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**UKRAINE
NATIONAL ELECTRICITY REGULATORY COMMISSION
NERC OVERSIGHT OF ENERGO MARKET**

**NIS Institutional Based Services Under the Energy
Efficiency and market Reform Project
Contract No CCN-Q-00-93-00152-00
Ukraine Power Sector Reform
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Final Report

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EXECUTIVE SUMMARY

This position paper describes the appropriate level of National Electricity Regulatory Commission (NERC) oversight of the Energomarket, conformance to market rules and competition in the electricity generation market. This report is a deliverable under Subsection I A in Article IV of USAID Delivery Order No 18 I A (10)

Chapters 1 to 6 of this report documents the mandated responsibilities of NERC within the framework of the latest legislation, decrees, the Energomarket Members' Agreement (the Agreement), and other legal and normative documents. In review of various documents, and in the process of identifying role of NERC in relation to various issues, specific recommendations for addressing those issues are made throughout this report. Also discussed are the key issues and the requisite monitoring and enforcement requirements.

Chapter 7 presents specific recommendations for direct enhancement of oversight capabilities of NERC. These include:

- ▷ Personnel Appointment of 5 dedicated managers reporting to the NERC Head of the Pricing and Electricity Generation Division. NERC may fill these positions may by present NERC personnel responsible for similar activities at NERC. The recommended positions are:
 - ▶ Market Relations Manager
 - ▶ Energomarket Performance Manager
 - ▶ Electricity Generation Manager
 - ▶ Information Systems Manager
 - ▶ Analytic Support Manager
- ▷ Technology installation of a computer network system equipped with database, presentation, and analytic software packages
- ▷ Analysis design of analysis, development of requisite measures and indicators, and automation of data retrieval, data analysis, and report production procedures

Chapter 8 presents in detail the data collection and data analysis activities to be performed by NERC. Also included are procedures for development and interpretations of a number of

measures and indicators to be used for evaluation of Energomarket performance and detection of noncompliance or irregular activities by the Energomarket entities

The first section of Chapter 9 provides a short action list to implement the recommendations of this report

Chapter 9 presents a draft regulation based on the findings of the report, in order to satisfy the requirements of the mandated role of NERC as the overseer of the electricity market performance, enforcer of compliance with electricity wholesale market rules and promoter of competition in the electricity generation market

The draft regulation is designed to set forth the actions of NERC related to data collection from Energomarket entities, description of the data analysis to be performed, interpretation of the findings, and the eventual course of actions in case of determination of noncompliance or irregular activities by Energomarket entities

CHAPTER 1

INTRODUCTION

1.1 CONTENTS OF THIS REPORT

This report documents the mandated role of the National Electricity Regulatory Commission (NERC) as the overseer of the electricity market performance, enforcer of compliance with electricity wholesale market rules, and promoter of competition in the electricity generation market. Based on the findings, the report provides a set of recommendations intended to enhance and support oversight and enforcement capabilities of NERC. An introduction is provided in Chapter 1.

The mission and responsibilities of NERC within the framework of its interrelation with the Energomarket, Minenergo, and other market entities are identified in Chapters 2 to 5. Findings are based on a review of relevant legal and normative documents, including the Act of Ukraine on Electricity Sector, various Presidential and Governmental Decrees, Energomarket Member's Agreement and Market Rules, and the pertinent Licenses issued by NERC. In review of relevant documents, various issues related to NERC are brought to attention, and specific recommendations to address those issues are presented.

Chapter 6 of this report summarizes current institutional and exogenous constraints that must be taken into account in framing a suitable set of objectives for oversight activities of NERC. As the economic landscape in Ukraine evolves, capabilities of NERC should be adaptable to new conditions, and be sufficiently robust to enable it to respond to new requirements.

Chapter 7 provides a set of recommendations intended to enhance personnel and technological capabilities at NERC, and help it to successfully carry out its mission as the overseer of the market performance and watchdog of generation competition. Specific recommendations are made for services of 5 dedicated personnel with specialized functions and responsibilities, and their qualifications. In addition, specific recommendations are made for enhancing technological capabilities at NERC. These include installation a network of computers equipped with database and analytic software packages.

Chapter 8 proposes design of requisite analysis and development of relevant measures and indicators and measures that will provide the NERC with the tools to support its decision making and enforcement activities

In Section 1 of Chapter 9, general recommendations, in the form of a short action list are presented for a staged process to fully empower NERC with its new capabilities. Section 2 of Chapter 9 presents a draft regulation based on the findings of the report. The draft regulation sets out to implement the requirements of the mandated role of NERC as the overseer of the electricity market performance, enforcer of compliance with electricity wholesale market rules and promoter of competition in the electricity generation market.

The draft regulation lays out framework for the actions of NERC related to data collection from Energomarket entities, description of the data analysis to be performed, interpretation of the findings, and the eventual course of actions in case of determination of noncompliance or irregular activities by Energomarket entities.

The Reference section provides a list of documents in English that were used to prepare this report and support the conclusions and recommendations stated herein. Findings are based on a review of the English translation of available documents. The parts taken verbatim from other documents are shown in quotations. Any Italics have been added in this report.

1.2 KEY TERMS

The Agreement	Energomarket Members' Agreement
COB	Cabinet of Ministers
ESE	Energomarket State Enterprise
Genco	Generation Company
IES	Independent Electricity Supplier
Minenergo	Ministry of Fuel and Energy
NDC	National Dispatch Center
NERC	National Electricity Regulatory Commission

Oblenergo Regulated Electricity Supplier

RDC Regional Dispatch Center

Verkhovna Rada Parliament of Ukraine

CHAPTER 2

RESPONSIBILITIES OF NERC UNDER THE ELECTRICITY LAW

2.1 STATE SUPERVISION IN THE ELECTRICITY SECTOR

The Act of Ukraine on Electricity Sector (No 575/97-BP, October 16, 1997) (the Act) lays out the overall features of the Electricity Wholesale Market of Ukraine, and general responsibilities of the NERC

As will be the case in the subsequent sections, this report reviews each relevant document in detail, and as relevant issues to oversight role of NREC are identified, if warranted, it provides specific recommendations to address those issues

Article 9 of the Act, "State Supervision in Electricity Sector," indicates two general areas of inspection by two state inspection organizations. The one meriting mention in relation to NERC is

- The State Inspection in Electricity Plants and Network Operations, to carry out the supervision, over the observance of the technical requirements for the operation of the power equipment of the electricity sector facilities (power plants and networks), connected to the integrated power grid of Ukraine

As discussed in Chapter 5 of this report, Generation and Network Licenses issued by NERC contain requirements and conditions to be satisfied the Licensees. NERC has the authority to monitor and enforce compliance with the license conditions. However, the Act indicates that the State Inspection in Electricity Plants and Network Operation is designated as the state agency that carries out the inspections of generation and network facilities.

The Act does not state the source or the types of norms and standards to be inspected. Further amendments or orders by Minenergo on these issues will be required to clarify the status and the extent of responsibilities of these inspection agencies, and their relation to NERC as the issuer of some of the technical requirements.

- ▷ Recommendation It is recommended that the proposed NERC Market Relations Manager and Electricity Generation Manager (described in Chapter 7) coordinate joint policy actions

in relation to The State Inspection in Electricity Plants and Network Operations State Inspection, and facilitate resolution of problems arising from overlapping areas of authority

2.2 LOCAL EXECUTIVE POWER AND LOCAL SELF-GOVERNING BODIES

Article 10 of the Act provides a number of general areas of responsibilities to the local executive power and local self-government bodies on the territories subordinated to them

These include

- 1 agreement to the location of the electricity sector facilities
- 2 participation in the development of comprehensive plans for power supply to consumers
- 3 participation in dealing with emergency situations
- 4 regulation of tariffs of thermal power in compliance with the Act
- 5 promotion of electricity sector development in the region

None of these activities appears to interfere with NERC or Energomarket activities. However, proper implementation of policies in each of the mentioned areas requires coordination and cooperation with Energomarket State Enterprise (ESE), the Energomarket Board, and NERC. For instance, the Sec 3 6 of the Energomarket Agreement requires that ESE carry out “the annual development of the Ten Year Statement, setting out the planned development of the High Voltage Network over the next following ten years”. Furthermore, NERC is responsible for licensing of any such future facilities. Coordination with development policies of local administrators is then a necessity.

- ▷ Recommendation It is recommended that Local Offices of NERC be provided with directions, rules, procedures, and standards, to address matters of local concerns and to coordinate their activities with local executive power and local self-governing bodies in carrying out their responsibilities in the areas identified above.

