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**EU vs. China in greening the electricity of
Eastern European EU member states**

-Case study of Romania's wind power sector-

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Opening note

Having followed the specialisation in International Marketing and Management, the choice of topic for this master thesis could be somewhat surprising. Political economy and energy topics have not been the main focus of the programme, but I have used term papers to enrich the course experience in this direction of interest. While literature covered at BI has been used less explicitly, this master thesis has been framed by a world view and theoretical frameworks discussed during the 2 years of studies, the last year's apprenticeship at Sund Energy as part-time analyst and the volunteering work as climate advocate in the Challenge Europe initiative organised by the British Council in 2009-2010. The literature review required an eclectic selection of theory in fields I have not had time to study in-depth and it is an expression of how BI has honed my analysis and synthesis skills to prepare me for an international career as business leader. In fact, the work behind this thesis is a modest attempt at bringing together several research streams in an exploratory study that has been just as much a journey of self-discovery.

The language and headings used are also rather unconventional for the academic purpose of this paper. The last two years have taught me the importance of clear and effective communication, especially when the audience is multicultural and diverse. I have also learned that breaking down silos of organisation and thinking has a tremendous potential for springing to surface innovative solutions. For all these reasons, I have tried to make this paper an interesting and easy reading while keeping an academic tone. I have taken the risk of losing academic rigour because of this approach, despite all effort to avoid it, but I believe mastering international marketing and management is as much as all of the above as about taking risk. As this is a master thesis and the most important paper I have written so far, it should represent what I have come to master and stand for. If the result is disappointing for those who have supported this work with advice and ideas I can only apologise for having misunderstood their message.

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Abstract

The clash of cultures and ideologies put on stage by the eastern enlargement of the EU has sparked as much hope as frustration. While learning to listen and trying to understand each other, the member states face strong headwinds that risk sinking the ideal of a united Europe. Abandoning a numbing welfare state ideal in favour of neoclassic models had been discussed for decades but it had never been defined so clearly as in Europe 2020. The odds are against the new member states, whose progress could slow if EU redirects cohesion funds; shifts FDI focus to emerging markets; and still cannot manage to remain competitive on the global stage.

At the core of Europe 2020 lies the renewable energy sector, with binding targets which expect of the new member states to prop up the development of world class technology, even as financial support from EU might fade. As China rises among the important manufacturers of increasingly competitive and cheaper renewable generation technology, it could become a better solution for ‘greening’ the energy systems of the new member states, even if it dents scale economies for Western European manufacturers. China could be interested in such partnership to access the EU market via countries where it is already competitive and with whom it has shared communist ideals until recently. This could spark interesting outcomes for EU as a whole and it is worth seeing whether the deal would make sense for the new member states as well.

Analysing five areas where the new member states need support to meet the 2020 binding targets –access to finance, the worth of technology, the cost of capital and of technology, auxiliary costs with maintenance, operation, and integration in the energy systems of intermittent renewable capacity, as well as implications for the progress in governance–, the study outlines important issues new member states need to consider in deciding whether attracting Chinese investments is desirable. It also finds out that only some countries might be interesting and interested in a partnership with China, at least in an early stage, and that the new member states should actively engage with China in order to make such a partnership happen. As the case study of wind power in Romania shows, steps in this direction are already taken, but confirmatory statistical analyses cannot be performed as developments are in too early a stage to have enough information. Customised studies for either particular technologies or individual countries could bring further insight and can be an interesting area of future research.

I. Introduction

Following the daunting recession soon after its eastern enlargement, the European Union –henceforth EU– found its competitive advantages fading in front of rising Chinese “soft power” (Nye, 2004) faster than expected. Abandoning the numbing welfare state ideal in favour of neoclassic models had been discussed for decades, but it had never been presented so clearly as in Europe 2020 –the 2010 strategy by the European Commission for smart, sustainable and inclusive growth– (European Commission, 2010a). For the former communist new member states from Eastern Europe –henceforth NMS10–, whose social policies have always been short of the welfare state ideal but which are aspiring to it since accession, the outlook is grim.

They are relying on a cohesion policy which hands them structural funds to catch up with the fifteen more developed member states in Western Europe –henceforth EU15– and while Europe 2020 would not eliminate this lifeline, it will most likely trim it starting with 2014 and might even redesign its principles to cushion record and lasting unemployment in all member states –henceforth EU27– despite some of the EU15 not being normally entitled to such support (thenews.pl, 2010). Two troubling scenarios in recent research, analysing the potential impacts of a future demise in the European social security net or rising energy prices, are also placing the NMS10 economies at disadvantage compared to the EU15 regardless of how the cohesion policy will look like (Smith and Dubois, 2010).

Just as worrying for the NMS10, which have rapidly opened up their economies to western foreign capital after the communist regimes fell, EU15 multinationals are put off by the devastating economic downturn in Eastern Europe and envisage the redirection of their shrunk capital from the NMS10 towards the emerging markets with better growth opportunities, particularly China. The EU is gradually opening its trading relations with China (European Commission, 2010b), interested to gain a strong foothold on the enormous market in areas where it still has a competitive advantage –particularly energy and environment technology.

While lowering trade barriers with China is likely to lead to an increase in EU15 exports of technology, it will also increase imports and attract more foreign direct investments –henceforth FDI– from China. The premise of this research is that the NMS10 should profit from this opening to make up for the dry up in western FDI. While this applies for all economic sectors, of particular interest is the potential in developing the NMS10 renewable energy sector with Chinese capital, technology

or both. Renewable energy is at the heart of Europe 2020 and is supposed to drive EU economic recovery, in part by setting ambitious targets for the NMS10. Since support schemes for the deployment of renewable energy technology –henceforth RET– are mostly paid for by the population and little is covered by EU structural funds or other EU mechanisms, the NMS10 are in effect shouldering the high cost of new technology development in the EU15 through widening their already large current account deficits.

China does not own the latest RET, but it is rapidly growing into one of the large manufacturers of wind turbines and solar photovoltaic cells. This is still secondary innovation or even mere licensing of European technology, but the Chinese would use the new bilateral agreement to enhance their knowledge and increase capacity for more advanced domestic designs. In their current situation, the NMS10 are not in need of latest technology anyway, if what is expected by the EU is just to meet renewable targets in 2020. Given the Chinese wealth of available capital, the more affordable cost of their RET and the rapidly improving project development skills of Chinese companies, the NMS10 might stand to gain from attracting RET from China before getting locked in European –and particularly German– RET clench. Communist legacy could catalyse relationships and speed up the process. EU15 countries should not dread the move, as this may also play out well for them.

There is little empirical evidence of such a strategic move unfolding, so the paper is exploratory in nature. To illustrate early steps in this direction, a case study of the wind power sector in Romania is presented, as a road opener for penetration in other NMS10 and other RET in the future. Wind power is chosen because NMS10 capacity is still underdeveloped compared to potential, the technology is currently imported from the EU15, but it is becoming affordable and generic enough so that China has got good hold of it. Romania is preferred to the other NMS10 because it has good wind potential that is under development, it is an EU laggard that makes EU15 energy companies uncomfortable to invest, and it has better ties with China. In fact Romania was an outlier in the Soviet sphere of influence, as the Ceaușescu regime left the soviet economic area and had a stronger bilateral relationship with China and even the western world for a while. If Romania indeed cooperates with China for renewable capacity development, other NMS10 will possibly follow such a strategy, especially if Europe 2020 does not succeed in the years to come.

The rest of the paper is structured in five parts. Part II describes issues of political economy related to the transformation of EU15 welfare states; the way it brought about the eastern enlargement to include NMS10; the democratic and governance progress of the latter and their alternatives for own welfare models. The unsettling perspective of a failing EU vision is also portrayed in light of recent results from European regional cohesion research. Finally, a parallel with China's successful pseudo-communist development is presented, explaining the growing innovative potential of the behemoth.

The focus of part III is the energy sector. It begins by placing renewable energy at the heart of Europe 2020; then it presents the path dependency of NMS10 energy systems to bring in context recent and current reform efforts and the privatisation process dominated by EU15 utilities. For manageability, the paper will focus only on electricity generation from renewable energy sources –henceforth RES–, so the following sub-chapter dives into the need for flexible support schemes to prop up technology development and investor confidence in capacity deployment, to chart challenges for renewable generation investments in the NMS10. Finally, a sub-chapter dedicated to China depicts its energy challenge and surprising signs of an energy revolution that could spread to the NMS10. Account of this development is the Sino-European energy partnership.

Part IV builds on the previous two, provides a rationale for why both EU15 and China could be interested in NMS10 and their energy systems, then embarks on analysing the prospects of the partnership with China from five different angles – financing, costs, technology, supply chain and service aspects and governance–, as compared to the solutions available from the EU15. A short overview of how the NMS10 could weigh such a partnership differently is presented, without being categorical or thoroughly grounded in research.

The case study on Romania and early developments in its wind power generation is discussed in part V. Reluctance by EU15 investors and a commitment by CDB are discussed, concluding however that China is unlikely to push aside investors in racing for the wind resources of this NMS10 state. Rather, collaboration could be pursued in fossil generation or, maybe, solar RET.

Last, the paper summarises findings, outlines limitations and suggests avenues for future or better research. Remarks on research methodology are also presented.

II. When “I” meets “WE” –the political economy of EU and China

The clash of cultures and ideologies put on stage by the eastern enlargement of the EU has sparked as much hope as frustration. While learning to listen and trying to understand each other, the member states face strong headwinds that risk sinking the ideal of a united Europe. China is the syncretism of both worlds –the capitalist and the communist, the democratic and the autocratic– and so far has managed to prosper by keeping them at peace. The EU might have to win from coming closer to China and learning its way. The gain could in fact be reciprocal. This chapter is an attempt to briefly review the recent political economy of the two entities and to prepare the argument that China could actually mediate widening incongruence of EU15 and NMS10 interests.

II.1. EU –the emperor’s outfit, old and new clothes

Reuniting more than half a billion people (Eurostat, 2010a) the European Union of 2010 –henceforth EU27– is the largest economy in the world, with a €11.8 trillion gross domestic product –henceforth GDP– in 2009 in spite of constraints posed by the recent economic recession (International Monetary Fund, 2010). In a world of slow awakening to the threat of anthropogenic climate change –following the UN Climate Change Conference of 2009, the Copenhagen Accord was signed by most heads of states, but was far from a universal binding agreement–, the EU27 is also well positioned on the global stage, with a carbon intensity of its energy use of 2.5 tonnes CO₂ per ton of oil equivalent –henceforth toe– and a energy intensity of the economy of 0.14 toe per 1000€ (see Appendix 1). Together with Japan, the EU27 is a global leader in terms of energy and carbon intensity of the economy; scoring better than the other two largest economies, United States of America –henceforth USA– and China (see Appendix 1).

Nevertheless, lurking in the multilevel diversity granted by its current makeup and exposed or confirmed by recent statistics, lie fundamental challenges to the future development and global competitiveness of the EU27. “Europe’s average growth has been structurally lower than that of our main economic partners, largely due to a productivity gap that has widened over the last decade. This is due to differences in business structures combined with lower levels of investment in research and development –henceforth R&D– and innovation, insufficient use of information and communication technologies, reluctance in some parts of society to embrace

innovation, barriers to market access and a less dynamic business environment.” (European Commission, 2010a, page 5). For example, private spending in R&D is significantly lower in the EU27 compared to the USA and Japan, while China and India are catching up quickly by investing heavily in technology development that boosts their economies. Moreover, the EU is falling behind in education, training, as well as matching qualifications with market needs, threatening competitiveness fundamentals on the medium and long run (European Commission, 2010a).

This situation implies that EU’s “biggest challenge is to escape the reflex to try to return to pre-crisis levels” by changing course to “a strategy for smart, sustainable and inclusive growth” (European Commission, 2010a). This strategy, also known as Europe 2020, is supposed to lead to sustainable recovery of EU27 (see Scenario 1 in Appendix 2, as compared to Scenarios 2 and 3) by enhancing the creativity of its citizens and safeguarding the strength of its industrial base. Education, private investments in R&D and poverty alleviation are building blocks of Europe 2020, in which the efficient and environment-friendly use of resources plays a key role (European Commission, 2010a).

Why the “back-to-normal” reflex is so strong and the challenge to finally build a “new normal” is so difficult, as well as the associated implications for the NMS10 are the subjects of the following sub-chapters.

II.1.1. Capitalist Europe –the dusk of Keynes and dawn of Schumpeter

The first years of the Cold War seriously weakened capitalism in Western Europe, where technology and management practices were one generation behind the USA but were promoted by governments and businessmen who had vested interests in them (Silberman et al, 1996). Alarmed by the looming soviet influence in outposts of capitalism, the USA has devised the ‘Marshall Plan’, attempting to set Western Europe on a path of economic prosperity and competitive growth. The assistance was conditional on Europe adopting the development model desired by America, a compromise between liberal internationalism and state capitalism. The USA has thus influenced the economic policies of recipient countries, imposing Keynesian demand management and a Fordist capital–labour agreement where productivity gains were matched by increased salaries. (Ivanova, 2007)

Fordism outgrew its limits in the 1970s, as energy prices increased, productivity growth slowed down, and raising production costs thwarted the balance between

high profits and high salaries (Ivanova, 2007). Western Europe slowly embarked on a structural shift towards neo-liberalism, abandoning the Keynesian National Welfare State –henceforth KNWS– and moving towards Schumpeterian Workfare Post-national Regimes –henceforth SWPR– that promote competitiveness through innovation and flexibility, transforming social policy into a market-enabling arena (Jessop, 2002). Unionised labour opposed this change and the shift of production to more profitable economic settings, postponing the globalisation of some of the largest European corporations.

Regional variations of how political economy was implemented and adjusted over time by clusters of European nations are object for social embeddedness theories. There are several ways to distinguish between the various European social agenda typologies. First, the welfare state approach identifies three main policy models: a continental European insurance model, a Nordic citizen's rights universal model and the British residual model. However, focusing on labour market policies, four different models can be identified in a bi-dimensional matrix that ranks countries depending on the equity and efficiency of the welfare systems (see Appendix 3). In this framework the Nordic countries fair best, being both efficient and equitable systems, while central and western continentals are less efficient but nevertheless fair. Inequity in labour market policies is identified in both efficient Anglo-Saxon countries and the less efficient states of southern Europe. (Midttun et al, 2006)

Second, the 'varieties of capitalism' model described by Hall and Soskice divides market economies into liberal –characteristic for the Anglo-Saxon countries- and co-ordinated –specific for Nordic and central Europe–, with France and southern European countries falling in between. The main difference between the two types of economies is that “market mechanisms are supplemented by different forms of co-operation, networks and collaborative actions” (Midttun et al, 2006, page 372) in the co-ordinated market economies.

An interesting aspect can be mentioned regarding small states, such as most of the NMS10. Midttun et al (2006) present an idea advanced by Katzenstein whereby in small states international competition and pressure enhances co-operation, while social and cultural homogeneity enables them to be flexible in terms of social and labour policy. A current case in point from the NMS10 could be the discipline of Baltic states –Estonia in particular–, severely affected by the economic downturn but stable politically and decisive in fiscal and social retrenchment.

Competition from rapidly liberalising American and British multinationals led to the creation in Western Europe of a powerful business lobby group; the European Round Table of Industrialists –henceforth ERT–. The organisation –representing at present 41 multinationals from the EU15 and one from the NMS10– suggested in 1993 that high labour costs were the largest threat to competitiveness for all EU corporations. Cheap non-unionised labour in the fresh democracies of Central and East Europe came therefore as a fantastic opportunity. (Ivanova, 2007)

II.1.2. Remoulding the NMS10 in western cast –privilege and privation

Post-communist Eastern Europe and post-war Western Europe both suffered from foreign indebtedness, unstable currencies and outdated infrastructure. Productivity levels were also similarly backward compared to world class and both regions had educated and skilled workforces –albeit in Eastern Europe people were unfamiliar with markets and capitalist practices–. According to Silberman et al (1996) capital and productivity support based on principles of the Marshall Plan could have led to sustainable increases in efficiency, by helping large numbers of managers from Eastern Europe to get accustomed to modern practices. However, nothing similar to the Marshall Plan took place in the 1990s. The western prescription for Eastern Europe was shock therapy, to rapidly close down or privatise uncompetitive units and turn them into viable players on competitive markets. The application of neo-classical economic theory failed in the formerly state planned economies, opening up the fragile transition states for FDI at bargain prices.

This was consistent with the ascent of neo-liberalism in western economic policies and once the penetration of foreign capital was well on its way, the perspective of European integration started to take shape: “Of the issues that have dominated the ERT’s agenda since 1983, eastward enlargement is on par with the creation of the single market in the 1980s and the single currency in the 1990s” (ERT, 2001, page 4). Rapid economic integration combined with slow rising of living standards and no costly welfare burden provided a window of opportunity of irresistible appeal for western industrialists, who supported the integration of the NMS10. They have taken over the factors of production in these transition economies in the aftermath.

European leaders took a leap of faith by committing to the eastern enlargement of the European Union –henceforth EU– in 2004 and 2007. The NMS10 had a lower level of economic development compared to West European members (Maddison, 2003) and all embarked on a long process of convergence as catch-up economies,

albeit from different levels. Slovenia is actually the only state in the group with a gross domestic product –henceforth GDP– per capita higher than Portugal’s, the least developed of the EU15 (International Monetary Fund, 2010). They were also organised under communist regimes for almost five decades up to 1990, requiring of most decision-makers and ordinary people an unpalatable paradigm shift to free market capitalism. Undoubtedly, the years of pre-accession to EU have mobilised in the NMS10 remarkable reform drive in politicians and citizens alike. For young generations, untainted by communist legacy, the opportunities opened up by EU integration are energising. Democracy has sprinkled, governance has improved, economic growth returned.

II.1.3. With carrots and billboards –governance progress in the NMS10

The beginning of bilateral negotiations for EU integration coagulated political will in the NMS10 towards implementing the conditionality provisions imposed by the EU15, isolating populist and antidemocratic forces and accelerating the process of democratisation. Way and Levitsky (2007) argued that the increase in “the density of ties (economic, geographic, political, diplomatic, social and organisational) and cross-border flows (of capital, goods and services, people and information)” (page 53) between member states and candidate countries has played an important role in supporting the process of democratisation. Exchanges with international actors and the perspective of joining the club of western economies elevated some of the East European economies as compared to their neighbours who were not offered the opportunity to become part of the EU (Levitz and Pop-Eleches, 2009).

While the asymmetrical relationship between the EU and candidate countries may have explained performance before enlargement, post-accession performance has different causal mechanisms and is more interesting to discuss for the purpose of this paper. According to Knill and Tosun (2009), the EU15 were concerned before enlargement that due to bureaucratic incapacity –which cannot be entirely denied– and unwillingness to implement EU policies –caused by mutual misunderstanding of basic standpoints related to unclear or incongruent principles–, NMS10 states would backslide in terms of political reform once the EU lost the strong leverage of conditionality. However, to the contrary, the transposition of European policies into law by the NMS10 has surprisingly outpaced progress in EU15 (Sedelmeier, 2008) and the situations of non-compliance follow patterns present in the EU27 (Falkner and Treib, 2008), unsystematic in terms of geographic location.

Two ways of analysing transposition performance is to assess its variance across sectors and the differences between countries. First, directives are in general slow to make their way into national law when they relate to the single market, social policy, consumer protection and environment protection (Knill and Tosun, 2009). Moreover, released of conditionality pressure and suppressed political struggles, the NMS10 have lost ground after enlargement in political stability, effectiveness of governance and control of corruption (Levitz and Pop-Eleches, 2009).

Second, there is a high variation in transposition performance across the NMS10. Levitz and Pop-Eleches (2009) present Latvia, Slovakia and Romania as laggards but find no support for genuine backsliding, while Knill and Tosun (2009) award Hungary, Lithuania and Slovenia as best performers and Bulgaria, Romania and the Czech Republic as less responsive. They also explain that the performance of transposition efforts is related to the success of pre-accession efforts, the skill and motivation of bureaucrats and the degree of dependence on trade within the EU. Pre-accession effort is important because of progress in implementation capacity and the development of defence mechanisms against the risk of being ‘shamed’ by the EU (Sedelmeier, 2008). For the purpose of this paper, the aspect of intensity of trade links with the EU is of particular interest. In a longitudinal study covering 2 decades of implementation, Perkins and Neumayer (2007) found that the member states which were more dependent on trade with the EU were also more effective in transposing directives into law.

Having said this, it is also worth mentioning that the short period of time elapsed since the enlargement allows rather for empirical evidence and not solid theory. In addition, few studies have gathered data on how the laws are actually reflected in the social and business setting and these are usually limited to particular countries and sectors. For example, there is no theoretical study on the application of energy policy in the NMS10 in the context of the recent renewable energy directive, as it has not even been really implemented in all countries. It is not the purpose of this study to achieve that either, so the case study would rely mostly on empirical data collected by the EU or the member states themselves.

II.1.4. Investigating options for the NMS10 –which welfare state

Unfortunately, transition economies have been avoided by recent welfare theory studies, as their historical and economic development was different from western models. However, as argued by Aidukaite (2009), communist societies developed

sometimes social policies almost as advanced as those of Western Europe, where productivity and merit were socially rewarded. When communism collapsed, the social agenda was pursued by the political elites and bureaucrats rather than by the incipient political parties. Depending on existing legacies and effectiveness of the bureaucratic apparatus, post-communist social policies developed in various ways, partly privatising the system, and combining assistance with insurance in different degrees. Common features include “the supremacy of the social insurance system, high coverage but relatively low benefit levels and identification of social security systems with the experience of the Soviet past” (Aidukaite, 2009, page 35). After all, the NMS10 would not need to adopt a welfare model imported from Western Europe, gradually developing own systems. Ideally, these would be versions of the Scandinavian model (see Appendix 3).

The process of EU integration has altered existing social consensus in the NMS10 and marked a direct shift towards the SWPR, without an intermediary trial of the KNWS and genuine understanding of the new policy rationale. Consequently, the NMS10 have problems in “internalising, indigenising and then institutionalising various EU discourses” (Lendvai, 2008, page 517). Implementation is exacerbated by contradictory expectations from the EU, such as the squaring of extensive need for investments in infrastructure –renewable generation capacity and improvement of energy efficiency standards– with the rigidity of Maastricht criteria. This brings about situations where education, healthcare and social security are neglected, but money has to be channelled to innovation and R&D. When most of the EU15 are themselves not complying with their own fiscal prudence criteria, as in the advent of the recent recession, mutual understanding becomes even more problematic.

This does not mean that a KNWS is desirable for the NMS10, but it does bring up another problem faced by these states. With the power transfer from states to the markets, companies have started to take over part of the social policy agenda. The rise of the SWPR was accompanied during the last decade by the adoption in ever more multinationals of a corporate social responsibility –henceforth CSR– idea, image, ideal and ultimately strategy. Moving towards SWPR and reliance on the incipient CSR movement is feasible in countries with established social consensus and a strong civil society. In most of the NMS10, “governance understood as the diversification of actors involved in policy-making and the reconfiguration of the relationship between the state and society gained little momentum” (Lendvai 2008

page 518). Consequently, CSR has little chance of overtaking the role of the state in social arena so talking of CSR models in Western Europe that could be adopted in the NMS10 would probably be missing this point. Rather, CSR is sporadically stepping into areas where the state has lost capacity of intervention, through local subsidiaries of multinationals. Whatever contribution they make to the welfare of the NMS10 depends on the strength of CSR in the home country of the companies and the associated over- or under- compliance with the flimsy labour and social security legislation enforced by the transition governments. This implies that even if the EU15 governments dropped social security standards within a few years, for the NMS10 there is no alternative yet to fighting poverty with public money.

As “the EU exports its internal tensions, incongruous and ambiguous EU policies and agenda, economic hegemony and embedded neo-liberalism” (Lendvai, 2008, page 510) to the transition economies, it is important not to disqualify and dismiss the region as underdeveloped. Rather, the NMS10 need understanding and support in tackling “structural imbalances between labour and capital, states and markets, transnational capital accumulation and social agenda and party systems” (Lendvai, 2008, page 509). The EU’s current challenges are in fact greatest in the NMS10. Their average GDP per capita is merely 35% of the EU27 average (see Appendix 1) and all the NMS10 countries invest less than the already low EU27 average of 1.9% of GDP in innovation and R&D, with Slovakia spending just 0.47% –a stark contrast to 3% overall targets for EU27 in 2020– (Eurostat, 2010b, data for 2008). The degree of tertiary educational attainment is below the EU27 average in seven of the NMS10 (Eurostat, 2010c, data for 2009), while average energy and carbon intensities of the NMS10 economies are considerably above averages for EU15, the USA and Japan –though also significantly better than China’s (see Appendix 1). Inching towards the European single market for people, capital, goods and services together with their demanding –seen as ignorant and impatient at times– western partners, the NMS10 struggle to fathom European Commission directives and to render them applicable to local political, economic, and social realities.

II.1.5. Unsettling scenarios for EU futures –implications for the NMS10

Having reviewed essential theory related to political and economic relationships between the EU15 and the NMS10, it is time to take a look at recent research on potential uneven impacts of discontinuities in the future of EU27. The European Spatial Planning Observation Network –henceforth ESPON– tested “how external

events may have asymmetric impacts across the European territory [...] to raise awareness to the fact that today's policy choices have to be evaluated not only in light of current policy goals but also in the light of possible, sometimes dramatic, future events" (Smith and Dubois, 2010, page 1).

