ARE HYDROELECTRIC POWER PLANTS REALLY RENEWABLE?: A COMPARATIVE STUDY IN TURKEY, UNFCCC AND EUROPEAN LAW

HİDROELEKTRİK ENERJİ SANTRALLERİ GERÇEKTEN YENİLENEBİLİR ENERJİ Mİ?: TÜRKİYE, BM İKLİM DEĞİŞİKLİĞİ ÇERÇEVE SÖZLEMESİ VE AVRUPA HUKUKUNUN KARŞILAŞTIRMALI BİR ANALİZİ

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ABSTRACT

In international environmental literature, hydroelectric power plants (HEPs) are considered as renewable or green energy for a long time. As it can be observed in Turkey, since some countries give "green/renewable energy credits" for HEPs and subsidize them, it will be valuable to evaluate this matter in detail, analyzing legal shortcomings and making proposals to avoid environmental harm caused by HEPs. This paper assesses the misuse of the "green/renewable energy" term for HEPs in Turkey, in the United Nations Framework Convention on Climate Change (UNFCCC), and in some other countries. It proposes that the renewable energy category should be amended and HEPs should not be considered as renewable energy automatically.

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ÖZ

Uluslararası çevre literatüründe, hidroelektrik enerji santralleri (HES'ler), uzun zamandır yenilenebilir ya da yeşil enerji olarak düşünülmektedir. Türkiye örneğinde gözlemlenebileceği gibi, bazı ülkeler HES'ler için "yeşil/yenilenebilir enerji kredisi" ve teşvik vermekte olduklarından, bu meseleyi yakından incelemek, yasal eksikliklerini analiz etmek ve HES'lerden kaynaklı çevresel zararlardan kaçınmak için yeni önerilerde bulunmak anlamlı olacaktır. Bu makale, Türkiye'de Birleşmiş Milletler İklim Değişikliği Çerçeve Sözleşmesi ve diğer ülkelerin literatüründe "yeşil/yenilenebilir enerji kredisi" tanımlamasının yanlış kullanımını değerlendirmektedir. Bu çalışma, yenilenebilir enerji kategorisinde değişikliğe gidilmesini ve HES'lerin otomatik olarak yenilenebilir enerji sayılmamasını önermektedir.

Anahtar Kelimeler: Hidroelektrik enerji santralleri (HES'ler), Yeşil/yenilenebilir Enerji kredisi.

Keywords: Hydroelectric power plants (HEPs), Renewable energy credits.

INTRODUCTION

The green energy approach in Turkey is in its infancy age. Private sector energy investments started with HEPs after the Turkish government declared its support for new energy investment throughout the nation. In the meanwhile, the Turkish Environmental Code came into effect in 1983, but the Ministry of Environment did not promulgate the first Implementation Regulation until 1993 (Environmental Impact Assessment Regulation, Official Gazetta: 28784, hereinafter "EIA Regulation"). The Environmental Regulation has been amended eight times since then. As a result of these amendments, under the pressure of the energy industry, the previous substantive standards were weakened and the Environmental Regulation has become little more than a series of procedural requirements for investors.

With these amendments to the Environmental Regulation, investment projects from small scale to giant size have taken place even in ecologically remote areas in

Turkey, especially in the energy sector. Meanwhile the Renewable Energy Law no. 5346 came into effect in 2005 (Law No. 5346, Available at in Turkish: http://www.mevzuat.gov.tr/MevzuatMetin/1.5.5346.pdf). As a result of thousands of new power plants, especially small to large-scale hydroelectric power plants, environmental destruction has spread rapidly even in small villages.

Part I gives brief background information regarding HEP legislation, environmental harms caused by HEPs, and the legal basis for cases challenging HEPs. Part II presents the ecological and legal problems with regard to HEPs in the Turkish law system, with examples of various environmental cases. Part III demonstrates legal situations related to HEPs in the U.S. and other countries. This part also discusses the cases related to HEPs around the world. This part further introduces the incentive mechanisms in UNFCCC and corresponding water directives in European Union (EU Water Directive Framework - Directive 2000/60/EC of the European Parliament and of the Council, hereinafter EU Water Directive Framework). The Article concludes in Part IV by analyzing the legal provisions related to HEPs and incentives thereof in the Turkish legal system, the UNFCCC system and the European Union system and by suggesting a new approach regarding HEPs.

