



## Ethylene Gas, Moulds, Pathogens & Fresh Produce



# Thank you for considering Bio Turbo!

PACIFIC DATA SYSTEMS AUSTRALIA (FreshView Systems) have 16 years' experience supplying, and developing, post-harvest technology solutions.

In meeting with yourselves, specific areas were highlighted where improvements could be made along the fresh produce chain. Primarily, these improvements relate to freshness, prevention of loss, prolonged and safer storage life, as well as improving overall customer satisfaction when purchasing fresh produce.

For this reason, we would like to introduce BRISMARK to what is considered the benchmark technology solution for preventing fresh produce infection and wastage during transport, storage and handling, while at the same time removed the unwanted natural ripening gas of ethylene.

The product is MIATECH'S BIOTURBO, a solution that is used internationally at every level of the post harvest chain.

As Miatech's authorised Australian reseller, PACIFIC DATA SYSTEMS are pleased to make this technology available for implementation within the market at every level of fresh produce handling; farm storage, transport, wholesale, and retail.



Scott Fletcher

**Technical Sales**

07 3361 2000 | 0448 222 684

[sfletcher@pacdatasys.com.au](mailto:sfletcher@pacdatasys.com.au)



# Loss of Product & Increase in Commodity Wastage



Each year, millions of tonnes of fresh produce are lost as wastage occurs at all points along the line - farm, transport, storage, wholesale, retail, and especially in the home. This equates to wastage estimates being as high as 20% from seed to shelf!

Traditionally loss has been a built-in cost factor, but ultimately it is a loss that can be avoided.

The primary reasons for such high spoilage is over-ripening and cross contamination due to improper storage and handling conditions.

Whilst the majority of cold rooms currently utilise temperature and humidity control to combat this, in the majority of cases, little to nothing is being done to address the damage caused by exposure to ethylene and harmful airborne pathogens.

## Annual Losses Globally\*

**92 Million Tons**



Vegetables

**60 Million Tons**



Fruit

*\*Source: FAO. 2011. Global food losses and food waste – Extent, causes and prevention.*

# Ethylene & Airborne Pathogens

Ethylene is one of the major reasons for premature ripening causing produce to become soft and rotten. As produce spoils, it creates favourable conditions for mould spores and airborne bacteria.

Since higher humidity can increase the opportunity for mould growth, technology should be utilised which effectively deals with airborne bacteria and ethylene, minimising these concerns.

Consequently, spoiled items can infect the rest of the produce with cross contamination issues.

## What is Ethylene?

Ethylene, or ripe gas as it is sometimes referred, is an odourless, colourless hydrocarbon gas that is produced naturally by fruit, vegetable and plant produce. It can also occur due to combustion and other man-made processes (e.g. gas-drive forklifts), and is the hormone primarily responsible for controlling the growth and development of the produce.

Certain produce emit higher levels of ethylene than others which, when stored adjacent to more ethylene sensitive commodities, proves to be an unwanted accelerator of ripening, cross contamination and rot - a storage process often employed by large wholesale and retail storage facilities, alike.

## The Impact

### ✘ Affected Commodities



Premature Ripening



Browning / Yellowing



Russet Spotting



Shrinkage / Shrivel



Anthracnose



Mould Build-up



Fungi Development



Rotting

# The Solution: Miatech's Bio Turbo



## Airborne Bacteria & Ethylene Removal

The most advanced ethylene gas removal and airborne pathogen killing system available on the market...

### The Bio Turbo System

Miatech's Bio Turbo is a patented technology for cleaning the air from all sorts of airborne organic compounds. It effectively removes ethylene gas, bacteria, mould spores and viruses.

#### Eliminates 99,5% of Pathogens - Extends Storage Life

Significantly improves the lifespan and the quality of stored produce by cleaning storage and atmosphere of pathogens.

#### Removes Ethylene - Prevents Premature Ripening

Bio Turbo effectively eliminates the ethylene gas from the air. This helps slow down the natural ripening process and protects ethylene sensitive products such as apples, avocados, kiwifruits, and many more.

#### Minimises Cross Contamination

By killing airborne bacteria, Bio Turbo prevents cross contamination which often takes place when produce of various types are stored in one cold room.

#### Decreases Odours

Bio Turbo significantly cuts down on the odours caused by ethylene. It helps to provide a more pleasant environment for the staff to work around.

