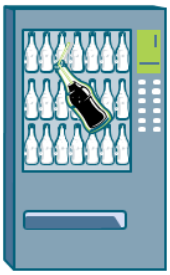


Country:	Australia
Technology:	Vending Machines
Sub Category:	Beverage only (can/bottle)

Introduction

The first stage in the Mapping and Benchmarking process is the definition of the products, i.e. clearly setting the boundaries that define the products for use in data collection and analysis. Doing this ensures that comparison between the participating countries is done against a specific and consistent set of products.

The summary definition for this product is:

> *Self-contained refrigerated systems designed to accept consumer payments or tokens to dispense pre-packed beverages (cans/bottles/food packets) at between 3°C and 12°C without on-site labour intervention*

Hence data was sought on the energy performance of the following product types:

- Beverage (can/bottle)
- Food/Snack (spiral, carousel or other vend type)[1]

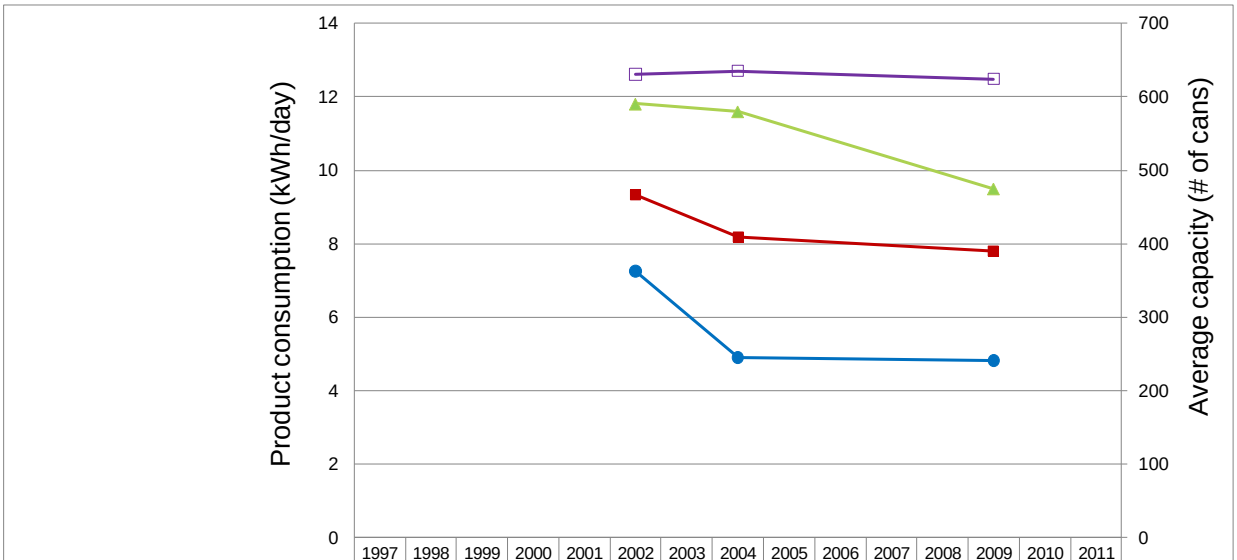
Other characteristics to be noted :

- Capacity - number of cans / bottles / snacks or volume (litres)
- Storage temperature
- Ambient temperature during test
- Whether for indoor or for outdoor use
- Capability of automatically switching into a low power mode
- Presence of usage sensor or timer to enable low power modes
- Refrigerant used
- Glass fronted or solid

A full product definition is provided at the annex website[2].

[1] No data was available on this product type
[2] see http://mappingandbenchmarking.iea-4e.org/matrix?type=product&id=8

