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Legal Drivers of Green IT

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Abstract:
Climate change threatens to have a wide range impacts on ecosystem and present enormous challenges for conventional modes of socio economic governance. The topic of climate change has pushed top list of all the scientific and policy program. These include legislation policies, practices, procedure and culture. Against this back drop, the last few years have seen consolidation of body of all principles organized around the central problems of irrigating and adapting to climate change. The new climate change laws span from international to local levels of governance. There exist challenges that climate change law is likely to face as its development proceeds a pace, such as coping within internationalization of the greenhouse problem and ensuring that a venue for wide spread participation in climate regulation. Part two of this paper elaborates more about legal drivers in coupling with legislation. How climate change law responds to this challenge in particular, is likely to determine its effectiveness and cohesiveness as a body of law for dealing with the broad predicted impacts of global warming. The second part starts with the discussion on unchanging face of National and international legislation, factors affecting International legislation and re-emergence of climate change law as a dynamic field of legal endeavor. This is followed in Part III by a synopsis of the role of industry and regime in major areas of legal development.

Keywords: Legal drivers, climate change, environmental legislation, coupling, legislation, green IT

1. Introduction

Environmental law has developed rapidly and now encompasses a range of sub-specialties, including international environmental law, biodiversity law and water law. The latest branch of the metaphorical environmental legal tree to take shape is that of climate change (Jones, 2014). It has emerged against the backdrop of intensifying scientific, economic, social and political debates over the impacts of greenhouse gas ('GHG') emissions on the world's climate system. In response, there has been an accumulation of case law, legislative development and international regulation that makes up a distinctive body of legal principles and rules identified as climate change law. As a leading environmental law, climate change law is an organizing principle whose time has arrived (Hahnel, 2010).

There are several factors that are important in bringing up the focus on climate change issues and in providing a way for change of law immediately. A major part that has influenced the aspect is consolidation of the scientific data on climate change that it has marginalized the changes of climate skeptics (Splash, 2012).As a result, the legal solutions on climate change are likely to entail the changes on the current governance and regulatory frameworks, with consequences felt in many other sectors like law including the constitutional law, the administrative law and property law (Horowitz, 2010)

According to Jones (2014), the birth of a new legal discipline is often a matter of interest only to sub-specialists in an already specialized field. The ramifications of the emergence of climate change law, however, promise to be more far-reaching. For a start, the extent of the climate change problem is so broad that it has the potential to affect many sectors of social life and legal scholarship. Climate change law is likely to be relevant to insurers considering the scope of risks to include in insurance contracts, international bodies concerned with threats to peace and security in the face of water shortages, and domestic energy retailers drawing on different sources of power generation to supply consumers (Kennet andKamarudin, 2012). In addition, climate change presents enormous challenges for socioeconomic governance systems. The federal government's leading climate change adviser Garnaut (2008), has recently described climate change as a diabolical.

Institute of European Environmental Policy(IEEP) (2006), points out that,this legal field is not confined simply to international treaties and new legislation but is aimed directly at mitigating global warming.Rather, it encompasses aspects of the existing environmental and broader legal framework, employing them in new ways to respond to aspects of the climate

change problem. While legal tools are not the only means used to address greenhouse pollution and its impacts, the law nonetheless stands to make a very important contribution to managing climate change. In particular, legislation domestic and international is needed to underpin the governance and regulatory frameworks put in place to control human behaviors that have effects on the climate system, State Legislation on E-Waste *(2009). The* law also has a vital part to play in providing a forum for mediation between the many different interests and actors involved in the field of climate change policy. In this regard, legal mechanisms such as those facilitating participation, accountability, judicial review and dispute resolution can be employed to enhance the quality and social acceptance of climate change initiatives. Kahle *(2014)*, asserts that Environmental law, climate change law has a very broad scope, touching on areas often not considered environmental in nature. Given that the scale of climate change can be pitched globally for example, ocean warming or locally extinction of a rare species with climate induced habitat changes, climate change law involves governance systems extending from the international level to the national and local levels (Runnals, 2011).While maintaining a common focus on addressing the issue of climate change, the regulatory tools of climate change law are likewise drawn from a wide range of legal fields, including administrative law, property law, tort law, corporation's law, human rights law and international law.

