

**AN ASSESSMENT OF ENERGY AND
EMISSIONS PERFORMANCE OF
BUILDINGS AT TEACHERS MUTUAL
BANK LTD**

AUGUST 2016

Overview

Teachers Mutual Bank Ltd, which includes Teachers Mutual Bank and Unibank, has invested significantly in improving the environmental performance of its buildings, which are the largest source of its direct environmental footprint.

This report provides an assessment of the environmental credentials of the bank, with a focus on electricity and greenhouse gas (GHG) emissions and reduction measures in buildings over the past five years. The main measures are Solar PV installations and LED lighting upgrades.

Teachers Mutual Bank Ltd currently owns premises at four locations: Homebush, Rooty Hill, Parramatta and Perth. These sites account for over 90% of Teachers Mutual Bank Ltd's emissions from buildings. The bank operates out of a further four rented premises and is limited in its ability to implement emissions reduction measures at these sites. As such, the focus of this assessment is on the owned sites.

The bank's broader GHG footprint (leased sites and vehicles) has also been reviewed to put the performance of owned buildings in context. Since 2013, Teachers Mutual Bank has been a carbon neutral organisation with zero net emissions.

Highlights

- Since **2011**, Teachers Mutual Bank's emissions from owned buildings has reduced by **16%**, or **3.3%** a year on average.
- Installations of **612** solar PV panels and **1,826** LED lights are on track to reduce building emissions by a further **28%**.
- **186kWp** of solar PV installed on all **4** owned buildings. The 186kWp represents a near 80% increase in known PV capacity in the banking sector in Australia, from **240kWp** to **426kWp**. Two of the sites will also export solar power to the grid.
- Solar PV installed at the Unibank Perth office is forecast to generate **40%** of its electricity use.
- The LED lighting upgrades on **3** owned buildings reduces electricity consumption from lighting by **68%**.
- Combined the Solar PV installations and LED lighting upgrades represents:
 - + Total investment cost of **\$454,467**
 - + Annual cost savings of **\$148,899**
 - + Electricity savings of **557,083 kWh** p.a.
 - + Emissions savings of **462 tCO₂-e** p.a, or **28%** of the total
- Over the next **5** years, Solar PV and LED is forecast to save **\$744,493** in costs and **2,306 tCO₂-e** of emissions
- Since **2013**, Teachers Mutual Bank has been a carbon neutral bank, offsetting all emissions from vehicles and buildings (Scope 1 and 2 emissions).
- Since **2011**, Teachers Mutual Bank has increased its economic activity (**+38%** assets) while reducing emissions (**-16%**). Therefore emissions intensity reduced by **39%** from **0.54 to 0.30 tCO₂-e** per million \$ of assets. The impact of PV and LED lighting upgrades will improve this significantly.
- From October 2016, Teachers Mutual Bank Ltd will have solar PV and LED lighting installed at all four of its owned buildings.

Emissions and energy footprint

Teachers Mutual Bank Ltd's energy and emissions footprint is created through both Scope 1 and Scope 2 emissions. Scope 1 emissions are direct emissions generated through the use of fuel in staff vehicles while Scope 2 emissions are indirect emissions generated through the consumption of electricity in buildings owned or rented by Teachers Mutual Bank.

This assessment is considering both Scope 1 and 2 emissions for the five year period between FY 2011 and FY 2015:

- In FY 2011 and 2012, Teachers Mutual Bank only measured emissions from owned and leased buildings (Scope 2)
- From FY 2013, emissions from staff vehicles (Scope 1) were also measured
- Since FY 2013, Teachers Mutual Bank has purchased carbon offsets for all Scope 1 and 2 emissions and has been a carbon neutral bank
- The number of buildings occupied has increased to seven sites, and the addition of the UniBank Perth office in July 2015 mean that the Bank has occupied eight sites from FY 2016
- The rollout of main emissions reduction measures (Solar PV installations and LED lighting upgrades) will be completed by October 2016 and so cost and emissions savings do not appear in the FY 2011 – 2015 data set.

In FY 2015, the total GHG emissions for Teachers Mutual Bank were 2,389 tonnes CO₂-e. This was comprised of:

- 638 tCO₂-e from fuel use in vehicles (Scope 1 emissions)
- 1,751 tCO₂-e from electricity consumption in buildings (Scope 2 emissions)

Of the 1,751 tonnes of Scope 2 emissions, 1,600 (91%) were generated from buildings owned by Teachers Mutual Bank in Homebush, Rooty Hill and Parramatta (NSW)¹.

