

STANDBY PRODUCT PROFILE 2004/15

UPDATED NOVEMBER 2005

PRODUCT PROFILE



BURGLAR ALARMS

AUSTRALIA'S STANDBY POWER STRATEGY 2002 - 2012

AN INITIATIVE OF THE MINISTERIAL
COUNCIL ON ENERGY FORMING
PART OF THE NATIONAL
GREENHOUSE STRATEGY

The National Appliance and Equipment Energy Efficiency Committee seeks comment on this proposal from any interested person or organisation.

Please email comments to:

energy.rating@deh.gov.au

Alternatively, hard copy comments can be mailed to:

Equipment & Appliances Team
Australian Greenhouse Office
Department of Environment and Heritage
GPO Box 787
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Comments received by 28 February 2005 will assist in determining the final form of the policy proposals taken to government.

An electronic version of this Standby Product Profile and other Profiles released for public discussion can be obtained from www.energyrating.gov.au

CONTENTS

Product Description	2
Current Ownership and Trends	2
Sales	2
Relevant modes for the 1 Watt power plan	3
Known Standby Data for New and Installed Products	4
Greenhouse Emissions	6
Current Overseas Policies and Trends	6
Government Target	7
Government Proposals to meet this Target	8
References	8

PRODUCT DESCRIPTION

This profile covers burglar alarms systems, typically installed in dwellings and small-to-medium sized business premises. It does not cover building management systems used in commercial or apartment buildings, nor does it cover video surveillance systems which typically operate in 'on mode' at most times and therefore do not have significant standby energy consumption.

Early alarm systems relied upon a ratchet and gear assembly to ring a bell when a window or door was opened. With the advent of electricity, alarm systems were developed which used electrical window and door switches to trigger an alarm. These early alarm systems were generally mains powered, whereas modern alarms typically operate on 12-16 volts DC and include some form of movement detection inside the building being protected.

Alarm systems are used in residential and business premises, and employ sensors which detect activity and trigger an alarm or other function such as a 'back to base' alert to a security company. These systems typically include a central control unit with control panel, backup battery, keypad interface, intrusion detectors, power supply and audible and/or visual alarms.

Intrusion detectors send a signal back to the central control unit via a wired or wireless connection. Proximity reed switch and glass breakage detectors, used to detect the opening or breaking of doors and windows, still play a role in some alarm installations but to some degree are being replaced by movement detectors.

Passive infrared (PIR) movement detectors are common, with 'dual tech' sensors also becoming more popular. Dual tech sensors include a PIR sensor along with either a microwave or ultrasonic sensor and are less prone to false tripping by movement of pets and curtains blowing in the wind, etc.

More exotic sensor types include infrasonic, volumatic, audio, proximity, geophonic, piezoelectric and vibration detection, which are typically used only in sophisticated commercial applications.

Proximity reed switches and glass breakage detectors are entirely passive and draw negligible current from the central control unit. However movement sensors, 90-95% of which are hard wired, rely on 12 V DC power from the central control unit. The remaining 5-10% are wireless units, which are battery-powered and therefore do not fall under the standby power program.

The central control unit is usually powered by one or more 12-16V AC external power supplies, which are often hidden from view within a ceiling or wall cavity. Most systems also incorporate a backup battery and charger, which can draw up to 1 amp when the battery is charging.

The average domestic or small-medium business alarm system consists of the following components:

- > Central control unit + keypad(s)
- > Power Supply(s)
- > PIR sensor(s)
- > Dual tech sensor(s)
- > Audible and/or visual alarm(s), which do not draw standby power.

CURRENT OWNERSHIP AND TRENDS

Burglar alarms were installed in 20% of all NSW dwellings in 1999, and 23% of houses had an alarm installed, compared with 6% of apartments [Home Security Precautions NSW, ABS 2000]. This is consistent with current insurance company data which shows that around 25% of Australian policyholders have a burglar alarm installed. In this profile it is therefore estimated that there are 1.7 million domestically-installed alarms.

Discussions with industry experts reveal that around 20% of all burglar alarms are installed in business premises, the majority of which are small to medium size businesses. Thus the total stock of burglar alarms falling under this profile is currently estimated at 2.1 million.

