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**Engineering Development Board**  
Ministry of Industries, Production & Special Initiatives  
Government of Pakistan

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## *Preamble*

Engineering Development Board in pursuit of its mission to strengthen various sectors and sub-sectors of the economy carried out a study on the energy meter manufacturing industry in Pakistan. This report is the outcome of detailed deliberations held with the major stakeholders in the sector including the regulatory body NEPRA .It provides an insight into the available technologies, the market potential and derivatives of this industry and the requirements to make this sector a global player.

The local meter manufacturing industry is in business for the past fifty years but the industry has yet to cater to the export market for sustainable growth.

World energy meter market stands at around one billion US\$. In the wake of global transformation of this industry, other countries are drawing enormous economic benefits. This is supplemented by efficiently managed metering system for the operators with an equally transparent and efficient system for the consumers. The cost attributed to inefficient metering, theft and wastages excluding line losses, is 30 to 35% higher than the world standards. This difference is enough to indicate that Pakistan requires energy discipline on war footings.

The Government of Pakistan has initiated rationalization of the power sector, the metering infrastructure however, remains dormant. The local industry and the DISCOs are oblivious to the technological developments in the metering system .Major factors restraining the local industry for a turn around is its preoccupation to meet the technical and regulatory requirements of WAPDA since business of this sector is centered around WAPDA. Consumers, on the other hand are not confident and satisfied with WAPDA for its old metering system.

We feel that all the stake holders operating in this sector must enjoy optimal comfort level through liberalization of the metering system. The consumers must be free to choose a certified meter from the open market supplied by the certified manufacturers. WAPDA (DISCOs) must employ a metering system of world standard for the manufacturers to meet not only the domestic need but also to target export market.

For this to realize, the metering system needs to be regulated by an independent body. Meters must be tested, certified and type approved by independent labs for availability in the open market.

**Muhammad Shamim**  
**Chairman of the Committee**

# GROWTH STRATEGY FOR ENERGY METER SECTOR

## 1. Introduction

- 1.1 The local meter manufacturing industry of Pakistan is in business for the past fifty years with business and technology purely centered to WAPDA regulations and its metering system. Although the industry has been nurtured by providing protection, yet it has not been able to focus on export orientation for sustainable growth.
- 1.2 Today, there are 7- 8 major manufacturers of energy meters in the country producing for one customer only i-e WAPDA which is catering to the demands for local consumption. On the other hand, the world market for energy meters is ever expanding with a global trade of over a billion US\$ and annual growth rate of 21% .
- 1.3 A rapid change has been adopted by the major global players, both in the metering technology itself and the metering system in general. Coupled with a deregulated metering and power distribution system in these countries, all the stake holders from distributor to manufacturer and finally the consumer are comfortably placed. Their economies are also deriving great benefits in form of enormous cost savings in meter reading, billing and revenue recovery infrastructure and efficient use of electrical energy in time of this acute energy crisis. Consequently increased productivity is making them produce competitive products for supply in the world market. Over US \$1 billion global market of energy meters is ever expanding and presenting enormous opportunities for those in the business. An analysis of the global market is depicted below:

### World Exports and Country share of Electricity Meters

	Exporters	Value exported in 2004, in US\$ (000)	Annual growth in value between 2000-2004, %	Annual growth in quantity between 2000-2004, %	Annual growth in value between 2003-2004, %
	<b>World estimation</b>	<b>1,038,938</b>	<b>21</b>		<b>16</b>
1.	Hungary	132,242	130	91	37
2.	Czech Republic	125,931	397	424	873
3.	China	114,616	56	42	-12
4.	Slovenia	101,676	10	4	2
5	US A	72,354	-6	1	-7

	Exporters	Value exported in 2004, in US\$ (000)	Annual growth in value between 2000-2004, %	Annual growth in quantity between 2000-2004, %	Annual growth in value between 2003-2004, %
6.	India	7,706	0		-5
7.	Japan	1,077	-16	-22	63
8.	Pakistan	133			39
9.	European Union	61			