According to Hahnel (2010), ICT could start making a difference in management of climate change if there will be efficient hardware and consumption of low power by the devices. Green IT strategy and tactical initiatives directly reduces the carbon footprint of an organization's computing operation. Green IT does not simply look at minimixing envrionmental impact ICT industry, but also encourages and supports. Greener behavior by the organization's employees, customers and suppliers, regardless of the type, shape orsize of the organization By different appraoches such as creating awareness and promotion of the education activities for the legislations and chance on culture of an organization can be changed (Spash, 2012).

1.1. Coupling with Legislation

United Nations Environment Program (2010), explains how a number of countries are passing climate change legislation. Practically all major emitters of greenhouse gas have in place laws to control emissions, conserve energy or promote cleaner form of energy production. The laws are not always encouraged only by the people concerned about anthropogenic changes of climate. They do not reach the global response that would result to limited climate change risks to the levels that are acceptable which should be less than 2^0c of average warming. Nevertheless, they constitute a growing aspect of public policy and legislative activity in parliament around the world (*Scott*, 2009). *Law* making on issues relating to climate change has been traditionally attributed to government development of the laws and the agreement attained to support the law implementation process. Increasingly it is being realized that advancing domestic climate change legislation can help to create the conditions that enables an international deal be *reached (*EdaGurel-Atay, *2014).*A diverse legislative framework can affect many aspects of the design, manufacture, procurement, operation, use and disposal of ICT products and services. Indeed, the need to comply with relevant legislation and standards is a major driving force for suppliers and consumers to improve ICT sustainability, (Horowitz, 2010).

According to United Nations Environment Program (2010), the global regulatory landscape is evolving to keep pace with the growing focus on ICT's environmental effects. This state of flux can create both confusion and opportunity, which in turn can lead to negative and positive impacts. For example, confusion can stimulate debate and eventually result in a better understanding about particular regulations and requirements, while opportunities for using the system can impede progress towards truly sustainable practices. International Chamber of Commerce (ICC), (2012), asserts that point of view in practical context, having knowledge of the drivers behind national climate change legislation is essential since it might give a new way of effectively reducing the emissions through policies. However, there is not examination on the quality of the legislations on the desired laws. Some of the effective drivers to lawmaking have benefited positively the climate change. They Include:

- Improved energy efficiency. Bringing lower costs and greater competitive reduces both the need for energy supply and energy related emissions. Globe climate legislation study where legislations include the efficiency energy policy.
- Increasing funding in the national energy sources that have low emission of carbon like having nuclear and renewable energy. The renewable energy many include wind source, solar and hydropower. Improve security for the power through minimization of dependence on foreign imports of energy which are often fossils-based and increasing resilience to fuel price shocks including promoting diverse and more domestic sources of clean energy supply in their legislation.
- By giving promotions to clean energy and efficient energy technologies, where nations should invest in advanced technologies to gain competitive advantage in the home markets locally and internal on wider range of low carbon energy, goods and services.
- There are many countries that have issues with the quality of air. There is need to lower the need to depend on fossils fuels and switching to cleaner sources of energy, for power generation and vehicles, air quality improves, helping to reduce the economic and social costs of respiratory –related diseases.

Analysis of the environment: there is need to have computational and processing tool applied on environmetal data once it is collected and stored in performing the required analysis. The data may include atmospheric quality, land, and water

where quality assessment tools like technologies for analysing the conditions of the atmoshpere are used. They include tools such as GHG emissions an pollutants and examining the quality of water and its avaiability in the soil. Martinez-Alierand Ropke (2008), concluded that data analysis is important especially when correlating observational and data from second order in environmental measurements like biodiversity. Environmental planning: planning is a process that involves information from the environmental analysis process at the international, regional and national level so that decision making process is successful (*Curry et al., 2012*). They further state that planning activities may involve grouping of the different environmental conditions used in agriculture and forestry. The information may be supplied from other environmental sectors and focused on particular issues like the protected zones, biodiversity and industrial pollution. Planning is also about prediction of the environmental and emergency cases like climate change and natural disasters (Gardiner, 2007).

