

### 1. **Waste to Energy - A New Proposal in the New Millennium for Brunei Darussalam**

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#### **Abstract**

As the population, industrialization and urbanization increase in Brunei Darussalam, the generation of waste in different forms also increases. Health and environmental impacts that may result from such waste are a growing concern for sustainable development of human society. Recent technological developments show that proper management of this waste will minimize risks to human health and the environment and also will support the economic growth of a country. This paper presents (i) a clear and brief view of the waste generation, its management and its impact on the greenhouse emissions, (ii) a method of conducting a survey to estimate the amount of Municipal Solid Waste generated by the whole country and (iii) an integrated, cost effective and environmental friendly technology to tackle the generated harmful Municipal Solid Wastes in Brunei Darussalam. The proposed Solid Waste Management Technology provides technological transfer to the country, creates job opportunity, increases business possibilities, brings in foreign investment and offers an efficient and economical solution to the ever-increasing waste management problems.

### 2. **A Computer-based On-Line Electrical Energy and Cost Saving System**

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#### **Abstract**

This work investigates a simple, mathematical computer-based model that is used to compute the yearly electrical energy use and cost savings due to power factor improvements in power system applications. A mathematical algorithm was developed in order to permit the best improvement in power factor value. In turn, this power factor improvement leads to a reduction in the total annual electrical energy consumption. To obtain these savings in cost and electrical energy, a simple interactive computer program has been devised in accordance with the mathematical algorithm.

This interactive computer program is interfaced to the power system to control and monitor the effect of changing the power factor value. The change in power factor value is recorded in a Data Management file (DMF).

### 3. **A Simple Digital Meter for Electrical Energy Measurement**

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#### **Abstract**

A simple digital circuit for the measurement of electrical energy is presented in this work. The design is based on a sample and hold method, which generates two D.C. signals. The first signal is proportional to the peak value of the line voltage,  $V_m$  and the second signal is proportional to the instantaneous value of the line current at the instant of peak voltage,  $V_m$ , i.e.  $I_m \cos \Phi$ , where  $\Phi$  is the phase angle between the line voltage and line current signals. Multiplication of the two signals over a predetermined period of time will provide an output proportional to the electrical energy consumed by the load. A voltage to frequency converter, VFC, is used to digitize the electrical energy signal. This signal is then digitally displayed through suitable circuitry.

### 4. **Unsupervised Neural Network and Expert System for Automated Knowledge Acquisition from Network Performance Data**

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#### **Abstract**

A basic reason why we monitor the performance of a system is to define the overall state of the machine ("It's Ok" or "It's slow" etc). In other words to determine whether the system is experiencing a bottleneck or not. This paper investigates the application of Self Organizing Maps (SOM) and Expert System (ES) for the network performance management area. This paper proposes a system that collects data from a certain server and processes this data in order to get knowledge concerning the current network performance. To demonstrate the applicability of the proposed method to network performance domain problems, a case study in input output disk performance status (iostat) domain is presented. In particular, an approach is proposed for extracting knowledge concerning the current network performance.

### 5. **Small and Medium Enterprises (SMEs) in Brunei Darussalam: Importance and Constraints**

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## Abstract

This paper is a summary of our recent survey on Small and Medium Enterprises in Brunei Darussalam. The paper will focus on the importance and major constraints of small and medium enterprises in the economic development of Brunei Darussalam. In Brunei Darussalam, SMEs have been identified as an important player in the industrial development and diversification programme of the government. An endeavour has been made to find out through our survey and interviews, the constraints faced by SMEs in Brunei Darussalam. As reported by our respondents, they tend to suffer from obstacles, among others, in financing, marketing, management, location of the enterprise, high rent of the private premises, competition, and access to information sources. The SMEs surveyed by us have indicated the major constraints according to the degree of intensity of the constraints. Similarly major success factors have also been mentioned according to priority. The various steps taken by the government for the establishment and promotion of SMEs in Brunei Darussalam have been outlined. Furthermore, the representatives of all commercial banks in Brunei Darussalam were interviewed and we have been able to obtain their views with regard to financing of SMEs. On the basis of information obtained, the paper will provide some suggestions. But since our survey has not been comprehensive, the conclusion and suggestions may be taken as tentative. Regarding methodology, structured questionnaires were sent out to one hundred and ten SMEs on a random basis. The interviewers collected the questionnaires duly filled by the respondents. The sample includes the manufacturing, service and the primary sectors and limited to SMEs in Brunei Muara district.

## 6. An Analysis of Rainfall Data for Brunei Darussalam

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### Abstract

Rainfall is an essential part of an hydrological data collection system, and is an important environmental datum for the planning of many water-related civil engineering projects. In order to obtain reliable estimates, a comprehensive network of rainfall data collection stations need to be established throughout the present and potential project sites of a country. The rainfall and temperature data collected at Brunei International Airport have been analysed to study and reflect on the needs of establishing a reliable rain-recording network for Brunei Darussalam. The rainfall data for the period 1997-2000 have been analysed to investigate the causes of widespread haze that occurred during 1997-98. Further, these data are also analysed to get an insight into the monthly and maximum 1-hr rainfall patterns relevant to Brunei Darussalam.

## 7. A Dual Fuel System (CNG-Diesel) for a Single-Cylinder, Stationary Engine Used in Power Generation

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## Abstract

Single-cylinder diesel engines are widely utilized in Malaysia to generate electricity on small scales in open markets and rural areas. This paper represents a brief study carried out to: (1) understand the nature of exhaust emissions ( $\text{NO}_x$ , CO and  $\text{CO}_2$ ) when adopting a dual fuel system using Compressed Natural Gas (CNG) in a single-cylinder, stationary diesel engine, and (2) compare the dual-fuel emission and engine performance results to those of diesel. The use of CNG is considered a possible solution for reducing the toxic emissions from these engines. This work shows that by using the dual fuel system,  $\text{NO}_x$ , CO and  $\text{CO}_2$  concentrations in the exhaust gases were, on average, reduced by 54%, 59% and 31% respectively when the engine runs at maximum-load operating conditions. The average power output from the engine operating a dual fuel was 10% higher than that operating on diesel over the tested range of engine speeds

## 8. A Pavement Maintenance Planning System for the Roads Network of a Major City

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### Abstract

The maintenance of a large and sophisticated road network is a complex task. The budgets allocated for this sector of the economy are invariably limited compared to network demands on the countries resources. A systematic approach is necessary to provide facilities and framework for making more favorable and economically acceptable decisions, and to integrate information need by different levels of management. The system described here was designed for the city of Baghdad, Iraq. The implementation phase was carried out with the direct involvement of the second author of this paper

The required system had to identify a vast amount of data on individual roads and process this data into information that can be accessed and used by various components of this system and ultimately by the 'Decision Makers'. The subsystem components of this model were designed in a 'Module' form to permit independent changes, development or upgrading of each Module.

These Modules were Road Identification and Geometric Information System, Pavement Condition Evaluation and Rating System, Selection of Suitable Maintenance Methods, Costs and their final effect of upgraded pavements. A unifying Module was included to provide facilities for Cost Optimization within a predefined Budget. This is termed here as the 'User and Decision Support Information Module'.

A computer program was prepared to perform the functions specified in the analytical model suggested in this work. The model provides facilities for storing and retrieving various data and for processing this data into Decisions Oriented Information. The Information was designed to assist the authorities in the choice of maintenance measures that can be adopted within the resources and budget available.