

Lighting Examples of CADDET

(Energy Efficiency)

*The Institution of Engineers, Australia
Electrical Branch*

SYDNEY 8 February 2001

presented by

PAUL McGREGOR

Chairman, CADDET NSW State Team
& Director, McGregor & Associates

Building Better Wheels!!

**Residential Energy Efficiency
& Renewable Energy Benefits
from
Using CADDET**

***BDA - AGO
ESD Initiative Seminar***


SYDNEY 3 March 2001

presented by

PAUL McGREGOR

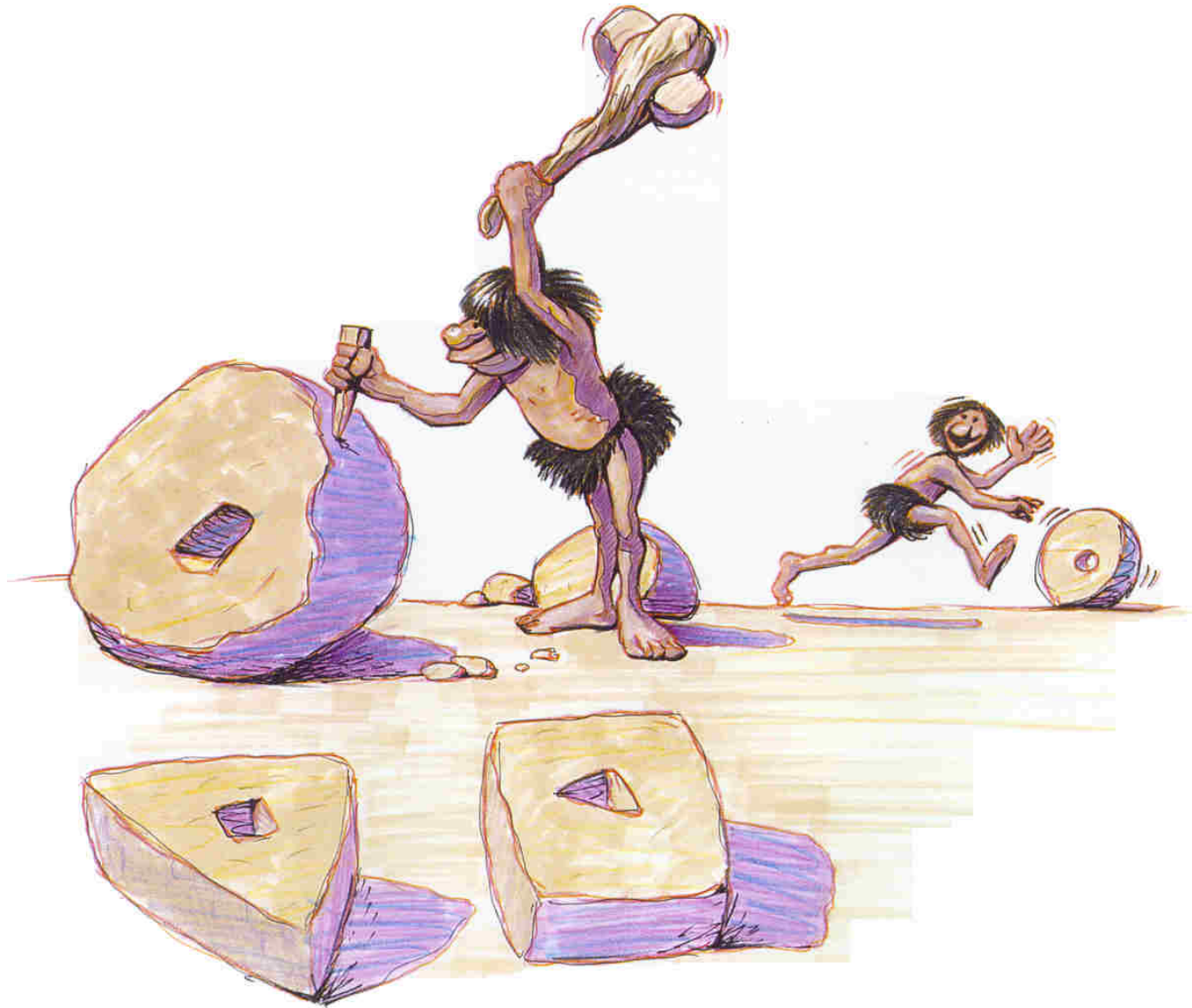
**Chairman, CADDET NSW State Team
& Director, McGregor & Associates**