- 1.4 In view of the ever expanding global energy meter trade and the fact that the meter reading infrastructure and power losses are causing immense revenue loss to the operators with consequent burden on the consumers.
- 1.5 It was therefore, felt that Pakistan probably is one of those few countries that require energy discipline on war footing basis. The industry and the country at large are continuously being deprived of economic benefits already being enjoyed by other nations.
- 1.6 EDB thus took the lead to constitute a committee to deliberate on the above issues and to define a framework for growth of energy meter sector. List of Committee members is placed at **Annexure-I** and Terms of Reference for the committee are placed at **Annexure-II**.
- 1.7 The committee had its first meeting on 07 December, 2005 having representation of all stake holders including the consumers. During the second meeting a sub committee was constituted to discuss the proposal of independent regulation of the metering system by NEPRA with its chairman. In the last meeting of the committee held on 07 February, 2006, detailed deliberations were held with all stake holders on transforming the metering system.

## 2. Some Facts

- 2.1 WAPDA, on the conditions imposed by the international financial institutions was split into eight Distribution Companies (DISCOs). The prime objective was to accelerate the privatization process. These DISCOs were given administrative control and to some extent financial powers.
- 2.2 DISCOs are responsible to distribute and sell electricity supplied by WAPDA within their territory on a non-discriminatory basis to all the customers who meet the eligibility criteria laid down by the National Electric Power regulatory Authority, NEPRA.

- 2.3 The electricity metering instruments are provided to the consumers by DISCOs. These meters are manufactured based on with old technology and metering system.
- 2.4 With the divesture of WAPDA, the government is trying to rationalize the power sector. Although, the meter hardware has been made exceptionally foolproof but its compatible reading infrastructure is old aged and is still plagued with enormous pilferages.
- 2.5 WAPDA has been in the design, testing and regulating the metering system since long time and is the sole purchaser for DISCOs, the local manufacturers centered their technological and business orientations to meet WAPDA's requirement only and not focused to DISCOs needs and also not focused to users benefit. Consequently, neither the local manufacturers nor the metering system could be reformed.
- 2.6 The plight of consumer increases when the inefficiencies of the metering system results in over billing. A news clipping placed at **Annexure-III** clearly depicts that loopholes in the metering system are causing damages to the consumers.

### **3. Trends in the Metering System**

- 3.1 Today, the countries having established metering systems have switched over to solid state meters which are well integrated with the metering infrastructure that forms a complete smart pre-paid system. Such products mitigate the financial risks associated with power distribution and promote responsible power usage by energy consumers. The existing secured electromechanical meters being manufactured and used in Pakistan cannot be made to integrate with the Automated Meter Reading (AMR) Systems. Now that the world is rapidly shifting to such intelligent pre-paid meter reading systems it is imperative that our local meter manufacturing industry is tuned to manufacture such smart meters.



### **4. Derivatives of Energy Meter Industry**

- 4.1 Electronics technology has revolutions both, in the products and process technologies. With the incorporation of computers, microprocessors, and highly integrated devices, handling any degree of complexity of data and information can be managed easily. Products are rapidly being digitized to suit computer based environment. From mechanical watches to digital watches, mechanized automobiles to electric cars with



electronic transmission, manual transactions to Automated Teller Machines (ATMs) and mechanical to electronic weigh balances, the process of digitizing is ongoing as more and more mechanical and electromechanical products are made user friendly by amalgamating features and characteristics into portable modules through digitizing. This process is concurrent to the ever growing requirement of processing enormous intricate data efficiently and to utmost accuracy. Virtual instruments are already the order of the day. Pakistan cannot remain oblivious to such changes especially in areas which are ripe for such transformations as switching to digital systems.

