

For discussion
On 10 February 2000

LEGISLATIVE COUNCIL
PANEL ON ENVIRONMENTAL AFFAIRS

Energy Efficiency and Conservation Initiatives for 2000/01

PURPOSE

1. This paper briefs Members on the Government's proposed energy efficiency and conservation initiatives in 2000/01.

BACKGROUND

2. More efficient use of energy has both economic and environmental benefit. It would help Hong Kong to support an increase in population and improve the standard of living without severe impact on the environment. Reducing energy consumption and cleaner method of energy production would reduce the emission of air pollutants, particulates and greenhouse gases.

3. Between 1988 and 1998, per capita energy¹ use increased from 38,365 Megajoule (MJ) to 58,434 MJ. Energy requirements per unit of GDP increased by 26% and overall energy use has increased from 215,919 Terajoule (TJ) to 390,747 TJ. Compared to 1988, consumption of electricity and automotive oil products in 1998 increased by 66% and 70%² respectively.

¹ Based on Hong Kong Energy Statistics Annual Report 1998 Edition. Energy consumption, GDP and population figures are based on that reported by Census and Statistics Department.

² EMSD's preliminary projection based on Hong Kong Energy End-use Database and other relevant government data.

4. Increasing energy use consists of small increments in demand. Strategies to improve energy efficiency must also be directed to influencing many areas of choice. Existing measures include –

- building energy codes to encourage developers and designers to adopt energy efficient designs of buildings services in new buildings;
- issue of compliance certificates to give recognition to those who achieve high energy efficiency by complying with the building energy codes;
- the Energy Efficiency Labelling Scheme for Household Electrical Appliances to provide information on selected household appliance to consumers;
- energy audit surveys for existing public buildings and retrofitting with more energy efficient equipments;
- pilot programmes to examine innovative energy efficient equipment under local conditions and disseminating the programme results to the private sector;
- establishing an historical energy end-use database to help benchmark Hong Kong's energy efficiency performance and to identify opportunities for improvement; and
- studies to examine the feasibility of wider use of water-cooled air conditioning systems (WACS) in non-domestic developments and energy performance contracts and energy services companies as a cost effective means for companies to achieve higher energy efficiency.

Annex A gives a brief summary of each of these initiatives.

INITIATIVES FOR 2000/01

4. The transport and commercial sectors are the two main energy users, consuming 35% and 33% of the total energy respectively. In 2000/01, we will implement a number of new initiatives that aim to improve the energy efficiency of these sectors. In addition, the potential of using renewable energy to meet part of the energy demand will be examined and a pilot programme will be undertaken to assess the performance of renewable energy equipment under local conditions.

Water-cooled Air Conditioning Systems (WACS) Implementation Studies

6. A Preliminary Phase Feasibility Study for the wider use of WACS, completed in April 1999, has established the viability as well as economic and environmental benefits of substituting existing non-domestic air-cooled air conditioning systems with WACS in Hong Kong. We propose to conduct -

- a 12-month territorial study in October 2000 at an estimated cost of \$15 million. The aim is to examine in detail the environmental, health, regulatory, institutional, financial, technical and land administration issues and to formulate a master development plan and control requirements for the phased implementation of WACS.
- a district cooling system study starting in December 2000 for the South East Kowloon Development and a WACS implementation study starting in early 2001 for Causeway Bay and Wanchai. Each study will take about 12 months and cost about \$12 million. The district studies will examine ways to overcome the problems and constraints on implementing WACS in a new reclamation district and an existing district.

We will make separate funding applications to Finance Committee for the territorial study and the Southeast Kowloon Development in April 2000 and June 2000 respectively.