### Want to know more about the Bio Turbo Product?

Download a free QR-Code App  
(iOS / Android) to access a Bio Turbo  
video and technical brochure

#### VIDEO



Scan QR-Code

#### BROCHURE



Scan QR-Code

# Bio Turbo: Complete Supply Chain

## Bio Turbo Maintain Freshness at any Stage of the Supply Chain



### Consumption

Broken cold chain reduces significantly the product storage life. This, together with overstocking, causes waste at the household stage.



### Retail

Improper demand forecast, along with poor storage conditions result in the throwing away of many products.



### Distribution

Even with short-term storage period, product shriveling and mould-spreading bring noticeable shrinkage at this stage.

### Processing & Packaging

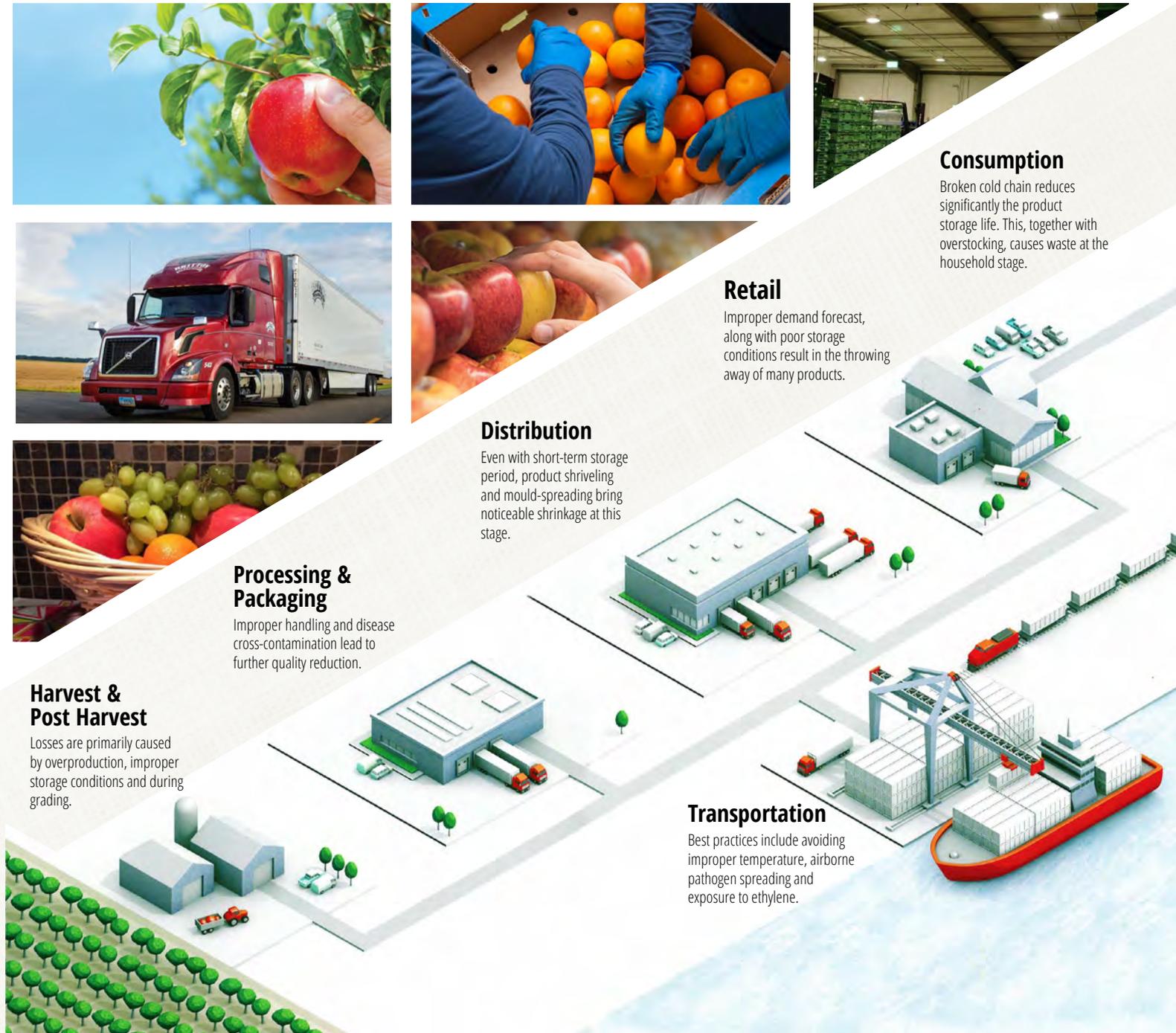
Improper handling and disease cross-contamination lead to further quality reduction.

### Harvest & Post Harvest

Losses are primarily caused by overproduction, improper storage conditions and during grading.

