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**The Challenge of Climate Protection in populous emerging economies:
Which political system suits better?**

Robin Schluttenhofer

Students' register number: 102756

Identification number: 29801

Primary supervisor:

Prof. Dr.sc.pol. Ralph Wrobel

Secondary supervisor:

M.A. Thomas Rink

Hand in date:

26/01/2016

Contact details:

Phone number: 03473/ 810828

Address:

Pfeilergraben 2a, 06449 Aschersleben

E-mail address:

Robin.Schluttenhofer@web.de

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List of acronyms and abbreviations

BRIC	Brazil, Russia, India and China
CCS	Carbon Capture and Storage
CO2	carbon dioxide
CSP	Concentrated Solar Power
ERI	Energy Research Institute
GDP	Gross Domestic Product
GONGO	government-organized non-governmental organization
G77	Group of 77
HCFC	hydro chlorofluorocarbon
LED	light-emitting diode
NDRC	National Development and Reform Commission of the People's Republic of China
NGO	non-governmental organization
NTPC	National Thermal Power Corporation
SCO	Shanghai Cooperation Organization
SEB	State Electricity Boards
UNFCCC	United Nations Framework Convention on Climate Change
U.S.-China CCWG	Climate Change Working Group of the United States of America and the People's Republic of China

1. Introduction

The Peoples Republic of China and the Republic of India are of immense global interest for they control large land masses, have the largest and still growing populations on earth and fast growing economies as well as serious environmental challenges. The need to develop a highly productive economy as well as a social system to ensure political stability must therefore be balanced with a thorough calculation of emerging risks in terms of climate protection. Both states exert growing influence on the success and failure of global climate protection programs which leads to the question, how well they are suited to solve their own problems as well as take responsibility for progress and setbacks of their environmental policy. The leading question of this thesis is therefore, which political system is better suited to tackle the challenges of climate protection in populous emerging economies.

A comparison of the Republic of India and the People's Republic of China, which share a similar initial situation, shall point out, what consequences their different political approaches have for the success of their respective climate protection measures. The Republic of India shares similar political attitudes with European states in terms of democratic decision making and individual rights which also influences the way Indian institutions are authorized to work. From the European perspective this system, although opposition can become an interfering factor for necessary measures, is deemed to be a desirable one, because an active role of the population as well as the independence of political opposition are perceived as opportunities to push forward essential reforms.

The People's Republic of China has a state apparatus that shares some similarity with the former Union of Soviet Socialist Republics, where the Communist Party had no considerable parliamentary political rivals and other political parties were de facto controlled by the Communist Party. This system, which is often criticized by the United States of America as well as their European partners, is on the other hand often seen as highly effective in terms of decision making, as a consensus in the Politburo Standing Committee is quickly implemented in actual policy and governmental institutions have more options and authorizations in dealing with disruptive factors.

While the Republic of India and the People's Republic of China face a multitude of shared challenges and are expected to assume a growing responsibility for global climate protection projects, they also have increasing capabilities to influence international decision making processes. They both are nuclear powers with the largest standing armies on earth and their attractive developing markets, economic growth as well as their diplomatic contacts, which manifest in their presence in BRIC and SCO (India currently has an observer status in the Shanghai Cooperation Organization). In that position both states can formulate their policies and strategies according to their national interests which can differ from the demands of European or North American partners which have limited prospects to enforce certain policies. To develop a coherent structure of research, the established theories of public choice are first introduced as they built a foundation for a further comparison of the political systems which define the decision making processes in both states.

One indicator for the commitment of both states to a responsible climate policy is their readiness to make binding agreements, on which successes and failures can be measured. As ecology-minded rhetoric is no substitute for actual measures and delaying tactics might jeopardize the success of international climate goals, this research will evaluate the progress of the respective political systems on the degree announced plans and goals are implemented as well as on the binding commitments the two representing states are ready to make in an international context. For a detailed assessment of those measures, the amount of noxious emissions and the climate protection laws in both states as well as the obstacles for their implementation are crucial factors of success, but the degree of non-governmental activities and the public investment in climate relevant technologies also indicate and influence certain developments and are therefore not to be ignored.

A research on the respective climate policies and their effectiveness is built up on the different strategic approaches both states announce in their respective development plans which are then examined in correlation with the actual progresses that were achieved since the formulation of the recent strategies. A comparison of the challenges and measures of both states with the development of current industrial states shall lead to prognoses about further developments in the field of climate protection and a conclusion to the question which one of the two compared political systems is more successful in the implementation of effective climate protection laws.

2. Public Choice

2.1 Democratic and autocratic forms of government

To understand the processes which influence the different progresses in the field of climate protection in the Republic of India and in the People's Republic of China, certain theoretical considerations of the respective political systems are needed. Therefore, general theories and observations about the behaviour of politically relevant groups and their influence on the distribution of public goods will lead to conclusions about the causes of the observed situation in both states. Theoretical models from the subject of political economy or public choice are first introduced and afterwards modified to do justice to the observed realities in both societies which represent neither the pure form of dictatorship nor the pure form of democracy.

According to Olson the presumption that interest groups act as homogeneously as individuals must be doubted. If altruism is considered as a negligible factor, rational acting members of such groups will in trend prefer to act according to individual interests in contrast to the shared interests of the group. He defines the group as an accumulation of people with at least one shared interest. Random accumulations without a shared interest are considered less important for the subject of group theory. Single individuals of a group are compared to companies of the same branch of trade which share certain interests, but also compete with each other (Olsen 3 - 9). If individual members of a group profit from the realization of the shared goal even after carrying the aggregated costs, there is no need for extensive organization. In contrast to that, larger groups require more organization to provide the needed incentives (ibid., 45).

According to the Polity Index, which measures the inclusiveness of governments, states are acknowledged as democracies that fulfil certain criteria (Deacon 2003, 13 - 17), but can differ considerably from the mentioned model, in which the whole population can be considered as the political elite with to a large extent equal relevance in decision processes. The Republic of India for example can comply with international standards and is hence considered to be a democracy, but there is a strong elite formation.

With parts of the rural India that are still ruled by a caste society, the Republic of India is indeed still far from the model of a completely inclusive society and corruption is also an unsolved challenge for the implementation of Indian laws.

According to Niskanen, it is too unprecise to describe all decision making processes in democratic societies as done 'by the people' as there are sub groups within a population with different interests. Depending on the income the share on taxes and the share on transfer payments may differ with the lower income population benefitting from higher income taxation and therefore from a higher distribution of wealth, while the high income population benefits from a lower taxation. Therefore the distribution of wealth is more relevant for a democratic system, where the share of median voters highly influence the election results, while in autocratic systems the margin between per capita taxes and costs for public spending add up to the revenue of an autocratic government. The possibility of a coup d'état causes most autocratic governments to deter from the maximization of this margin by completely cutting public services or imposing taxes, which threaten the existence of a larger part of the population (Niskanen 1997, 466 - 467). In a democracy the decision making processes are not limited to the elections, but market influence is also a variable to be considered (Arrow 1963, 1). It is reckoned that in a socialistic democracy, where public elections decide the quality and quantity of production goods, the decision would be very similar to the outcome of free market processes, with the distinction of market processes as a non-secretive election, where the voters have a different influence on the outcome depending on their financial means (Bernholz/ Breyer 1984, 59).

Political and economic strategies of various competing interest groups are therefore inconsistent with the idea of a fixed preference of a majority that will lead to a predictable result in political elections. The mutual influence of strategies on each other leads to a situation, in which rational decisions and strategies would, even on the premise of access to all relevant information, not stay constant; hence the competing rivals have to change their decisions in accordance to the strategies of the competition (Arrow 1963, 20). The presumption of steady preferences and constant decisions leads to contradictions as majority preferences can adulterate each other. Therefore the advantages and disadvantages of the compared political systems need to be considered in correlation with the ethical consensus of a society as concentration or distribution of wealth can be accepted to varying degrees.

2.2 Legitimization of governments

As there are differences between the autocratic and democratic governments there are also various ideologies the respective states derive their legitimacy from. Dictatorships and democracies therefore point out their advantages over the disadvantages of competing forms of government. The distribution of public goods and successes in the implementation of effective climate protection can serve as means to emphasize the superiority of a preferred political system.