Renewable Energy

7. We plan to commission within this year a study to assess the potential applications and uses of renewable energy resources in Hong Kong with special reference to photovoltaic technologies suitable for small-scale electrical power generation. A pilot project will be carried out as part of the study. It will include the use of photovoltaic panels and solar heating panels to meet part of the electrical and heating energy demands of a government office building. The consultancy study together with the pilot project is estimated to cost \$16.5 million. This project is supported by Economic Services Bureau. We will submit a funding application to Finance Committee in May 2000

Energy End-use Database - Residential Household Energy Consumption Survey

8. The data for the Residential sector in the Energy End-use Database was based on survey conducted in 1995. To enhance updating work, we plan to carry out sectoral energy end-use surveys in 2000 to collect up-to-date domestic household energy consumption information. We expect the surveys to be completed in early 2001. The estimated cost is \$1.2 million.

Energy Consumption Indicator for Transport and Commercial Sector

9. We plan to commission a consultancy study in late 2000 to develop energy consumption indicators and targets for selected segments in the transport

and commercial sectors. The indicators and benchmarks will enable the Government to consider future targets, track changes, and compare them with other countries, and identify opportunities for energy efficiency improvements. The data will also be made available to individuals in energy consuming groups so that they can also use the indicators and benchmarks to assess their performance and to identify improvements in energy efficiency to achieve cost savings. The study will cost about \$5.8 million and the final report is expected by early 2002.

Energy Efficiency Labelling Schemes for Vehicles

10. We will introduce Energy Efficiency Labelling Schemes for vehicles to raise awareness among car buyers about opportunities for greater fuel efficiency. EMSD have started a literature survey on overseas experiences and held preliminary discussions with the trade on the proposed Energy Efficiency Labelling Schemes. We will announce further details in mid-2000.

Energy Efficiency and Conservation Legislation

11. With the publication of measures such as the Building Energy Codes and the implementation of the various Energy Efficiency Labelling Schemes, we are approaching the limits of what can be achieved using the voluntary approach. We believe it is time to study the feasibility of introduction of energy efficiency and conservation legislation. This study will be carried out during 2000. The community, professional institutes and developers will be consulted in 2001 on any proposals that are developed.

ENERGY EFFICIENCY OFFICE (EEO)

12. The EEO of the Electrical and Mechanical Services Department, established in August 1994, provides technical advice on energy efficiency and conservation. Annex B shows the existing organisation of EEO and summarises the major responsibilities of the Energy Efficiency Division.

13. The Director of Electrical and Mechanical Services (DEMS) considers that the existing management structure at the EEO is no longer satisfactory. The Division is already too fully involved in other policy commitments to be able to implement the proposed initiatives. DEMS proposes to establish a new Division within the EEO to undertake all matters relating to promoting WACS, examining renewable energy sources and formulating mandatory energy efficiency and conservation requirements. The new Division will be headed by a Chief Building Services Engineer of directorate grade D1 rank. An organisation chart showing the proposed structure of EEO is at Annex C. We will submit a paper to the Establishment Subcommittee of Finance Committee for the creation of a directorate post on 23 February 2000.

Environment and Food Bureau

February 2000

SUMMARY OF EXISTING ENERGY EFFICIENCY PROGRAMMES

Building Energy Codes

1. The Building (Energy Efficiency) Regulation, introduced in July 1995, provide for the control of the OTTV of commercial and hotel buildings through the OTTV Code. A Working Party led by Buildings Department, with members from other government departments, professionals, academics and trades representatives was established in May 1998 to review the OTTV control requirements. .

2. The Energy Efficiency Office (EEO) of EMSD published building energy codes on lighting, air conditioning and electrical installations in 1998. These codes were implemented through the Energy Efficiency Registration Scheme for Buildings launched in October 1998. The building energy code on lifts and escalators will be published and implemented in 2000.

Energy Efficiency Registration Scheme for Buildings

3. The Energy Efficiency Registration Scheme for Buildings launched on 29 October 1998 covered lighting, air conditioning and electrical installations in a building. Building installations meeting the requirements of these building energy codes can be registered with EEO. There are already 14 buildings covering a total of 21 installations registered. The scheme will be reviewed after 18 months implementation.