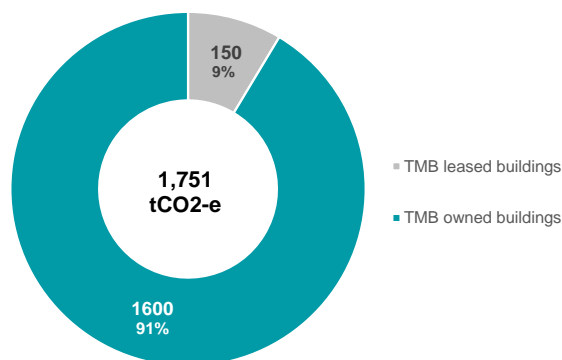


Figure 1 - Teachers Mutual Bank absolute GHG emissions from buildings for FY 2015

¹ The Perth Unibank office was acquired in July 2015 so data has not been included in Teachers Mutual Bank's emissions and electricity footprint for FY15 but has been included in data projections going forward

As Figure 2 illustrates, emissions from electricity consumption at owned buildings have been mostly consistent the past three years, and have decreased by 16% since the baseline year of FY 11 to 1,600 tCO₂-e.

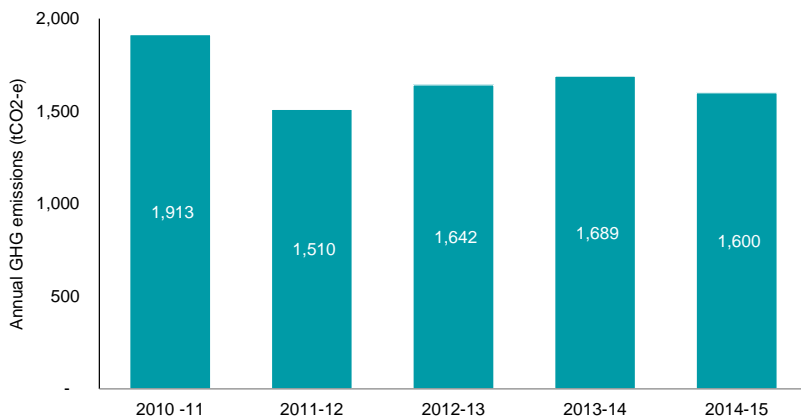


Figure 2 - Emissions from owned buildings for FY 11 - 15

The overall decrease over the past five years is despite the expansion into a new office in Parramatta for FY 14 and FY 15, which increased the total despite decreased electricity consumption at the other two sites in those years.

At the two main sites of Homebush and Rooty Hill (which represent 90% of total emissions), emissions have dropped by 25% from 1,913 to 1,436 tCO₂-e. This is displayed in Figure 3 below.

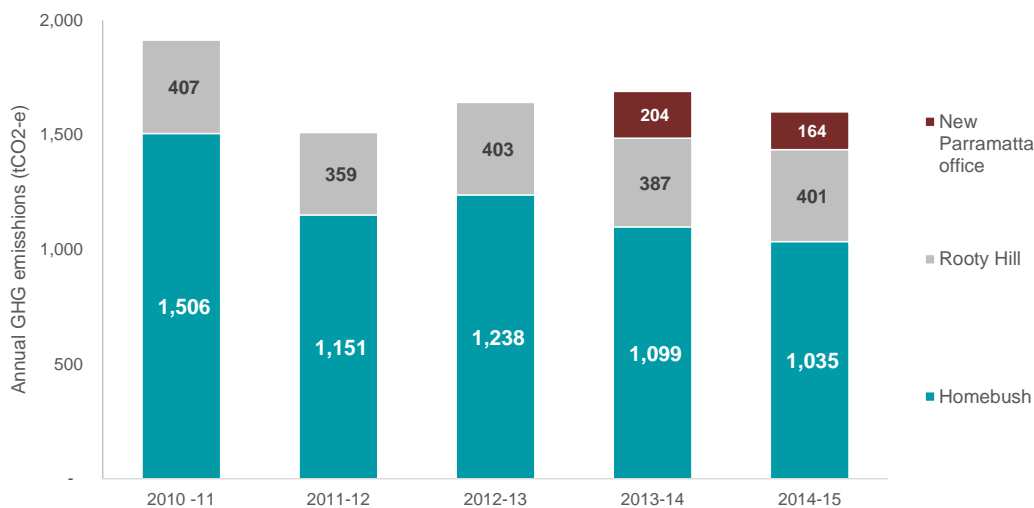


Figure 3 – Annual GHG emissions, by owned office

Emissions reduction and carbon neutrality

Emissions reduction measures

In 2015 and 2016, Teachers Mutual Bank Ltd has invested in two significant measures to reduce the emissions associated with its largest source of emissions, building electricity consumption:

