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FYR MACEDONIA ENERGY POLICY PAPER

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ABBREVIATIONS AND ACRONYMS

CHP	Combined Heat and Power
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EE	Energy Efficiency
ERC	Energy Regulatory Commission
ESM	Electric Power Company of Macedonia
EU	European Union
FI	Financial Institution
GDP	Gross Domestic Product
GEF	Global Environment Fund
GIS	Generation Investment Study
GOM	Government of Macedonia
IAS	International Accounting Standards
IFI	International Financial Institution
LPG	Liquified Petroleum Gas
NEK	National Electric Company of Bulgaria
PPA	Power Purchase Agreement
PPP	Purchasing Power Parity
RE	Renewable Energy
SEE	South East Europe
SEEREM	South East Europe Regional Energy Market
SMD	Standard Market Design
SME	Small and Medium Enterprise
UK	United Kingdom
UNDP	United Nations Development Program
USAID	United States Agency for International Development
US	United States

EXCHANGE RATE (Effective July 2004)

US\$1.00	=	51.1178 MKD
1 MKD	=	US\$0.0195627
1 EURO	=	62.5018 MKD

MEASUREMENTS

GWh = Giggawatt-hour

KWh = Kilowatt-hour

MW = Megawatt

tcm = thousand cubic meters

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PREFACE

This Report provides an overview of the investment and policy choices in the Macedonian energy sector. On the investment side, the Report highlights the criteria under which potential investments in a new Combined Heat and Power (CHP) plant and a new coal mine should proceed. The Report focuses on reforms that would be required to support the CHP project, namely ratification by Macedonia of the Kyoto Protocol and resolution of ownership issues related to the gas pipeline linking Skopje to Bulgaria. The Report recommends development of a Skopje gasification project, and a Renewable Energy Project. Regarding reforms to support Macedonia's participation in the regional energy market, the Report concludes that good progress is being made, particularly as regards development of a regulatory framework for the energy industry. The Report recommends that ESM is restructured prior to privatization, with hydro assets being separated from thermal generation, and possible ownership separation of thermal generation and distribution. The Report also questions the economic viability of the Skopje oil refinery, and recommends that a review of this is undertaken.

The Report was prepared in the first half of 2004 by David Kennedy, Jim Moose and Peter Johansen. Comments from Ardo Hansson, Mohinder Gulati, Quaye Armar, and Venkataraman are gratefully acknowledged. The Report was presented to a workshop of Macedonian government officials and energy experts and was revised in light of comments received. Jennifer Ngaine processed the Report for publication.

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CHAPTER 1

INTRODUCTION/ENERGY SECTOR OBJECTIVES

Macedonia has recently made significant progress in energy sector reform, most notably through adoption of an Energy Law and establishment of an independent energy regulator.

Notwithstanding this, further progress is required if the following objectives – agreed between the Government of Macedonia (GOM) and the World Bank – for the Macedonian energy sector are to be met:

- To provide secure and affordable energy on a sustainable basis;
- To commercialize the energy industry;
- To improve energy efficiency in Macedonia; and
- To improve environmental performance of the Macedonian energy industry.

These objectives derive from the broader goal of the Macedonian government to promote macroeconomic stability and growth whilst protecting poor groups in the population.

Successful implementation of energy sector reform will support: reduction of the fiscal and quasi fiscal budget deficits; provision of reliable and competitively priced energy to Macedonian industry; provision of affordable energy to residential consumers.

Fulfillment of energy sector objectives outlined above is the motivation for this paper, which covers the power, heating, gas and oil sectors.

Outstanding energy sector challenges fall into two broad categories: those relating to maintaining *energy balance*, and *reform* challenges.

Challenges relating to the energy balance derive from the first three objectives above. Reform challenges derive from all four objectives.

Domestic primary energy resources in Macedonia comprise lignite and hydro power. Crude oil is imported through a pipeline from Greece and refined in Macedonia and in addition some products are imported. A small amount of natural gas is imported from Russia through Ukraine, Romania and Bulgaria. Regarding secondary energy, there is a potential domestic power capacity imbalance in the medium term.

Going forward, lignite supplies from working mines will become exhausted in the medium term. This is a crucial point given that currently around 70 percent of power is currently generated from lignite, and power is used extensively in the residential (often for heating) and industrial sectors. In addition, energy demand has increased in recent years, a trend that is likely to continue given forecast macroeconomic growth. In these circumstances, action is required if energy balance is to be maintained.

Options for maintaining energy balance include:

- Opening of new seams in existing lignite mines/opening of new lignite mines;
- Addition of gas fired power capacity;
- Increasing power imports;
- Reduction of losses in power distribution; and
- Increased gasification through construction of new gas distribution networks.

The paper provides a framework for determining which of these options are economically viable/beneficial.

The main messages in the paper as regards energy balance are:

- The Government of Macedonia should support the most *economically beneficial* investment projects from the various alternatives.
- This (economics based decision making) neither *a priori* prefers, nor precludes, the use of domestic primary resources for energy supply.
- A feasibility study is required to confirm the economic benefits associated with exploitation of new mine seams/new mines.
- A feasibility study is required to establish the economic viability of the proposed Skopje CHP plant.
- Should the study demonstrate viability, a strategic investor for the project should be selected through an international competitive tender.
- In order to support the project, the Government of Macedonia should sign the Kyoto protocol, and resolve ownership issues related to the gas transmission pipeline.
- If the project is shown to be not viable, it should not proceed; the CHP plant would become a stranded cost for ESM (the national power utility) in these circumstances.
- ESM should develop a project for reduction of losses in power distribution.
- A Skopje gas distribution concession project should be developed.
- Further work is required to evaluate the economic benefits of new gas pipelines which would facilitate transport of Caspian gas through Macedonia to western Europe.

It is implicit in the above that the paper does not elaborate a detailed investment program (as would, say, a least cost expansion plan for the power sector). Rather, it reviews existing work that has been done, and identifies gaps where further work is required, in order that an investment program can be developed.

It should be noted that the World Bank is supporting several feasibility studies through its administration of a grant from the Japanese Government. These studies, which should be

seen as fully complementary to this paper, should be completed by August 2004, at which point decisions on the energy sector investment program should be made by the Government of Macedonia.

In the interim period before the studies are completed, the *economic* investment program will remain unclear. Given that this is the case, the paper does not propose a balance between domestically produced/imported energy/power going forward. For example, the appropriate level of power imports, from an economic point of view, will depend on feasibility of the proposed Skopje CHP plant. Whether gas should be substituted for coal in power generation will depend on the feasibility of opening the proposed Brod Gneotino coal mine. To reiterate, answers to questions in these areas will become clearer upon the completion of feasibility studies currently under implementation.

The World Bank recognizes that the Government of Macedonia may choose to incorporate other factors (e.g. political, social) in its decision making as regards energy sector investments. One key area will be the extent to which Macedonia relies on the regional energy market for supply of primary (gas) and secondary (power) energy.

To reiterate, this paper abstracts from other considerations (e.g. political), and focuses on economics as a basis for decision making. Decisions based on economic criteria would be optimal from the perspective of Macedonian energy consumers (residential and industrial) and taxpayers.

Regarding reform challenges, it is necessary that further steps are taken in order that secure and affordable energy supply is sustained. Steps relate largely to implementation of the Energy Law as amended, and cover development of the energy sector regulatory framework (particularly as regards secondary legislation for pricing), commercialization and restructuring of ESM, and energy industry ownership.

The paper recommends energy sector reforms that are deemed appropriate in the Macedonian context. Proposed reforms are consistent with requirements under the Athens Memorandum establishing the South East Europe Regional Energy Market (SEEREM), to which Macedonia is a signatory (discussed in section 3.2 below).