1. LEGISLATION AND ENVIRONMENTAL ISSUES WITH HEPs.

In recent years, environmental problems have increased significantly in Turkey; especially the government's approach to energy policy has spurred energy investments. As a result of government incentives and guarantees, as of January 2013, approximately 2,000 hydroelectric power plant projects were either granted license and waiting for an environmental impact assessment (EIA) or under construction (Report of Chamber of Civil Engineers, available at in Turkish http://www.imo.org.tr/resimler/dosya_ekler/07fecbe56c80bdf_ek.pdf?dergi=144).

Subpart 1 explains how Turkish legislation differs significantly from legislation in the European Union and how HEPs have been exempted from EIA review.

Experts explain that most hydroelectric power plants use dams to allocate water in a reservoir. Allocated water is then released to spin a turbine and generate electricity (See at http://www.nrdc.org/energy/renewables/hydropower.asp). Water can be deemed as a renewable resource; however, the natural ecology of rivers cannot be considered as renewable. This is the first problem with the hydroelectric power plants and creates one of the reasons for most opponents to oppose such projects. Hydroelectric dams adversely affect aquatic ecosystems by

harming plants, fish, and other wildlife in and near rivers as well as community life, which is explained in detail in subpart 2 of this Part.

Legislation Issues of HEPs in Turkey

In Turkey, with Law No. 3096, electricity production was opened to the private sector for the first time in 1984 (Law No. 3096 available at in Turkish: http://www.enerji.gov.tr/mevzuat/3096/3096_Sayili_TEK_Disindaki_Kuruluslarin_Elektrik_Uretimi_Iletimi_Dagitimi_ve_Ticareti_Ile_gorevlendirilmesi_Hakkindaki_Kanun.pdf). After this new law, the number of energy investments increased significantly. Hydropower plant constructions and license applications further skyrocketed after the enactment of the Renewable Energy Law No. 5346 in 2005. This law includes a very significant provision for environmentalists and local people to oppose. The law permits and gives renewable energy license for the HEP projects that encompass a reservoir area less than 15 km^2 and there is no limitation for installed capacities (Law No. 5346). The government guarantees to buy the electricity with a price of 5–5.5 Eurocent/kWh for 10 years from the entities that are holding a renewable energy resource certificate, regardless of their installed capacity. Most European countries subsidize only small size HEPs - for example smaller than 500KW or smaller than 5MW. The subsidy in Turkey created a very profitable area for the private sector. The businessmen have invested more in large hydropower systems than river-type small hydropower plants because of potentially higher profits. For example, Koprubasi Dam, on the West Black Sea Basin, having a height of 108 m, a reservoir area of 5.9 km^2 and 79 MW of installed capacity, is subject to Law No. 5346. Although almost no country accepts 79MW as renewable energy that entitles subsidy, in Turkey Law No. 5346 covers and subsidizes this kind of large-scale hydroelectric power plants. The effect of the law was immediately seen after its publication, resulting in a total of 1024 project applications with an installed capacity of 6500MW by the private sector in Turkey in 2006 (Kucukali S., Baris K., 2009: 3872–3879; Özkan, 2014: 231). This policy has resulted in the following total capacity of HEPs in Turkey as of 2012:

- Approved but not licensed yet: 39.630 MW,
- Licensed but not made grid connection agreement yet: 16.187 MW,
- About to make grid connection agreement: 7.156 MW,
- Made grid connection agreement but not come online yet: 18.227 MW,
- Installed capacity is lower than 10 MW: 5.974 MW (See at in Turkish: http://www.teias.gov.tr/YayinRapor/APK/projeksiyon/KAPASITEPROJEKSIYONU2012.pdf).