2.3 STATE REGULATION OF THE ELECTRICITY SECTOR AND NERC

Article 11 of the Act states that “The agency of state regulation of the activity in the electricity sector shall be the National Electricity Regulatory Commission of Ukraine (NERC)”

Article 12 of the Act lists the main tasks of NERC, as follows

- 1 regulation of the natural monopoly entities’ activities in the power sector,
- 2 promotion of competition in the electric power generation and supply,
- 3 ensuring implementation of pricing and tariff policy in the electricity sector,
- 4 electricity and thermal power consumer rights protection,
- 5 development and approval of electricity utilization rules,
- 6 issuance of licenses for business activities for the right to carry out activity in electricity generation, transmission and supply,
- 7 control over licensees’ compliance with the licensed activity conditions,

The second part of Article 12 of the Act states that “The National Electricity Regulatory Commission of Ukraine, in accordance with the tasks imposed on it, shall participate in the regulation of settlement and payment relations in the Wholesale Electricity Market”

In addition to the preceding statement, items 2 and 3 of Article 12 provide a mandate for oversight of the market competition and for compliance with pricing and tariff policy in the electricity sector

Article 13 of the Act defines the Licensing in Electricity Sector, and assigns the authority for issuance of licenses for electricity generation, transmission, and supply to NERC

Article 14 of the Act defines the activity of the control of the integrated power grid of Ukraine as a “state” function, and delegates the unified centralized dispatch function to a state company appointed by the central bodies of executive power. The Energomarket Agreement, preceding the issuance of the Electricity Act, names this state entity as the State Energomarket Enterprise

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Article 15 of the Act defines “The Wholesale Electricity Market of Ukraine,” which is in general agreement with the provisions of the Energomarket Agreement

Article 17 of the Act describes the “General Principles of Power Tariffs Formation ” This Article can be summarized as follows

- 1 Formation of wholesale electricity tariffs shall be carried out at the Wholesale Electricity Market in accordance with the Agreement
- 2 Retail electricity price shall be formed by the electricity suppliers, according to the conditions and rules for the right to carry out entrepreneurial activity in electricity supply This implies tariff setting according to the conditions set in supplier Licenses issued by NERC
- 3 Tariffs for electricity transmission and supply by the local electric networks shall be regulated by the NERC
- 4 Regulation for the electricity tariffs of Combined Heat/Power Plants (CHP) shall be carried out by NERC with the account of tariffs for thermal power
- 5 Regulation of tariffs for thermal energy shall be carried out by the Council of Ministers the Autonomous Republic of Crimea, oblast, Kiev and Sevastopol City State Administration, except for cases stipulated by the Act

Therefore, one can piece through and identify the responsibilities assigned to or implied for NERC In addition to having the responsibility for the oversight of market competitiveness and for compliance with pricing and tariff policy in the electric power sector, NERC has obviously vast powers as the regulator of the natural monopolies, and specifically as the entity which sets tariffs for those regulated businesses

Regulation of retail electricity tariffs has the potential to be a matter of future contention This issue impacts both the consumer and the supplier, and is a matter that cannot be dealt with exclusively by the terms and conditions of the licenses It is clear that the retail tariff setting is outside the domain of the local administrative authorities However, it is not clear whether NERC currently has sufficient organization, staffing, and expertise capabilities to implement appropriate retail tariff design in different territories and for different suppliers

- ▷ Recommendation It is recommended that NERC establish three to four regional divisions of the Division of Licensing and Pricing in order to coordinate, and set retail tariffs for suppliers in their corresponding territories These regional NERC Offices will deal with two areas of

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retail rate design (i) establishment of distribution, supply charges, and loss factors for different local electric companies, and (ii) verification of energy charges by different suppliers pegged to the wholesale electricity prices applicable to the region. These Regional NERC Offices will have decision-making authority and will work with individual NERC Local Offices in their territories.

CHAPTER 3

ROLE OF NERC UNDER THE ENERGOMARKET AGREEMENT

3.1 SUPERVISORY ROLE OF THE ENERGOMARKET BOARD

A distinction should be made between the “supervisory” role of the Energomarket Board and “oversight” role of NERC. The Energomarket Agreement assigns the Energomarket Board responsibilities for supervision, testing, and auditing of the market operation. The specific supervisory responsibilities of the Energomarket Board include

1. Exercise of overall supervision of ESE in its operation of the Wholesale Electricity Market Arrangements, the Market Operating System and associated activities (Sec 6.6.1)
2. Monitoring on a regular basis each of activities of Energomarket State Enterprise (ESE) as specified in the Agreement and the Wholesale Electricity Supply License in the performance of its obligations (Sec 6.6.2 (c))
3. Appointing an accounting firm as the Market Auditor, to perform annual audit of the activities, calculations, and allocations performed by the SSA and MFA. Market Editor should also perform tests and checks of the Market Software or other elements of the Market Operating System, including a review, every three years, of the scheduling and dispatch (Sec 13.1, and 13.1.1 to 13.1.7)

Hence, the Agreement clearly assigns the responsibility for the overall supervision of ESE and all market activities and calculations to the Energomarket Board. However, the supervisory functions and applicable procedures for the Energomarket Board have yet to be developed. According to the Agreement, NERC is a party to the findings of any supervisory procedures, audits, and tests. This report does not imply transference of any such supervisory activity to NERC, and instead, advocates the implementation of supervisory functions and development of necessary procedures within the Energomarket Board.

The Agreement assigns a number of specific roles to NERC, and assigns to it the final authority having the right to approve the major decisions of the Energomarket Board and the Energomarket General Meetings. Note that the Ukraine Act on Electricity assigns to Minenergo,

in addition to NERC, the right of agreement with the changes in the Energomarket Members' Agreement

3 2 NERC AND THE SCHEDULE 1 OF THE AGREEMENT

The Preamble of the Agreement clearly states that "In relation to this Agreement NERC enjoys the rights and authorities conferred upon it inter alia by the relevant legislation, provisions and licenses" The specific aspects of the Agreement concerning NERC are itemized below

- 1 Approval of NERC is required for the Market Rules, Schedule 2 of the Agreement (Sec 1 1, in Definitions and Interpretations, under Market Rules)
- 2 The method for determining the charge for connection [to the High Voltage Network facilities] shall be agreed with the NERC (Sec 3 3 (b))
- 3 NERC exercises indirect authority, as the issuer of Licenses, in qualifying the new Market Members, since "the candidate shall possess a License for the activity in which it wishes to become a Market Member (Sec 4 2 2 (a))
- 4 NERC shall be notified of any other additional requirements that the Board may require new Market Members to satisfy for membership NERC has three months to state its disapproval for such requirements (Sec 4 2 2 (e))
- 5 In the event any dispute over the Board's refusal to admit a New Member, a reference would be made to the NERC, who will make a decision (Sec 4 2 5)
- 6 NERC shall be informed of the dates and agenda for the General Meeting, and its representatives shall also have the right to attend General Meetings (Sec 5 2 3)
- 7 A Market Member shall be permitted to appeal to the NERC in respect of any decisions made at a General Meeting, which can render the final decisions on the matter of the appeal (Sec 5 3)
- 8 The Board shall include a Non-Voting director from NERC, in addition to a number of other entities (Sec 6 2 4 (b))
- 9 NERC shall cast a vote in the event of a tie vote for the selection of the Board Chairman (Sec 6 3 1)

- 10 NERC may request the Board to convey to ESE or any other Party or the Market Auditor any directions or request of the NERC
- 11 Sec 7 2 5 implies that all orders by the Board to be implemented by the SSA must have been approved by NERC in accordance with the Agreement (Sec 7 2 5)
- 12 The SSA shall be under obligation to notify the Board and the NERC immediately of any instance of an error (Sec 7 3)
- 13 The appointment of a successor to SSA shall be subject to the approval of the NERC within three months (Sec 7 5)
- 14 The appointment of a successor MFA shall be subject to the approval of the NERC within three months (Sec 8 3)
- 15 The SSA and MFA shall submit the results of all tests of the Market Operating System, as are ordered from time to time by the Board or the Market Auditor, to the Board and the Market Auditor and the NERC at *its request* (Sec 12 1)
- 16 The NERC, in addition to the Board, shall have the right at any time (after consultation with MFA and SSA) to propose (and the Market Members in General Meeting shall decide upon) the termination of the contract of Market Auditor (Sec 13 2)
- 17 All reports of the Market Auditor shall be sent to the Board, the NERC and all Market Members
- 18 The Board shall notify the NERC of any defect in the Market Software or any other aspect of the Market Operating System that is brought to the attention of the Board (Sec 14 1)
- 19 The NERC shall formally approve any amendments to the terms of the Agreement. Such approval will be granted within a ten-day period. Any rejection of a proposed amendment shall be in writing setting out the reasons for such a decision and sent to the Board (Sec 15 1 2)
- 20 If any Party refuses to execute an amendment approved by NERC and Market Members together holding 75 per cent of Weighted Votes within 10 working days, the Agreement shall automatically be terminated and would be replaced by a new amended agreement among the concurring Parties. Amendments approved by NERC and Market Members will be included in the text of the Agreement (Sec 15 1 3)

- 21 In the event of any inconsistency or conflict, the provisions of any License shall prevail over the Agreement (Sec 15 2 1)
 - 22 The Board shall notify each Party, the Market Auditor, and NERC of any *biannual reviews* of the operation of the Agreement, and provide them each with a copy of the Board's report accordingly (Sec 16 3, end)
 - 23 NERC, in addition to other parties, shall be notified promptly by the Board, of the notice of Non-Performance by reason of Force Majeure, provided by any Non-Performing Party (Sec 17 1 (a))
 - 24 Consent of the NERC is required for termination of the Defaulting Market Member as defined under the Agreement (Sec 18 2 6)
 - 25 The Agreement may be terminated by a unanimous resolution of Market Members in General Meeting and the prior written consent of the NERC has been obtained or automatically as set out in Sec 15 1 3 (Sec 20 4)
 - 26 NERC may request divulging of any information by the ESE (Sec 22 2)
 - 27 The Agreement states "NERC's Rights For the avoidance of doubt, the Parties acknowledge and agree that nothing in this Agreement shall exclude or restrict any of the rights, powers, privileges, remedies, duties and obligations of the NERC under the relevant legislation or any License (Sec 25 3)
 - 28 The Agreement approved 15 November 1996 drops from the earlier version article 26 3 dealing with NERC's rights
 - 29 The decision of the Disputes Committee in respect of any Notified Issue can be appealed to the NERC within 5 days of the Dispute Committee's decision (Sec 27 7)
- ▷ Recommendation The proposed NERC Energomarket Performance Manager should draft a report itemizing each specific requirement under the Agreement, and define the appropriate administrative and policy actions required meeting those requirements