CADDET IEA
OECD




SEDA

Sustainable Energy Development Authority
SOLUTIONS FOR OUR FUTURE



**WHY DO WE ALWAYS
WANT TO REINVENT
THE WHEEL?**

➤ **I N D U S T R Y A S S O C I A T I O N S**

➤ **P R O F E S S I O N A L**

I N S T I T U T E S

➤ **S U P P L I E R S**

➤ **F R I E N D S & A S S O C I A T E S**

➤ **J O U R N A L S**

➤ **C O N F E R E N C E S**

+

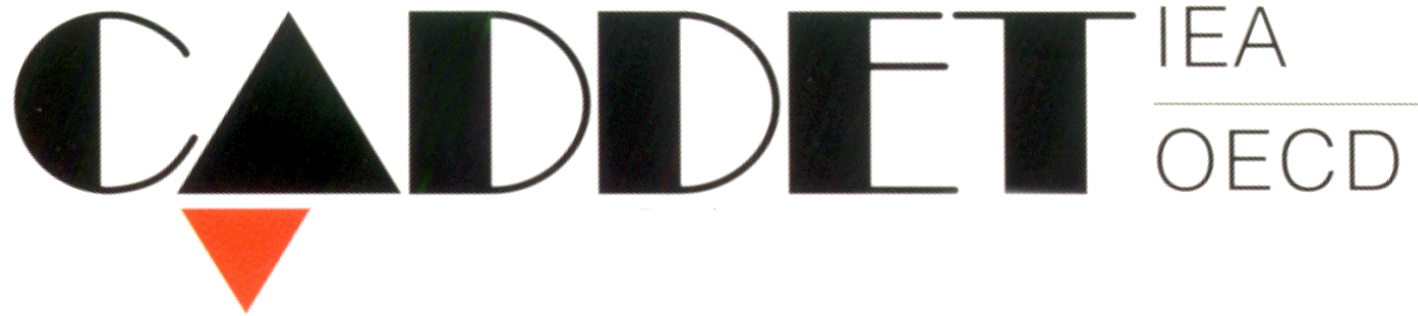
➤ **C A D D E T**

WHAT IS

CADDET ^{IEA}

_{OECD}

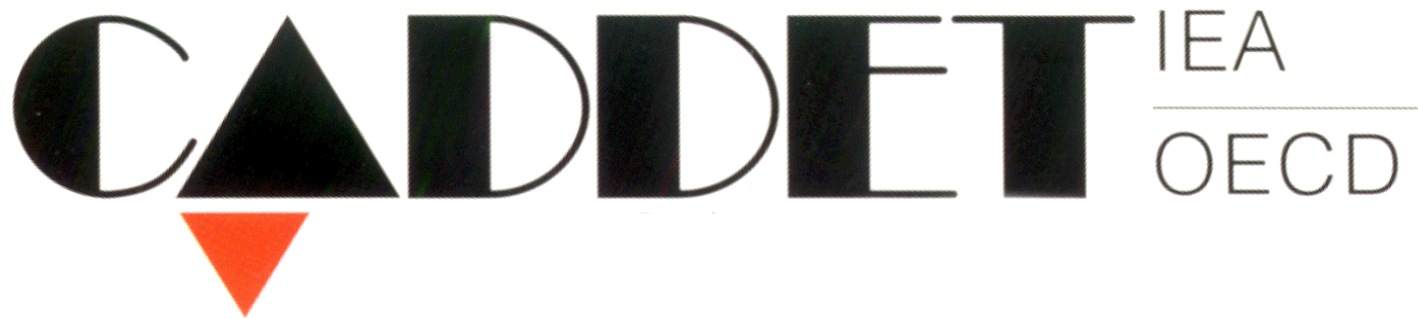




IS A

VALUABLE

RESOURCE



**Centre for the Analysis &
Dissemination of Demonstrated
Energy Technologies**



- An international energy information sharing network
- Part of the International Energy Agency's (IEA) activities set up within the framework of the Organisation for Economic Cooperation & Development (OECD)