SALES

The majority of alarms systems sold in Australia are either manufactured overseas, or use overseas manufactured components which are assembled in Australia. On the basis of information provided by alarm system manufacturers, total sales of alarm systems are approximately 160,000 p.a. This figure, combined with the estimated stock of 2.1 million systems, suggests an average system lifespan of around 13 years. This is consistent with lifespan estimates provided by manufacturers.

Manufacturers state that, since September 2001, sales are increasing at a rate of 10% p.a., whereas prior to this sales growth was around 5% p.a.

RELEVANT MODES FOR THE ONE WATT POWER PLAN

Burglar alarms typically have three operational modes: on, active standby and passive standby. On-mode occurs when the alarm is sounding, and is generally not considered under the standby power plan. Alarms typically do not have an off switch and do not operate in off mode.

Active standby mode occurs when the alarm system has been armed and is prepared to detect an intrusion event and sound the alarm.

Passive standby mode occurs when the system has been disarmed and the alarm will not sound in the event of an intrusion event. In most systems, the power consumption in passive standby is identical to that in active standby mode, due to the high degree of system functionality in passive standby mode. Functions in this mode can include:

- > Charging of backup battery.
- > Keypad prepared for the system to be armed by the operator.
- > System performing ongoing diagnosis of sensors and other components, in order to inform operator immediately of any faults (i.e. before the operator requires the system to be armed).

- > Preparation for immediate arming of the system, when required, i.e. to ensure that the power-up delay has expired by the time the alarm is armed.
- > Adjusting to current conditions such as temperature and background noise.
- > Prevention of tampering.
- > In some systems, different parts of the building can be armed whilst other are disarmed (e.g. arm downstairs at night).
- > In some systems, features such as a 'door bell' are included, which will ring if a person walks through front door past a movement sensor.

There are a vast number of inherent and customisable system functions available, leading to a wide range of standby power levels for alarm systems.

KNOWN STANDBY DATA FOR INSTALLED STOCK AND NEW PRODUCTS

As most burglar alarms are plugged into the mains at a hidden location, measuring the power consumption of installed systems is difficult. Hence the 2001 intrusive household survey [NAEEEC 2001] includes measurements for only four systems, as shown in Figure 1. The average power consumption of these systems was 5.3 W.

Other power consumption data used in this profile include:

- > Standby power for typical central control units + keypads (battery fully charged). Manufacturers state that control panel + keypad standby power typically ranges from 2.0 to 6.6 W. A weighted average of 4 W is used in this profile.
- > External power supply performance data from testing performed for the upcoming MEPS program for

external power supplies. Power supply losses, at typical standby load, were estimated at 1.4 W.

- > Power draw data for PIR and dual tech sensors was taken from a sample of manufacturer specification sheets. The average power draw is calculated for each model by weighting the quiescent and 'with motion' power draw by 90% and 10% respectively. The results are shown in Figure 2, which graphs the sensor average power (vertical axis) and the number of sensors in the sample having that power reading (horizontal axis). Across all models, the average power for PIR sensors was 0.13 W and for dual tech sensors was 0.2 W.

From the data listed above, the average alarm system is estimated to consume around 5.9 W, as shown in Table 1.

FIGURE 1 ALARM POWER CONSUMPTION DATA (WHOLE SYSTEM)

