

For information
On 18 July 2003

**Legislative Council Panel on Economic Services and
Panel on Environmental Affairs**

DEVELOPMENT OF RENEWABLE ENERGY

Introduction

At the Joint Panel meeting on 28 April, Members requested the Administration to –

- review the target of Renewable Energy (RE) contribution to the electricity demand;
- consider the environmental and social benefits associated with the use of RE other than cost considerations;
- discuss with the two power companies to allow and facilitate RE producing organizations/companies access to the electricity grid in the context of the 2003 Interim Review of the Schemes of Control Agreements (SCAs); and
- draw up a concrete timetable for development and wide-scale application of RE.

This paper sets out the Administration's responses to the requests.

Development of RE

2. With the joint support of the then Environment and Food Bureau and the Economic Services Bureau, the Electrical and Mechanical Services Department (EMSD) commissioned the Study on the Potential Applications of

RE in Hong Kong in 2000 and completed it in late 2002. The Study has identified solar power, wind power, waste-to-energy and building integrated fuel cells as promising RE sources/technologies for wide scale application in Hong Kong. The Study has also recommended that the Government should adopt RE targets¹ of 1% in 2012, 2% in 2017 and 3% in 2022. The findings and recommendations of the Study were presented to Energy Advisory Committee, Legislative Council Panel on Environmental Affairs, Advisory Council on the Environment, and Energy Efficiency & Conservation Subcommittee in January and February 2003. The Executive Summary and the full Study Report were also uploaded onto the web site of EMSD for public access since February 2003.

3. The Environment, Transport and Works Bureau (ETWB), as the policy Bureau responsible for protecting the environment, is committed to spearheading the development of RE in Hong Kong with a view to further improving our air quality and reducing our greenhouse gas emission. The ETWB and the Economic Development and Labour Bureau (EDLB) will pursue the issue with the two power companies in the upcoming interim review of their Scheme of Control Agreements this year. We will also aim to encourage participants of the post-2008 electricity market to supply more electricity generated from RE sources, while meeting our objectives as regards reliability of supply and reasonable costs to consumers. The two Bureaux will work together to examine how the Government can formulate a comprehensive policy to promote the development of RE in the long run, bearing in mind that the development of RE has far reaching implications on not only the environment, but also sustainability of our power industry, the local economy and the community.

¹ The 1999 power demand level in Hong Kong is used as the basis for the targets.

Review the target of RE contribution to electricity demand

4. Public support is the most critical factor for the successful development of RE. According to the views collected² during the recent public consultation on the findings of Stage 1 of the “Study on the Potential Applications of RE in Hong Kong”, most respondents considered the targets (i.e. 1% in 2012, 2% in 2017 & 3% in 2022) recommended by our consultant conservative. This may indicate that the public are more receptive to RE than the consultant had envisaged. Therefore, ETWB is conducting a review of the RE targets proposed by the consultant with a view to meeting the latest aspiration of the community. Of course, it is important to consider the practicability and possible impacts on the electricity supply reliability and tariffs before determining how the revised RE targets should come into play in the post 2008 electricity market.

Environmental and social benefits associated with the use of RE

5. In formulating our RE policy, the Government will certainly take into account the environmental and social benefits, apart from the cost considerations. Wider adoption of RE has become an irreversible worldwide trend, not only because RE is more environmental friendly in the sense that it virtually emits no greenhouse gases and air pollutants, but also because RE reduces the reliance on exhaustible sources of fuel. The natural storage of fuel such as coal and natural gas will be used up in the long run and their prices will gradually go up.

6. Although the cost of tapping most sources of RE is still generally higher than the cost of using fossil fuel, particularly before taking into account

the hidden social and health costs relating to the combustion of fossil fuel, due to advancement in technology, wind power has becoming increasingly cost competitive over the years. In fact, the unit cost of electricity generated by modern wind turbines is now only slightly higher than the unit cost of electricity generated by coal-fired or gas-fired generators. **Prima facie**, there appears to be a case for reviewing the target of the power generation mix with wind power as the major contributor and the implication on power generation cost, since it is expected that the chosen target will help reduce the greenhouse gas emission of Hong Kong and make positive contribution to the environment.