Unlikely but possible events with potentially disturbing but not totally destructive effects can be investigated beyond linear extrapolations by using wild cards –this is common practice in corporate strategy–, to enhance organisational preparedness and hint to mitigating options. Insightful examples of typically wild card scenarios that did happen are the collapse of the Soviet Union, or even the EU enlargement to include the NMS10. In the latter event some of the EU15 –such as Germany– saw an opportunity to expand markets while others – chiefly the Mediterranean economies– resented the rechanneling of structural funds away from them. Such dichotomies revealed for the EU15 and NMS10 for a couple of recent scenarios in the ESPON programme are particularly relevant for the purpose of this research, also as they distinguish between outcomes in contexts of cohesion –Keynesian– and competitiveness –Schumpeterian– policy making. (Smith and Dubois, 2010)

First, describing a situation of oil scarcity and very high energy prices as early as 2017 –which following the recession could be postponed but not dismissed–, the wild card analysis pictures a cohesion scenario where support for bio energy crops –for better or worse from environmental and food supply perspectives– enhances rural development in the EU15, but fails to revolutionise the outdated agriculture system of the NMS10. Rising transport costs would hit remote areas hardest, with less damaging impacts only for regional hubs of the NMS10. In the likelihood of a competitiveness scenario –and valid also for the cohesion scenario with attenuated impacts– high energy costs would close down inefficient or heavy industry, which has a preponderance in the NMS10 due to the communist legacy. All EU27 states would see diminishing trade, but the peripheries and especially landlocked regions –common for the NMS10– would bear the brunt. (Smith and Dubois, 2010) While there is no easy way out of this situation, strong focus on localised harvesting of RES could soften the thump. Though paying for renewable energy capacity would probably become the cheaper alternative in this scenario anyway, minimisation of costs would make good sense for the NMS10 so as not to overburden their already cash-strapped budgets.

Second, imagining an EU still unable to rapidly reduce social spending to relieve burden from public debt, the research tested the possible impacts of social security demise in the EU –only basic social redistribution is feasible by 2022. Supposing cohesion precedes competitiveness in the meanwhile, the scenario reveals positive but not sufficient impacts on convergence up to the disruptive event, with capital regions and clusters of innovation catching-up but rural areas in the NMS10 still long behind. If the demise of social security occurred despite a predominant focus on competitiveness in the EU27 –which already has lagging regions falling behind and exacerbated disparities between and especially within the NMS10–, then this would bring further prosperity to the richest regions in the EU15 and damnation for poor regions of the NMS10. (Smith and Dubois, 2010) To mitigate part of the looming risks of such a scenario –the wild card was created before the devastating downturn that has accelerated weakening of the EU15 welfare states and triggered the Europe 2020 strategy– the NMS10 can and should imagine alternative paths to development beyond the deteriorating prospect of EU frameworks, such as higher orientation towards trade with China. It is probably interesting to investigate then potential effects of such a move for the EU process of integration and creation of a single market, but this is beyond the scope of this research.

II.2. China –could the awaken dragon feng-shui the world?

During the past year, catalysed by faltering economics in all developed countries, it seems that nearly every other month China did it again. The largest country in the world –hosting a population of almost 1.34 billion– (CPDRC, 2010) is already also the second largest national economy in real terms –having surpassed Japan in the second quarter of 2010– (Whipp and Anderlini, 2010) and the top energy user –having ended up just short of the USA’s energy consumption at the end of 2009– (British Petroleum, 2010). China has also been acknowledged as largest exporter –it outperformed recession stricken Germany in 2009– early in 2010 (Bradsher and Dempsey, 2010) and is expected to end the USA’s more than 110-year supremacy in manufacturing in 2011 (Marsh, 2010). No wonder then that China was also the largest car market in 2009 –having overtaken an ailing USA– (Guillaume, 2010) and that due to low energy efficiency and use of coal for electricity generation it has already been the largest carbon dioxide emitter since 2008 (British Petroleum, 2010). An interesting account of some of China’s achievements over the past six decades –and especially the last three decades– is presented in Appendix 4.

II.2.1. China and the NMS10 –neoclassical economics and organisation theory

The success of economic transition in China, started by Deng Xiaoping telling the Chinese that "to get rich is glorious" (Kriz, 2010, page 541), has taken by surprise developed country economists. In neoclassical economics, firms compete in open markets using available resource endowments and profits are the outcome of good management, the alternative being bankruptcy. The theory correctly predicted that planned economies misallocate resources and that information asymmetry in state-owned companies –henceforth SOE– renders competitive adjustment impossible, so in the long run these firms must fail. (Murrel, 1991) However, the hypothesis that rapid privatisation and restructuring could solve the competitiveness problem was falsified by experience in the transition economies of Eastern Europe. On the contrary, the piecemeal dual approach to liberalisation taken by China has led to impressive results.

Discussing the concept of viability of the firm, Yifu Lin (2005) explains that state planning was designed to create non-competitive firms so as to industrialise poor, uneducated, agrarian economies. Resource scarcity was tackled by the communists by assuming ownership of all production factors and redirecting them to priority sectors, instead of leaving allocation to market forces. Weak control mechanisms did not allow central planners to assess resource needs appropriately, encouraging inefficiency and creating soft budgetary constraints (Kornai, 1998). The problem can well be translated to the support schemes for renewable energy technologies, where asymmetric information can distort competition between technologies, such as the exaggerated support for solar photovoltaic in the Czech Republic (Buchan, 2010). While in isolated instances non-viability is manageable, when it engulfs a whole economy plagued by bad corporate governance and unclear property rights restructuring can be cumbersome. The shock therapy applied to Eastern European economies brought shock but no therapy (Yifu Lin, 2005).

China took a different path, experimenting with progressive degrees of openness – such as the introduction of executive boards, individual investors and investment funds– to increase the competitiveness of non-key SOEs, and with new industries based on the national resource endowments –especially abundant, cheap, skilled, hard-working labour suitable for manufacturing–. As state subsidies for traditional sectors were not cut abruptly economic collapse was avoided. Resource allocation gradually improved and performance was enhanced, motivating and enabling the

state to restructure its traditional sectors plagued by corruption and inefficiency. Relying on the attractiveness of its huge domestic market, China attracted capital from international equity markets and through joint ventures with multinationals. (Yifu Lin, 2005) It preferred the second approach, to enhance access to advanced technology. The multinationals bought into the Chinese scheme –despite problems with corruption, IPR and cultural differences– attracted by the enormous potential of the domestic market, cheap skilled labour force, good coast location favourable for exports and swiftness of getting things done by the autocratic regime. The size of East European state economies would likely have not attracted similar interest from multinationals even if these had been trying to gradually open up to foreign capital and technology in a similar way.

The approach would not have been possible in Eastern Europe anyway, because of differences in how central planning was designed and the associated flexibility to adjust. Organisation theory identifies as key factors for successful change “a good reform blueprint and its correct implementation” (Qian et al, 1999, page 1087). As soviet socialists adopted a functional organisational structure, wherein specialised ministries coordinated large factories, their economies reaped scale advantages at the cost of inflexibility to change. Decision was concentrated at the top, based on incomplete understanding of local particularities, so reform blueprints were often flawed and even proper implementation would have lead to suboptimal results. As factory managers distrusted centralised blueprints and were superficial in reform implementation, results were even poorer. Instead, China followed a regional and local decentralisation structure, sacrificing scale but being able to experiment with several solutions for encountered inefficiencies. Good blueprints were identified and their implementation was more successful since local authorities could relate to the experience of other regions. (Qian et al, 1999) The Chinese economy started to open up 10 years before the inflexible soviet systems collapsed.

II.2.2. Starring in the world economy –the good, the bad and the ugly

Sustained strong economic growth based on exports of cheap manufactured goods has stocked China with the world’s largest foreign-exchange reserves, now worth \$2.45 trillion (Zacharias and Harui, 2010). The clout, amplified by depressed asset prices brought by financial meltdown in the developed economies, allowed China to go over the last 5 years on a genuine shopping spree around the world, cutting deals to quench its domestic thirst for primary resources and to quicken its access

to first-class technology (see Appendix 5). Thanks to its policy of no interference in domestic matters of its trade partners –in contrast to infamous conditional loans from the International Monetary Fund– China has gained influence in most of the emerging and developing economies, to the dismay of the developed world (The Economist, 2010). Enchanted or not, Europe was not shy in nodding to Chinese capital either, receiving investments of over \$53 billion in the period 2005-2009 in sectors like energy, transportation and property (Foreign Policy, 2010).

Behind big numbers and impressive rates of economic growth for three decades, China remains however among the less developed countries in the world, with a GDP per capita less than 10% of the USA's, EU15's or Japan's (see Appendix 1) –albeit in purchasing power parity it fares better. While hundreds of millions have been lifted from absolute poverty, millions other in the internal provinces still lack basic amenities. Even the wealthier regions on the coast are plagued by chronic air pollution, despite their overall better access to sanitation, education and a diversity of other services (UNDP China, 2010). One-party rule and the associated lack of freedom of speech, corruption and intellectual property theft are also tainting the country's overall ratings, as illustrated in a recent ranking by Newsweek (2010) in which China ended up 59th out of 100 surveyed countries (see Appendix 6).

II.2.3. Unleashing the free spirit –secondary and disruptive innovation in China

Domestically, one of China's major recent achievements is the near elimination of illiteracy. All male and female youth are enrolled in primary education, with 99% of those aged 15 to 24 being literate (UNICEF, 2010). Consequently, China has a dynamic skilled workforce that may soon be capable of genuine innovation and world class R&D even though many technologies are still only adopted alongside FDI via duplicative or creative imitation (UNDP China, 2010). In fact building on the advanced technology acquired via joint-ventures with foreign multinationals, China is already capable of secondary innovation as it moves up an establishment chain of technology importing, licensing and joint development (Wu et al, 2009).

Secondary innovation is specific for latecomer companies in developing countries, entering industries by necessity at a time when they lack both technology and the market for it, but which can build on specific competitive advantages to catch-up (Mathews, 2002). It represents a stage of learning and knowledge utilisation rather than new knowledge creation, but it has the potential to increase productivity and competitiveness (Wu et al, 2009). This fits with Christensen's conceptualisation

of sustaining innovation (Christensen, 2010) and can be associated to the stage of structural and functional understanding outlined by Wu et al (2009). Technology developed in China is not yet outstanding, but it has tremendous potential for cost innovation, which could speed up the commoditisation of new and still expensive technologies that should be deployed on large scale quickly. That is the case of the RET, for example, where next-to-world-class cheaper technology may be deemed sufficient as an alternative to building fossil generation capacity in emerging and developing economies.

Having reached this stage, the challenge for China is to move beyond and learn to create new things, as it used to when it invented the paper, porcelain, gunpowder and other commodities of nowadays society. This is consistent with Christensen's definition of disruptive innovation (Christensen, 2010), which requires freedom of thought and expression that enhances human creativity. Kriz (2010) suggested that China is the world's largest purposeful organisation and explained that "creativity functions best when it operates from both top-down and bottom-up" (page 543), since the quality not quantity of human capital is what leads to breakthroughs. The Communist Party has made it national priority to unleash innovation within 2020, but it is questionable whether a command economy fulfils the basic conditions to nurture and materialise genuine ideas. According to the Global Innovation Index Report 2009-2010, China is already ranking 21st in capacity for innovation, on the same level with the Czech Republic and second only to Slovenia among NMS10 countries (GII, 2010). Organising for knowledge creation and gradually softening state control might allow China to move up the list sooner than many believe.

All is not bright though for China's rising power and signs of trouble do lie ahead. The past year has seen a recurring debate about the threat of a big property bubble and the risk of overheat for the economy injected with a large stimulus package. The Communist Party has so far managed to contain both and there is a slowdown in economic growth (Dyer, 2010), but there is no certainty over what course China will follow on the medium and long run and how stable the current regime is. An even more worrying issue is China's increasing energy import dependence and its difficulty in staving off its soaring energy demand and associated GHG emissions. Incapable of reducing energy intensity by 20% between 2005 and 2010 according to its pledge, the state party will limit production from outdated factories in more than 2000 companies by the end of September 2010 (Hook, 2010). While this is a

temporary fix, more sustainable solutions are also in the making, and these will be addressed in sub-chapter III.4.

Building on learning from wild card –or system stress– tests, it seems reasonable to argue that China could take a part in diversifying the dependence of NMS10 on trade with the EU. While diversification and strengthening of ties with China can be probably argued for any country and any sector, it is particularly interesting to investigate the opportunity of such a move in the NMS10, and even more so for a sector still considered rather high-tech such as renewable energy technologies. In light of this argument, the following chapter presents a theoretical perspective on the latest renewable energy of the EU and its implications for the NMS10, as well as insights into what role China might play in this framework.

III. Bold steps to never-ending power –rushing for renewable

Two centuries of departure from the primacy of RES in sustaining civilisation and the world economy have first propelled humanity, but lately also greenhouse gas – henceforth GHG– emissions and energy prices to previously unimaginable height. For all of the three reasons above, turning back to RES is now rapidly taking place –at least in terms of installed electricity generation capacity for now (SEFI and BNEF, 2010)– thanks to RET development –wind turbines, solar photovoltaic and plenty other technologies in early development stages– initiated in the advanced capitalist societies of Europe and the USA. The realisation brought by China that most energy use and GHG emissions will soon come from the booming emerging and developing economies and understanding of the devastating consequences this could possibly bring, Europe and the USA are pledging to support their new triad partner –Japan has just fallen back on fourth place (Whipp and Anderlini, 2010) – in shifting to RES and eventually developing its own RET capacity. The move is timely and important, since China could make it more affordable for the emerging economies to leapfrog the dirty legacy of the developed world. This chapter is an attempt to review issues relevant for an argumentation of whether the NMS10 are among those that could stand to gain from a renewable partnership with China.

III.1. EU renewable energy directive –the making of green dreams

The aim of this sub-chapter is to introduce the rationale and history behind EU's 2009 directive promoting development of the world's leading renewable energy industry within the next decade.

III.1.1. Europe 2020 –building on existing strengths to fend off threats

The bold new strategy presented by the European Commission and supposed to make the European dream come true is embodied in the 20/20/20 by 2020 targets, whereby the EU has pledged to cut greenhouse gas emissions by 20% compared to 1990, to increase the share of RES in gross final energy consumption to 20% and to reduce energy use by 20% compared to baseline forecasts through higher energy efficiency (European Commission, 2008).

The rationale for promoting the 20/20/20 by 2020 targets are manifold and could be illustrated by three main pillars, which have been mentioned in this context for the first time in a White Paper in 1997 (see Appendix 7). First, the EU27 sees the growing global concern with climate change as an emerging opportunity to boost

the economy, by building on its leading position in carbon and in energy efficient technology. Apart from finding a large domestic market which works towards the 20/20/20 targets, the EU hopes to benefit from a first mover advantage in exports of low-carbon solutions to its major trading partners. Moreover, harvesting RES is labour intensive and the EU believes the sector could create 0.7 million additional jobs by 2020, apart from plenty other jobs needed in the effort to enhance energy efficiency. Small and medium-sized enterprises –henceforth SMEs– would benefit most, fostering innovation in local communities. (European Commission, 2008)

Second, improved energy efficiency and higher use of RES also has the potential to reduce energy imports. On the one hand, this can save at least €50 billion –the estimation was made at \$61/barrel oil prices–, adding up to the list of economic benefits. On the other, energy independence equates with an improved security of energy supply. (European Commission, 2008) In 2008, the EU27 secured through imports an average of nearly 54% of its energy use, while 10 countries among the EU15 relied on imports for a higher share than average. Although 6 of the NMS10 import less than half of their energy needs (Europe’s Energy Portal, 2010), their infrastructural dependence on Russia and the intricacy to diversify import sources makes them particularly vulnerable to supply shortages, and their 4 more import dependent neighbours even more so –a telling example being the Russian natural gas cut-off via Ukraine in January 2009–. The NMS10 would probably have little difficulty in meeting the 20/20/20 by 2020 targets if they treated them as promptly as their security of supply. To the contrary, however, security of supply concerns have determined some of the NMS10 states –Poland and the Czech Republic– to pursue carbon intensive energy policies reliant on own coal reserves to diminish Russian gas imports (Buchan, 2010).

Third, with regard to the issue of environment sustainability, meeting the 20/20/20 in 2020 targets could diminish emissions of GHG and other pollutants, improving the local environment and human health, contributing to the mitigation of climate change, as well as convincing other major polluters in the world to rise to the low-carbon challenge (European Commission, 2008).

III.1.2. Aiming high –renewable energy targets in the EU27

At the core of “Europe 2020” and its “20/20/20 by 2020” binding targets lies EU’s renewable energy policy, continuously refined “to address sustainability concerns surrounding climate change and air pollution, to improve security of supply and to

develop Europe's competitiveness and industrial and technological innovation" (European Commission, 2009a, page 2). The policy context was created gradually around the directives 2001/77/EC and 2003/30/EC and the 2005 Biomass Action Plan, seeking to create a climate of investment confidence and act as a catalyst for customised actions in the member states. Tentative shares of electricity from RES by 2010 have been agreed for each member state in the 2001 directive, indicating an average for the EU15 of 22.1% –adjusted to 21% in 2004 following the eastern enlargement. In 2003, the directive on RES for transportation set a common goal of replacing 5.75% of fossil fuel use with renewable fuels –mainly from biomass– in each of the EU27 member states by 2010 (European Commission, 2009b).

Assessing regularly progress toward the indicative targets, the EU27 have come to gradually understand the main drivers and barriers to RES capacity deployment in each member state. As acknowledged by the Commission, the 2010 targets are not likely to be met, despite reduced energy use caused by the recession. In 2009, just short of 20% of electricity generation came from RES (Bloem et al, 2010), while a larger gap is registered in the penetration of first generation bio fuels for transport, due to recent concerns about food supply and life-cycle emissions –in 2007, after two years of fast growth, the Commission was estimating that similar progress for the following years to 2010, which did not materialise, could raise the share of bio fuels in transport energy use to 5%– (European Commission, 2009a).

The failure is confirmed by the concentration of RES use around few technologies –hydro, biomass and wind– in few member states. Reasons for this are inadequate procedural laws and insufficient capacity to process applications for RES project development, to provide priority grid connection, to balance the higher variability in the energy mix caused by intermittent RES (see Appendix 8). The Commission reports that in most member states, authorities lack vision in how to develop RES take-up, sheltering incumbents locked in fossil generation, deterring innovation and failing to create investment opportunities. (European Commission, 2009a)

Following thorough analyses and public consultations, after more than a decade's learning, the directive 2009/28/EC was passed into law, covering all forms of RES in electricity, heating, and transportation, and setting a mandatory target for all the member states to 2020 as well as checkpoints on the way (European Commission, 2009a). The new law emphasises the need for a "fair and adequate allocation [of efforts], taking account of member states' different starting points and potentials,

including the existing level of RES in the energy mix” (Europa, 2009b). From the reference year 2005, each EU27 state needs to increase its share of use of RES in the energy mix by 5.5 percentage points, with the remaining gap to be covered by all member states according to the burden sharing agreement (see Appendix 9). In transportation, member states share the same target –10% of energy use from RES not necessarily bio fuels–, while for both energy in general and transportation the increases in energy efficiency are expected to play a key role (Europa, 2009b).

The directive expects all states to take “appropriate steps to develop transmission and distribution grid infrastructure, intelligent networks, storage facilities and the electricity system” (Europa, 2009b, article 16, paragraph 1) and provides rules for virtual exchanges of renewable energy among member states to help balance their meeting of the binding national targets. Moreover, to ensure the 20% overall share is reached, the Commission monitors progress in delivering on the national targets by comparing national status reports submitted every second year to the legally set trajectories. A slow start is currently being circumvented by asking member states to submit national renewable energy action plans –henceforth NAP– by mid-2010, in which to outline the long-term energy strategy, including ways to solve already identified problems and prevent new ones from occurring. (Tindale, 2009)

In 2008, RES covered 10.3% of final energy use in the EU27 (see Appendix 9).

III.2. Energy in transition –changing lane to western standards

To understand the opportunities and challenges of current plans for developing the renewable electricity capacity of transition economies, this sub-chapter introduces important structural differences between the energy markets of the former NMS10 and the EU15. The focus is to emphasise path dependencies in the energy systems and policies of the NMS10 rather than a comprehensive parallel of the EU15 and NMS10 systems. A brief overview of privatisations that brought EU15 utilities in control of generation and distribution assets in the NMS10 is as well presented, as this will enhance discussion on the role they could play in the renewable energy investments to come.

III.2.1. Inefficiency, the chronic disease of energy systems in the NMS10

To begin with, communist economies did not prioritise energy efficiency due to a lack of market-driven competition and outdated production processes, allowing or even encouraging the industrial sector to grow energy intensive and polluting. The

socialist doctrine regarded utilities such as electricity and heat as basic amenities, subsidising energy prices especially for households and neglecting to meter usage. Environment protection and climate change were of no concern for the communist governments, so public awareness of pollution was limited, despite smog and acid rains that caused bad health. (Ürge-Vorsatz et al, 2006) Moreover, corruption was present at both industrial and residential level, encouraging inefficiency and even theft (Lovei and McKechnie, 2000).

However, positive legacies can also be identified. Urban planning encouraged the development of high-rise neighbourhoods and the spread of communist apartment blocks enhanced cogeneration and district heating, often actually using waste heat from nearby industrial units. It also favoured the spread of urban public transport networks, which were intensely used thanks to heavy subsidies. Consumption was in general low and reusable packaging was common, so residential energy use was below Western European levels, albeit more wasteful. (Ürge-Vorsatz et al, 2006)

Meanwhile, competition in capitalist Europe fostered efficiency, while democratic processes built up momentum around an environmental policy push. The growing standards of living were translated into consumerism, and capitalist countries were soon faced with extensive though rather efficient energy consumption. Divergence continued between the two sides of the iron curtain up to the fall of the communist regimes in 1989-1991. (Midttun and Chander, 1998)

The collapse of all economic sectors in East European countries in the 1990s was followed by a dramatic reduction in energy consumption and decreased levels of pollution. As privatization of state owned enterprises took place to create a market economy, industrial energy consumption started to rise –especially after the year 2000. However, compared to 1990, the base year for measuring GHG emissions under the Kyoto protocol, energy use in 2009 was still up to 50% lower in all of the NMS10, and so were carbon dioxide emissions. (British Petroleum, 2010) As all states basically have surplus emission allowances, they are able to sell them to countries which have a shortage, promising to invest the proceeds into renewable energy capacities –even though the EU15 have been insisting that the allowances should rather be scrapped in order not to depress prices, an argument completely misplaced in the eyes of the NMS10 (Buchan, 2010).

There is also another reason for the NMS10 being frustrated by EU15 demands and why the tentative 2010 targets were difficult if not impossible to reach. In the

process of economic restructuring during the 1990s, as energy intensive industries were scaled or closed down in these countries, power demand that was covered by fossil generation was interrupted. Hydropower –the main source of clean energy– has kept running at capacity, even though investment in new projects faltered. The 2010 targets were set based on the reference year 2000 (European Commission, 2009b), when energy use in most of the NMS10 was at its lowest or nearly lowest since the 1970s (British Petroleum, 2010). Economic recovery, rising standards of living and consumerism have over the last decade increased energy use per capita, but unfortunately most of the NMS10 have missed on the opportunities of positive legacies described above. People have been quick in abandoning most of what are now outdated, unreliable and inefficient networks built in the time of communist rule, so there was backsliding in cogeneration, district heating and public transport –especially rail transport, replaced by road traffic (Úrge-Vorsatz et al, 2006). With fossil fuels covering most of the rebound, it was challenging for RES targets to be achieved even in ideal settings. As in 2007 only Germany, Denmark and Hungary seemed on track toward meeting their 2010 targets (see Appendix 10), the realism of target setting itself is questionable.

Energy policy in the NMS10 has in this context focused on increasing efficiency and diversifying imports to improve security of supply. Discussing these issues is not the subject of this research, but a couple of implications for renewable energy policy should be mentioned. First, one painful readjustment that has taken place in the NMS10 has been the gradual cutback or even elimination of energy subsidies for electricity and especially for heating. According to Buchan (2010), the price of gas and electricity in the NMS10 is still below EU15 average, especially if there is low grid connectivity to western markets. However, fuel now takes slightly larger portions of income in the NMS10 when adjusted for purchasing power parity, and fuel poverty is of concern in the perspective of a single EU27 energy market with similar prices across the member states. Expensive renewable energy can be taboo for the NMS10 governments, especially when the burden falls on voters. On the other hand, a slight incentive for expanding use of RES is the positive impact of decreasing import dependence and improving security of supply.

III.2.2. Dirty trails –path dependencies in the energy systems of the NMS10

While the transition economies were mostly embracing coal and oil for electricity generation, links with the Soviet Union also lead to widespread use of natural gas

and the development of associated infrastructure. This has actually improved the GHG emissions performance of the NMS10 slightly, even though in most cases at the cost of high import dependence on Russia. As a matter of fact, a recent wave of upgrading the electricity and gas grid cross-border connections in the NMS10 under the European Energy Programme for Recovery –from the recession– is the largest energy infrastructure package ever paid for by the EU (Europa, 2009a), to improve security of supply. As typical contracts for gas imports were and still are ‘take-or-pay’ deals, gas has to be used before other alternatives (Reiche, 2006). If energy demand falls more than expected –such as in times of economic downturn and at the collapse of the communist regimes– and there is a surplus of contracted gas, this replaces some coal and can impact also on use of and indeed incentive to invest in RES.