Energy Efficiency Labelling Schemes

4. The EEO launched the first voluntary Energy Efficiency Labelling Scheme (EELS) in June 1995. There are now five Energy Efficiency Labelling Schemes covering household refrigerators, room coolers, washing machines, compact fluorescent lamps and clothes dryers. By the end of 1999, 99 labels for refrigerators, 136 labels for room coolers, 11 labels for washing machines and 192 labels for compact fluorescent lamps have been issued. EELS for water heaters will be launched by end of 2000. EEO has examined new labelling schemes for office equipment and a short-list of office equipment was produced at the end of 1999. The first scheme for office equipment will be launched in 2000.

Energy Audit Surveys

5. EEO has been conducting energy audit surveys in public buildings since 1994 and significant energy savings were achieved through identifying and implementing energy management opportunities such as adjusting equipment settings, operational procedures and routines. By the end of 2001, EEO will have completed energy audit for 145 major Government and public buildings, accounting for 77% of the total electricity consumed by public buildings. EEO expects that the energy saving obtained from energy audit and implementing good house keeping measures will diminish as the awareness of the building users on energy saving increases due to the promotion of the energy saving programmes. To maintain the momentum of energy audit, EEO has published simplified Guidelines on Energy Audit to encourage building users to carry out self-audit.

Energy Management Pilot Programme

6. EEO started in May 1999 a two-year pilot EMOs programme at a cost of \$6 million to study innovative energy efficiency equipment in Government buildings. Innovative energy efficiency installations including dimmable electronic ballasts, T-5 fluorescent luminaires, Miconic 10 lift traffic control system, occupancy detector for lighting and air-conditioning control, indirect evaporative heat recovery system and energy optimizer for escalators will be examined. A pilot installation and testing for an energy optimizer for escalators in North Point Government Offices had begun.

Energy End-use Database

7. In 1999, the Database has been successfully updated to include 1995 and 1996 data. Work for updating to 1997 and 1998 is in progress and would be completed by end 2000. A basic historical data set for 1986 to 1996 has been made available for public reference through the internet in EMSD's Homepage.

Energy Efficiency Performance Contracting and Energy Services Companies (ESCOs)

8. One of the policy initiatives announced in 1998 was to explore the concept of introducing energy services companies (ESCOs) to enhance energy efficiency and conservation within the Administration. EEO had set up the ESCOs Task Force to gather experience and advice from local and overseas to recommend guidelines for energy performance contracting. The Task Force recommended to explore the possibility of conducting pilot energy performance contracting projects for five buildings of similar characteristics. EEO will consult

the Energy Efficiency and Conservation Sub-committee in March 2000 on the way forward.

Preliminary Phase Consultancy Study on the Wider Use of Water-cooled Air Conditioning systems in Hong Kong

9. Air conditioning electricity consumption in non-domestic buildings is responsible for about 25% the total electricity consumption, the majority of which is consumed by the more energy intensive Air-cooled Air Conditioning Systems (AACS). A Preliminary Phase Consultancy Study for Wider Use of Water-cooled Air Conditioning Systems in Hong Kong with focus on fundamental analysis, basic groundwork, and recommendations on further work, was commissioned by the Electrical and Mechanical Services Department in October 1998.

10. The study established the viability as well as economic and environmental benefits of WACS as compared with AACS. Three basic concepts of WACS, including the Centralised Piped Supply System for Condenser Cooling (CPSSCC), Centralised Piped Supply System for Cooling Towers (CPSSCT), and District Cooling Scheme (DCS), have been evaluated as part of the preliminary phase study and have found to be attractive. All of the three WACS schemes have the potential for wider adoption. Annual energy savings of up to 24%, 17%, and 32% can be achieved by CPSSCC, CPSSCT, and DCS respectively as compared with AACS. Wider use of WACS can also have substantial knock-on benefits by space savings in plant room, reduced operating cost of air conditioning plant, reduced capital investment in air conditioning plant, reduced primary energy requirement of power stations, reduced greenhouse gas emissions from power stations, reduced thermal discharge at power stations, reduced noise impact of air conditioning plant, potential for power station

deferment, new business opportunities, potential for using electricity at off-peak tariff, and economies of scale achievable through centralised WACS schemes.

