a surprise to note that Turkey's GHG increased 133,4% in the period between 1990-2012. Turkey is among the first 20 countries in the world in this respect (Table 4-5).

Indeed, Turkey's gloomy energy efficiency and/or intensity figures have been addressed in the last two

strategic documents of the Ministry of Energy and Natural Resources.[54] There are negligible differences between those two reports in terms of their emphasis on energy security and environmental/ecological issues. Acknowledging a slight increase in CO_2 emissions sourced from electricity generation in the period of 2004- 2007, the earlier report aims to minimize environmental degradation caused by energy generation and targets to reduce the pace of rising GHG emissions in the energy sector by 2014 as we have partially noted in Table 5.[55] By noting that energy intense sectors (i.e. cement and iron-steel) play dominant roles in the Turkish economy, the actual report set the objective of "energy efficient Turkey". In this parallel, it proposed various goals in improving energy conservation, efficiency in lighting, heating, etc.[56] Beyond these, arguably as a positive step in the direction of sustainable energy policies, the latter report has also included a theme titled "good governance and stakeholder interaction" with an emphasis on public participation in every phase of policy making.[57]

However, the details of envisaged stakeholder interaction is not yet clear. For stakeholders meetings to realize their potential to contribute to good governance depends on preventing over-representation of certain actors at the expense of others.[58] If such meetings are organized in a way to ensure that dialogue between policymakers and the broader public takes place, high public support (56%) to curb GHG levels (Table 3) may influence energy policy implementation in Turkey. In this light, looking into Turkey's energy practices since the signing of COP21 serves as a litmus test for assessing the credibility of the commitments made at COP21 as well as the impact (or the lack thereof) of stakeholder meetings on enabling public opinion to influence climate action in energy policy.

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On 22 April 2016, a glimmer of hope occurred for Turkey's sustainable energy prospects with the Minister of Environment and Urban Ministry Fatma Güldemet Sarı's signing of COP21. In its INDC, Turkey pledged to increase its use of solar, wind and hydro power; to commission the building

of a nuclear power plant; to reduce electricity transmission and distribution losses to 15 percent; to rehabilitate its existing power plants, and to establish micro-generation, co-generation and production on site at electricity production. Notwithstanding the debate surrounding the sustainability and social and environmental costs of hydropower and nuclear power plants,[59] these commitments also fell short of credibility. Only a few days after this signature, Sarı's presence at the opening ceremony in Adana of the country's 8th largest thermal power station became a vivid example of Turkey's contradiction between its energy and climate change policies. On the one hand, Turkey signed an agreement committing to reduce CO_2, on the other hand, it was planning to build around 80 coal-fired thermal power plants.[60]

Actually, those plants have been projected to be built in line with the Electrical Energy Market and Supply Security Strategy Document's (2009) objective to utilize the country's entire local coal resources to generate electricity by 2023.[61] In the background of this objective, there were two reasons: 1) meeting incrementally increasing demand; 2) decreasing dependency on imported natural gas. In this framework, the Turkish Ministry of Energy and Natural Resources (ETKB) declared 2012 as "the coal year".[62] This prompted numerous investment support mechanisms and environmental exemptions for coal mining and coal powered electricity generation projects. Recent amendments in the Electricity Market Law bestowed two privileges to local coal powered electricity generation: purchase guarantee and priority in reaching the national grid.[63] Such emphasis on promoting the use of domestic coal to reduce Turkey's dependency on imported coal is also noted by TEPAV in an analysis.[64]

Considering about 80 new thermal power plants' multiplier effect on emissions, bells are ringing for Turkey's sustainable energy future. If all the planned thermal power plants are completed, among the other countries making new coal investments, Turkey would rise to 4th position, following China, India and Russia. Those forthcoming thermal power plants are estimated to emit equal amounts to the total annual emissions in Turkey.[65] Arguably, those plants will likely have negative implications, on the global level, given that they will be perceived contradictory with Turkey's COP21 pledges at Paris. Overall, one may wonder and ask: "Does coal have any place in Turkey in the post-Paris period?"[66]

Moreover, Turkey pledged to reduce greenhouse gas (GHG) emissions to 4.2% per year by 2030. However, as Kozakoğlu pointed out, this commitment is not based on a realistic calculation of Turkey's actual performance so far.[67] Between 1990-2013, GHG emissions in Turkey grew 3.9% on average per year. But in its INDC, Turkey assumes the expected growth in GHG emissions will be 5.7% per year and commits itself to reducing them to 4.2%, which means significant growth in comparison to a 3.9% increase that took place in the same period.