Discussion with the two power companies on access to the electricity grids

7. We will make use of the upcoming interim reviews of the existing SCAs to rally support from the power companies to pave the way for future development of RE. As the first step, we will encourage the power companies to fund more RE projects or to take on such projects themselves. We will also ask the companies to make it easier for access of third party pilot RE projects to their electricity grids. These measures together would allow prospective RE investors in both the private and public sectors to gain first hand experience in various RE technologies and build up a knowledge base for local implementation. Although any changes to the Scheme of Control Agreements will require the agreement of the two contracting parties, we believe that the power companies should be able and willing to respond positively to our above proposals, as they have taken the initiatives to promote RE even before we approach them.

² A summary of the views received is provided at Annex.

Timetable for development and wide-scale application of RE

8. We need to work on the most appropriate RE targets for Hong Kong, high enough to make meaningful contribution to the environment but not to impose any unacceptable burden to the community or dampen the growth of our economy. This requires us to consider carefully how the RE element should feature in the post 2008 electricity market review, which both the EDLB and the ETWB will continue to work closely on. As the post 2008 electricity market review is still at a planning stage, the Administration is not able to commit to a concrete timetable on the development and wide-scale application of RE at this juncture. However, we will maintain close dialogue with Members and other interested parties while we are mapping out the way forward.

Environment, Transport and Works Bureau
Economic Development and Labour Bureau

July 2003

(Annex: Summary of views received during the public consultation)

1 INTRODUCTION

1.1 OBJECTIVE OF REPORT

This report summarises the views and opinions received from the public on the findings of Stage 1 of the *Study on Potential Applications of Renewable Energy in Hong Kong* (hereinafter referred to as the Study).

It is not the intention of this report to provide specific responses to the public comments received. Rather, the objective is to summarise and categorise the views received for further consideration by the Government.

1.2 CONSULTATION PROCESS

The Executive Summary of the Stage 1 Study was posted on the EMSD web site on 6th February 2003. Copies of the full Stage 1 Report were also made available to interested parties on request. The full report was eventually uploaded onto the EMSD web site on 19th March 2003. The period for receipt of public comments closed on 6th April 2003.

A total of 28 submissions were received. The submissions may be categorised into the following groups:

Green Groups and Non-governmental Organisations

- Civic Exchange
- Friends of the Earth, Hong Kong
- Green Peace
- The Conservancy Association

Professional Institutions and Trade Organisations

- The Hong Kong Federation of Electrical and Mechanical Contractors Ltd
- Institute of Energy Hong Kong Branch
- ASHRAE Hong Kong Chapter
- The Hong Kong PV Consortium
- The Hong Kong Institution of Engineers
- Air and Waste Management Association Hong Kong Section

Political Parties

- ❑ Hon Law Chi Kwong representing the Democratic Party
- ❑ Citizens Party

Power Utilities

- ❑ CLP Power
- ❑ The Hongkong Electric Co Ltd

Business interests

- ❑ Marubeni Asian Power Ltd
- ❑ Cheung Kong Infrastructure Holdings Ltd
- ❑ Shell Solar Pte Ltd

Consulting Companies

- ❑ Environmental Resource Management Ltd
- ❑ Ove Arup & Partners
- ❑ Rankine & Hill (Hong Kong) Ltd

Individuals

- ❑ Dr Edward Lo
- ❑ Mr Lee Shiu Fung
- ❑ Mr Kim Salkeld
- ❑ Mr Samuel Chan
- ❑ Dr Josie Close
- ❑ Mr Donald Latter
- ❑ "Blurmax"
- ❑ Mr Henry Young

2 SUMMARY OF COMMENTS

2.1 OVERVIEW

Twenty-six of the submissions supported promoting wider application of renewable energy (RE) in Hong Kong. The arguments for promoting RE were mainly that it would bring about many environmental, social and economic benefits. There was only one submission that mildly questioned whether there was an urgent need to develop new or increase power generation capacity in Hong Kong.

