

Australian Standard_v

**Energy management programs—
Guidelines for definition and
analysis of energy and cost
savings**

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Association of Consulting Engineers, Australia
Australian Construction Services, Department of Administrative Services
Australian Gas Association
Australian Institute of Energy
Australian Institute of Petroleum
Australian Institute of Refrigeration, Air Conditioning and Heating
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Department of Energy, New South Wales
Department of Mines and Energy, South Australia
Department of Primary Industries and Energy
Department of Public Works, New South Wales
Electricity Supply Association of Australia
Ministry of Housing and Construction, Victoria

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Department of Industry, Technology and Resources, Victoria
Energy Managers Group, Melbourne

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PREFACE

This Standard was prepared by the Standards Australia Committee on Energy Auditing as one of a suite of Standards being produced following a request, on behalf of the Australian Minerals and Energy Council's then Co-ordinating Committee on Energy Management, from the former Department of Resources and Energy (now the Department of Primary Industries and Energy), to assist in the National Energy Management Program.

The case study provided to illustrate the application of guidelines in this Standard to a real-life situation was made available by courtesy of the Minister of Housing and Construction, Victoria.

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FOREWORD

This Standard sets out guidelines to assist energy users to identify opportunities for cost savings by preparing uniformly based reports on savings or losses predicted or derived from energy management activities and subjecting such data to financial evaluation in accordance with AS 3595.

The presentation used in this Standard lends itself to a computer-based spreadsheet analysis.

STANDARDS AUSTRALIA

Australian Standard

Energy management programs — Guidelines for definition and analysis of energy and cost savings

1 SCOPE This Standard describes guidelines that enable energy users to analyse proposals for cost savings devised as part of an energy management program. This is achieved by manipulating fuel tariffs, load factors and the predicted effects of plant or building changes to provide standardized projections and forecasts comprising the energy cost data required for financial evaluation in accordance with AS 3595.

NOTE: Examples of suitable tariff tables for the collection and display of data and an actual case history to illustrate the practical use of the method are given in appendices.

2 APPLICATION This Standard is intended for use by institutional, commercial and industrial organizations in the reporting and analysis of the projected or forecast use and cost of energy.

3 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

- | | |
|------|--|
| 2725 | Guidelines for reporting energy use as part of the energy audit |
| 3595 | Energy management programs — Guidelines for financial evaluation of a project |
| 3598 | Energy management programs — Guidelines for the preparation of an energy audit brief |

National Energy Conservation Program. Canberra: AGP 1982.

Advisory booklet No. 1 — Developing an energy management program

Advisory booklet No. 3 — The energy audit

4 DEFINITIONS For the purpose of this Standard, the definitions given in AS 2725, AS 3595, and those below apply.

4.1 Definitions relating to savings or losses in the use and cost of energy

NOTE: See Figure 1 for an illustration of these definitions.

4.1.1 Actual savings/losses in the use and cost of energy — the quantitative difference between the projected or forecast data on the use and cost of energy and actual data with an energy management program (EMP) in place. The difference may represent savings (where reductions are indicated) or losses (where increases are indicated).

4.1.2 Actual use and cost of energy — the actual use and cost of energy in a given reporting period.

4.1.3 Historical use and cost of energy — the actual use and cost of energy in time periods prior to the reference period.

4.1.4 Forecast savings/losses in the use and cost of energy — the quantitative difference between projected data on the use and cost of energy and forecast data with an EMP in place. The difference may represent savings (where reductions are indicated) or losses (where increases are indicated).

4.1.5 Forecast use and cost of energy — the use and cost of energy that may be expected in future reporting periods with an EMP in place.

4.1.6 Projected use and cost of energy — the projection into the future of actual data on use and cost, excluding the effects of an EMP, but allowing for other known or planned events (for example, changes in production levels, changes in rentable space).

4.1.7 Reference level — the actual use or cost of energy in the reference period, usually just before the possible introduction of an EMP.

4.1.8 Reference period — the reporting period over which the reference levels of use and cost of energy are taken, usually just before the possible introduction of an EMP.

4.1.9 Reporting period — a unit of time over which the use and cost of energy is to be reported, typically a year, quarter or month.

4.2 Definitions relating to energy supply tariffs

4.2.1 Billing period — the interval of time to which the energy supply bill refers. In the case of gas and electricity, this would usually be one, two or three months, being the period between meter readings. For other energy forms, the period will be a variable depending on the rate of consumption, amount of energy in storage, and the rate of ordering.