11. The study has also identified the potential problems and constraints to implementing WACS in future. They are the need for long term service contract, reliability of service providers, potential for abuse of market power, size of infrastructure, health impacts from use of cooling towers, use of scarce land resource, discharge of effluents to marine environment, and high initial capital investment and potential for customer confusion. These implementation constraints, however, are not insurmountable. They can be overcome through proper review and setting up of policies, legislation and regulation, planning and land allocation, good engineering design, and innovative technology application.

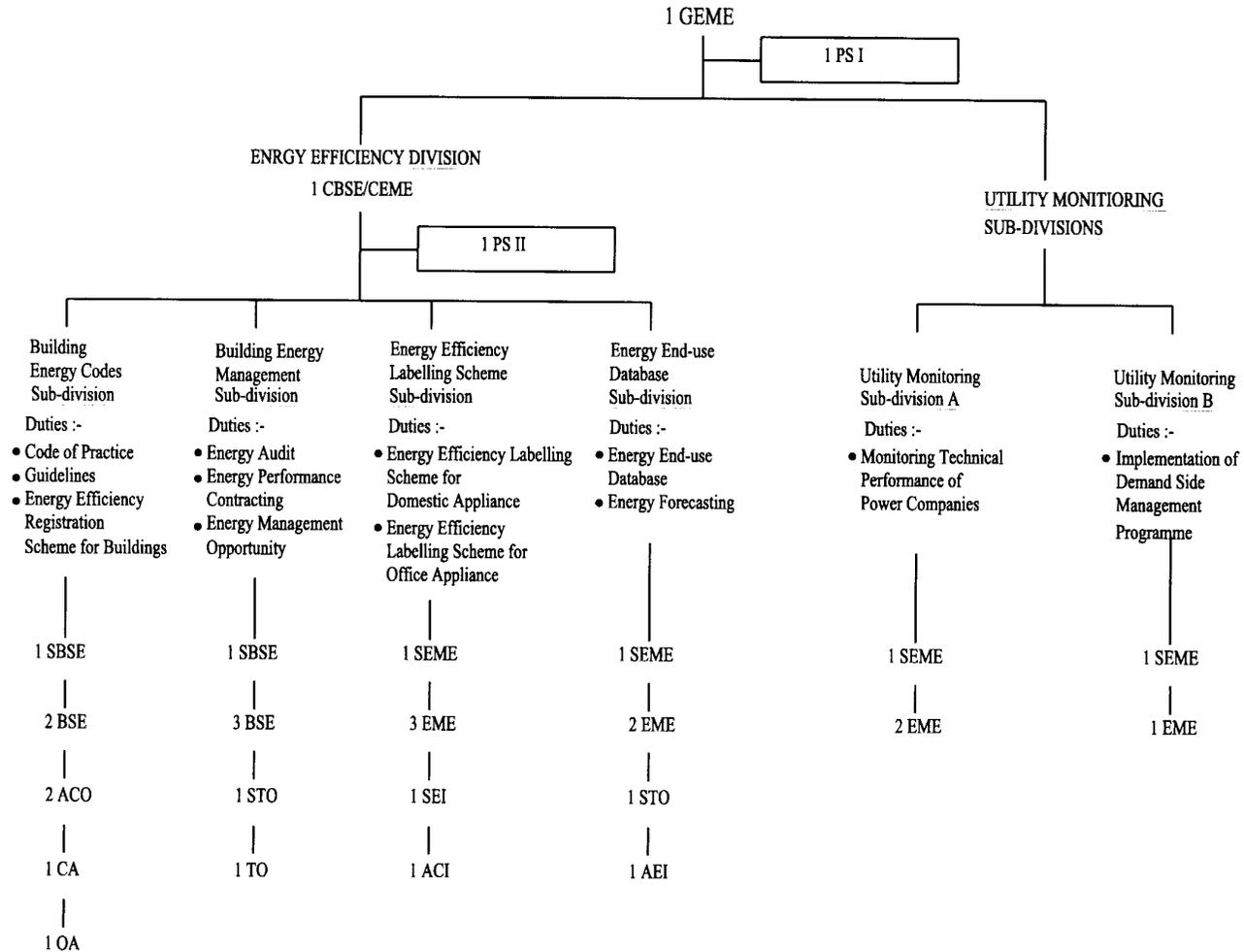
12. The study also recommended conducting territorial and district implementation studies in parallel to allow early realisation of the potential energy saving. [This will be done as detailed in para 6 of the main paper.] The study was completed in April 1999. The findings and recommendation of this study was endorsed by a Study Steering Group and the Energy Efficiency & Conservation Sub-committee in July 1999 and October 1999 respectively.