- **CADDET** facilitates the sharing of expertise in **energy efficiency & renewable energy** applications
- **CADDET publications** promote energy saving technologies to the world
- **Your input** is needed if you want **CADDET** to publicise your technology

-PUBLICATIONS

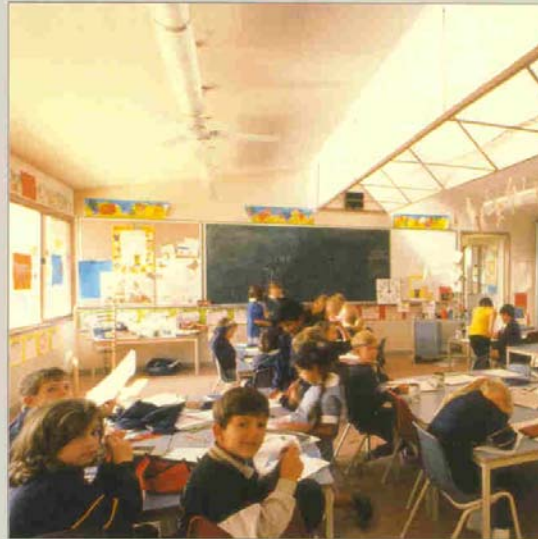
- **The Register** – a database of over 1500 international demonstration projects
- **Analysis Reports** – detailing selected energy topics
- **Newsletter** – a quarterly topical magazine on the latest energy issues
- **Technical Brochures** – describe proven energy saving technologies

- **Maxi Brochures** – raising awareness of key technologies that save energy AND make good financial sense
- **Proceedings from Expert Meetings** – published following meetings organised by CADDET



- **CADDDET Analysis Reports** compare a selection of demonstration projects within one field of technology.
- Some examples currently available:
 - *Energy Efficient Lighting in Commercial Buildings*
 - *Industrial Ventilation*
 - *Heat Exchangers in Aggressive Environments*

Learning from experiences with
**Energy Savings in
Schools**



CADDET IEA
energy efficiency OECD
ANALYSES SERIES No. 21

CASU
March 1997



- The **CADDET Newsletter** features articles on energy efficiency projects, together with information on more general energy matters, legislation and government policy in participating countries.
- Subscription is **FREE**



- **CADDET Maxi Brochures** are colourful 16 to 24-page booklets in A4 format
- Some currently available titles:
 - *Saving energy with Efficient Lighting in Commercial Buildings*
 - *Saving energy with Industrial Motors and Drivers*
 - *Saving energy in the paper recycling industry*



Saving energy with
**Energy Efficiency
in Hospitals**

Maxi Brochure 05

CADDET IEA
OECD
energy efficiency

CENTRE FOR THE ANALYSIS AND DISSEMINATION OF DEMONSTRATED ENERGY TECHNOLOGIES

- **The Register** – a database of over 1500 international demonstration projects
- **Technical Brochures** – describing projects of significant technical advance whose benefits have been proven
- **Newsletter** – a quarterly topical magazine on renewable energy projects
- **Mini Reviews** – assess the current status and future trends for renewable energy technologies



- **CADDET Mini Reviews** contain papers, contributed by experts in 11 member countries
- Four reviews are available
 - *Active Solar Energy*
 - *Wind Energy*
 - *Energy from Crops & Crop Residues*
 - *Advanced Thermal Conversion Technologies for Energy from Solid Waste*

CADDET REPORTER

The **CADDET Reporter** is published quarterly to serve the needs of **Australian** users of **CADDET** with information on developments, products, events and other items of interest.

CADDET REPORTER

A recent survey of **CADDET Reporter** readers revealed that the majority:

- are well-educated, mature males in senior managerial and technical roles
- are heavy users of e-mail and the Internet
- use the information in the CADDET Reporter for work and personal interest
- are the decision-makers in service industries, manufacturing and government

HOW DOES THIS
RELATE TO
ELECTRICAL
SERVICES

PARTICULARLY
LIGHTING?