A problem, which occurs while searching for the optimal method of public goods distribution, is the Pareto optimality in which no improvements in the provision of goods for one part of the society can be achieved without having to accept impairments in the supply of goods for another one (Bernholz/ Breyer 1984, 21). To develop a concept of optimal usage distribution a government must face the challenge of measuring and evaluating the usage. While a precise expression of this usage in numbers is not always possible, the individual order of preferences including indifferences and conflicting preferences are often the basis of different points of view on the responsibilities of a social state. The question, which investments are considered to be more important than others, is often dependent on the personal situation of the observer (Arrow 1963, 15 -17). Therefore even an optimal government (which has all relevant information for its fiscal decisions) couldn't be considered as perfect since the Pareto choices don't allow for an optimization of all factors (Niskanen 1997, 469). The implication of that effect is that a decision about the distribution of public goods is often measured on ethical questions rather than on scientifically verifiable ones. That bears the danger of an interference of ideological preferences with the research. The consequence can be that observed conditions in a state are assumed to be a direct result of the respective political system while other factors may play a more significant role. With the researcher minimalizing the effects of ideological preferences, value judgements are still less reliable than positive statements, which can be scientifically disproven (or temporarily verified until refutation). Value judgements about the desirable distribution of goods are mainly measured on their logical flawless derivation of accepted norms and the absence of contradictions between the pursued goals (Bernholz/ Breyer 1984, 25 - 26). In case of climate policy the progresses in the reduction of noxious emissions can be clearly measured, but with the interference of other competing goals the general distribution of limited resources is a significant factor to be introduced.

According to Buchanan and Musgrave a state is defined as a cooperative venture, which has the leading responsibility to act according to the interest of its members. Therefore an individualistic approach as well as group interests built the foundation of the functions a state is expected to fulfil. Liberty, on which the legitimacy of a state is often measured, is in Musgrave's opinion characterized by individual self-interests as well as mutual concern for other parts of the society. The provision of institutions for the cooperation of its citizens is understood as the state's authorization to exist and it is this organization of sub-functions from which a state derives the authority. The actual implementation of executive, legislative and judiciary functions and the delegation of enforcing power differ according to the constitution of the state. The well-organized accomplishment of certain targets as well as the leadership quality of its political representatives, who should be ready to take long-term crucial decisions, even on the risk of losing votes for a following mandate, are relevant factors which determine to what extent a state can cope with its responsibility. One often demanded function is also the protection from corrupt officials, but the general assumption of a kleptocratic government doesn't seem to be suited for the modelling of a society (Buchanan/Musgrave 1999, 32 - 35).

2.3 Advantages and disadvantages of democracies and dictatorships

For the evaluation of the distribution of public goods in a state the tendency emerges to prefer a system which benefits a large percentage of the population over a form of government which mainly benefits a smaller group. According to Deacon the decisions about public goods distribution are made according to the political relevant usage that can be achieved. Therefore the distribution of public goods in dictatorships is believed to mainly benefit elites, which are necessary for the survival of the political system, while democracies (where political decisions are made by the whole population) are believed to distribute public goods for the advantage of a larger group. In an ideal democracy the power elite and population are believed to be the same group. The politically relevant elite in an autocratic system may have more opportunities to use corruption to get access to public goods, while every vote is considered equally significant in a democracy, which makes the whole population relevant for the election of competing politicians (Deacon 2003, 6 - 10).

These assumptions may by trend be observed in various dictatorships, but there are limitations to the concentration of wealth an autocratic system can afford. In my observation a fight against corruption can be crucial for an autocratic system, as an insurgency of larger fractions of the population as a result of poverty can threaten even dictatorships which are willing and capable to react with military force (as observed for example in the Arab Republic of Egypt in the year 2011). If a crackdown on corruption is deemed necessary by the government of a dictatorship, it has the option to apply drastic measures which a democratic constitutional state, that guarantees certain rights, is unable to apply. The current Anti-corruption campaign in the People's Republic of China is also introduced in the researches considering the obstacles for an effective climate protection in China.

For a democratic government certain transfer payments which benefit a majority of voters (like a social support in case of unemployment following an accident or illness) can be considered like fixed costs (Niskanen 1997, 171), but to assume, that only democracies can have an incentive to develop a social system, which benefits a majority of the population, may be misleading. A high but ideologically controllable percentage of the population (for example the worker or peasant class in a socialist dictatorship) can also be used as a counterbalance to the power of wealthy and highly educated groups to prevent a possible opposition from influential members of the elite. Hence a strong distribution of public goods towards a social system can be in the interest of a ruling party.

The political unpredictability of dictatorships resulting from power struggles inside the elite or from the myopic character of the decision making processes in some autocracies is considered as a major risk for investments (Deacon 2003, 13). As the lack of property rights depresses investments, the mentioned corruption of influential officials may also drain money from the concerning economy. Therefore incomes in the private economy of authoritarian systems are expected to be lower than in inclusive societies (ibid., 26). This assumption is dependent on the degree of widespread corruption or a lack of trust in the stability of an autocratic government. Successes in the fight against corruption and a consensus of the ruling elite towards a guarantee of property rights can mitigate that effect as demonstrated by the highly productive private economies of the Republic of Singapore or Negara Brunei Darussalam. In a democratic state a rise of fixed costs, for example on the defence, is observed to decrease the public spending on transfer payments without affecting the taxes paid by the wealthy minority. Therefore investments in armaments projects are rarely opposed by the high income population (Niskanen 1997, 467).

Although the reduction of social spending in favour of military projects are rarely in the interest of a large percentage of the concerning population (if no serious threat of an invasion is apparent), it can be observed, that the market influence of the upper percentages of the population can indeed lead to such a trade-off, even in democratic societies.

The damage that is sustained by the elite (for example damage from environmental pollution) and the benefits for the public from investments in an autocratic system are also assumed to be marginal (Deacon 2003, 11). Protection from environmental hazards is considered a public good and is assumed to have similar trends depending on the form of government. While a rise of the income level lead to a modernization of environmentally relevant technologies in democracies, a rising income is described to have less effect on the investments in ecologically sustainable technology in dictatorships (ibid., 38 - 40). In case of the People's Republic of China it can be observed that this assumption of an elite which can avoid environmental damage by choosing unaffected areas to live, is just in part appropriate. Members of the political elite are expected to participate in activities and congresses of the Communist Party in Beijing (or other large cities across China) and many members of the economic elite are active in various overcrowded metropolises, which share the burden of high air pollution. In many cases of environmental damage (for example in case of water pollution in rural areas), it can indeed be observed, that economic and political decision makers leave the burden to the affected local population, but the tackling of noxious emissions as well as climate change problems may be relevant for even highly influential parts of the society.

The options for the allocation of public goods for a certain target, for example climate protection, are either a planned organization by the state or a usage of market mechanisms. The assumption of a central planning institution, which has access to all essential information, is useful for the design of descriptive models, but the absence of complete information makes incorrect planning unavoidable. For planned economies it is essential to develop mechanisms that allow for fast adjustments for an approach towards the optimal planning. In market economies with a decentralised organization there is the threat of an absence of the desired perfect competition with its stabilizing effects (Bernholz/ Breyer 1984, 51). This danger is very relevant for the Republic of India, in which political interventions in the economy can encounter juristic resistance. As politics and economy influence each other, a regulated property law is the basis for a free market economy (ibid., 14).

Although the economy of the People's Republic of China strives towards an opening of free markets, the consequences of governmental interventions in a planned economy are still very relevant for the Communist Party of China, because its power concentration allows for a strong political interference in the economy against the resistance of individual stake holders.

Apart from the general interests and decision making processes, democracies and dictatorships can act differently depending on the level of far-sight the current leadership possesses. An optimal government would act oriented on the long-term effects, while a democratic system often focusses on short-term effects, but even myopic democracies are considered much more beneficial for the majority of the population than a dictatorship, which can also act myopic depending on the leadership. Long-term oriented politics in an autocratic system mainly benefit the population compared to a myopic autocratic government. Long-term oriented democratic governance is expected to invest less in transfer payments (it is even recommended to abstain from all transfer payments apart from social insurance networks that are considered as fixed costs), while a free market economy increases the average incomes. The assumption, that this cutting of transfer payments lead to a situation, that benefits all concerned groups of the population almost to the optimum (Niskanen 1997, 172 - 174) is a basis for many political arguments, which often favour a democratic political structure with a free market economy and may to a certain degree be influenced by ideological preferences even to the point, where no alternative to this model is deemed worthy of consideration.

A certain preference of a market economy becomes apparent, but whether this preference influences the research or is a result of this research remains unanswered (Bernholz/ Breyer 1984, 26). Niskanen's comparison between democratic and autocratic fiscal policy supports Deacon's theories to a large degree (Niskanen 1997, 171) as even myopic democracies are considered to be more beneficial to the population (apart from the autocratic elite) than long-term oriented dictatorships. Therefore he agrees to Mancur Olsen's description of a dictator as 'stationary bandit'. Democracies often face a trade-off between the benefits of frequent elections (replacement of unsuitable leaders and quick changes of undesired policies) and the benefits of long-term oriented politics as frequent election force politicians towards a myopic policy. Apart from the mentioned disadvantages dictatorships are also assumed to have an incentive to expand their rule over a large population, because their income is based on the margin between its costs and the taxes they can impose on their people, while democracies profit from such an expansion only if there are considerable costs that are independent from the demographic trends of a state (for example for defence) (ibid., 177 - 178).