As per Scott and Molly (2009), management of the enviroment and protection entails all aspects associated to management and mitigation of the impacts on the envroment in addition to assisting in adapting yo the environmental conditons. It is a process that includes resource and nergy conservation with management of the emission of the GHG and management systems. The reduction systems and controll of the pollution in a given enviroment with the methodologies such as reducing negative effects of the polluants and hazards to the environment that are man made. Legislation around sustainability is tightening up and increasingly requiring companies to act. Directive sets guidelines for disposal with an emphasis on re-using redundant equipment above recycling. It puts the responsibility on the manufacturers and vendors of electrical equipment to collect and reuse or recycle equipment. Energy tariffs, carbon reporting requirements. The new Carbon Reduction Commitment will force people to examine energy consumption in organizations, inevitably reaching the ICT department (Puglia and Virgilian, 2013).

2. The Unchanging Face of National and International Legislation

As per Curry et al. (2012), the issues of environment at local and internal level are becoming more aligned to the internal law. There is a difference in laws based on their nature and level of objectives. Some of the laws are those that are issued as executive orders while others are legislated by the lawmakers. There are laws that have binding statutory obligations while others are just wishes. Although internal law demands that a state should carry out the international mandates, the approaches used in executing the internal obligations by the state differs based on the judicial measures, the executive willingness and the legislation. There has been a debate about the environmental implications on the based on the international laws and there have been several agreements and declarations at the internal level. There are many environmental challenges that both developed and developing countries face such as the challenge of change in climate patterns and improving the level of efficiency in energy use, management of water and pollution to aware and water among others (Kennet, Winchester and Felton, 2012).Environmental issues are by their nature global. While local action is required, international cooperation is essential. Key areas include: providing and operating the infrastructures for monitoring and early warning; collecting, analyzing and disseminating the information necessary to enable governments and other agencies to manage, mitigate and adapt to climate change; building capabilities, (Martinez-Alierand Ropke, 2008).

2.1. Factors Affecting National Legislation Include

The level of democracy: Democratic systems, where political accountability is higher and governments are inclined to take voters preferences into account, pass more climate legislation.
Strength of the executive and form of government: The stronger and more unified the executive, the easier governments will find it to pass climate laws. Presidential regimes, characterized by strong executives, are therefore expected to pass more laws.

- Existence of comprehensive climate policy. Countries that have passed broad, unifying legislation can be expected to pass further laws afterwards aimed at implementation.
- Partisanship: Climate skepticism is associated with right-of-center political attitudes. Left of center governments might be more inclined to pass environmental legislation.
- Electoral cycle. The implementation of potentially controversial measures such as carbon taxes is not expected close to a general election. Only favorable policy measures such as renewable energy subsidies may be observed before election so the incumbent governments can gain an electoral advantage in the polls.
- Business cycle: Concern for environment may have less political traction during difficult economic times, unless green investment is seen as an effective counter-cyclical policy.Therefore, the business cycle may be expected to influence the path of climate legislation.

2.2. Factors Affecting International Legislation Include

- Hosting summits: Countries hosting high profile international meetings, such as a position of international (COP) to the UNFCC, are thrust into a position of international leadership that may motivate or overcome resistance to, subsequent climate legislation.
- Peer group effects: The climate action a country undertakes is likely to increase with the number of laws already passed by other countries. This is due to combination of learning/knowledge spill-over the more a policy is adopted the more is known about its merits and peer pressure. Countries with close cultural or trade links are likely to influence each otheron climate policy. These two effects are measured by the number of laws already

adopted by all other countries in the sample. The effect is stronger between countries with strong cultural or economic ties.