Nuclear has also been part of the energy mix in seven of the NMS10, running at base load and influencing the need for renewable electricity generation. Following the Chernobyl catastrophe, Poland has given up building its own nuclear capacity and pre-accession negotiations with the EU included closing down one third of all existing units in the region, in Bulgaria, Lithuania –both its units, the last in 2009– and Slovakia. (Reiche, 2006) Part of the glut in generation capacity following the reduction in energy demand has thus been taken away. Even more capacity would soon be phased out, mainly from coal generation, as the units are close to end-of-life and they do not comply with EU environment regulations. New capacity will therefore need to be added in the NMS10 during the following decade, opening up the potential for a higher penetration of RES in their electricity mix.

Communist regimes did support the use of RES, developing the potential for large hydropower units and preserving biomass use for heating in poor rural areas not connected to district heating or the gas grids. Bio fuels have long been used in the Czech Republic, geothermal district heating was implemented in Hungary, solar water heaters were being installed in most of the NMS10 before 1990. Preference for centralised units has however hindered the development of small hydropower generation units, and Latvia has even closed some for this reason. It is also useful to mention that renewable energy technology was developed in the NMS10 for a long time, mainly hydro turbines, biomass boilers and solar collectors. However, wind turbines and photovoltaic cells are not produced competitively in these states and this causes reluctance in harvesting wind and solar RES. (Reiche, 2006)

III.2.3. Getting re-plugged –energy sector investments in the NMS10

The convulsion of the European process of shifting the energy industry towards renewable generation can be captured by a bi-dimensional map along political and commercial lines. Midttun and Koefoed (2003) present 4 ideal types of initiatives that transform the energy sector in Europe into a more environment-friendly one, along two bi-polar dimensions (see Appendix 11). On one hand, some electricity generators have been proactive with regard to clean energy investments compared to lagging European and national legislation. Among these players, some chose a ‘standardized commoditisation’ strategy to reap economies of scale through large investments addressed to the broad energy market. The alternative approach was a ‘specialised segmentation’ strategy, where sustainable competitive advantages are gained through differentiation in servicing particular segments. The focus could in this case be on ‘design, brand image, technology, features, customer service, or dealer network’ (Midttun and Koefoed, 2003, page 678). It is interesting to assess the approach taken by the newly restructured energy companies of the EU15 when the NMS10 markets for electricity and gas opened up for privatisation.

During the decade before the eastern EU enlargement, gas distribution, electricity generation and electricity distribution were partly privatised in the NMS10, with EU15 players assuming most of the ownership in the non-Baltic states and leading the upgrading of infrastructure. This is in line with expectations based on the ideas outlined in sub-chapter II.1.2: a wider process of market liberalisation was starting to take shape; utilities in Western Europe needed to increase scale to cut costs and boost profits; while the EU was envisaging the common energy market. The main investors –E.ON, EDF, RWE, Enel and CEZ – followed a regional –not national– strategy for eastward expansion, attempting contiguous geographic coverage and seeking to synergise generation and distribution businesses. (LaBelle, 2009) In the framework put forth by Midttun and Koefoed (2003), this corresponds to a type I strategy, with standardised commoditisation at a European level. Investments in renewable energy capacity by these and new players are likely to follow the same strategy. The dire markets of the NMS10 are not mature or sophisticated enough for a customised approach and are in quick need of cash inflow to modernise. This argument is effectively disarming the idea of type II or type III strategies for the NMS10 markets, as these are suited for more mature and competitive markets in the years to come.

III.3. Electrifying times –renewable generation in 2020 in the EU27

For manageability, this paper discusses only renewable electricity generation that contributes to meeting the 20/20/20 by 2020 objectives. Since it is not realistic to expect a uniform 20% RES share in the use of each of the electricity, heating and transportation sectors, renewable electricity would need to make up to 35-40% of total electricity generation for the 2020 overall target to be reached, equivalent to 1120–1400 TWh yearly. That is roughly double the 608 TWh generated in 2009, coming mainly from hydropower, wind, biomass and solar. Other technologies to be introduced on a larger scale by 2020, such as geothermal, tidal and wave power generation have been negligible so far. (Bloem et al, 2010)

III.3.1. Opportunities from and threats to renewable electricity generation

Two main aspects are relevant concerning the penetration of renewable electricity in the EU27 energy mix. First, the EU aims to consolidate its leadership in clean energy technologies, where it has an edge, supporting the development of new and perfecting of existing technology. In 2009, Europe was leading in corporate clean energy R&D with investments of \$8.1 billion and it was second only to the USA in government clean energy R&D with spending of \$3.6 billion –and rapid growth to compensate for a large fall in corporate spending (see Appendix 12). However, a substantial share of the money was spent on technology that improves efficiency rather than on developing new or better generation capacity –solar and wind took the bulk of such investments (SEFI and BNEF, 2010). In wind turbine technology, for example, which accounted for the largest renewable capacity that was installed globally in 2009, Europe's edge is illustrated by the presence of companies among the top 10 global producers –3 from Germany, 1 from Spain, 1 from Denmark– (see Appendix 13). Moreover, it is relevant that Europe's R&D in RET is present almost entirely in the EU15, with very low spending and rates of success in the NMS10. This picture is consistent with the overall level of R&D spending in the latter group.

Second, the EU needs to find ways to deploy the renewable generation capacity it manufactures in the most cost effective way. Since renewable technology is more expensive than conventional alternatives, long-term stable support schemes are to reduce risk, minimise capital costs and attract investment in improved technology, while remaining flexible in front of rapid innovation and allowing for technology differentiation. While most of the EU27 states have in place appropriate support

schemes (see Appendix 14) the Commission says that Bulgaria and Romania need to improve their legislation in this matter (European Commission, 2009b). The financial squeeze of public budgets seen so far in 2010 in countries such as Spain, Greece and Portugal may weigh over the ability of indebted governments to keep high levels of support for renewable energy in the future (SEFI and BNEF, 2010).

III.3.2. Green guts –investing in renewable generation capacity

In order to understand the investment choices made by electricity producers, it is important to identify the threats and opportunities associated with such decisions. The highest risk involved in technology research and capacity building projects in the electricity sector is related to the need for long-term planning. For example, a response to insecurity regarding the evolution in EU climate and energy policies could be a delay in investments (Fuss et al. 2008). The feeling of insecurity can be triggered by the postponement of decisions already made via lobbying or due to bureaucracy, or by the introduction of entirely new policies –important here are their purpose, timing, and expected effectiveness– (Blyth and Yang, 2006).

Investments in renewable generation capacity are also constrained by access to the electricity grid and other potential administrative conundrums. Since unit capacity is usually small, generation intermittent and RES often present highest potential in off-grid areas, investors are concerned about the cost, duration and priority of grid connection. The directive from 2009 is addressing this issue, but implementation is in the responsibility of national authorities in each member state, with different degrees of success. Lead times for project authorisation are also different for each state and usually also for each technology and installed capacity, encouraging or deterring some investments depending on cost, leanness and level of bureaucracy. (European Commission, 2009b) In general there seems to be a trade-off between the length of lead times and the transparency of procedural administration, EU15 being in general more transparent but exceeding deadlines to approve projects (see Appendix 15).

Permit rejections, usually related to issues with grid connection or grid capacity to take up intermittent sources, also influence investment decisions apart from direct bearing on actual installed capacity. Examples of high rates of permit rejection are the ceilings on new installed wind turbine capacity in Estonia, Hungary and the Czech Republic. Countries where grid capacity is causing problems are mapped in Appendix 16. Finally, certification of renewable electricity through guarantees of

origin, also addressed by the 2009 directive, is not always transparent and fully reliable, causing concerns on the accountability of reported progress. (European Commission, 2009b) In fact, all NMS10 were late in implementing a guarantee of origin system at all, in spite of the 2003/30/EC directive (Buchan, 2010).

The renewable energy directive of 2009 has had an essential role in lowering the uncertainty for investors and it should be expected that as the economic recession recedes they will step up capital commitments to expand renewable portfolios. In the EU15 markets, this should ideally lead towards type II investment strategies (see Appendix 10). According to Pinkse and Kolk (2009), small innovative firms can properly develop and prosper only in a fully liberalized market, so the current status of the European energy sector results in suboptimal solutions to mitigation of GHG emissions. For example, translating the renewable energy directive in the NMS10 is likely to strengthen type I strategies. Uneven liberalization of the EU27 electricity markets will still influence the pattern of investments in RET for some time, allowing the nurturing of preferred technologies and even pockets of type IV strategies –mostly in the NMS10.

III.3.3. Propping the ladder –types and integration of support mechanisms

To compensate for national policy uncertainties, high R&D costs of technologies for renewable generation and the long lead development and break-even time, it is essential that governments provide incentives in the form of tax breaks, minimum guaranteed prices such as feed-in tariffs or green certificates. The appropriate type and level of government support depends on the stage in the development of each technology. According to Midttun and Gautesen (2007), early development stages should be managed by ‘dynamic innovation-oriented regulation’ such as “research and development policies, technology subsidy policies and niche market policies”; while ‘efficiency-oriented regulation’ as “competition policies, third party access policies and corporate governance policies” is better suited for proven technology (see Appendix 17). The authors explain that new technologies are better served by feed-in tariffs, while mature technologies could be supported with green tradable certificates. The evolution of such policy mixes should be carefully planned.

This dynamic regulation environment requires of bureaucrats good understanding of market developments and capacity to design flexible mechanisms that respond to potentially swift changes. For authorities in the NMS10, whose performance has been discussed in sub-chapter II.1.3, this can be a terrible conundrum. Making

this easier is the lagging innovative capacity of the NMS10, which realistically are only going to adopt proven technology for the foreseeable future. The main focus should thus be on ‘efficiency-oriented regulation’, which transition bureaucracies have been improving for 20 years and for which best practice is probably easier to find in the EU15. As some deployment –if not also development– of innovative renewable energy technology needs to take place in the NMS10 to meet the 2020 targets; exclusive use of green certificates would probably not be optimal, being suitable for example for wind and biomass, but not for solar. However, as long as the NMS10 opt for adoption of proven technologies to maximise volumes rapidly at minimum cost, green certificates combined with renewable portfolio standards can be an attractive main policy option.

Tax incentives –exemptions, deductions and tax allowances– can complement the main support schemes. Most widely used are the excise duty exemptions, also in Poland, Romania and Slovakia among the NMS10, reducing higher production costs. Other options are preferential value added tax rates in compliance with EU law, or private income and corporate tax incentives –as the Czech Republic uses to encourage installation of solar photovoltaic capacity. (Cansino et al, 2010)

A brief discussion on integration of support schemes at EU level is useful for the paper’s argument. After long debate, the EU has stepped back from the universal guarantee of origin –henceforth GO– that was envisaged to increase the flexibility in achieving the 2020 targets and harmonise support schemes across the member states. “The final compromise on the RES directive sets the framework for three voluntary flexibility mechanisms –statistical transfer between the member states, joint projects and joint support schemes” (Klessmann, 2009, page 4975). Design of mechanisms can take place according to own needs, but it is unlikely that much effort will be put into this, especially by the NMS10. Statistical transfers would be easiest for the target year 2020, while joint support schemes are most unlikely. As for joint projects, they are involving private investors most and there has already been a wave of investment under the JI framework, where capacity is built in the NMS10 but emissions are accounted for in the EU15. (Klessmann, 2009) In terms of financial flows for renewable electricity capacity investments in the NMS10, the latter are most likely to materialise. However, while they do boost renewable generation in these countries, they do not contribute to meeting emissions targets,

so they are not necessarily an optimal solution from an East European perspective –even though the level of emissions is generally less of a problem in the NMS10.

III.3.4. Smiling but not tickled – renewable electricity generation in the NMS10

In this context, it is not surprising that the bulk of investment in renewable power generation takes place in the EU15, which currently manage 98% of EU27 wind turbine capacity and 96% of EU27 photovoltaic generation capacity –compared to 85% of total primary energy consumption (see Appendix 1). The NMS10 present a vast potential for expansion of renewable electricity generation, especially from wind and solar RES, but actual progress is disheartening due to lack of financial capital and own technology, cumbersome authorisation procedures, and technical problems with the integration of renewable electricity in ageing oversupplied grid structures. Political concerns of unpopular rises in electricity prices due to support schemes for RES deployment, the opacity of some incumbent generators, and the trailing liberalisation of electricity markets are also hindering investments in clean electricity generation in the NMS10. (Buchan, 2010) However, bound to report on their plans and expectations regarding their renewable energy targets, the NMS10 are generally optimistic. All expect to meet national targets, with half –Bulgaria, Estonia, Lithuania, Poland and Slovakia– planning to exceed their commitments and sell the surplus to underperforming states of the EU15 (Buchan, 2010). How committed the NMS10 will be to meeting the 20/20/20 by 2020 targets remains to be seen, given no threat of direct economic penalties except possible infringement procedures. The pressure is then moral, and this has functioned well so far for all NMS10 (Levitz and Pop-Eleches, 2009), but this time that might not be enough.

At a strategic level, the NMS10 have several reasons to be reluctant to the take up of expensive renewable electricity generation technology. First, the additional cost of renewable electricity support schemes is likely to slow down the lengthy course of convergence with the EU15. Similar concerns have been raised by all emerging economies, arguing that developed countries ought to provide the technology and capital for a global shift towards low carbon energy sources, so as not to damage the prospects for economic growth in less developed states (World Bank, 2009). In effect, the NMS10 cannot afford to pay for expensive renewable technology in the foreseeable future and expect the EU15 to finance the harvesting of their RES. Second, the Europe 2020 strategy is seen in the NMS10 states as “swapping fuel dependence on Russia for technology dependence on western Europe, particularly

Germany. It is certainly true that assembling and installing wind turbines imported from Germany provides little local employment” (Buchan, 2010, page 7) and adds to menacing current account deficits.

Finally, looking at the three scenarios described in the Europe 2020 strategy, the NMS10 have reason to worry about getting their economies stuck in the back yard of a lagging region in terms of innovation and economic growth (see Appendix 2).

These problems suggest that while progress has been achieved and shares of RES in the electricity mix of NMS10 countries is converging with EU15 levels, merely applying free market capitalism is unlikely to close the gap (Maza et al, 2010). An interesting possible avenue is in this case an economic partnership with China, as the countries share a recent communist heritage and similar level of development. It might be better for the NMS10 to attract capital and technology for renewable electricity generation from China, rather than put their faith entirely on the EU15. China’s potential rising attractiveness for the NMS10 regarding renewable energy collaboration is discussed in the following section.

III.4. Patting the dragon –is China changing heart or only its skin?

This sub-chapter presents China’s growing might in the global demand for energy sources, its radical changes in consequence of this, and its increasing influence on the shape of renewable energy technologies in the world.

III.4.1. Abandoning the dirty old path –China’s energy problem

In many ways, the first 30 years of communism in China have created similar path dependencies in the energy system as described for Eastern Europe (see sections III.2.1 and III.2.2). The communist credo that heavy industry should be at the core of economic development and reliance on domestic energy resources have lead to wasteful practices and preference for the most easily available –hence cheapest– yet dirtiest of fuels, coal. Air and water pollution were extreme and the need for a change arose long before concerns about energy security or climate change.

The Chinese turn towards social capitalism at the end of the 1970s has marked the beginning of a process of efficiency improvements, to decouple economic growth from energy demand and diminish pollution of the environment. Fossil fuels make up most of the Chinese energy mix (see Appendix 18) while industry creates most of the energy demand, so policies targeted the SOE to promote modernisation and energy conservation. Since 2006, all resource intensive exports bear an energy tax

and rebates have been entirely eliminated for almost all products, which translated into carbon emissions for steel and aluminium give similar prices to the European allowances. (Zhang, 2010) The effective stimulus package created by the planners to avoid economic slowdown has interrupted efficiency performance during 2009 (British Petroleum, 2010), but efforts are being taken now to reverse the trend in a typical Chinese way (Hook, 2010) –which is dreaded by democracy.

Impressive results have also been achieved in the building sector, with plans for efficiency improvements in new buildings of 50% compared to 1980 by 2010 and 65% by 2020. Transportation is seeing important efficiency changes as well, with better fuel standards than the USA, albeit still worse than the European ones. The 9 year lag registered in 2001 in emission requirements compared to the EU is now reduced to less than 6 years (Zhang, 2010). Determination to find solutions for the public transport networks in China's growing cities are potentially leading to new disruptive designs (Lai, 2010). However, a lot more needs to be done, building on principles laid down in a Renewable Energy Law of 2005 (Clark II and Li, 2010).

III.4.2. No time to fool around–China's energy revolution

In a world facing accelerating climate change, China is not well positioned, being criticised by all major developed economies for its high carbon intensity of energy use –3.45 CO₂/toe, due to a large share of coal in primary consumption– and even higher energy intensity of the economy in relative terms –0.62 toe/1000 €, due to its heavy industry– (see Appendices 1 and 15).

In response to accusations, China has initiated a clean energy revolution, setting aggressive policy targets for the penetration of RES. According to its latest pledge the country aims to cover 21% of electricity demand and 17% of final energy use with RES in 2020 despite double digit growth in energy demand, partly by raising its targets for renewable technology capacity. This makes EU targets look puny in terms of new renewable capacity, as solar photovoltaic and wind turbine installed in China should reach 10 GW and respectively 100 GW in 2020. In order to meet such ambitious targets, China has stepped up financial investment in clean energy companies, reaching \$33.7 billion in 2009. This was 28% of total global financial renewable investments –second only to Europe as a region and to Germany– and China is set to become world leader in 2010 as few large deals were cut in Europe in the first semester. Bank lending and effective auction mechanisms and feed-in

tariffs have raised investor confidence, leading to a surge in mega-projects, mainly for wind power. (SEFI and BNEF, 2010)

Owing to a late start from a low base, China is still behind the EU27 at counting installed renewable energy capacity (see Appendix 19), but it has added in 2009 the largest wind turbine capacity, equalling Germany's base at 25.8 GW. This has led to three of the world's top ten wind turbine manufacturers being from China. The country manages already the world's largest renewable technology capacity, both with and without counting large scale hydropower. (REN21, 2010) Although at a much lower level, investment in solar photovoltaic capacity has also surged in 2009, thanks to new subsidy schemes and significant cost reduction for China's manufacturers. In a more fragmented market than that for wind turbines, 5 of the top 10 world photovoltaic players are Chinese. (REN21, 2010)

While China is definitely already a major player on the global renewable energy stage, rapid developments have mostly taken place thanks to technology transfers from Europe and the USA. In this context, the following sub-chapters snapshot the strengthening partnerships between Europe and China in the energy sector and wind turbine technology development in China with associated challenges.

III.4.3. Blowing into burning needs –wind RET. Made in China

As the Chinese wind market has taken a giant leap in terms of installed capacity in the last 5 years (Li, 2010), it is useful to review key achievements and challenges for current and future development, as they are representative and relevant for the role China could assume in international markets.

Wind turbine R&D started in China in the early 1980s with experimental designs for small scale demonstration of new technology from European manufacturers, paid for by loans and grants from governments interested in promoting their local manufacturers. Early wind farms used imported turbines and components, Chinese designs being of too low quality. In the 1990s, joint-ventures with leading turbine developers such as Vestas and Gamesa were established to initiate fast knowledge transfers– including in maintenance and repairing– and to boost domestic markets. Concessions for wind projects started in 2003, offering guaranteed grid access and feed-in tariffs, on condition that 50% of turbines were manufactured in China. The policy intended to lower domestic production costs by generating scale, to boost local employment, as well as determine foreign players to increase manufacturing

presence on the domestic market and improve the quality of domestic technology. (Li, 2010) Since components were still mostly imported, from 2008 concessions have a 70% “domestic cost content requirement” (Han et al, 2010, page 2948), to bring the manufacturing of auxiliary equipment to China. The supply chain can be fully covered by domestic players now and the industry has expanded greatly.

A recent important achievement by China’s wind R&D base was the breakthrough development of a permanent magnetic levitation power generator, which is able to extend load capacity by 20% thanks to functioning at lower wind speed and could thus halve wind farm operating expenses. Moreover, the first unit manufactured in China with fully domestic IPR was 20% cheaper than imported models and had a 1.5 MW capacity, more than most domestic alternatives. (Liao et al, 2010) While most Chinese players are merely imitating or licensing foreign technology, there is marked improvement in the capacity for secondary innovation among leading players, while disruptive innovation seems also achievable.

Notwithstanding important advancements, Chinese wind technology and project development capacity leaves much room for improvement. A common problem is the poor quality of components and even turbines, which often causes prolonged breakdowns –on average every fifth day, compared to once a month for imported models. The associated increased need for maintenance adds to cost, and problems with servicing and warranty deter investors. (Li, 2010) Due to improper feasibility studies before project development, many wind farms actually operate at loss (Yu and Qu, 2010). Turbines are seldom customised to site and weather variability and this decreases performance considerably –on average domestic turbines perform at capacity factors 5 percentage points below foreign models. (Li, 2010) As long as the government focuses exclusively on installed capacity, China cannot maximise the potential of wind resources (Han et al, 2010).

In order to improve on this situation, the Chinese authorities have lowered barriers for access to financing for small companies. The measure will initiate more R&D on customised turbine designs and would hopefully also improve human capital in the industry. (Liao et al, 2010) However, the cost content requirement could work against long-term interests for the Chinese wind industry. Domestic players are in general not mature enough to perform without collaboration with and competition from foreign players, not least to develop their capability of operating integrated supply chains and to start experimenting offshore. (Li, 2010)

III.4.4. Sino-European energy partnerships

Acknowledging their mutual importance as trade partners, the EU and China have progressively strengthened ties during the last decade, establishing collaboration protocols in a wide array of fields (European Commission, 2010c). In the area of energy and climate change, a high level framework for cooperation, known as the “EU-China Partnership on Climate Change”, was signed in 2005. This enabled the integration of emissions offsets from Clean Development Mechanism –henceforth CDM– projects within the EU Emissions Trading Scheme –henceforth ETS– and enhanced the transfer of capital and low carbon technology to China. To illustrate, 90% of all wind energy projects registered in China in October 2008 were seeking CDM registration. (Müller et al, 2010)

As explained in sub-chapter III.4.3, transfers began long before signing the recent partnership, as EU member states were interested in first mover advantages on the vast Chinese market. Bilateral transfers were initiated to promote exports of own technology or to secure affordable emission credits, under Joint Implementation – henceforth JI– frameworks. As Denmark, Germany, Spain, the Netherlands and others committed resources to China, especially in the wind energy sector, a local technology base started to form. Four main stages have been identified regarding these technology transfers at company level: import, licensing, joint development, and full acquisition by Chinese players of European manufacturers –therefore own development. (Müller et al, 2010)

The Chinese government played an important strategic role in this process, in two main ways. First, via front-end policy support, the Chinese authorities subsidised renewable energy technology R&D in domestic companies and universities so as to enhance the knowledge transfer initiated through joint-ventures with European manufacturers. Second, via back-end policy pull, the government has encouraged or even mandated domestic companies to purchase locally developed technologies and thus support their further improvement. In some cases, government agencies actually purchased renewable energy technologies and distributed them for free to state-owned enterprises, displeasing western licensors. This practice and distrust on issues related to intellectual property rights –henceforth IPR– have determined multinationals to transfer only technology that is five to eight years old. Therefore many Chinese companies do not own key technologies, their manufacturing being based on European licenses. (EurActiv, 2010)

In this context, current negotiations envisage lowering both tariff and non-tariff barriers that hamper investment between the two major trade partners, in order to promote the exchange of “environmental goods and services, especially wind and hydroelectric turbines, solar-powered boilers, solar panels, seawater desalination plants and wastewater reuse and treatment” (Europa, 2010). Another possible area of cooperation is to use European expertise in electricity grid connection, capacity expansion and system operation to speed up RES penetration (Müller et al, 2010).

While the EU15 sees in such cooperation the opportunity to increase market share in the growing clean tech sector, China hopes to overcome its current challenges in the years to come and to unlock new markets that could bring scale economies for its industries and thus help reduce technology costs further. While the United Kingdom and the USA are attractive markets for the Chinese players (Li, 2010), the NMS10 are also a potential target once trade barriers are lowered, given their need to expand renewable capacity rapidly to meet their 2020 targets.

For the NMS10 the benefit could be significant. Even though Chinese companies do not own yet latest clean energy technologies, some can already provide value for money for the cash-strapped catch-up economies. Combined with the potential financing brought by Chinese investors, this might be a good solution for NMS10 economies in rebuilding their energy sectors and meeting the targets pledged as member states of the EU. The following chapter builds a framework to analyse the strategic moves that could unfold in the years to come, identifying opportunities and threats for the NMS10.

IV. Pick your pal: Western Europe versus China

Civilisation has reached a turning point. Breakthrough is created at unprecedented pace and the world is getting connected virtually and physically in what decades ago would have been unimaginable ways. Emerging economies are finally making their way through to offering most people a decent life. But the carrying capacity of the environment is exceeded and risks causing disasters of unknown scale and with unforeseen consequences that could exacerbate poverty, hunger, disease and death for many. The welfare system of the west –also known as the north– is now crumbling on the brink of falling apart, as eastern peoples –part of what is called the south– are asserting the steering of the world albeit through sheer number, not living standards yet. The north can be accused of much misery, but it has brought the world together and has learned a lot from its mistakes. The south needs to gain this wisdom and avoid repeating dreadful deeds. Energy in particular could be the make or break in this change of leadership, as it is at the heart of economies, on top of political agendas and crucial for society. This chapter is attempting to craft a framework for assessing whether a stronger partnership between the east and the west could be built where the two worlds meet on still rather neutral ground, the NMS10, in a sector which is likely to regain its importance, renewable energy.