The main messages of the paper on the reform side are that:

- Power tariffs should be increased in real terms as investments are undertaken.
- ESM and the Government of Macedonia should adopt and implement a plan for reduction of power sector losses.
- One major challenge for the new independent energy regulator is the development of tariff methodologies for the power sector.
- Generation, transmission and distribution businesses of ESM should ideally be separately owned following restructuring, unless there is a signal from the market that some cross ownership will be required to stimulate sufficient investor interest.

- Thermal generation should be privatized on a stand alone basis (i.e., it should not be integrated with hydro generation or distribution, and subject to the proviso above on cross ownership).
- Distribution should be organized as one company (if the objective is for privatization to an international strategic investor).
- Macedonia should establish a power market surveillance function, though this need not be a standard market operator.
- Pipeline and trading activities of Makpetrol should be separated.
- Secondary legislation for the gas industry should be developed.

The paper is structured as follows: Chapter 2 of the paper discusses energy balance in Macedonia, and considers alternative options going forward, first in the power/coal sectors, then in district heating, gas and oil. Chapter 3 considers energy sector regulatory development and industry restructuring. Outstanding challenges are summarized in Chapter 4, and an action plan proposed.

CHAPTER 2

ENERGY BALANCE

This section of the paper explores options for maintaining energy balance. Given that the primary energy balance is dominated by coal produced almost exclusively for use in power generation, together with hydro power production, power balance is the key determinant of energy balance in Macedonia; energy balance data is presented in Table 1. For this reason, the section starts by focusing on the power sector. Noting that energy intensity is high in Macedonia, the section proceeds by examining measures to reduce energy demand, as listed in Chapter 1 above (reducing power distribution losses, etc.).

Table 2.1: Macedonia energy balance 2000¹

Supply and consumption	Coal	Crude oil	Petroleum products	Gas	Hydro	Electricity	Heat
Production	1209				101		
Imports	105	818	376	54		10	
Exports			-224				
Electricity plants	-1214		-99		-101	585	
CHP plants	-11		-18	-7			22
Heat plants	-15		-125	-35			170
Petroleum refineries		-991	952				
Industry sector	-99		-186	-6		-134	
Transport sector			-360			-2	
Other, including residential	-5		-115			-312	-66

2.1. Power Sector

Installed power generation capacity in Macedonia is 1450 MW, comprising approximately 60 percent thermal and 40 percent hydro plant.

The main thermal generation plant – “Bitola” – has three units each of 225 MW, commissioned starting in 1982 with planned retirement/rehabilitation from 2013. In addition to Bitola, there is a 120 MW lignite fired plant – “Oslomej” – due for retirement in 2013 and a 210 MW oil fired plant – “Negotino” – which, due to prohibitively high

¹ Derived from International Energy Agency Data. Table is a summary of the energy balance and abstracts from aspects of the full energy balance where production / consumption is of small magnitude. A negative entry in rows for *Electricity*, *CHP*, and *Heat* plants indicates consumption by these sectors. Data in thousands of tons of oil equivalent.

fuel costs, has been used very rarely since it was commissioned in 1978. There are also seven large hydro plants in Macedonia with combined capacity 480 MW, and a number of small hydro plants with total capacity around 50 MW.

Table 2.2: Macedonia power demand and supply²

	1993	1998	2003	2008E	2013E	2019E
Power Demand ³ (GWh)	5690	6626	7222	8074	9780	12600
Power Production from existing plants ⁴ (GWh)	5136	6523	6272	5836	1230	1230
Power imports (GWh)	554	103	950	2238	8550	11370
% of Power Imported (Negotino out of operation)	10%	2%	13%	28%	87%	90%
% of Power Imported (Negotino in full operation)				14%	75%	78%

Forecast power demand and supply are presented in Table 2.2 above. On the supply side, the table assumes that there are no new additions to capacity and that plant (specifically Bitola and Oslomej) is retired at current planned dates. The table shows supply for two scenarios: the first scenario assumes that, whilst available, Negotino is not dispatched due to prohibitively high costs; the second scenario assumes that Negotino is dispatched, and is included to illustrate the extent of Macedonia's power import dependency (for example, whilst Macedonia's power imports in 2008 may be close to 30 percent, because it is cheaper to import power than to operate Negotino, it *need* only import under 15 percent).

The table shows that, absent investment in new capacity and new fuel sources, a capacity imbalance will emerge in the medium term, and that by 2013, should Bitola close, Macedonia would be almost wholly dependent on imported power.

It is unlikely, however, that this situation will ensue in reality, given the various investment options open to Macedonia, which include: opening new lignite seams in

² Based on data provided by ESM.

³ Includes all power uses including billed consumption, losses and exports (if any). Estimates from ESM except for 2019 which is an extrapolation by the Bank.

⁴ Excludes Negotino which is not generally used as it costs around 6 cents/kWh. Negotino, however, can produce a maximum of about 1600 GWh per year if required.

existing mines/new lignite mines and – later – rehabilitation of Bitola; investment in new gas fired capacity; and increased power imports.

These are now considered in turn, based on the assumption that the Government of Macedonia will aim to select the most economically beneficial investments from available alternatives⁵.

2.2 Maintaining Current Capacity/Bitola

One key issue as regards power balance in Macedonia is fuel supply to the Bitola power plant. This plant currently consumes 6.5 million tones of lignite annually from the Suvodol mine, where remaining reserves in the upper seam are around 60 million ton (i.e. enough to fire Bitola for another nine years [to the end of the design life for the first unit of the plant]).

A study carried out for ESM by Harza in 2000⁶ suggested that exploitation of deposits in the Suvodol lower seam (where reserves are estimated to be around 36 million tons), and from a new mine (“Brod Gneotino”, with estimated reserves of 43 Million tons), together with rehabilitation of Bitola from 2013, would be economically beneficial. This would partially close the capacity imbalance shown in table 2 above.

The study proposed that equipment from the Suvodol upper seam should be transferred to exploit reserves in the lower seam and at Brod Gneotino, once the upper seam is exhausted. In this scenario, imported lignite would be required to fire Unit 3 of Bitola following rehabilitation to be completed in 2020.

An alternative would be to begin mining of the Suvodol lower seam and Brod Gneotino earlier, postponing the need to import lignite beyond 2020. To the extent that this would require purchase of extra mining equipment, the study suggested that it would not be economically beneficial relative to the case where equipment is redeployed from the Suvodol upper seam.

Since this time, further work on feasibility has been carried out, both by Exergia for the Government of Macedonia⁷, and by ESM. Whilst this work suggests that mining the

⁵ Construction of new transmission interconnections with neighboring countries is not regarded as a priority in this paper in the context of near term actions to maintain power balance in Macedonia, particularly given the additional capacity linking Macedonia and Bulgaria that will become available under an ongoing project. New interconnections might be required to support power balance should the life of the Bitola power plant not be extended beyond the current date for closing (see discussion in section 2.2); assessment of new interconnections could be carried out as part of a new feasibility study depending on the results of the Bitola Fuel Supply Feasibility Study (see section 2.2). Whether additional interconnections (e.g. to Albania) would yield trade benefits for Macedonia will become clear through the Generation Investment Study (GIS) being carried out by the European Commission and the World Bank in the context of regional energy market development, due to be completed by the end of 2004. Clearly, if additional links are justified, then new projects should be developed. At the current time, however, it would be premature to commence with project development.

⁶ Least Cost Expansion Planning Studies, Harza Engineering Company International L.P., April 2002.