This law raises a conflict between Turkey and EU policy. In European Union member states, some countries limit the installed capacity up to 500KW while some others limit the capacity up to 10 MW to support them as a renewable energy (Ringel M., 2006: 1–17, Available at: www.elsevier.com/locate/renene). Although there is no international consensus on the definition of small hydropower, the EU Directive sets a limit for carbon credits issued from HEPs to 20 MW. The UK green certificate market-based mechanism has the same limit. However, this does not mean that European countries support and incentivize HEPs under 20MW as renewable energy resources. Likewise, in several countries Feed-In Tariffs do not apply to hydropower above a certain size limit e.g., France 12 MW, Germany 5 MW (Intergovernmental Panel on Climate Change (IPCC) (2011), Special Report Renewable Energy Sources and Climate Change Mitigation, Working Group III-Mitigation of Climate Change, IPCC). In Sweden, small HEP means hydroelectric plants up to 1.5 MW. However, The European Small Hydropower Association (ESHA) and the European Commission (EU) tend to accept an installed capacity of up to 10 MW in total (Kucukali S., Baris K., 2009: 3872–3879).

There are various statutes in Turkey regulating new HEP projects from construction permit to licensing and environmental impact assessment (EIA). Environmental Impact Assessment Regulation article 7 requires an EIA report to be prepared for the projects that are listed in Annex I of the Regulation. Annex I paragraph 16 of the Regulation describes HEPs that need an EIA as "river type power plants with an installed capacity of 25 MW or more." Before 2008, Turkish EIA regulations did not require an EIA report for hydroelectric power plants below 50 MW installed capacity. The new regulation came into effect in 2008 requires that hydropower plants having an installed capacity between 0.5 and 25 MW have to undertake an EIA as same as current 2013 regulation (EIA Regulation). However, larger hydroelectric power plants had already obtained licenses before the new regulation. This EIA regulation is also considered to contradict seriously the EU policy.

Environmental Harm Caused by HEPs

Hydroelectric power plants prevent the necessary connection between water flows upstream and downstream of the facility. Therefore, it has deteriorative consequences such as blockage of fish passages. To solve these problems, effective fish passages for local and migrating fish species should be provided. However, the Turkish regulation regarding HEPs does not require fish passage. In Turkey, if an energy investment company wants to build a hydroelectric power plant, it has to

sign Water Usage Rights Agreement with General Directorate of State Hydraulic Works in Turkish DSI (The regulation concerning the Water Usage Right Agreement, 2003, is available in Turkish at: http://www.dsi.gov.tr/docs/hes-su-kullan%C4%B1m-anla%C5%9Fmalar%C4%B1/skha_yonetmelik.pdf?sfvrsn=0). Furthermore, the Regulation concerning the Water Usage Rights Agreement is not adequate to protect the aquatic system and ecology. According to the Regulation concerning the Water Usage Rights Agreement, the facility should maintain a minimum flow (also defined as environmental flow) determined by the General Directorate of State of Hydraulics in the river that is adequate for the existing fish population, wildlife and water quality, taking seasonal fluctuations in flow levels into account. However, there is not any standard for the determination of the necessary environmental flow in Turkey. Although construction of fish passages is obligatory in most of European countries, there is no such obligation for HEP projects defined by laws or regulations in Turkey (Kucukali S., Baris K., 2009: 3872–3879). This could cause loss of fish and/or fish habitat in project areas. This matter is discussed further in part 3 of this paper.

Hydroelectric power plants usually destroy aquatic ecosystems in rivers. These plants are also in competition with other water usage such as fresh drinking water, agriculture, recreation and so forth. The construction of new hydropower plants interferes strongly with the natural and social balance in the regions. Such projects entail extreme burdens for the local population. Most of the times they have to be replaced while their original area of settlement vanishes in the floods and they are given no adequate compensation. In addition people living downstream are affected, because the new dam can deplete their traditional sources of income. Dams usually destroy farmers' lands due to the absence of regular flooding (United Nations Development Program (UNDP), World energy assessment. New York, NY: UNDP; 2000). Dams on rivers affect the amount, quality and temperature of water, which has adverse effects on aquatic system, agriculture and drinking water. Changing the river pathway and shortage of water can cause serious disputes between people as well (See more detailed information at: http://www.conserve-energy-future.com/Disadvantages_HydroPower.php#sthash.OPksjJeT.dpuf).