The views received can be grouped into the following nine broad aspects:

- ❑ Definition of RE;
- ❑ RE Targets;
- ❑ Import of RE;
- ❑ Role of Government;
- ❑ Institutional and Regulatory issues;
- ❑ Grid Access;
- ❑ Power pricing;
- ❑ Market issues, including RE financing options and tariff impacts; and
- ❑ Technical and technology issues.

2.2 RE DEFINITION

The term “renewable energy” can be defined in different ways, and there is no universally accepted definition at present. For the purposes of the Study, the Consultants have adopted the general working definition that “*renewable energy sources are secure and inexhaustible, in the sense that there is no problem of reserves being depleted*”.

2.2.1 Energy-from-Waste

Six submissions objected to classifying “energy-from-waste” as a RE source, irrespective of the technology with which the energy is extracted from waste. Generally, these submissions considered that only clean resources such as solar and wind should be regarded as truly renewable. One submission specifically objected to using waste-to-energy incineration technology. However, one individual did support the extraction of biogas from organic waste as a RE source.

One suggested the definition adopted by the United Nations Environment Programme (UNEP)¹ on RE should be followed. Another suggested adopting the International Energy Agency (IEA)² definition.

2.2.2 Fuel Cells

Fuel cells are a new energy technology. Four submissions requested that fuel cells should not be considered as a RE source, especially when calculating the projected RE contributions in the future.

2.3 RE TARGETS

The Study proposed targets of 1% (2012), 2% (2017) and 3% (2022), given the many identified constraints and barriers.

Eleven submissions considered such targets to be low and conservative. They advocated higher targets, as many overseas countries have set higher targets and this would signal Government's commitment to RE development. Two suggested a 5% RE target (based on wind power) should be considered. One submission proposed alternative RE targets: 1% (2008), 3% (2013) and 6% (2018), excluding energy-from-waste and fuel cells, for further public consultation.

However, two submissions expressed caution over target setting at this stage and opined that more analysis would be needed. One submission suggested that while the proposed targets appeared low, they could be reviewed after the 2003 SCA Interim Review, or when incentive schemes and funding mechanisms have been established.

At the other end of the spectrum, two suggested that the proposed targets are not overly conservative given the many constraints, or indeed could be too high. It was suggested that targets should be based on "achievable" potential. One submission indicated that should government determine to introduce RE on a compulsory basis, targets should be set in consultation with the industry to ensure that the magnitude and implementation mechanism are realistic and beneficial to the community. This was echoed by another, who opined that compulsory targets for RE or any other energy sources may lead to inefficiency.

¹ According to the UNEP (*Natural Selection: Evolving Choices for Renewable Energy Technology and Policy*, pp. 5, 2000), sources of renewable energy exist in the form of direct and indirect solar radiation, the heat of the earth (geothermal energy), and the gravitational effects of the moon that creates the tides. Direct solar radiation striking the earth also drives the global weather system and photosynthesis. This, in turn, creates the wind and waves, as well as biomass (plant and animal matter). Electricity can be generated from solar, wind, biomass, geothermal, hydropower, and ocean resources.

² The Renewable Energy Working Party of the IEA suggests that: "Renewable Energy is energy that is derived from natural processes that are replenished constantly. In its various forms, it derives directly or indirectly from the sun, or from heat generated deep within the earth. Included in the definition is energy generated from solar, wind, biomass, geothermal, hydropower and ocean resources, and biofuels and hydrogen derived from renewable resources." (*Renewables Information 2002, International Energy Agency*, pp. iii, 2002)

2.4 RE IMPORT

The Study focused on RE sources that are available locally. Seven submissions suggested that import of RE power (from Guangdong) should also be considered to supplement local RE resources.