3.3 NERC AND SCHEDULE 2 OF THE AGREEMENT

The Energomarket Agreement Schedule 2, draft of July 2, 1997, assigns a number of responsibilities to NERC

- 1 Approval of the value of XX (the inflexibility range) established by the Wholesale Market Board (Sec 3 5 3)
 - 2 Establishment of value of the bid cap, k_{NERC} (Sec 5 3 1)
 - 3 Agreement to the value of FCF (Availability Price multiplier), and values of A and B (Availability Price limit coefficients), set by the Energomarket Board
- ▷ Recommendation The proposed NERC Energomarket Performance Manager and the proposed NERC Analytic Support Manager should work with other experts in the industry and government to analyze the available data and technical and economic literature. They should perform other analytical and modeling studies as necessary, in order to provide recommendations to the division head and the Commissioners on values of Energomarket coefficients listed above, together with economic impacts of recommended values and sensitivities to any increase or decrease to those values

3.4 COMPLIANCE WITH ENERGOMARKET RULES

Findings of the previous section indicate a number of distinct responsibilities assigned to NERC in relation to the Energomarket operations. These responsibilities can be classified into the following 3 categories

- 1 Regular liaison with Energomarket Board in relation to Board Meeting attendance, attending to the business of oversight of the Board business in selection of SSA, MFA, Market Auditor, and approval of routine Board and General Meeting resolutions
- 2 Oversight of the Market Rules, approval or setting of the settlements constants and coefficients, review of the Board biannual reviews, review of the Market Auditor reports, review of other tests or checks approved by the Board or requested by NERC, and approval of the amendments to the Market Rules
- 3 Performing settlements of last point of appeals for Market Membership, Market Rules disagreements, and resolution of disputes

The responsibilities classified above require different classes of knowledge information and capabilities. A corresponding list of job classifications at NERC may have the following titles and descriptions

- ▷ Recommendation It is recommended that NERC assign dedicated personnel with responsibilities in each of the following areas
 - 1 Energomarket Relations The first category requires a permanent non-voting NERC representative dealing with the administrative issues of the Energomarket operations. The representative will also have the advising authority within NERC and in relation to the Energomarket Board to approve or disapprove of routine matters of Board Business according to the stipulations of the Agreement. Chapter 7 of this report recommends a position of Market Relations Manager at NERC who would be in charge of Energomarket Relations
 - 2 Energomarket Rules and Performance The second category requires detailed knowledge of Market Rules and corresponding data and information related to the market operations and activities and calculations of the NDC, SSA, and MFA. A group of experts will have the authority to review the new Amendments to the Market Rules, and review Market Auditor reports, review results of the tests and checks on data flow and operations of the NDC, SSA and MFA, and to make decisions as stipulated by the Agreement. Chapter 7 of this report recommends a position of Energomarket Performance Manager at NERC whose responsibilities will cover Energomarket Rules and performance
 - 3 Appeals and Disputes The third category requires need-based decision-making involving appeals and Market Member disputes. One or more NERC Commissioners or directors forming NERC Appeals and Disputes Committee would be assigned to deal with the relevant issues and issue draft final decisions for consideration by the Commission in accordance with the articles of the Agreement

CHAPTER 4

RELATIONSHIP OF NERC TO THE CABINET OF MINISTERS AND MINENERGO

4.1 CABINET OF MINISTERS AND MINENERGO AND THE AGREEMENT

The division of responsibilities among NERC, Minenergo, and the Cabinet of Ministers (COM) is not clear in practice. As history indicates, decisions of Minenergo and COM affect both the technical and the financial aspects of the Energomarket operations. It is a matter of utmost importance for the continued economically efficient operation of the Energomarket to clarify these relationships and delineate appropriate authority of these entities and their relations to each other.

The Energomarket Agreement, in contrast to its treatment of NERC, where it assigns a number of general and specific responsibilities, does not consider any significant role for COM and Minenergo in the approval process or operation of the Energomarket.

The only direct reference to COM and Minenergo is in the event of *system emergency*, which states that

“In the event of a system emergency declared by the Cabinet of Ministers, the Minister of Energy and Electrification of Ukraine acting through the ESE may temporarily suspend the dispatch and determination of the Wholesale Market Price and load management arrangements of the WEM and manage them by direct order. This order shall lapse when the system emergency terminates.” (Sec. 17.4)

Another implicit reference to Minenergo is in Article 14, “Control of the Integrated Power Grid of Ukraine.” It states that “Functions of dispatch (operation and maintenance) control over the integrated power grid of Ukraine shall be carried out by the *state company appointed by the central bodies of executive power* implementing control in the electricity sector.” Implications are that Minenergo, as the “central bodies of executive power implementing control in the electricity sector,” shall have responsibility for dispatch functions. This provides a central role for Minenergo in the operations of the Energomarket. The main source of the body of data for the settlements and funds allocations is NDC. As long as the details of commitment, scheduling, and dispatch software are non-transparent, Minenergo can exert unwarranted control over the financial flows in the market.

- ▷ Recommendation The proposed NERC Market Relations Manager and NERC Energomarket Performance Manager should participate in working groups together with Minenergo and NDC, with the purpose of reviewing the rules and procedures at NDC, and providing appropriate tests and checks on commitment, scheduling, and dispatch software currently used by NDC. The body of work in the report provides sufficient justification for NERC to require participation in such working groups, and require data and information from NDC.

4.2 MINENERGO AND THE PRESIDENTIAL DECREE OF DEC. 1, 1997

The Presidential Decree No 1320/97 of December 1, 1997, titled "Regulations on the Minister of Energy of Ukraine," assigns broad responsibilities to Minenergo of Ukraine, in planning and management of the electric power sector of Ukraine. A number of these responsibilities and resultant activities may be in direct conflict with the intent of the Energomarket operations as stated in the Energomarket Agreement.

The Decree makes reference to NERC in two instances:

- Article 6 stipulates that Minenergo of Ukraine must interact with NERC and other central and local executive bodies.
- Article 9 stipulates that an advisory Board of Minenergo may include managers from the national electricity regulatory body, among others.

No references are made to the functions, responsibilities and the extent of the authority of NERC in the context of the Integrated Power System of Ukraine and the Energomarket operations.

The Decree assigns a number of responsibilities to Minenergo in respect to development and management of the power sector in Ukraine. These overall responsibilities, in addition to promoting government energy policy and ensuring compliance with acts, legislation, other legal requirements, touch a number of activities that influence the development and proper operation of the Energomarket. The list below provides a summary of these activities:

- management of the power industry of Ukraine
- development and meeting consumer demand for heat and electricity
- promotion of the electricity market establishment

- further introduction of economic reform within the sector
- development of relevant financial and economical, and other norms, and approval of the industry standards
- development of antimonopoly policy, promotion of the development of competition
- consideration of proposals of enterprises on location of new and liquidation of outdated production facilities
- submission of proposals on the receipt of privileged credits, determination of privatization features, de-monopolization of the industry enterprises
- coordination of the activity on efficient elimination of emergency consequences at the power sector entities
- establishment of a structure of the state enterprise responsible for central dispatch (organizational and technological) of the Integrated Energy System of Ukraine
- carrying out of the state energy inspection of electricity and heat demand
- coordination of relationships between energy suppliers and energy consumers as regards energy supply
- carrying out of the state energy inspection of meeting the technical requirements for operation of power plants and networks, and energy equipment at the power sector facilities

Article 7 states that “Decisions of Minenergo of Ukraine adopted within its competence are subject to *compulsory execution* by central and executive bodies, local administrations, enterprises, institutions, and organizations *of all ownership forms*, and by Ukrainian citizens”

It is apparent that activities in most of these areas require coordination and interaction with NERC and the Energomarket Board

It is important to note that the Decree does not specify any responsibility for regulation of prices and tariffs to Minenergo, except to the extent that is implied in its “submittal of proposals on the receipt of privileged credits ”

The Decree indicates the general Minenergo responsibilities in the area of inspection of energy sector entities, although it does not identify the specific state agencies responsible for inspection (these are specified in the Act of Ukraine) On the other hand, NERC is given the authority by the Act of Ukraine for issuance of Licenses in the power sector, which are or may be made subject to inspection by either NERC or the government inspection agencies

- ▷ Recommendation Proposed NERC Market Relations Manager and NERC Electricity Generation Manager should facilitate coordination of these inspection activities and cooperate with Minenergo in other arenas such as development of the electricity wholesale market, promotion of competition, development or specification of norms and standards in Licenses

CHAPTER 5

CONDITIONS OF LICENSES FOR ENTREPRENEURIAL ACTIVITIES

5.1 LICENSING AUTHORITY OF NERC

Decree of the President of Ukraine (No 213/95, 14 March 1995) and the Resolutions of the Cabinet of Ministers (No 109/95, 13 February 1995, and No 516/95, 13 July 1995) give the licensing authority to NERC. NERC issues licenses for the following entrepreneurial activities:

- 1 Wholesale Electricity Supply (including centralized dispatch activity)
- 2 Generation of Electricity
- 3 Electricity Transmission by Main and Inter-State Networks
- 4 Transmission of Electricity by Local Electricity Networks
- 5 Electricity Supply at Regulated Tariff
- 6 Electricity Supply at Non-Regulated Tariff

Each class of these licenses includes compliance conditions compelling the license holder to provide data and reports either at a regular basis or as requested by NERC.