As per Curry et al. (2012), international law on environment just as the numerous national legislation on environmental laws are just about control of pollution in the end of the process. There is need for a more comprehensive method to give force to the systems on change in production and consumption behaviors that are complex. Getting more range of regulatory framework and techniques that could motivate systems in place to address the environmental concerns. Having basic rights conceptualization could result to the higher standards of the fundamental rights in legislation protection. The environmental concerns in their nature are global, alhough local prevention approaches are required, having an international support is significant (Kennet and Kamarudin, 2012). Some of the main areas include the provision an operation of the infrastructures and monitoring of the early signing where data is gathered and analyzed. The information from the analysis need to be disseminated for government and other partners to take action on climate change.

3. The Role of Industry and Regime

Industry and regime are capable of playing a key role in addressing the global challenges of climate change and sustainable development through the use information and Communication Technologies (ICTs), such as satellites, mobile phones or the Internet, International Chamber of Commerce (ICC), (2012).By promoting innovative ICT solutions to environmental questions , it promotes development of the green policies to awaken industrial activities, creation jobs and make the competitiveness of the market but at the same time handling the international environmental issues like change in the climate and the scarcity of natural resources. National are seeking innovative ways to promoteeconomic activity (Yun, Won and Gil-Yeon, 2012).

According to Keim (2008), concerned IT providers have been collaborating and also working with related industries for several years to ensure high standards are maintained that inform this developing regulatory framework to reflect the realities of the industry. Consortia such as the Green Grid bring together with IT product and service providers, energy providers, cooling engineering companies and large-scale end users identify how standards are likely to affect the industry. Importantly, these groups also give us the opportunity to influence the standards that we and our customers will need to comply with in the future. Customers, equipment suppliers, service providers and systems integrators need to join forces to understand this complex regulatory landscape. With a better understanding of the standards and legislation that apply, the IT industry can develop products and services that meet business needs while complying with regulations. Furthermore, lessons learned during this process can be fed into the standards development process to create more relevant regulations in the future (Scott and Molly, 2009).There were recommendations made by Green Growth Strategy (OECD 2011) that creating green policies should be welcomed and motivated as better ways of using the natural resources and improve the new acitivities of the economy. The quick way in which eco-innovations are being accepted can be used as a tool to improe enviromemnt on economic and social improvements by enablingsynergies both in OECD and non - OECD countries. Institute of European Environmental Policy (IEEP) (2006) asserts that, a major feature of the knowledge related economy is the influence that IT presented to the industrial sector, where there is high increase of services and decline in manufacturing activities. Normally, services consume less energy intensive and less polluting. Among those countries with a high and increasing share of services, we often see a declining energy intensity of reduction with the emergence of the Knowledge Economy ending the old linear relationship between output and energy use i.e. partially de-coupling growth and energy use.

According to Yun, Sun –jin and Won, Gil-Yeon (2012), incremental innovations alone cannot achieve an absolute decoupling of economic growth from environmental impacts. Increasing the market potential for more radical and systemic eco-innovations is becoming of particular importance to enable a long term transition and transformation towards a greener economy .The purpose of the OECD project on business Models is to explore the potential of such radical and systemic eco-innovation to examine how successes it can be further extended, accelerated through the application and elaboration of innovation or through other policies (Virgilian, *2013)*.For there to be an encouragement to the industries to accept economic chances presented by development of the innovative technologies for services and products, there is a need to explore aspects of non-technological commercialization, as well as the development of environmental technologies. Since business models and non - technological innovation are relatively known to policy makers and industry alike, a good number of real - life examples are being collected and will be analyzed (Murugesan, 2008). This work eventually helps the governments to develop and implement policies, enabling and driving green transformation through the wider diffusion of eco-innovation practices (Wagner et al., 2002). There must be a standardized way for ICT to support the sustainable future where the impact of ICT can be measured. There should be a way to assess the direct influence of the ICT use to the environment and the indirect implications on the GHG emissions on other sectors apart from the ICT sector. The standards should be based on the Life Cycle Assessment (LCA) approach as provided by ISO 14040 and ISO 14044.