Energy consumption of new beverage vending machines Australia

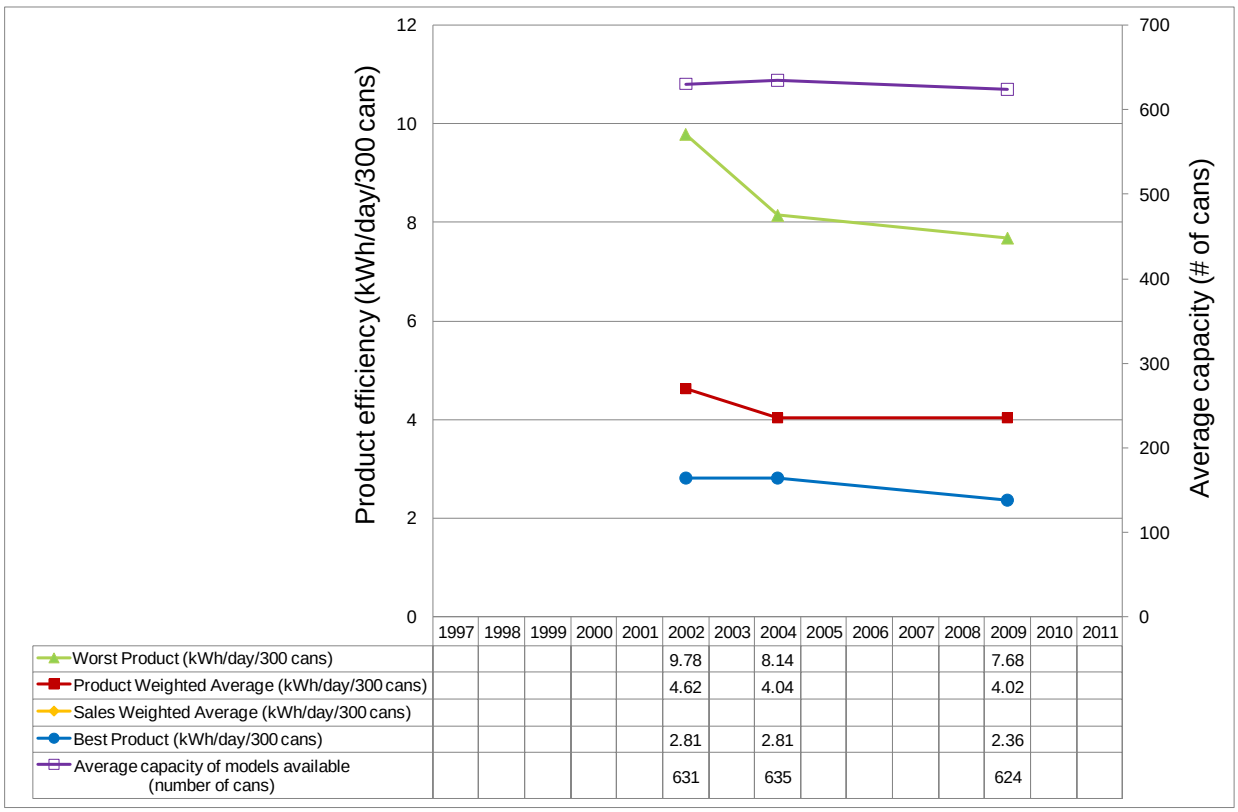


	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Worst Product (kWh/day)						11.81		11.60					9.49		
Product Weighted Average (kWh/day)						9.33		8.17					7.79		
Sales Weighted Average (kWh/day)															
Best Product (kWh/day)						7.25		4.90					4.81		
Average capacity of models available (number of cans)						631		635					624		

Key notes on Graph (see notes section 1)

- Most data are derived from research reports commissioned by the Australian Government covering 2002 and 2004. Six additional products are included from independent test reports covering 2002 (three products) and 2009 (three products).
- The data covers 15 products in 2002; 49 in 2004 and 38 in 2009.