HEPs are very attractive investments due to their low costs of electricity generation. However, hydropower plants often have serious social and environmental impacts, which are often ignored in economic cost-benefit analyses. Dams have displaced at least 40-80 million people around the world and negatively affected more than 470 million people living downstream (See at http://www.internationalrivers.org/resources/hydropower-7901). Yet there is no

roadmap for the global expansion of hydropower that would assess how much more damming the freshwater ecosystems can absorb.

The flooding area of HEPs can be enormously large, comparing to their power generation capacity. As an example for the dams' flooding area; the large Balbina hydroelectric plant, which was built in a flat area of Brazil, flooded 2,360 square kilometers-an area the size of Delaware-and it only provides 250 MW of power generating capacity. This capacity is equal to more than 2,000 acres used per MW produced (Fearnside, Phillip M., 1989: 401-423). Flooding land for a hydroelectric reservoir has an extreme environmental impact; it destroys forest, wildlife habitat, agricultural land, and scenic lands. In many instances, such as the Three Gorges Dam in China, entire communities have also had to be relocated to make way for reservoirs (Yardley, Jim, 2007). Thus HEPs can be very expensive investments for states and eventually consumers, considering the land area they may occupy. These large flooding areas are often taken from individual owners by way of eminent domain or public lands are rented to investors in return of very small amount of money.

There can also be wildlife impacts of dammed reservoirs. Since reservoir water is usually more stagnant than normal river water, reservoirs can cultivate an excess of algae and other aquatic weeds that lead deterioration of aquatic life (National Renewable Energy Laboratory (NREL), Renewable Electricity Futures Study, 2012).

Dams in pristine forests have caused deforestation, thus resulting in large emissions. Estimates for life-cycle global warming emissions from hydroelectric plants built in tropical areas are much higher than expectations from true renewable energy resources. After tropical areas are flooded, the vegetation and soil in these areas decomposes and releases both carbon dioxide and methane (IPCC, 2011, IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation. Prepared by Working Group III of the Intergovernmental Panel on Climate Change; O. Edenhofer, et al: 1075).

The proponents of hydropower, such as the International Energy Association, assert that "all environmental impacts of HEPs can be mitigated by thorough flow-management programs." However the independent World Commission on Dams found, with the empirical evidence, that efforts to mitigate the environmental impacts of dams have usually failed (See more at http://www.conserve-energy-future.com/Disadvantages_HydroPower.php#sthash.OPksjJeT.dpuf).

2. EXAMPLES OF ENVIRONMENTAL CASES RELATED TO HEPs IN TURKEY.

Local people, environmentalists and environmental NGOs have challenged many Turkish projects based on insufficient EIAs, various licensing problems, or contravention of zoning plans. The majority of these cases have been filed before the administrative courts, asking for injunctive relief as well as quashing of the projects. However, most of the time these cases have been unsuccessful, since the Turkish judges have not had any environmental law background and have limited knowledge about impacts of these new and large energy investments on ecology and environment.[2]

In Turkey, file suits against HEPs usually are based on challenging governors' decision on EIA approvals. Therefore, court decisions made for these file suits are mostly procedural rather than on merits. This means that even when courts, although rarely, quash EIA approval decisions, investors have always pursue the way of making small changes in their EIA files and submit it for approval again.

However most of the time, courts make decisions on procedural grounds such as standing, legal interest, and filing the case after the required time period. As an example, the Ordu Administrative Court rejected the request of quashing a HEP project that was based on challenging the EIA of a hydroelectric power plant. In this case, the EIA was not sufficient in terms of impacts on endangered species in the subject river. The project was withdrawing most of the river water and leaving almost nothing for downstream towns and animals that are dependent on the river. In addition, pollution stemming from dredged materials was not addressed properly. The communities' right of access to water was also harmed and the EIA did not examine this issue at all. Despite all this, the court did not find "enough harm" to the environment to grant injunctive relief and denied the case on the basis that it was filed beyond the required filing time and because of standing (Ordu Administrative Court, File number: 2012/618, E. Decided on Dec 13, 2013, The author of this paper is the principal lawyer in this case). As a result, the construction continued. After a while, landslides occurred in the construction area. In addition, the construction company polluted the river severely. The court case is in the Supreme of Turkey now for appeal.