3. Climate protection in the People's Republic of China

3.1 Chinese position in international climate protection negotiations

As the global CO₂ output from the years 1990 to 2007 increased by 26.5 per cent, the emerging economy of the People's Republic of China was responsible for 48.5 per cent of this growth of CO₂ emissions, while the Republic of India had a significantly smaller, but still worrying and rising impact on the total emission increase of 7.1 per cent. According to the ratification of the Kyoto protocol on August 2002 and its status as a non-Annex I country, there is no binding international commitment for the People's Republic of China to reduce its emissions, but a declaration of the national strategy and progress is expected. While the former president Hu Jintao considered climate protection as a part of the national development rather than as a part of the Chinese responsibility for the environment (Oberheitmann/ Sternfeld 2009, 137 - 141), the changes of priorities under president Xi Jinping lead to announced intensions of coordinating the own affords with international targets after the year 2020.

Until the United Nations Climate Change Conference in Copenhagen, which takes place in 2020, the People's Republic of China hopes to reduce the emission intensity by 40 - 45 percent. The U.S.-China Climate Change Working Group (CCWG), which was founded in April 2013, is a step towards the bilateral settlement of disagreements that limited both state's commitments in a unilateral framework. In 2014 the United States of America and the People's Republic of China started to communicate and coordinate their respective climate policy interests. This bilateral approach is expected to lead to shared standards and an effective cooperation in the implementation of emissions reduction strategies of the United Nations Framework Convention on Climate Change (UNFCCC) (Dröge/ Wacker 2014, 1 - 3).

Beyond that cooperation, the Chinese contribution to global climate protection affords is expected to improve significantly as the People's Republic of China announced ambitious targets and shared important information on its climate strategy in preparation of the 21st annual Conference of Parties to the United Nations Framework Convention on Climate Change in Paris at the end of November 2015 (Sandalow, David 2015, 1- 2).

3.2 Noxious emissions in the People's Republic of China

It can be observed that in the years 2000 to 2007 the total emission of CO₂ accelerated significantly. While already wealthy regions had a rather preferable tendency of emission reduction, the developing regions in the Central-South and North-West of China had growing emissions depending on the economic growth of the concerning provinces. This mentioned development of the release of climate active gases should be considered in connection with an improving of the emission intensity in those regions. The output of noxious substances in relation to the economic growth measured in financial units was reduced through progresses in energy intensity and economic structures (Dong/ Lu/ Du 2010).

The People's Republic of China alone accounted for 25% of the total global carbon emissions in the year 2012 and because of the enormous population its total emissions equalled the added CO₂ output of the United States of America and the whole European Union, while the per capita level draws near to the average per capita emissions of the European Union. From the global growth of the CO₂ output between the years 2010 and 2012, the Chinese share contributed 73% as the production of coal (approximately half of the global exploitation) and cement (about 60% of the cumulated worldwide production) are second to none. The main sources of the CO₂ emissions in the People's Republic of China are the industrial production of goods and the energy generation, while in fully industrialized states a shift towards transportation and private households as the main emission sources can be observed. Hence the Chinese per capita emission of carbon is approaching the average in the European Union and has therefore not reached the per capita CO₂ level of the United States of America, while the living standard of those industrialized states is not reached yet, it can be expected, that the CO₂ emissions will still expand before the tipping point is reached (Zhu 2015, 1 - 3).

Whether this tipping point can be estimated around an average of eight tones of CO₂ output per person like in the European Union or even at an average of 17 tons of carbon emissions per person like in the United States of America is still unclear. With a current per capita GDP that equals one eighth of the US-American average gross domestic product and a tendency towards an ongoing economic development (with varying economic growth rates and priorities), the People's Republic of China faces a risk of emitting a dangerous amount of noxious substances (which include CO₂, but are not limited to it), before its development into an industrialized state is completed (ibid., 5).

The consequences of the emissions burden already pose serious risks on the population of the People's Republic of China. Among the 50 cities with the highest air pollution worldwide, 31 were located in the People's Republic of China. Seven of the ten cities with the most serious burden caused by noxious emissions were Chinese cities. Respiratory diseases, in particular lung cancer, are currently the most common type of disease and are estimated to have caused the accelerated death of 650,000 people and 400,000 cases of chronic obstructive pulmonary disease in eleven Chinese metropolises. One third of the Chinese territory is affected by acid rain that is caused by emissions of sulphur dioxide and nitrogen oxide (Bohnet 2008, 4). Beside public health concerns, there are also worrying trends in the agricultural sector, that are expected to shift the focus from crops, that will lose productivity as a result of higher temperatures towards plants, which may even grow in areas, in which the climate change provides for preferable conditions. While the north-eastern provinces may benefit from a growing agricultural production, the North China Plain is expected to experience droughts and face therefore a higher need of water supplies for an at best stagnating production. An increase of water shortages and a decrease of crop production in this region are expected. In north-western provinces a further increase of crop yields due to water shortages and a loss of agricultural potential in south-eastern provinces as a result of floods and even a permanent loss of growing areas because of rising sea levels are estimated to cause massive damage on the total productivity of the agricultural sector of the People's Republic of China (Wang/ Huang/ Rozelle 2010, 5).

In the year 2012 it was observed that while the Chinese total GDP was around 55% of the US-American economic performance, the emissions already were twice as high as the CO₂ output of the United States of America. The implementation of this is, that technological affords to reduce the carbon intensity of the Chinese industry sectors can have a significant impact on the emissions burden for the Chinese population and on the global tackling of the climate change. Chinese plans to reduce the carbon intensity from the year 2005 by 45% until the year 2020 reflect the translation of those insights into a climate political agenda in the year 2009. The realization of the environment protection targets in the national five years plans is hoped to limit the growth of CO₂ emissions to a peak in the year 2030. This goal was announced in November 2014 in the framework of the U.S. - China Joint Announcement on Climate Change and Clean Energy Cooperation (Zhu 2015, 3 - 7). The implementation of ambitious climate protection targets and political strategies will lie in the adjudication and enforcement of appropriate laws, which lay the foundation for the required changes in the way, further economic development is achieved.

3.3 Chinese climate protection laws

The environment protection and conservation of resources are key targets of the current, the 12th Five-Year Guideline (Five-Year Guidelines are the current wording for the Five-Year Plans since the 11th Five-Year Guideline) which was announced by the National People's Congress in the year 2011. One major goal is the reduction of the energy demand per GDP unit of 16%. As the supply of energy is one considerable source of pollutant emissions, the actualization of this goal is ambitious but may account for a significant progress in the climate protection affords of the People's Republic of China (CBI China 2011).

In comparison with the goal of the 11th Five-Year Guideline of reducing the energy consumption per GDP unit by 20% between the years 2005 to 2010, the conclusion emerges, that the reduction of energy consumption alone is not sufficient for an effective climate protection as progresses in this field can only be achieved to a certain degree and lose in momentum in the long term, as the economic development makes a reliable energy supply indispensable (Oberheitmann/ Sternfeld 2009, 147).

A review of the ecological achievements that were made in the last Five-Year period in the introduction of the current Five-Year Guideline seems to be rather optimistic compared to the assessment of the challenges which result from the economic globalization, e.g. the international financial crisis (CBI China 2011). According to the National Development and Reform Commission (NDRC) of the People's Republic of China the weather conditions caused by the climate change already lead to serious damage. Since the year 2012 mud- and landslides, floods and typhoons, storm surges and several droughts of varying intensity, especially in the Yunnan Province, affect the economy and jeopardize people's lives. In November 2012 the ecological challenges were a major topic in the 18th National Congress of the Communist Party of China (National Development and Reform Commission of the People's Republic of China 2013, 1).

The CO₂ reduction goals that were agreed on in the making process of the 12th Five-Year Plan require a thorough organization of sub-targets and responsible institutions. A macro strategic study of low-carbon development in China that was commissioned by the National Development and Reform Commission in cooperation with the Ministry of Finance is hoped to provide the necessary information for actual measures (ibid., 7).

One strategy is the elimination of overcapacities, which resulted from the governmental support of industries which were considered as strategic important. A set of strictly enforced energy consumption and emission standards by local governments is expected to quicken the modernization of the concerning industry branches and the elimination of obsolete production methods. Another strategic goal is a shift from the usage of highly pollutant fossil energy sources to clean energy sources. Shale gas and synthetic natural gas as fossil energy sources are also used to at least reduce the noxious emissions which result from the burning of the even more pollutant coal. The strategic goals for an energy shift and the suggested measures for their implementation are defined in the Airborne Pollution Prevention and Control Action Plan that was announced by the State Council of the People's Republic of China in September 2013 (National Development and Reform Commission of the People's Republic of China 2013, 14 - 15). For the effective implementation of those plans, the legal foundations of climate policy affords are evaluated and the climate relevant laws are coordinated with the laws concerning energy and natural resources. The capability of concerning authorities to oversee and enforce the adherence to those laws are strengthened (Xue, Lan/ Simonis, Udo E./ Dudek, Daniel J. 2006, 11).