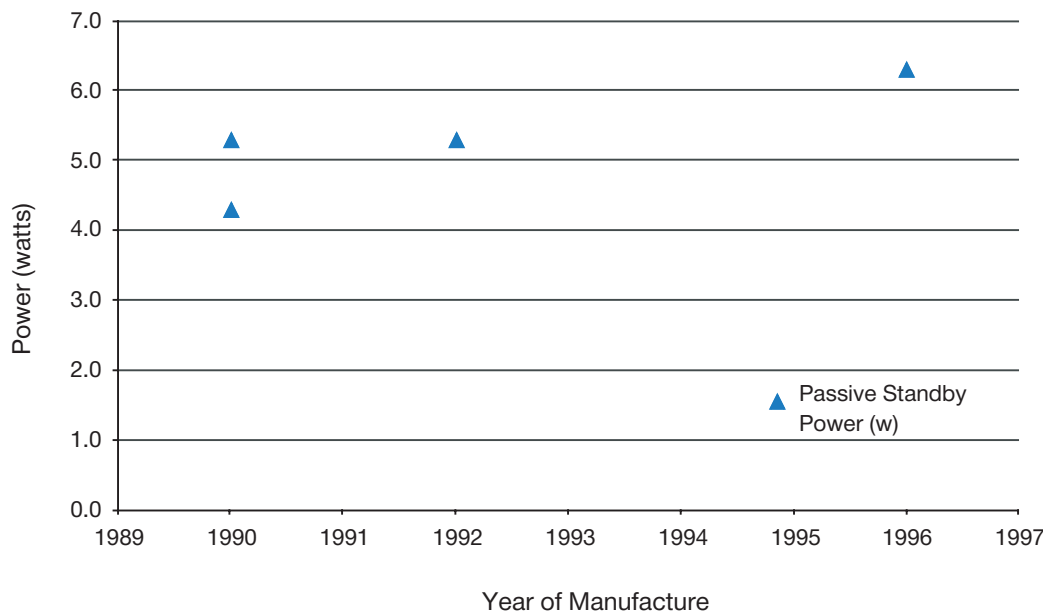
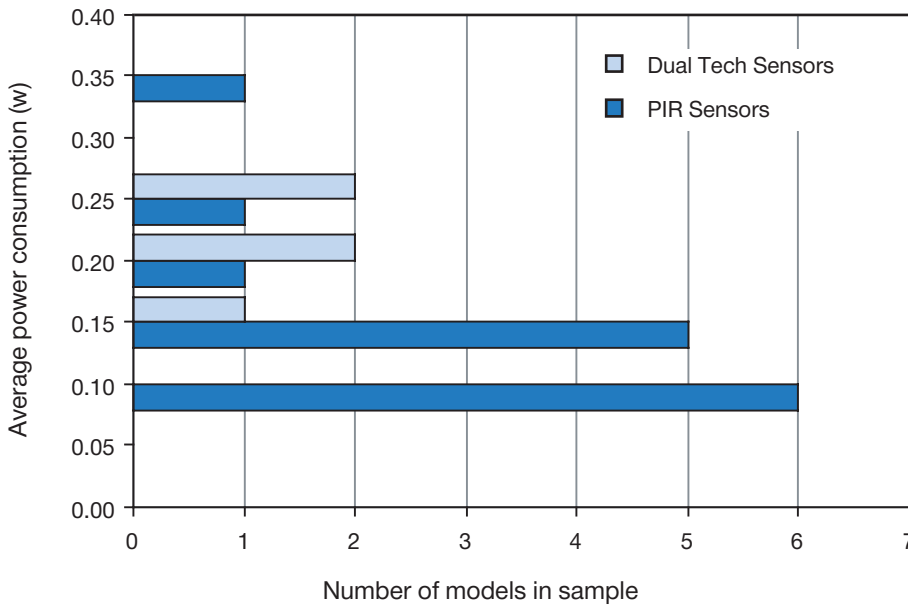


TABLE 1 ESTIMATED AVERAGE ALARM SYSTEM POWER DRAW

Component	Standby Power per Component (W)	No. per System	Subtotal Standby Power (W)
Control Panel + Keypad (battery fully charged)	4.0	1.0	4.0
Power Supply	1.4	1.0	1.4
PIR Sensor*	0.13	3.0	0.4
Dual Tech Sensor*	0.20	0.2	0.04
Total power (W)			5.9

*Average calculated by weighting the quiescent and 'with motion' power draw by 90% and 10% respectively

FIGURE 2 MOVEMENT SENSOR AVERAGE POWER DRAW



This estimation of 5.9 W is consistent with the average of 5.3 W from the 2001 intrusive household survey. Note that these figures are identical for active standby and passive standby modes.

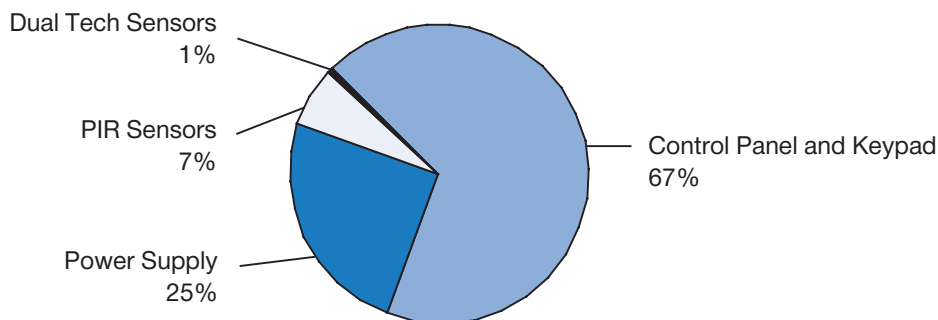
For the average alarm system, the relative power draw of system components can be seen in Figure 3, from which it is concluded that the central control unit is responsible for the greatest power draw.

