



**CASE STUDY 3**

# Using an Energy Efficiency loan to finance an efficient refrigeration system

SCENARIO **End of life replacement**

TECHNOLOGY TYPE **Refrigeration**

**Situation**

**A mushroom supplier is seeking to replace its old refrigeration compressor equipped chillers. It is considering two options: two 900 kW screw compressor equipped chillers; or two 900 kW high-efficiency compressor equipped chillers.**

The high-efficiency compressor equipped chillers are over 50% more expensive than the less efficient options, but typically use 40% less power for the same cooling output and have operating costs 50% less than the less efficient option. The high efficiency units are half the size and one fifth of the weight of the same capacity reciprocating compressor, extremely quiet, and use ozone and greenhouse gas friendly refrigerants. The compressors have in-built soft starters and VSDs, which means the compressor operates to match the load.

**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 (\$)	233,300	\$365,500
Operation and maintenance cost (\$ p.a.)	\$16,378	\$8,189
Electricity use (kWh p.a.)	767,000	460,000
Equipment life (years)	15	15
Electricity cost reduction in first year from EE (\$)		\$61,400
Simple payback period for EE (years)		6.9
Simple payback period for EE, with marginal capital (years) <sup>5</sup>		2.5

<sup>5</sup> This 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.

“ The company determined that it would be better off by about **\$340,000** over 15 years if it invested in the energy efficient system ”

**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 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

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

Item	NPV
Standard system	-\$1,290,953
EE system	-\$952,501
Difference	\$338,452

The company determined that it would be better off by about \$340,000 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 the energy efficient refrigeration system 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. Using the Project Impact Assessment with the Measurement and Verification Method to determine the number of ESCs it could create, the value from the ESCs was estimated at about \$14,600, 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 ESCs	NPV with ESCs	NPV rank	Comment
Energy Efficient loan	\$80,015	\$100,891	1	
On-bill financing	\$71,513	\$92,390	2	
Commercial loan	\$60,426	\$81,302	3	
Capital lease	\$53,620	\$74,496	4	
Self funded	\$48,268	\$62,882	5	
Operating lease	-\$111,535	-\$90,658	6	
Environmental Upgrade Agreement	N/A	N/A		Not considered as the project is not in a council area where Environmental Upgrade Agreements are available

*The company decides to seek an energy efficiency loan to fund its refrigeration upgrade as this finance option results in the highest expected NPV.*

FINANCE OPTION SELECTED

**Energy Efficient loan**

NEXT STEPS

**Refer to the process outlined in Section 5.1**