The supply of cleaner energy sources as one part of the climate protection process is supplemented by an improvement of the current efficiency of its generation as well as progressive energy conservation technologies. Guidelines and regulations for energy intensive industries and a limitation of the fuel consumption of manufactured vehicles that are controlled in the framework of quality inspections are further necessary steps towards effective noxious emission cuts. 600 technologies from 11 industries are expected to overall improve energy efficiency and emissions reduction. (National Development and Reform Commission of the People's Republic of China 2013, 18 - 21). Reforestation projects, which shall be launched from 15 model forests management bases, have also significant strategic value in the transformation of CO₂ into oxygen. Further attention is given to the limitation of the methane output that results from the treatment of garbage. Controlling technologies are also applied to terminate hydro chlorofluorocarbon (HCFC) emissions from various industries (ibid., 24 - 26). The environment protection laws of the People's Republic of China are in general considered to be comparatively strict and ambitious, but a main problem that became apparent in the last years is a lack of enforcement of the laws. Without an eager identification and effective penalization of law violations, the announced plans may be commendable in theory, but its implementation still faces considerable challenges.

3.4 Obstacles for effective climate protection in China

One important requirement for the implementation of the Five-Years Guidelines is the political will from the top government to the local authorities in charge. In the upper levels of the Chinese government the eagerness for climate protection measures is rivalled by a need to ensure a reliable energy supply, be it clean energy or if necessary the currently used fossil energy sources.

As a policy towards energy security emerged to be of strategic importance, it became the framework as well as a limitation for the emission control affords. Energy efficiency may serve both purposes, but the attempt to merge both strategic variables in the year 2006 resulted in a compromise, mostly in favour for the energy supply, which is immediately needed for the economic growth that had high priority under the administration of Hu Jintao and Wen Jiabao. Economic growth as the basis for poverty alleviation is estimated by many as the leading criterion for the legitimacy of the power position of the Communist Party and for social harmony (Hallding/ Han/ Olsson 2009, 120 - 121).

Even with a current party leadership's change of priorities, there is still the challenge of diverging interests between the central government in Beijing and the local authorities. As local environment protection offices need the support of the respective government, they have to rival powerful state owned companies, which in most cases are superior in terms of political influence and economic means to bring their interests to bear (Hofem 2010, 7). One major problem for the enforcement of environment protection laws of different kinds were the lack of authority that was delegated to the responsible government agencies. A fragmentation of authority lead to a situation, were laws could be completely ignored by companies, while the local government agencies were uncertain, who had the assignment to close down the companies in question (ibid., 19).

The personal ambitions of politicians who could be held responsible for a loss of workplaces and social unrest that resulted from their decision to shut down illegal operating companies (especially if they belonged to industry branches which were considered as strategic important by the central government) made it attractive for the cadres in charge to hesitate in climate protection matters and avoid potential risks for a further political career, while seeking the support of well-connected state owned companies.

As there are still considerable disparities in the economic development of the various provinces, the central and western provinces are expected to undermine the central government's plans to reduce the usage of coal as a major energy source. The lack of control on the usage of coal as a cheap option for a fast but reckless economic growth may provide opportunities for local authorities to act independently from the national climate protection strategies (Greenovation Hub 2015, 18 - 19).

Apart from concurring priorities of the top leadership and vaguely defined authorities of the law implementing organizations, corruption and political power struggles are also major burdens to the climate protection efforts in the People's Republic of China. While the corruption of local politicians and wealthy managers of state owned enterprises must be expected and dealt with by the central government as mentioned in the considerations about public choice theories, a power struggle of high ranked officials can pose a serious threat to governmental strategies and have the potential to cause significant changes in the direction policies on national level are headed. The current administration under the president Xi Jinping pushed forward environment reforms and considered a slowing of economic growth as tolerable for the sake of a more stable and sustainable development. While the economic and environmental reforms were deemed essential by the Politburo Standing Committee of the Communist Party of China, the currently faced financial turbulences provoked an internal opposition by influential cadres of the Communist Party. The position of the president is further weakened by elites, which became powerful under the administration of former presidents Jiang Zemin and Hu Jintao and who may also have reasons to be worried about an anti-corruption campaign that can also target very powerful former members of the ruling elite like Zhou Yongkang.

The consolidation of Xi Jinping's power and the indeed essential measures against corruption indicate a strong mutual mistrust between old and new party elites. This nervousness is also reflected in the Chinese state media, which communicate the enormous opposition against the current reforms very explicitly to the public, which is rather unusual for them to do (Huang 2015). On the other hand, the clear support for Xi Jinping's reforms by the state controlled media seems to indicate, that the influence of the former party leadership has not reached the governmental agencies, which control the public relations of the state, yet. Political stability will be crucial for climate protection negotiations with the People's Republic of China as a change of leadership is very likely to result in a shift of political priorities towards an economic growth that is less limited by governmental climate protection efforts.

3.5 Public activity in China

In contrast to the Republic of India, the government of the People's Republic of China has the authority to censor and control media content, which in general is contrary to the development of an independent climate political engagement of the public. Environmental activism, which may serve as a counter balance against the corruption of local politicians, is actually useful and desired by the central government, but any criticism against shortcomings of the central government is considered as dangerous and is in most cases quickly dealt with. With contradicting positions in the Communist Party, that were introduced in the last chapter, the decision of what content is censored is often not a guarantee for the absence of the undesired information in the public opinion. Microblogging (called Weibo in China) can spread information faster than authorities can react and the public support for a campaign by one part of the government makes it risky for another governmental stakeholder to enforce a censorship of the same content.

In the case of the investigative documentary called "Under the Dome", which was financed and produced by the former China Central Television journalist Chai Jing in the year 2015, a very large audience was reached, before it was deleted from most media. In this documentary, the various reasons for the enormous smog burden of the People's Republic of China are researched and the practices of large state owned oil companies (and the political framework that failed to enforce the environment laws and supported inefficient companies from strategic key industries) are uncovered, while the affords of the central government under president Xi Jinping to reform the economy and tackle the mentioned problems are praised. Public support by the Ministry of Environmental Protection of the People's Republic of China and the privileged position of the former state media reporter helped to spread the documentary in a short timeframe. While pressure from powerful state owned enterprises resulted in the current censorship of the content, over 100 million views in the first 48 hours of free access may have a certain impact on the public opinion and the formation of climate active non-governmental organizations (Bristow 2015). NGOs in general face a shifting political environment as they are desired as supporters for the Chinese policy, but can also be suspected as pressure groups, which can organize an opposition under the influence of foreign stakeholders (Lehrac 2004, 7).

The deep mistrust for non-governmental organizations that is in contrast to the desire to delegate responsibilities of the state to private financed groups lead to the formation of government-organized non-governmental organizations (GONGO) (Lehrac 2004, 9). The attempts of the Chinese government to control or at least influence the civil engagement should be considered as a major burden for the development of a public interest for climate protection. On the other hand, the tendency to monopolize those activities and the obvious damage of noxious emissions for the society may lead to the opposite development. As more people lose confidence in the ability or will of the state to tackle the environment problems effectively, the attempted control over climate active organizations may lead to a stronger strive towards opposition by concerned activists. It can be doubted that a government can fail to make progress in terms of climate protection, or environment protection in general, while guiding and controlling the public ecologic engagement without losing credibility in the long term.

As technological progress plays a critical part in the official climate protection strategies, an overview of promising companies shall allow for a consideration of the current technological capability for a shift towards ecological sustainability. There are various programs which try to support the development of ecological responsible companies by awarding them with certain certificates and branches, which can be used for public relations goals and can help to build networks of enterprises with similar values. While some certificates are currently issued or even made compulsory for trade by state authorities, a common removal of emission filters after the certification has severely damaged the trust in the enforcement of respective laws. Therefore ecology labels that are issued by non-governmental organizations or networks, which cooperate with scientific institutions, can help to fill a void.

The research conducted for ‘The China Top 100 Green Companies Report’ that is issued by the China Entrepreneur Club provides data about promising companies, which should be observed as they are expected to stir the Chinese economy in a sustainable direction. One challenge in the consideration of the current level of Chinese green technologies is the limitation of most reports to a number of significant and powerful companies, while the current sophistication of smaller companies, which in summation may also have a high impact on the total emission reduction, is hard to quantify (Zhang 2012). As the economic and technological development in the People’s Republic of China affects a large number of various companies, it could be hoped that a growing percentage of smaller enterprises also evolve into more sustainable companies.

3.6 Climate relevant technologies in China

For climate relevant technological progress to spread among not only a few top enterprises, but also to a broader number of companies, one step can be a stop of measures that protect inefficient companies in strategic key branches or large state owned companies from the market processes that benefit innovative enterprises. As government controlled companies are forced to modernize, smaller independent companies also have an interest in using innovations (for example in climate relevant technologies for mentioned marketing reasons) to secure a place in their respective market. Another strategy, which is used by the central government, is a financial support for research and development investments in promising technology branches.