IV.1. Conceptual framework

Building on the review of literature in parts II and III, there are five main topics to discuss in deciding whether the NMS10 should consider attracting China in their effort to build renewable generation capacity or should keep faith in the western model they have recently adopted and stick with what the EU15 have to offer (see Appendix 20). First, the ability of the EU15 and China to finance the deployment of RET is discussed. Second, an assessment of cost advantages for the two options is presented. Third, regardless of capital and the price tag, technology should be chosen to maximise value for money. Fourth expertise in expansion and managing the electricity grid to cope with changes brought by integrating RES is considered. Fifth, the impact of each option on future evolutions in governance in the NMS10 is debated. At all times, the perspective adopted is that which the NMS10 could espouse, but attention is also given to collaboration between the EU15 and China. The hypothesis is that the more China catches up with the EU15, the more likely it is its appeal to NMS10 will rise. Before embarking on the analysis, main accounts of why both EU15 and China could be interested in NMS10 are given.

IV.2. Ready to date –why could the NMS10 be attractive?

The assessment of how the NMS10 could evaluate the alternatives given by China and the EU15 regarding the expansion of renewable generation capacity would be pointless had it not been for two pre-existing conditions. The first is that NMS10 states are in poor financial shape, leave room for improvements in governance and democracy, as well as lack own competitive RET technology and skills needed for developing RES projects and associated grid expansion and management. Parts II and III have given account to that, suggesting that the gap be bridged with optimal solutions from either the EU15 or China. This is not meant as an insult to NMS10, but rather a pragmatic assessment of what could raise the region's competitiveness in the current global economic and political setting. What China and EU15 could contribute is outcome of their strengths and weaknesses, which are also outlined as realistically as possible. This is a version of game theory in open form.

The second pre-existing condition is that both the EU15 and China need to find it attractive to invest in developing renewable generation capacity in the NMS10. It is this idea that the following two sub-chapters briefly assess based on the context created in the previous sections.

IV.2.1. First in the harem? –expanding EU15 renewable excellence

Funding sustaining and disruptive innovation in RET is costly and investments are made in R&D when support mechanisms are in place to reassure the private sector that there is a stable growing market for the new products. The renewable energy directive adopted in 2009 has created a framework for RET development in EU27 and it envisages scale economies by coordinating action in all member countries under the burden sharing agreement. EU15 utilities have already taken over much of the energy sector in the NMS10 –mostly distribution but generation capacity as well– and they are investing to develop the NMS10 energy systems and integrate them within what is going to be the EU single energy market. The EU competitive edge in RET would likely have EU15 utilities and other renewable energy project developers in the NMS10 rely mostly on European technology. In preparation for the single market, EU15 investors, utilities and technology players alike should be interested in the NMS10 markets.

Significant scale economies are unlikely to be achieved in the NMS10, though. As their primary energy use is 5.6 times lower than that of the EU15 despite a double energy intensity of the economy (see Appendix 1), the RET market opened up in

the NMS10 is important but not outstanding. Before losing ground to competition from the USA and other developed nations, the EU15 have to expand RET market share in the fast emerging economies of Asia, Latin America and even Africa –top of the list being China. As the NMS10 are close to becoming home turf for energy actors in the EU15 with the creation of the single market, one possible implication is strong commitment to their development, but yet another is that they are taken for granted and therefore of lower priority compared to expanding to new markets (see Appendix 21).

IV.2.2. A marriage of convenience –entering EU through the back door

China has gained a reputation as ‘workshop of the world’ and is a powerful export driven economy, but achieving this while plagued by energy inefficiency and coal dependence has also turned it into a perfect ‘smoke stack’ to point climate fingers at. State planners have travelled to lands the west had long forgotten to sign deals for raw materials that would keep their factories running, but an increasing energy import bill, pollution and early signs of climate change are triggering a strategic reorientation. Harvesting domestic RES and creating a more value-driven industry are at the top of the state planners’ agenda, so domestic RET development is now aggressively pursued alongside the automotive, telecommunications, finance and other sectors. China’s export orientation is still strong, but FDI is also increasingly important in both emerging markets –where it is building infrastructure in return for resources– and more developed ones –where it is using export revenues to tap into top-notch technology and leading western business practices– (see Appendix 5). Chinese technology is arguably not yet competitive enough for exports, but the situation is gradually changing, and possibly faster than many expect.

Given China’s affinity for emerging markets rich in resources or for the developed ones having competitive technology, the NMS10 could well fall under the radar. However, the NMS10 need more FDI than the EU15 have been committing as the financial downturn unfolded (PWC, 2010) and they are part of the attractive single European market. A shared communist legacy might enhance communication and turn the NMS10 into a bridgehead leading to the EU market in terms of FDI and exports of technology. This could in fact be a strategic move to threaten dominant positions of the EU15 in the NMS10 in terms of technology exports. However, it cannot be taken for granted that China is planning to actively pursue such a move, since it could well wait until it becomes competitive enough and then go directly

to the EU15 markets. The NMS10 would probably have to actively engage China in order to make it happen.

Early signs of strong Chinese interest in NMS10 were the seminars at the EU and Polish pavilions in Shanghai this year at the world exhibition, where discussions focused on the local business settings and associated investment opportunities. In the dialogue there was also interest from the Bank of China and early experiences from companies already present in the NMS10 such as Lenovo and BYD Auto. (Franklin, 2010) In fact, electronics, car manufacturing and general infrastructure work are the main sectors which have been entered by Chinese companies so far in NMS10, as illustrated by the contract for ZTE to build a new mobile network in Hungary (Bryant, 2010). Renewable energy projects are not yet present, but that could change. The next sub-chapter discusses whether the NMS10 would have to gain in the renewable generation sector by pursuing such a strategy.

IV.3. Treat or trick – does it make sense for NMS10 to rely on China?

Scouting for sources of capital to prop up their economies, the NMS10 could look to China more than expected before the financial downturn, when EU15 financing was reigning supreme. One of the largest infrastructure investments needed in the NMS10 in the next decade is the improvement of energy systems, including new capacity in both fossil and renewable generation, grid expansion and management, better distribution networks, since the EU has set up clear binding targets for each state, prioritising the sector against all other infrastructure investments. Looking at the scale up of renewable electricity generation capacity in the NMS10, this sub-chapter analyses whether China could be an attractive partner according to 5 main criteria: available investment capital, cost of technology, reliability of technology, implications for governance and auxiliary support with grid access, expansion and management.

IV.3.1. How thick is your wallet? –where to look for finance

NMS10 need to attract foreign investments or to get loans and grants to deploy the renewable generation capacity stipulated by the renewable energy directive. FDI is likely to be brought by investment funds seeing opportunity in the sector since the energy directive has been put in place or by utilities that are or probably will be bound to supply electricity with a minimum renewable content by 2020. While utilities present on the national markets already see an incentive in expanding the

generation portfolio with RET, investment funds are likely to go to those states in which support schemes are most generous and promise best returns on investment. Since statistical transfers are possible between countries, even utilities can choose to focus on deployment in their most attractive markets.

Two issues arise at this point. First, statistical transfers of renewable electricity are reliable and affordable only in so far as the EU target is met or even oversupplied and some countries will have a surplus to sell at reasonable price. This is uncertain and the national deployment of RET should be first priority for the NMS10. This implies that competitive support schemes are needed in each state in addition to a good investment climate. Second, mechanisms such as joint projects deploy RET in recipient countries –such as the NMS10– but account for at least part of targets in generation and emissions in the investing state. It is debatable whether NMS10 would stand to gain from such partnerships, since they use up renewable potential but do not exclude the need for statistical transfers and risk causing a lock-in into a dependence situation. It is not the purpose of this paper to go into details on this matter, but the position taken is that deployment of RET which leads to generation counted domestically are preferable on the long run. This does not discredit CDM and similar mechanisms in general, but when yearly binding targets are enforced it is best to meet them individually on the long run.

Analysing support schemes in the NMS10, a comparison with Germany –the most successful and attractive market for RET so far thanks to size and own technology development, but also a competitor for future deployment– for April 2010 reveals that only 4 of the NMS10 have competitive solar feed-in tariffs and none supports off-shore wind power successfully. However, support for onshore wind power is within the German range and even slightly higher for 4 of the NMS10. (Europe's Energy Portal, 2010) This suggests that onshore wind should take off, while solar photovoltaic RET could be an attractive investment in some of the NMS10. It is also useful to remark that Poland and Romania, the largest NMS10 and potential RET absorbers, have no feed-in tariffs (REN21, 2010).

Apart from private investors –where distinguishing between EU15 and China is of little relevance– and utilities, finance could also come via loans and grants. Loans for emerging and transition economies are typically offered by development banks for specific projects. There is a wealth of institutions and funds investing in RET deployment (SEFI and BNEF, 2010, page 52), each offering own conditions. For

the NMS10, the case of European Investment Bank –henceforth EIB– is relevant, with financing of €4.6 billion in 2009 (see Appendix 22). The European Bank for Reconstruction and Development –henceforth EBRD– is investing less but still an important amount in its regions (EBRD, 2010). However, NMS10 compete with other European countries for these funds, so the amount they can attract is lower. An alternative to European loans could be provided by the China Development Bank –henceforth CDB–, which is stepping up support for the domestic renewable energy industry (Biggs, 2010) and is pledging assistance to renewable projects in the NMS10 already (Holslag, 2010). Alternatives are important since development banks from the western economies might have less spare capital if their welfare systems continue to suffocate public budgets.

Grants are almost exclusively channelled to the NMS10 via EU cohesion policy in the form of structural funds. During the program in place up to 2013, the EU does not prioritise renewable energy investment (Buchan, 2010), as funding is allocated mainly for small scale generation –specific for type II investments in the Midttun and Koefoed (2003) framework, but unlikely to contribute notably to the binding targets–. The cohesion policy from 2014 onwards is soon to be negotiated by the member states, and conflict has already surfaced (thenews.pl, 2010) as EU15 are envisaging redistributing the funds towards their costly welfare system. Such a move goes against Europe 2020 principles (European Commission, 2010a) and in case the social security net breaks (Smith and Dubois, 2010) there is little chance for redistribution of even basic social needs to the NMS10. Even if the structural funds do become available in higher amount for RET deployment, an overall cut in support would overburden the NMS10 budgets and endanger viability of their support schemes in general. Overreliance on EU15 might in this case not be the best strategy for the NMS10. China could also provide grants to NMS10.

Finally, it is impossible to test the hypothesis that EU15 are redirecting FDI from the NMS10 towards China. Recent data do not falsify it either yet, though. Intra-EU27 FDI directed to the EU15 in 2009 was 56% lower compared to 2008, which itself was already lower than 2007 flows. The average slowdown in FDI was 73% for the NMS10, of whom 4 actually saw disinvestment. This data represents FDI flows from any EU27 state so it does not account for intra-NMS10 FDI flows. At the same time, outward FDI from EU27 to China in 2009 was still lower than in 2007, but 13% higher than in 2008 (see Appendix 21). It is important to note the

low level of EU27 outward FDI to China, and that half of the amount comes from Germany (Eurostat, 2010d). Data confirm trends already identified for 1990-2004 by Resmini and Siedschlag (2008), who found that OECD FDI flows to EU15 and China had been complementary, but the reorientation towards China was lowering funds allocated to the candidate countries in Eastern Europe. The Baltic states and Bulgaria, due to their size and limited opportunities for scale economies, suffered most loss in financial support and were most exposed to capital flight in case of downturns. The trend can also be observed in recent data.

The hypothesis that decreasing EU15 capital flows to NMS10 are replaced by FDI from China is not supported. The decrease in FDI from China to the NMS10 was even more pronounced than that of the EU15, with divestment in 2009. Moreover, four of the NMS10 –Bulgaria, Latvia, Slovenia and Lithuania– have not seen FDI inflows from China in 2007-2009 almost at all. On the contrary, EU15 attracted significantly more FDI from China than NMS10 (see Appendix 23). This serves as confirmation that NMS10 fall under the radar of Chinese FDI and that an active approach to attracting Chinese capital would be needed. It also hints to the idea of bilateral partnerships, since capital commitments from the state in China would be less susceptible of divestments in case of financial crises.

All in all, China could be an important source of FDI for the NMS10 if a strategy to attract investment is pursued. However, capital would be tied to issues of cost, technology, governance and management capability. These aspects are analysed for the renewable generation sector in the following sub-chapters before reaching a conclusion on the viability of stronger bilateral partnerships with China.

IV.3.2. Bargain hunting –how to minimise costs

Financing the expansion of renewable generation capacity with EU15 or Chinese capital –provided this is desired, as argued earlier– is ultimately a matter of cost-benefit analysis. Key aspects to investigate are the worth of technology, impacts on democracy and governance and the cost of capacity operation and management of the grid. Before discussing these aspects, it is necessary to establish whether a Chinese partnership is likely to cost less upfront –the cost of capital and of RET.

Cost of capital is almost irrelevant for grants, but it is important for loans, whose repayment is ultimately trickling to electricity users regardless of whether they are assumed by the state or privately. This is important, as energy prices have already

increased considerably more than incomes in the NMS10 and fuel poverty can be a serious risk as the electricity markets are opening up in preparation for the single EU27 energy market (Buchan, 2010). The severe economic downturn in NMS10 as the financial crisis unfolded has determined the governments to apply for loans from the International Monetary Fund in order to finance widening public deficits and restore financial market credibility. As EU15 investments channelled mostly to real estate, constructions and banking during the boom preceding the crisis, the growth had been unbalanced –with consumption imports outpacing manufactured exports–. (Bakker and Gulde, 2010) Investment in production capacity is therefore needed as soon as possible and the experience of past years has made the NMS10 governments wary of speculative flows of capital from the EU15. China could be an interesting alternative to EU15 if it is willing to build new plant and revive the manufacturing sector –as long as this can be done at competitive energy efficiency and good quality compared to what the NMS10 already have–. The topic will be addressed in the following sub-chapter, when discussing the worth of Chinese RET and brought up again for case study discussion in part V.

The conditionality of current loans on fiscal restraint and rechanneling of financial flows to tradable sectors is now rebuilding the financial position of the NMS10 so they can borrow at more affordable cost to support social cohesion and invest in infrastructure. However, the debt situation of Greece has given a further blow to investor confidence in the region and EU15 FDI inflows have diminished, so the process might be lengthy. (Bakker and Gulde, 2010) The cost of capital problem faced by the NMS10 governments weighs over their ability to support penetration of RES in the energy mix, and the issue has been of concern also for EU15 states like Portugal, Spain and Greece (SEFI and BNEF, 2010). The less a government can secure affordable financing on the long run, the more important it is to find alternatives to attract investors through other means. The case is even stronger if energy prices increase significantly (Smith and Dubois, 2010).

Different contexts apply for each of the NMS10, so generalisations in this respect cannot be made. Not all NMS10 needed bailout from the International Monetary Fund, while Slovakia and Slovenia have already adopted the euro and are able to finance their infrastructure development at lower cost than other NMS10 states. Some states have their currency pegged to the euro and some let their currencies float, with different impacts on cost of public capital and subsequent leverage for

renewable support schemes. This paper does not go in depth into such aspects and would not distinguish between particular NMS10, merely mentioning that NMS10 have different positions which will lead to different judgements on the viability of a partnership with China. Further comments will follow in part IV.4.

Development funds would probably be the first financing option for the NMS10 – beyond private investments by utilities and NMS nationals–, since these provide better repayment conditions and they are specifically linked to investments in new infrastructure. Funds which could be relevant for RET deployment were presented in part IV.3.2. The cost of capital from various development funds is not subject of this paper, but it is worth mentioning that the assessment should also take into account their associated conditionality –contract given to preferred consultants for advice, recommended technology and maybe even indication of which companies to implement the solutions with. If NMS10 would like to avoid getting stranded with German or Danish RET, relying exclusively on EIB and EBRD public funds is probably not advised. Conversely, relying exclusively on CDB would favour Chinese solutions and bear all the associated implications.

Distinguishing between private and public financing is important at this stage. As utilities which are already present in the NMS10 electricity markets seek capital for their renewable generation capacity investments, they can do so in countries where they are headquartered –usually the EU15 in the euro area–, where interest rates on credit are lower. This money can be then distributed to subsidiaries in the NMS10, circumventing the high cost of capital problem. The same goes for other investors and investment funds from EU15, and their capital costs should be lower than those of Chinese investors as well. A statistical investigation of these aspects should be carried out to test the hypothesis, but that is beyond the research scope.

However, it is useful to note that Chinese private capital would probably cost the NMS10 more than EU15 alternatives, since China is still an emerging market and capital costs are in general low in the EU15 after the recession. It is also relevant to bring up the issue of loan currency, since for the 8 NMS10 outside the euro area fluctuations in exchange rate can turn favourable conditions into bad decisions in retrospect. Moreover, yuan-denominated loans from China can prove particularly costly in case the state government decides to let the Chinese currency float free against the American dollar, due to sustained pressure from the USA and EU or simply for economic considerations.

Regarding the cost of technology, the first genuinely Chinese wind turbine was on average 20% cheaper than western substitutes (Liao et al, 2010). Thanks to scale economies on the large domestic market, comparatively cheap labour and the high potential for secondary innovation, China is in position to bring costs down even further as compared to improvements in the EU15. This is valid for both wind and solar RET, and China could contribute in this way to making otherwise expensive solutions commercially sustainable without subsidies earlier. The cost innovations in solar photovoltaic cells have propelled five Chinese companies among the top 10 world manufacturers (REN21, 2010).

IV.3.3. Checking the gift horse's teeth –can China provide competitive RET?

As presented in sub-chapter IV.3.2, private Chinese investments would probably come at higher or similar capital costs as EU15 financing, so an attractive Chinese deal would most likely come via CDB. A conditionality attached to this financing in the development of renewable energy capacity would be to use Chinese RET, as the state is encouraging domestic manufacturers and trying to create economies of scale beyond the Chinese market. Since the technology is cheaper than EU15 alternatives, there is no apparent reason to turn down such offer, especially in time of austerity. However, the appropriateness of Chinese RET for the NMS10 should be carefully evaluated before accepting a bargain that could turn out unprofitable. Since NMS10 have no experience with solar photovoltaic and wind RET (Reiche, 2010), they are unlikely to be capable of secondary innovation and could merely imitate existing technology domestically. China can provide solutions better than the NMS10 are able to create locally, but less competitively than EU15 solutions, as indicated by its world ranking in innovative capacity (GII, 2010).

In fact, as China only develops its capability based on wind turbine technology that is 5 to 8 years old in the west (Euractiv, 2010) in a sector which advances at fast pace, it could be argued that Chinese technology is nearly obsolete. Capacities for one world class turbine oscillate between 1 and 5 MW nowadays and units are customised for various terrain conditions and wind speeds, requiring around 900 components each. Sophistication increases manufacturing costs, but it maximises harvesting of the renewable resource. China's auxiliary component industry is still in early stages of development, and designs are simpler and less customised. Most recent turbine models typically have a capacity of 1.5–2MW, and genuine Chinese designs are built with the domestic market in mind, where weather and terrain are

not necessarily compatible with the situation in Eastern Europe or at least less so compared to models manufactured in the EU15. (Li, 2010) For NMS10 the risk is that land is used for lower than largest available capacities and less than optimal reaping of the RES, which should weigh on the feasibility analysis. Offshore wind turbines for those NMS10 not landlocked are not yet manufactured competitively in China (Li, 2010), even though the situation is likely to change rapidly, so China cannot yet be seen as an affordable alternative to what is currently prohibitively expensive technology for NMS10 (see updated feed in tariffs on Europe's Energy Portal, 2010).

The quality of Chinese RET has been discussed in part III.4.3 for the case of wind turbines and auxiliary components and has been judged of being relatively poor in terms of reliability. Durability is difficult to estimate, since there is not sufficient history of operation and longitudinal observation for sound analysis. Nonetheless, existing studies point to the frequent need for maintenance and long idle times of Chinese turbines, which end up with load capacities 5 percentage points below the western substitutes –although in part this is explained by improper match with site conditions. (Li, 2010) Chinese solutions for wind RET risk using as much finance and more land and wind RES than EU15 alternatives and, while China can boast impressive installed capacities and get away with it, what NMS10 need is actual electricity fed into the grid to meet binding targets. A decision to approach China for a partnership in renewable generation capacity should take this into account.

Although photovoltaic technology has not been the focus of analysis, it is worth noting that China's cost leadership has lifted domestic manufacturing of cells and panels even more impressively than the case of wind technology (REN21, 2010), albeit with strong subsidising from CDB. The Chinese solutions are appreciated in the USA, apart from rapid developments in the large domestic market. The cost of solar electricity might in this case become competitive with grid parity by 2012 in Spain and 2015 in Germany if improvements continue apace. (Biggs, 2010) There are, undoubtedly, issues with quality in solar RET, just as the wind designs are not necessarily optimal. But developments are remarkable and China is becoming an important provider of increasingly more competitive RET on the global market at least in terms of 'value for money'.

This means that despite potential problems, China could eventually turn out to be a worthwhile partner for NMS10 in expanding renewable electricity generation at

affordable costs. A careful selection of partners from those supported by CDB is important, but at the same time it is probable that RET exported to the EU markets will be the best China has and competitive with EU15 alternatives if what the state tries to achieve is gaining market share in the most competitive RET market so far and reciprocation of EU15 FDI into China in the renewable sector. Moreover, it should not be taken for granted that any RET from EU15 is of good quality and the ‘value for money’ principle should be applied as rigorously to all suppliers.

IV.3.4. Mending brigade –how to manage renewable capacities and the grid

While attractive financing for affordable and competitive infrastructure solutions a Chinese partnership could bring the NMS10 in renewable generation capacity can definitely be tempting, it is important not to neglect issues related to project and grid development and management. They complete the supply chain from R&D to installation and operation, while making sure intermittently renewably generated electricity is always given priority to the grid, so as to maximise renewable shares in actual energy use. While grid-related aspects are outside scope of responsibility for renewable capacity developers, projects that are not ensured permanent –even priority– access to the electricity grid are not feasible. NMS10 need to apply the provisions of directive 2009/28/EC and develop transmission, storage, distribution infrastructures so as to accommodate all approved projects. Ideally, approval rates would not be lowered by the capacity to accept all generated electricity at time of peak supply and possibly base load demand.

Renewable project development is not yet the ace which the Chinese companies can play well on international markets. The problems have been partly addressed in sub-chapter IV.3.3 for the case of wind farms, ranging from mismatch between site conditions and turbine design to maintenance, warranty and customer service (Li, 2010). The recent requirement for 70% domestic cost content is changing this situation for wind farm projects, as the major players are gaining experience with numerous ongoing turnkey deliveries. Site selection, turbine orientation, turbine adaptability and unit reliability and servicing are gaining importance for Chinese companies’ brand strategy –probably even more so on international markets– and the Chinese have so far proven rather swift in implementing the changes they have become convinced are needed. Partnership with foreign developers on the Chinese market would allow them to learn about these aspects as well. NMS10 authorities are also learning to address potential problems at the stage of project approval, by

analysing applications from experienced EU15 companies and comparing them to early results of completed and operational projects. It should be possible to avoid wasteful solutions, and that goes for projects from EU15 developers as well.

Investment strategies adopted by Chinese project developers that might cooperate with the NMS10 would generally fit type IV strategies as long as they take place within national bilateral agreements, with a perspective of type I expansion when the single energy market is well in place or the bridgehead role of NMS10 would have served its purpose and Chinese companies are ready to strike deals on EU15 ground. Ideal type III or better yet type II strategies are not compatible with state planners' aims to reach scale economies and penetrate EU markets. However, as argued, NMS10 energy systems are not mature enough for such strategies anyway and type I strategies are already pursued by EU15 firms. Collaboration with both China and EU15 would not change the type of investment strategies in renewable capacity deployment in the near future, and meeting binding targets does not lend itself to segmented differentiation either, at least until the market becomes mature –that is seldom the case for EU15 in terms of renewable generation as well.

Grid access, expansion and management are already slowing down speeds of RET deployment in NMS10, as seen in approval rates for wind from Estonia, Hungary and the Czech Republic (European Commission, 2009b). While permit rejections criticised by the Commission can be partly explained by poor project applications or limits on available funds for financing feed-in tariffs, bureaucratic procedures and grid capacity have been identified as major concerns as well. The former are discussed in the following sub-chapter, but the issue of grid development should be tackled first. China has been a top performer in expanding renewable capacity in recent years, but the actual accrual of generated electricity has not kept pace. In solving grid related problems, China would need to seek EU15 partnership as it is negotiating the relaxed bilateral trade agreement and it is not in a position to offer such assistance to the NMS10 (Müller et al, 2010). In fact NMS10 should smarten up electricity grids with EU15 support and make it possible to feed in renewably generated power produced thanks to Chinese capital, technology or both.

IV.3.5. Bridal bribing –how to make sure governance improves

A pure business approach to the option of a partnership with the Chinese would more often than not stop here. If all the previous conditions –affordable capital, good 'value for money' products that suit the needs and quality of the associated

services– were met, the deal would most likely gain the acceptance in boardroom. The unbearable burden of welfare states that is gradually taken over by companies via CSR is determining some multinationals consider also wider implications to society and the environment. Issues of corporate and state governance are shaping the way society develops and are important for democracy, human rights, welfare. A typical government approach would probably also end here when envisaging a bilateral partnership, but this paper discusses what could be termed government social responsibility –henceforth GSR–. Without going into governance theories, the basic principles of social security of environment protection are important in the makeup of current governments throughout the world, whether free market or social capitalist. GSR is more important than CSR so long the latter is not strong enough or regulated sufficiently so it can take the redistribution burden from the state. From this perspective, it is important that NMS10 governments find balance in possible advantages of economic deals with China and possible disadvantages on the governance front. This sub-chapter will build on theory described in parts II and III to discuss such implications for the renewable generation deal.