4.2.2 Block tariff — a tariff based primarily on a commodity charge; different blocks of energy may be charged at different rates. It is usual for the initial block of energy to be charged at the highest rate, with subsequent blocks charged at decreasing rates. However, inverted tariffs are possible, where blocks subsequent to the initial block are charged at increasing rates.

4.2.3 Commodity charge — the charge made by some energy supply organizations, based only on the amount of energy supplied.

4.2.4 Contract tariff — a tariff, based on negotiation between the energy supply organization and the consumer, that is maintained for a set period.

NOTE: Negotiations may cover unit charges to be made for energy and rate of energy use, or maximum quantities incorporated, as well as discounts for interruptibility of supply accepted by the user.

4.2.5 Demand charge — the charge made by the energy supply organization based on the rate of energy supply.

4.2.6 Demand tariff — a tariff in which, in addition to commodity and facilities charges as with a block tariff, a charge is made based on the maximum rate of energy consumption.

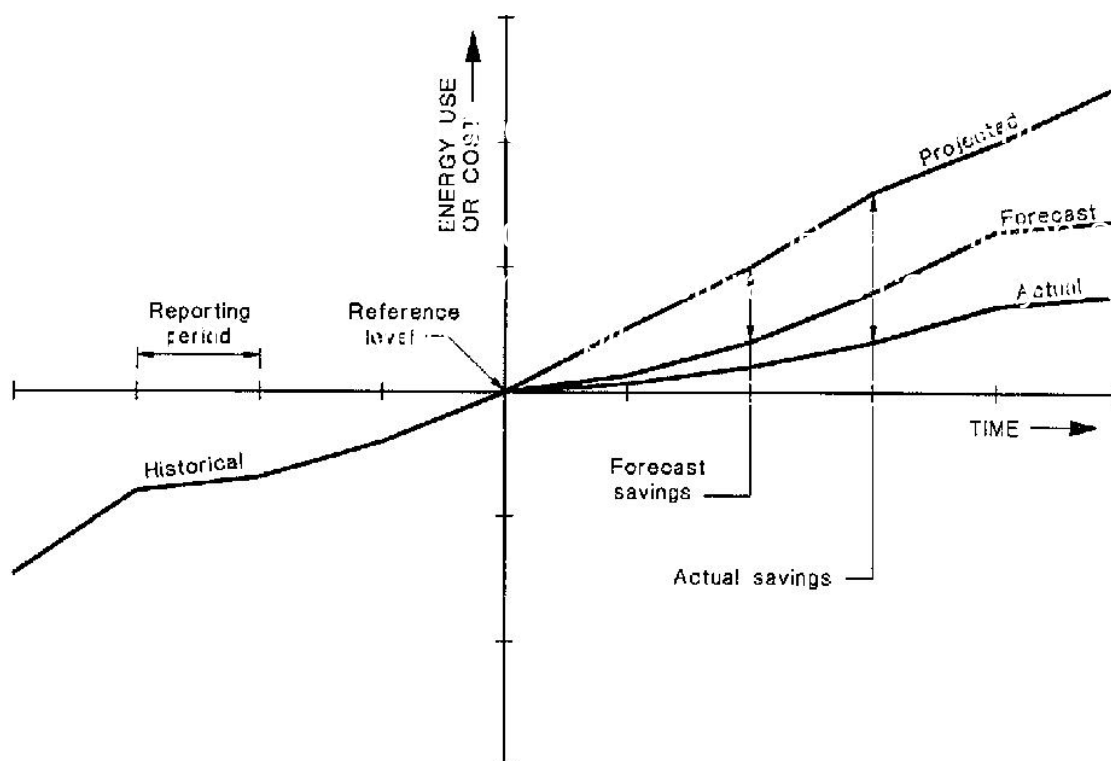


FIGURE 1 ILLUSTRATION OF DEFINITIONS USED IN REPORTING ENERGY SAVINGS (OR LOSSES)

4.2.7 Energy tariff — a scale of charges made by the energy supply organization for the supply of energy.

4.2.8 Facilities charge — any charge that exists outside the energy and demand charges.

4.2.9 Published tariff — a tariff for which details are available to consumers on request. Most domestic, small commercial and small industrial energy consumers purchase energy at published tariff rates.