A counter view was presented by two submissions. Both suggested that it would be preferable for Hong Kong to focus on its own local resources. A reason given was that Guangdong is short of electricity supply.

2.5 ROLE OF GOVERNMENT

Fifteen submissions suggested that the Government has an important role to play in RE promotion, by establishing the necessary market and regulatory conditions, and funding research and pilot projects.

Three further suggested that as the Government is the largest electricity consumer and/or owner of building stocks in Hong Kong, it alone could create a strong demand for RE power.

2.6 INSTITUTIONAL AND REGULATORY ISSUES

2.6.1 Institutional

One submission suggested that an Energy Commission or equivalent should be set up to coordinate all energy related policies.

2.6.2 Regulatory

Ten submissions suggested that the current Scheme of Control Agreements were hindering the development of RE in Hong Kong. RE development should be incorporated into the post-2008 electricity framework. One suggested that a new arrangement alongside the current SCAs would be needed at present to cover the transition to the new post-2008 regulatory regime.

Three advocated the introduction of more competition into the electricity market, through opening up the market to independent power producers. They argued that decentralised generation would facilitate development of some RE systems.

However, there was a view that deregulation of the electricity market for open competition could destroy the goals of RE and rational energy use. It was opined that new profit incentives for the power companies to develop clean power sources would benefit Hong Kong far more than a single competition policy.

2.7 GRID ACCESS

Seven submissions suggested that independent power producers should be allowed to access the grid. One specifically called for non-discriminatory grid access by RE generators, through setting up of an independent transmission operator.

2.8 POWER PRICING

Five submissions commented that the current pricing of conventional power (which does not account for environmental and social costs) is a barrier to development of RE in Hong Kong. Two further argued that some RE technologies would be cheaper than conventional fossil fuel power if these externalities were factored in the cost of electricity generation.

2.9 MARKET ISSUES, FINANCING OPTIONS AND TARIFF IMPACT

The Study proposed three financing options for RE development:

- ❑ Modifying the current SCAs to include RE projects;
- ❑ General Levy to fund RE projects; and
- ❑ Voluntary Green Power Scheme.

One submission suggested that the Government should set a RE target for the power companies, and advocated the adoption of a Voluntary Green Power Scheme (with Government underwriting a *purchase guarantee*). Another supported both the setting up of a General Levy and Voluntary Green Power Scheme. Yet another suggested that Government should provide direct funding of RE projects.

However, three submissions did suggest that more analysis of supply, demand and tariff impacts on users should be conducted before a decision should be made. One submission remarked that RE projects should be economically justifiable and socially beneficial without having one group of customers subsidising another.

Another submission pointed out that the impact of wind power utilisation on electricity tariff would need to be evaluated further, but suggested that there should be no significant impact in the near future due to the small capacity involved and the market price would be subject to many policy and technical issues.

2.10 TECHNICAL AND TECHNOLOGY ISSUES

The key points were:

- ❑ Nine submissions advocated deployment of wind energy systems, owing to its cost-competitiveness and short development period. However, one submission suggested that the Study had over-estimated the wind energy potential and under-estimated its cost.
- ❑ Decentralised generation was advocated, especially building integrated solar PV systems for Hong Kong's dense built environment.
- ❑ Two submissions suggested further consideration of tidal power systems.

- ❑ More detailed technical analysis should be conducted on emerging technologies, balanced resources, PV system performance, wind farm siting, etc.
- ❑ Wind and PV power could be used to produce electrolytic hydrogen, which can in turn be used as a fuel in fuel cells or internal combustion engines.
- ❑ Using biogas (from sewage treatment plants) and landfill gas as fuel in fuel cells.
- ❑ Wind farms could be sited at offshore locations to minimise visual and social impacts.
- ❑ Supply reliability must not be compromised as a result of adopting RE sources.