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Macedonia's Prospects on Reaching the 2020 Energy Policy Targets

Rationale for action on the problem

The Macedonian approach to energy policy creation closely follows the EU 2020 guidelines in relation to CO₂ emissions reductions, increases in the share of renewable energy sources in the energy mix and improvements in the energy efficiency standards. The current energy policy relies on three important official papers, which were approved by the Macedonian government in 2010: Strategy for Development of the Energy Sector up to 2020 including a vision until 2030, Strategy for the Use of Renewable Energy Sources and Strategy for Energy Efficiency Improvements until 2020. Macedonia has implemented a Strategy for Development of the Energy Sector in 2008, aiming at:

- reduction of energy intensity for at least 30%,
- increase the Renewable Energy Sources (RES) in the final energy consumption to 20%,
- reduction in CO₂ emissions by 30% relative to 2006 (in particular 20% reduction in the greenhouse gases (GHG) emissions from the electricity generation sector).

The focus in this brief is whether and to what extent can the aforementioned goals be reachable. The reduction of energy intensity seems unreasonable; nevertheless the two other goals are worth scrutinizing. With an expected annual growth of 3% in final energy consumption, electricity is anticipated to be the second most consumed energy good; it would constitute 34% of final energy consumption in Macedonia by 2016. This growth in demand is a valid threat to both supply security (and hence RES in final energy consumption) and emissions targets given the current energy composition. The areas where the country could invest to reach the RES target is the electricity sector, as for the gas and crude oil derivatives Macedonia is currently

EXECUTIVE SUMMARY

The current energy policy of Macedonia aims at reduction of energy intensity for at least 30%, increase the renewable energy sources (RES) in the final energy consumption to 20%, and reduction in CO₂ emissions by 30% in comparison to 2006. In this brief, the focus is on whether or to what extent the latter two goals could be reached by 2020. The main conclusions of the carefully conducted analyses are that the RES will probably not reach more than 17% of final consumption and the GHG emissions are actually growing rather than decreasing. A careful revision of the energy policy documents is needed, along with institutional and infrastructural improvements of the energy sector if the country is to ensure affordable energy and security of supply. Investments into RES in electricity production need to be fostered in order to reduce GHG emissions and the import dependency.

highly dependent on imports and it will take long time until the renewable substitute goods (such as biogas or electric cars for instance) become available on the Macedonian market. Restructuring of the generation and improving the existing plants are obligatory if the 2020 targets are to be reached by the country.

For Macedonia it is important to reach those energy policy targets for several reasons. First of all, the coal resources are quite limited and are expected to be depleted in Macedonia in the next two decades or much sooner. Therefore, the renewables (especially solar radiation and hydro) should become increasingly important in the production of electricity if the country wants to have secure supply as well as affordable electricity for satisfying the growing domestic demand. Secondly, the emissions of GHG are also increasing with the growing demand, which is characteristic for any developing country, and the higher emissions are associated with further environmental deterioration and climate change. The deterioration of water and air quality are impacting the health of people and other living creatures and the climate change leads to

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extreme weather conditions such as floods, droughts and winds, all of which have bad consequences on agriculture and animal husbandry.

Those two targets are not binding for Macedonia as a signature country of the Kyoto Protocol, so even if the country violates the targets there are no penalties, but are important milestones in the projected national energy policy targets. If Macedonia does not invest enough now in RES in the electricity generation process, current and especially future supply would be far from adequate. A direct consequence will be a drastic price increase, which will decrease consumer welfare of the poorest households as well as the competitiveness of small and medium enterprises. RES are of particular importance in the electricity production mix because are necessary to ensure sustainable development, security of supply and a must in order to lower the GHG emissions from the generation process. Energy policy and the current situation in the electricity industry has not been given enough attention in the Macedonian public even though electricity is essential for everyday life of people and normal functioning business.

Current and Proposed Policy Options

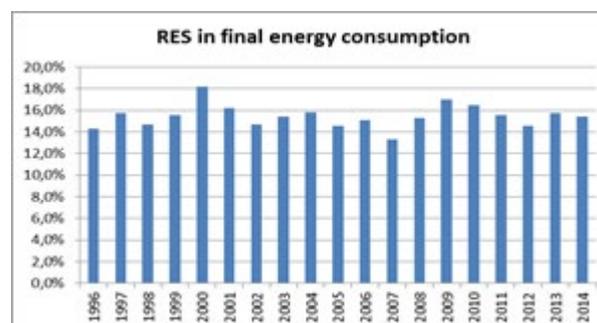
The Renewables in the Final Energy Consumption Target (with focus on the RES in the production of electricity)

The first and most significant RES in the electricity mix of Macedonia is hydro power. Thanks to its hydrology and geography, Macedonia has a broad potential for hydro power plants and this potential is far from being fully utilized. The hydro power plants are expected to produce between 20% and 40% of domestic electricity production but a smaller part from the domestic demand (around 15% in a year with average hydrology).