The current Five-Year Guideline represents this goal as National Low Carbon Tech Innovation and Model Industries Projects were launched including 34 scientific projects in the fields of energy production, coal related industries and the construction branch as well as material production industries. Further support is given for newly emerging strategic key branches and over 20 scientific areas, where an overall improvement in terms of sustainability of the Chinese economy is expected, for example in energy and environment branches, biology and high-tech branches (like new-energy transportation and new materials). Between the years 2012 and 2013, 138 venture capital funds with 38 billion yuan were invested for those projects, among those investments 11 billion yuan in 38 funds financed the support of branches, which have a direct impact on the Chinese environment protection plans like the generation of alternate energies, energy conservation and environment protection projects (National Development and Reform Commission of the People's Republic of China 2013, 11 - 12).

For the ambitious goal of a renewable energy share of 15 per cent of the total energy supply by the year 2020 it is reckoned that about 120 billion United States dollars need to be invested by that time (Hallding, Karl/ Han, Guoyi/ Olsson, Marie 2009, 128). While the governmental measures and investments and the public activity are an important part of the comparison between the climate protection policies of the People's Republic of China and the Republic of India, the actual developments and progresses that can already be observed, are major sources for conclusions about the advantage of one represented political system for the tackling of the described challenges.

3.7 Hitherto existing progress in China

The Chinese affords to reduce the demand for coal and thus to control its CO₂ emissions seem to achieve first results. According to a report from the Greenpeace Energy Desk the People's Republic of China managed to reduce its carbon dioxide emissions in the first four month of the year 2015 by a similar amount as the total CO₂ output of the United Kingdom in that time by cutting the coal usage by the fourfold amount of the British total coal consumption in that time frame. As the Chinese demand for coal increased steadily until the year 2014, it now seems to accelerate its decrease leading to a fall of coal usage by almost 8% in the first month of the year 2015 in comparison with the first month of the year 2014 and a resulting cut of carbon emissions by 5%. This astonishing development which was announced in April 2015 is considered to be a direct result of a consequently enforced reform of the coal mining, in which over 1000 coal mines were shut down. The International Energy Agency reported that such a decrease of noxious emissions was not seen without an economic decline for 40 years and it can be expected that this development, if sustained over the year, would make the People's Republic of China the first state to ever achieve a confirmed year-on-year cut of coal utilization and carbon emission on this scale. It should however be noted, that the reduction of the total coal demand is also generated by smaller progresses for a vast population and other states may have achieved a higher per capita reduction of the coal dependency (Myllyvirta 2015).

In a report of the Energy Research Institute (ERI) in Beijing of the year 2001 the Chinese focus on energy efficiency improvements is deemed to be among the most effective measures that the Chinese government can refer to. With a heightened standard of energy efficiency it is estimated that carbon emissions can be reduced by ten to fifteen per cent. Investments in renewable energy sources are on the other hand considered to be less promising because the competitiveness of alternate energy sources is doubted, especially hence the currently consumed coal is regarded as a cheap option (Vuuren / Zhou/ Vries/ Jiang/ Graveland/ Li 2001, 72).

Those predictions may be of interest for the evaluation of possible scenarios under certain circumstances, but the ability of an autocratic system for sudden changes was highly underestimated. It can be concluded that the reforms of the current president Xi Jinping, indeed have a major impact on the emissions of the People's Republic of China.

The lack of predictability of a dictatorship, which Deacon described as a burden for investment (Deacon 2003, 13) can also lead to an unexpected fast progress in certain areas (in this case in the climate protection affords of the People's Republic of China), if the government defines it as a relevant factor for the stability of the political system. The described possibility of power struggles in the ruling elite in an autocratic system is also a significant threat for reforms, which are pushed forward against the resistance of competing parts of the Communist Party. Under the assumption that the current reforms are continued under the leadership of Xi Jinping and his administration, tendencies towards an effective or at least functioning climate protection strategy are observable.

4. Climate protection in the Republic of India

4.1 Indian position in international climate protection negotiations

The Republic of India as a fast developing economy has a similar initial situation as the People's Republic of China and demands towards the industrialized states for technological and financial aid for the climate policy, but also has a responsibility for its own emissions that resulted from an enormous economic growth. The current government of Narendra Modi still emphasizes economic development as the main priority and until now did not define any national climate targets for the United Nations Framework Convention on Climate Change (Dröge/ Wagner 2015, 1 - 3).

While the People's Republic of China succeeded in achieving a large extent of energy security (although there are still energy security issues which are considered as an obstacle for the Chinese climate protection goals) and is now concerned with the reduction of its dependence on fossil energy sources, the Indian economy still needs to develop a reliable energy infrastructure and has therefore little prospect of reducing its usage of fossil energy sources in a short time frame. Poverty reduction and the establishment of public support for a large share of the population are still very pressing issues in the Republic of India and force the government to develop the national economy as soon as possible.

The Indian position of a different responsibility towards climate protection, which emphasises the history of the currently industrialized states of causing damage to the global climate while achieving their economic growth and therefore demands equal rights in regard of emissions producing economic growth, is shared by many developing states. For the assertion of shared interests in international negotiations, especially as a counterbalance to the influence of the industrial states, the Group of 77 (G77) formulated demands, which mainly aim towards a role of the industrialized states as supporters of national climate protection projects of the developing states instead of a position, in which they can dictate binding climate protection commitments. The Republic of India can use its position as a partner of the Group of 77 to delay the pace in which reforms and results in the climate change mitigation can be demanded from its government while it formulates comparatively moderate demands towards the annex I states (Michaelowa, Katarina/ Michelowa, Axel 2015, 19).

With this background, a soon commitment to binding climate protection agreements is highly unlikely and the refusal of international demands for an Indian cooperation in climate protection negotiations is shared by the Indian political parties. That approach is often legitimized by the differentiation of the shared responsibility according to the capability of the member states of the United Nations Framework Convention on Climate Change (UNFCCC). According to the Indian argumentation, this reflects the claim of developing countries for the same opportunities for economic growth as the ones, now established industrial nations used for their own development. There are first signals from Indian representatives, but no binding commitments so far.

Among the announcement is the promise from the former Prime Minister Manmohan Singh in 2007, that the per capita CO₂ emissions of the Indian population will not exceed the per capita emissions of the industrialized nations. While the Indian population includes a high percentage of poor families who are currently unable to afford for example own automobiles, the reduction of this poverty may lead to a situation, in which low quality fossil energy sources become a viable option for the supply of a broader part of the population. It can be expected, that while the Republic of India can introduce affordable sustainable technologies, the current industrial states also reduce their CO₂ emission through technological advancements. In the year 2009 at the climate summit in Copenhagen the Environment Minister Jairam Ramesh signaled India's readiness to reduce its CO₂ emissions by 20 to 25 per cent until the year 2020 (Dröge/ Wagner 2015, 1 - 4).

4.2 Noxious emissions in the Republic of India

One pressing problem the Republic of India shares with the People's Republic of China is a high dependency on a large amount of energy for the further development of its economy. That energy demand is, like in the People's Republic of China, to a high degree met by exploiting coal as a cheap energy source. In the year 2008 the need for electricity was estimated to triple until the year 2030 and it was concluded that coal will still be the leading means to ensure its energy supply as there were no considerable affords observed to invest larger amounts of money to develop competing renewable or at least emissions reducing alternatives apart from few power stations which rely on already available water reservoirs. The suspected consequence of this tendency would be a rise of carbon emissions from 1.15 billion tonnes in the year 2005 to 3.3 tonnes in the year 2030. Similar pessimistic predictions were made about the dependency on petroleum. Fossil energy sources were even estimated to gain a higher percentage of the total energy production of the Republic of India (Haftendorn/ Freund/ von Hirschhausen/ Holz 2008, 818).

In the year 2014 the overall energy supply was considered insufficient as the power plants were technologically obsolete and not capable of providing enough energy for the desired economic development. The efficiency of the energy distribution was also observed to be a big issue as the technological means were inadequate and the political framework was met with serious criticism. With an indeed necessary increase of the energy output by 128% since the year 2000 it was also observed that carbon dioxide emissions grew by approximately 80% since 2001. The Republic of India became the third serious emitter of CO₂ in the world, after the United States of America and the People's Republic of China. There are vast opportunities to improve the climate protection as the Indian subcontinent includes a long coast line that can be used for the usage of wind energy, waterfalls from the Himalaya where the enormous gradient can be exploited and the vast area has a very high degree of insolation. Besides the potential for renewable energy sources even the currently used coal has a high amount of ash and can be cleaned to at least cut its impact on the Indian carbon emissions (Raschen 2014, 1 - 3).

The Republic of India, which per se has a tropic average temperature and in which a large percentage of the population is dependent on the agricultural sector for income, is at high risk of feeling the consequences of a continuing climate change. Dry land farming is widespread in India and it is observed that various important crops, including rice and wheat, are approaching their maximal temperature tolerance. The water reservoirs in some regions are also expected to decrease in already affected regions, which may lead to distribution expenses (the average availability of usable water is considered as sufficient, but certain regions will be increasingly dependent on water supplies from other sources).