1. Solar Photovoltaic (PV) panels installed on all of its 4 owned buildings (Homebush, Rooty Hill, Parramatta, Unibank Perth)
2. LED lighting replacement at 3 of its owned buildings (Homebush, Rooty Hill, Perth)

The Bank has also invested in emissions reductions previously:

- In 2014, the Parramatta office was fitted with LED lights. This involved replacing 469 lamps at a net cost \$16,718. The replacement has been estimated at **reducing annual lighting electricity consumption by 26% and nearly \$18,000** in annual electricity and maintenance savings, which means a payback period of less than 1 year.
- In 2013, the Bank invested in a Long Range Holden Volt, a battery powered electric car with on board generator. As part of fleet use, Teachers Mutual Bank employees have driven the Volt over 17,000 km, **saving up to 1,800 litres of petrol consumption and 4 tonnes of emissions.**

The combined measures are forecast to reduce Teachers Mutual Bank Ltd's total annual emissions by 28% from owned buildings (462 tCO₂-e) in FY 2017 and the remaining amount is offset through carbon credits. This breakdown is illustrated in Figure 4 and the Solar PV and Lighting upgrade impacts are explored below.

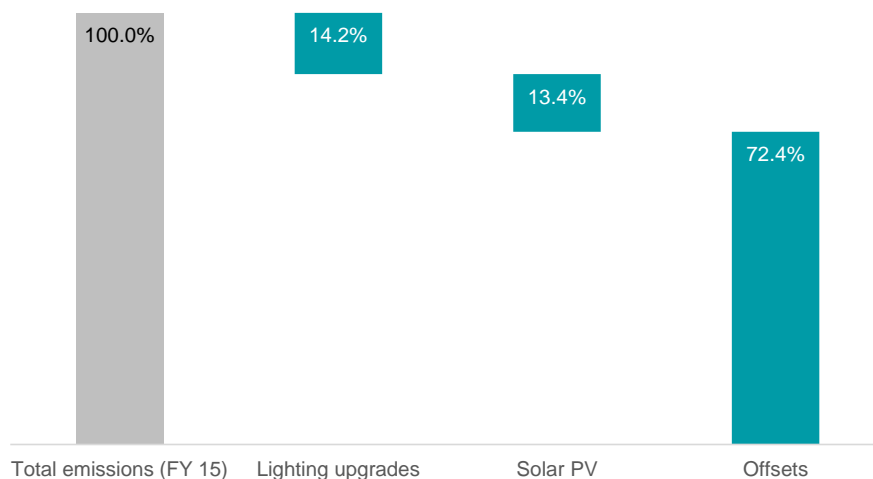


Figure 4 - Contribution of emissions reduction measures and offsets projected per annum (based on FY 15 figures)

Solar PV installations

Teachers Mutual Bank Ltd has worked with AGL to install a total of 612 solar PV panels across its 4 owned premises. The total cost was \$400,000 and once small-scale technology certificates are included, the net price of the installations is \$239,000². This investment totals a peak power of 186 kW and is estimated to generate up to 270,000 kWh per annum as set out in Table 1. Two of the systems will also export up to 6,500 kWh to the grid annually.

Three installations have been completed during FY 2016, with the Unibank WA office expected to be on line by October 2016.

Table 1 - Solar PV installation overview, by site

Site	Peak power (kWp)	Number of panels	Est. annual generation (kWh)	Est. annual export (kWh)	Gross system cost (\$)	Net system cost (w/ STC rebate)
Total for owned sites	186	612	270,100	6,520	\$397,236	\$239,003
Homebush, NSW	80.3	259	126,000	-	\$169,667	\$101,942
Rooty Hill, NSW	58.3	188	71,000	-	\$118,632	\$69,516
Parramatta, NSW	24.5	79	34,500	1,296	\$47,250	\$26,615
Perth, WA Unibank	22.4	86	38,600	5,224	\$61,687	\$40,930

Teachers Mutual Bank Ltd's solar PV installation means it will have solar power at all owned building sites and Figure 5 demonstrates the proportion of electricity consumption from solar generation expected at each site.