5.2 CONDITIONS IN THE LICENSE FOR WHOLESALE ELECTRICITY SUPPLY

Of particular interest are a number of requirements in The License for Electricity Wholesale Supply concerning compliance with the Energomarket Rules. These are:

- 1) "The Licensee must perform its duties that are stipulated by Agreement among members of the Wholesale Electricity Market" (Sec 3.3.1)
- 2) "The Licensee has to implement Centralized Dispatch Control, following the requirements of Regulations and Rules, Instructions and in accordance with Market Rules" (Sec 3.4.1)

Furthermore, The License for Electricity Wholesale Supply requires the following reporting rules (among others)

- 1 “The Licensee must submit to NERC reports for the Licensed Activity in the form established by the Ministry of Finance and Ministry of Statistics of Ukraine and additional reporting forms adopted by NERC by standard procedures” (Sec 3 1 1)
- 2 “The Licensee must provide to NERC, in whatever manner of form and whenever NERC may reasonably require it, any information relating to the Licensed Activity that NERC may reasonably consider necessary to enable NERC to carry out its duties,” (Sec 3 2 1)
- 3 “NERC and its authorized agents have the right of access to the Licensee’s territory, equipment and documents for inspection of its Licensed Activities, and the Licensee shall render necessary assistance, if NERC has grounds to do this to ensure control over the Licensed Activities of the Licensee” (Sec 4 1)

Hence, the License for Wholesale Electricity Supply grants NERC the right to request and receive information and data to ensure control over the activities of the ESE

5.3 CONDITIONS IN THE LICENSE FOR GENERATION OF ELECTRICITY

The License for Generation of Electricity contains similar conditions for compliance of Generation Licensee with the Electricity Wholesale Market Rules and applicable reporting requirements

In addition, The License for Generation of Electricity also contains a number of specific requirements meant, rightly or wrongly, to ensure fair competition among generation companies and to avoid market dominance by any company These conditions include

- 1) “The Licensee must neither Own or Operate more than 25% (30% for a nuclear generating company) of Total Licensed Generation Capacity unless other was approved by NERC and agreed with Minenergo and Antimonopoly Committee of Ukraine” (Sec 2 1)
- 2) If the Licensee owns and/or operates more than 25% of the Total Licensed Generating Capacity (30% for a nuclear generating company), NERC may require that the Licensee reduce, over a period to be determined by NERC (not less than 2 years), its generation capacity in its/his ownership or operation so as not to have in ownership or operation more

than a certain percentage to be specified by NERC and agreed with Minenergo and Antimonopoly Committee (which percentage shall not be less than set in Paragraph 2 1)” (Sec 2 2)

- 3) “The Licensee shall not in any manner or form, collaborate with any other party in the preparation and/or submission of bids except as may expressly be provided by the effective law” (Sec 2 6)
- 4) “The Licensee shall not engage in any form of monopoly activity as specified in the Law of Ukraine “On Limitation of Monopoly and Prevention of Unfair Competition in Entrepreneurial Activities” and in other legislative acts, in particular, in relations of the Antimonopoly Committee or NERC” (Sec 2 9)
- 5) “The Licensee has to provide information on Generation Blocks for Centralized Dispatch in accordance with conditions of operation of the Wholesale Electricity Market of Ukraine and *to guarantee that a bid for generated electricity is based on the costs of the relevant period (italics added)*” (Sec 3 2 2)
- 6) “The Licensee must adhere to all dispatch orders according to the Rules of Technological Operation and to effective regulations, if that does not contradict technological regulations on safe operation of nuclear power plants and on radiation safety The Licensee must make available to the dispatching bodies all technological documents and supply reports and information needed to perform its duties” (Sec 3 2 4)

The authority for NERC to request and receive data and information is contained in the following sections

- 1 “The Licensee must provide NERC on its substantiated requirement, information or reports concerning the Licensed Activities of the Licensee that NERC may reasonably consider necessary to carry out its duties” (Sec 3 5 1)
- 2 “The Licensee must make available in addition more extensive information on the Licensed Activity of the Licensee, if required by NERC, than specifically provided by Paragraph 3 1 [dealing with financial reporting]” (Sec 3 5 2)
- 3 “NERC and its authorized agents have the right of access to inspect the Licensee’s premises, equipment and documents, and the Licensee shall render necessary assistance in the course of inspection of its Licensed Activities, if it is necessary for providing control of the Licensed Activity of the Licensee” (Sec 4 1)

- ▷ Recommendation It is recommended that the proposed NERC Electricity Generation Manager develop the rules, standards, and other measures for monitoring and enforcement of compliance with the conditions of Licensees. The NERC Electricity Generation Manager should also draft work plans for regular audits, data requests, interviews, and any other activity that is deemed required for carrying out responsibilities of NERC. Furthermore, the Electricity Generation Manager should coordinate activities of NERC with other interested parties, especially with the State Inspection in Electric Plant and Networks Operation charged by the Act of Ukraine to carry out plant and network inspections.

CHAPTER 6

STRUCTURAL CONSTRAINTS AND LIMITATIONS

6.1 UNCERTAINTIES IN MARKET STRUCTURE AND INSTITUTIONAL SUPPORT

Ukraine's economy is still in transition. The structural realignments and economic transformation have resulted in a slow down of economic activity and loss of industrial production in the past few years. There is an expectation that in 1998 or 1999 Ukraine may see the start of a recovery in GNP and industrial production. Concomitant with the economic and industrial restructuring, Ukraine's institutional infrastructure, such as federal and local bureaucracy, the banking and financial sector, the legal system, and statutory laws on trading and contracts, are also undergoing transformation. The banking and financial sector and the legal system have yet to develop to a point where they can provide sustained support for the proper running of the market economy.

The electric power sector of Ukraine has gone through a corporatization phase, but it still has not passed the crucial milestone of true privatization of its market entities. A true market business culture is still lacking, and implementation of international accounting standards, business, strategic, and investment planning, and business accountability are still in their infancy.

Specific problems, some external due to the conditions just described, and some internal to the power sector, have introduced structural constraints to the improvement of the sector. Most prominent are the nonpayment problem, low cash collections, barter trading, unregulated trading in secondary debt instruments, and business irregularities such as entrenched corruption.

It is apparent that it will take a few years for these evolutionary transformations to stabilize. Fortunately for Ukraine, a major part of the restructuring of the sector has been accomplished. NERC is occupying a crucial space in the midst of these transformations based on its mandated responsibilities. To support its activities as a regulator of the natural monopoly market and overseer of the natural competitive market, NERC has to have expanded and flexible capabilities, to enable it to respond to changing circumstances. However, the same economic constraints also limit the extent of what can be done. The recommendations of the next section are meant to provide the right balance and trade off between the limited resources and desired features of a more robust NERC.

A broader perspective on forces shaping the process of change in Ukraine also contributes to a more rational expectation on the part of policy makers who are managing the change at NERC and other newly formed institutions formed to guide the new market economy in Ukraine

6.2 WORKABILITY AND RELEVANCE OF PRESENT ENERGO MARKET

Similar external and internal constraints, as mentioned above, also impede or constrict the applicability of certain Energomarket arrangements and rules. Some of the externally imposed constraints, such as the low collection rates, are economic in nature. These constraints limit the unfettered application of Electricity Wholesale Market Pricing Rules. System Marginal Pricing and Availability Pricing, if applied to their full extent, would result in excessive wholesale and retail electricity prices which would be both economically unsustainable due to low collection rates and politically infeasible.

There also exist a number of technical constraints that limit full application of Energomarket rules and contribute to the non-transparency of the market operations. Examples of these are non-duplicable dispatch data due to inaccessibility of the NDC commitment and dispatch, inherent design inflexibility of thermal power plants, outdated heat rate or input-output curves used by power plants and economically inefficient operation of power plants based on non-economic procedures inherited from the Soviet era.

Consequently, as an overseer of the market operations, NERC has the responsibility not only to enforce adherence to market rules and procedures, but should also take positive actions to eliminate these fundamental technical constraints. It can do so by requiring accessibility and test runs of the commitment and dispatch software and regularly updating the market rules and procedures to provide positive incentives for change.

6.3 STATUS OF CURRENT MARKET COMPETITION

Currently, the electricity generation sector of Ukraine consists of four thermal generating companies, two hydro generating companies, and one nuclear power company operating 5 nuclear power plants. As such, it is in a better starting point than was the United Kingdom where two only thermal generating companies were formed at the start of power sector privatization process. In the UK, the regulator (OFFER) had to intervene in the market a number of times, by indirectly imposing caps on generation price bids and by requiring the sale by the two companies of some of their generation assets.

However, although the company mix is more ideal in Ukraine, the companies are subject to aforementioned financial and economic constraints. Ukraine's Energomarket currently operates under imposed price caps due to fuel shortages and poorly maintained plants, problems which in turn stem from the nonpayment problem or retail price limits, hence hindering true competition. However, even in the event of true untangling of reins on the free operation of the market and absent any market collusion, the technical and operational limits of the old-design power plants may not provide a sufficient mix of available and flexible blocks to make the competitive market work properly.