Some of the hydro plants underwent renovation but this process has not even started yet for the rest of them. The projects for the new hydro plants are progressing slowly as the initial investments are quite substantial and ELEM (Electro Power Plants of Macedonia, the national electricity generation company) has limited funding resources. As electricity power plants require a huge initial capital investment, Macedonia needs to attract a foreign investment in this sector if it is to have the necessary production capacities after REK Oslomej and REK Bitola (Sector 1 and 2) close down in the early 2020s. There is huge potential for investments in the river Vardar region as well potential for investment in photovoltaics, considering that Macedonia has large number of sunny days in the year. Even with the RES investments, other investments will still be needed into conventional coal power plant or potentially nuclear. Another policy step towards increasing the share of

RES in the electricity mix was the wind park Bogdanci. Sixteen wind turbines, were installed in Macedonia by the ELEM in 2014 (and additional six will be installed), where a large ratio of the investment came from the German government. The annual production from the wind turbines is expected satisfy around 2% of final demand. Security of supply is statistically and probabilistically dependent and as such the secured supply from such a wind park may be substantially lower than the total installed capacity of 50 MW. EU standards mention that a probability of above 25% for availability of the capacity is considered as the secured supply at any given moment.

The figure below shows the RES (geothermal, biomass and part of electricity) as proportion of final energy consumption in Macedonia. In the period 1996-2010, RES constituted on average constituted 15% of final energy consumption. Since the Strategy was introduced in 2010, the percentage of RES did not change drastically; RES constituted on average 15.7% of final energy consumption in the period 2010-2014. Those numbers show that the implementation of RES in the energy sector is slow and the 20% target is not likely to be reached, at least not by 2020.



The Emissions Targets

Macedonia is still lagging behind with the greenhouse gases emissions reduction targets as energy consumption is raising at approximately 2-3% yearly. The projects for renovation and re-modernization of REK Bitola, the largest coal based power plant, also involved desulfurization filters so that the power plant now satisfies the basic requirements about emissions concentrations. Emissions targets are unlikely to be reached by REK Oslomej, the second largest thermal power plant as it does not even satisfy the basic pollution standards due to its age and current coal grade.

The domestic production of electricity still relies at least 60-80% on the production from the coal power plants, which means that GHG emissions are rather high. Moreover, the goal to reduce emissions by 30% in comparison to 2006 and in respect to the scenario

where only coal is used to produce electricity seems a farfetched and nowhere near the EU 2020 energy targets (the EU goal specified is 20% reduction relative to 1990's levels).

Table 1 shows the emissions from the conventional power plants in 2006, 2009 and 2012. The highest emissions from SO₂, NO_x, CO₂, dust, ash and slag come from the REK Bitola as it is the biggest thermal power plant. REK Oslomej has on the other hand highest CO emissions. Energetika (the combined cycle power plant) contributes only to a small share of the CO and NO_x emissions. It is striking that the total CO₂ emissions, as the most important GHG, have actually increased by 88% between 2006 and 2009 and by another 11.5% between 2009 and 2012. And total CO emissions have increased by 56.5% between 2009 and 2012.

It would be interesting to see how the emissions patterns have developed in 2015 but there should not be too big of a difference since the production structure is relatively unchanged. On a positive note, the total SO₂ emissions and dust have decreased by around 13% and 22% in the period 2009-2012 respectively. It appears that the desulfurization of REK Bitola has contributed to lowering SO₂ emissions so that climate change could be potentially mitigated. Nevertheless, those reductions, and especially the increase in CO₂, are far off from the 30% reduction by 2020 relative to 2006 target (or even the sub-target), if we consider that demand for electricity is constantly growing and generation relies coal power plants for more than 60% of total production. Besides, emissions from the industry sector and from the public transport, and especially private vehicle transport, are likely to have increased during this period.

Recommendations

I. Revision of the existing energy policy documents and market liberalization

In the new Strategy for Development of the Energy Sector for the period after 2020, and the

new accompanying Program for Realization of the Strategy for Development of the Energy Sector in the period 2016-2020 as well as the Strategy for development of renewables, the Macedonian policy targets should be made compatible with the new 2030 targets from the Lisbon framework. The framework from Lisbon defines even stricter targets namely at least 27% of RES in final consumption and at least 27% efficiency improvements by 2030.