4.2 Due to the above developments, the electricity meter is now part of a much broader spectrum of industrial measuring and calibrating instruments. The industry not only manufactures instruments but provides software and related services. It is no more isolated and is producing multiple products owing to common professional expertise required to produce a number of measuring and metering instruments. Few of them are listed as under:

- i) Gas or smoke analysis apparatus
- ii) Chromatographs and electrophoresis instruments
- iii) Spectrometers, spectrophotometers meters and spectrographs using optical radiations (UV, visible, IR)
- iv) Exposure meters
- v) Gas or liquid supply or production meters, including calibrating meters
- vi) Revolution counters, production counters, taximeters, mileometers, pedometers and the like; speed indicators and tachometers
- vii) Instruments and apparatus, for measuring or checking voltage, current, resistance or power, without a recording device.
- viii) Other instruments and apparatus, specially designed for telecommunications (for example, cross-talk meters, gain measuring instruments, distortion factor meters, psophometers)

4.3 Prepaid metering system has already been introduced by telecommunication networks which are centrally monitored and controlled.

## **5. Multiple Benefits of Transforming the Existing Metering System**

5.1 The operators, DISCOs, consumers and meter manufacturing industry are being rapidly deprived of the economic benefits and the opportunity to be part of global business. It is imperative that solid state technology with well integrated metering infrastructure be in place soonest possible. The metering infrastructure and meter manufacturers must be part of a system where meter hardware is standardized and regulated by independent bodies. The labs must have international accreditations in

order to establish international credibility in the global markets. Other benefits of this transformation are listed below:

- 5.1.1 The consumer will be at liberty to buy certified type approved meters from the open market which will herald an era of open competition and alleviate the grievances of manufacturers, presently inherent in the tendering procedures of WAPDA (DISCOs).
- 5.1.2 The process time of acquiring meters and installing them from WAPDA (DISCOs) will be drastically reduced. Installation can be carried out by DISCOs certified/ supervised private companies, adding to employment generation through these companies.
- 5.1.3 The computerized prepaid meters will eliminate the meter reading and bill generation costs and revenue losses due to manual meter reading and bad debts.



*Panel-mounted solid-state electricity meter with remote current and voltage sensors, capable of being read, programmed remotely by modem and local infra-red.*



*Prepayment meter and magnetic stripe tokens. Displays information and statistics such as current Tariff and remaining credit. Also has the provision to activate a small amount of emergency credit.*

- 5.1.4 Meter hardware related maintenance cost and procedures will be minimal due to its solid state nature.
- 5.1.5 The local meter manufacturing industry will be able to export to world markets and be part of the global supply chain while earning valuable foreign exchange.
- 5.1.6 While entering in to the digital technology arena, the local industry will be open to choose from the portfolio of the metering equipment industry.
- 5.1.7 Due to technology parity with world standards, new investors will be encouraged and provide a boost to the economy

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## 6. Recommended Framework

- 6.1 **Guaranteed correct measurements** of the metering instrument under all working conditions throughout whole period of use and within defined permissible tolerance.
- 6.2 **Legal requirements to be laid down under legislation** for measuring equipment along with its use, measurement and testing methods.
- 6.3 **Requirements which must be complied** with before instrument can be offered for use
- 6.4 On the basis of legal requirements and international standard practices instrument specifications are developed with full detail of design type and testing methods to meet the future need of the operating companies (DISCOs). For the purpose, **the expertise of WAPDA shall be used and is to be approved by NEPRA.**
- 6.5 Based on the approved specifications the **metering device must be type approved and verified by an authorized body under NEPRA.** The verification and testing procedures shall be carried out in the authorized laboratories and the manufacturers shall comply the certified specifications in products.
- 6.6 To ensure the quality of the products the authorized agents shall **make surprise checks and visits to the manufacturer on regular basis and their reports shall be sent to NEPRA and the operating companies (DISCOs).** Thus, the verification and testing procedures in laboratories and manufacturer's premises shall be under controlled and authorized conditions.
- 6.7 Third party recognition for their technical competence granted on the basis of **ISO/ IEC 17025 “**
- 6.8 **Public as well as private labs to be accredited.**
- 6.9 Secondary standard and calibration at utility level.
  - 6.9.1 **Inspection:** With serially manufactured measuring instruments i.e. energy meters verification on a sampling plan to ensure that each meter fulfils requirements.
  - 6.9.2 **Market surveillance:** Government to authorize inspectors and should laid down procedures for random checking to ensure accuracy during usage.

