

CONSULTATION PAPER
ON
PROPOSED AMENDMENTS TO
ELECTRICITY SUPPLY REGULATIONS

Electrical and Mechanical Services Department
Government of the Hong Kong Special Administrative Region
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INTRODUCTION

This consultation paper sets out the scope of the proposed amendments to the Electricity Supply Regulations. We invite your views and comments on the proposals highlighted in the paper.

2. The Government will carefully consider all the views expressed before finalizing the proposed amendments to Electricity Supply Regulations for introduction to the Legislative Council.

BACKGROUND

3. The Electricity Ordinance (“the EO”) (Cap. 406) was enacted in 1990 to enhance safe use of electricity. It repealed and replaced the outdated Electricity Supply Ordinance (“the ESO”) (Cap. 103) which was first introduced in 1911. The existing Electricity Supply Regulations (“the ESR”), which was originally made under the ESO, is now a subsidiary legislation under the EO.

4. The ESR stipulates technical specifications of the electricity supply equipment as well as technical requirements on voltage, testing, protection and so on. To keep pace with the current international practices and the latest electrical technologies adopted by the electricity supply industry, there is a need to update the terminology, specifications and technical requirements stipulated in the ESR.

5. To strengthen the regulatory framework for effective enforcement, the Government conducted a consultation exercise in March 1999 to gather views on amending the ESR. Views and comments were received from 30 stakeholders and interested parties, and in general, they were supportive of amending the current ESR. However, in 2001, in light of the review of the post-2008 electricity market, the Government decided to put the proposed amendments on hold. As an interim measure, a voluntary Electricity Supply Code (“ the ESC”) was put into use in April

2002 after consultation with the electricity suppliers to set out the requirements and general guidelines related to design, construction, operation and maintenance of power systems and associated equipment.

6. Following the conclusion of the post-2008 Scheme of Control Agreements with the two power companies, the Government considers now an opportune time to resume the proposed legislative amendments to the ESR to remove the outdated provisions and upgrade the technical standards to that of the current international practices. As the previous consultation was conducted quite some time ago, the Government opines that a new consultation exercise should be arranged to gather the updated views on the proposals.

7. In preparation of this consultation paper, we have duly taken into account views and comments received from the previous consultation exercise.

PROPOSED AMENDMENTS TO ELECTRICITY SUPPLY REGULATIONS

Objective

8. The objective of the proposed amendments to the ESR (“the New Regulation”) is to update and strengthen the regulatory framework for the electricity supply standards in Hong Kong to ensure a safe, reliable and efficient electricity supply.

New Regulation and Code of Practice

9. We propose that the New Regulation should prescribe essential requirements for compliance by an electricity supplier, in broad and general terms, to allow sufficient flexibility to cater for new developments in electrical technologies.

10. Paragraphs 13 to 27 below describe the regulatory provisions to be included in the New Regulation, which are written intentionally within the ambit of the existing EO. The proposals have taken into account the deficiency of the existing ESR and the latest development in the electricity supply industry. A comparison table between the existing ESR and the proposed New Regulation is shown in the Annex which highlights the differences between the two regulations as well as the

rationale behind the proposals.

11. The New Regulation will be supplemented by a Code of Practice (hereinafter called “the CoP”, which is based on the ESC mentioned in paragraph 5 above) which provides guidelines on how the statutory requirements of the New Regulation can be met. The CoP will be prepared upon consultation with the power companies and other stakeholders with due considerations on international standards, working practices in developed countries as well as local operating conditions.

12. Taking into account different types of electricity supply equipment and installations adopted by the power companies, we propose that the New Regulation will not have retrospective effect on the existing equipment nor installations unless there is a genuine need to upgrade the standards for safety reason.

Proposed Regulatory Provisions

Electricity Supply Specifications

13. Electricity supply specifications are essential to ensure the quality of electricity supply to consumers. Specifications for the supply voltage and frequency vary among different countries, and it depends on the nominal voltages in use and the characteristics of individual generation, transmission and distribution systems. The proposed supply voltage and frequency specifications are -

Nominal supply voltage :	Low voltage :	220 Volts root mean square, ¹ alternating current single phase or 220/380 Volts root mean square, ¹ alternating current 3 phase 4 wires
	High voltage :	11kV, 22kV or 132kV root mean square, ² alternating current 3 phase
Permissible voltage variation ³ under normal	Low voltage :	+/- 6% ¹
	High voltage :	+10% or -2.5% ²

¹ Low voltage specification stated in the existing ESR will be retained in the New Regulation.

² New specifications to be included in the New Regulation.