As per Jones (2014), the numerous international laws focuses on the issues of pollution, remediation, compensation and abatement for the impact resulting from hazardious practices. The reason for the internal systems in the international environmental law is just to take on the traditioanl approach of command-and-control method to the regulation of the envirment. Because the international legal system, it traditionally lags behind developments in the domestic laws of the respective nations, the movement toward preventing environmental harm remains on the distant horizon of international law

(Runnals,2011).The level at which the issues concerning prevention of pollution and providing better production concepts will be added to the international environmental laws will depend on the rate at which these concepts are presented and added to the local laws for the states to practice at domestic level. It will also rely on the level of influence the factors can change the international affairs and law in general. Lack of focus on the actual issues of bettering the environmental status for the industrial ecosystems is warring. It should instead be encouraging pollution prevention, reuse of resources, and the systems aspects of cleaner production as indicated in current international environmental law (Spash, 2012).

The spread of globalization of the developments in the economic perspectives at the regional and international levels and where more priorities are on free trade agreements there is increasing demand for international environmental agreements (Keim, 2008). The increase of the international environmental laws will result to better role that it will play in the efforts to protect the environment. It will improve on the process of having better priorities at the international level on protection of the environment. Therefore, it is essential that international environmental laws are developed to shift the systems in having a formula on how to reduce pollution and efficient use of the resources. Lack of the measures will increase the risk that new and emerging laws may not provide efficient use and reuse of resources at the global level (Kennet, Winchester and Felton, 2012). As globalization of economic development continues to expand, international environmental laws not only must it move away from impediments to bettering the environmental characteristics of the ecosystem but should offer an incentive for accepting of the system-based approaches (Scott and Molly, 2009). The external causes that prevent the wider implementation of policies to prevent pollution, frugal resource utilization and a systems method to environmental causes at the state level are many and also manifest at the internal level. There must be a law that plays a key role in motivating those practices that are preferable environmentally (Mittal, 2014). Barton (2008), affirmson data centers being one of the growing area of ICT at high rate, making it critical to lower their energy consumption and GHG emissions. States that are reducing energy consumption and GHG emissions should be given priority during the early stages of design and productions. Continuous evaluation will need that there is a management and enhancement of energy use for efficiency while the data centers offer services. There are approaches that can be used in the process of having better practices. For instance, improved cooling procedures would reduce the energy consumption by 50% (Jones, 2014). The best practices include guidelines on management and planning of data centers; optimum design of data center buildings; selection of ICT equipment; cooling and power equipment; data center utilization and the monitoring of data centers after construction.

The Organization for Economic Co-operation and Development (OECD) (2012) has published a survey of over 90 government and industry initiatives on Green IT. The report found out that there was concentration on green IT technology but not on the implementation of the technologies and methods of reducing global environmental concerns. Governments were not concerned with global warming and environmental degradation in relation to the solutions provided by green IT. There are only few initiations less than 20 percent that have measure goals, the government programs are pointing at more inclusion of the goals towards environmental impacts than business associations (Gardiner, 2007).Industrial ecology represents a system wide approach to analyzing industrial processes. With this approach it is possible to evaluate how environmental concerns and costs may be integrated into industrial and economic decision making, and to maximize the beneficial use of resources while minimizing disruptions to the industrial ecosystem (Scott and Molly, *2009)*. Awareness of the issues relating to sustainability added with customer pressure and government association is resulting into business network value chains. The industry has decided to work together in adapting their processes that support sustainability. The joint efforts towards better environmental practices has been made possible by the concepts of carbon emissions, water usage and renewable resources to impact the society (Mittal, 2014).