In addition, the public participation process usually does not take place fairly during the decision-making regarding HEP projects. As long as a public meeting

[2] This general information and opinion is provided from the author's experience over several years.

takes place, no matter how many people oppose it and no matter how persuasive are the arguments that they make, courts commonly consider it sufficient that public participation has occurred and look no more deeply (EIA Regulation). This was also the case in Ordu lawsuit.

Hydropower projects are sometimes in conflict with cultural heritages as well. Another example from Turkey; Ilisu Dam shows that how big a dam project's impact can be on environment and community as well as cultural heritage of the whole country and the world (See at http://www.internationalrivers.org/campaigns/ilisu-dam). Ilisu Dam threatens a 10,000-year-old ancient city named Hasankeyf. Hasankeyf is a clearly in the cultural heritage list in Turkey and has to be protected strictly. It is the only place in the world that bears 9 criteria out of 10 UNESCO's world heritage criteria. However, the Turkish government has avoided filing an application at UNESCO to have Hasankeyf listed in the world heritage list. Instead Ilisu Dam construction has continued as a government project. Many national and international campaigns have taken place to convince the government to stop this dam. In 2009, all European investment banks declared their withdrawal of financial support due to this controversy. Nevertheless, Ilisu Dam is shown as to be completed in 2015 in the government energy projection (See in Turkish at http://www.epdk.gov.tr/documents/elektrik/rapor_yayin/UretimKapasiteProjeksiyonu_2013_2017.pdf). The highest conflict about Ilisu Dam is that it is excluded from the EIA process upon addition of a "temporary provision" in the EIA regulation. According to this provisions, regardless of the environmental impact, any project that were included in government investment plan before 1993 is exempted from EIA process (Temporary Provision 3, EIA Regulation). Therefore although around 70,000 people has been and will be displaced, many significant cultural heritage features will vanish under the water, and the ecology and the aquatic system will be destroyed as well as its transboundary impacts, not even a procedural EIA will take place (See: http://www.internationalrivers.org/campaigns/ilisu-dam). This example may show how severe the impacts of hydroelectric power plants can be without any legal protections.

Another significant legal problem concerning HEPs is that the cumulative effect of hydropower plants at the regional and national levels is ignored. Therefore, since court cases are filed against individual HEPs, courts and amicus curiae usually confine their attention to the impact on a single river that any given HEP will have. One single hydropower plant may not have significant impact on ecology (although

even this may not be the case). However, considering that 2,000 HEPs nationally are under construction and will come online in the future, the impacts of this large amount of dams should not be ignored. Either a national or at least a regional cumulative impact analysis should be mandatory. Otherwise, in the near future there might not be any fresh water or living ecosystems left due to the destruction of those HEPs on rivers and on the environment gradually.

Lastly, in Turkey there is no actual monitoring and auditing during or after the construction. In the EIA regulation, there is a monitoring requirement in theory, but in practice it is not possible for government agencies to inspect all HEP constructions. This prospect of no monitoring also causes serious environmental damage (Özkan, 2014: 230), since investors usually use the cheapest possible methods and this leads low quality constructions and environmental pollution.

3. HEPs IN OTHER COUNTRIES AND IN UNFCCC

Other Countries in Terms of HEPs

In the United States, large hydroelectric dams were historically built without considering the impacts of dams on fish, water flow, and the aquatic environment (See at http://www.nrdc.org/energy/renewables/hydropower.asp). One exam of such a plan was the Tellico Dam in Tennessee – although in this case the courts ruled in favor of the fish. In one of the most important environmental cases in the United States, *Tennessee Valley Authority v. Hill*, the Court made a breakthrough decision. The Supreme Court ceased construction of a million dollar dam in order to protect an endangered species known as snail darter. The court held that an injunction would ensure full compliance with the Endangered Species Act. The court concluded that with the Endangered Species Act, the Congress chose the endangered snail darter over a million-dollar dam (Tennessee Valley Authority v. Hill, 437 U.S. 153, 1978). As is well known, after the Supreme Court made its decision, Congress changed the law and the dam was built, destroying the home of the snail darter.