⁷ Investment options in the energy sector, Exergia S.A., December 2002.

lower seam of Suvodol would probably be economic, mining of Brod Gneotino is likely to be marginal from an economic point of view. In fact, further work is required to determine the extent to which mining equipment could be shared, and to which new investments would be required in order to exploit Suvodol lower seam and Brod Gneotino.

To this end, the Government of Macedonia has in 2004 commissioned a *Bitola Fuel Supply Feasibility Study*. The study will estimate the levelised cost of mining Suvodol lower seam and Brod Gneotino under various scenarios, and provide a view on the economics of starting to exploit these mines now and in the future.

From an environmental perspective, implications of mining the Suvodol lower seam would be very limited, given that the Suvodol mine is already in operation (i.e., there would be no need to create a new mine or disturb new land). Whilst there would be some increase in dumping of waste material as the lower seam is mined, this could be dumped back into the existing open pit.

Regarding Brod Gneotino, environmental ramifications of exploiting this new mine could be significant, in terms of disturbing land and waste disposal. In addition, mining Brod Gneotino would result in increased dust production, and would require pumping of water from the mine (which would be below the water table) into an adjacent river. Any decision to move forward with exploitation of Brod Gneotino would have to account for these potential consequences, and elaborate mitigation measures.

Should the Bitola Fuel Supply Feasibility Study show mining of Brod Gneotino to be uneconomic, and assuming that the Government of Macedonia is pursuing economic – rather than political [e.g. to maintain employment in the mining industry] objectives, then alternatives of replacing Bitola with imported coal fired/gas fired generation from 2013 should be considered through a new feasibility study. Such a study would consider the costs of rehabilitating Bitola to run on gas rather than coal/adding new gas plants elsewhere in the country/importing power.

Should the feasibility study show exploitation of new seams and/or new mines to be economic, ESM should proceed to develop a Bitola fuel supply project; ESM has had preliminary discussions with the World Bank on this issue. It should be noted, however, that – irrespective of whether the World Bank is able to provide funds - there is a potentially large finance gap relating to the proposed Brod Gneotino project.

2.3 Options for Meeting/Managing Rising Power Demand

2.3.1 Investments in power generation/increased power imports

In order to meet forecast increasing power demand, either investments in new power generation capacity or increased power imports will be required no matter how Bitola is supplied with fuel.

One candidate for investment in power generation is a new 200 MW Combined Heat and Power (CHP) plant to be constructed in Skopje.

A study carried out by the Japan Consulting Institute in 1999⁸ suggested that a CHP project in Skopje would have a favorable economic rate of return. This study did not, however, compare the project with the alternative of increasing power imports. In addition, the assumed gas price in the study of US\$85/tcm has increased to around US\$150/tcm currently.

The Harza study (discussed above) argued that a CHP plant would enter the least cost expansion plan for the power sector. This relied, however, on there being limited capacity for power imports. Subsequently Macedonia and Bulgaria have reached agreement on construction of a new transmission interconnection between the two countries, and a project is now under implementation; thus the Harza assumption on power imports is no longer valid. In addition, gas prices have changed significantly since the Harza study was carried out in 2000.

Recognizing the need to update previous work, the Government of Macedonia has in 2004 commissioned a *Skopje CHP Feasibility Study*. This will explore the economic viability of the proposed CHP plant *vis a vis* power imports and the possibility of converting the Negotino (oil fired) plant to run on gas or imported coal⁹. The study will assess whether there is an economic rationale for a CHP plant and, if so, when such a plant should be constructed.

The feasibility study should be completed by the end of the second quarter in 2004. Assuming that it supports the proposed CHP project (i.e. demonstrates that it would provide power at lower cost than alternatives) a number of actions would be required.

Given the Government of Macedonia's constrained financial resources, construction of the CHP plant would have to proceed as a private project, sponsored by a strategic investor and commercially financed. To this end, the Government of Macedonia should appoint an adviser to select an investor through appropriate / transparent procedures.

The adviser would draft gas supply, power and heat purchase contracts for the CHP plant, together with bidding documents for an international competitive tender. The adviser would work with the Government of Macedonia, providing support in carrying out the tender (issuing request for proposals, technical evaluations, financial evaluations, etc.). It is likely that this process could be completed, and an investor selected, by the end of 2004, or early in 2005. The financing package, to be determined after the tender is

⁸ Feasibility study on the project in the Republic of Macedonia Skopje – 190 MW gas fired combined cycle heat and power plant, Japan Consulting Institute, December 1999.

⁹ Should Negotino conversion be demonstrably economically viable, either through the CHP Feasibility Study, or through another, more detailed study, then a project to implement conversion might be developed. As with the potential CHP project, and taking into account Government finance constraints, such a project would have to be carried out on a private basis.

resolved, may or may not include International Financial Institutions – who could potentially offer equity, debt or guarantees – as required by the investor.

In order for the CHP project to be viable, it is highly likely that the strategic investor would need to be able to benefit from related carbon credits, which in turn would require that Macedonia signs the Kyoto protocol. In addition, a baseline emission analysis should ideally be carried out prior to the tender process; this would clarify the quantity of potential carbon credits related to the project.

It is likely also that project viability would require a reduction from the current gas price in Macedonia. Either the Government of Macedonia/or Makpetrol should negotiate to this end, or the tender process should be organized to give the selected investor an incentive to negotiate a lower gas price. In addition, gas pipeline ownership issues (discussed in section 3.4 below) should be resolved as a matter of priority.

2.3.2 Investment in power distribution

The power distribution network in Macedonia suffers from a lack of investment in previous years. Aging equipment is partly responsible for distribution system losses estimated to be 17 percent of power available. This is a figure which is high by western European standards. Failure to remedy this situation - through investments to rehabilitate and upgrade the distribution network - would result in increasing losses and declining system reliability, particularly in a context of demand growth. Conversely, investment in the distribution network should help to reduce the capacity imbalance in Macedonia (because the electricity would no longer be lost but could be used).

A feasibility study for distribution investments was undertaken for ESM by Harza consultants¹⁰. The study suggested that a US\$60 million investment would yield a loss reduction equal to 4 percentage points, or around 300 GWh of power annually. The associated economic rate of return is in excess of 20 percent - significantly higher than returns associated with generation projects – makes investment in power distribution a priority for the power/energy sector.

In addition, distribution loss reduction would have associated environmental benefits in the form of reduced emissions (sulfur dioxide, nitrogen oxide and greenhouse gasses) relative to a counterfactual of higher thermal power generation to maintain energy balance.

Recognizing this, the Government of Macedonia and ESM are working together with the World Bank to develop an energy project which will include a significant power distribution loss reduction component.

¹⁰ ESM distribution system modernization feasibility study, Harza Engineering Company, June 1998.

2.3.3 Energy efficiency

Macedonia has a considerable untapped energy conservation potential, unlocking of which would help to maintain energy balance. The strongest indication of this potential is to compare the energy intensity expressed as total primary energy production divided by the GDP. Table 2.3 below shows that the energy intensity in Macedonia is on a level comparable with that of its non-EU neighbors but much higher than that of countries of the EU. Even when GDP is adjusted for Purchasing Power Parity Macedonia's energy intensity is about 50 percent higher than that of neighboring EU countries like Austria, Italy and Greece.

Table 2.3: Energy intensity in Macedonia compared to neighbors and EU¹¹

Country	Energy intensity toe/000's US\$ GDP	Energy intensity toe/000's US\$ GDP (PPP)
Non-EU neighbors		
Albania	0.52	0.16
Bosnia	0.68	0.16
Bulgaria	1.49	0.38
Croatia	0.34	0.22
Romania	1.18	0.31
Serbia and Montenegro ¹²	0.50	0.26
Turkey	0.38	0.19
FYR Macedonia	0.53	0.23
Selected EU countries		
Austria	0.11	0.15
France	0.15	0.19
Germany	0.13	0.18
Greece	0.20	0.17
Italy	0.14	0.13

The reason for the high energy intensity can be traced to: i) heavy use of energy in metal processing industry; ii) low-efficiency power generation, supply and consumption; and iii) the prevalence of using electric energy for residential heating during the winter.