³ The permissible voltage variation is comparable with international standards and in line with existing Supply Rules of the two power companies.

conditions at the
consumer's incoming
terminals :

Nominal supply frequency : 50 Hertz

Permissible frequency
variation⁴ under normal
conditions : 50 Hertz +/- 1%²
(i.e. +/- 0.5 Hertz)

14. Under normal operating conditions, an electricity supplier will be required to supply electricity to the consumer's terminals within the stipulated supply voltage and frequency specifications. Subject to the approval of the Director of Electrical and Mechanical Services ("the Director"), an electricity supplier may supply electricity, at the request of any special consumers, at a high voltage other than those stated in paragraph 13 above.

15. In line with the existing practice, provisions will be made to allow an electricity supplier to disconnect the supply to consumers under the following circumstances :

- (a) existence of imminent risk of electrical accident; and
- (b) safe and stable operation of the electricity supplier's or another person's electrical installation being jeopardized.

The CoP will make reference to the practices in developed countries and international standards such as European Standard BS EN 50160⁵ in drawing up relevant requirements.

Power System Earthing Requirements⁶

16. The purpose of power system earthing is to protect the public and the

⁴ The permissible frequency variation of +/- 1% is in line with international standards.

⁵ BS EN 50160 depicts the characteristics of the voltage at consumer's supply terminals in public electricity distribution systems for low voltage 1 kV rms or below and medium voltage between 1 kV rms and 35 kV rms.

⁶ Earthing requirements stipulated in the existing ESR will be re-drafted to keep up with the latest requirements.

workers against electrical shock as well as to ensure effective operation of protection equipment under fault conditions. The New Regulation will prescribe general requirements of power system earthing for electricity supply systems. Detailed earthing requirements will be specified in the CoP with reference to international standards and current practices in Hong Kong.

17. The power system earthing requirements will include, but not limited to, the following -

- (a) general earthing requirements associated with generating stations, transmission and distribution substations;
- (b) general earthing methods including connection, inspection and testing; and
- (c) step and touch voltages and the Rise-of-Earth Potential (“ROEP”) under fault conditions.

Safety Requirements for Electrical Equipment

18. The New Regulation will stipulate basic essential safety requirements for electrical equipment, to ensure safety of the workers in the electricity supply industry as well as members of the public. The New Regulation will also impose responsibilities upon an electricity supplier to ensure safety and reliability of the electricity supply systems and associated equipment in respect of design, installation, commissioning, operation and maintenance. Existing safety provisions specified in the ESR, which are applicable to date, will be retained.

19. The New Regulation will prescribe the following in relation to safety and reliability of the electricity supply systems

- (a) essential safety requirements for design, installation, commissioning, operation and maintenance of electrical equipment for the electricity supply systems. (Detailed safety requirements for specific equipment will be stated in the CoP);⁷

⁷ Updated requirements to be specified in the New Regulation.

- (b) adequate protection against overload and electrical fault;⁷
- (c) adequate protection against fire, influx of water or any noxious or explosive liquid or gas;⁷
- (d) safe clearance of overhead lines, including minimum safe distance and minimum ground clearance at different transmission and distribution voltages;⁷ and
- (e) regular inspections and maintenance by an electricity supplier.⁷

20. Under the New Regulation, an electricity supplier will establish a safety management system to enhance operational safety. The management system will ensure employees or contractors to work on or near an electricity supply system in a safe manner. Specific safe working practices for work on high and low voltage systems will be included in the CoP.⁸

Electricity Supply System Design Requirements

21. In addition to the safety provisions, the electricity supply systems and associated equipment should be designed to cater for the anticipated power demand with high reliability and security. It would be impracticable to specify in detail the design of all types of equipment in the electricity supply systems, and therefore, the New Regulation will specify the general requirements and standards.

22. Updated technical requirements and standards will include the following -

- (a) design and installation of generation equipment ⁹ including cogeneration¹⁰ facilities;
- (b) design and erection requirements for electrical installations in transmission and distribution substations;¹¹

⁸ *General safety requirements for work on specialized electricity supply equipment will be specified in the CoP.*

⁹ *New provision will be required for regulating the standards of generation facilities.*

¹⁰ *Cogeneration means the use of waste heat from an industrial process to produce electricity.*

¹¹ *Updated requirements to be specified in the New Regulation and CoP.*

- (c) design and installation of underground cables;¹¹
- (d) design and erection of overhead lines;¹¹ and
- (e) design and installation of electricity supply systems to comply with the exposure limits of power frequency electric and magnetic fields as recommended by international guidelines.¹¹

Prevention of Electrical Interference with Telecommunication Lines

23. The New Regulation will stipulate the minimum separation distance and other precautions for constructing new overhead electricity lines in the vicinity of telecommunication lines so as to prevent undue electrical interference and provide sufficient safe working distance. The requirements will be set out in the CoP after consultation with the stakeholders and the Office of the Telecommunications Authority (“the OFTA”).