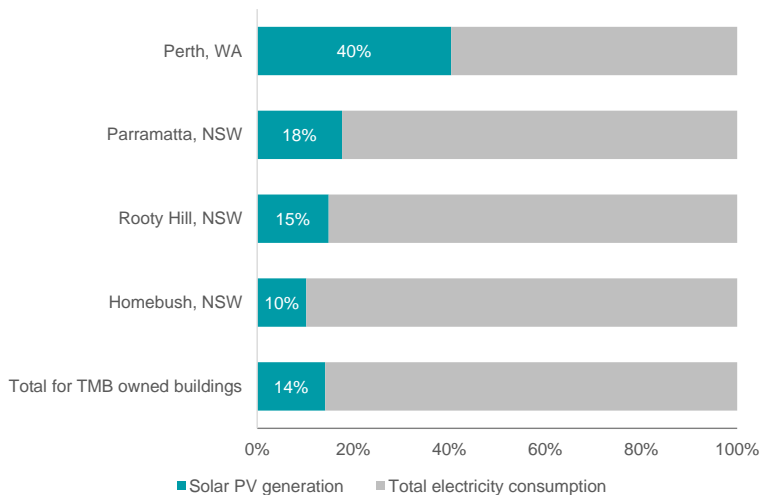


Figure 5 - Proportion of annual electricity consumption from solar PV generation (based on FY15 electricity consumption)

The solar PV installations are forecast to reduce **up to 224 tCO₂-e of emissions annually**, which is approximately 13% of Teachers Mutual Bank Ltd's total emissions. Additionally, the installations will result in **up to \$41,000 of savings in annual electricity costs**. Therefore, the total installations have a simple payback of approximately 5.9 years, although this varies per site as shown in Table 2.

² This is the net system cost after small-scale technology certificates (STCs) from the Renewable Energy Target are taken into account, which result in an estimated rebate of \$158,233

Table 2 - Annual emissions and cost savings from solar PV installation, by site

Site	Annual emissions avoided (tCO ₂ e)	Annual cost savings*	Expected payback
Total for owned sites	224	\$40,739	5.9
Homebush, NSW	106	\$17,849	5.7
Rooty Hill, NSW	60	\$7,391	8.8
Parramatta, NSW	29	\$5,572	4.8
Perth, WA Unibank	29	\$9,927	4.1

*Based on current retail price of electricity for Teachers Mutual Bank Ltd and estimated performance of system

LED lighting upgrades

Teachers Mutual Bank Ltd commissioned Illum-A-Lite to replace a range of fluorescent, halogen and HID lighting at three of its owned sites, with more efficient LED lighting.

A total of 2,938 lamps will be replaced with 1,826 LED installations at Homebush, Rooty Hill and Unibank Perth for a net capital investment of \$215,000³.

These upgrades are expected to reduce lighting electricity usage at **these sites by between 60-70%**. For Teachers Mutual Bank and Unibank, the upgrades will **reduce annual electricity consumption by up to 287,000 kWh, or 14% of Teachers Mutual Bank and Unibank's total annual consumption at owned sites**.

This is explored in Table 3 and Figure 6 below.

Table 3 - LED lighting upgrade projected electricity savings, by site (based on FY 15 data)

Site	Current lighting electricity usage per annum (kWh)	Lighting electricity saving per annum (kWh)	Reduction in lighting electricity usage per annum (%)	Total electricity usage per annum (kWh)	Total electricity saving per annum (kWh)*	Total electricity saving per annum (%)
Total for owned sites	377,344**	256,434	68.0%	2,000,509	286,950	14.3%
Homebush, NSW	265,379	183,893	69.3%	1,231,902	205,727	16.7%
Rooty Hill, NSW	56,323	33,572	59.6%	477,510	38,199	8.0%
Perth (Unibank)	55,642	38,969	70.0%	95,627	43,024	45.0%

*Includes A/C savings at a conservative estimate of 15% of lighting electricity savings

** Based on 3 sites listed here, Parramatta office lighting electricity usage not known

³ This is the net capital cost after rebates from the NSW Government's Energy Savings Scheme (ESS) are included, which are estimated at \$24,314