The above targets are even more ambitious for a developing country such as Macedonia, but perhaps the electricity mix of the Macedonian economy can be drastically improved in favor of RES. This could be done by fostering domestic investments from the private sector and attracting foreign capital along with further liberalization of the electricity sector. Hence, further liberalization in the generation sector is needed and also vertical unbundling between ELEM and MEPSO (the Macedonian electricity transmission company) could bring more competition and lessen the monopoly like behavior of the two still completely state owned companies. ELEM could be made into public private partnership instead of being 100% owned by the state. MEPSO will probably stay monopoly by nature. Transparency needs to be increased concerning the electricity imports and electricity exchanges should be introduced. The exchange will create transparent price signals for all the market participants.

II. Fostering investment into RES and the financing of the feed-in-tariffs (FIT)

Macedonia has vast potential for production of electricity from photovoltaics, with average annual solar irradiation of 1623 kWh/m². Investment into PV needs to be made more favorable for investors from the domestic private sector. Reducing the tax on profits could be stimulating for domestic investors, and this could open job positions and

Table 1. Total emissions (in tons) from the ELEM power plants						
Source	Year			Change in %		
	2006	2009	2012	06-09	09-12	06-12
SO ₂	52924	94781	82633	79	-13	56
CO	745	2034	3184	173	57	327
NO _x	11083	19973	18748	80	-6	69
CO ₂	5461797	10288101	11473600	88	12	110
Dust	3558	14181	11138	299	-22	213
Ash and slag	1273792	1679546	1547757	32	-8	22

stimulate economic development. Furthermore, the production quotas limits for PV need to be urgently increased as the current 12MW is too small. This step could be a trigger for new jobs, growth and cleaner environment. Investment is already made favorable for foreign investors but the laws and regulation are still too complex. The time frames for inclusion of PV into the network should be better defined and the whole application process should be made simpler. As previously mentioned, hydro has also great potential in Macedonia, especially in the Vardar valley.

Another concern is the source of finance for the RES policies. For instance, Germany has introduced renewable energy surcharge as part of the final consumer electricity price in order to finance the production of electricity from renewables and the FIT. Macedonia has not defined a source of finance for renewables but has set up subsidized pricing for buying electricity from some types of RES generation. A special fund, as part of the government budget, should be created for this purpose. Besides, the FIT should be revised at least once per year so that to reflect the changes in price of electricity and equipment, considering how much the initial costs of investment have decreased in the past few years.

III. Improvement of the institutional and infrastructural capacities

Another possible problem could be the fact that Macedonia as a developing country is trying to implement policies which are proving cumbersome even for some of the EU member states. In addition, the country still lacks the infrastructural capacities while the energy sector needs strengthening to ensure the success of Macedonia in the EU access negotiation. An institution or legal entity should be put into place to monitor and control the GHG emissions. Restructuring of the electricity generation and improving the existing plants are obligatory to reduce emissions. Another potential solution could be the implementation of emissions trading scheme, under which power plants could buy permits, for emitting specific amount of CO₂ emissions, at an auction or the government could distribute such permits.

Improvement and restoration of the transmissions and distribution networks is necessary in order to ensure integration of the RES into the

network. Investment is also necessary into off-grid systems, where for instance a household or farm could use the electricity produced by the PV or wind farm. Energy savings policies could dramatically reduce the GHG from the households sector, which consumes around 40% of final energy. If energy savings equipment is released from paying the VAT, this could lead to more investments in such equipment. Moreover, households should be subsidized to invest into renovation or investment which would make their dwelling more energy efficient. Those policies will potentially reduce the demand for energy and decrease the energy import dependency of the country. Moreover, marketing campaigns should raise the public awareness that too much electricity is consumed and that too many GHG emissions are released, which exacerbates the global warming problem.

All in all, it appears that Macedonia already has in place energy policies, which closely follow the ones of EU countries. Only the emissions reduction target is different: under Kyoto is defined as 20% reduction in GHG by 2020 relative to 1990. The general conclusion is that the action plan is not precise enough, the policy implementation progress is slow and at the same time the effectiveness of the policies is not being evaluated. The 2020 goals on emissions reduction and RES into final energy consumption will probably not be reached. Nevertheless, the government could undertake several measures to ensure that Macedonia is on better track for reaching the 2030 targets. First of all, the national strategic documents should be improved by defined better plans and policy instruments incorporating the 2030 targets of the EU Lisbon agenda and the market should be further liberalized. Second, investment into RES in the electricity generating sector and especially into PV needs to be fostered by both domestic as well as foreign investor. Last, but not least Macedonia need development of the infrastructure and institutions to ensure proper development of the energy sector in the future.

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