Therefore, it is required of NERC to develop the proper audit procedures, measures and indicators to survey the generation market, in terms of market shares of total generation and shares of flexible generation that compete to set the SMP. NERC should also develop capabilities to understand the bidding and operational behavior of different blocks, power plants, and generation companies. The importance of this issue is evident from the British experience. A non-competitively set wholesale market price, whether through market dominance or through industry collusion, will be reflected in high system marginal and availability prices. A sophisticated generating company can study the trade-off of declaring more blocks unavailable and forego income due if they were to be dispatched against the possibility of a more expensive competing block setting higher wholesale prices, and thus indirectly benefiting from the higher prices. Any marginal increase in prices will have an impact on the overall value of electricity being generated (since all the thermal blocks are paid the same price), and consequently, will translate to higher prices at the retail level. These increased wholesale and retail prices could be significantly higher. The next section recommends additions to NERC capabilities to address these needs.

6.4 UNCERTAINTIES IN THE FUTURE RELATIONSHIPS INVOLVING NERC

The body of legal and normative acts and decrees is still evolving. An important milestone will be effective clarification and untangling of lines of authority between NERC, Minenergo, and other relevant market entities.

Section VI, Part 3 of the Act of Ukraine on Electricity requires that "The Cabinet of Ministers of Ukraine shall until June 1, 1998 work out and submit for consideration by the Verkhovna Rada of Ukraine the draft of Act of Ukraine on the Wholesale Electricity Market Operation." Hence, further changes in the market will be forthcoming.

In addition, plans are underway to review and modify the Energomarket Members' Agreement and Electricity Wholesale Market Rules, sometime in 1998, in order to address various legal and technical issues

An important development will be clarification of the legal status of the ESE and also the Energomarket Board in the context civil business laws of Ukraine. Presently ESE is in some respects indistinguishable from NDC. The SSA and MFA functions are carried out by employees of NDC, but are governed in large part according to rules issued by ESE. NDC still does not have the charter required by its WEM license to clarify the administrative parameters of its operations with respect to ESE.

There is also a movement at Verkhovna Rada to bring NERC under the umbrella, tutelage, and direct control of the Rada. In the event of success of such moves, NERC would cease to be a federal agency under the executive branch. In that capacity, NERC (legislative branch) would have to interact with the Energomarket Board (an association of free market entities based on Agreement), and Minenergo and Inspection Agencies (executive branch). In effect the Rada would have the power to license entrepreneurial activities in the power sector. These and many other near-term developments would have a direct impact on NERC operations, and might entail redefinition of mission, functions, and responsibilities of NREC.

CHAPTER 7

ENHANCING ORGANIZATIONAL CAPABILITIES OF NERC

7.1 ORGANIZATIONAL STRUCTURE OF NERC

A draft of Presidential Decree (No 262/97-BP, 23 December 1997) amends previous presidential decrees by enlarging the size of NERC to a total of 5 commissioner, including the chairman, and specifies a Working Body to consist of a Central Working Body and Local Offices

The present Working Body includes a Secretariat and an Executive Director overseeing a number of Departments and a number of Divisions within each Department. Principal funding for NERC comes from license fees

Present Departments and Divisions are

- Department of Licensing and Pricing
 - ▶ Division of Energomarket and Electricity Generation
 - ▶ Division of Electricity Transmission
 - ▶ Division of Electricity Supply
- Legal Department
- Technical Department
 - ▶ Division of Computerization and Information
 - ▶ Division of Economic Analysis and Prognosis
- Public Relations Department
- Department of Local Agencies
- Department of General Affairs
 - ▶ Division of Accounting, Reporting and Labor Organization
 - > Subdivision Administrative and Economic Team
 - > Subdivision Team of Labor Supply and Information Protection

Currently, one department director is involved with the Energomarket affairs, dealing mostly with settlements and market funds allocation issues. He receives very limited technical support within NERC, and is dependent on assistance from outside consultants helping with the restructuring of the sector. His technical staff involved with ESE includes one computer support assistant whose responsibilities and functions can potentially be expanded. Otherwise, the NERC staff is currently overburdened by attending to a host of problems stemming from the economic difficulties in Ukraine. These include the nonpayment problem, non-cash instruments, barter arrangements, tax issues, insufficient cash collections, funds allocation to entities, fuel shortages, lack of proper metering and data collection, and a host of other problems.

In addition to adequate staffing, NERC also lacks a number of other capabilities. These include independent data collection, auditing, information management system, dedicated analytic department, and technical industry compliance experts.

In addition to its responsibilities for Energomarket oversight and market competition, NERC must handle a host of other activities. These include new responsibilities for regulation of gas supply, transportation, and distribution, oil transportation, electric power supply reliability and quality, consumer rights protection, regulation of local natural monopolies, i.e., oblenergos, including retail tariff and distribution charge settings, and license compliance enforcement. To support expanded responsibilities of NERC, additional departments and divisions should be added to the NERC organizational structure. This report, however, is only concerned with the NERC oversight of market performance and market competition.

7.2 RECOMMENDATIONS FOR ADDITIONAL PERSONNEL AT NERC

To support enhanced responsibilities for Energomarket performance oversight and dealing with market competition issues, the Division of Energomarket and Electricity Generation should employ 5 dedicated managers to deal exclusively with issues of market performance and competition. The dedicated staff may include current employees and technical and support staff. These 5 positions may require additional administrative support. They would report to the Division Head of Energomarket and Electricity Generation. The dedicated positions include

1 *Market Relations Manager*. This is a position for a liaison officer interaction with the Energomarket Board, ESE (NDC, SSA, MFA), Generation Companies, Minenergo, and the Antimonopoly Committee. This high-level position can be filled by the Division Head. It requires general knowledge of the relevant issues and requires a person who can deal with other organizations and their decision-making hierarchies. The Division Head of Energomarket and Electricity Generation can be a candidate for this position.

- Educational qualifications and work experience
 - ▶ Engineering, economics, or legal high education, 5 years of experience in high level managerial position in the energy field, with some government experience
- Responsibilities
 - ▶ Pass a knowledge test of Act of Ukraine on Electricity Sector, relevant Presidential and Governmental Decrees, Energomarket Members' Agreement, Electricity Wholesale Market Rules, Dispatch, Settlements, and Market Funds Procedures, NERC Licenses on Entrepreneurial Activities
 - ▶ Attend Energomarket Board meetings and work with the Board
 - ▶ Attend Minenergo meetings and work with Minenergo personnel
 - ▶ Liaison with ESE, Generating Companies and other market entities

2 *Energomarket Performance Manager* This position requires a person knowledgeable in Energomarket Agreement, Electricity Wholesale Market Rules, rules and procedures of the National Dispatch Center, System Settlements Administration, and Market Funds Administration

- Educational qualifications and work experience
 - ▶ Higher Education in engineering, economics, or the law, 3 years of experience in energy field with numerical capabilities and computer knowledge
- Responsibilities
 - ▶ Pass a knowledge test of Act of Ukraine on Electricity Sector relevant Presidential and Governmental Decrees, Energomarket Members' Agreement, Electricity Wholesale Market Rules, Dispatch, Settlements, and Market Funds Procedures, NERC Licenses on Entrepreneurial Activities
 - ▶ Oversee the Energomarket Operation through regular attendance of meetings, inspection of relevant organizations and interview with their personnel

- ▶ Review data and information regularly received from various market entities
- ▶ Review overall economic efficiency, consistency of Market Rules, and effective organizational and operational procedures
- ▶ Make policy recommendations to directors and commissioners when finding evidence of nonperformance, inefficient operations, imperfect market rules or inefficient procedures
- ▶ Provide the technical and economic advice to NERC for approval of amendments to Energomarket Agreement and changes to the Market Rules dealing with dispatch, settlements, and funds allocation
- ▶ Prepare quarterly reports for review by Division and Department Heads and the Commissioners

3 *Electricity Generation Manager* This position requires a person knowledgeable in technical and economic issues related to electricity generation, including capabilities in economic analysis related to fixed and variable costs, plant operation, knowledge of incremental cost curves, and other knowledge as may be required

- Educational qualifications and work experience
 - ▶ High Education in engineering and/or economics 3 years of experience in working in the power sector, with numerical capabilities and computer knowledge
- Responsibilities
 - ▶ Pass a knowledge test of Act of Ukraine on Electricity Sector, relevant Presidential and Governmental Decrees, Energomarket Members' Agreement, Electricity Wholesale Market Rules, Dispatch, Settlements, and Market Funds Procedures, NERC Licenses on Entrepreneurial Activities
 - ▶ Work closely with the personnel from other divisions and be mostly concerned with the compliance of Generation Licensees with both their license conditions and the Electricity Wholesale Market Rules

- ▶ Ensure effective competition in the generation market by analysis of bidding behavior of Gencos, and tracking each company's share of the generation market in total electricity generated to make sure they comply with the 25% rule and also by comparing shares of flexible blocks setting the effective System Marginal Price
- ▶ Make policy recommendations to NERC directors and Commissioners in case of evidence of market dominance, or evidence of collusion among market members
- ▶ Interact with the appropriate NERC Local Offices responsible for territories containing power plants and generation companies
- ▶ Prepare quarterly reports for review by Division and Department Heads and the Commissioners