Studies¹³ have indicated that opportunities exist for improvement through adoption of well-proven and readily available technologies including efficient appliances, controls and insulation. Application of these technologies on a widespread basis would not only reduce energy demand and help postpone future investments in new generation capacity but would also reduce emissions.

However, a number of barriers are hampering the investment in energy efficiency (EE) projects, most notably: (1) lack of awareness, information, and confidence on the part of

¹¹ Based on data from the International Energy Agency.

¹² Includes Kosovo.

¹³ For example, USAID: Draft Energy Efficiency Strategy, December 2003.

Small and Medium Enterprises (SMEs), Government/budget entities, and residential consumers, on the efficacy of EE investments and technology; (2) lack of capacity in EE project development, including engineering, installation, and monitoring of energy efficiency measures; (3) lack of understanding and capital available through Financial Institutions (FIs) for EE investments; and (4) perceived risks of EE investments by FIs.

The GOM is presently considering embarking on an Energy Efficiency and Renewable Energy (RE) Strategy in order to increase EE/RE investments in the economy. The thrust of the initiative would be to improve the investment climate for EE and RE. The World Bank is providing support through a new GEF grant project, with the objective to remove barriers for investments in sustainable energy, defined as energy efficiency and renewable energy. The GEF project will support development of the Energy Efficiency and Renewable Energy Strategy.

2.3.4 Renewable energy

Macedonia has promising indigenous resources of renewable energy. These include hydropower, geothermal energy, biomass energy, and in the longer term wind energy. However, even though a pipeline of financially viable renewable energy projects has been identified by different project developers, these are not being implemented because of institutional and financial constraints.

The GEF Mini Hydro project that will be completed by the end of June, 2004, has demonstrated that financially viable opportunities exist for tapping of small **hydropower** resources, e.g. by adding small turbine plants to existing water supply pipelines. For the purpose of following up on this project, the Ministry of Economy has developed a “pipeline” of 4 similar projects (each in the range of 0.5 to 5.0 MW) proposed by public sector entities and 11 mini-hydro projects (each in the range of 0.1 to 1.0 MW) proposed by private investors. These projects have all been screened for technical and financial viability, but they mostly still face institutional constraints (e.g. the solving of water rights issues) and all suffer from limited access to finance.

The Macedonian Geothermal Association has prepared a list of eight projects for expansion and rehabilitation of the existing **geothermal** schemes in Macedonia, mainly for use of geothermal heat in greenhouses and for space heating. The projects appear to be financially viable (pay-back time less than seven years) but many face substantial institutional problems (e.g. public ownership of the near-bankrupt spas that own the existing boreholes).

ESM is interested in developing a measurement program to determine the potential for **wind energy** in Macedonia. Such a program would need to be put in place before it would be possible to estimate the financial viability of wind power in Macedonia.

In Kavadarci, center for the wine production in Macedonia, there is interest in projects to prepare fuel briquettes from vineyard waste. The project sponsors have calculated that at

current energy prices such a project would have a pay-back time of five to six years. Several other options for **biomass** use exist.

Removing barriers for use of these renewable energy supply options would increase the supply from indigenous energy sources, create local employment options and mitigate the adverse environmental impact of energy production. The World Bank will assist the GOM in the removal of barriers for renewable energy as part of the new GEF project discussed in section 2.3.4 above.

2.4 District Heating

District heating in Macedonia is largely confined to Skopje¹⁴, where there is currently 487 MW of hot water generation capacity and 26 MW of steam capacity. Annual heat production is around 685 GWh, predominantly for residential and commercial consumers. System losses of around 14 percent are not unduly high by regional standards, although there may be scope for economically viable loss reduction projects.

A study carried out by Exergia for the Government of Macedonia suggested that scope for extending the Skopje district heating network is limited¹⁵. Potential for improved performance of the district heating sector in Skopje will depend largely on the economic viability of the proposed CHP plan (discussed above). A viable CHP plant would allow lower cost supply heat supply as the plant would supply the district heating network with most of the costs of producing the heat paid by the electricity consumers.

Exergia also assessed the scope for district heating outside Skopje. Based on pre feasibility studies carried out for six cities in Macedonia, two of these – Bitola and Kocani - were identified as preferred candidates for district heating projects. Feasibility studies for two projects were carried out by Exergia. The studies suggested that positive economic returns would yield from investments of the order Euro 6 million in Bitola and Euro 6 million in Kocani. Noting that the small project sizes may be an obstacle to securing of finance, one option would be to roll district heating in to wider municipal investment programs; financing could then be sought on a consolidated basis (i.e. for the program as a whole rather than individual projects).

2.5 Natural Gas

Electricity is widely used for residential heating in Macedonia, particularly in urban areas, as shown in Table 2.4 below. Electric heating is both inefficient (as manifest in Macedonia's relatively high energy intensity, shown in Table 2.3 above) and undesirable from an environmental point of view in comparison to the use of gas for heating.

¹⁴ There are small systems in Kocani and Bitola, but Skopje is the great majority of the district heating load.

¹⁵ Investment options in the energy sector, Exergia S.A., December 2002.

Though a gas pipeline was constructed in 1996 connecting Skopje to the Bulgarian gas network, and facilitating the import of Russian gas, capacity utilization is currently under 10 percent, and gas demand is only 1 percent of total energy demand in Macedonia.

Table 2.4: Sources of heat provision in Macedonia¹⁶

	City	Rural	Total
Electric heating	25%	4.55%	16.76%
Wood	63.83%	94%	75.98%
Petroleum	1.4%	0.62%	1.08%
District heating	8.66%	0.62%	5.42%
Burning garbage	0.7%	0.21%	0.5%
Other	0.28%	0%	0.17%
Unknown	0.14%	0	0.08%

Given the presence of the gas pipeline, and population density, Skopje is the most likely candidate for a Macedonia gasification project. The economics of gasifying areas in Skopje currently not served by the district heating network are dependent on the relative price of gas and power. A study carried out by COWI suggested that development of a Skopje gas distribution network would be economically viable at the then current gas and power prices¹⁷.

In order for a Skopje gas distribution project to proceed, a number of issues would have to be settled (e.g. relating to ownership of the gas pipeline) and a framework for regulation of the gas industry developed; these issues are discussed in section 3.4 below.

In addition, a feasibility study would be required in order to elaborate details of a Skopje gasification project. It would build on the COWI study, providing precise estimates of costs and benefits associated with gasification, and through this, to specify a project design (in terms of areas to be covered, number of consumers to be connected, forecast prices, finance requirements, etc.). Such a feasibility study lies well beyond the realms of the current paper.

With progress in these areas, it may be feasible to structure a concession for development of a Skopje network; donor finance should be sought for development of such a concession. To the extent that market sentiment for gas distribution concessions is not favorable – the extent of private sector interest should become clear following tenders for gas distribution concessions underway or planned in a number of South East Europe (SEE) countries - construction of a gas distribution network could be financed on a sovereign basis.

¹⁶ Source: UNDP household survey, 2001.

¹⁷ Skopje gas distribution pre feasibility study, COWI, 1998. The importance of this study in the context of the current paper is in the main message – that Skopje gasification is economically viable – rather than in details, the latter which will require much refining in a feasibility (as opposed to pre feasibility [already completed]) study.