LIGHTING IS AN ENERGY
FORM BUT DOES NOT
ALWAYS NEED MAINS
CONNECTED ELECTRICAL
ENERGY

DAYLIGHTING

**PV POWERED
LIGHTING**

Light tunnel for natural daylighting of Australian school

Summary

The Park Ridge Primary School in Victoria, Australia has been constructed to an innovative design which optimizes energy efficiency, with particular attention to natural daylighting of all spaces. Daylight is admitted to rooms via east-west aligned skylights which direct the light onto acrylic baffles from where it is reflected onto the white-painted ceilings.

From there it is reflected down onto the work plane.

This system gives regular, even light and provides up to 70% of the school's light requirements. A lighting control system has been installed for supplementary lighting, when needed. The design could be readily adapted to other types of single storey, non-residential buildings.

Highlights

- Energy-efficient school building
- Savings of up to 70% in lighting costs
- Applicable in single storey non-residential buildings
- Zero payback period on new buildings

Interior of classroom showing light tunnel and baffles to reflect daylight.





Glass Roof-integrated PV System at an Environmental Centre

Summary

In 1995, a semi-transparent photovoltaic (PV) roof, consisting of polycrystalline cells mounted between sheets of glass, was installed at the visitor centre of the National Environmental Education Centre in

the Netherlands. The system produces about 4,000 kWh/year of electricity and is intended to demonstrate the use of PV electricity to a broad public. A monitoring device displays power production at that moment as well as total energy production since the project began.

Highlights

- ▼ Semi-transparent PV modules
- ▼ 12.5% efficiency
- ▼ High educational value

The Dutch National Environmental Education Centre; the PV panels are mounted on the sloping part of the glass roof.



Photograph: Rensgard Binnings



Angular selective skylights - natural lighting for schools

Summary

An innovative daylighting technology developed by the Daylighting Research Group at the Queensland University of Technology (QUT) is set to revolutionise school lighting practice. It also has the potential to influence building design in a much wider range of commercial applications.

In October 1995, angular selective skylights were installed in a classroom at Waterford State Primary School, in Queensland, Australia. The immediate response from the school was that the lighting was excellent. It eliminated the need for supplementary lighting and provided far more natural illumination, well above the minimum required levels even in overcast conditions.

Highlights

- Potential CO₂ reduction 320,000 tonnes/year in Australia
- Improved lighting quality
- Eliminates need for artificial lighting

The angular selective skylights.



lution costs in a new building will be lower and will result in a shorter payback period, but this depends on the type of roof, ceiling height, etc.

Energy savings are potentially large. Installing angular selective skylights in a school with 20 classrooms, the potential energy saving is 20 x 2,000 = 40,000 kWh per annum.

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CADDET IEA +
energy efficiency OECD

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* IEA: International Energy Agency
OECD: Organisation for Economic
Co-operation and Development

IEA

The IEA was established in 1974 within the framework of the OECD to implement an International Energy Programme. A basic aim of the IEA is to foster co-operation among the 23 IEA Participating Countries to increase energy security through energy conservation, development of alternative energy sources, new energy technology, and research and development (R&D).

This is achieved, in part, through a programme of energy technology and R&D collaboration currently within the framework of 35 Implementing Agreements, containing a total of more than 60 separate collaboration projects.

The Scheme

CADDET functions as the IEA Centre for Analysis and Dissemination of Demonstrated Energy Technologies. Currently, the Energy Efficiency programme is active in 15 member countries.

This project can now be repeated in CADDET Energy Efficiency member countries. Parties interested in adopting this process can contact their National Team or CADDET Energy Efficiency.

Demonstrations are a vital link between R&D or pilot studies and the end-use market. Projects are published as a CADDET Energy Efficiency 'Demo' or 'Result' respectively, for on-going and finalised projects.

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Energy-efficient lighting and ventilation in an office building

Summary

A publicly-owned office building in Eskilstuna, Sweden, has been retrofitted with high-frequency lighting, in combination with self-regulating controls for the lighting and ventilation systems. The building has a total floor area of 19,000 m² and contains more than 300 offices, a conference room, lunch rooms, and a recreation hall. Before retrofitting the total annual electricity con-

sumption was 1,300 MWh and the district heat consumption was 950 MWh. The total annual energy consumption was reduced by 20% as a result of the new installations.