These dams also block migrating fish and the reservoirs alter the flows, temperature, and chemistry of a river. This is one of the reasons that hydropower doesn't count toward utilities' renewable energy mandates in most states. In the U.S. many states have renewable portfolio standards (RPS) that require utilities to generate a percentage of their power from renewable sources. If hydropowers were counted as renewable energy in those states, it would discourage the development of new solar or wind energy resources. Throughout the country, large hydropower

facilities aren't generally considered in states' renewable energy goals. For example, Michigan doesn't consider hydropower as renewable if it requires construction of new dams (http://www.dsireusa.org/incentives/index.cfm?SearchType=RPS&&EE=0&RE=1).

In Latin America about three-quarters of energy requirements are met by hydropower. Brazil's proposed Belo Monte Dam is one of the most controversial HEPs in the Amazon. The Belo Monte Dam would have a small reservoir area (440 km^2) and 11,181.3 MW large installed capacity. However, the Altamira Dam - upstream counterpart of Belo Monte that would regulate the flow of the Xingu River would flood a vast area - 6.140 km^2 (Fearnside, 2006: 16-27). These dams will have a significant impact on the ecological system in the world's most important oasis – Amazon - as well as on many indigenous communities that have lived in the Amazon river basin for centuries. The Amazon is one of the most significant ecology and carbon sinks not only for Latin America but also for the whole world. The case of Belo Monte and the five additional dams planned upstream indicate the need for Brazil to reform its environmental assessment and licensing system. The Brazilian Congress approved the Belo Monte dam in 2005. Although there was large indigenous people's opposition, an inadequate EIA, and no mitigation plan for affected local communities, the license of the project was approved in 2010. Since cost-benefit analysis of private investors did not fit the actual scenario, the Brazilian Environmental agency approved partial construction although this was against Brazilian law. Finally the construction started and partial construction is expected to be completed in 2014 (See at http://amazonwatch.org/work/belo-monte-dam).

Belo Monte is one of the world's most controversial dams and has faced resistance from indigenous peoples and social movements for more than 20 years, supported by national and international environmental groups. Many group of people have challenged the project's legality through lawsuits that have reached Brazil's Supreme Court (See at http://amazonwatch.org/work/belo-monte-dam). Yet despite these challenges the project has advanced significantly recently.

A very similar matter can be seen in Panama. Panama's Barro Blonco dam threatens thousands of indigenous people living in the Tabasara River (http://earthjustice.org/blog/2014-april/urgency-grows-in-panama-as-dam-building-continues). This dam is also supported by the Panamanian government and is regarded as a renewable energy investment. As it is explained below, the UNFCCC's clean development mechanism (CDM) approved the Barro Blanco project and issued a carbon credit project for it (https://cdm.unfccc.int/Projects/DB/AENOR1261468057.59/view).