Energy efficiency of new beverage vending machines Australia

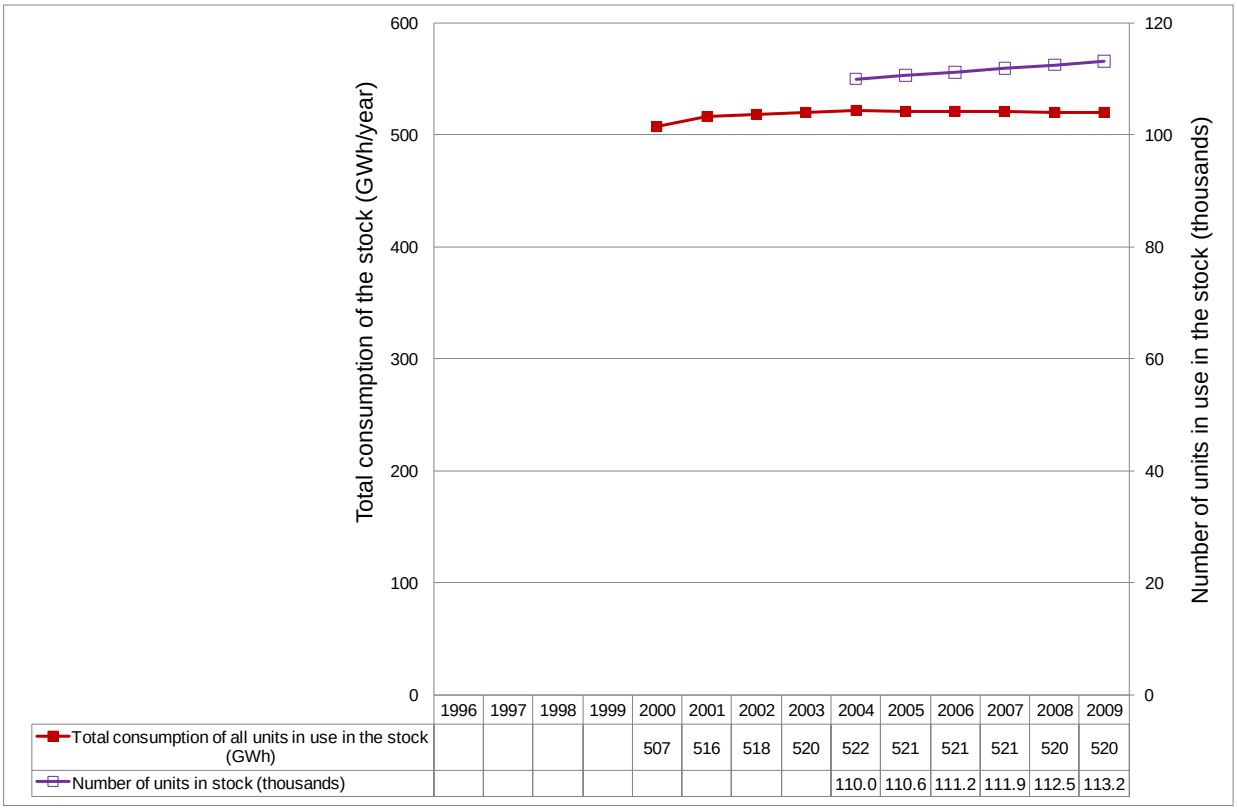


	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Worst Product (kWh/day/300 cans)						9.78		8.14					7.68		
Product Weighted Average (kWh/day/300 cans)						4.62		4.04					4.02		
Sales Weighted Average (kWh/day/300 cans)															
Best Product (kWh/day/300 cans)						2.81		2.81					2.36		
Average capacity of models available (number of cans)						631		635					624		

Key notes on Graph (see notes section 2)

- Most data are derived from research reports commissioned by the Australian Government covering 2002 and 2004. Six additional products are included from independent test reports covering 2002 (three products) and 2009 (three products).
- The data covers 10 products in 2002; 44 in 2004 and 38 in 2009.

Total energy consumption in the existing beverage vending machine stock - Australia



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Total consumption of all units in use in the stock (GWh)					507	516	518	520	522	521	521	521	520	520
Number of units in stock (thousands)									110.0	110.6	111.2	111.9	112.5	113.2

Key notes on Graph (See Notes Section 3)

- The consumption and stock data are derived from the draft Regulatory Impact Statement (Niskin, 2008).

Major Policy Interventions (See notes Section 4)

Suppliers can voluntarily use the US ENERGY STAR label in Australia through a reciprocal agreement with the US Government that has been in place since 2006. The three major suppliers in Australia (which account for 80% of sales) supply machines compliant with ENERGY STAR although it is not known if they supply *only* compliant products.

Regulatory Minimum Standards (MEPS) have been proposed for Australia and New Zealand and a Regulatory Impact Statement has been published[3] but the regulation has not yet been enacted. The draft performance standards have been published as AS/NZ 4864.2:2008 "Performance of Refrigerated Beverage vending machines, minimum energy performance standard (MEPS) requirement". Part 1 of this test standard lays out a test methodology identical to that of ENERGY STAR / ASHRAE 32.1. The minimum energy performance requirement is the same as U.S ENERGY STAR Tier 1 requirement which was in force from 2004 to June 2007. The Australian Government has carried out testing of products to determine whether or not they comply with this requirement, but the MEPS are not enforced.

AS/NZ 4864 also identifies a high efficiency standard which corresponds with the ENERGY STAR Tier 2 requirement which came into force July 2007. This is only a voluntary labelling requirement for the information of potential buyers.

[3] Niskin (2008) Regulatory Impact Statement: Minimum Energy Performance Standards and Alternative Strategies for Refrigerated Beverage Vending Machines. Consultation Draft, Equipment Energy Efficiency Committee. Report No 2008/10, September 2008, Niskin Enterprises Pty Ltd.

Cultural Issues (See Notes Section 5)

The Australian refrigerated beverage vending machine market is comprised of three key segments:

- manufacturers/importers/distributors of vending machines;
- owners of vending machines (brand companies & independent operators); and
- site owners.

The major soft drinks companies dominate the vending market and purchase and own their vending machines. They provide installation, restocking and servicing for their operators.

The independent operator sector comprises small companies that purchase small fleets (on average ten vending machines) for on-site rental. Similarly, these small companies usually provide installation, restocking and servicing.