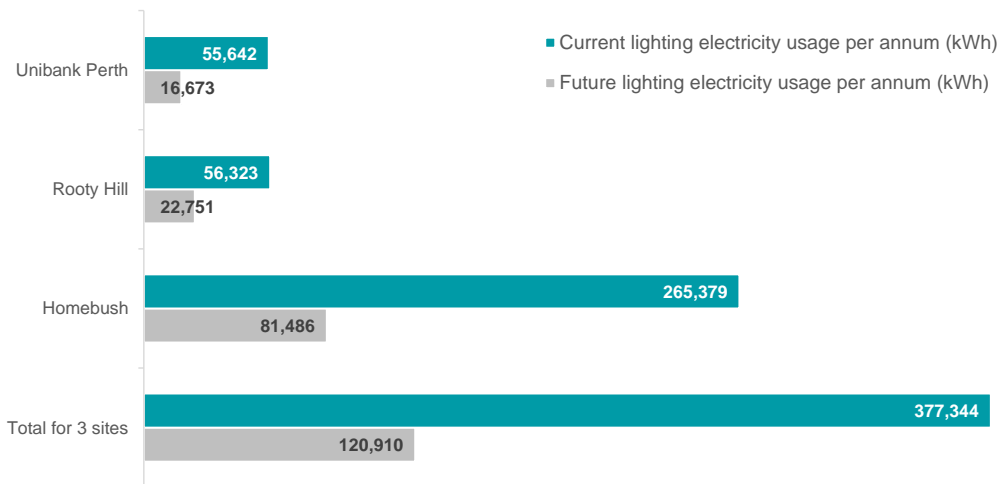


Figure 6 - Annual savings in lighting electricity consumption from LED lighting upgrades, by site

The LED lighting upgrades are expected to reduce **up to 238 tCO₂-e of emissions annually**, equivalent to 14% of Teachers Mutual Bank Ltd’s total emissions from owned buildings. Additionally, the installations will result in **up to \$108,000 of savings in annual electricity bills and maintenance costs**. Therefore, the total installations have an expected simple payback of approximately 2 years, although this varies per site as shown in Table 4.

Table 4 - Annual emissions and cost savings from LED lighting upgrades, by site

Site	Annual emissions avoided (tCO ₂ e)	Annual emissions avoided (%)	Total annual cost savings*	Capital investment (after rebates)	Expected payback
Total for owned sites	238	14.3%	\$108,160	\$215,464	2.0
Homebush, NSW	173	16.7%	\$84,493	\$148,258	1.8
Rooty Hill, NSW	32	8.0%	\$9,546	\$29,658	3.1
Perth, WA (Unibank)	33	45.0%	\$14,121	\$37,548	2.7

*Includes electricity costs (using current retail electricity price for Teachers Mutual Bank Ltd) and maintenance costs (based on expected failure rates and replacement costs for existing lamps)

Carbon neutrality

Since July 2012, Teachers Mutual Bank has been a carbon neutral bank that offsets GHG emissions from Scope 1 and 2, electricity and fuel use.

Teachers Mutual Bank has invested in three carbon offset projects in Asia- Pacific that have robust social, environment, community and education credentials. The offset supplier is Climate Friendly.

As part of its emissions calculations and offsets, Teachers Mutual Bank undertakes two Greenhouse Gas (GHG) accountancy processes:

1. A GHG emissions inventory that creates a financial accounting system for our organisational GHG emissions under our operational control.
2. An assurance audit that provides an independent, expert assessment and verification of our Inventory, and verification of our claims of carbon neutrality.

Future performance

Both the solar PV installation and LED lighting upgrades will have ongoing environmental and financial benefits. While the expected lifespans for both installations are 20+ years, projections have been made for the next five years in this section.

As Table 5 demonstrates, Teachers Mutual Bank Ltd will **save nearly \$204,000 in electricity bills and avoid over 1,100 tonnes of emissions over five years from the solar PV installations.**

Table 5 – Five year forecast of emissions and cost savings from solar PV installation, by site

Site	Annual cost savings	Cost savings over 5 years*	Emissions avoided over 5 years (tCO ₂ e)	Emissions avoided over 5 years (% of total emissions)
Total for owned sites	\$40,739	\$203,694	1118	13%
Homebush, NSW	\$17,849	\$89,245	529	10%
Rooty Hill, NSW	\$7,391	\$36,955	298	15%
Parramatta, NSW	\$5,572	\$27,860	145	18%
Perth, WA (Unibank)	\$9,927	\$49,634	147	40%

*No cost escalation assumed

Similarly, Teachers Mutual Bank Ltd will **save over \$540,000 in electricity and maintenance bills and avoid nearly 1,200 tonnes of emissions over five years from its LED lighting upgrades** as indicated in Table 6.