4. Government

Government agencies are putting in efforts to implement the standards and regulations that offer green computing. According to (Mittal, 2014), many agencies of the government have implemented the standards and regulation that promote green ICT. Some of the efforts include the 2006 energy star program that introduced more requirements for computer equipment, along with the strict ranking of the systems to be approved. Spash (2012) stated that improved performance of the environment means dealing with global warming and bettering the use of natural resources. The author further stated that this was the main challenge. The ICT sector needs to improve its efforts in having a better system for environmental management *(*Donnellan et al., 2011).According to Spash (2012), Government programs and industry initiatives can be composed *of* sub programs and sub initiatives. Some governmental bodies and industry associations have a number of small programs and initiatives, which are not directly comparable with large ones. In order to make these programs and initiatives more comparable, they have been regrouped by those bodies that initiated those (Wagner et al., 2002). In other words, programs and initiatives of the same government body or industry association are treated as one program or initiative. Programs and initiatives on ICT and the environment of governments and industry associations cover:

- Policy areas and business activity areas adapted from the ICT policy framework areas cover, innovation for Green ICTs and ICT applications,
- Increasing Green ICT diffusion and ICT applications in public and private sectors.
- Promoting environment related ICT skills and education.

Donnellanet al. (2011), asserts that the 2011 Greening government ICT strategy set emphasizes on government to use green ICT. This will contribute to green commitments and provide financial savings using efficient and green practices. The strategy included an initial 4-year roadmap of commitments to reduce the government's technology energy consumption and promote sustainable digital alternatives to paper-based processes. Government digital approaches underpinned a major reduction in energy consumption by ICT. According to Horowitz (2010), by 2008, 26 US states established statewide recycling programs for obsolete computers and consumer electronics equipment. The statutes either impose an advance recovery fee for each unit sold at retail or require the manufacturers to reclaim the equipment at disposal.

According to Hahnel (2010), in 2010, the American Recovery and Reinvestment Act (ARRA) were signed into legislation by President Obama. The bill allocated over $90 billion to be invested in green initiatives. An increasing number of governments are seeing ICTs as an important part of their strategies for tackling environmental problems. Most OECD governments have established policies and programs on ICT and the environment. However, despite some common focus points and targets, the administration of these policies programs, their targeted objectives, quality of their assessment and evaluation differ significantly across countries (Keim,2008). The Council evaluates computing equipment that measure a product's efficiency and sustainability attributes. Products are rated Gold, Silver, or Bronze, depending on how many optional criteria they meet. On 2007-01-24, President George W. Bush issued on Executive Order 13423, which requires all United States Federal agencies to use EPEAT when purchasing computer systems that ensures reduction of gas emissions (Kennet, Winchester and Felton, 2012).

According to Puglia, Virgilian (January 2013), an analytical matrix classifies programs and initiatives by the following three criteria: Direct or enabling effects, Policies and programs can focus on direct effects when targeting the environmental impacts of ICTs, or they can focus on enabling effects when using ICT applications to reduce environmental impacts across economic and social activities (Mittal, 2014).In Environmental impact category Life cycle, Goods and services go through different life cycle phases. Policies and programs focusing on the direct environmental effects of ICTs can target one or more life cycle phases of ICT and design manufacturing distribution, use or disposal, United Nations Environment Program (2010). Policies and programs can also focus on the enabling effects of ICTs at a specific life cycle phase (Hahnel, 2010). For example, they can promote ICT applications that make manufacturing distribution or use of goods in non-ICT sectors more resource efficient. The life cycle concept is used to structure policies and programs.

5. Conclusion

Parliaments around the world are increasingly legislating on climate change. They act with a view to both reduce greenhouse gas emissions and adapt to the impacts of changing climate. A key concern is the cleaner production and more efficient use of energy. But climate laws also cover transport, agriculture, forestry and a host of activities, like water use, that are vulnerable to climate risks. Some laws are couched in terms of green growth, energy security, air pollution or other domestic objectives, rather than climate change. But more and more countries are passing laws that are explicitly aimed at climate change, establishing new policies, processes and institutions such as independent agencies and oversights bodies to deal with the problem.

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