The United Nations Framework Convention on Climate Change

Some people think that another force that has been contributing to investing in new hydropower projects is the United Nations Framework Convention on Climate Change (UNFCCC), which was signed by many countries around the world in 1992 (United Nations Framework Convention on Climate Change, May 9, 1992, S. Treaty Doc No. 102-38, 1771 U.N.T.S. 107). Since the emission reduction provisions were inadequate in UNFCCC, the parties adopted the Kyoto protocol in 1995 (Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 10, 1997, U.N. Doc FCCC/CP/1997/7/Add.1, 37 I.L.M. 22, 1998). Article 12 of the Kyoto Protocol provided the clean development mechanism (CDM), which is designed to assist developing countries (Annex-II countries) in achieving sustainable development. With this mechanism industrialized countries (Annex-I countries) get credits when they finance projects for reducing greenhouse gas emission in developing countries. As of April 2012, the number of registered projects for certified emission reduction credits (CERs) is 4005 and issued CERs amount to 908,678,320. Each CER corresponds to 1 ton of CO2 reduction. In theory, the way CDM works is that an investor from an industrialized country, or an industrialized country government, can invest in, or provide finance for, a project in a developing country that reduces greenhouse gas emissions. The investor then gets credits – carbon credits for the reductions and can use those credits to meet their Kyoto protocol target. Hydropower makes up 30% of all carbon offsets projects registered under the CDM. Although the Kyoto protocol's timeframe is ended in 2012 and has not been renewed yet, the CDM mechanism spurred hydroelectric power plant investments in Annex-II countries since HEPs are counted as renewable and supported under CDM. Although the European Union in 2009 adopted a rule that excludes HEPs bigger than 20 MW, this rule does not cover other countries outside European Union area (See at http://carbonmarketwatch.org/).

Turkey became the 189th party by signing the Convention on May 24, 2004, although the country does not have a formal emissions reduction target. The carbon emission statistics of Turkey demonstrates that the energy sector and industry are the biggest sources for carbon emissions (International Energy Agency (IEA). Energy policies of IEA Countries: Turkey 2005 Review. Paris: OECD/IEA; Energy Information Administration (EIA). Turkey country analysis brief, 2005, http://www.eia.doe.gov, State Institute of Statistics (DIE), Statistic yearbook of Turkey in 2003, Prime Ministry, Republic of Turkey, Ankara, 2004; Ministry of Energy and Natural Resources (MENR), Energy report of Turkey, Ankara, Turkey,

2005, http://www.enerji.gov.tr). The adoption of CDM has also encouraged HEP investments in Turkey. Investors have hoped either to sell their investments to foreign companies or to get CERs to use in the future, since Turkey's status is quite vague under the Kyoto protocol. However, some experts claim that since Turkey is not an Annex-II country, the effect of CDM is irrelevant. In fact, there are better supports in Turkish national law and financial system, as explained above, than what CDM might offer. Nevertheless, if the Kyoto Protocol is to be renewed, CDM should be amended significantly taking impacts of hydropower plants on the environment into account, as it is the case for Panamanian Barro Blanco Dam.

HEPs and the European Union Water Directive

In the preamble of the European Union Water Directive (EUWD), water is defined as not being a commercial product but, rather, a heritage which must be protected, defended and treated as such **(**Preamble 1, EU Water Directive Framework). The Directive state that the European Community policy on the environment is to "contribute to pursuit of the objectives of preserving, protecting and improving the quality of the environment, in prudent and rational utilization of natural resources, and to be based on the precautionary principle and on the principles that preventive action should be taken, environmental damage should, as a priority, be rectified at source and that the polluter should pay." (Preamble 11, EU Water Directive Framework; Özkan, 2012: 140). The Directive mandates that an effective and coherent water policy must take account of the vulnerability of aquatic ecosystems (Preamble 17, EU Water Directive Framework). The Directive also emphasizes the significance of the natural flow conditions and the hydrological cycle in rivers as well as integration of qualitative and quantitative aspects of both surface waters and groundwaters, for the purposes of environmental protection (Preamble 34, EU Water Directive Framework). Although, this Directive does not set forth any limits for ecological flow, it requires the member states to take the hydrological cycle and other ecological effects of any project interferes with the freshwater systems into consideration.

Ecological flow is the amount of water that is left in the aquatic ecosystem, or released into it to maintain the aquatic system (Bakken T.H. and others, 2012). In some countries, ecological flow is set at a level up to 10% of the water in rivers. This is also the default position in the Turkish regulation concerning Water Usage Rights Agreement. As explained above in Part I-3., there is no certain ecological flow in Turkish law and regulations. The regulation states that hydropower operators leave enough water in the streambed to ensure the continuation of natural

life therein, but there is little likelihood that "enough water" will actually be left flowing. The amount and timing of water flow that shall be left in the streambed shall be determined in the EIA, which will be prepared by the investor company and approved by the Ministry of Environment. The water flow that shall be left in the streambed cannot be less than 10% of the 10-year average flow**.** During the EIA process, if it is determined that the 10% would not be enough to sustain ecological needs, the required flow might be increased. If the project does not require an EIA, there must be at least 10% of the 10-year average flow. In most court cases, however, HEP investors assert that they would leave 10% and this would be enough to sustain aquatic system in rivers, although HEPs that have come online show the opposite.[3] Investors most of the time leaves only 10% regardless of river condition since there is no definitive legal requirement to leave more.