One preliminary observation is that good governance has been preponderant but not overarching in the relationship between EU15 and NMS10. Since building the EU require cooperation between many different actors, principles advanced in the community regulations are aspiring to fairness and trying to adjust the levelling of the playing field in areas where full blown competition would knock down areas in member state economies and have unpleasant implications for their –and on the common market for all member states’– societies. But aspiration has not entirely equated with achievement. EU15 governments are more powerful thanks to size and economic leverage, so they are imposing fairness based on own understanding of progress and motivations in the NMS10 –seasoned through voting power by the same understanding by ordinary citizens of the EU15–. The mechanism has so far fuelled impressive progress in governance and democracy in pre-accession stages, but it has created incongruence and misunderstandings thereafter (see part II.1.3).

Governance, political stability and control of corruption have backslid after the conditionality of accession was over, but less than previously expected thanks to efforts of progress transparency –that creates competition between NMS10–which is outlined in reports issued by the European Commission. Mistrust has also led to backsliding due to uninspired targets or recommendations for the NMS10 from

the European Commission –such as the setting of renewable energy targets using the trough year 2000 as reference or the suggestion from EU15 that NMS10 ought to scrap Kyoto allowances (Buchan, 2010) – which undermine the motivation of NMS10 governments to comply –also for election considerations based on what their citizens make of the situation–. The ongoing debate on redistributing part of the cohesion financing to EU15 from 2014 on (thenews.pl, 2010) is account of the same problem.

Nonetheless, progress in democracy and governance in the NMS10 is visible and encouraging, and EU has played an important role in this. Transparency is crucial and increased trade links with the EU15 –exchanges of people, capital, goods and services– are building mutual trust that in turn improves governance in NMS10, at least to levels of governance achieved in the ‘model’ states of EU15. With this in mind, trading with China and decreasing dependence on EU15 bears the risk of damaging the process of integration, because China ranks less impressive in terms of governance and democracy (Newsweek, 2010). A few remarks on this topic are important to make.

First, corruption is less likely to occur in dealings between NMS10 and China as compared to bilateral partnerships between the behemoth and resource rich states with weak governments. The relationship between NMS10 and China should have as rationale to speed up convergence at acceptable cost for the former and to step boldly and fairly into the EU market for the latter. Issues of corruption between an NMS10 state and the Chinese that hamper fair competition on the common market would be resented by the EU27 in general and transparency frameworks should continue to disprove and disclose unfair acts. China’s ‘soft power’ is built also on non-intervention in national policies, so worries that collaboration with China in the NMS10 could lead to further backsliding might be exaggerated.

Second, bureaucracy in the NMS10 needs to become more efficient not only at the request of EU, but also because China is unlikely to be patient with long-winded procedures. The state government is used to implement decisions swiftly and has preferred trade partners where this is also possible –either efficient yet demanding democratic bureaucracies or other autocratic governments–. The decentralisation approach to governance taken by state planners (see part II.2.1) has so far proven its worth and EU15 are also emphasising the need for re-localisation of decision-making through regional policies. A partnership with China might teach NMS10 a

useful governance lesson and actually speed up efforts at enhancing bureaucracy. Such an outcome might also be less expected in EU15.

Finally, as NMS10 governments loose capacity of social redistribution as transfer to the market proceeds, CSR needs to become more important in NMS10. Actors from EU15 are playing an important role in this respect, but the civil society does not yet stand up to the challenge. It would probably be idealistic to consider that Chinese companies see value in CSR, since their governance is controlled by the state almost in entirety. But just as much unfairness from domestic NMS10 firms and unethical deeds of the EU15 are triggering responses from the civil societies, Chinese players which are not performing at acceptable standard would become targets for the increasing public discontent. If Chinese companies get to perform on NMS10 markets in ways they are used to in developing and emerging markets, the civil society in NMS10 would probably react, with positive spillover effects for both sides –stronger NMS10 civil societies and more responsible behaviour of internationalising Chinese companies. Again, this is less straightforward, but it could have important implications.

These hypotheses can well be proven wrong by future developments and there are for sure areas of research which could bring a better insight into the matter. But in order to test them, there is probably no better place than the NMS10, which have seen the communist philosophy lead to downright dismay and are now grabbing hold of a model which is in need of change or likely to fail as well.

IV.4. Yin and yang –the choice between EU15 and China is... both?

Not surprisingly, the answer to the east-west dilemma is not straightforward. The NMS10 would need to assess the advantages and disadvantages of a partnership with China in the deployment of renewable generation capacity before making a final decision. Each of the aspects discussed –access to finance, appropriateness of technology and associated costs; issues related to project or grid development and the implications for governance– pose potential problems. The best solutions for each of the NMS10 are different depending on RES potential, gap to meeting the targets, availability of affordable financing, own evaluation of desired technology. The decisions would probably be influenced by previous collaboration with China as well, regardless of what best solutions would seem to be.

In general, financing by development funds should be a good solution for NMS10, but associated conditionality requires careful assessment besides repayment terms. A flexible deal with CDB where the NMS10 have room to find optimal solutions in terms of technology, project development and grid connection could be better than a similar deal with European development banks. As argued, the meeting of EU15 and Chinese governance systems could spark interesting outcomes –if held in check by the EU– for Chinese multinationals, NMS10 governance and build up of civil society, and potentially for the EU15 learning by monitoring outcomes.

Briefly reviewing outlook for each NMS10 country, prospects for collaboration in the initial stages could be better only for some. Slovenia, Slovakia and Estonia are or will very soon be part of the euro area, with Slovenia having received little FDI from China in 2007-2009 (see Appendix 23). Lithuania and Latvia have not had any FDI from China in 2007-2009, and in general the electricity markets of Baltic States are soon to be integrated to the common Nordic market. A partnership with China might have fewer chances to start in these countries also because of size – the limited number of needed renewable generation projects could weigh on China being interested in engaging these states–. Bulgaria has received little FDI as well in recent years, but it is less integrated in the EU and has good potential for solar – in 2009 the installation for solar photovoltaic has started to increase promisingly (British Petroleum, 2010) – and also for wind (Ragwitz et al, 2010).

The remaining four states in the NMS10 are larger and have had FDI inflows from China in 2007-2009 (see Appendix 23). The Czech Republic has seen a surge in 2009 in installed solar capacity–as a result of expensive support schemes (Buchan, 2010) – so it could appreciate cheaper photovoltaic technology from China which allows the diminution of costly incentives. Hungary is on track with meeting 2010 targets and might weigh less potential advantages of RET from China (European Commission, 2009b). Poland is the largest NMS10 market, receiving FDI from China and in need of expanding RET deployment in order to decrease dependence on coal. Romania is the second largest NMS10 state, a laggard EU member like Bulgaria, and its commercial relations with China are developed (Korniyenko and Sakatasume, 2009). There is good potential for all RES in Romania, but sufficient domestic fossil fuels make the switch complicated, as for Poland (Ragwitz et al, 2010). Neither Romania nor Poland have feed-in tariffs, so the partnership with

China is more likely to bring support mechanism costs down easier and so it could be seen as a more attractive option in these countries.

Plenty of other potential arguments could be certainly brought to the fore, but that is not the purpose of this research. The main rationale has been to see if, how and why China could play a role in ‘greening’ the electricity systems of the NMS10, as well as implications for the EU15, which have assumed this task so far but are not certainly well positioned to continue to do so in the short –cost of technology as long China has a cost edge–, medium –access to affordable finance if a choice needs to be made between NMS10 and emerging markets– or long run –support for convergence in case of welfare state demise–.

The following chapter is a case study of the wind power sector in Romania, where early signs of a shift in strategy might have important consequences. The paper is then drawing final conclusions and outlining a number of limitations and possible areas of future research.

V. Case study: Romanian developments in the wind power sector

With capital inflows from the EU15 weakening or not directed towards productive sectors, some of the NMS10 have started to attract investors from China to boost exports, fix current account deficits, lower unemployment and rebound from deep recession to speed up the process of convergence with the EU15. Sectors such as electronics, machinery and infrastructure are slowly becoming attractive for China and trade is likely to increase in the near future. A major infrastructure investment to be undertaken by NMS10 is the energy sector, with particular focus on binding targets for renewable energy in 2020. The opportunities and threats of partnering with China in this sector before getting stranded with EU15 technology were put forth in chapter IV, but it is important to discuss actual developments in potential markets of choice for initial steps. This chapter will explain why the wind energy sector and Romania were preferred for illustrating the case, then discuss what has happened so far and what the future prospects could be.

V.1. Chasing air –why focus on the wind energy sector

Returning to renewable sources in energy use after a two-century venture in fossil fuels seems to have finally become serious business, at least regarding electricity if not yet in heating and transportation. In 2009, renewable electricity generation capacity was scaled up globally by about 83GW, the same as new capacity added for fossil alternatives (SEFI and BNEF, 2010). Hydropower –and especially units larger than 10MW– still accounted for 80% of total renewable generation capacity of 1230 GW existing in 2009, but new wind generation capacity was for the first time higher than new hydro. While solar photovoltaic capacity is growing also in importance, its higher cost makes take-up slower than wind –which is now driving a renewable bonanza. (REN21, 2010, page 13)

EU27 is the leading member in renewable generation in the new economic triad – EU, USA and China–, as it operates nearly half of global wind capacity installed by 2009 and the edge is even larger in solar photovoltaic –three quarters of total globally installed capacity in operation in 2009–. Development and manufacturing of wind and photovoltaic RET have thus boomed thanks to EU15 markets, which are the world's most competitive and concentrate almost all the EU capacities so far (see Appendix 1). Wind energy is, however, taken up faster now by the USA and China, which are closing the gap. The largest market for wind turbines was in

2009 China, even though the behemoth does not yet make it in the top 5 countries when counting new added solar photovoltaic capacity. Therefore, China could be more experienced in wind RET than solar –even though it has more companies in top 10 world manufacturers for solar than for wind– so it might prefer wind RET for now for penetrating the NMS10 markets. (REN21, 2010, pages 54-55)

Wind is also the technology which is generic enough to be afforded on wider scale by NMS10, as onshore generation support schemes are close to parity with prices for electricity (Europe's Energy Portal, 2010), even though wind projects are only now starting to shape as a reaction to EU determination (see Appendix 24). Wind capacity should therefore expand considerably in NMS10 in the following years, so it could represent a potential market for Chinese players who seek to test their forces against EU15 leading RET manufacturers. For all these reasons, the case study will focus on wind and not on solar RET.

V.2. Harvesting RES in the Carpathian garden –why start in Romania

The expected expansion of wind generation capacity in the NMS10 could be most exhilarating in Romania, and there are several reasons to select the country as case study: the gap between wind potential and installed capacity, the market size and recent wind projects, the relationship with China and the EU.

Wind has a theoretical potential for electricity generation of 23TWh in Romania (Alexandru et al, 2008), but only 11GWh were generated by 14MW of installed capacity in 2009 (Sandulescu, 2010). As shown in Appendix 24, Romania is one of the laggards in NMS10 regarding wind turbine capacity. However, the situation is about to change, since two large projects have received in 2010 all permits for construction and grid connection. Announced as the largest onshore wind farm in Europe so far (Savu, 2010) and respectively the largest wind project that has been built on land in the world (White and van Loon, 2010), there is reason to believe that recent developments in the wind energy sector in Romania can raise interest among eagle-eyed investors from China. Grid capacity is also not so restrictive in Romania compared to other NMS10 (Simonot, 2010), and generation can be more easily adapted for balancing intermittence from wind and other RES thanks to the flexible mix, so rapid scale-up could be possible if the investment climate is right.

That is the problem, though. Despite having just passed legislation which creates a framework for supporting generation from RES, Romania is not stable politically,

it has ineffective and corrupt bureaucrats who are not even able to absorb grants given by the EU under the cohesion program, and has not decided yet on the fate of the energy generation and distribution capacities which are not privatised. The projects for electricity generation with both fossil and renewable energy sources have often been postponed or cancelled, waiting for a trailing clearer framework for future development. Forecasted numbers in national submissions to the EU are therefore not necessarily grounded in reality, with the civil society trying to make its voice heard against brash plans outlined by ephemeral authorities. These issues will be addressed in the actual case study, which is presented in section V.3.

As Romania has long been China's main trade partner and investment destination in the NMS10 (Korniyenko and Sakatsume, 2009), and is among the largest states in the region –second to Poland in surface and population, third after Poland and the Czech Republic in GDP (International Monetary Fund, 2010)–, cooperation in the renewable sector might be easier to kick-start there than in other NMS10 and it is worth analysing further in the following sub-chapter.

V.3. Sowing Chinese wind in Romania –will the harvest be storm?

Contrasting is probably the best word to describe Romania, a medium-sized state which for millennia has resisted at the intersection of most empires in the region, seeing them rise and fall. Recently escaped from the communist embrace, having just jumped in 2007 on the EU boat to 'smart, sustainable and inclusive growth' (European Commission, 2010a), Romania is at the same time archaic and modern, poor and rich, socialist and capitalist. With a GDP per capita 20% of the average for EU15, the country is the second poorest among EU27 –slightly ahead of only Bulgaria– and thus accounts for 14% of NMS10 primary energy demand despite having 21% of their population. While the energy intensity of the economy is the same as the NMS10 average –0.30 toe/1000 €–, the carbon intensity of energy use is lower than both EU15 and NMS10 averages –2.4 tCO₂/toe– (see Appendix 25) thanks to using the considerable hydropower technical potential in proportion of 40% (Alexandru et al, 2008). In 2008, Romania covered 20.4% of its final energy use from RES; against a target of 24% in 2020, the gap being the lowest in EU27 (see Appendix 9). If strong economic growth would not be expected, focusing on narrowing the large gap in energy efficiency could by itself meet the target. Since there is good potential for virtually untapped RES –wind, solar, geothermal and small hydro–, Romania should be able to meet the targets even if the economy

grows at sustained pace. This section will briefly introduce the country's energy sector and review recent developments in renewable to explain why China could be an interesting partner for scaling up wind generation.

V.3.1. Will the tap go dry? –security and affordability of supply in Romania

Romania has one of the lowest energy import dependence rates in EU and NMS10 (Europe's Energy Portal, 2010), thanks to almost sufficient rates of exploitation of own resources of coal, oil and natural gas, as well as the use of nuclear and hydro plants for generation of electricity (MO, 2007). However, the situation was not so favourable between 1975 and 1990. Similar to the other former communist states –and since it did not rely on Russian imports of energy even more so–, Romania had built an energy-thirsty and inefficient economy, scaling up extraction of all its fossil resources to fuel heavy industry and manufacturing. The first oil price spike of the early 1970s avoided the country, since the economy kept running without expensive energy imports. The situation changed radically after 1975 though, as the production of oil and gas peaked almost at the same time. Despite meeting the growing demand by increased extraction of coal in the 1980s (British Petroleum, 2010), imports were also needed and they deteriorated the balance of payments. Many infrastructure projects were interrupted, electricity supply was rationed and basic amenities such as heating, transport and even food were cut drastically for the population in order to gather enough export revenues to pay energy imports. Eventually, this has attracted the fall of the inflexible regime and brought death to Nicolae Ceaușescu, the country's leader. (Murgeanu, 2010)

The shock therapy applied in neo-liberal spirit at western advice in the fresh state throughout the 1990s has brought along the closing down of plant and sharp falls in energy demand. This has demoted the security of supply problem, since most of the halved needs could for a while be again covered by indigenous production. At the same time, large hydropower plants built during the communist rule continued to run at capacity, even though building new units has been neglected. (Buchan, 2010) The share of RES in the generation mix increased significantly as energy demand bottomed in 2000, but it has had problems keeping pace with the rebound ever since. Binding targets for 2020 are built based on the situation in 2005, trying to account for the situation, but Romania still needs to increase its share of RES in all sectors. As the depleting fossil resources are soon to be again resented in costly imports, expanding the use of RES would be timely to ensure the affordability and

security of supply. The building of new plant running on coal and gas, as well as expanding nuclear capacity are also envisaged, since existing thermo-generation units are inefficient and would soon be closed down. Romania needs significant investments in energy infrastructure in the following two decades (MO, 2007), so it is relevant to see whether China could be among the investors, particularly in the promising sector of wind electricity generation.

V.3.2. EU to the rescue –but is Romania ready to jump in western arms?

The wave of restructuring and privatisations of SOE has only gotten to the energy sector in Romania in 2005-2006, when EU15 utilities already present in the other NMS10 markets bought regional gas and electricity distribution companies from the government. CEZ, E.ON and Enel have taken over what has been privatised in electricity distribution, while E.ON and GDF Suez have stepped in to manage the gas networks, as both markets are in a process of gradual liberalisation since 2007 (LaBelle, 2009). Progress has been encouraging up to the advent of recession and the premise of increasingly competitive markets plus expectations of new capacity needs in the near future brought a wealth of plans for new units from all players, in several resources and throughout the country.

The situation has deteriorated considerably since then, though. Nearly 4GW of the 11GW originally announced have been cancelled or postponed indefinitely. From the remainder, OMV Petrom –the main privatised oil company of Romania– is the only investor completing a project soon –860 MW gas-fired plant–. Two nuclear units in the Cernavodă plant expected to double installed capacity by 2014 are at tender, while the status for any other project designed for non-renewable energy sources is unknown. (see Appendix 26) The situation is probably in part owing to trimmed recessionary budgets for private investors, but the government has also contributed generously to stalemate. Romania lacks a private-public partnership law that would enhance cooperation between the state owned Termoelectrica and potential investors, making negotiations for new projects cumbersome, susceptible to corruption and very opaque –one consequence being, for example the scrapped CEZ deal with Termoelectrica for a 400MW gas-fired plant–. (ICIS Heren, 2010)

Apart from the obscure dealings of corrupt officials, a planned overhaul of SOEs in the energy sector is also deterring investment. Videanu, minister of economy, is pushing ahead with plans to break down the current structure of energy companies controlled by the state –currently grouped around resource types: hydro, thermo

and nuclear— and reorganise them in two national champions. The move is meant to bring together unprofitable —such as most thermo— and better performing assets —mainly nuclear and hydro— to enhance investments, but it is unlikely that enough profits can be created to sustain the overarching changes that are needed. On the contrary, transparency would suffer another blow. Moreover, dominant positions of the two new companies —each would have 44-48% of total generation capacity— are now deterring private foreign investors to commit to their announced projects. The competition authority is now looking into the law supposed to create the two national champions. (Nutu, 2010)

In fact, the only plan for new fossil plant that has sprung since the announcement of this reorganisation is a €1 billion project by China National Electric Company to bring on stream a 500 MW lignite unit in the Rovinari thermal power plant, but no additional details have been given on timing or commissioning so far (ICIS Heren, 2010). This suggests that Chinese investors are willing to enter the market regardless of the unstable political environment, but it also highlights the opacity of collaboration into the matter so far. Reviewing the elements discussed in part IV; EU15 investors seem to lower capital commitments to Romania, China seems to be willing to provide capital and technology for coal thermo power generation, but implications for governance and possible backsliding in progress towards EU integration are uncertain.

Developments in the traditional fossil fuel sector are thus not promising, but they open up the perspective of collaboration with China in more conventional sectors than wind power generation. It is now time to review developments of this latter sector and present the role China could assume based on the current context and business environment.

V.3.3. Hot air by the Black Sea –wind power projects in Romania

The outlook for the renewable energy sector is not as bleak as for the coal and gas generation units, and wind power has so far energised the authorities and investors alike. Despite a minuscule 14 MW capacity installed at the start of 2010, this year has brought closer to reality five large projects adding over 2.3GW of generation capacity as they gradually come on stream up to 2017 (see Appendix 26). Myriad smaller farms are either in development or seeking permits for grid connection. In fact, the grid operator had registered last year requests for connection amounting to 22.8 GW, almost double the 13GW technical potential, while 11GW were still

waiting for approval in August 2010. Meanwhile, Transelectrica is able to allocate transmission capacity for 3.5 GW from wind turbines and has already signed over 100 contracts for this amount. As it is planning to expand capacity, more projects would be able to come on stream, but when and how much is feasible and will go ahead is uncertain. (Pârvoiu, 2010)

The first wind park in Romania planned to reach a capacity of 600MW when it is completed in 2011 –almost double the size of Scottish Whitelee development– is owned by the Czech incumbent CEZ, which is also operating regional distribution networks in Romania (Savu, 2010). The project is worth €1.1 billion and includes 240 turbines of 2.5MW capacity each, produced by General Electric (Incont.ro, 2010). For the research purpose, this park does not use EU15 technology and is owned by an investor from another NMS10 state, so it does not increase reliance on EU15. This investment weakens the case for orientation towards China.

An even larger investment is being prepared by Spanish utility Iberdrola, with 50 wind farms expected to become operational between 2011 and 2017, connecting to the grid 1.5 GW of installed capacity. Iberdrola's partners in the project are two Romanian and one Swiss engineering company, undermining again the idea of a lock-in with EU15 solutions for the wind sector. As the company claims to have a flexible approach to investment commitments, it is not certain that all announced capacity will materialise, but the early stage is promising. (White and van Loon, 2010) This project is also not necessarily increasing dependence on the EU15, so it also weakens the case for partnering with China.

Another interesting project is currently developed by Petrom, which apart from its gas plant planned for commissioning in 2011 has also purchased a 45MW project for wind generation in the same area close to the Black Sea. Vestas turbines would be used, and the project is part of a diversified portfolio the company is trying to acquire. According to Petrom, the gas and wind generation projects are capable of balancing one another and are complementary. (Stromsta, 2010)

On this background, CDB has pledged support for Chinese wind RET developers to invest in the same area in developing wind farms, even though details are slow to be released (Roberts, 2010). This news has come at around the same time as the interest in building the thermo power plant at Rovinari (see section V.3.2) and the strength of such commitments is uncertain, but potential implications are large.

V.3.4. No wind of change – improper legislation and support for wind energy

While developments seem promising, implementation is likely to be trailing due to the corruptibility of legislation. In a recent study, Bădilă et al (2010) present an exhaustive analysis of the legal environment relevant for Romania's wind energy sector. They explain that legislation is often adopted without stakeholder dialogue or proper open consultation, with overnight changes the interested parties find out about in the media. Methodologies for applying the law are then often trailing for long periods of time and are confuse or contradictory. Since the capacity allocated by Transelectrica for new grid connections is limited, heated competition over the available capacity has given authorities the opportunity for illicit gains for holding some projects longer for approval and favouring others, given the large number of permits that need to be obtained –85 in total, which translates into 2-3 year lead times from project to implementation. EU legislation is in place, but nuances are shaping the legal framework in incongruent ways with EU principles.

Trauner (2009) explains that Romania, despite being reasonably responsive in the implementation of community law, has been accepted as EU member while still having important unfinished reforms. Their completion will now likely take long, due to corruption, the dominance of the former communist political elites which have no interest in reform, and ineffective and inefficient bureaucracy. Attracting investors capable of developing wind projects as well as in solar, geothermal and small hydro capacity would require a sustained effort at reforming the system so as to eliminate the extraordinary uncertainty that looms over future decisions the government would make.

An example in this sense is the latest law for promoting RES in the energy mix. It has taken the government two years to improve the original law 220/2008, which had been suspended almost immediately after adoption due to inconsistencies with EU legislation. The new law has no guidelines for application and is incongruent with the national renewable action plan sent two weeks late to the EU on July 15, 2010 –and still not available in full for the public. The Romanian civil society has protested by addressing a letter to the European Commission, asking the repealing of the submitted national strategy and its reanalysis so as to be consistent with the legislation that has taken two years to create. (Carbon Credit Exchange, 2010)

The support scheme in place in Romania for RES is a combination of renewable obligations and green certificates issued for each MW of renewable electricity fed

into the grid. For example, solar will receive 6 certificates per MW, biomass and biogas 3 certificates, while wind would be entitled to 2 certificates per MW up to 2017 and 1 thereafter. Certificates have a price floor of €27/MWh and a ceiling at €55/MWh, effectively creating a feed-in tariff of 5.4-11 €/kWh up to 2017, which is compatible with German feed-in tariffs. The price will be established based on the demand for green certificates, given a renewable obligation quota set to rise from 8.3% in 2010 to 20% in 2020. (Sandulescu, 2010)

V.3.5. Is China going to storm waters in the Romanian wind energy sector?

While in the fossil generation sector it seems that investors have been put-off by government plans to create two national champions, corruption and the financial downturn, the wind generation sector is picking up impressively despite uncertain investment environments generated by faulty legislation, lengthy lead times and pervasive corruption which determines small investors to sell projects to the ones which have enough clout or political leverage to get things done.

The available grid capacity has already been allocated to great extent, so few new wind projects are likely to be approved in the near future, as the infrastructure will need upgrading first –the lack of experience in balancing intermittent generation is likely to require EU15 support in this area. The CDB promise to support Chinese wind RET developers build wind farms on the Black Sea coast is thus difficult to fulfil even if the Romanian authorities were extremely interested in such support. Given the opaque and complicated approval process, the Romanian government could give priority to a Chinese project ahead of other applications, especially if the SOEs can easily have a stake in it.

The difficulty of accessing finance for the fossil generation sector and the Chinese expression of interest in building a new lignite unit in Romania could mean that a partnership will be established in the energy sector, but in detriment to ‘greening the electricity system’ of this NMS10. On the renewable energy front, there could be collaboration with China in solar photovoltaic, given that the current installed capacity is insignificant and that Chinese technology is becoming affordable. This would however be even more difficult to analyse, given little has happened in the sector so far.