Metering Requirements

24. To facilitate accurate recording of electricity consumption, the New Regulation will prescribe standards in connection with design, construction and use of electricity meters. The CoP will set out the specifications and technical guidelines on the accuracy, installation and testing requirements for electricity meters. To ensure accuracy of the electricity meters, an electricity supplier will carry out regular sampling checks on all the meters.

25. Testing, calibration and installation records of electricity meters will be kept and maintained for a prescribed period as determined by the Director.

OFFENCES AND PENALTIES

26. To align with similar offence relating to safety and energy supply (e.g. Factories and Industrial Undertakings Ordinance, Cap. 59 and Gas Safety Ordinance, Cap. 51 and the subsidiary regulations), the following offences and penalties are

proposed for inclusion in the New Regulation -

- (a) any electricity supplier who contravenes the proposed requirements in respect of power system earthing and electrical safety (paragraphs 16 - 17 and 18 - 20 above), commits a major offence and will be liable to a fine of \$100,000; and
- (b) any electricity supplier who fails to comply with the provisions of the New Regulation, except for those mentioned in (a) above, will be liable to a fine at Level 3 (i.e. \$10,000 as stipulated in Schedule 8 of the Criminal Procedure Ordinance, Cap. 221) for every such default and in the case of continuing offence to a daily penalty at Level 1 (i.e. \$2,000) for each day during which the offence continues.

27. The penalty under the New Regulation will not affect the liability of the electricity supplier to make compensation in respect of any damage or injury which may be caused by reasons of his default or negligence.

APPEALS

28. Any person aggrieved by a decision or action of an electricity supplier under the New Regulation may appeal to the Director under Section 42 of the EO. Any person or company aggrieved by a decision or action of the Director under the New Regulation may appeal to the Appeal Board under Section 43 of the EO.

SUSTAINABILITY ASSESSMENT

29. A sustainability assessment shows that the proposed amendments to ESR should strengthen the regulatory framework for the electricity supply standards in Hong Kong. The proposal is also in line with the sustainability principle of enhancing a safe, reliable and efficient electricity supply as well as keeping pace with international standards and practices.

WAY FORWARD

30. The Electrical & Mechanical Services Department will consider views and comments submitted on this consultation paper and make recommendations. We intend to implement the New Regulation by 2010. After the New Regulation has been enacted and gazetted, it will be brought into effect after a suitable grace period to allow time for the electricity suppliers to make the necessary arrangements for compliance.

COMMENTS

31. Please send us your views and comments on this consultation paper on or before 31 December 2008 :

- (a) by post to Electricity Legislation Division, Electrical and Mechanical Services Department, 3 Kai Shing Street, Kowloon, Hong Kong (Attn.: Chief Electrical & Mechanical Engineer/Electricity Legislation); or
- (b) by fax to Electricity Legislation Division, Electrical and Mechanical Services Department on 2895 4929 (Attn.: Chief Electrical & Mechanical Engineer/Electricity Legislation); or
- (c) by e-mail to esrconsultation@emsd.gov.hk.

All responses will be treated as public information unless otherwise specified.

Electrical and Mechanical Services Department
October 2008

Consultation Paper on Proposed Amendments to Electricity Supply Regulations (ESR)

A comparison table between the existing ESR and the proposed New Regulation

<u>Regulatory Provisions</u>	<u>Existing ESR</u>	<u>Proposed Amendments</u>	<u>Justification/ Remarks</u>
1. Electricity Supply Specifications			
-- Nominal high voltage supply voltage and permissible variation	Specification not applicable to the present electricity supply system	11kV, 22kV or 132kV(rms) (+ 10/- 2.5 %)	New specification is needed to match with international standards (para. 13 refers).
-- Nominal supply frequency and permissible variation	50 Hz (+/- 2 %)	50 Hz (+/- 1 %)	The frequency variation is in line with international standards including standard of Mainland China (para. 13 refers).
-- Non-standard supply voltage	Not specified	High voltage supply (other than those specified in para.13) will be allowed subject to approval of Director	New provision is needed to meet the requirements of special consumers (para. 14 refers).
-- Conditions to disconnect an electricity supply	Not specified	Electricity supplier will be allowed to disconnect supply in case of abnormal conditions	This is a new provision in line with international standards such as BS EN 50160 and practices in developed countries (para. 15 refers).