### Transportation

Best practices include avoiding improper temperature, airborne pathogen spreading and exposure to ethylene.



# Bio Turbo : Technology Overview

## How It Works

Bio Turbo units use a patented 4-stage purification process to achieve highest results in reducing ethylene and airborne bacteria:

### Stage 1

#### Air Filter

Removes dust and other particles from incoming

### Stage 2

#### Ozone Chamber

Ozone destroys ethylene and bacteria

### Stage 3

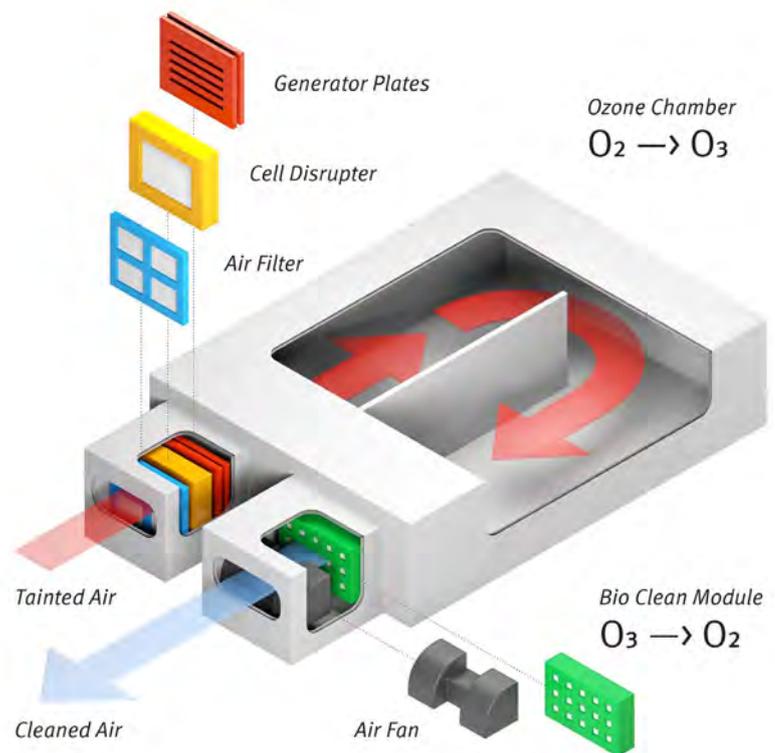
#### Cell Disrupter

Cell membranes are destroyed

### Stage 4

#### Bio Clean Module

Ozone turns back into oxygen



### Eliminates 99,5 % of pathogens

Bio Turbo effectively removes 99.5%+ of airborne pathogen from storage area, preventing bacterial contamination, mould growth and unpleasant odours



### Removes ethylene

Bio Turbo eliminates ethylene gas successfully preventing premature ripening and decay

# Bio Turbo : Competing Technology

## Bio Turbo - Comparison with Similar Technology

	BIO TURBO	POTASSIUM PERMANGANATE PELLETS	'NASA' TECHNOLOGY SPECIAL LIGHTS IN COMBINATION W/ CATALYST	OZONATING ROOM
<b>Active Against</b>	Ethylene and airborne pathogens	Ethylene only	Ethylene and airborne pathogens	Ethylene and airborne pathogens
<b>Initial Investment</b>	Average	Low	Relatively high	Relatively high
<b>Maintenance Cost</b>	Low	High	High	High
<b>Maintenance Labour</b>	Change air filter and ozone plates annually	Monthly check-ups to find out if the pellets are still good. Replacing pellets 2 to 6 times per year as they expire, each pallets load is about 100 lbs.	Replacing special light bulbs annually	Trained personnel necessary for operating equipment
<b>Maintenance Supplies</b>	Air filter and a set of ozone generating plates	300 – 400 lbs of pellets for every system each year	A set of UV lamps Safety considerations	
<b>Safety Considerations</b>	None	None	None	Exposure to ozone in high concentrations is dangerous
<b>Unit Capacity</b>	One unit can cover up to 200,000 cubic feet in 24 hours	One unit covers up to 150,000 cubic feet	One unit covers up to 50,000 cubic feet	



# Bio Turbo : Rapid Return on Your Investment

## Bio Turbo: Example ROI for Apple Storage

The following graphic shows how the Bio Turbo solution can deliver a return on investment in less than a season.