In order for gasification to take place outside Skopje, a new north-south pipeline would be required. Such a pipeline would also potentially facilitate import of Caspian gas to Macedonia, possibly at a lower price than Russian gas. Recognizing the potential for import of Caspian gas through Turkey to SEE, a project to construct a new Greece – Turkey gas pipeline has been developed. In conjunction with the Greece-Turkey pipeline, Macedonia, Albania, Bosnia and Herzegovina, Greece, Serbia and Turkey signed an interconnection agreement in February 2003, whereby there was agreement to explore options for exporting gas from Turkey via Greece to the other signatory countries.

The World Bank has commissioned a preliminary study to establish possible delivery prices of Caspian gas to SEE countries¹⁸. The study suggests that based on current off-take contract prices between Turkey and Azerbaijan, together with transport costs associated with new pipelines, Caspian gas would come in to Macedonia at a price slightly lower than the current Russian gas price. Delivered gas prices could fall if off-take prices in Turkey are renegotiated; there would seem to be scope for this given that off-take prices currently exceed costs of supply. Further work is required before any decisions to proceed with pipeline investment are made. To this end, the EC has launched a major study of gasification in SEE. This should be completed in 2005, and will help to establish whether a north – south gas pipeline in Macedonia is economically viable.

2.6 The Oil Industry

The petroleum sector in Macedonia consists of a refinery in Skopje (OKTA), a petroleum pipeline from the Greek border to the refinery, and a distribution system for petroleum products including terminals and service stations

The country's domestic demand for petroleum products is relatively stable at around 700,000-900,000 tons per year. The main products are gasoline (about 20 percent of consumption), diesel fuel (about 40 percent of consumption) and heavy fuel oil (about 30 percent of consumption). In addition there are miscellaneous products (LPG, jet fuel, lubricants) which account for the remaining (approximately) 10 percent of consumption.

Most of the petroleum products are produced by the OKTA Refinery, including the bulk of the gasoline and diesel and almost all of the heavy fuel oil. The OKTA Refinery is owned by the Greek firm Hellenic Petroleum, following privatization in 1999. Built between 1978 and 1982 using primarily Russian equipment, the refinery is small, and – lacking sophisticated equipment – adds little value.

The refinery is supplied with crude oil through a pipeline jointly owned by Hellenic Petroleum (80 percent) and GOM (20 percent). Built by Hellenic, and completed in 2002, the pipeline has capacity of 2.5 million tons per year (i.e. more than adequate to meet domestic demand and for exports to other countries in the region [e.g southern Kosovo]), and connects the refinery to Hellenic's terminal in Thessaloniki. It is the least cost means

¹⁸ Cost of gas supply to Albania, Bosnia and Herzegovina, Macedonia and Serbia, Economic Consulting Associates, August 2003.

of supplying crude oil to the refinery (although pipeline access charges are high for the period 2002-07 to finance construction).

Notwithstanding the pipeline economics, the refinery is currently fundamentally uneconomic when compared to the alternative of importing petroleum products to Macedonia. Indeed, it only survives due to the presence of tariffs on imported petroleum products; the tariff for imported products is 20 percent, compared to the tariff for imported crude oil of 1 percent. This tariff regime may be seen as a tax, undermining competitiveness of the Macedonian economy, and thus is key from the point of view of Macedonian economic policy.

Based on the above, this paper recommends that the GOM undertakes a study of future options for the OKTA Refinery. Such a study would assess the costs (relatively high priced petroleum products) and benefits (largely employment related) associated with continued operation of the refinery. It would propose measures to support improved operation of the refinery (e.g. labor restructuring, investment to support upgrading, possible construction of a new Kosovo pipeline), and would consider the economic impact of refinery closure, and utilization of the Thessaloniki pipeline for supply of product rather than crude oil.

Such a study would have to be carried out with the full support and cooperation of Hellenic, recognizing that the OKTA privatization agreement is still binding. It is likely, however, given the underlying economics, that the GOM and Hellenic could come to a mutually acceptable solution as regards modification of this agreement in a way that would be of significant benefit for the Macedonian economy.

CHAPTER 3

ORGANIZATIONAL ASPECTS OF THE ENERGY INDUSTRY

3.1 Major Organizations

The Ministry responsible for the energy industry in Macedonia is the Ministry of Economy. A moderately sized unit in that Ministry provides oversight and policy guidance for the sector. In addition there is the Energy Regulatory Commission (ERC) which was established in 2003 and which is moving to regulate electricity tariffs and gas tariffs and to provide licenses for the main participants.

The main sector companies are; the electric company, ESM, which is government owned; the OKTA Refinery, which is private; the Skopje District Heating Company, Toplifikacija, which is private; and Makpetrol, a private company which is the major distributor of petroleum products and claims to own the gas pipeline.

3.2 Development of a Regional Energy Market

Development of a regional energy market would offer significant potential benefits to Macedonia in terms of cheap power imports, reserve capacity sharing, export of hydro power, power transit, and reduced gas prices.

Recognizing potential benefits, and as part of a wider movement to deeper regional integration, the Government of Macedonia, together with the governments of Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Kosovo, Romania, Turkey, and Serbia and Montenegro signed the “Athens Memorandum – 2002” whereby they have agreed to develop a South East Europe Regional Electricity Market (SEEREM).

The Athens Memorandum provides a broad framework for energy sector reform in SEEREM participant countries. It is summarized here, and will serve as a basis for following discussion of energy sector reform in the Macedonian context.

Under the Athens Memorandum, participating countries have committed to undertake the following steps in the power sector:

Policy

- Energy strategy to be adopted.

Effective tariffs and affordability

- Power tariffs and payments discipline to be such that effective tariffs cover costs.
- Social safety net for the power sector to be in place.

Regulation

- Independent regulator to be set up.
- Grid codes to be adopted and implemented.
- Transmission tariff methodologies to be adopted.

Industry commercialization and restructuring

- Increased utility transparency to be achieved through application of International Accounting Standards (IAS) and best practice on corruption abatement as advised by a reputable international body.
- Transmission system operator to be set up. This entity should be independent at least in terms of its legal form, organization and decision making from other activities not relating to transmission.
- Distribution system operator(s) to be set up. This entity should be independent at least in terms of its legal form, organization and decision making from other activities not relating to distribution.

Market development

- Information exchange between national dispatch centers to commence, moving to tele-information exchange amongst dispatch centers.
- Commercial codes to be developed.
- Open network access and liberalization of the market for non household consumers to take place in a phased manner from 2005.

Regarding inter-regional trade, the Memorandum states that the energy market in SEE will be integrated into the European Union's internal energy market.

The 2003 revision of the Athens Memorandum also includes provisions relating to gas market development, and proposes the establishment of a South East Europe Regional Energy Market.

Requirements for the gas sector largely mirror those for the power sector and include: setting up of an independent gas regulator; unbundling of different gas industry functions with legal; separation of transmission and distribution from other industry functions; open access to networks and storage facilities; opening the gas market in a phased manner from 2005; defining eligible customers at that time to include power generators, and such that 20 percent of the market is liberalized; and separate ownership of transmission, distribution. For countries in SEE where gas penetration is currently less than 10 percent, a gas expansion plan to raise use of gas above this threshold before 2010 must be adopted and implemented.

3.3 The Power Industry

3.3.1 Power tariffs

As noted in the summary above, the Athens Memorandum requires that power tariffs cover costs in SEEREM countries. Tariff data is presented in Table 3.1. The current average tariff is adequate for short term financial viability of ESM, as manifest in the positive operating cash flow for the company, as recorded in its 2002 audited accounts and 2003 unaudited accounts.