The majority of Australian refrigerated beverage vending machines are imported from the USA and to a lesser extent Europe, with minimal imports from Asia. Three suppliers account for about 80% of the market.

Notes on data

Section 1: Notes on Product Efficiency

1.1 Test methodologies, Performance Standards and Labelling Requirements

Performance information for the 2002 and 2004 Australian data was based upon ANSI/ASHRAE 32.1-1997. The 2009 data was derived using AS/NZ 4864.1:2008 "Performance of Refrigerated beverage vending machines, test methods-energy performance". This Australian methodology is identical to that for US ENERGY STAR and ANSI/ASHRAE Standard 32.1-1997.

Efficiency is measured as kWh consumed per day in idle mode per 300 cans held by the machine.

1.2 Product Efficiency Graphic

Data were only available for refrigerated beverage vending machines for Australia, not for food/snack machines. The data set was compiled from two sources:

Source 1, new product data 2002 and 2004
Historical data associated with research by Ellis & Associates (noted as "Refrigerated Beverage Vending Machine Qualified Model List"). Ambient test conditions as per ENERGY STAR criteria.

Source 2, new product data 2002 and 2009
This used data from six test reports, three for 2002 (ASHRAE 32.1) and three for 2009 (AS/NZ 4864.1:2008). For a couple of machines more than one energy test was done and each of the test results appears in the data set. Results for one product in 2002 supported the assumption that that there is no significant difference in energy consumption results from ANSI/ASHRAE 32.1-1997 (11.4 kWh/24h) and CAN/CSA-C804-96 (11.6kWh/24h). For one product the energy consumption was tested with the light on and then off, giving rise to a significant difference in energy consumption.

An important distinction of product type that also defines the ambient temperature in which it is tested is whether it is designed to be placed outside and fully weatherproof or only indoors. Ambient temperature (defined by usage location) affects the energy consumption of the machine – consumption rises (or falls) by around 3% for each additional (or reducing) degree Celcius of ambient temperature above the internal storage temperature of the machine. The ASHRAE 32.1 test standard and AS/NZ 4864.1:2008 require a different test temperature and humidity depending on whether the product is intended for indoor or outdoor use (see table below).

Summary of test method requirements for ambient temperature and storage temperature.

Test method	'Indoor' type product		'Outdoor' type product	
	Ambient temperature (DegC)	Ambient humidity (%RH)	Ambient temperature (DegC)	Ambient humidity (%RH)
ASHRAE 32.1 (USA, Canada, Australia) and AS/NZ 4864.1:2008	23.9°C±1°C	45%±5%	32.2°C±1°C	65%±5%

To make data comparable, all were normalised for internal storage temperature and for ambient temperature during test (carried out for both consumption and efficiency results):

i. Storage temperature: as if tested with a storage temperature of 4.4°C (where this was made possible by any declared storage temperature). This was done assuming 3% change in consumption for every degree Celcius difference.
ii. Ambient temperature: as if tested at the ASHRAE outdoor requirement as per the table above. This was also done assuming 3% change in consumption for every degree Celcius difference.

The internal product temperature during test was assumed to be 4.4°C in all cases (standard requirement for soft drinks).

Section 2: Notes on Product Consumption

2.1 Test methodologies, Performance Standards and Labelling Requirements

Consumption is measured as kWh consumed per day in idle mode. Results are derived using the same test methodologies as for efficiency above.

2.2 Product Consumption Graphic

Results are derived using the same data sources as for efficiency above.

Section 3: Notes on Consumption of Stock

The installed stock of refrigerated beverage vending machines was estimated at between 100,000 to 120,000 in Australia in 2005 (from Collins and Ellis, 2005[4]). The current stock is assumed to remain within the estimated range since new sales largely account for replacement of existing stock (based on confidential advice from machine suppliers).

Machine annual sales were estimated between 1,500 and 2,000 in Australia in 2005 (Collins and Ellis, 2005). Consultation with large and small importers/distributors confirms the range although there was a preference for the bottom of the range.

The consumption data in each year is derived from the draft Regulatory Impact Statement (Niskin, 2008, Table 2, page 24) and sales and stock data (from Appendix 8). The typical product efficiency in the stock (kWh/day) was calculated from estimated total stock consumption divided by stock (millions) divided by 365.

Section 4: Notes on Policy Interventions

No further information to add.

Section 5: Notes on Cultural Issues

No further information to add.

[4] Collins, R and Ellis, M (2005) Analysis of the Potential for Minimum Energy Performance Standards For Refrigerated Beverage Vending Machines. Prepared for The Australian Greenhouse Office and NAEEEC under the National Appliance & Equipment Energy Efficiency Program. Draft published March 2005.