Whilst the above figures represent estimated average standby power values, there is a wide range of functionality of central control units and movement sensors, and subsequently a wide range of standby power levels. For example variation in central control unit standby power between models is affected by the presence or absence of a large number of variables, including:

- The number of sensors that are or can be connected.
- The ability to operate multiple protection zones.
- Door bell function.
- The ability to perform sophisticated system diagnostics.
- The ability to connect wireless sensors and keypads, etc.
- The presence of a back to base alert.
- The size of the backup battery and charger.

Similarly, movement sensor models vary widely in a number of areas including range, coverage shape, sensitivity, sophistication of electronic circuitry to prevent false triggering, etc.

FIGURE 3 RELATIVE POWER DRAW OF SYSTEM COMPONENTS



GREENHOUSE EMISSIONS

The BaU greenhouse gas emissions from standby energy consumption of alarms systems in Australia is estimated at 100,000 tonnes CO₂e per annum in 2004 and predicted to rise, as shown in Figure 4 (BaU curve).

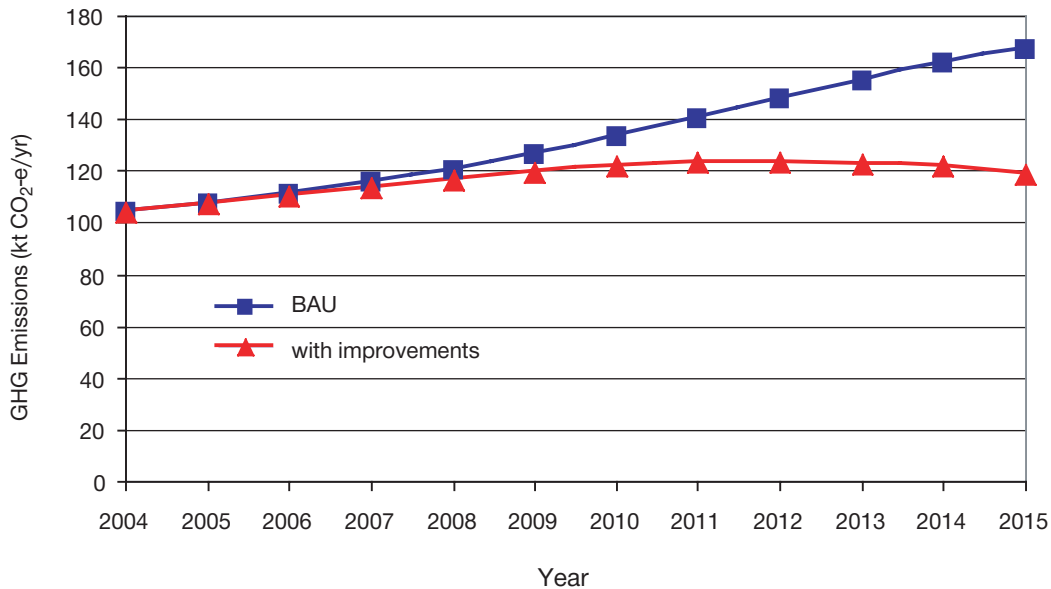
It is expected that the following consumption limits (Table 2) could be achieved with some care in design.

TABLE 2 FUTURE CONSUMPTION LIMITS FOR ALARM SYSTEMS

Component	Standby Power (W)	Notes	Average No. per System	Subtotal Standby Power (W)
Central Control Unit + Keypad (battery fully charged)	1.5	Best known	1.0	1.5
Power Supply	1.0	Assuming MEPS for external power supplies	1.0	1.0

Assuming the alarm component consumption limits (Table 2) are met by 2012 for all new product sales, estimated greenhouse gas savings are illustrated in Figure 4 (the 'with Improvements' curve). Savings are estimated to be around 10kt CO₂e p.a. by 2010 and 50kt p.a. by 2015. Cumulative greenhouse savings to 2015 are estimated at 180kt CO₂e.