Table 3.1: 2003 power tariffs in South East Europe and (selected) accession countries (excludes taxes)¹⁹

Country	Residential customer tariff (US cents/kWh)	Non residential (distribution customer) tariff (US cents/kWh)	Average (distribution customer) tariff (cents/kWh)
Macedonia	3.7	5.0	4.5
Albania	3.5	5.5	4.2
Bulgaria	3.2	4.2	3.8
Croatia	8.0	6.6	7.1
Hungary	8.8	7.6	8.0
Romania	6.8	4.9	5.3
Slovak Republic	8.4	9.2	7.6
Turkey	8.2	8.1	8.2

In comparison to other countries, however, average tariffs in Macedonia are slightly low by the standards of SEE, and are well below levels prevailing in western Europe. Though there may not be a case for a significant real tariff increase in 2004, real tariff increases will be required in the medium term to finance investments in power generation, transmission and distribution. At a minimum, real tariffs should be maintained in Macedonia (i.e. the tariff increase in 2004 should least equal to inflation). Beyond 2004, real tariff increases (i.e. tariff increases exceeding inflation) should be implemented to ensure ongoing financial/operational viability of ESM.

As the market for large power consumers is liberalized, as envisaged under the Athens Memorandum, it will be necessary that tariffs are at cost recovery levels for each category of consumers. In particular, cross subsidy between residential/commercial and (large) industrial consumers will not be sustainable in a liberalized market setting.

In Macedonia, households and businesses pay more than large industry for power. The average tariff for large industry in 2003 was 2.4 cents / kWh, with tariffs for some direct consumers as low as 2 cents/kWh. Such low tariffs for direct customers will not be sustainable in a liberalized market. Whilst tariffs may for direct customers may remain lower than those for distribution level customers in a liberalized market (reflecting lower

¹⁹ European Regional Regulators Association database and ESM.

relative costs for the former), current tariffs for direct customers do not cover the ongoing cost of supply, and will have to increase significantly over time.

3.3.2 Power payments

In requiring that *effective* tariffs cover costs, SEEREM countries must ensure that payments problems are tackled prior to market opening. Standard indicators of power sector payments discipline are: collections (revenue collected relative to billed); and losses (non billed consumption).

Table 3.2: 2002 power sector collections in Macedonia²⁰

Consuming Group	Invoices (mln. Dinars)	Receipts (mln Dinars)	Collection (%)
Residential	6437	5848	91
Industrial	6657	6032	90
Total	13094	11880	91

Payments discipline in Macedonia is summarized in Table 3.2. The table shows that collections remain a problem by western European standards – collections in western Europe are close to 100 percent - and this jeopardizes financial/operating viability (specifically, the ability to mobilize finance for necessary investments) of ESM going forward. Regarding commercial losses, these are around 7 percent in Macedonia, and are negligible in western Europe; again, this undermines ESM’s financial viability.

Evidence from other transition economies, and emerging markets, suggests that the best means to tackle payments discipline problems is to introduce the private sector in power distribution; this is discussed more in section 3.3.5 below.

Short of introducing the private sector, a number of measures can help to improve payments discipline:

- Meter reading, billing and payments practices can be modified.
- The government can ensure that budget entities and state enterprises pay bills.
- Legislation can be changed (if needed) to allow disconnection of non paying customers.
- Penalties for non payment (e.g. fines) can be increased.
- New policies can be introduced (or existing policies more strenuously implemented) by the power utility (e.g. as regards disconnection).

In these circumstances, an action plan for improvement of power sector payments discipline, to be agreed between ESM and the Government of Macedonia, and covering the areas above, would help to improve financial viability of ESM for the interim period before privatization.

²⁰ Based on ESM data.

3.3.3 The social safety net

Tariff increases can make power unaffordable, particularly for poor consumers. This is not an argument against increasing tariffs – tariff increases are required for industry viability – but, rather, it is an argument for strengthening the power sector social safety net in order that tariff increases are socially and politically acceptable.

Affordability is a major concern in Macedonia given: (i) the reliance of a significant part of the population (17 percent) on power for heating; (ii) tariff increases to date, and the need to further increase tariffs; and (iii) the current lack of a social safety net for the power users.

A preliminary affordability study of Macedonia has been carried out in the context of the SEEREM²¹; data from this study is presented in Table 3.3. The table contains affordability ratios, measured as household power billed divided by household income, for different types of consumers (households are differentiated by their level of consumption [columns in table 3.3] and their income [rows in table 3.3]).

Table 3.3: Power sector affordability in Macedonia

Consumption (kWh per year)	1200	1700	3500	7500	13000	20000
Monthly bill (MKD)	281.34	388.34	774.39	1629.54	2806.54	4304.54
Affordability ratio for lowest decile ²²	4%	5%	10%	21%	36%	56%
Affordability ratio for medium decile	1%	2%	3%	6%	11%	17%
Affordability ratio for highest decile	0%	1%	1%	3%	5%	7%

The World Health Organization uses 10 percent as the critical threshold, beyond which energy affordability is regarded as being problematic. The table shows that energy affordability is a problem, based on this definition, for consumers of more than 7,500 kWh per year of power (i.e. those using power for heating), and for the unemployed, pensioners and beneficiaries of social assistance consuming less than this amount.

On the basis of the data in the table, policy measures to increase power affordability are a priority to support tariff reform. In the long term, increased use of gas for heating may help to ease affordability constraints. In the short / medium term however, strengthening of the power sector social safety net will be required.

There are two main candidate mechanisms for social support *vis a vis* power consumption: block tariffs, and targeted subsidy.

²¹ Power sector affordability in South East Europe, Ian Pope Associates, November 2003.

²² The population is stratified according to expenditure deciles as reported in the household budget survey of 2001.

Under a block tariff structure, a basic amount of power is provided at a low tariff (typically below cost), with higher tariffs for consumption beyond this level. Block tariffs are attractive because they cover the poor well, and do not require external (budgetary finance). Shortcomings of block tariffs include the fact that they do not target the poor (i.e. they may benefit the not poor also) and that they may result in high marginal tariffs for consumption above the basic level.

Targeted subsidy would typically be given in the form of an ear marked transfer (e.g. a voucher for power consumption) or a cash transfer specifically for poor consumers. A targeted subsidy is attractive because it focuses the subsidy on the poor, and does not distort prices. It may, however, be problematic in a transition economy context given (i) problems in identifying the poor (ii) government budget constraints.

In these circumstances, it is often appropriate to first introduce a block tariff structure and, as ability to identify the poor improves and government budget constraints ease, to then introduce a targeted subsidy.

Without further analysis, it is not clear what the appropriate solution would be in the Macedonian context. Given the need to develop a power sector social safety net in light of ongoing affordability problems, the next step would be for the Government of Macedonia to retain an adviser in this area, with a view to developing/implementing a support mechanism in time for the heating season in 2004.

3.3.4 Power regulation

Development of a power sector regulatory framework will be a key determinant of the sector investment climate. More specifically, the extent to which prices are increased to cover investments, and as a result, whether finance is mobilized, will depend on the regulatory framework, as will privatization of ESM. As noted above, an independent power regulator is also required under the Athens Memorandum.

Recognizing the importance of independent regulation, the Government of Macedonia allowed for the establishment of an independent energy sector regulator under the Energy Law of 1997 as amended in 2002.

The Law (Article 11) states that “In order to ensure reliable and safe power supply for the consumers in the Republic of Macedonia, protection of nature and environment, an Energy Regulatory Commission of the Republic of Macedonia is founded... This regulatory Commission is to be independent and to have the power to establish tariffs for energy (electricity, gas and district heat) and to issue licenses in the electricity area.”