4 *Information Systems Manager* This position requires a computer network expert with background in design and management of database systems

- Educational qualifications and work experience
 - ▶ Higher Education in computer science, 3 years of experience in computer network management, information management systems, and database system control or management
- Responsibilities
 - ▶ Pass a knowledge test of Act of Ukraine on Electricity Sector, relevant Presidential and Governmental Decrees, Energomarket Members' Agreement, Electricity Wholesale Market Rules, Dispatch, Settlements, and Market Funds Procedures, NERC Licenses on Entrepreneurial Activities
 - ▶ Maintain the information management system
 - ▶ Provide computing, data handling, and report generation support to other managers and technical and support staff
 - ▶ Receive, retrieve, and collect Energomarket performance and electricity generation data (ideally by electronic communication), including generation

technical, economical, and market offer data dispatch operations, settlements calculations, and market funds allocation data

- ▶ Prepare quarterly reports for review by Division and Department Heads and the Commissioners

5 *Analytic Support Manager* This position requires a person with analytical capabilities and computer knowledge in usage of spreadsheet and presentation software

- Educational qualifications and work experience
 - ▶ Higher Education in engineering or economics, 3 years of experience in data analysis
- Responsibilities
 - ▶ Pass a knowledge test of Act of Ukraine on Electricity Sector, relevant Presidential and Governmental Decrees, Energomarket Members' Agreement, Electricity Wholesale Market Rules, Dispatch, Settlements, and Market Funds Procedures, NERC Licenses on Entrepreneurial Activities
 - ▶ Analyze the regular influx of technical and economic data coming to NERC, and in the context of Market Rules and bidding, dispatch, settlements, and funds allocation procedures
 - ▶ Provide the necessary analytical results and extracted information necessary for informed decision making by other managers
 - ▶ Prepare quarterly reports for review by Division and Department Heads and the Commissioners

In the future if the financing and budget of NERC allows, it would be ideal to have a two-person team for each position, to provide a fault-tolerance capability, continuity, flexibility, and skill retention to NERC operations in case of loss of personnel. The second person may hold the title of Assistant to the Manager and act as an apprentice, in-job trainee, and general support

7.3 RECOMMENDATION FOR TECHNOLOGY SUPPORT AT NERC

To support proper oversight of the market performance, market competition and enforcement of compliance with applicable Licenses, rules, and regulations, it is necessary to enhance capabilities of NREC in the areas of Information Management Systems and Technical and Economic Analyses. An ideal system would include the following features:

- Computer Network
 - ▶ Dedicated server
 - ▶ A number of networked personal computers (for manager and assistants)
- Communication
 - ▶ Dedicated high speed modem line for automatic retrieval of data
 - ▶ Internet and e-mail capability for research and communication
- ◆ Database Capability
 - ▶ General purpose, user-friendly, and easy to modify and expandable
 - ▶ MS Access and/or Visual Basic
 - ▶ Data and document database
- Analytical, Presentation, and other Software
 - ▶ MS Word
 - ▶ MS Excel
 - ▶ MS PowerPoint
 - ▶ Statistical packages (for example, SAS)

The list provided here is only a recommendation based on cross-software transferability and availability of Cyrillic based versions, and compatibility with software currently being used by market entities. Alternative software packages should also be reviewed before a final decision is made. NERC should issue requests for proposals for competitive procurement, installation, and maintenance of the recommended hardware/software configuration. A rough estimate of equipment and software cost, including licensing, is \$20,000 to \$30,000. Application development may require a full-time assistant working under the Analytic Support Manager and the Information Systems Manager.

Empowering NERC with the recommended capabilities will require a rigorous training program and regular retraining updates for its personnel to cover both policy and technical issues

CHAPTER 8

DEVELOPMENT OF ANALYSIS DESIGN, MEASURES AND INDICATORS

8.1 ENERGO MARKET DATA FLOW AND ANALYSIS

A primary task for enhancement of NERC oversight capabilities is to identify and prioritize the most pertinent analyses, measures, and indicators of market operations. An initial step is to go through a full cycle of data collected, processed, and transferred by the NDC, SSA, and MFA. This will enable identification of (i) the missing links, (ii) departures from Market Rules, (iii) systematic errors, (iv) areas for modification, and (v) procedures for automation.

According to the Energomarket Members' Agreement, the Energomarket Board is also responsible for the supervision of the market operations. Therefore, similar capabilities should be created at the Energomarket Board with full access to all data generated at the market.

A most important issue is the non-transparency and inaccessibility of the commitment, scheduling, and dispatch software used at NDC. Settlement calculations and funds allocations and therefore, determination of payments to generators are based on the results of these programs. Requirements for these programs, with rules and procedures for their operations, are not specified in the Energomarket Members' Agreement or any schedules to the Agreement. In other words, it is not clear whether unit commitment, block scheduling, and actual dispatch are based on optimal least-cost methodology. The lack of capability to duplicate results of these programs, especially values of Scheduled Generation and Instructed Generation, makes it impossible to validate the final results of Settlement Calculations and Funds Allocations.

Ideally, the Energomarket Board and NERC should have the capability either to reproduce the results of these programs, or at least to have full access to the methodology and mechanism of these programs.

A related factor hampering validation of operational data is the absence of a Dispatch Journal containing a description of the actual decisions made and implemented in real time. In addition to other data and information, the Dispatch Log should be developed, used, and made available to the Energomarket Board and NERC.

The following sections present lists of recommended analyses, measures and indicators, mostly in the form of proposed graphs, a good number of which have been produced by the team of data analysts at Hagler Bailly Kiev

8.2 ANALYSIS AND REPORT GENERATION

NDC collects, processes, and transmits a continuous stream of data on a daily basis for scheduling and dispatch at NDC, settlement calculations at SSA, and funds allocation at MFA. The useful measures and indicators are identified by going through a complete cycle of bidding scheduling, instructing, actual dispatching, post-dispatch adjustments, settlements calculations, and funds allocations

Most of the proposed investigations are based on the findings of the Hagler Bailly data analysis team including insights gained from meetings at NERC and NDC. The list here proposes some additional analysis and extension of the current work

8.2.1 Collection and Spot Checks on Daily Cycle of Data

The list of data to be collected and checked daily is based on the daily data cycle produced starting with generation bidding and ending with funds allocation calculations. Here is a cursory list

- daily price offers, hourly maximum and minimum availability declarations, hourly flexibility declarations
- forecast and actual load and interchange data by RDC regions and total system
- commitment schedule (day-ahead scheduled generation)
- instructed generation (same day instructions)
- actual and adjusted generation
- pre and post system marginal price calculations
- availability price forecasts
- block settlement bid price, block stack price
- actual flexibility, block actual availability
- various indicators and instructions determining payments, such as scheduled block start-up indicator and constraint start-up indicator
- settlements calculations, including constraint payments, generation payments, block penalties, unscheduled availability
- uplift components

- loss calculations
- market funds allocation calculations

Currently, most of these data are collected in a number of separate spreadsheet files in a rather haphazard manner. Daily reviews, manual checks, and presentation of the results based solely on the collection of these spreadsheets are daunting tasks.

> Recommendation

- ▶ The present activity of production of graphs and tables based on NDC and NERC data at Hagler Bailly Kiev should continue. It is recommended that daily graphs or tables of average values be done for QSP (qualifying settlements period currently hours 7 to 23) and non-QSP.
- ▶ In parallel to the current activities, a new data platform and presentation format should be devised based on the operational data flow and connections between different variables. This effort will consist of identifying the source data and their original format, and modifying the current spreadsheet formats for increased presentation consistency and easy downloading from the source. The short list provided above can be used as a starting point, and modified later to exclude any redundant data.
- ▶ At a later stage, spreadsheets should be replaced by a user friendly database program with easy data down-load and presentation capabilities.

8 2 2 Confidence in Unit Commitment, Scheduling, and Dispatch Programs

As pointed elsewhere in this report, the procedures for commitment, scheduling and dispatching at NDC, in general, are non-transparent. A number of data items generated by NDC on a daily basis cannot be reproduced using only the available generation offer data and the forecast load. For instance, neither the Agreement nor the Market Rules specifies the methodology for determination of Scheduled Generation (SG) or Instructed Generation (IG). Yet, these values are the determinants of Wholesale Purchase Price (WPP) and payments to each block. The values reported by NDC for SG and IG are simply taken as given in the settlements and funds allocation calculation. It may appear that to check the down-stream data for accuracy without having confidence in the up-stream data is pointless. However, it is still worthwhile to develop the analytic and presentation capabilities at NERC, in order to check for inconsistencies and inaccuracies in other aspects of market operations and calculations.

Considering the intent and specifications of the Energomarket Members' Agreement and conditions of the Wholesale Supply License, NDC is responsible for operation of the system based on economic efficiency principle. According to the Agreement and other documents reviewed previously, it falls on the Energomarket Board to supervise and on the NERC to enforce compliance with the market rules and the terms and conditions of the Wholesale Supply License.

> Recommendation

- ▶ At the earliest time possible, NDC should make available to NERC and Energomarket board, the unit commitment, scheduling, and dispatch programs being used at NDC and RDCs, including operational manuals, input and output data, and validation test runs.
- ▶ At a later phase, these programs should be evaluated, and if found to be unsatisfactory, should be modified, extended, or replaced at the direction of NERC, the Energomarket Board, and panel of industry experts.