VI. Conclusions and limitations

This study has departed from the observation that EU15 welfare states are under considerable strain following the economic downturn and there is uncertainty on whether the social security net will remain in place in current form to prop up the convergence efforts of NMS10 countries. Meanwhile, China has asserted an ever powerful role in international markets and as it is waiting for the domestic market to thaw, it is seeking expansion to international markets not as exporter but also as direct investor. China has also developed capacity for secondary innovation and is envisaging more disruptive results in the years to come, though challenges remain considerable. In the particular front of renewable energy –which the EU15 see as great opportunity to rebuild competitiveness and strengthen innovation capacity– China is also becoming a reputable competitor in terms of ‘value for money’. As the country is stepping into value-oriented exports and out to new markets, it is important for NMS10 to investigate a partnership with China in parallel with the one already in place with the EU15. This need not be initiated over RET trade, but such an option is not to neglect given the weight put by the EU on meeting 2020 binding targets. Whether such an option is realistic was the main topic of research and analysis. Implications of a China – NMS10 partnership on the latter have been addressed in terms of governance, and ideas of why outcomes might be positive for the process of EU integration were put forth.

VI.1. Conclusions

An important result is that it does not seem China would come to NMS10 without invitation. The latter would have to engage with the government in Beijing and try to assess what kind of support would fit with their development plans. Financing from development banks –apart from direct financing by EU15 utilities which are already present on the market and interested in building capacity, including RET– could be the most affordable option to scale up renewable generation capacity for NMS10, but conditionality should be analysed carefully in order to make sure the solutions chosen are optimal. In any case, China is not well positioned to provide project development and grid expansion and management solutions, so EU15 is likely to continue facilitating these areas in the future regardless of who provides financing and RET. Different courses of action would suit better various NMS10 states and particular technologies, but a detailed discussion is not covered in this research. Reasons in support of the suggestion that a partnership might actually

enhance EU integration by softening incongruence between the EU15 and NMS10 interests are brought up, but hypotheses are not tested since there is no available data for a grounded analysis. It does not seem likely that NMS10 will necessarily play a role in enhancing common ground between China and EU27 –as foreign direct investment between the two large economies is very low–, unless pursued as a strategy.

Some interesting insights can also be drawn based on learning from international management research. Business systems, internationalisation process theory, the importance of relational drivers in exporter-intermediary relations and the theories on country-of-origin effects cast light on conclusions from the study and are hence discussed in the following paragraphs.

Business systems theory is most insightful for the research scope as it suggests an interconnection between the frameworks for business; institutions and culture (see Appendix 27). The theory proposes that business systems change fastest and in so doing they trigger adaptation in institutions and, ultimately, in culture. An account of the Chinese social capitalist business system is given, outlining implications for governance and culture. The article (Redding, 2002) reinforces ideas expressed in this research that the advent of Chinese businesses in financing and deploying the renewable generation capacity NMS10 need is likely to lead to new institutional arrangements, similar to how EU integration is currently doing. The clash of east and west business systems on the background of EU driven governance changes of a former communist institutional system is likely to spark interesting outcomes.

Establishment chain theory casts light on a Chinese rationale for penetrating the EU market via NMS10. Johanson and Wiedersheim-Paul (1975) suggest that the process of internationalisation is a series of stages of increasing commitment to foreign business operations. Regular export activities have been pursued by many manufacturing firms in China for decades now, and this is starting to happen also for RET players. The following stage would be the setting up of sales subsidiaries –or the beginning of financing project developments– in foreign markets, before committing to foreign direct investments (see Appendix 28). The choice of market and entry mode is addressed by Johanson and Vahlne (1977), internationalisation being perceived as a process of decreasing psychic distance to foreign markets. In this case, in what concerns the state government, early exports of new solutions to foreign markets could be seen as easier to markets with which they share affinities

in terms of history, culture, politics or duration of previous economic relations. It has been argued that NMS10 could be an interesting option for China in becoming more active on the EU market. The operations could in time be expanded in these countries to include manufacturing of RET by opening new factories to supply the EU27 in competition with EU15 providers (see Appendix 29).

The preference for NMS10 is not clear-cut though. Revisiting their original model recently, Johanson and Vahlne (2009) explain that rather than psychic distance it is the liability of network outsidership that could prove more important in foreign market choice. Business networks are increasingly important in learning processes and knowledge transfer, trust building and opportunity development. FDI from the EU15 –particularly from Germany and Denmark– has been instrumental for local Chinese RET manufacturers and the experience of collaboration and networking could enhance a direct expansion to the EU15 markets, without intermediary stage in NMS10. That is particularly the case for countries without previous cooperation with China. The tendency to establish base directly in main competitor markets in EU15 when Chinese companies become sufficiently competitive can be outdone rather by NMS10 which have had ties with China before and can relate to existent networks. Government relationships in this respect are more important, whereas in EU15 business networks would likely prevail.

A better understanding of how embedded Chinese RET companies are in network relationships with the EU15 and the type of existing relations with the NMS10 is possible thanks to a framework suggested by Solberg (2008). When there is a high cultural distance between business partners –which is the case for both EU15 and NSM10 in relation to China–, the type of relations that should develop in order to enhance performance depend on product complexity. As long as China focused on manufacturing basic EU15 designs, cultural relations were customary. The degree of sophistication when collaborating in high value-added manufacturing like RET requires more trustful, flexible relations. Building such relations enhances strong network development, which could lower the barriers perceived by Chinese RET manufacturers to move to the EU15. Relations between NMS10 and China have lower complexity than required by genuine innovation and knowledge transfers as in the case of RET, so relations are rather cultural. Cooperation on implementing complex solutions would lead to developing stronger ties, with positive impact on balancing the currently higher FDI flows to EU15 (see Appendix 30).

Finally, country-of-origin theory in international consumer behaviour brings up an important aspect related to the willingness of NMS10 to engage in stronger trade with China, including for the build up of renewable generation capacity. Verlegh and Steenkamp (1999) reviewed existing research on the topic and concluded that industrial goods –such as RET– are as susceptible to country-of-origin effects as consumer goods. Moreover, the importance of country-of-origin is stronger when the transaction is between more developed economies and less developed ones. In this case, NMS10 which perceive their level ‘too developed’ to go for RET from China and aspire to being members of the current EU15 club could find the option discussed in this paper less attractive (see Appendix 31).

All these theories indicate that Poland, Romania, Bulgaria, Hungary and possibly the Czech Republic would be more inclined to consider a partnership with China than the other 5 NMS10. The case study of Romania has revealed an illustration of how these aspects play out, but further analysis would need more unfolding of events. In fact, the case for dual orientation would have probably been stronger if sectors where China has built a strong competitive advantage –manufacturing, for example– had been considered. However, EU places its bets on renewable energy and environment technology, where China is still tutored by the EU15 and USA, but seems to be learning rapidly and to be asserting a powerful position globally. An assessment grounded as much as possible in theory of the potential of NMS10 becoming an important bridgehead between EU15 and China in this sector seemed like an important research topic that has not been addressed from an international management viewpoint.

Finally, the analysis of the wind instead of solar sector does not suggest that wind is necessarily more suitable for a RET partnership with China. On the contrary, it might be that wind potential is already mature and affordable enough to trigger a preference for world class technology from EU15. Solar photovoltaic could in this case lay ground for renewable capacity collaboration between those NMS10 with solar RES potential and China’s manufacturers. Moreover, renewable electricity is chosen for manageability purposes, but other low carbon solutions such as better and affordable technology for thermoelectric coal generation might be envisaged as well –an illustration being current negotiations between Romania and China in this field–. Ultimately, other manufacturing facilities might represent the first step in establishing more complex collaboration, before RET is competitive enough.

VI.2. Limitations

An important limitation to this study is its exploratory nature, since only past and part of future potential developments can be grounded in theory. In the particular field of renewable generation capacity, internationalisation of Chinese companies is in its earliest stages –recently begun export orders. Moreover, placing the focus on NMS10 governments which need to meet mandatory targets and their take on the issue has made the use of international management theory marginal –hinting to intergovernmental relations that could work out similarly to the corporate world but with only arguable arguments in this direction–. Instead of testing hypotheses related to the five areas where collaboration would be needed, a non-opinionated discussion departing from the most recent research results available has been the chosen approach. The results are interesting, but their validity would be tested as future events unfold.

A more detailed research based on one particular technology in one of the NMS10 –such as it was attempted in the case study–, of both solar and wind RET in one of the NMS10 or of one of the two RET in several or all NMS10 could have revealed more detailed results on the topic of interest –even though it is probably too early to find the data for a clear-cut assessment anyway–. The discussion on cost of and access to finance has been only partly grounded in theory and in-depth work could reveal more appropriately whether Chinese capital is actually attractive to NMS10 in this sector. This could include detailed comparisons of loans from development banks which NMS10 could access for renewable generation capacity deployment and their historic conditionality. On the technology front, the analysis would have been more insightful if, for example, the top 10 technology players in both wind and solar RET would have been submitted to competitive comparison in terms of specifications, quality and cost of offered technology. Finally, the implications on governance could be explained more thoroughly if similar experiences in other regions would have been found and results analysed. All these issues and certainly others remain for future studies to address.

The decision to focus the discussion on the 3 main actors is also limiting validity, since it is not accounting for other external factors with influential roles. Thus, the western world –the north– is represented in this study by EU15, while the eastern emerging markets –part of the south– are embodied by China. The important role of USA, the rising of other emerging economies as alternatives to and competitors

of China –for example India and Brazil– and the situation of Russia –which could be a larger substitute to NMS10– means that the wider topic of bridging the divide in communication and exchanges between the main groups of shifting geopolitical influence could have been approached by using other examples. Their roles on the discussed context could have brought interesting aspects into perspective, but the situation would have become too complex. Rather the subjects and the objects of study could have been different altogether.

Finally, one very important possible limitation is the uncertainty of provisions that arise in the new and more comprehensive bilateral trade agreement which is being negotiated between EU and China. As long as China needs to enhance its capacity for innovation in RET and improve the competitiveness of its companies thanks to collaboration with EU players, the agreement might maintain trade barriers for all Chinese RET so as to prevent it from entering the EU markets. Such a provision is likely to undercut any advantage discussed throughout this paper and render the analysis pointless. However, its rationale would remain applicable to collaboration in other non-key EU sectors which could be important for NMS10 –for example equipment manufacturing by Chinese companies for the EU market–. That means the paper should have opened interesting new avenues for research, despite plenty limitations. The potential outcomes for EU integration and the creation of a single market would be one such avenue. At a minimum, this research paper should have been convincing enough for NMS10 to open up the possibility of diplomatic shifts to China and other markets when negotiating with the EU15 the continuation of convergence commitments for the decade to come and beyond.

VII. Notes on methodology

Trying to bring an eclectic insight into the researched topic, papers from the areas of international management, political economy, organisation theory, innovation, governance and energy policy –with focus on renewable policies and investment strategies– have been selected to be as close to state of the art literature as possible and at the same time address the core issue of concern. Since this addresses events which have happened over the last few decades and especially the last years or are yet to unfold, much of the literature is published after the beginning of this master program in autumn 2008 and a number of articles are still currently in press.

Data collection for the analysis process relied on secondary sources of information retrieved in reports and databases. These have also had to be as recent and reliable as possible. Preferred sources for statistical data on EU27 indicators –population, spending on innovation, educational attainment, FDI flows within the EU, to and from China– have been Eurostat releases, with focus on 2010 databases that cover information up to 2008 or 2009. GDP data for 2009 has been aggregated from the International Monetary Fund, while energy data by country –compiled by region– such as energy demand and installed wind and solar capacity, as well as emissions of carbon dioxide were retrieved from a comprehensive database from June 2010 published by British Petroleum. Energy and carbon intensities were calculated for comparison purposes based on this data.

European Commission publications and portals were useful up to date sources of information for the Europe 2020 context and its transposition in renewable energy targets, as well as for tracking achievements and challenges in this direction in the individual countries. Global developments in renewable capacity and finance are available in trustworthy reports from BNEF in collaboration with SEFI –which is part of UN–, from the Institute for Energy of the Joint Research Centre organised under the European Commission (JRC), as well as the Renewable Energy Policy Network for the 21st Century (REN21). Ragwitz et al (2010) has a good update and review of the renewable energy sector in each of the EU27, including RES potentials, policy status and key influencing factors, useful in estimating which NMS10 could seek a partnership with China in the renewable generation sector.

For China, data on progress in competitiveness, innovation and development, skill formation and governance was based on recent reports from the UNDP, UNICEF, OECD, as well as comprehensive databases compiling statistical information from

many official sources released by Newsweek in August 2010. Global Innovation Index is a detailed indicator platform useful in cross-checking the data in order to assess the capacity for secondary and disruptive innovation in China. Moreover, a number of recent articles reviewing the wind energy sector in China were used.

Recent sources of information, however reliable, disclose preliminary data which is likely to be adjusted as detailed bottom-up collection becomes available. For the purpose of this research –which is exploratory in nature– that is not crucial, but it is important to maintain the liability of estimation assumed by the secondary data sources. Estimation margins are most likely higher for China than for EU27, but it is clear that the trend is one of rapid investment in renewable capacity expansion, also with perspectives for internationalisation.

Coverage of recent developments in reliable online media such as Foreign Policy Financial Times, New York Times and Bloomberg, as well as reports with recent analysis from organisations such as the European Spatial Planning Observation Network, the Oxford Institute for Energy Studies or the Centre for European Reform, have enhanced a higher level of understanding of the topic of concern.

Finally, regarding the case study, a combination of foreign and national media has been used in order to capture as much information as possible. Up to date relevant information was also retrieved from presentations at seminars by consultants from EWEA and the authorities. Unfortunately, it has been impossible to hold meetings or interviews with the stakeholders. A comprehensive overview of barriers to the wind energy sector in Romania has recently been published by Lamar Company, but its cost is prohibitive and access to its content was not possible.

Symbols and abbreviations

BNEF – Bloomberg New Energy Finance

CDB – China Development Bank

CDM – Clean Development Mechanism

CPDRC – China Population and Development Research Centre

CSR – Corporate Social Responsibility

EBRD – European Bank for Reconstruction and Development

EIB – European Investment Bank

ERT – European Round Table of Industrialists

ESPON – European Spatial Planning Observation Network

ETS – Emissions Trading Scheme

EU – European Union

EU15 – European Union before the enlargement of 2004 and 2007, including 15 states. In alphabetical order, they are: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and United Kingdom.

EU27 – European Union in 2010, including 27 states. In alphabetical order, they are: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and United Kingdom.

EWEA – European Wind Energy Association

FDI – Foreign Direct Investment is an international investment made by a direct investor to acquire a lasting interest (at least 10% of the equity capital) in an entity operating in an economy other than that of the investor

G20 – Group of Twenty, reuniting the largest developed and emerging countries, which have a systemic impact on the global economy

GDP – Gross Domestic Product

GHG – Greenhouse gases

GII – Global Innovation Index

GO – Guarantee of Origin

GSR – Government Social Responsibility

IPR – Intellectual Property Rights

JI – Joint Implementation

KNWS – Keynesian National Welfare State

MO – Monitorul Oficial (Official Monitor of Romania) –legislation compendium

m.u. – measurement units

NAP – National (Renewable Energy) Action Plans

NMS10 – Group of 10 new member states from former communist Eastern European countries, which joined the EU in 2004 and 2007. In alphabetical order, they are: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia.

OECD – Organisation for Economic Co-operation and Development

PWC – PriceWaterhouseCoopers

REN21 – Renewable Energy Policy Network for the 21st Century

RES – Renewable Energy Sources

RET – Renewable Energy Technology

SEFI – Sustainable Energy Finance Initiative (a joint initiative of UNEP Finance Initiative, UNEP Energy Branch and Basel Agency for Sustainable Energy)

SMEs – Small and medium-sized enterprises

SOE – State-Owned Enterprise

SWPR – Schumpeterian Workfare Post-national Regime

Toe – Ton of oil equivalent

UN – United Nations

UNDP – United Nations Development Programme

UNICEF – United Nations Children’s Fund

USA – United States of America

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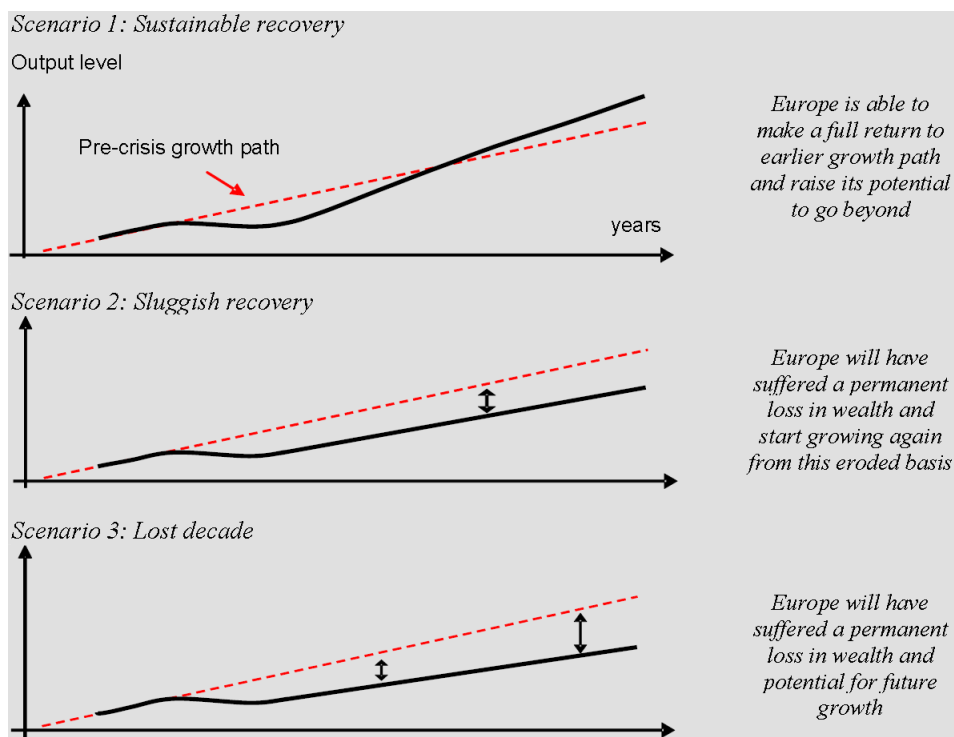
Appendices

1. Synthetic indicators for EU27, EU15, NMS10, USA, Japan, China

Data for 2009	EU27	EU15	NMS10	USA	Japan	China	m.u.
Population	501	398	102	310	127	1340	million
GDP	11806	10934	849	10233	3638	3524	€ billion
Primary energy consumption	1623	1375	244	2182	464	2177	mtoe
Photovoltaic capacity	15987	15353	629	1646	2628	305	MW
Wind turbine capacity	74767	73194	1538	35139	2208	25853	MW
CO ₂ emissions	4066	3361	694	5942	1222	7518	mtCO ₂
GDP/cap	23565	27472	8324	33010	28646	2630	€
CO ₂ emissions/capita	8.11	8.44	6.80	19.16	9.62	5.61	tCO ₂
Carbon intensity of energy use	2.51	2.44	2.84	2.72	2.63	3.45	tCO ₂ /toe
Energy intensity of the economy	0.14	0.13	0.29	0.21	0.13	0.62	toe/1000 €
Carbon intensity of the economy	0.34	0.31	0.82	0.58	0.34	2.13	tCO ₂ /1000 €

Source: Eurostat 2010a, Eurostat 2010b, US Census Bureau 2010, CPDRC 2010, International Monetary Fund 2010, British Petroleum 2010, **EurObserver 2010**, **EWEA 2010**, **EEA 2010**, as detailed in the references section

2. Three scenarios for Europe in 2020



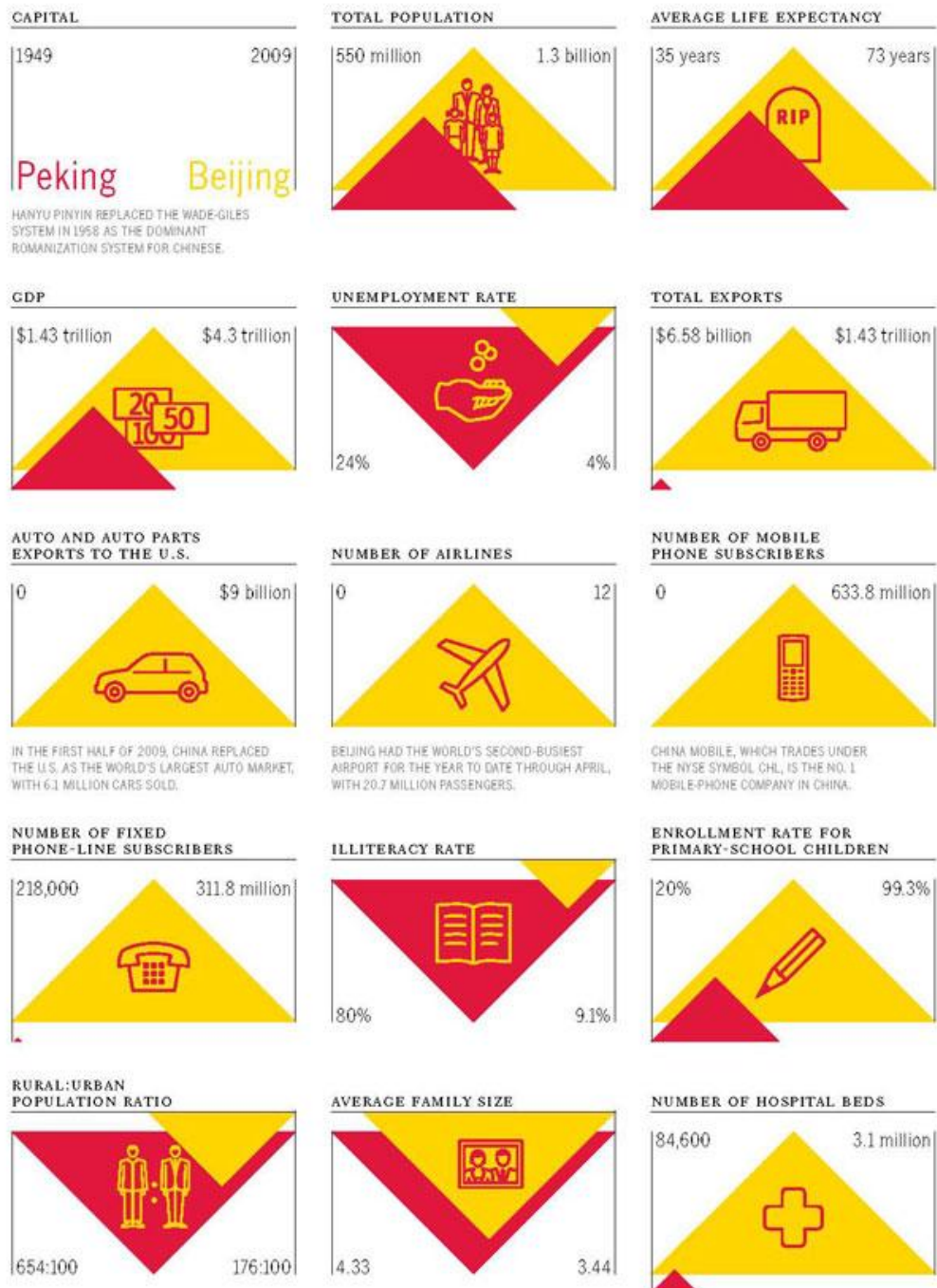
Source: European Commission, 2010a, page 7

3. European welfare state typology based on labour market policies

		Efficiency	
		Low	High
Equity	High	Continental Europe	Nordic Europe
	Low	Mediterranean Europe	Anglo-Saxon Europe

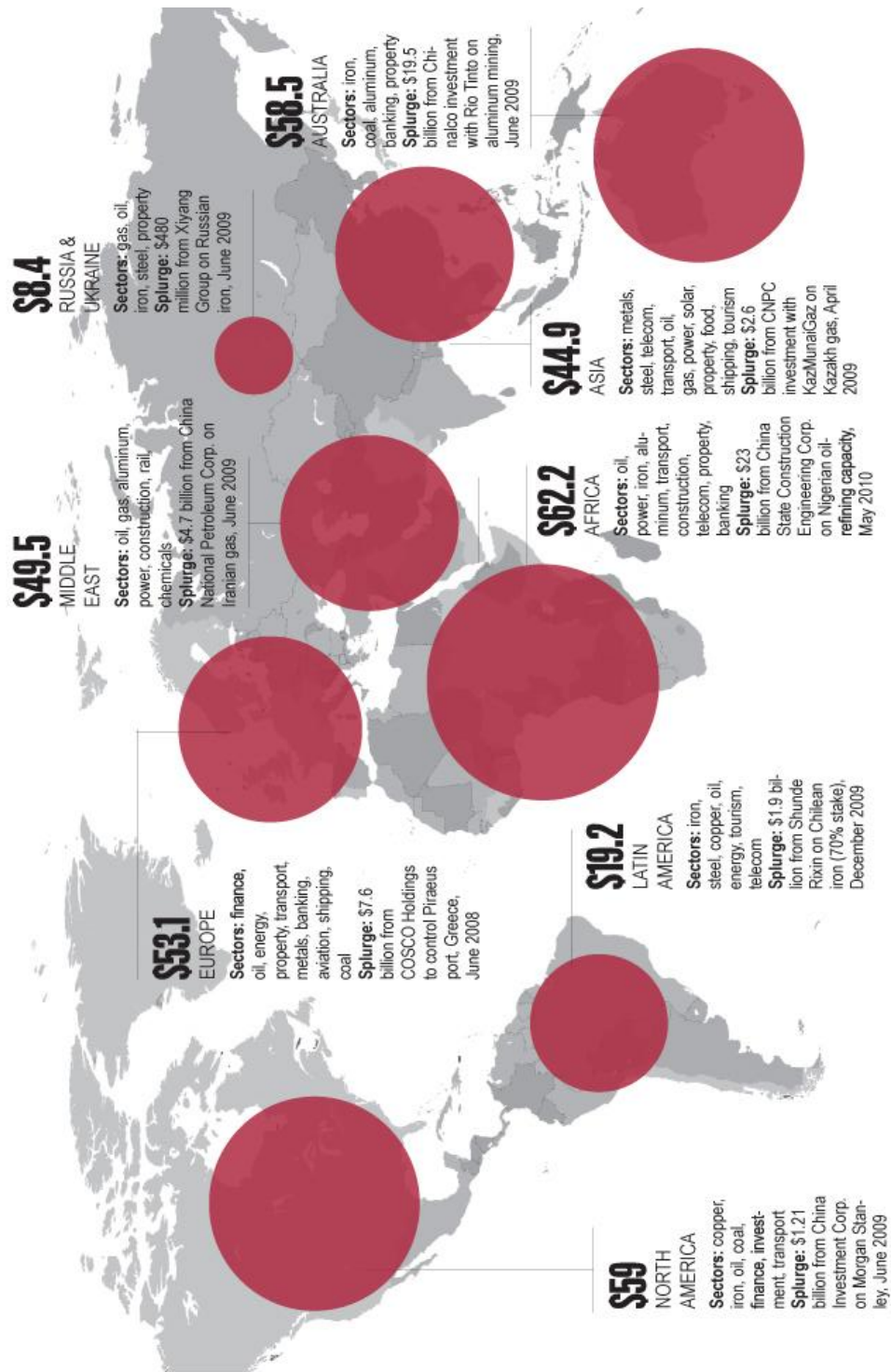
Source: Midttun et al, 2006 based on a paper by Sapir