Following passage of the Law, and subsequent amendments, progress has been made, and the Energy Regulatory Commission is now in place. The key power sector challenge for the regulator is now to develop secondary legislation, most notably, tariff methodologies for power generation, transmission and distribution. The transmission tariff methodology

is required under the Athens Memorandum, whilst a generation/distribution methodology would support the requirement under the Memorandum to achieve cost reflective prices.

Two types of tariff mechanism might be used by the regulator: multi year tariffs (sometimes called incentive, price cap, or RPI-X regulation); or cost plus regulation.

Under a multi year tariff mechanism, the regulator sets tariffs to cover forecast costs over a number of years (typically five to seven years). Once tariffs have been set, the incentive for the regulated power company is to seek cost reductions; if cost reductions can be achieved profits are increased for a given tariff. Tariffs are reset at the end of the multi year period (e.g. after five years) at which point cost reductions are passed on to the consumer in the form of lower tariffs in the next multi year period.

Under cost plus regulation (sometimes called cost of service regulation), tariffs are set annually to cover costs. Cost plus regulation typically does not provide incentives for regulated companies to make efficiency gains. Rather, experience suggests that costs tend to escalate under cost plus regulation, and that to counter this, heavy regulation is required; the regulator requires a large and expensive staff, and legal disputes over allowable costs are frequent.

In addition to advantages as regards incentives, multi year tariffs can provide comfort for potential investors, reducing medium term uncertainty over cash flows. It is notable that privatization of power distribution companies in transition economies has typically occurred within a multi year tariffs framework. On this basis, it is recommended that multi year tariffs be made the basis of power sector regulation.

Within a framework of multi year tariffs, a decision is required as to how capital cost will be treated. Amongst the alternatives are to enter capital cost in the tariff calculation at book value, or replacement value, or write assets down. A full discussion of this issue would require too much discussion for this paper. In summary, moving to replacement value as a basis for calculating capital cost would probably require premature tariffs increases (i.e. before tariff increases are required to finance investments). The recommendation in this paper is that, given affordability constraints, capital costs be based on book values.

3.3.5 ESM commercialization/restructuring

ESM has fulfilled requirements under the Athens Memorandum to provide externally audited IAS accounts. A number of challenges remain, however, as regards ESM commercialization. As noted in section 3.3.2 above, payments discipline remains a problem for ESM, with levels of receivables and payables that are high by industry best practice standards. In addition, labor productivity, whilst comparable with that of other power utilities in South East Europe, is low compared with western Europe. These problems should be tackled if Macedonia is to fully benefit from SEEREM development.

Evidence suggests that introduction of private sector strategic investors best supports power industry commercialization. In particular, sale of assets to strategic investors has quickly resulted in improved payments discipline, as shown in Table 3.4. Though the evidence from transition economies on labor productivity is less clear cut, the experience more generally – in developed countries and in emerging markets – is that the introduction of the private sector to the power industry results in efficiency gains.

Table 3.4: Cash collection rates pre and post privatization²³

	Pre privatization	Year 1	Year 2	Year 3
Almaty, Kazakhstan	1	51	70	80
Karaganda, Kazakhstan	10	25	35	46
Telasi, Georgia	8	14	29	55
Moldova	26	58	NA	NA

Though there is no requirement under the Athens Memorandum to privatize power industry assets, as noted above privatization would support SEEREM accession, and the Government of Macedonia has stated its objective to privatize power generation and distribution.

It should be noted that the appetite of the private sector for purchase of power assets in transition economies has declined recently for the following reasons:

- The collapse of ENRON, following which energy traders have focused on balance sheet strengthening rather than international expansion.
- Investors have lost money on power assets in the US and the UK.
- US and European companies lost money in Latin American power following currency devaluation.
- Political/regulatory risk perceptions have increase following problems with Power Purchase Agreements (PPAs) in Indonesia, Philippines, Pakistan and regulatory problems in Hungary, Kazakhstan and Moldova.

Discussion with investors who have previously shown interest in the region suggests that currently there is no appetite for increased (equity) investment in transition economy power sectors from American, English, Spanish and Swedish companies formerly interested in these markets. There is only limited interest from French, German and Italian companies.

²³ Source: Transition Report 2001, EBRD. It should be noted that some of the strategic investors owning the companies in the table have since sold their interests, typically due to problems stemming from the regulatory environment. The importance of a strong regulatory framework is discussed in section 3.3.4 of this paper.

In terms of private participation in SEE, currently no distribution assets are privately owned²⁴. Distribution company privatizations in Romania only received limited interest (two companies were offered, five firms were pre-qualified, and one bid received), whilst in Bulgaria, for three packages of distribution companies offered five firms have pre-qualified.

Clearly it remains to be seen whether investors would be interested in purchasing Macedonian power assets; the GOM's privatization adviser should provide a view on this.

Should investor appetite prove to be limited, a second best solution would be to introduce the private sector under incentive based management contracts; this could help to tackle payments discipline problems in power distribution.

Assuming that there would be interest from investors, this paper supports privatization of power generation and distribution subject to the following provisos:

- (i) secondary (regulatory) legislation should be in place for privatization; and
- (ii) the industry structure for privatization should be one that best supports market liberalization.

Under the Athens Memorandum, there is a requirement that power utilities are unbundled, with legal and functional separation of power generation, transmission, and distribution businesses, in order to create a level playing field for competition.

The following options are consistent with the Athens Memorandum:

- Generation, transmission and distribution are subsidiaries of a holding company.
- Generation and distribution are subsidiaries of a holding company, whilst transmission is a stand alone company.
- Generation, transmission and distribution are separately owned companies.

From a competition perspective, the third option is preferred here, whilst the first and second may be useful interim measures in the power industry restructuring process. From the point of view of privatization proceeds, on the other hand, the first option would maximize revenues to the Government if the assets were to be sold as a single unit.

Before recommending that ESM be restructured as separately owned generation, transmission and distribution businesses, and in the context of planned privatization, it is important to explore whether stand alone generation and distribution companies would be sufficiently attractive to potential strategic investors.

On the generation side, evidence from the region, and from Bulgaria in particular, suggests that Bitola is of sufficient size to be of interest to potential strategic investors. However, in spite of its size the lack of long term fuel supplies could be a major problem

²⁴ Moldova, which has private distribution, is not considered part of SEE.

for investors when combined with any potential environmental liabilities associated with the Suvudol Mine.

Whilst hydro assets could be offered for sale, retaining public ownership here, at least for an interim period, would be beneficial as regards system control, and would allow continued accrual of rents to the Government. Also there are very few countries which have privatized major hydropower assets.

In some transition economies with chronic payments problems and concerns over generation performance, most notably Georgia and Ukraine, evidence suggests that bundling of generation and distribution may support privatization by allowing some mitigation of payments and performance risk.

In the case of Macedonia, payments problems, whilst a serious issue, are not chronic, and generation performance is adequate. In addition, payments risks are limited given that there is only one – rather than multiple – generation companies. In these circumstances, the case for bundling generation and distribution is not convincing, and bundling might work against the Government's objective to liberalize the power market.

This statement is made with a proviso: if it proves to be the case that there is a market signal, such that cross ownership of thermal generation and distribution will be required in order to stimulate sufficient investor interest in privatization, then generation and distribution assets might be offered together in a holding company structure. Whilst the GOM's privatization adviser may provide guidance on this issue, a true market test of investor appetite would allow bids on separate generation and distribution companies and on the same companies together, as part of the privatization bidding process.

The discussion above assumes that Bitola – and associated coal mines – will continue to be economic. To the extent that this is not the case (e.g. if the Brod Gneotino mine proves to be uneconomic) then Bitola is unlikely to be attractive to investors, whether or not it is bundled with other (hydro or distribution) assets.