8 2 3 Analysis of Bidding Patterns by Block types and Generating Companies

There are three themes that relate to how generation companies make price offers. First, the conditions of the Generation License require that the plant price bids be based on actual costs. Second, the price setting in the wholesale market is influenced by the price bid of the marginal flexible block. Third, collusion and market dominance are not conducive to competitive price.

setting

Each of these themes warrants a closer look at how generating companies make their bids. Daily data are made available by NDC, including block no-load heat, block start-up costs, and block incremental costs at 4 elbow points. Other available data include block types, fuel types and fuel prices.

- ▷ Recommendation Continue the present Hagler Bailly Kiev data analysis and result presentation activities, and expand it to cover additional activities included in the list below. After review and approval by the Hagler Bailly NERC project manager, and any necessary modifications, the calculations and presentations should be automated to the extent possible for transfer of methodology to NERC. The following list, which includes many of the current activities, is a suggested initial investigation.
 - ▶ Classify block types by (i) company, (ii) plant, (iii) RDC location, (iv) size, (v) fuel, (vi) technology, (vii) age based on decade of commissioning, (viii) others
 - ▶ Determine monthly average, maximum, minimum, and standard deviation of BNL, BSU, INC for each block
 - ▶ Plot the graph, for each month, of the daily bidding maximum values of BNL, BSU, INC for each block
 - ▶ Chart or tabulate the monthly average, maximum, minimum, and standard deviation of BNL, BSU, INC for each block type grouping (i) same size and same fuel, (ii) same size, same fuel, same location, (iii) same size, same fuel, and same company, (iv) other possible combinations. Purpose is to identify blocks bidding out of the expected range. Note that there are 3 values of BSU and up to 4 values of INC. Initially, all data must be investigated in order to select a subset that would prove most valuable and provide the most information
 - ▶ Plot a graph for a year's worth of daily bidding values for selected blocks. On the same graph show the applicable fuel price trend

- ▷ Recommendation During the Soviet days, each power plant's operational characteristics were tested and summarized in "incremental fuel cost" curves (or basically a heat-rate curve multiplied by fuel price). The incremental fuel cost curves of individual plants may have been updated regularly. If so, NERC should have access to individual generation unit incremental fuel cost curves. NERC should

- ▶ Request and receive updated HOP curves for each power plant in Ukraine
- ▶ Compare monthly average bid values to information from generating unit incremental fuel cost curves. Further work may be required to separately identify no-load heat and start-up costs
- ▶ Plot a graph of the cumulative bid curves (or incremental fuel costs) cost/MWh and/or hourly costs versus MWh for total generation, and for each generating company for 7 days of one randomly selected week of the month. Compare the graph to the incremental fuel cost curves provided by the generation companies

As implied in the previous section, lack of full information on procedures for determination of scheduled generation and same-day instructed generation, and the absence of a Dispatch Journal hinder full review and validation of many aspects of the market operations. For example, it is not clear why some blocks are constrained on and some are constrained off, or how being constrained on or off correlate with transmission constraints and other factors. Some plants may use the transmission capacity availability information, and expectation of being constrained on or off, to bid prices in a such way that will directly benefit them if they have dominant market position in a natural market area (an area surrounded by constrained transmission)

- > Recommendation Use the information on constrained on or constrained off blocks to do the following analysis
 - ▶ Chart and compare bids by constrained on and constrained off blocks
 - ▶ Analyze dispatch of unscheduled blocks and non-dispatch of scheduled blocks for the same plant
 - ▶ Identify blocks which are persistently constrained on or constrained off and determine the reasons for this occurrence (transmission constraints, market dominance, etc)

The expected outcomes of the recommendations of this section are

- (i) To detect general patterns of bidding related to various block type attributes and fuel price,
- (ii) To detect and identify unexpected or out of range bidding behavior blocks or plants, or companies, and

- (11) To check whether, as stated in the Generation Licenses, the block price bids conform to their actual costs

8 2 4 Analysis of Block Flexibility Declarations

Block flexibility values, in addition to price bids, and block availability declarations are determinants of the system marginal price (SMP) Furthermore, the actual competition in the generation market, in terms of price setting, is between the available and flexible blocks Analysis of availability and flexibility patterns will enable an assessment of real competition in the generation market, and provide insight into the SMP and AP values

> Recommendation

- ▶ Investigate and identify blocks and block types which are by design inherently inflexible
- ▶ Identify the daily list, number of blocks, and hours a day each block is declared flexible based on availability formula for qualifying settlement periods (QSP hours 7 to 23)
- ▶ Identify the daily list, number of blocks, and hours a day each block is declared flexible based on setting the flexibility declaration to 1 for a complete 24-hour cycle
- ▶ Chart the (i) total number of blocks declared flexible, and (ii) total blocks available, for each generation company, for each hour of the month (or averaged for QSP hours, and averaged for non-QSP hours)
- ▶ Chart a graph of the percentage of total blocks declared flexible by each generation company over the total available blocks
- ▶ Chart a monthly graph of the hourly total capacity in MW declared flexible, and (ii) hourly total capacity in MW declared available, for each generation company (or averaged for QSP hours, and averaged for non-QSP hours)
- ▶ Calculate the Herfindahl Hirshmann Index (HHI) based on the MW value of blocks declared flexible, grouped by (i) blocks, and (ii) generation companies (see memo on Competition by Jim Stanfield for definition of HHI The memo notes that “In

evaluating mergers in the US, an HHI above 1800 is considered a danger signal, an HHI of 2500 is frequently considered the optimal screen for decisions whether to regulate an industry's prices")

- ▶ Calculate the HHI based on the number of blocks declared flexible to total number of flexible blocks

The expected result is

- (i) To ensure that the market rules are being followed,
- (ii) To identify blocks violating the rules,
- (iii) To check whether the rules themselves contribute to the high level of inflexibility and lower competition,
- (iv) To check the degree of competition at different times of day and night. In case inconsistencies are detected, NERC should require generation companies to report reasons for such inconsistencies

In case of incidents of low competition based on the above analysis, NERC and the Energomarket Board may have to propose measures to rectify the problem

Future analysis may look into sensitivity of prices or number of blocks declared flexible to the increase in the flexibility range in the flexibility formula given in the Energomarket Agreement

Another issue to investigate in the future is the impact of current flexibility rules and bidding behavior on the day and night prices

8.2.5 Analysis of SMP and AP

With the advent of full competition, the System Marginal Price (SMP) and the Availability Price (AP) will set the Wholesale Purchase Price (WPP) and, along with other power purchase costs and uplift, the Wholesale Market Price (WMP) in the Energomarket. Not only would SMP and AP influence the level of prices for ultimate customers in Ukraine, they will also be the signals that will drive investment decisions in Ukraine's power sector. Hence, it is incumbent upon NERC and the Energomarket Board to establish the capability to observe and analyze changes

SMP and AP in relation to other variables, and to identify and forecast trends driving these price components

> Recommendation

- ▶ Chart a weekly figure consisting of hourly values of weighted averages of SMP (by MWh), and total demand
- ▶ Chart a weekly figure consisting of hourly values of weighted (by MWh) average of AP and the difference between total maximum declared availability and total demand
- ▶ Investigate availability declaration behavior of generation companies by plotting the hourly Maximum Declared Availability of each block, and establishing average, maximum, minimum, standard deviation, and other statistical indicators for a given time horizon such as a week, a month, or a quarter. This investigation is intended to detect irregular behavior, gaming, and collusion in declaration of availability with the intention to create capacity shortage and induce higher AP
- ▶ Determine which block types set SMP (SMP includes BNL and BSU, in addition to INC)
- ▶ Determine contribution of BNL and BSU in SMP in the month based on SG data
- ▶ Analyze the effect on the average cost of energy of unbundling BNL and BSU bids (paying each generator its own such costs), and determine how best to accomplish this
- ▶ If BNL and BSU costs remain bundled, determine the best way to do so, i.e., how to factor them in or how to spread them over the hours and blocks
- ▶ Do regression and multivariate analysis (if sufficient data is available) of SMP and AP based on the following variables
 - day-type (day-of-week)
 - time-of-day
 - total system demand
 - total available capacity
 - ratio of total number (or size in MW) of flexible blocks to total number (or size in MW) of total available blocks (or HHI index as described before)

- fuel prices
- average ambient temperature in Ukraine
- others

The last proposed analysis should be designed carefully, because as noted previously other components and factors influence of the values of SMP and AP, and care must be taken in inclusion of relevant variables. This is a first cut approach. More sophisticated statistical and stochastic techniques for price analysis and price forecasting do exist.

8 2 6 Investigation of Impact of Price Caps on Competition and Funds Allocation

Presently, price setting in the Energomarket does not adhere to the letter of the Agreement. NERC imposes caps on maximum price bids. NERC also changes the Fixed Costs Factor and the high and low points of the interpolation range for the calculation of the Availability Price. Finally, irrespective of the price determined by the rules, the actual price paid to thermal generators is established ex-post by NERC.

> Recommendation

- ▶ Analyze the impact of price caps and sensitivity to price caps, both in terms of impact on competitive bidding behavior of blocks and also in terms of implications for determination of funds allocation. The methodology for this investigation will require development of adequate modeling and simulation methodology. Techniques for simple spreadsheet analysis should be investigated first.
- ▶ Analyze the impact of different Fixed Cost Factors and different high and low points of the interpolation range. The original parameters were set at \$50.00 for FCF, 2,000 and 1,000 MW for high and low points respectively. These parameters are now \$10.00, 600, and 300. What would be the impact of, say, \$5.00, 2,000, and 1,000? Or of \$10.00, 2,000 and 300?