4.2.10 Special conditions — the other relevant conditions of supply that may be set by the supply organization. These may include —

- (a) physical specification of the energy forms, e.g. composition, energy content (limits);
- (b) delivery conditions, e.g. pressure, voltage, frequency, delivery loads; or
- (c) effect of the user's site operations on the supplier, e.g. power factor (some electricity utilities base their charges on power use in kilovolt-amperes).

NOTE: The supply organization should be consulted to determine special conditions.

4.2.11 Time of use (TOU) tariff — a tariff that incorporates different charges for commodity supplied (and rate of supply) at different times, such as during peak periods, off-peak periods, summer/winter seasons, weekends.

5 PROCEDURE FOR THE DETERMINATION AND PRESENTATION OF ENERGY AND COST SAVINGS

5.1 General The energy use and costs that would arise if particular energy saving measures were taken and those that would be expected if no changes were made may be determined and presented using the following procedure (shown in Figure 2).

NOTE: It is unlikely that an energy management program will be considered for a system not yet commissioned, but if it is, then clearly some estimate of energy use for the system as designed will have to be made to substitute for the measured data available in the case of an existing system.

5.2 Prepare records Prepare records of actual energy use for past billing periods in accordance with AS 2725. It is not possible to state for how many billing periods records are required, but there should obviously be sufficient for a projection of future energy use to be made. If the system under study has little or no variation in performance with time, then a reference level may be used as the projected energy use. In this case, only the reference level is required, measured data being unnecessary.

5.3 Decide options Decide which options are to be evaluated as possible choices in an energy management program.

NOTE: These options may be identified after conducting an energy audit (see AS 3598) and consulting the checklists contained in such references as National Energy Conservation Program Advisory Booklets on Energy Management (see Clause 3.1).

5.4 Insert tariff details Complete the upper part of the tariff tables appropriate to the system under study (see

Clause 6 and Appendix A).

5.5 Prepare predictions For each alternative decided in Clause 5.3, prepare energy usage predictions (as

illustrated in Figure 1). The reporting period should be the same as the billing period to allow later combination of this data with tariffs (see Clause 7).

5.6 Assign costs Combine the energy use predictions with the tariff data to give cost predictions for each

alternative in the EMP (see Clause 7). Where a projection from measured data is not possible, the reference period data on use and cost of energy may be used for determining savings/losses, adjusting as necessary to allow

for known or planned events.

5.7 Financial evaluation Conduct financial evaluation of the alternatives in accordance with AS 3595 (see Clause 7).

5.8 Prepare report Prepare a report based on the recommendations given in Clause 10.

6 TARIFF STRUCTURES

6.1 General This Clause describes tariff structures and the factors that influence them. It is also intended to assist the user in the selection of the best tariffs to suit individual circumstances, assuming that there is some choice.

In forecasting the use and cost of energy in some future period, it is recommended that the tariffs in operation at the date of the report should be used. Tariff details with dates should be clearly stated.

Information on some of the factors influencing tariff structure and choice is provided as follows as an aid to users:

- (a) *Energy types* Different energy types are purchased under different tariff or price structures. Some energy types such as natural gas and electricity cannot easily be stored in large quantities but other energy types such as coal, oil and liquefied petroleum gas (LPG) are stored on site for use as required. For easily stored forms of energy, a price discount may be applicable to bulk purchases.

Special arrangements for certain energy types may have to be made by the consumer, and these should be allowed for in any overall economic analysis, e.g. provision of storage areas, tanks, transformers or employment of electricians certified for work on high voltage.

- (b) *Charge types* All energy tariffs include a charge for the actual amount of the commodity supplied (whether this be on a mass, volume or energy basis). Some contracts for the supply of energy provide for a minimum commodity or demand charge, payable to the supplier, even if usage levels fall below the quantities to which these minimum charges apply. In a similar way, penalties may be incurred if contract usage levels are exceeded. Some contracts may include an interruption clause whereby the supply organization may, under certain conditions, interrupt the supply of energy.

Tariffs that relate to types of energy not easily stored may be of block form and may also include a demand component. From the supplier's viewpoint, this is appropriate because the supply and distribution systems must be capable of making energy available to the consumer at the maximum rate at which it is demanded. Some tariffs offer a lower charge for energy used in off-peak periods, and a penalty rate for energy used in peak periods. In some cases, a surcharge may be applied to tariffs to cover winter periods.

Other charges that may be made include those for the provision of supply facilities (such as pipework and metering) or delivery. Such charges are grouped under the term 'supply charge'.