Even the humid regions are estimated to suffer the consequences of the climate change as climate extremes (droughts as well as floods) are predicted to appear more frequently. Forests are, like in the People's Republic of China, in great danger of getting damaged due to their role as an energy source and therefore their ability to counterbalance the climate change by binding large amounts of CO₂ is also jeopardized. The alteration of the biological diversity that is caused by the climate change may also accelerate the deforestation, a suspected ecological calamity various scientists are worried about (Shukla/ Sharma/ Ravindranath/ Garg/ Bhattacharya 2003, 31 - 32).

The Bay of Bengal is at high risk of being hit by the tropical cyclones which are expected to affect the coastal areas more frequently, especially in the post-monsoon period. The Indian government has further reason to worry about the impending deterioration of the ecological situation as a spreading of Malaria and other tropical diseases into currently unaffected regions may be hazardous to the public health that already is hard to ensure considering the large Indian population and widespread poverty (Sathaye/ Shukla/ Ravindranath 2006, 319).

As the Republic of India is threatened by the climate change to a high degree and in many facets (ranging from ecological, economic and even medical problems), a reliable climate protection strategy and thorough implementation of adequate measures are urgently needed. The governmental approach to those pressing challenges will be of great importance for the comparison between the two political systems which are represented by the People's Republic of China and the Republic of India.

4.3 Indian climate protection laws

As the Indian government is confronted with the consequences of the climate change, the need to develop an effective climate protection policy is apparent. While the Republic of India still insists on its right to act independently from binding international regulations, a growing determination to make progress in a national framework can be observed. Especially the development of photovoltaic technology and a strengthening of the subnational state's role in the national climate protection affords seem to be of considerable interest for the central government.

The federal structure of the state is regarded as an asset as it allows for subnational states to develop innovative policy making approaches in the framework of national guidelines. In the United States of America, which shares a similar political structure, the federal states are praised as 'laboratories of experimentation' (Jørgensen 2012, 3 - 4).

This approach is a fundamental contrast to the ideals of the People's Republic of China, where the central government pursues a policy of stronger control over provincial decision making processes, although autonomous regions and special administrative regions (as well as limited reforms on municipal level) also serve as testing grounds for various political strategies. The Chinese point of view considers a delegation of power and responsibility as prone to the corruption of individual politicians while a centralized organization is hoped to enforce long term aims more efficiently than a more fragmented society can.

This subdivision of the Republic of India into 28 subnational states and 7 union territories were also considered during the formulation of the National Action Plan on Climate Change that is valid since the year 2008. Like the Chinese 12th Five-Year Guideline this plan emphasizes affords towards the development renewable energy sources to support their competitiveness with the currently used fossil energy sources and points out the already mentioned energy efficiency that is often criticised and were a large potential for improvements is expected. One major reason for the shared importance of energy efficiency affords for both emerging economies is the opportunity to pursue climate goals without having to cut down the economic development while also improving the crucial energy security (ibid., 11 - 12).

Renewable energy projects are of strategic interest for both states, because socio-economic opportunities are considered as among the most promising compared to other climate protection options. The development of infrastructure and working places in rural regions are important for the reduction of the peripheralization of the concerning areas. In India there is also a growing interest in the market for renewable energy, which can be considered as an economic incentive for investments (Jørgensen 2012, 12).

According to the National Action Plan on Climate Change, poverty reduction and economic growth still have very high priorities as the Indian climate protection strategies are formulated to avoid compromises, which trade of socio-economic progress to climate protection. While measures that improve the ecological situation without slowing down the economic growth are understandably preferred (and indeed needed as poverty reduction and the establishment of a nationwide social system in India are big issues, even compared to the situation in the People's Republic of China), the Indian government seems to limit its climate protection strategies almost entirely on them. Compared to the People's Republic of China, where under the administration of president Xi Jinping a moderate slowing of economic growth is accepted in order to make progress in the reduction of noxious emissions. A stronger participation in international climate negotiations is planned.

The corner stone of the development targets are the Eight National Missions, on which the Indian government measures the success or failure of its current policies. They include the National Solar Mission (usage of the tropical sun intensity through decentralized deployment of Photovoltaic cells and investments in research and development projects), National Mission for Enhanced Energy Efficiency (based on the Energy Conservation Act of the year 2001 the Bureau of Energy Efficiency and its subordinated organizations are responsible for the strengthening of promising technologies on the Indian market), National Mission on Sustainable Habitat, National Water Mission (conservation, distribution and recycling of water resources), National Mission for Sustaining the Himalayan Ecosystem (which is jeopardized by the continuing climate change), the National Mission for a Green India (various ecological projects with a high emphasis on forest preservation), National Mission for Sustainable Agriculture (adaptation of the agricultural sector to the climate change) and the National Mission on Strategic Knowledge over Climate Change (information on the impact of the climate change and successful countermeasures are exchanged globally to provide a scientific long-term solution) (Prime Minister's Council on Climate Change 2008, 2 - 5).

4.4 Obstacles for effective climate protection in India

The need to ensure a reliable energy supply for a large population on the scale the Republic of India has to govern is already a challenging task, but this population growth is not expected to cease until the end of the 21st century. It is estimated, that the population at that point may be around 1.65 billion people. Governmental projects, which aim at an improvement of family planning and education, have shown certain successes (a decline of the growth rate from 24.8% during the years 1961 to 1971 to a growth rate of 21.3% during the years 1991 to 2001 effectively cut total births by 40 million people over 30 years), but the prospect of such a large population with growing economic demands must be taken seriously when climate protection plans are formulated (Shukla / Garg / Dhar / Halsnaes 2007, 31).

Those economic demands lead to a rapid urbanization as well as an increasing motorization. As undisturbed logistics are crucial to the strategic development of the Indian economy, great emphasis must be placed on a modernization and on the reduction of carbon dioxide emissions resulting from the various means of transportation. Road transport became the most significant way of transportation and in the years 2006 and 2007 its share measured 4.5 per cent of the Indian GDP. This percentage is expected to still increase and among the road transport public transportation has a declining share. This dependency on a motorization, which currently is a major air pollutant, poses a serious threat to the reduction of total carbon emissions (Bandyopadhyay/ Thukral 2010, 1 - 2).

According to the International Energy Agency the Republic of India cannot be expected to fully implement its emission reduction targets due to the complexity and sluggishness of the political system. Reforms of the provision of electrical energy towards enhanced efficiency are further slowed down by the bureaucratic structure which relies on obsolete transmission technology and is prone to corruption. The main reason is that the Indian electrical power supply is to a large degree monopolized by state owned enterprises, which also rely heavily on the financial support of the state. Especially State Electricity Boards (SEB) control around fifty percent of the power supply and further companies owned by the central government like the National Thermal Power Corporation (NTPC) control further 35 per cent. As only around 14 per cent of the power generation are supplied by private owned companies, the structural problems are very similar to the ones that the People's Republic of China currently faces (Haftendorn/ Freund/ von Hirschhausen/ Holz 2008, 820).

4.5 Public activity in the Republic of India

According to a poll conducted by the Lowy Institute for International Policy and Australian Indian Institute the mentioned challenges in the provision of crucial resources (energy supply but also water and food security) as well as a continuing climate change are perceived as serious dangers by 80 to 85 per cent of the asked Indian population. Corruption is also considered as a decisive factor jeopardizing the Indian development plans by over ninety per cent (Medcalf 2013, 1). The reach of various media and information seems to have improved dramatically as the climate change along with the other mentioned challenges are commonly known to a large percentage of the concerning population (ibid., 4).

In a democratic system the public opinion can be considered as a factor steering the politics towards a more climate and environment concerned approach, while economic and social issues will still remain of great importance in the Republic of India. The availability and free access to media that are independent from the public relations campaigns of the government may prove to be an asset for independent climate protection affords which the population of the People's Republic of China lacks. The public interest in climate protection and the formation of several NGOs also indicate a state's approach towards climate policies. In case of the People's Republic of China, the central government tries to influence or control NGOs to prevent the possibility of growing opposition to the leading Communist Party. The Chinese censorship also interferes with the access to information concerning the danger of environmental damage or the failures and setbacks of governmental measures.

The Republic of India clearly benefits from the collaboration between government organizations and NGOs in pursuit of various goals. Especially innovative and flexible methods are traits, which NGOs can provide for projects of interest to the government (Alsop/ Arya 1999, 7). It can be hoped that ongoing experiences with such cooperation can improve the coordination of climate specific projects, which are shared by governmental and government independent organizations and provide new promising methods for the common goal of climate protection.

4.6 Climate relevant technologies in India

Apart from the public interest the technological options are also a decisive factor in regard to the mitigation of carbon dioxide emissions. The geographical consistency of the governed territory and therefore the viability of effective solar, hydro power or wind as means for clean energy production in competition to fossil fuel of different natural quality are independent from the political system and can therefore not be used to compare its impact on the climate protection. The political motivation to exploit the available energy sources or to prioritise certain choices over other options is nonetheless a decision that can root in the general political framework. In the Indian case, the currently considered technological options for the reduction of noxious emissions and their probability of implementation should be observed to gain a general understanding of the Indian situation.