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## 7. Proposed Action Plan



7.1 In order to implement the transformation of the metering system, an action plan has been put into place. Various agencies involved in the implementation process are also mentioned.

- (i) **Ministry of Water and Power** to formalize the recommendations and acquire necessary approvals from relevant forums at the earliest and ensure speedy implementation through its subordinate organizations.
- (ii) **NEPRA** to formulate policies for the solid state pre-paid metering system based on following guidelines:
  - To issue measuring instrument directives
  - Lay down the design specification for measuring instruments and testing methods.
  - Lay down the consumer and operator requirement for the measuring equipment to meet different user applications such as house hold consumers, commercial/ /industrial users, pre-paid/post paid billing mechanism etc.
  - To standardize the units for metering and measuring quantities including billing quantities such as *kwh, kva, kvarh, pf penalty, distortion penalty, tariff structure, demand period, power quality standards etc.*
  - To issue directives for establishing accredited labs in public and private sector and to provide incentives for the labs. The development of independent labs with complete EMC, environmental testing as per international standards such as IEC 17025 shall be ensured.
  - To develop the standards for the energy meter testing and accreditation labs.
  - To formulate calibration standards and procedure for DISCOs and manufacturers.
  - To develop and implement metering/ measurement dispute resolution procedure for *Consumers, IPPs, DISCOs, NTDCs, KESC.*
- (iii) **WAPDA/ DISCOs/ KESC** to act as an authorized body for:
  - Preparation of specification as per IEC, NEPRA regulations and field requirements.
  - Prototype approvals for testing of offered design.
  - Inspection, certification and sampling procedure
- (iv) Local Manufacturers to ensure **compliance to NEPRA regulation and WAPDA standards**. Maintenance calibration and procedures laid out by NEPRA / WAPDA.
- (v) **DISCOs/KESC** to follow NEPRA regulations/ procedures to.
  - Maintain metering equipment according to regulations.

- Maintain meter labs under certification from standard labs.



**Annexure - I**

**Composition of committee on Energy Meters**

<b>Mr. Muhammad Shamim, Chairman PTMA</b>	In chair
<b>Mirza Nasir Baig, DGM EDB</b>	Secretary
<b>R. Admiral Shahid Farooq, Chairman NTC</b>	Member
<b>Mr. Kamal A. Abbassi, CEO ATN (Pvt) Ltd</b>	Member
<b>Mr. Mohsin Syed, CEO Hybird Technics</b>	Member
<b>Mr. Junaid A Bajwa, G.M TIP Haripur</b>	Member
<b>Mr. Javed Safdar, Chief Engineer TIP Haripur</b>	Member
<b>Mr. Haroon A Khan, MD Pak Electron (PEL)</b>	Member
<b>Mr. Ajmal Sharif, DGM EDB</b>	Member

## Annexure - II

### Terms of Reference

- 1) To take stock of the present position of this industry in terms of :
  - Technology
  - Manufacturing Capabilities
  - Manufacturing Capacities
  
- 2) To suggest how this industry can achieve quantum growth and become a global player, so as not only to meet the domestic requirements but also to export the local products.
  
- 3) To help develop a locally manufactured energy meter through a design competition among Pakistani Technical Universities and make a working group consisting of representatives from:
  - UET's
  - Cell Phone Companies
  - Data Base Specialists
  - Phone Terminal manufacturers
  - WAPDA