Table 6 – Five year forecast of emissions and cost savings from LED lighting upgrades, by site

Site	Annual cost savings	Cost savings over 5 years*	Emissions avoided over 5 years (tCO ₂ e)	Emissions avoided over 5 years (% of total emissions)
Total for owned sites	\$108,160	\$540,799	1188	14%
Homebush, NSW	\$84,493	\$422,464	864	17%
Rooty Hill, NSW	\$9,546	\$47,729	160	8%
Perth, WA (Unibank)	\$14,121	\$70,606	163	45%

*No cost escalation assumed

Over the five years from FY 2011 – 2015, Teachers Mutual Bank reduced emissions from owned buildings by 16%, an average of 3.5% per annum. **The lighting upgrades and solar PV installations together mean that Teachers Mutual Bank Ltd will generate 28% fewer emissions from its owned buildings per year, compared to 2015.**

Table 7 – Combined Solar PV and LED Lighting upgrade data, annual and 5 year forecast

	Solar PV	LED Lighting	Total
Number of installations	612 panels	1826 lights	-
Investment cost	\$239,003	\$215,464	\$454,467
Annual cost saving (\$)	\$40,739	\$108,160	\$148,899
Annual electricity savings (kWh)	270,133	286,950	557,083
Annual emissions savings (tCO ₂ -e)	224	238	462
5 year cost savings (\$)	\$203,694	\$540,799	\$744,493
5 year electricity savings (kWh)	1,350,666	1,434,750	2,785,416
5 year emissions savings (tCO ₂ -e)	1,118	1,188	2,306

Over the next five years, Teachers Mutual Bank Ltd would generate 8,364 tonnes of gross emissions without the upgrades. The Bank is now forecast to generate 6,058 tonnes of gross emissions, which will be offset. This is shown in Figure 7.

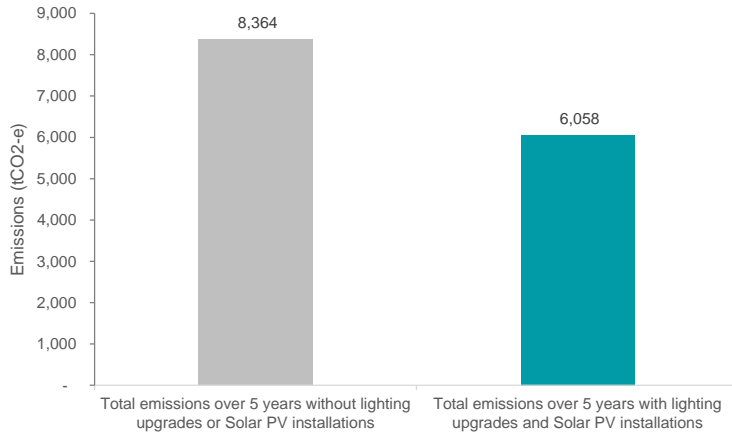


Figure 7 - Total owned building emissions avoided from LED upgrades and solar PV installations - 5 year forecast⁴

Solar PV in context

The Bank's total solar PV installation is one of 26 medium-scale installations⁵ commissioned in Australia in 2015. The installation represent 2.3% of the total output capacity of all medium-scale installations for 2015⁶.

According to solar energy consultants Sunwiz and a review of publically available information, **Teachers Mutual Bank Ltd's solar PV installation represents an 80% increase known solar PV capacity in the banking sector in Australia (from 240 kWp to 426 kWp).**

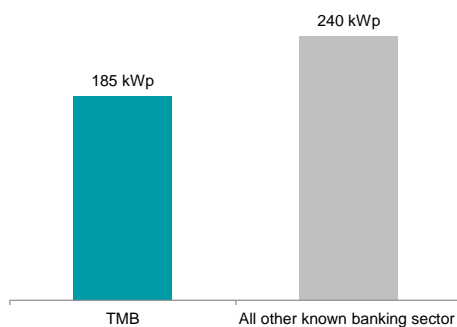


Figure 8 - Installed solar PV capacity in the banking sector (as of July 2016)

There are six other known installations in the banking sector and Teachers Mutual Bank Ltd's are also the first known solar PV installations in the banking sector in NSW.

