MEASUREMENT & Verification

CASE STUDY: Siemens & Peter MacCallum Cancer Centre

The well-designed M&V Plan gave us confidence that we were saving energy and dollars. The measurement was transparent and in real-time, making it easy for us to ensure our project had delivered what we had planned for ***Peter MacCallum Cancer Centre.***

The Project

As a global leader in Cancer Research, the Peter MacCallum Cancer Centre faces numerous challenges: rapid growth, increasing energy rates, and electrical infrastructure running near capacity. Instead of investing in additional electrical infrastructure and increased energy use, the Peter MacCallum Cancer Center explored a more innovative and cost-effective approach, through an Energy Performance Contract with Siemens.

Cost Saved / yr:	**$69,393**
Energy saved / yr:	**4,372 GJ**
GHG saved: tonnes CO2-e	**1275**
Payback (yrs):	**5**
M&V methodology:	**Option B**

Through a modernization of building controls, new variable speed drives, and mechanical refurbishments, the Peter MacCallum Cancer Center reduced its loading on electrical infrastructure, and now benefits from ongoing energy cost savings to pay for the initial investment.

M&V in the Project

To ensure a payback period of 5 years or less, measurement and verification (M&V) was employed to guarantee project performance. This project used the M&V methods as detailed under the international system, IPMVP. M&V was introduced into the project at the design phase, so right from the beginning, the details around measuring of savings were understood and agreed upon. The methodology of measuring savings is critical in an Energy Performance Contract.

Courtesy of Siemens Australia Ltd

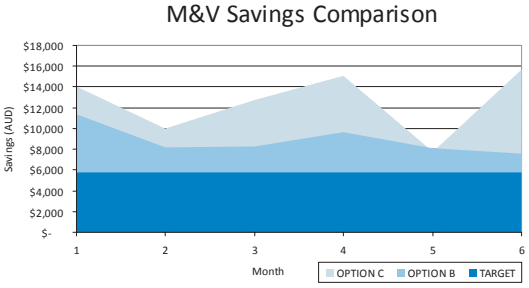
Randy Gadient, Senior Energy Engineer, Siemens and Greg Phillips, Director of Support Services, Peter MacCallum Cancer Centre.

M&V Methodology in detail

For the improvements at the Peter MacCallum Cancer Centre, sub-metering was installed to isolate the energy performance of the retrofit, and measure ongoing performance. Retrofit Isolation, or Option B, provides a high degree of containment in measuring savings, but often misses secondary savings achieved through interaction of building systems.

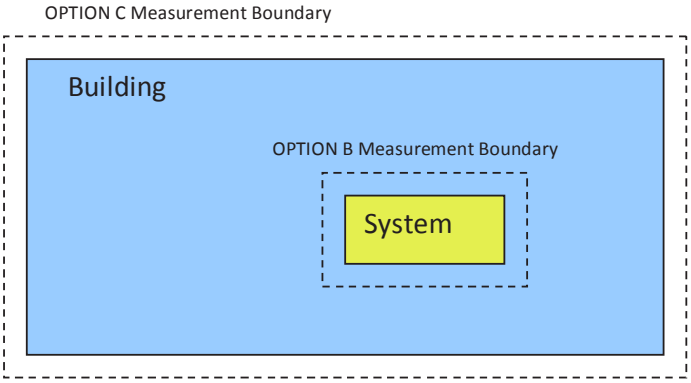
As a courtesy to the Peter MacCallum Cancer Center, and as the first Victorian hospital to undertake an Energy Performance Contract, Siemens also performed a whole building analysis, or Option C, to validate savings. While Option C is able to holistically measure the savings achieved by a measure as well as the influencing interactions between systems, Option C provides a low level of visibility on how savings are generated.

The savings from both Option B and Option C methods at the Peter MacCallum Cancer Centre are summarized below.



The most obvious observation in analysing the savings identified between Option B and Option C is that they are different.

The reason why the savings measurements are different is due to different measurement boundaries. Option B defines a very tight measurement boundary around the improvement, and in this case, is not able to measure the secondary effects of the improvement. Option C defines a very broad measurement boundary (the main utility meters) encompassing the entire hospital. Because of this, Option C is able to identify, or measure savings that are not visible to the measurement of Option B. This is represented in the following diagram.



This highlights the importance of Measurement and Verification in the project process.

The Parties involved and why they made the M&V decisions they did

Measurement and Verification is an integral part of the project process, and should be considered early in the design phase of a project. Each measurement method has its own merits and applications; each of which should be considered during the project development. The merits and applications of the two M&V methods considered for this project are summarized below.

Option B	Option C
Ability to measure improvements in isolation	Ability to measure combinatory effects of many measures
Applicable when savings are less than 20% of total bill	Applicable when savings are greater than 10% of total bill
Data readily available in most cases	Data is linked to utility billing cycles
Difficult or costly to measure secondary effects / interactions	Inherently measures secondary effects / interactions
Insensitive to changes outside of system but within facility	Sensitive to changes outside of system but in facility

An open dialogue between the Peter MacCallum Cancer Centre and Siemens helped future-proof this project against possible changes. Option B was selected to isolate the improvements from future changes, provide a high degree of visibility, and ability to continuously monitor ongoing savings in real-time.

In order to effectively continuously measure savings performance, sub-metering was installed on the main mechanical switchboard to monitor energy consumption against baseline conditions. Real-time sub-meter data is streamed to Siemens EMC software via the internet to monitor meter readings. This allows constant monitoring of the project by both the customer and the ESCO, and full transparency of savings.

Benefits of M&V for this project

Measurement and Verification provides certainty that savings are achieved, and protects the financial investment in the project. For the Peter MacCallum Cancer Centre, Measurement and Verification also allows the hospital to report on energy savings that are proven using industry standard M&V methodology.

In order to improve the accuracy of Option B, additional sub-metering could have been incorporated into the project to measure secondary effects. However, this would have come at a great expense to the project. The costs and benefits of Measurement and Verification should always be considered when designing a project.

Courtesy of Siemens Australia Ltd

Waiting room at Peter MacCallum Cancer Centre.

> "It is critical to have the M&V plan designed well before the project is implemented. A robust M&V plan ensures the energy savings can be clearly seen by all interested parties"
>
> **Randy Gadient.**

For more information on this project please contact Randy Gadient, Senior Energy Engineer, Siemens at **randy.gadient@siemens.com**