Average apple price per kg \$1.20  
 Average weight per box 25Kg  
 Average value of box \$30  
 Total boxes in cold room 5,000  
 Total value of apples stored \$150,000



**APPLES**

1 Kg  
**\$1.20**



**BOX**

25 Kg  
**\$30.00**



**COLD ROOM**

5000 boxes  
 125,000 Kg  
**\$150,000**



With the **Bio Turbo 1000** costing on average \$10,000 delivered and installed, the return of investment is less than a season.

Every season without the Bio Turbo costs \$18,000 to the apple dealer

*The above data is taken from observations in various apples storage facilities in India.*

After 3 months



**BOX**

23 Kg  
**\$26.70**



**COLD ROOM**

5000 boxes  
 117,500 Kg  
**\$132,000**

**12%**  
 of losses  
 during storage  
**\$ 18,000**

Without Bio Turbo there is an average of at least \$1.50 reduction on the prices that each box fetches in the market.

There is also about 1.5 Kg losses in apples that must be thrown away (per box) due to ethylene and airborne pathogens.

Total value \$26.7 per box

The \$3.6 difference represents 12% of losses during storage time which could be avoided with the Bio Turbo.

**That is \$18,000 in a 3 month period.**

After 3 months with BT



**BOX**

24.5 Kg  
**\$29.40**



**COLD ROOM**

5000 boxes  
 122,500 Kg  
**\$147,500**

Return  
 on Investment  
**3**  
 less than  
 months

With Bio Turbo, only 1.6 % of losses during storage time due to ethylene and airborne pathogens the quality is still the same.

# Bio Turbo : Field Test Results

## Bio Turbo Field Test - Results and Summary

Bio Turbo is a solution designed to prevent premature spoilage of produce and mould growth by removing airborne bacteria and ethylene from storage facilities. This study describes a test of Bio Turbo and its ability to remove ethylene.

This test was conducted in March 2012 by one of the UK's leading fresh produce manufacturers, specialising in the supply of bagged salads, leafy salad bowls and trays and prepared fruits to major retail and food service companies.

The Bio Turbo 6000 was tested in three different locations with results showing that Bio Turbo can effectively reduce ethylene levels to zero.

## Bio Turbo Field Test - Results and Summary

The Bio Turbo 6000 ethylene removal systems were installed in three warehouses in March 2012. They replaced potassium permanganate systems.

Below is a table showing the size of each warehouse and the target level of ethylene that was sought to be achieved. The target levels are based upon the type of fruit stored in each warehouse and its sensitivity to ethylene.

	<i>warehouse size (m<sup>3</sup>)</i>	<i>target ethylene level (ppm)</i>
<b>Warehouse A</b>	2777	0.5
<b>Warehouse B</b>	2652	1
<b>Warehouse C</b>	5576	0.5

The graphs show the average ethylene ppm (parts per million) in each warehouse over a 24 hour period with and without the Bio Turbo system installed. For each set of data, the ethylene levels were recorded for 24 hours over 4 consecutive days. An average was then calculated of the 4 different ethylene levels at each hour. The target level for each room is shown by the blue line in each of the graphs. The target levels are based on the type of product stored in each warehouse and their sensitivity to ethylene.

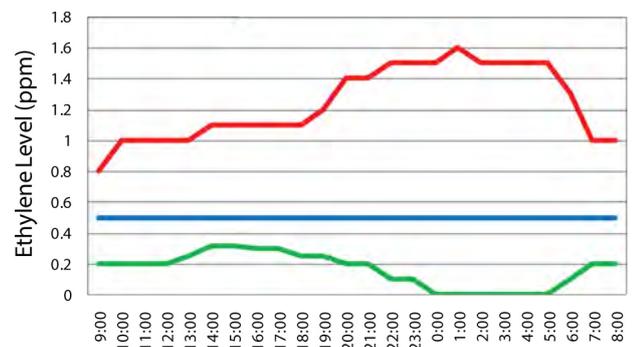
All the graphs show that the ethylene levels without the Bio Turbo units were generally above the target level. The levels vary throughout the day due to several factors such as the volume of fruit at any given time and the movement within the warehouses. The levels tend to be lower during production hours as there is a lot of movement of the fruit within the

warehouses and doors are being opened and closed which displaces the air within the warehouses and therefore some of the ethylene. During non-production hours the levels of ethylene increase without the Bio Turbo units.