4. China's development under 60 years of communist rule



Source: Lee, 2009

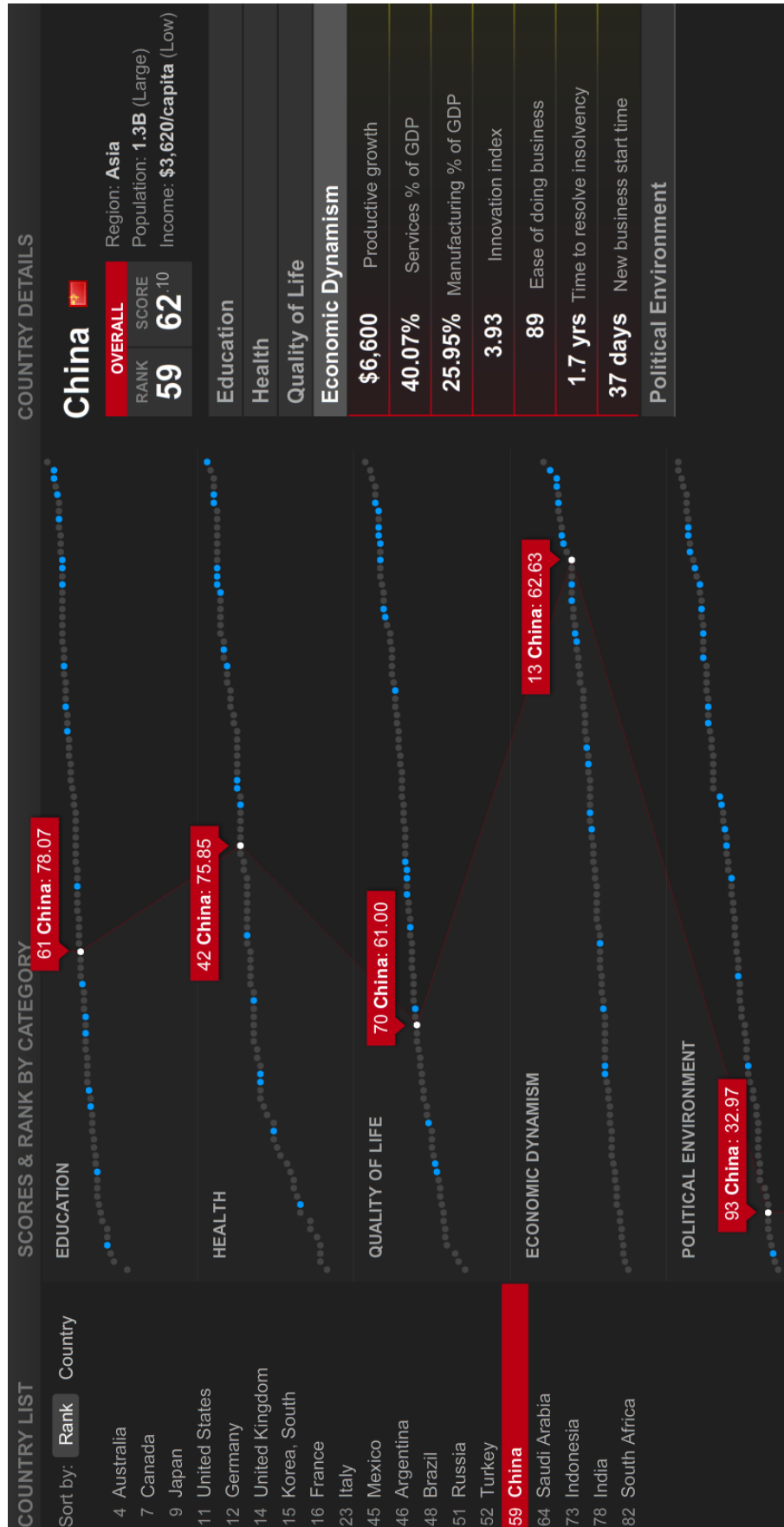
5. Chinese investments by world region in 2005–2009 (billion \$)



Source: Derek Scissors, China Global Investment Tracker 2010, The Heritage Foundation

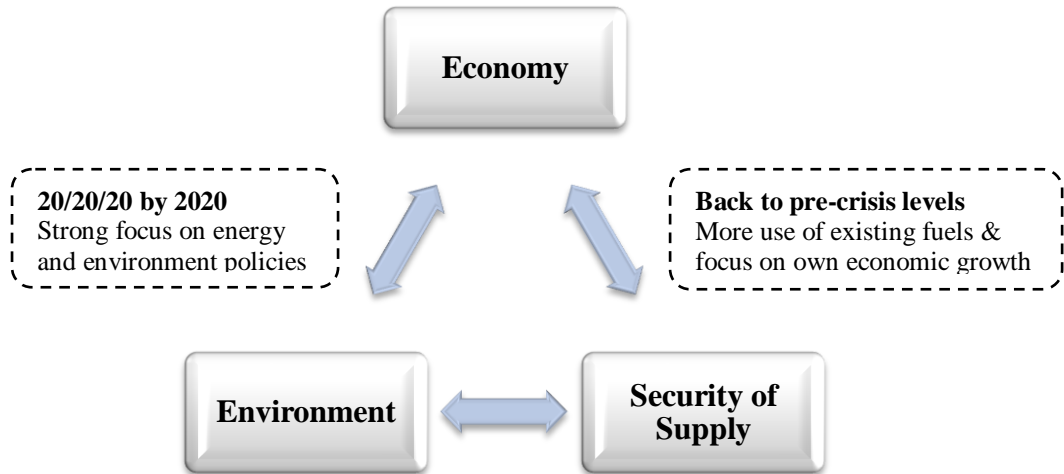
Source: Foreign Policy, 2010

6. Snapshot of China’s multi-level ranking within the G20



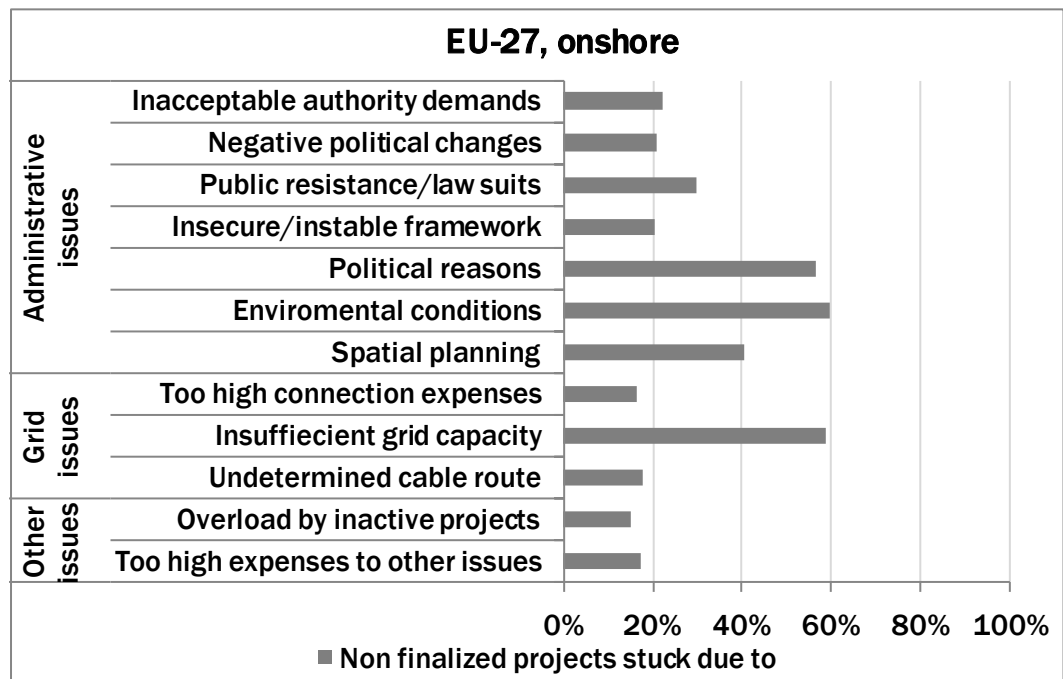
Source: Newsweek, 2010

7. Pillars for the “Europe 2020” strategy



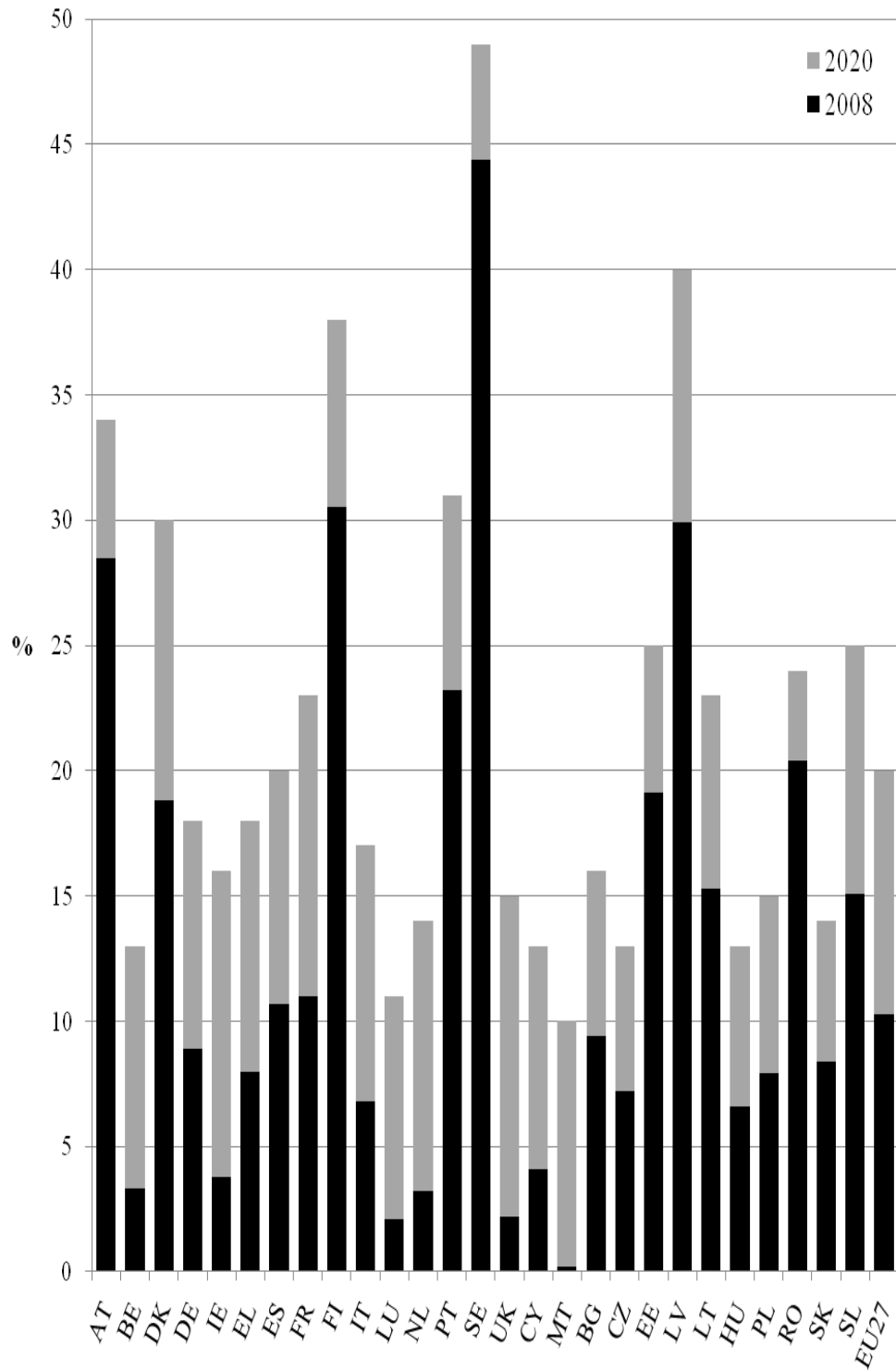
Source: Sund Energy, 2010

8. Barriers to take-up of RES in EU27, case for wind



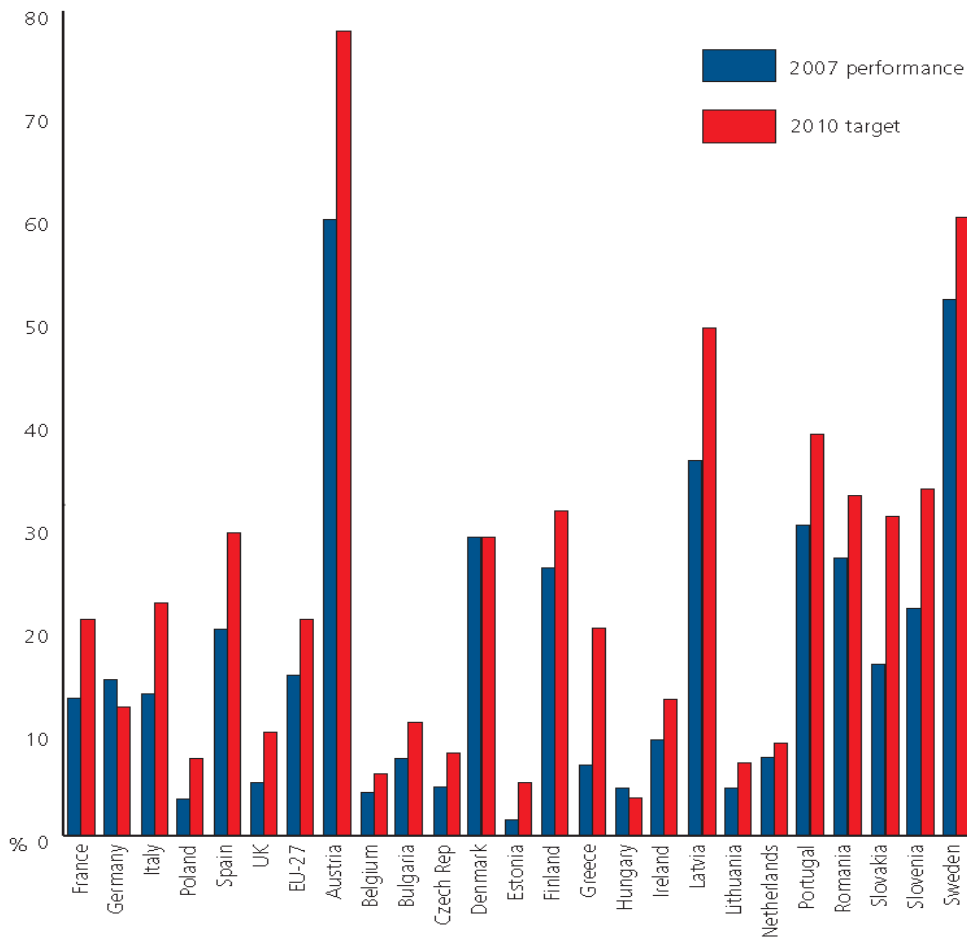
Source: Strøm, 2010

9. Burden sharing agreement for renewable energy targets in 2020



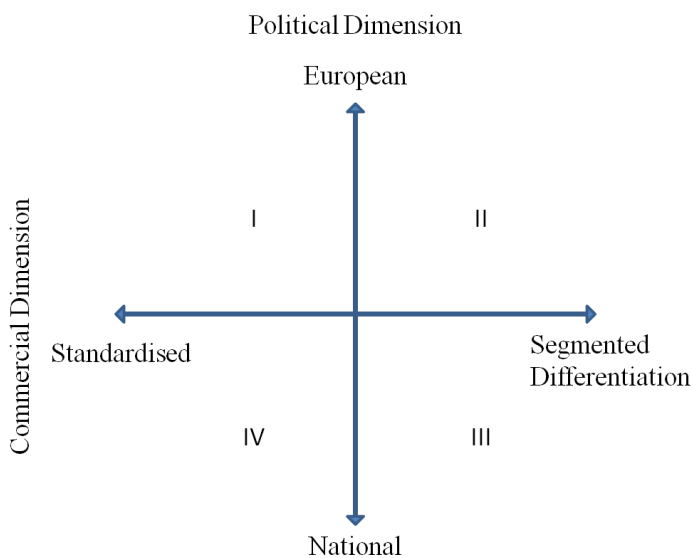
Source: Roubanis, 2010

10. Burden sharing agreement for renewable electricity targets in 2010



Source: Tindale, 2009

11. Alternatives for greening the electricity industry in the EU27

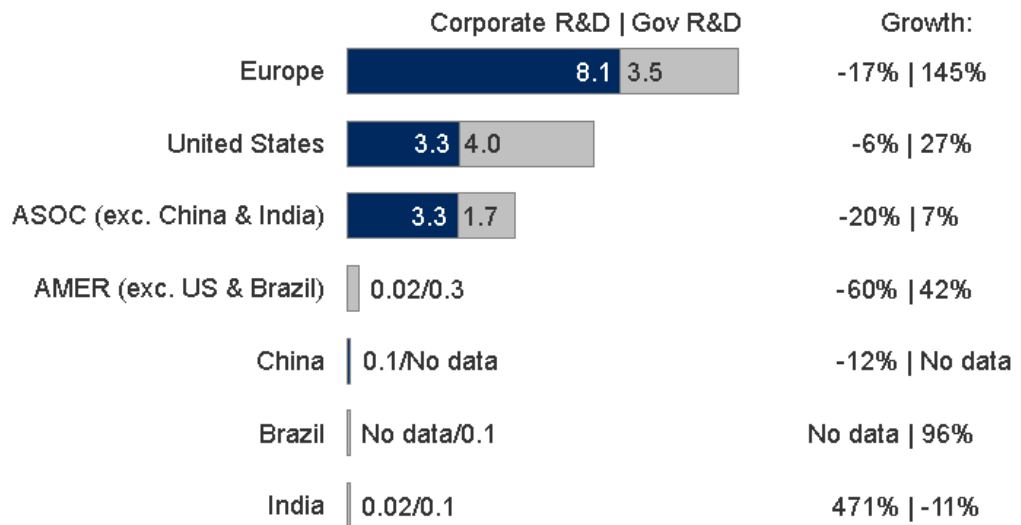


V – pure market basis without supportive political arrangements

Source: Midttun and Koefoed, 2003

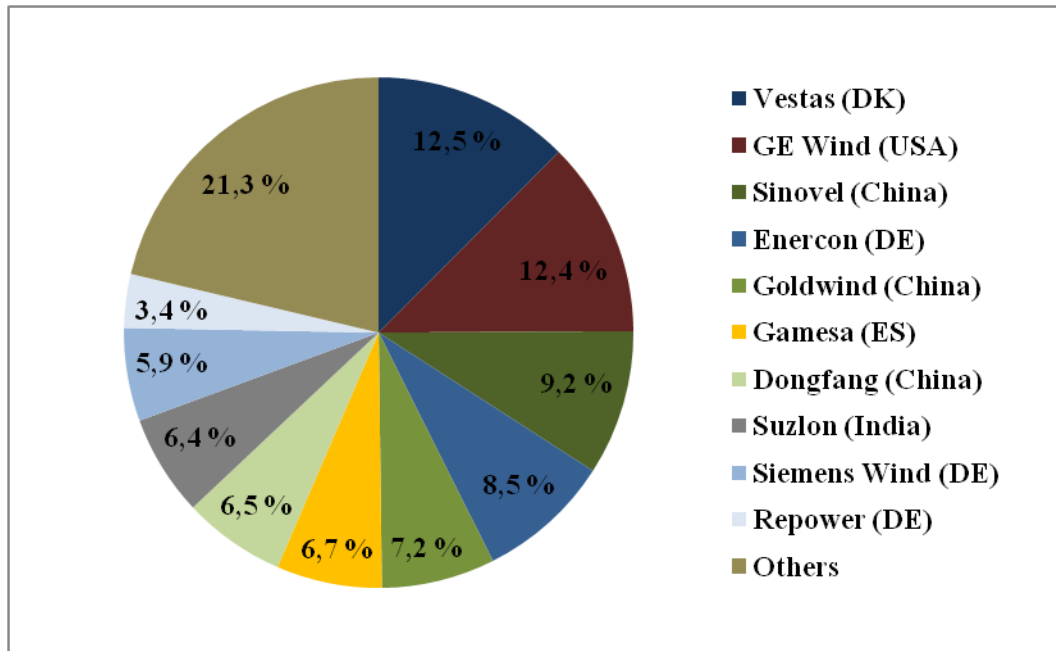
12. Corporate and government R&D in renewable technologies

Volumes for 2009 (\$ billion) and percentage growth compared to 2008



Source: SEFI and BNEF, 2010

13. Capacity market shares of wind turbine manufacturers in 2009



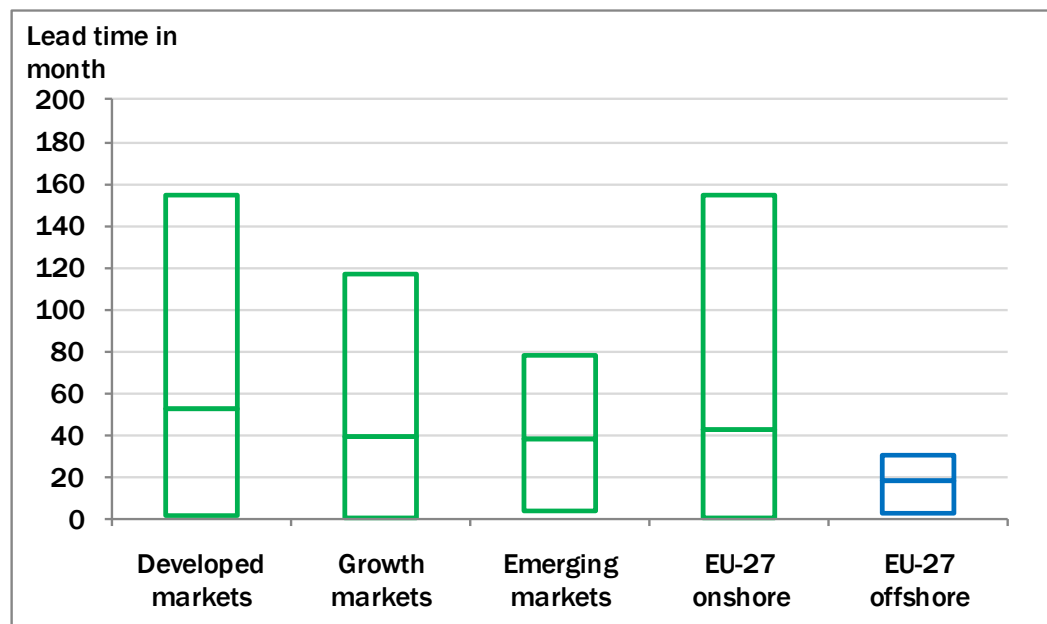
Source: Bloem et al, 2010

14. Renewable energy support schemes in the EU27

Country	Feed-in tariff	Renewable Portfolio Standard/quota	Capital subsidies, grants, rebates	Investment or other tax credits	Sales tax, energy tax, excise tax, or VAT reduction	Tradable RE certificates	Energy production payments or tax credits	Net metering	Public investment, loans, or financing	Public competitive bidding
EU-27										
Austria	X		X	X		X			X	
Belgium		(*)	X	X	X	X		X		
Bulgaria	X		X						X	
Cyprus	X		X							
Czech Republic	X		X	X	X	X		X		
Denmark	X		X	X	X	X		X	X	X
Estonia	X		X		X		X			
Finland	X		X		X	X	X			
France	X		X	X	X	X			X	X
Germany	X		X	X	X			X	X	
Greece	X		X	X				X	X	
Hungary	X		X	X	X				X	X
Ireland	X		X	X		X				X
Italy	X	X	X	X	X	X		X	X	
Latvia	X				X				X	X
Lithuania	X		X	X	X				X	
Luxembourg	X		X	X	X					
Malta			X		X			X		
Netherlands			X	X	X	X	X			
Poland		X	X		X	X			X	X
Portugal	X		X	X	X				X	X
Romania		X			X	X			X	
Slovakia	X			X	X				X	
Slovenia	X		X	X	X	X			X	X
Spain	X		X	X	X	X			X	
Sweden		X	X	X	X	X	X		X	
United Kingdom	X	X	X		X	X			X	