In these circumstances, and as noted in section 2.2 above, the economic option would be to close Bitola at the end of its design life. Alternative options would be either to subsidize investments in the Brod Gneotino mine, either from the Government budget, or through bundling Bitola with hydro assets and cross subsidizing mine investments from hydro rents. These options would not be consistent with the objectives for this paper laid out in Chapter 1 above.

The question remains as to whether there would be interest from potential investors in Macedonian distribution companies and, more specifically, whether a distribution company would have sufficient critical mass if sold separately from generation.

Evidence here suggests that a Macedonian distribution company should be at least as big as other distribution companies that have been privatized in other transition economies and emerging markets. Table 3.5 shows average size of privatized distribution companies

ranging upwards from 199,00 customers. If Macedonian distribution was sold as a single entity the number of distribution customers in Macedonia (around 600,000) is well above this minimum threshold.

Table 3.5: International examples of electricity distribution privatization²⁵

Country	No. of separate businesses sold	Average number of customers (000's)	Average sale value (US\$ mln)
Argentina	18	356	156
Brazil	17	1581	1067
Peru	9	230	67
Hungary	6	828	183
Australia	5	398	1251
India	4	330	9
El Salvador	3	294	195
Colombia	3	963	651
Bolivia	2	199	58
Domin. Rep.	2	406	161
Guatemala	2	557	311
Panama	2	227	151
Georgia	1	370	26

Regarding whether distribution should be broken into more than one company, there is scope for this based on the data in the table. Experience from Georgia and Moldova, however, indicates that it is difficult to privatize distribution outside the capital city. There may be scope in the Macedonian context for breaking distribution into two or three entities, with possible privatization to local investors. It remains unclear at this time, however, whether there is qualified local investor interest in the sector, and whether performance under ownership by local investors would match that under ownership by an international strategic investor.

In summary, following the discussion above, this paper recommends to following *vis a vis* the power industry structure for privatization:

- Generation, transmission and distribution should be separately owned companies.
- Within generation, thermal and hydro assets should be separately owned.
- There should probably be one distribution company (or more than one if the intention is to sell companies to local investors).

²⁵ Source: Strategy for reform and development of state level power distribution [in India], World Bank, November 2002.

3.3.6 Power market development²⁶

As noted in section 3.3.5 above, power market development is a key means to achieve one overarching objective of this paper- to commercialize the power industry in Macedonia; it is also the main objective in the Athens Memorandum.

Whilst market development should yield benefits, there are also associated risks, for example, potential upswings in residential prices, and possible shortages of capacity. These are recognized in the Athens Memorandum through the proposal that the market be opened in a phased manner, starting with the largest customers, reducing gradually the threshold for eligibility over time. In addition, the Standard Market Design (SMD) for the SEEREM will elaborate mechanisms for protection of residential consumers, and support of investment in necessary capacity. Once these mechanisms have been agreed at the regional level, it will be important that they are adopted in Macedonia.

In terms of institutions required to support market development, and aside from the regulatory framework, there will be a need to establish a *market surveillance* function.

It is likely that the SEEREM will be based initially on a model of third party network access and bilateral contracts between generators and large consumers, rather than a more complex day ahead regional power pool/sub regional power pool. Then market surveillance would relate to contract enforcement and/or implementation of the (to be agreed) SEEREM Commercial Code. This could be carried out by a market operator (i.e. a separate body) but in the Macedonian context, might best be carried out by a unit within the separate transmission company. Even as day ahead trading develops over time, it is unlikely that there would be a Macedonian day ahead market given the limited scope for within country generation competition. The likelihood is that Macedonia will participate in a sub regional/regional market, thus there would be no need for a market operator going forward.

In terms of balancing demand and supply in real time, there is scope for Macedonia to share reserve capacity with other countries in SEE. Recognizing this, ESM has entered an agreement with the Bulgarian power utility (NEK) for sharing of reserve capacity. This paper supports sharing of reserve capacity on a bilateral basis (i.e. the agreement between ESM and NEK), whilst recommending over time that opportunities for sharing reserve with other countries are explored.

3.4 Natural Gas

In order for compliance with the Athens Memorandum, natural gas pipeline and natural gas trading activities of Makpetrol should be separated, preferably – from a competition perspective - in terms of ownership, and at a minimum – for compliance with the Athens Memorandum - to subsidiaries within a holding company.

²⁶ There is an emerging literature on comparative models for power market liberalization. A consensus is emerging that, particularly in transition economies, bilateral contract based markets are appropriate, at least for an interim period; see Transition Report 2001, EBRD, for a discussion.

As part of the separation, it will be necessary to address the issue of (Bulgaria-Skopje) pipeline ownership, currently the subject of dispute between Makpetrol, the Government of Macedonia and Gazprom. Without resolution of this issue mobilization of finance for projects reliant on the pipeline (e.g. Skopje CHP and Skopje gas distribution) will be problematic. Given that these projects may otherwise move forward in a relatively short time frame, it is a matter of urgent priority for the Government of Macedonia to resolve this issue.

The independent energy regulator discussed in section 3.3.5 above will have a remit to set tariffs for the gas industry. It is necessary that the regulator develops secondary legislation covering terms and conditions for third party access to the pipeline. Such a methodology should conform with principles endorsed in section 3.3.5 above (i.e., the methodology should be incentive based). As a Skopje gas distribution project is developed, there will be a need to develop an incentive based gas distribution tariff methodology. In terms of priority, and given that the CHP project would come before the gas distribution project, the pipeline methodology should come before the distribution methodology.

CHAPTER 4

SUMMARY OF CHALLENGES AND NEXT STEPS

Given progress in energy sector reform in Macedonia, outstanding challenges deriving from the objectives stated in Chapter 1 of this paper are:

- To complete feasibility studies for proposed CHP, coal and gas distribution projects, and to implement projects that are shown to be economically beneficial.
- To develop a project for reduction of losses in power distribution.
- Working with the Bank and GEF to develop a project to increase energy efficiency and use of renewable energy.
- To ratify the Kyoto Protocol so that the CHP plant is economically (more) attractive.
- To undertake a study of costs and benefits of the OKTA Refinery including closure.
- For ERC to develop an energy industry regulatory framework.
- To commercialize ESM through improving payment performance and industry unbundling.
- To resolve the gas pipeline ownership issue.
- To establish an Energy Efficiency Agency and Energy Efficiency Fund.
- To review future status of the OKTA Refinery.

Next steps to meet these challenges are summarized as follows:

Power industry

2004

- Completion of feasibility studies for CHP and coal projects.
- Finalization power distribution loss reduction project.
- Power tariff increase to maintain constant real tariff (at least).
- Introduction power sector social safety net as needed.
- Adoption of action plan to improve payments discipline and reduce losses.
- Adoption of a plan for ESM restructuring, and movement of accounting separation of different industry functions.

2005

- Implementation of viable projects in CHP and coal.
- Implementation of distribution loss reduction project.
- Adoption and implementation by regulator of tariff methodologies.
- Implementation of ESM plan for improvement of payments discipline and loss reduction.
- Implementation of ESM restructuring plan through unbundling of the company.
- ESM privatization process to commence.

Renewable energy/energy efficiency

2004

- Preparation of a Sustainable Energy Project.

2005

- Creation of an Energy Efficiency Fund, supported by GEF grant finance.
- Establishment of an Energy Efficiency Agency.
- Completion of a Renewable Energy and Energy Efficiency Strategy.

District heating

2005

- ERC to adopt and implement new tariff methodology.

Gas industry

2004

- Resolution of pipeline ownership issue.

2005

- Adoption and implementation tariff methodologies for pipeline and end users.
- Separation of pipeline and trading functions.

Oil Industry

2005

- Undertake study (preferably grant funded) of future options for the OKTA Refinery.

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