<u>Regulatory Provisions</u>	<u>Existing ESR</u>	<u>Proposed Amendments</u>	<u>Justification/ Remarks</u>
2. Power System Earthing -- General requirements for generating stations and substations -- General earthing method -- Special requirements under fault conditions	Existing ESR reg.10, 37, 38, part of 39, etc. specify requirements on earthing	Updated earthing requirements will be specified in ESR and CoP	Updated provision shall specify earthing connection and essential earthing requirements. Details will be specified in the CoP (para. 16 & 17 refer).
3. Safety Requirements for Electrical Equipment -- Essential safety requirements for design, installation, commissioning, operation and maintenance -- Adequate equipment protection -- Safety clearances of overhead lines -- Regular inspection and maintenance by electricity supplier	Insufficient provisions to cover new electrical equipment Same as above Existing ESR reg.13 specifies minimum safety ground clearances up to 165kV Not specified	Updated requirements will be specified in ESR and CoP Same as above Minimum safety distances and ground clearances at different voltage levels will be specified New requirements will be specified in ESR and CoP	Updated provision is needed to enhance safety requirements for design, installation, commissioning, operation and maintenance of electrical equipment for the electricity supply systems (para. 19(a) refers). Updated provision is needed to ensure safety and reliability of the electricity supply systems (para. 19(b) & (c) refer). This is an updated provision in line with international standards and practices on safety distances and ground clearances up to 400kV (para. 19(d) refers). This is a new provision to specify the responsibility of an electricity supplier to carry out regular inspection and maintenance of the electricity supply systems (para. 19(e) refers).

<u>Regulatory Provisions</u>	<u>Existing ESR</u>	<u>Proposed Amendments</u>	<u>Justification/ Remarks</u>
-- General safety requirements for work on or near an electricity supply system	Existing ESR mainly focus on safety aspects in relation to equipment design and construction. Safety at works is not specified.	New requirements will be specified in ESR and CoP	The new provision will prescribe a safety management system to ensure operational safety. General safety requirements for work on specialized electricity supply equipment will be specified in the CoP (para. 20 refers).
4. Electricity Supply System Design Requirements			
-- Design and installation of generating equipment	No specific requirement in ESR	New requirements pertinent to design and installation aspects of generating equipment will be added	New provision is required to specify the design and installation requirements of generating equipment including cogeneration. Details will be specified in the CoP (para. 22(a) refers).
-- Design and erection requirements for electrical installations in substations	Not clearly specified	Updated requirements will be specified in ESR and CoP	New provision is required to specify the design and construction requirements of transmission and distribution substations (e.g. SF ₆ gas insulated transformer and switchgear). Details will be specified in the CoP (para. 22(b) refers).
-- Design and installation of underground cables	Insufficient provision in ESR (reg.20, etc.) to cover latest development	Updated requirements will be specified in ESR and CoP	New provision in line with international standards and practices is needed to specify the requirements of transmission/distribution cables in respect of design, construction, installation and testing. Details will be specified in the CoP (para. 22(c) refers).
-- Design and erection of overhead lines	Insufficient provision in ESR (reg.13, etc.) to cover latest development	Updated requirements will be specified in ESR and CoP	New provision in line with international standards and practices is needed to specify the requirements of transmission/distribution overhead lines in respect of design, construction, installation and testing. Details will be specified in the CoP (para. 22(d) refers).

<u>Regulatory Provisions</u>	<u>Existing ESR</u>	<u>Proposed Amendments</u>	<u>Justification/ Remarks</u>
-- Design and installation of electricity supply systems with regard to electric and magnetic fields (EMF)	Not specified	New requirements will be specified in CoP	New provision is needed to specify the design and installation of electricity supply systems in compliance with the exposure limits of power frequency EMF as recommended by international guidelines (para. 22(e) refers).
5. Prevention of Electrical Interference with Telecommunication Lines	Not specified	New requirements will be specified in ESR and CoP	New provision is needed to stipulate the essential safety requirements to be observed in constructing new overhead lines to prevent interference and electrical accident (para. 23 refers).
6. Metering Requirements			
-- Design, construction and use of electricity meters	Not specified	New requirements will be specified in ESR and CoP	New provision is needed to facilitate accurate recording of electricity consumption. Details will be specified in the CoP (para. 24 refers).
-- Keeping of testing, calibration and installation records	Not specified	New requirement will be specified in ESR and CoP	New provision is needed to facilitate accurate recording of electricity consumption. Details will be specified in the CoP (para. 25 refers).
7. Offences and Penalties	Specified in ESR reg.40 but the penalty (i.e. \$100) is outdated	New requirements (i.e. penalties \$10,000 for minor offence or \$100,000 for major offence) will be specified in the ESR	New provision is needed to align the penalty with similar offence relating to safety and energy supply (e.g. Factory and Industrial Undertaking Regulations) (para. 26 refers).