⁴ The 5 year emissions forecast is based on the FY15 emissions data and assumes that emissions will remain the same each year. While emissions may not remain static, the quantum of emissions avoided from the lighting upgrades and solar PV installations will remain the same over 5 years, regardless of actual emissions produced. The UniBank solar PV is due on line in September 2016

⁵ Medium scale installations refer to systems between 100 kW to 1 MW

⁶ Clean Energy Council (2016) Clean Energy Australia Report 2015

Emissions intensity

Teachers Mutual Bank's emissions reductions can be placed in context by considering the intensity of emissions, i.e. the rate of change in emissions relative to another activity.

It is common practice for organisations to track their *absolute* emissions but tracking their *relative* emissions over time enables both an understanding of how emissions have changed in line with business activity and comparison across organisations of varying size and complexity. At an international level, for example, it is accepted practice for countries to use emissions per unit of GDP as an intensity metric. If GDP grows faster than emissions, this suggests that there are efficiency improvements in terms of emissions generated relative to economic activity.

Over the past five years, Teachers Mutual Bank has increased its economic activity each year while reducing emissions. Compared to 2011, Teachers Mutual Bank has increased its total assets by 38% while reducing its underlying emissions from owned buildings by 16%.

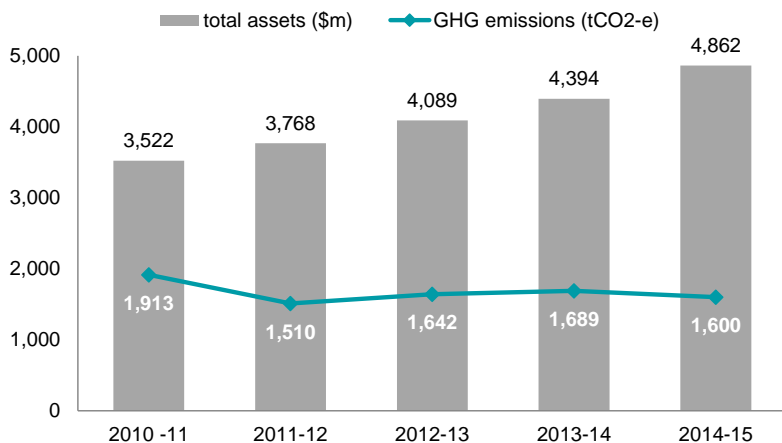


Figure 9 – GHG emissions from owned buildings compared to assets, by year

In other words, Teachers Mutual Bank has **lowered its emissions intensity by 39%** from 0.54 to 0.30 tCO₂-e per million \$ of assets.

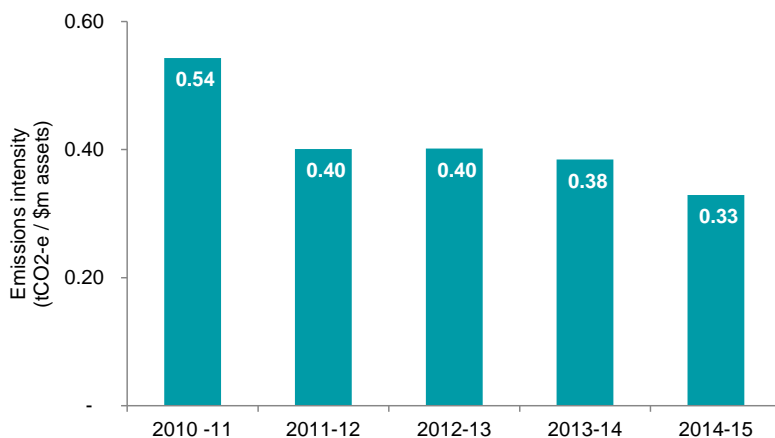


Figure 10 - GHG emissions intensity, by year

Total Greenhouse Gas (GHG) footprint - All buildings and vehicles

While this assessment has focused on the emissions footprint and reduction measures associated with Teachers Mutual Bank's owned buildings and Teachers Mutual Bank is carbon neutral, the total GHG footprint has also been analysed.

As Figure 11 illustrates, Teachers Mutual Bank's Scope 1 and 2 emissions from all buildings (owned and leased) and vehicles increased marginally (0.6%) in FY 15 compared to the previous year.