For the reduction of noxious emissions, the Indian government considers an increase of the share of renewable energy sources as well as a nuclear alternative to meet its long-term energy security needs. According to the Rajya Sabha Secretariat, the French method of using nuclear energy to provide 70 per cent of its total energy supply is also appropriate to secure a reliable energy supply in the future without causing the worrying amounts of carbon emissions as fossil energy sources (Rajya Sabha Secretariat 2008, 24). Security issues of nuclear technologies are not mentioned in the report of the Rajya Sabha Secretariat indicating that the climate change seems to be considered as a greater risk for the Indian development.

The complete substitution of coal based energy production with renewable energy is not considered possible until the year 2030, because the development of adequate technologies takes time. An impending increase of CO₂ emissions is therefore deemed unavoidable, even with the fastest possible implementation of currently available technologies. Those options mainly consist of solar, hydropower, wind, nuclear and biomass and two conventional technologies, namely carbon capture and storage (CCS) methods and an improvement of energy efficiency (Sekar 2013, 11 - 12). While the modernization of power plants relying on fossil energy sources makes even the usage of cheap coal less problematic and CCS technologies can also be used for natural gas and biomass energy production, it should be noted that because of the high ash content of a large share of Indian coal the currently widely spread carbon capture and storage technologies need to be adjusted for Indian requirements (ibid., 23).

The modernization of power plants with suitable CCS upgrades might be costly in the short run, but it is estimated that until the year 2050 most coal power plants without CCS upgrades will be phased out and can be replaced with already upgraded ones. It is still uncertain to what degree CCS technologies can be implemented to improve the Indian climate protection and it would also pose a risk to be hesitant about the introduction of cleaner technologies until the concerning power plants are replaced in the year 2050. Apart from the option to raise the standards of fossil energy usage, a shift towards renewable energy sources can also lead to the desired reduction of noxious emissions. With improvements of manufacturing capabilities, the solar energy is estimated to become one of the main assets for the supply of clean energy (Sekar 2013, 19). While concentrated solar power (CSP) is an already proven technology that is used in rural areas, it is not fully implemented on a national level in the Republic of India yet. The main challenge for the future increase of solar power usage is the limitation of Indian manufacturing capabilities of silicon wafers. Indian manufacturers already have international experience in the usage of offshore wind plants and with an Indian coast line of 7500 kilometres a vast potential is expected, but the resources which are needed to fully implement this technology are not assessed yet. Although there might be a promising potential for hydro power in India, this option is less likely to receive much attention due to the high financial costs of large hydro projects and the lack of an adequate working force (ibid., 21 - 22).

The evaluation of the ratio of high short-term cost towards long-term benefits of hydro power as a clean energy source can indeed be depending on the political far-sight of a democratic or authoritarian government as the People's Republic of China decided to invest for example in the construction of the Three Gorges Dam and implemented this project against the resistance of shares of the population affected by forced relocations. The Chinese government did not need to answer for the possible destruction of historical relicts which were not excavated yet or for the ecological risks a water barrier of this size can cause. In most democracies (including the Republic of India) fierce opposition against similar projects can be expected. A long-term observation must decide whether the advantages or drawbacks of those projects will predominate. Apart from technologies to mitigate noxious emissions and the resulting climate change, it is also essential for the Republic of India and the People's Republic of China to reduce its vulnerability to unavoidable climate changes. Projects which increase the capability of adaptation to the changing conditions are also a vital part of a technological solution (Asian Development Bank 2014, 11).

4.7 Results of Indian climate protection measures to date

For the comparison of the influence of political systems on the issue of climate protection of highly populated states with a fast growing economy, a consideration of the actual successes and setbacks of the representing states, the People's Republic of China and the Republic of India, are crucial. The mentioned policy independent factors also affect the observed current data to a varying degree.

According to the results of the Climate Change Performance Index from the year 2014 the Republic of India was downgraded by its national experts. The consequence is a drop of six places compared to the year 2013. The main reasons are its increase of CO₂ emissions and its slow progress in the development of renewable energy and energy efficiency technologies (Burck/ Marten/ Bals 2014, 4).

According to the Indian Ministry of Environment, Forests and Climate Change the National Solar Mission resulted in the installation of 8.42 million square meters of solar thermal collectors which have the capacity to generate 2,970 megawatt for the grid and 364 megawatt of solar power which are not connected to the grid. The National Mission for Enhanced Energy Efficiency already achieved certain successes with the introduction of a market based mechanism for the improvement of energy efficiency in the private economy under the name Perform Achieve and Trade. The cost of LED bulbs was reduced from approximately eight to three United States dollars and the introduction of ceiling fans with advanced efficiency lead to expectations of a saving of 23 million tonnes of oil-equivalent and a prevented need of capacity increases of 19,000 megawatt in total. The estimated result is an annual reduction of approximately 98.55 million tonnes of carbon dioxide emissions. The National Mission on Sustainable Habitat made energy conservation a vital part of all buildings and prepared a long term transport plan for cities. The results of the National Water Mission and the National Mission for Sustainable Agriculture are not directly related to the Indian climate protection affords, but are expected to provide valuable improvements for the national economy. The National Mission for Sustaining the Himalayan Ecosystem and the National Mission for a Green India are expected to mitigate the damage that was caused to Indian ecosystems or is expected to jeopardize them in the future. The protected forests also provide a carbon sink that is essential for the mitigation of the climate change (Ministry of Environment, Forests and Climate Change 2014, 4 - 11).

5. Comparison of the industrialization process in emerging national economies and already developed industrial states

5.1 Direct comparison of the Chinese and Indian climate protection results

In direct comparison with the People's Republic of China, which has a share from the global GDP of 14.63 per cent, but is responsible for 22.95 per cent of the global CO₂ emissions, the Republic of India has only a share from the world GDP of 5.66 per cent and is responsible for about 5.14 per cent of the global carbon dioxide output. This means, that the Republic of India is still a far less serious pollutant than the Republic of China, in terms of total CO₂ output and in terms of the emissions per GDP. The economic development of the People's Republic of China is still more advanced than the economic development of the Republic of India. Considering a similar initial situation of both states (the People's Republic of China is estimated to have a share of around 19.42 per cent of the world population and the Republic of India has a population consisting of 17.84 per cent of the global population) this observation is in stark contrast to the assumption of Deacon that under similar circumstances a democracy will generally have the higher economic growth. Although the People's Republic of China bears responsibility for far more climate relevant pollutants, an improvement was observed. That doesn't mean, the growth of those worrying emissions was reversed, but at least a slowing of those increases after a period of catastrophic emissions growth rates was achieved, while the Indian economy seems to follow in the Chinese footsteps and thus, the already mentioned peak of Indian emissions growth in the year 2050 may mirror the Chinese development (Burck/ Marten/ Bals 2014, 4 - 6).

A substantially stronger vulnerability of the Chinese dictatorship towards corruption and inefficiency in comparison to the Indian democracy was not observed. I would assume the reliance of both states on state owned, or at least state controlled, energy providing companies to be a major reason for shared problems concerning the organization of a reliable energy supply and effective climate protection. A privatization of the mentioned energy providing companies is not implemented yet; therefore it is still in question, to what degree such a restructuring is regarded as desirable by the Chinese Communist Party or the government of the Republic of India (Cunningham 2015, 42).

Even if there are respective measures in the near future, a sooner privatization of those companies in one state may only reflect the current stage of economic development which allows for a shift of priorities towards a less regulated energy supply and therefore is only indirectly connected to the political structure of the compared states.

As main reasons for the current Chinese progress the Climate Change Performance Index asserted its focus on renewable energy sources and a new political will to abstain from its massive usage of cheap coal and reduce the smog burden of its largest cities. To abstain from carbon intensive infrastructure development projects (the People's Republic of China reduced the emissions growth of this sector from 54 to 27 per cent) unfortunately doesn't seem like a viable option in the Indian context, as the Indian economy is, like mentioned before, highly dependent on road transportation and because the Chinese road grid already reached a level (at least in its eastern and southern provinces) which the Republic of India still needs to achieve (Burck/ Marten/ Bals 2014, 4). Apart from the total emissions performance, in which both states currently rank among the ones with the most serious problems (both were rated as 'very poor' in terms of both emissions level and development of emissions and the People's Republic of China was even the worst performing one among the 58 index states), there are also various contributing factors considered in this research. Both countries are ranked as 'poor' in terms of their usage of renewable energies. That rating is based on the actual effects in contrast to pure investments that are hoped to improve this performance later. Especially the People's Republic of China invested a considerable amount of money in projects that could change the evaluation significantly in future (ibid., 14 - 16). The energy efficiency of the People's Republic of China is still rated as 'poor', which already is an improvement compared to the Indian 'very poor' performance. Political affords, which are evaluated by 250 experts from various non-governmental organizations, clearly favoured the latest Chinese measures (which were evaluated as 'good') over the current Indian policies that were only rated as 'moderate' (ibid., 18 - 20).