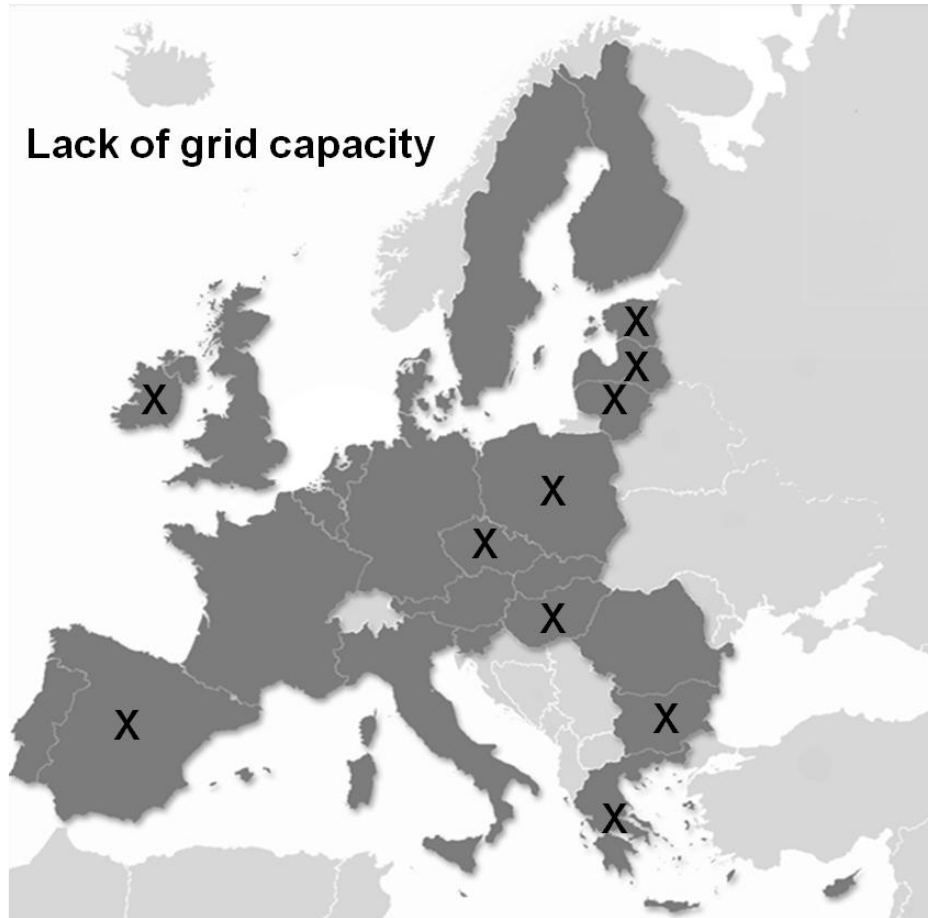
Source: REN21, 2010

15. Lead time – transparency trade-off in EU27 wind project approvals



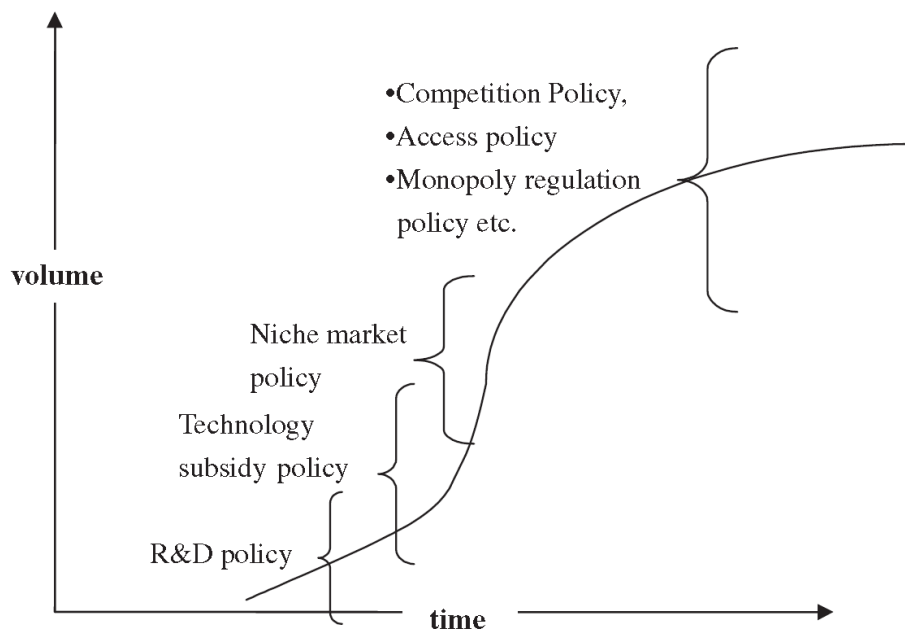
Source: Strøm, 2010

16. Countries where grid capacity hinders RET deployment



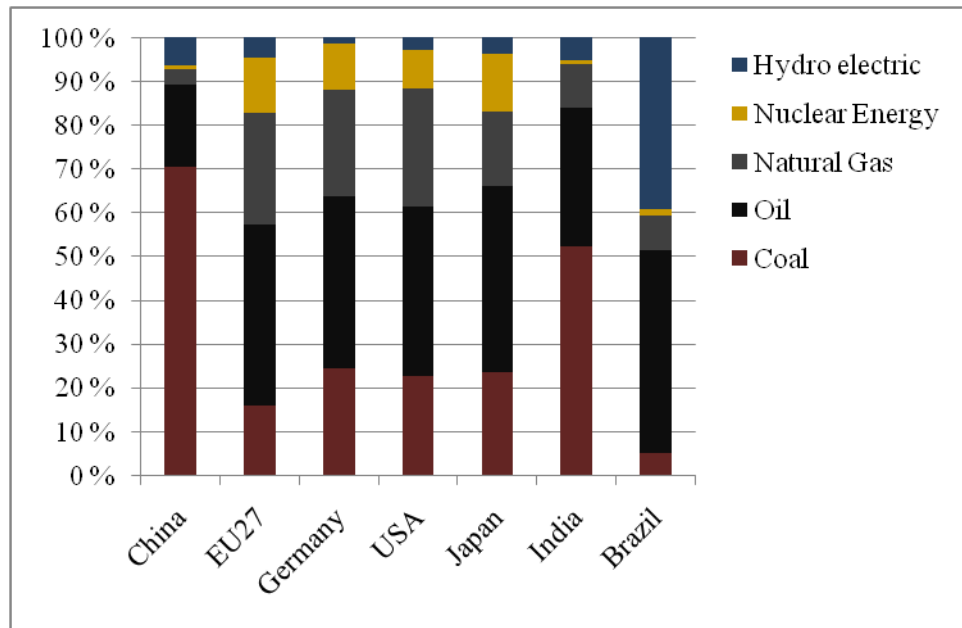
Source: Simonot, 2010

17. Policy instruments in various stages of development cycles



Source: Midttun and Gautesen, 2007

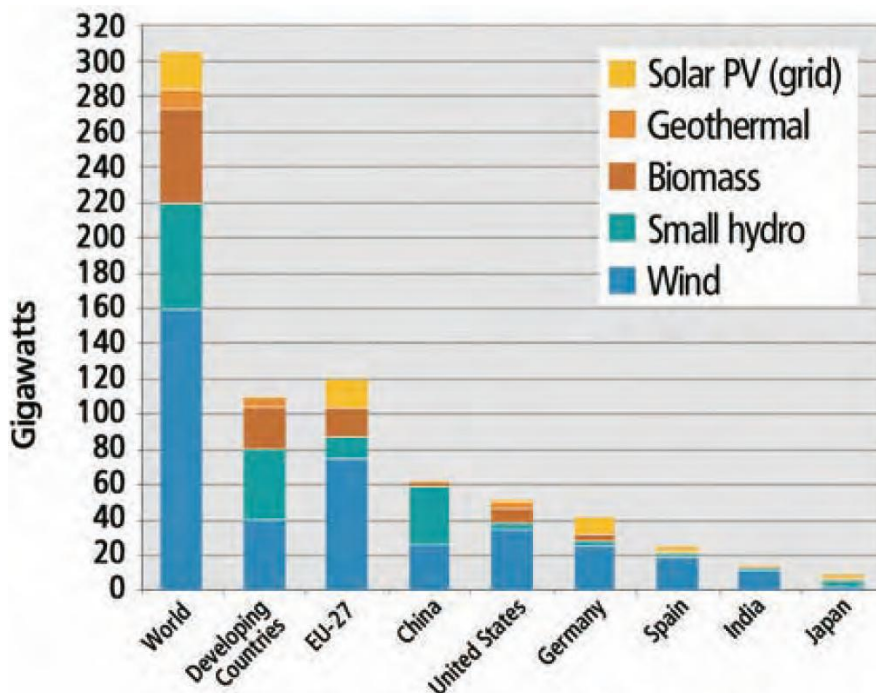
18. Energy consumption structure of the world's major economies



Note: Wind, solar, bio fuels and other renewable are regarded by British Petroleum as too small and will only be included in the statistics from 2011

Source: British Petroleum, 2010

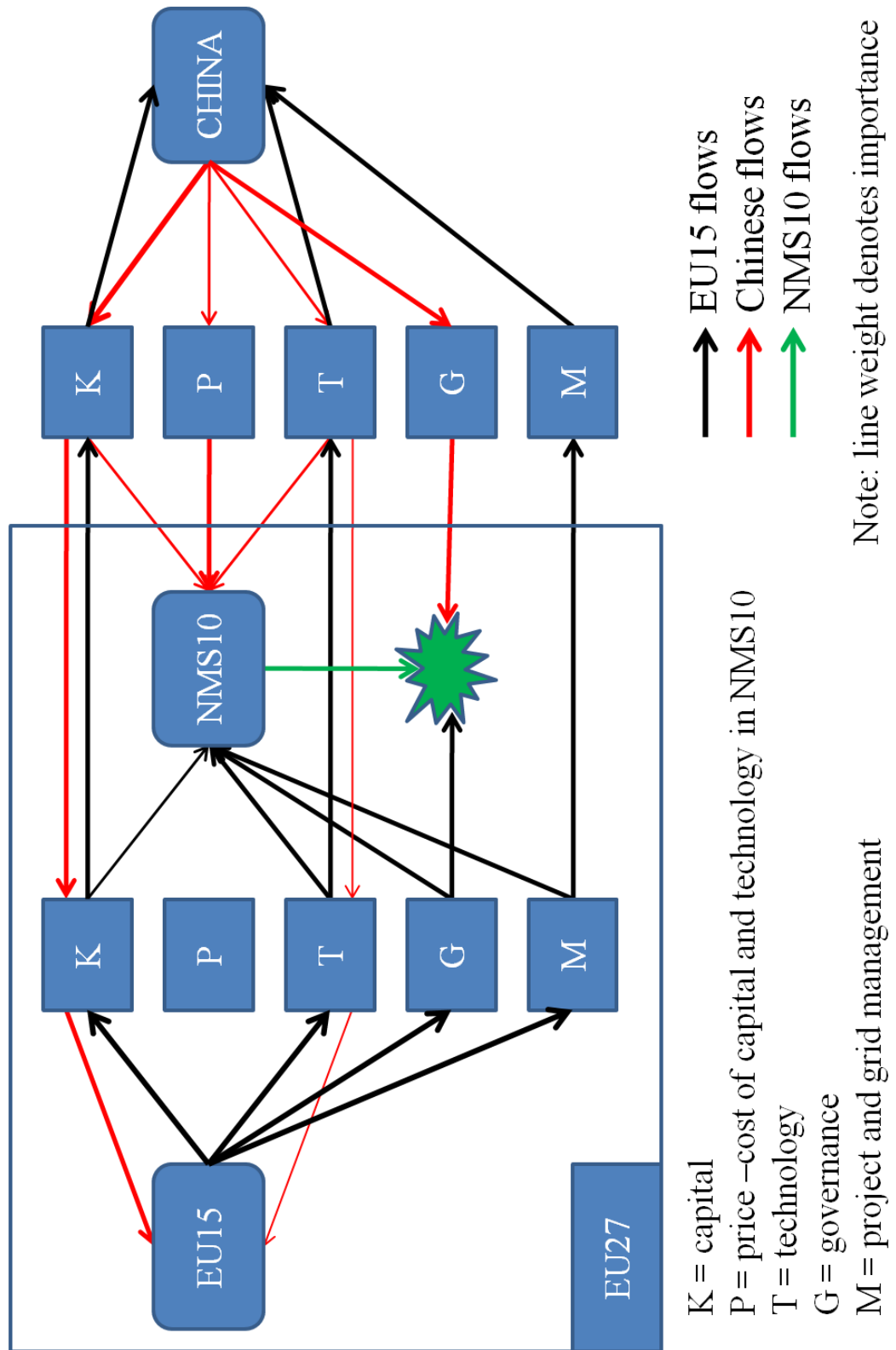
19. Renewable energy installed capacity by world regions (2009)



Source: REN21, 2010

20. Conceptual model and framework for analysis

Situation in 2010

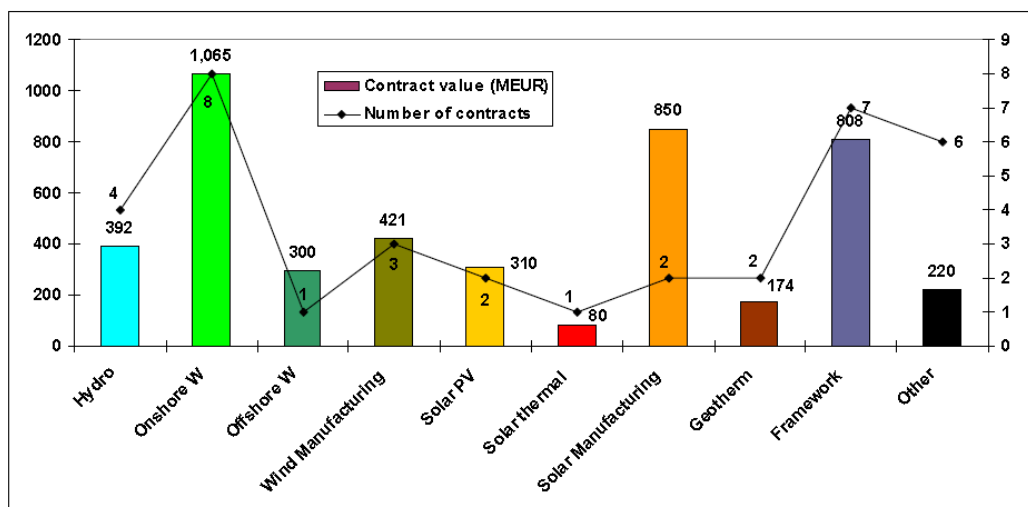


21. EU27 FDI: intra-EU and outward to China, 2007-2009

EUR bn	2007	2008	2009	% 08/09
Bulgaria	7.3	5.6	2.7	-52 %
Czech Republic	6.0	6.3	1.1	-82 %
Estonia	2.0	1.1	1.2	8 %
Hungary	2.8	3.7	-3.9	-203 %
Latvia	1.5	0.7	-0.4	-162 %
Lithuania	1.1	0.9	0.0	-95 %
Poland	14.2	9.7	6.8	-29 %
Romania	6.5	8.5	4.0	-54 %
Slovakia	2.0	2.5	-0.8	-133 %
Slovenia	1.1	1.1	0.0	-100 %
NMS10	44.5	40.2	10.7	-73 %
EU15	574.1	324.2	144.2	-56 %
China (mainland)	6.6	4.7	5.3	13 %

Source: Eurostat, 2010d, 2010e

22. EIB financing for renewable energy



Source: Trevoux, 2010, slide 5

23. China FDI: outward to EU27, 2007-2009

EUR m	2007	2008	2009
Bulgaria	1	1	1
Czech Republic	47	28	-36
Estonia	-1	3	5
Hungary	12	-78	-18
Latvia	0	0	0
Lithuania	0	0	0
Poland	70	97	-163
Romania	17	-3	0
Slovakia	6	4	-4
Slovenia	0	0	1
NMS10	152	52	-214
EU15	550	-124	531

Source: Eurostat, 2010f

24. Existing wind power capacity in EU27 (MW)

	2000	2003	2006	2009
Germany	6113	14609	20622	25777
Spain	2235	6203	11623	19149
Rest of EU15	4539	7679	15406	28268
NMS10, of which:	0	108	419	1573
Poland	0	63	153	725
Hungary	0	3	61	201
Czech Republic	0	9	54	192
Bulgaria	0	0	36	177
Estonia	0	2	32	142
Lithuania	0	0	48	91
Latvia	0	27	27	28
Romania	0	1	3	14
Slovakia	0	3	5	3
Slovenia	0	0	0	0

Source: EWEA, 2010

25. Synthetic indicators for EU27, EU15, NMS10, Romania, China

	EU27	EU15	NMS10	Romania	China	m.u.
Population	501	398	102	21	1340	million
GDP	11806	10934	849	116	3524	€ billion
Primary energy use	1623	1375	244	35	2177	mtoe
Solar PV capacity	15987	15353	629	0	305	MW

Wind turbine capacity	74767	73194	1538	14	25853	MW
CO ₂ emissions	4066	3361	694	84	7518	mtCO ₂
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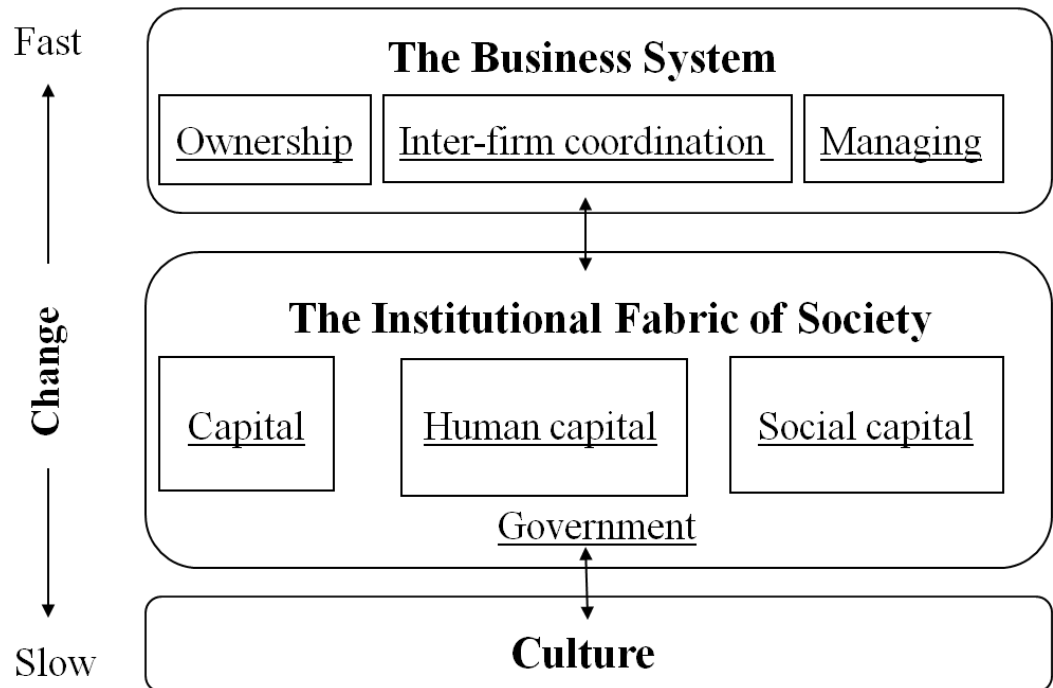
Source: Eurostat 2010a, Eurostat 2010b, US Census Bureau 2010, CPDRC 2010, International Monetary Fund 2010, British Petroleum 2010, EurObserver 2010, EWEA 2010, Sandulescu 2010, as detailed in References

26. Status of planned investments in energy capacity in Romania

Project	Companies	Capacity MW	Fuel	Completion	Status
Romania					
Petrobrazi	Petrom	890	gas	2011	Under construction
Fantanele-Co-gealac	CEZ, Termoelectrica	350	wind	2010	First stage
Fantanele-Co-gealac	CEZ, Termoelectrica	250	wind	2011	600MW at completion
Braila	E.ON, Enel	800	coal	2014	
Cosmesti	Verbund	99	wind	2012	First stage
Cosmesti	Verbund	140	wind	2013	210MW at completion
Cernavoda	Nuclearelectrica	2 x 700	nuclear	2014	At tender
Dobrogea	Iberdrola	1500	wind	2011-2017	50 windfarms in region
Rovinari	China's National Electric Company	500	coal	unknown	Unknown
Paroseni	Itochu, Japan	180	coal	unknown	Unknown
Tarnita-Lapusesti	Hidroelectrica	1000	hydro	unknown	Unknown
Borzesti	GDF Suez	400/500	gas	n/a	Shelved
Turnu Magurele	Alro, Interagro	unknown	unknown	n/a	Shelved
Gorj	Energy Holding	unknown	lignite	n/a	Shelved
Constanta	Rompetrol	unknown	unknown	n/a	Shelved
Doicesti	Mechel, Termoelectrica	250	lignite	n/a	Cancelled
Craiova	Edison	400	gas	n/a	Cancelled
Galati	Edison	1000	thermal	n/a	Cancelled
Galati	CEZ, Termoelectrica	400	gas	n/a	Cancelled

Source: ICIS Heren, 2010

27. Business systems theory



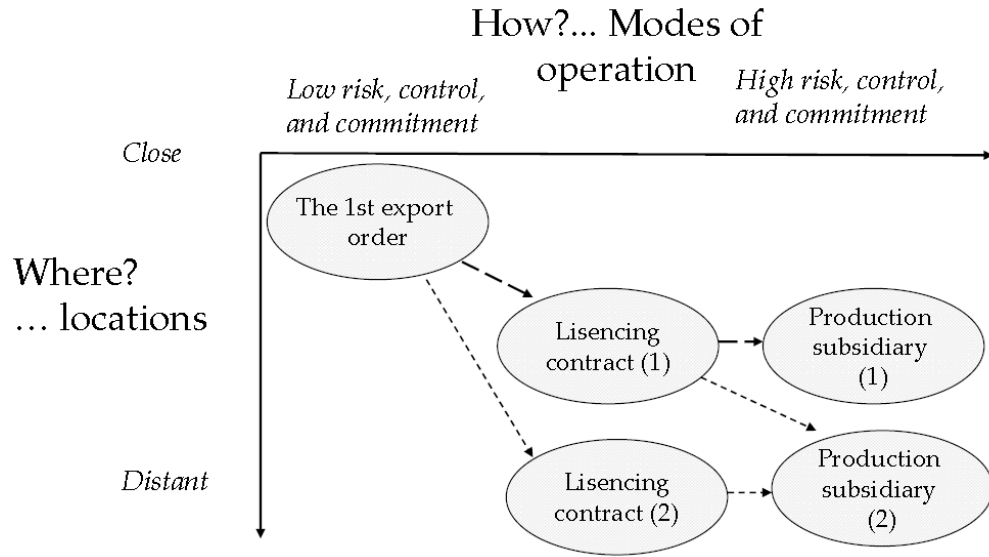
Source: Redding, 2002 (retrieved from class presentation by Professor Rolv Peter Amdam on September 3, 2008)

28. Increasing commitment of internationalising firms

1. No regular export activities
 2. Export through independent representatives
 3. Sales subsidiaries
 4. Manufacturing subsidiaries
- Blue curved arrows indicate a sequential flow from step 1 to 2, 2 to 3, and 3 to 4.

Source: Johanson and Wiedersheim-Paul, 1975 (retrieved from class presentation by Professor Gabriel R.G. Benito on October 20, 2008)

29. Establishment chain for internationalising firms



Source: Johanson and Vahlne, 1977 (retrieved from class presentation by Professor Gabriel R.G. Benito on October 20, 2008)

30. Typology of exporter – intermediary relationship

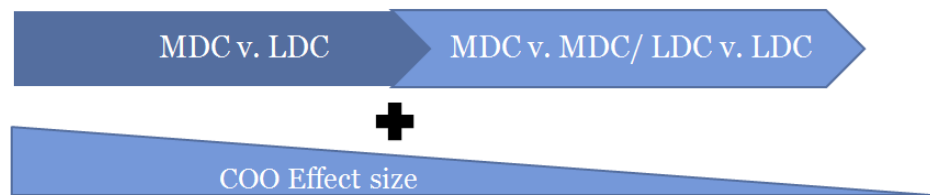
Cultural Distance–Need for Sensitivity	High	Cultural Relationships	Complex Relationships
	Low	Limited Relationships	Functional Relationships
		Low	High

Product Complexity–Need for Interaction

Source: Solberg, 2008

31. Country-of-origin effects and the level of economic development

H4. The country-of-origin effect is larger in studies that compare products from MDCs to products from LDCs, than in studies that compare products from either MDCs or LDCs.



Skill, technology, quality risk are perceived through level of development
LDC products are of worse quality than MDC products for MDC consumers

Hypothesis supported

Source: Verlegh and Steenkamp, 1999 (retrieved from personal presentation of the article in class on February 11, 2009)