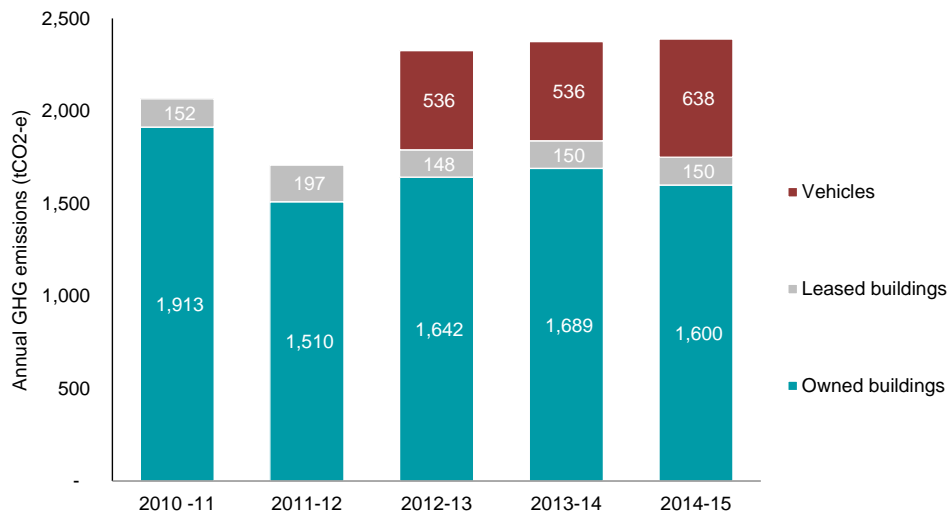


Figure 11 - Total GHG emissions for FY 11-15, by source

The main driver for this was an increase in vehicle emissions, despite a decrease in emissions from buildings. Over the past five years, Teachers Mutual Bank's total emissions from all buildings has decreased by 15%, despite the number of offices occupied increasing from 5 to 7 over that period.

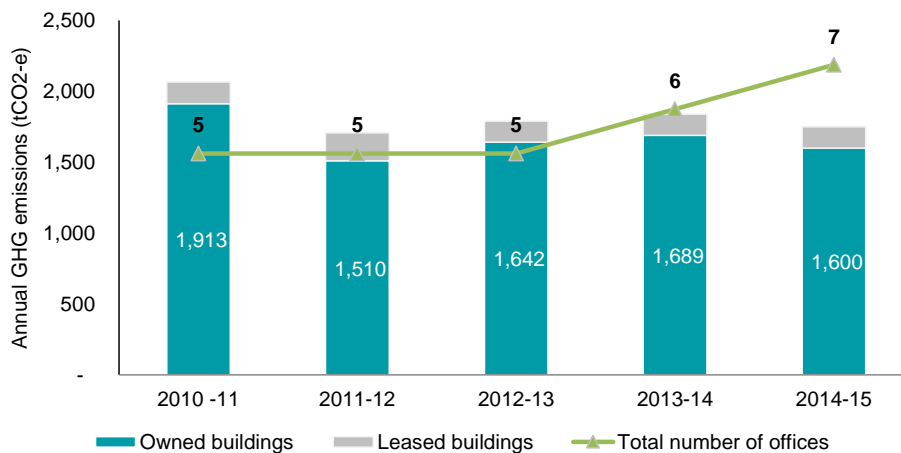


Figure 12 - Annual emissions for all buildings

Report preparation

This report has been prepared by The Incus Group and is based on audited data provided to The Incus Group directly by Teachers Mutual Bank Ltd and data provided by its suppliers, **Illum-A-Lite** and **AGL**. Teachers Mutual Bank Ltd includes Unibank and Teachers Mutual Bank. Since July 1 2015, UniBank is a division of Teachers Mutual Bank Ltd. Prior to that, the data refers to Teachers Mutual Bank only.

All analyses were performed on this data as made available in August 2016 and no verification was undertaken. The greenhouse gas emissions data reported here for Teachers Mutual Bank Ltd are based on Scope 1 and 2 emissions. All GHG emissions data was normalised using FY 2015 emissions factors from the Department of the Environment's National Greenhouse Account Factors to show real changes in emissions, accounting for changes in emission factors.

This report was prepared in accordance with the scope of work agreed with Teachers Mutual Bank Ltd and is based on generally accepted practices and standards at the time it was prepared.

About The Incus Group

The Incus Group is a purpose-driven consultancy that guides organisations through the life cycle of understand, measuring and managing their impact. Our expertise extends from the development of strategy through to impact measurement and capacity building and we seek to work with organisations to measure what matters and convert best intentions into successful outcomes.