Monitoring has shown a reduction in overall electrical energy consumption of approximately 30%. This saving comes from a 10% reduction in ventilation requirements, and a 40% reduction in electrical power demand.

Highlights

- Self-regulating lighting and ventilation
- 20% total energy savings
- Electric power demand reduced by 40%



The retrofitted building in Eskilstuna.

▼ Energy Efficiency project

Efficient commercial lighting in supermarkets

Location : Perth, Western Australia; Australia

Project Description

- General Description
- Technical data
- Performance data
- Energy data
- Environmental data
- Economic data
- Keywords
- Project Details

Related data

- Organisations
 - Documents
 - Organisations with experience in related technologies
-

Project Description

General Description

A supermarket chain was able to reduce lighting costs substantially in seven stores, while at the same time improving light levels and light quality through the use of improved lamps and reflectors. In a typical 2,000 m² store, 30 % of the energy load of 2,500 kWh was due to lighting. The Economic Energy Company was contracted to convert twin 58 W fluorescent fittings in the Farmer Jack stores to a single 58 W batten which achieved a 50 % reduction in lighting energy. In a typical store, about 500 fittings were converted using high efficiency 3M Specular reflectors and Wotan Triphosphor lamps.

After installation, initial light levels within the store were increased by 20-25 % with an accompanying 40 % improvement in colour rendition. Savings are expected to be AUD 22,000 per annum, providing a simple payback period of 13 months. This is in addition to savings in air-conditioning costs due to the lower waste heat from more efficient lighting.

The management of the chain are very satisfied with the result. The store appears more colourful and offers greater opportunities for displaying merchandise, particularly as the stock on shelves appears more attractive due to the evenness of the light and the increased light intensity on the products. Management has also found that the savings derived from reduced lighting costs are added to the company's profit at a time when revenues are more difficult to increase.

Technical Data

Conventional twin 58 Watt light fittings were replaced by single 58 W light fittings and high-efficiency reflectors. Reflectors are manufactured by 3M Company while the lamps are Wotan Triphosphor Lamps.

Energy Data

Lighting energy was reduced by 50 %, whilst lighting levels increased by 20-25 % and colour rendition improved by 40 %. Air-conditioning costs were also reduced as a result of lower waste heat from reduced lighting energy.

Environmental Data

Pollution was substantially reduced from lower electricity use.

Economic Data

Typical Total capital cost was AUD 24,400. Savings are estimated at AUD 22,000 per annum, giving a simple payback period of 13 months. □

Keywords :retailing, reflectors, luminaires

Project Number AU-95-507
 Project Type Result
 Start date June 01, 92
 End date June 01, 93
 Country Australia
 CADDET Brochure
 Primary Sector [3B] BUILDINGS: Commercial
 Primary Technology [F02] Lighting and Electrical
 Secondary Sectors []

Secondary Technologies []

Abbreviation Farmer Jack Stores
 Role Host Organisation
 Address Perth, Western Australia
 Australia
 Tel.
 Fax
 Email
 Related projects project list
[no contact details available]

Abbreviation Economic Energy Company
 Role EEC
 Role Monitoring Agent
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 Role ISR
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[none]

[Click here to get an overview of organisations that have experience in related technologies.](#)



- Visit the **CADDET Register** at Australia's premier energy efficiency website

www.isr.gov.au/caddet/

- With links to

CADDET's Renewable Energy site @

www.caddet-re.org

CADDET's Energy Efficiency site @

www.caddet-ee.org



For more information on how to expose your innovative technology to international markets via the CADDET Reporter, the Register or other publications contact:

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The Green Version of the Yellow Pages
is called

GREENTIE

which is similar to the

SEIA/SEDA

energy smart allies program



GREENTIE IEA
OECD

**Greenhouse gas technology
information exchange**



GREENTIE

- An intergovernmental information centre on greenhouse gas mitigating technologies
- Operates a worldwide technology database
- Established by the IEA and the OECD





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