

CASE STUDY 7

Using a commercial loan to finance motors with variable speed drives



SCENARIO **End of life replacement**

TECHNOLOGY TYPE **Motor with variable speed drive**

Situation

A series of water pumps run approximately 8,000 hrs. p.a. and are driven by ten 11kW high efficiency motors which are due for replacement. The motors run at full speed and pump flow is controlled via a throttling valve.

The owner has the option of like-for-like replacements or purchasing high efficiency motors together with VSDs to control flow and achieve energy savings when speed is reduced. A flow schedule analysis indicates that the VSD pumps would run at:

- 100% speed, 20% of the time (1,600 hrs. p.a.)
- 75% speed, 50% of the time (4,000 hrs. p.a.)
- 50% speed, 30% of the time (2,400 hrs. p.a.)

How does the energy efficiency system compare to the standard system?

The company first determines which system to install by calculating the expected cash flows and financial impact of each system. The lifetime cash flows are based on the following costs, electricity use and lifetime for each system.

Equipment type	Standard	EE
Cost to install (\$)	\$13,000	\$70,000 ⁸
Operation and maintenance cost (\$ p.a.)	\$0	\$0
Electricity use (kWh p.a.)	715,835	436,745
Equipment life (years)	15	15
Electricity cost reduction in first year from EE (\$)		\$55,818
Simple payback period for EE (years)		1.3
Simple payback period for EE, with marginal capital (years) ⁸		1.0

⁸This is the payback period for the EE option using the difference in capital outlay between the standard and EE equipment, rather than the full capital outlay for the EE equipment.

Annual cash flows comprise the following:

- In the first year, the cost of installing the equipment
- In all years, the operating costs (including operation and maintenance, plus electricity costs) and the tax impact of purchasing the equipment. The tax impact is the change in tax payable due to the change in operating costs and depreciation, which are tax deductible
- Electricity rate of \$200/MWh in year one, increasing each year by 2% (excluding inflation).

Electricity cost reduction
\$55,818
 in the first year

“ The company determined that it would be better off by about **\$317,000** over 15 years ”

The company used these annual cash flows to calculate the following NPVs of installing each system.

Item	NPV
Standard system	-\$944,835
EE system	-\$628,144
Difference	\$316,691

The company determined that it would be better off by about \$317,000 over 15 years if it invested in the energy efficient system. Even though the energy efficient system is more expensive to install, it results in much lower electricity costs and lower operation and maintenance costs throughout its life.

Based on this financial analysis, the company chooses to install the energy efficient system.

What is the effect of Energy Savings Certificates?

If the company installs efficient motors with variable speed drives it could generate additional value by creating ESCs through the NSW Energy Savings Scheme.

The company calculated the number of ESCs it could create and the money it would receive from these certificates, less the tax it would need to pay on the sale of ESCs. It used the Project Impact Assessment with the Measurement and Verification Method to determine the number of ESCs it could create. The potential net revenue from the ESCs was estimated at about \$15,000, further increasing the value of the energy efficient system.

For more details on the assumptions and calculations the company used, refer to the cash flow model accompanying this finance guide.

How do the various energy efficiency and renewables finance options compare?

The company calculated the expected cash flows and their NPVs for each finance option, including and excluding the expected value of generating ESCs. The results were as follows.

Finance option	NPV, no ESC	NPV with ESCs	NPV rank	Comment
On-bill financing	\$320,733	\$342,208	1	
Commercial loan	\$302,951	\$324,427	2	
Capital lease	\$301,648	\$323,123	3	
Self funded	\$305,866	\$320,899	4	
Operating lease	\$111,323	\$132,798	5	
Environmental Upgrade Agreement	N/A	N/A		Not considered as the project is not in a council area where Environmental Upgrade Agreements are available
Energy Efficient loan	N/A	N/A		Not considered as the project does not meet the minimum finance amount criteria

While on-bill financing results in the highest NPV, the company does not purchase energy from Origin Energy or AGL and does not wish to change energy retailers. The company decides to seek a commercial loan, as this results in the next best expected NPV.

FINANCE OPTION SELECTED

Commercial loan

NEXT STEPS

Refer to the process outlined in Section 5.1