4. ANALYZING THE LEGAL PROVISIONS RELATED TO HEPs AND A NEW APPROACH

In the international environmental arena, most environmental multilateral agreements have adopted the "precautionary approach". The 1992 Rio Declaration, Principle 15, formulates it as follows: "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost effective measures to prevent environmental degradation." (UN Doc. A/CONF.151/26 (vol. I); 31 ILM 874, 1992; Özkan, A., 2012: 140).

Under the guidance of the "precautionary approach", other alternatives, such as solar, wind power, wave energy or geothermal, to hydropower plants must strictly be considered. Both proponents and opponents of hydropower plants agree that there is no need to build new dams to harvest power while the electric efficiency is still a significant problem for every country in the world. Many environmentalists suggest incentivizing dam operators to maximize efficiency instead of investing in new energy projects. Experts state that about 70% of the total worldwide primary energy used is lost throughout the energy supply chain from the production to transmission of energy. The aims of sustainable energy and a successful climate protection policy cannot be reached without clearly improving energy efficiency. If the major part of energy produced by the power plants that are destroying ecology is lost in the supply chain, there is no reason to invest in more power plants and deplete the natural resources. It is often better and cheaper to support and

[3] Author's court experiences in Turkey.

incentivize efficiency of existing power plants and to invest in energy-saving equipment for the end user and states than to waste money on new power plants (Berger, 2002: 411–46). Sometimes energy efficiency can be provided with a little extra input, as cheap as upgrading the hydroelectric turbines. Many developing countries are faced with the question of how to meet the increasing energy needs of the population. However, energy loses are still enormously high and there is no improvement seen in this area. Consequently, states and governments should review their energy efficiency policy and invest more in energy efficiency projects rather seeking new energy production facilities.

New technology may also help reducing the harm of hydropower plants. For example, the Bureau of Reclamation is experimenting with a hydrokinetic turbine, which may produce more electricity without additional harm. Geo-engineering can also provide alternative and better technology for energy efficiency and production.

5. CONCLUSION

Hydropower plants are not the best solution to combat climate change. As explained, they sometimes might be more harmful to the environment than fossil fuels. Especially if they are located in the tropical areas, their reservoirs emit high levels of methane which is a greenhouse gas. While water can be deemed as a renewable resource, rivers and their ecosystems – including floodplains, wetlands, and marine environments – are not renewable. Wetland mitigation efforts have showed that it is almost impossible to create the same ecosystem as wetlands naturally have. Considering the serious, irreversible ecological impacts of dams, hydropower cannot be considered as a renewable source of power. In addition, in rural areas that are not connected to the electric grid, wind and solar powers are cheaper solutions than electricity from large dams. Furthermore, wind and solar projects are more resilient to climate change than large, centralized dams.

As part of this picture, the current Turkey's energy policy harbors significant environmental drawbacks. The policy, in supporting almost any kind of energy investment regardless of whether its impact, exacerbates the level of environmental degradation. Environmental concerns have become significantly important in the framework of EU policy as well as in the world. Therefore the laws of Turkey should be made compatible with environmental law of modern world. Turkey needs to change its renewable energy and subsidizing policy for large HEPs. The content of the Turkish Renewable Energy Law should be revised and a limitation, such as up to 0.5MW or 1 MW, should be adopted for the size of HEPs allowed to be counted as renewable energy projects, as in many European countries. In addition,

energy projects should be monitored and energy facilities should be audited. Finally, since lack of monitoring and auditing during or after HEP constructions lead to misuse of natural resources, monitoring and inspection should be an integral part of energy efficiency policy.

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