According to Deacon, the People's Republic of China as an autocratically ruled state is expected to spend a smaller share of its GDP in the reduction of poverty and also in climate protection (or environment protection in general) than the Republic of India as a democracy (Deacon 2003, 26). It can be observed, that the People's Republic of China spends a larger total sum of money than the Republic of India to achieve the mentioned goals, but as the Chinese total GDP is significantly higher, it is not proven without a doubt, how much money would be invested by the Indian government, if it has the same economic strength.

A mere comparison of the GDP to climate protection investment ratio would also not suffice, since it seems that both states do not only represent different government methods, but also different stages in terms of economic development, which influences not only the sum of money that can be spent in climate protection, but also the priorities of the government. As a definite result of climate relevant decisions on the same economic development level (and therefore a confirmed difference in direct dependence of the government system) has not emerged, the mentioned assumptions of Deacon are neither completely confirmed nor challenged by the results. The Indian democracy as well as the Chinese autocracy share similar structural problems that were caused by a need to ensure energy security.

The 2015 United Nations Climate Change Conference provided an opportunity to coordinate global climate protection affords and the agreements that were made allow for an assessment of the most current climate protection policies of the Chinese and Indian governments. In preparation of this summit the People's Republic of China announced plans to peak CO₂ emissions until the year 2030 and increase the share of non-fossil energy sources to 20 per cent of the total energy supply. That measure is hoped to reduce the CO₂ emissions by 70 per cent. The Chinese government also considers the possibility to peak its coal usage at 4.2 billion tons until the year 2020 and thus achieve an early emissions peak in 2025. The Asian Infrastructure Investment Bank (AIIB) also plans to support climate protection measures in developing countries (Natural Resources Defense Council (NDRC) 2015a, 1 - 3). Recently the Republic of India also demonstrated a serious commitment and announced its plans for climate protection (Natural Resources Defense Council (NDRC) 2015b, 3). Those plans don't seem to be considered a purely national matter anymore and the announced reforestation projects of both states may be of global importance.

According to Niskanen, even a myopic democracy should be considered as generally more desirable compared to a dictatorship, including far-sighted ones (Niskanen 1997, 172 - 173). In contrast to that hypothesis my observation points towards a speed advantage of a far-sighted autocracy towards a democracy, which needs to achieve a consensus, before the implementation of sudden, but in the long-term desirable measures can be enforced. This advantage is on the other hand strongly dependent on the leadership quality of the autocratic government. As the work of non-governmental organizations in the Republic of India seems to profit from the absence of governmental interference and of an uncensored reporting on climate change issues from media, which are independent from the public relation interests of the state, a clear advantage of democratic societies over dictatorships seems to emerge.

5.2 Economic and ecological challenges of populous states

While the current challenges that the world faces due to the economic development of the both states with the largest population, are indeed serious, the question arises, whether the already fully industrialized states, which went through a similar process, can actually support the People's Republic of China and the Republic of India in their struggle of climate change mitigation. It is also momentous to what degree the two increasingly influential national economies can learn from the mistakes and progresses that were already made in the past. In contrast to the European industrialization processes, which were at first completely free from ecological concerns, the People's Republic of China and the Republic of India are confronted with a responsibility that results from the latest insights into the reasons and consequences of the climate change.

The implication is that while both nations face many challenges the industrializing states of Europe faced, like the need to secure resources, markets and build up a functioning infrastructure; they are also expected to act according to their responsibility towards international climate protection goals. When the currently industrialized states started to shift towards a more ecological approach to economic growth (with Canada and the United States still refusing to support certain international agreements), they already had achieved a considerable wealth and therefore existing capabilities for poverty reduction (which depending on political preferences was reflected by the introduction of social systems with varying degrees of goods reallocation).

For the People's Republic of China and the Republic of India the implementation of climate related measures is often impaired by pressing needs, which reflect its current stage in the industrialization process. The main challenges of both populous states include a growth of disparities. Although significant progresses were made in terms of poverty reduction in the People's Republic of China, increasing differences in income and public goods distribution are expected to pose a threat for the social stability of both the People's Republic of China and the Republic of India.

The infrastructures and social systems of both states are further strained by the migration of rural parts of the population into large cities. A shift from an agrarian rural based society towards an industry dependent population that concentrates in growing cities was also observed in the industrialization process of European societies and also provides benefits like desired income and learning effects, but the massive scale of Indian and Chinese urbanization resulting from its large populations poses serious challenges for the concerned states. Both nations struggle with the economic effects of their environmental problems. Environment protection measures do, like already mentioned, often meet considerable limitations on the local level, which often are a consequence of the simultaneous economic development. One example is a lack of effective controlling structures on local level which makes an effective fight against corruption difficult and therefore subverts the implementation of climate protection measures.

The development of an infrastructure that is adequate to the large amount of traffic and that connects the remote provinces of both large territories with the economic centres, is also an issue of high relevance for the economic growth of both countries (Peterskovsky/ Schüller 2010, 1). While shortcomings in this area burden the development, infrastructure projects on such a massive scale also put considerable pressure on the climate protection goals of both states and the increase of conventional road traffic (apart from the more progressive technologies like electric vehicles) also causes an increase of noxious emissions.

5.3 Opportunities through advanced sciences abroad

As the accumulated global carbon dioxide emissions growth has to be limited to ten percent at most to prevent an increase of the global average temperature above two degree Celsius compared to the pre-industrial climate condition, which is a temperature margin that can cause serious consequences. One technology that is estimated to have a high potential for the drastic reduction of CO₂ emissions in the People's Republic of China and the Republic of India is the Chinese carbon separation and storage project, in which the People's Republic of China has made progresses that hopefully can be achieved in the Republic of India too.

The lack of this kind of innovation in the Republic of India is especially problematic considering the reliance of both states on coal as a cheap energy source. Apart from that technology, the production of biofuel is also worth consideration, although in the moment there are still serious questions that need to be reviewed, before an implementation on a larger scale can be planned. While a limitation of emissions resulting from road traffic or other fuel intensive transportation is clearly desirable, the sources of this biofuel must be controlled as a reckless deforestation for the sake of plant cultivation can be practiced if the incentives make it profitable. It must be observed that the measures, which are introduced for the goal of climate protection, are not allowed to worsen the already worrying climate change prospects.

A cooperation, in which the already industrialized states transfer innovative technologies and financial support to newly industrializing countries, which organize an implementation on a larger scale than most technology offering states can put into effect on their own, is one option that is hoped to benefit global climate protection goals. In theory, such an implementation of already existing technologies can also be applied in the currently developing countries, resulting in a significant mitigation of noxious emissions. The main obstacle in negotiations concerning technological transfers is a fear of innovative companies to lose profitable markets because of the possible copying practice of competing companies. A shared guarantee of intellectual property of the innovating enterprise is an important fundament for a successful cooperation (Thalmann 2010, 52 - 53).

6. Conclusion

The consequence of my observations in terms of a preferable form of government for populous emerging economies in consideration of the challenges posed by the climate change would be a recommended shift from an autocratic regime with meritocratic tendencies and an emphasis on a consequent fight against corruption towards a democratic form of government. In the first stages of this development an autocratic government can use the mentioned speed advantage to quickly develop strategic key industries for economic growth as well as establish structures, which are a fundament for further developments (for example the infrastructure and the energy grid) and instruments for an effective climate protection.

In regard to the economic development and successes in the fight against corruption, the Republic of Singapore, which shares traditions based on the teachings of Confucius with the Chinese population, can be regarded as a temporary role model. In the process of further development, a reform towards a democratic form of government is better suited to encourage a critical perception of the population towards climate politics and an active engagement in non-governmental organizations that can also complement the climate protection projects of the state. If a consensus regarding the necessity of climate protection measures is achieved, a democracy can be considered more reliable in the long run, as sudden changes in the leadership (resulting from elections in a democracy, but also from coup d'états and power struggles in a dictatorship) are far less likely to threaten the achieved progresses. Due to the benefits in terms of stability of democratic governments, they are suited to secure a long-term continuation of climate relevant political decisions and reduce the tendency towards corruption that results from a concentration of political power.

Examples for a successful (although not desired or planned by the respective governments) shift from an autocratic towards a democratic form of government can be found in the development of the Republic of Korea or the Republic of China.

To what degree the climate protection in the People's Republic of China could profit from such a transition towards democracy is not evaluated with certainty yet. Whether a temporary autocratic government would be able to reduce the corruption and inefficiency of the Indian economic development and climate protection more quickly also needs to be doubted and depends strongly on the premise that the autocratic leadership is determined to support that process as well as on the assumption that kleptocratic tendencies of that government are minimal. Apart from that premises, it is untypical for most autocratic leaders to voluntarily abstain from power and strive for a democratic shift for the sake of long-term climate protection goals. As autocratic leaders can in most cases not be trusted to introduce democratic reforms, only a worrying urgency of the fastest possible implementation of climate protection measures would make the dictatorship's ability to introduce drastic measures preferable to the long-term consistency of a democratic government that achieved a consensus in regard to climate protection.

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