8 2 7 Keeping track of Settlements Calculations and Market Funds Allocations

Data on Settlements Calculations and Market Funds Allocations are produced and delivered regularly to NERC. Hagler Bailly provides regular analysis for the data and produces presentation graphs illustrating the changes and trends. This work is recommended to continue.

Recommendation below provides an expanded list of graphs that will help with detecting changing patterns and/or inconsistencies in the data

> Recommendation

- ▶ Plot a monthly figure consisting of daily bar graphs (totaled for QSP and non-QSP) depicting (i) total generation by generation type (thermal, nuclear, hydro, and interchange), and total demand
- ▶ Plot a monthly figure consisting of daily bar graphs of total generation by each thermal generating company
- ▶ Plot four monthly figures, each consisting of bar graphs of daily values of installed capacity multiplied by 24 hours, daily sum of declared maximum availability, daily generation, and linear graph of percent utilization
- ▶ Plot a monthly figure consisting of daily bar-graphs of (i) total collection target calculated based on sum of payable due to generators and networks and other system costs, and (ii) collection target calculated based on weighted average tariffs
- ▶ Plot a monthly figure of daily bar-graph of (i) total collection target, and daily linear graphs of (ii) weighted average tariffs, and daily bar-graphs of (iii) total amount of energy delivered to retail suppliers, and (iv) total give and take, address sales, and offsets
- ▶ Plot a monthly figure consisting of daily bar graphs of daily (i) total collection target, (ii) total collections, (iii) cash collections, and (iv) linear graph of cash collection as percentage of collection target
- ▶ Plot a monthly figure consisting of daily bar graphs of (i) total cash collection, (ii) cash payable to the retail suppliers, and (iii) the offsets engaged by the retail suppliers
- ▶ Plot a monthly figure consisting of daily bar-graph of (i) total owed to generating companies, (ii) total cash payments due to generating companies, (iii) total non-cash transactions, including transfer orders and offsets, and linear graph of overall payments percentage for generating companies

- ▶ Plot a monthly figure of (i) change in retail suppliers' debt to NDC, and (ii) change in debt of NDC to the generating companies
- ▶ Investigate the mixing up of IES and Genco data. Today, for example, the MFP reports generator data mixed up with data from affiliated IESs, since they are "the same legal entity"
- ▶ Investigate the load shapes of IES customers (based on which IES get charged) and compare these to the actual load shapes of same customers. Relevant data may not be readily available, but the charge calculation methodology should be checked and reports of assumed load shapes need to be verified

8 2 8 Automation of Procedures

A major part of the oversight is routine observance and investigation of data flow through NDC, SSA, and MFA. As recommended above, proper indicators and measures based on the regular data flow should be developed which will provide sufficient on-going information to NERC to ensure adequate oversight capability with minimal demand for additional staffing and equipment.

NERC is still undergoing continuous development and growth. NERC personnel are fully occupied by current multitude of tasks that require their constant attention. Preliminary assessment of NERC capabilities in terms of staffing for data collection and analysis indicates major inadequacies that will leave NERC unprepared to shoulder additional responsibilities. Hence, enhancement of oversight capabilities at NERC should account for these deficiencies and place a minimal burden on its workload.

> Recommendation

- ▶ The appropriate course of action is to develop streamlined procedures including automated data processing so as to minimize the workload imposed on the NERC staff. Automation can be based on either spreadsheet macro development or additional easy-to-use computational software with report generating facilities.

CHAPTER 9

RECOMMENDED COURSE OF ACTION AND DRAFT REGULATION

9.1 SUMMARY OF RECOMMENDED COURSE OF ACTION

This section provides a short action list to implement the recommendations of this report

- ▷ formulate the proposed plan for enhancement of capabilities of NERC
- ▷ introduce the plan to NERC Commissioners and USAID
- ▷ prepare budget and secure funding for additional personnel and equipment (through license fees)
- ▷ fill the proposed positions
- ▷ procure the proposed hardware and software
- ▷ develop personnel training program
- ▷ develop measures and indicators for monitoring and required data analyses
- ▷ develop rules, procedures, and standards for policy actions and enforcement
- ▷ develop standards for appropriate NERC decrees, orders, and resolutions
- ▷ automate procedures for computation and communication

9.2 DRAFT REGULATION FOR NERC COMPLIANCE ROLE

9.2.1 INTRODUCTION

This section presents a draft regulation based on the findings of the report. The draft regulation lays out the regulatory actions of NERC as required by its mandate to oversee the Energomarket performance, to enforce compliance with the Market Rules, and to promote competition in the electricity generation market.

The draft regulation is designed to set forth the actions of NERC related to data collection from Energomarket entities, description of the data analysis to be performed, interpretation of the findings, and the eventual course of actions in case of determination of noncompliance or irregular activities by Energomarket entities.

9.2.2 Draft Regulation

I Monitoring Responsibilities

I.1 To carry out its oversight function, NERC shall formulate rules, procedures, and standards for the following activities:

- (i) Monitoring the market performance, enforcing compliance with Market Rules, and reviewing dispatch, settlements, and funds allocation procedures.
- (ii) Monitoring generation market competition and enforcement of compliance with Generation License conditions, Energomarket Members' Agreement, and Electricity Wholesale Market Rules.

II Drafting of Rules, Procedures, and Standards

II.1 Data Requirements

NERC shall identify the required list of data to be delivered to NERC on a regular basis by NDC, SSA, MFA, generation companies, and other market entities.

II.2 Data Collection

NERC shall specify the timing, format, and manner of data delivery to NERC by NDC SSA, MFA, generation companies, and other market entities Initial specifications are (i) timing weekly delivery of data, (ii) format Microsoft Excel spreadsheet files based on data templates specified by NERC, (iii) media e-mail communication

II 3 Data Analysis

NERC shall perform the requisite analysis and develop the required measures and indicators according to the recommendations of experts

II 4 Test and Audit Procedures

- (i) NERC shall design audit procedures to review unit commitment, scheduling, and dispatch software at NDC
- (ii) NERC shall design test data inputs to run on NDC, SSA, and MFA application programs to verify that programs are functioning correctly NERC shall receive executable copies of SSA and MFA programs
- (iii) NERC shall devise the procedures for carrying out and certifying tests of generation blocks and updating of block heat rates and incremental fuel cost curves, based on scheduled visits by technical experts and running of standard tests

II 5 NERC Corrective Actions

NERC shall develop a set of procedures for corrective policy actions by NERC when and if irregularities in Energomarket Operations are discovered The procedures cover

- (i) List of possible problems and the related market organization
- (ii) List of options for correcting the problems according to the powers vested in NERC by legislation and various presidential and governmental decrees subject to the laws of Ukraine

II 6 Possible actions include

- (i) Sending standard notices to relevant parties,
- (ii) Taking the matter to the Energomarket Board,

- (iii) Informing Minenergo, Anti-Monopoly Committee, and other relevant entities specified by relevant legislation and decrees as interested parties of the actions being taken,
- (iv) Imposing monetary fines,
- (v) Setting deadlines for voluntary corrective actions, i.e., changes in rules, procedures, operations, and behavior
- (vi) Proposing changes to rules, procedures, and operations
- (vii) Implementing follow-up steps for ultimate enforcement of rules and regulations

III Policy Actions In Case of Non-Compliance

NERC shall take the following measures in case of non-compliance

- (i) In case of non-performance of the Market Make formal recommendations to the Energomarket Board and Energomarket General Meeting for (i) amendments to the Energomarket Agreement, (ii) Changes to Electricity Wholesale Market Rules, (iii) Changes to ESE, NDC, SSA, MFA procedures
- (ii) In case of Generation non-compliance Follow the rules and procedures and conditions stated in the Generation License and enforce compliance with the conditions of the Licensee Impose the requisite sanctions on the Licenses in case of their failure to observe License conditions Work with the Anti-Monopoly Committee of Ukraine in cases of anti-monopoly legislation violations
- (iii) If the policy recommendations require consideration by Minenergo, COM, and the RADA, coordinate with the Liaison Officer and other Departments including the Legal Department in draft of recommended legislation and other normative acts or governmental decrees to be submitted to the proper government and legislative authorities

REFERENCES
LIST OF ENGLISH DOCUMENTS USED

TITLE, SOURCE, DATE, [HBIX DATED COMPUTER FILE]

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- 4 "License for Entrepreneurial Activities in Wholesale Electricity Supply", Approved by Executive Order of NERC, No 256, 16 December 1996 [HBIX Wes37mj doc, 20 August 1997]
- 5 "Standard License for the Right to Carry Out Entrepreneurial Activity in Generation of Electricity", Approved by Executive Order of NERC, No 3, 8 February 1996 [HBIX gen_29mj doc, 04 February 1997]
- 6 "Issues Regarding the Ministry of Energy of Ukraine", Decree of the President of Ukraine, No 1320/97, 1 December 1997
- 7 "On the Amendment of the Presidential Decree No 853 of 19 August 1997 "On Measures for introduction of the Government Policy on Natural Monopolies"", Decree of the President of Ukraine (Number and Date not available)
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- 9 "Competitive and Non-Competitive Behavior by Generation Companies in the Energomarket Pool", Jim Stanfield, prepared for USAID, by Hagler Bailly Consulting, Inc , 23 July 1997

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