Conclusions

At a time of "third industrial revolution" based on sustainable energy technologies and emergence of climate change as an international norm, particularly following the UNSDGs and COP21, countries have been faced with the daunting task of de-carbonizing their energy-intensive growth. Assuming that it is high time to discern those COP21 signatories' energy policies, the main contention of this paper has been to discuss the credibility of Turkey's commitment to take climate action through its energy policies. We argued that regardless of its COP21 commitments and high public support for climate action, Turkey has been maintaining carbon-intense energy policies as usual.

As stated in the actual strategic report of the Ministry, energy intense sectors of iron-steel and cement have been playing dominant roles in the Turkish economy. Moreover, there are findings about the existing negative correlation between local coal development and unemployment figures.[68] Nonetheless, increasing the country's fossil fuel supplies through local coal is not the sustainable option for Turkey. Considering Turkey's fossil fuel based energy intense economy, it should be noted that instead of giving priority to fossil fuel supplies, scientific studies have proposed that Turkey could make a policy shift by emphasizing energy efficiency and renewable energy development so that it can reduce fossil fuel demand without disrupting prospects for sustainable development.[69] Hence, the government can accomplish two objectives through one effort to create a properly functioning energy efficiency policy: 1) bolstering prospects for an economic model with less energy use, and 2) promoting sustainable green development, thereby addressing domestic and international climate change concerns. In this parallel, the İstanbul Policy Center 2015 report

titled "Low Carbon Development Pathways and Priorities for Turkey" proposes that a "green growth" approach is both adequate and economically feasible for Turkey.[70] Having watched the Britain-led industrial revolution of the 19th century and the US-led automated assembly line revolution in the 20th century from the sidelines, as Prof. Yeldan puts it, Turkey with its abundant renewable energy potential can become one of the forerunners of "the third industry revolution" of the 21st century.[71]

ANNEXES

Table 1. The level of concern in selected countries about different international issues

IMF Classification	Country	World Bank Income Group	Global climate change	Global economic instability	ISIS	Iran's nuclear program	Cyber - attacks	Tensions with Russia	Territorial disputes with China
Advanced Economies	Australia	High Income	37%	32%	69%	38%	37%	31%	17%
	France	High Income	48%	49%	71%	43%	47%	41%	16%
	Germany	High Income	34%	26%	70%	39%	39%	40%	17%
	U.K.	High Income	38%	32%	66%	41%	34%	41%	16%
	U.S.	High Income	42%	51%	68%	62%	59%	43%	30%
Emerging Economies	Argentina	High Income	57%	49%	34%	31%	28%	22%	18%
	Chile	High Income	62%	39%	31%	31%	22%	15%	15%
	Russia	High Income	22%	43%	18%	15%	14%	*	8%
	Brazil	Upper Middle	75%	60%	46%	49%	47%	33%	28%
	China	Upper middle	19%	16%	9%	8%	12%	9%	*
	Malaysia	Upper Middle	37%	37%	21%	11%	20%	9%	12%
	Mexico	Upper Middle	54%	46%	23%	28%	30%	16%	14%
	Turkey	Upper Middle	35%	33%	33%	22%	22%	19%	14%
	Peru	Upper Middle	75%	58%	35%	42%	35%	26%	27%
	South Africa	Upper Middle	47%	33%	26%	25%	28%	18%	22%
	India	Lower Middle	73%	49%	41%	28%	45%	30%	38%

Directly adopted from Pew Research Spring 2015 Global Attitudes survey Q13.

Table 2: Which one of these climate change effects concerns you most?