Legends :-

GEME	GOVERNMENT ELECTRICAL & MECHANICAL ENGINEER
CBSE	CHIEF BUILDING SERVICES ENGINEER
CBSE/CEME	CHIEF BUILDING SERVICES/ELECTRICAL & MECHANICAL ENGINEER
SE	SENIOR ENGINEER (MULTI-DISCIPLINE)
SEME	SENIOR ELECTRICAL & MECHANICAL SERVICES ENGINEER
SBSE	SENIOR BUILDING SERVICES ENGINEER
EME	ELECTRICAL & MECHANICAL ENGINEER
BSE	BUILDING SERVICES ENGINEER
E	ENGINEER (MULTI-DISCIPLINE)
STO	SENIOR TECHNICAL OFFICER
TO	TECHNICAL OFFICER
SEI	SENIOR ELECTRICAL INSPECTOR
ACI	AIR-CONDITIONING INSPECTOR
AEI	ASSISTANT ELECTRICAL INSPECTOR
ACO	ASSISTANT CLERICAL OFFICER
CA	CLERICAL ASSISTANT
OA	OFFICE ASSISTANT
PS I/II	PERSONAL SECRETARY I/II

Existing Organisation Chart for Energy Efficiency Office

As at 15.11.1999



Establishment Rank	No.
GEME	1
CEME	1
SEME	4
EME/AEME	8
SBSE	2
BSE/ABSE	5
PS I	1
PS II	1
STO	2
TO	1
SEI	1
ACI	1
AEI	1
ACO	2
CA	1
OA	1
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Major Responsibilities of the Energy Efficiency Division of EEO

The Energy Efficiency Division is responsible for a range of energy efficiency matters, including-

- investigating energy efficient equipment,
- developing energy efficiency labelling schemes,
- promoting and developing building energy codes,
- developing the Hong Kong Energy End-use Database,
- conducting energy audits in public buildings,
- studying the feasibility of energy performance contracting, and
- implementing an energy efficiency registration scheme for buildings.

Work on WACS is currently undertaken by the Energy Efficiency Division of the EEO on an ad-hoc basis.

Legends :-

- GEME GOVERNMENT ELECTRICAL & MECHANICAL ENGINEER
- CBSE CHIEF BUILDING SERVICES ENGINEER
- CBSE/CEME CHIEF BUILDING SERVICES/ELECTRICAL & MECHANICAL ENGINEER
- SE SENIOR ENGINEER (MULTI-DISCIPLINE)
- SEME SENIOR ELECTRICAL & MECHANICAL SERVICES ENGINEER
- SBSE SENIOR BUILDING SERVICES ENGINEER
- EME ELECTRICAL & MECHANICAL ENGINEER
- BSE BUILDING SERVICES ENGINEER
- E ENGINEER (MULTI-DISCIPLINE)
- STO SENIOR TECHNICAL OFFICER
- TO TECHNICAL OFFICER
- SEI SENIOR ELECTRICAL INSPECTOR
- ACI AIR-CONDITIONING INSPECTOR
- AEI ASSISTANT ELECTRICAL INSPECTOR
- ACO ASSISTANT CLERICAL OFFICER
- CA CLERICAL ASSISTANT
- OA OFFICE ASSISTANT
- PS I/II PERSONNAL SECRETARY I/II

Proposed Organisation Chart for Energy Efficiency Office