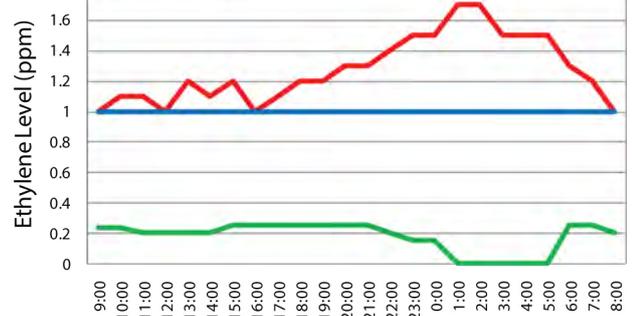
With the Bio Turbo units in use, the ethylene levels are kept below the target ppm throughout the day. There is some variation in the levels throughout the day but this can be attributed to the same reasons as before. The graphs show that with the Bio Turbo units in use during hours of non-production, the ethylene in the warehouse decreases to 0. This shows demonstrably that, in a closed environment, Bio Turbo units are able to eliminate ethylene over time.

Overall these results show that the Bio Turbo units exceeded the targeted goals and were able to effectively control the ethylene produced by fruits.

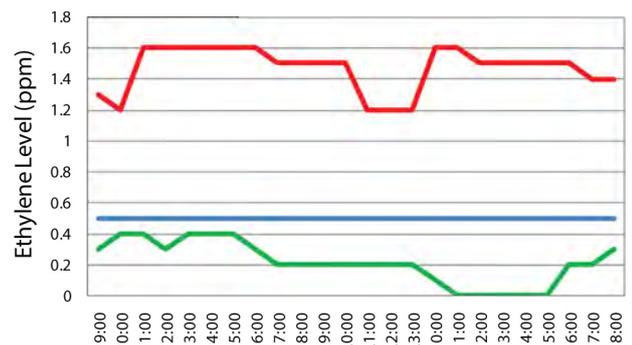
### Warehouse A



### Warehouse B



### Warehouse C



— No Scrubber  
— Target  
— Bio Turbo

# Bio Turbo : Case Study

## Bio Turbo: Avocado Test - May 2016

Bio Turbo influence on waste and quality loss of fruits due to ethylene and airborne pathogens

This test was conducted by MIA TECH's dealer in Kenya, **Ice In Refrigeration Engineering** (Mr. George Olweny Arogo, Director) at Olivado Ltd, one of the world's largest producers of extra virgin cold pressed avocado oil. For this test, the company compared quality of Hass avocados after one week of storage in two separate cold rooms. Factors such as temperature and humidity levels were the same in both rooms, but one room was also utilising a Bio Turbo ethylene removal system. [www.olivado.com](http://www.olivado.com)

### Ethylene Removal

The test showed that Bio Turbo minimized ethylene concentration in the cold room to 1-5 ppm, compared with up to 12 ppm in the cold room without Bio Turbo. After 7 days storage in the cold room with Bio Turbo, ripened avocados looked clean and fresh.

### Eliminating of Airborne Pathogens

Testing of airborne pathogens elimination demonstrated, that in the cold room with Bio Turbo, fungi and other pathogens were prevented from spreading. Therefore, there was no cross-contamination in that cold room.



*Unripe avocados before being loaded in the cold store.*



*Fruits proximate to infected ones were not contracted after one week storing.*

## The Result - Total Losses

### After 1 week without Bio Turbo



Avocados stored in the cold room without Bio Turbo were affected by pathogens and ripened faster due to ethylene influence, having lost much of their quality.

Wasted fruit in this cold room reached 20-30% per ton.

### After 1 week with Bio Turbo



In the cold room with Bio Turbo there were 2-5% of wasted fruit per ton.

Most of this waste came from fruit that had been affected with fungi, moulds or pathogens before test.

**View more case studies and testimonials at [www.FreshView.com.au](http://www.FreshView.com.au)**

**pacific data systems**  
Solutions. *Technology*. Simple. **Australia**

[pacdatasys.com.au](http://pacdatasys.com.au)

**FreshView**<sup>™</sup>  
POST HARVEST TECHNOLOGY SOLUTIONS

[freshview.com.au](http://freshview.com.au)

### **About Pacific Data Systems**

Pacific Data Systems was established in 1984 offering electronic scientific and industrial instrumentation, service and calibrations for a broad range of applications including Agriculture.

Since this time we have grown in capability and now have a strong customer base both within and outside of Australia.

Our post-harvest technologies are being used across the globe to improve visibility on operations, product quality and minimise food wastage.

We continue to invest in our people, processes, performance and technologies to ensure longevity and of equal standing provide working solutions, utilising the latest technology and making it as simple as possible for our customers.

### **Contact Us**

+617 3361 2000

[info@freshview.com.au](mailto:info@freshview.com.au)

[www.FreshView.com.au](http://www.FreshView.com.au)