IMF Classification	Country	World Bank Income Group	Droughts or water shortages	Severe weather, like floods or intense storms	Long periods of unusually hot weather	Rising sea levels	Climate change does not exist	Refused	Total
Advanced Economies	Australia	High Income	45%	18%	10%	19%	4%	3%	100%
	France	High Income	37%	24%	7%	31%	0%	0%	100%
	Germany	High Income	42%	30%	9%	14%	1%	3%	100%
	U.K.	High Income	33%	24%	6%	30%	1%	6%	100%
	U.S.	High Income	50%	16%	11%	17%	3%	4%	100%
Emerging Economies	Argentina	High Income	44%	37%	10%	8%	0%	1%	100%
	Chile	High Income	55%	27%	11%	6%	0%	0%	100%
	Russia	High Income	29%	38%	14%	7%	6%	6%	100%
	Brazil	Upper Middle	78%	8%	8%	5%	0%	0%	100%
	China	Upper middle	38%	34%	18%	4%	4%	3%	100%
	Malaysia	Upper Middle	23%	36%	36%	3%	0%	0%	100%
	Mexico	Upper Middle	63%	17%	14%	5%	0%	1%	100%
	Turkey	Upper Middle	35%	35%	16%	5%	2%	8%	100%
	Peru	Upper Middle	55%	25%	14%	4%	0%	1%	100%
	South Africa	Upper Middle	26%	31%	21%	8%	4%	11%	100%
	India	Lower Middle	53%	30%	11%	2%	0%	3%	100%

Directly adopted from Pew Research Spring 2015 Global Attitudes survey Q43.

Table 3: Do you support or oppose (survey country) limiting its greenhouse gas emissions as part of such an agreement [in Paris]?

IMF Classification	World Bank Income Group	Country	Support	Oppose	Climate change does not exit	Refused	Total
Advanced Economies	High Income	Australia	80%	15%	0%	6%	100%
	High Income	France	86%	14%	0%	0%	100%
	High Income	Germany	87%	12%	0%	1%	100%
	High Income	U.K.	78%	15%	0%	7%	100%
	High Income	U.S.	69%	24%	1%	6%	100%
Advanced Economies	High Income	Argentina	80%	11%	1%	8%	100%
	High Income	Chile	88%	8%	0%	4%	100%
	High Income	Russia	65%	17%	5%	13%	100%
	Upper Middle	Brazil	88%	9%	1%	3%	47%
	Upper Middle	China	71%	16%	4%	9%	100%
	Upper middle	Malaysia	70%	12%	2%	16%	20%
	Upper Middle	Mexico	78%	18%	0%	4%	100%
	Upper Middle	Turkey	56%	26%	2%	16%	100%
	Upper Middle	Peru	77%	14%	0%	9%	100%
	Upper Middle	South Africa	56%	18%	6%	20%	28%
	Lower Middle	India	70%	13%	1%	17%	100%

Directly adopted from Pew Research Spring 2015 Global Attitudes survey Q40.

Table 4: Selected GHG Emitters in Gg CO2 eq.

	1990 (Base Year)	2000	2012	Change from base year to latest reported year (%)
United States	6219,5	7075,6	6487,8	4,3
European Union (28)	5626,2	5121,6	4544,2	-19,2
European Union (15)	4266,8	4167,2	3622,922	-15,1
Russia	3367,7	2055,5	2297,1	-31,7
Germany	1248,0	1040,3	939,0	-24,8
United Kingdom	783,4	704,4	586,3	-25,2
Canada	590,9	721,3	698,6	18,2
Australia	414,9	489,8	543,6	31,0
Turkey	188,4	298,0	439,8	133,4

Adopted by the authors relying on the available data from UNFCC website

Table 5: Selected GHG Emitters from Energy, in Gg CO2 eq.

	1990 (Base Year)	2000	2012	Change from base year to latest reported year (%)
United States	5260,0	6107,7	5498,8	4,5
European Union (28)	4324,5	4003,5	3603,7	-16,6
European Union (15)	3281,2	3360,7	2893,3	-11,8
Russia	2725,1	1675,1	1887,2	-30,7
Germany	1019,0	856,4	786,0	-22,9
United Kingdom	611.7	561.9	485,5	-20,6
Canada	469,1	590.7	565,7	20,6
Australia	286,7	357,8	413,3	44,1
Turkey	132.8	213,2	308,6	132,2

Adopted by the authors relying on the available data from UNFCC website

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