FIGURE 4 – GREENHOUSE GAS EMISSIONS



CURRENT OVERSEAS POLICIES AND TRENDS

At this stage there are no overseas regulations or policies applying to alarm systems.

GOVERNMENT TARGET

EXTERNAL POWER SUPPLIES

In view of the significant losses from external power supplies, and the large number of alarms systems using external power supplies, NAEEEC intends to partly focus on external power supplies as a means of reducing alarm system energy consumption. Regardless of any specific recommendations for alarms, all external power supplies will be required to meet MEPS requirements described in Table 3 and Table 4.

TABLE 3 RECOMMENDED NO-LOAD REQUIREMENTS (MEPS) FOR EXTERNAL POWER SUPPLIES

Nameplate Output Power (Pno)	Australian MEPS Proposal Phase (1): April 2006	Australian MEPS Proposal Phase (2): April 2008
0 to < 10 watts	≤ 0.5 watts	≤ 0.5 watts
≥ 10 to ≤ 250 watts	≤ 0.75 watts	≤ 0.5 watts

TABLE 4 RECOMMENDED REQUIREMENTS FOR AVERAGE EFFICIENCY

Nameplate Output Power (Pno)	Australian MEPS Proposal Phase (1): April 2006	Nameplate Output Power (Pno)	Australian MEPS Proposal Phase (2): April 2008
0 to ≤ 1 watt	≥ 0.49 * Pno	0 to ≤ 1 watt	≥ 0.5 * Pno
> 1 to ≤ 49 watts	≥ [0.09 * Ln (Pno)] + 0.49	1 to ≤ 51 watts	≥ [0.09* Ln (Pno)] + 0.5
> 49 watts	≥ 0.84	> 51 watts	≥ 0.85

BURGLAR ALARM SYSTEMS

In accordance with the National Standby Strategy, NAEEEC intends to recommend to the Ministerial Council on Energy that an 'interim' target for alarms be adopted, to provide Governments with confidence that Australian products will meet the ultimate target in 2012. If the interim target is not met in the specified year, Government will commence dialogue with industry to explore other options, including the possibility of moving to Stage Two mandatory measures.

It is considered that the proposed targets are likely to be technically achievable with minimal cost and changes to product design. Given the wide variation in alarm component functionality and standby power draw, the Government targets for 2008 are not onerous. This should allow the majority of products to meet the targetted levels by 2007, whilst the relationship between functionality and standby power is explored in detail.

1. INTERIM TARGET - 2008

Component	Standby Mode (W)
Central Control Unit + Keypad (battery fully charged)	4.0
Power Supply	See above for MEPS levels

This target will apply to all burglar alarms sold in Australia in that year. NAEEEC proposes to monitor the sale of these products in that year and to move toward regulation should that target not be met by a significant number of products.

2. NATIONAL STANDBY STRATEGY TARGET – 2012

Component	Standby Mode (W)
Central Control Unit + Keypad (battery fully charged)	1.5
Power Supply	See above for MEPS levels

This target should apply to all burglar alarms from 2012.

GOVERNMENT PROPOSALS TO MEET THIS TARGET

Government agencies intend to take the following actions to assist industry meet the standby targets for burglar alarms.

Voluntary Tool Available	Action / Rationale	Date
Government procurement list	<ul style="list-style-type: none">MCE are considering a policy of preferencing the purchase of low standby burglar alarms where available and fit for purpose. Qualifying products to be included on the government Energy Allstars procurement database.	2005/6
Australian Standard	<ul style="list-style-type: none">To communicate government expectations in a new part of AS/NZS 62301.	From 2005
Annual survey	<ul style="list-style-type: none">To collect data on new burglar alarms and analyse trends. This data will be published annually.	ongoing

Government will announce whether this product should be targeted for stage two intervention under the National Standby Power Strategy (involving possible regulatory intervention) or whether the abovementioned actions together with industry intervention have been successful in meeting the target at the NAEDEC Forum in the year:

2009

REFERENCES

ABS 2000, Home Security Precautions New South Wales, Australian Bureau of Statistics, report number 4516.1, April 2000.