

To Be Rescinded



City of Seattle City Light Department

DEPARTMENT POLICY & PROCEDURE

Subject	Number <u>DPP 500 P III-420</u> Effective October 18, 1984
POWER FACTOR METERING AND BILLING	Supersedes N/A
Approved	Department City Light
	Page 1 of 6

1.0 PURPOSE

To provide instructions for installation of power factor metering (KVARH) and customer billing on Rate Schedule 81.

2.0 ORGANIZATIONS AFFECTED

- 2.1 Customer Service Division.
- 2.2 Engineering Division.
- 2.3 Operations Division.

3.0 REFERENCES

- 3.1 City of Seattle Ordinance No. 111615, Electric Rates and Provisions, and as the same may be amended or superseded.
- 3.2 Requirements for Electric Service Connection, City of Seattle, City Light Department, April 19, 1982, or as the same may be superseded or amended.

4.0 POLICY

- 4.1 The Seattle City Light Department may, at its discretion, install reactive metering on any customer's electric service for the purpose of determining the customer's monthly average power factor, if through analysis of the load, it is felt that a low power factor condition might exist. Reactive metering shall not be installed on residential occupancies.
- 4.2 The Seattle City Light Department may waive power factor billing on certain customer loads where customer power factor correction equipment would be detrimental to operation of the Department's distribution system.
- 4.3 The Seattle City Light Department shall have authority to revoke any power factor billing waiver granted customers upon 30-day written notice if it is determined by the Department that the conditions establishing the waiver have changed or been eliminated.
- 4.4 Any customer power factor correction equipment shall, if necessary, be switched out of the system under light load conditions to prevent supply of reactive energy into the Department's distribution system.
- 4.5 Unless the minimum power factor requirements has been waived, the Department shall not be obligated to provide electric service to the customer at any time at a power factor below 80 percent.
- 4.6 In consideration of metering cost, reactive metering shall only be installed on services with sufficient load to require demand metering.
- 4.7 Both the KVARH reactive meter and kwh meter for a customer's Service shall be entered into the CIS computer system, and billed commencing with energization of the service.

5.0 DEFINITIONS

- 5.1 Kwh. Kilowatt-hours, the actual real energy consumed.
- 5.2 Kvarh. Kilovar hours, or kilovolt-ampere reactive hours, the reactive energy of inductive loads that lags the real energy by 90 degrees in time sequence.
- 5.3 KVA Apparent power expressed in volt ampere.

- 5.4 Power Factor. The ratio of active power (kw) to the apparent power (KVA). It is defined as the cosine of the angle whose tangent is the reactive component (KVARH) divided by the real component (kwh) times 100. Power factor is measured in percent and varies in a range from zero to 100.
- 5.5 Total Connected Load. A customer's complete electrical equipment Inventory that is or may be used.
- 5.6 Capacitor. An electrical device that may be connected to a customer's electric service to improve the power factor of an inductive load.

6.0 RESPONSIBILITIES

- 6.1 Customer Service Division shall be responsible for:
- 6.1.1 Making all customer contacts, arranging office and/or field meetings between the customer and the Engineering and Operations Divisions as required.
 - 6.1.2 Preparing service contracts and service orders.
 - 6.1.3 Communicating and coordinating all matters concerned with power factor metering and billing between the customer and the Engineering and Operations Divisions.
 - 6.1.4 Making the final determination on installation of power factor metering and billing in accordance with the Power power Rate Schedule 81.
- 6.2 Engineering Division shall be responsible for:
- 6.2.1 Providing technical information, advice and recommendations on system requirements and effects as related to customer load characteristics and their interaction with the Department's distribution system.
 - 6.2.2 Making determinations when power factor billing shall be waived.
- 6.3 The Operations Division shall be responsible for:

- 6.3.1 Advising the Customer Service Division on meter installation details.
- 6.3.2 Installing the necessary reactive metering equipment.

7.0 PROCEDURE

- 7.1 The Customer Service Division is the contact with the customer for new or existing electric service installations, and determines the need for power factor metering and billing.
- 7.2 For a new or larger electric service installation, the Electric Service Engineer and Electric Service Representative determines the need for reactive metering, and may use the following approximation.
 - 7.2.1 A careful survey of the new and/or existing electrical load is made and segregated into “reactive” and “resistive” loads.
 - 7.2.2 Equipment considered to be reactive loads is as follows:
 - 7.2.2.1 Mechanical equipment driven by electric motors: air compressors, elevators, air conditioners, refrigeration equipment, water pumps, heat pumps, escalators, chillers.
 - 7.2.2.2 Dry-type transformers and auto-transformers.
 - 7.2.2.3 Arc welders.
 - 7.2.2.4 Power reactifiers.
 - 7.2.2.5 Induction heaters.
 - 7.2.2.6 Fluorescent lighting.
 - 7.2.3 Some examples of resistive loads with 100-percent power factor are:
 - 7.2.3.1 Space heating.
 - 7.2.3.2 Water heaters.

- 7.2.3.3 Incandescent lighting.
- 7.2.3.4 Industrial processes involving resistance heating.
- 7.2.4 If the reactive load equals or exceeds 50 percent of the total connected load, both reactive and resistive, then KVARH reactive metering should be specified on the General Service Application and Contract sent to the customer and on the service order sent to the Meter Section of the Operations Division.
- 7.3 For a very large new load, a large unusual load, or a new arc furnace load, the Service Representative consults with Engineering Division to determine any special requirements.
- 7.4 The Service Representative reviews the customer's installation of power factor correction equipment to make sure reactive is not fed back into the City Light distribution system during light load periods. This may require the customer to install contractors and time clocks on capacitor installations connected to the customer's service bus.
- 7.5 Upon return of the service order hard card signifying that all service And meter work has been completed, both the kwh and KVARH meters are entered into the CIS computer system for billing, effective from the date of service energization unless low factor billing has been waived.
- 7.6 At the time a KVARH meter is entered into the CIS computer system, a card for same is entered into a "tickler file" maintained by the Technical Advisory Services section, and dated for one year later.
 - 7.6.1 After the one-year period, the card, together with printouts of the billing histories of the KVARH meter and the associated kwh meter are given to an Electric Service Engineer for analysis.
 - 7.6.2 The Electric Service Engineer sends a form letter to customer with analysis and recommendations.
- 7.7 The customer is notified by letter from the Customer Service

Division whenever new KVARH reactive metering is installed, when an existing lower power factor situation is discovered. The power factor billing requirement and any corrective action the customer may take to increase power factor will be indicated.

8.0 APPENDIX

8.1 Distribution: All Department Policy and Procedure Manuals.

paid at the rate