

APPENDIX G

MATERIAL FROM AIRWAY INTERNATIONAL

AIRWAY INTERNATIONAL

Excellence in HVAC Hygiene



Reduce Energy and Maintenance Costs
Improve Indoor Air Quality

Proudly 100% Australian Owned
and Developed Technology

THE HVAC PROBLEM

SOURCES OF INCREASED ENERGY CONSUMPTION AND AIR BORNE BIOCONTAMINANTS IN HVAC SYSTEMS

HVAC BIO PROBLEMS

- PROBLEM 1:** Biofilm coating of cooling and heating coil fins and tubes dramatically decreases heat transfer.
- PROBLEM 2:** Air conditioning coils are designed with critical fin spacing, biofilm buildup between the fins greatly increases resistance to air flow thus increasing fan energy consumption in VAV systems. Conditioned air delivery can be reduced causing thermal discomfort and stale air pockets.
- PROBLEM 3:** The by-products of biofilms are a primary source of airborne fungal spores, endotoxins and mycotoxins in indoor air. These protein fragments significantly decrease the human immune response and are reported as common causes of flu like symptoms and fevers in scientific studies. The potentially adverse health effects of Bacterial Endotoxins (Lipopolysaccharides LPS) has been the focus of many studies in recent years. Air conditioning systems are implicated as a major contributor in elevating suspended LPS in modern office buildings.

THE COIL-PRO SOLUTION

ELIMINATES BIOFILM, OPTIMISES HEAT EXCHANGE AND AIR FLOW

THE SYSTEM

- STEP 1:** BIO-CLENS, a neutral, non-corrosive liquid, kills, penetrates and lifts biofilm which is removed by a low density, high pressure vapour mist without damaging coil fins and tubes. It also dissolves any previous coating to ensure no build up.
- STEP 2:** BIO-STAT, a non-corrosive, bactericidal and fungicidal coating is applied to provide a corrosion resistant coating with extended residual biocidal properties to coils.
- STEP 3:** BIO-TREAT is applied to walls, floors and ceilings surrounding coils which are often damp, grow mould and become a source of microbiological contamination to coils, filters and the air. The treatment removes mildew and biofilm leaving behind a long term biostatic treatment to these surfaces.

The **COIL-PRO SYSTEM** is derived from internationally patented and TGA approved medical infection control technology and provides protection for approximately 12 months.

This residual treatment will offer substantial energy savings relating to improvements in long term heat transfer and airflow through the coils and will reduce coil fin degradation associated with acidic secretions of biofilm

COIL-PRO BENEFITS

THE COIL-PRO SYSTEM IS A PRODUCT OF MANY YEARS OF AUSTRALIAN RESEARCH AND DEVELOPMENT

ELIMINATE BIOFILM / IMPROVE IAQ

Biofilm derived bacteria and fungi growing in air handling systems are important in the etiology of building health disorders.

"Even visibly clean units can harbor substantial biofilm".(*Hugenholtz92*)

"The elimination of biofilm in air handling systems including air conditioning coils is fundamental in achieving acceptable indoor air quality"

(*Clive Broadbent*)

REDUCE FILTER CONTAMINATION / REDUCE FILTRATION COSTS

"A significant factor limiting the service life of air conditioning dust filters is their colonization by microorganisms particularly fungi, longer service life of filters has been demonstrated when air conditioning coils are cleaned regularly or treated with an anti-microbial coating. This effectively limits the cycle of inter-contamination between coils and filters".

(*Dr R Simmons, Georgia State University, USA*)

REDUCE ENDOTOXINS, MYCOTOXINS AND SPORES/ IMPROVE IAQ

"Indoor air quality is dependent upon the concentration and type of contaminants. A major source of bio-contaminants is derived from air conditioning coils and dust filters. The elimination of biofilm and fungi from these components is paramount to the improvement of human health and efficient equipment operation."

(*CLYDE -APAC*)

An extensive study involving 19 buildings and over 1,000 employees showed endotoxin and mycotoxin levels many times higher in "sick" buildings than in "healthy" buildings. Significantly higher levels of bacterial endotoxin and fungal mycotoxin presence was demonstrated as biofilm inside air conditioning systems in the cases of the "sick" buildings.

(*Teews 94*)

MAXIMISE HEAT TRANSFER / REDUCE ENERGY CONSUMPTION

Heat conductivity of aluminium is approximately 200W/m.K whilst that of biofilm is approximately 0.2W/m.K. As conductivity has fundamental implications on heat transfer, clean coils devoid of biofilm obviously offer significant efficiency advantages.

Derived from (Refrigeration & Air Conditioning," Stoecker, W.F., McGraw Hill, NY)

EXTEND COIL LIFE / REDUCE COIL REPLACEMENT

The COIL-PRO SYSTEM developed by NOVAPHARM RESEARCH decreases coil corrosion and maximizes coil performance by significantly decreasing biofilm."

(*Tom Wagner, Chief Chemist, J.N. Kirby Pty Ltd*)

NO ADVERSE SIDE EFFECTS

"The application of the Coil-Pro System to air conditioning coils has no negative impact on the human health and safety of building occupants"

(*Professor G Crank, UNSW*)

Optimizes Air Delivery
Improves Heat Transfer
Optimizes Cooling Capacity



**HOW OFTEN DOES
YOUR SYSTEM FAIL
TO COPE WITH FULL
LOAD CONDITIONS**

Absenteeism resulting from ailments related to airbourne pathogens is one of Australasia's major overhead contributors.

Optimizes Heat Exchange
Reduces Coil Corrosion
Reduces Fan Energy Consumption
Reduces Filter Maintenance Cost



**REDUCES POWER
CONSUMPTION AND
OTHER OPERATING
COSTS**

World Health Organization WHO estimates that about 1/3 of all buildings are "Sick" in industrialized countries (WHO 95).

Removes biofilm from AC coils
Reduces contamination of filters
Reduces contamination of ducts



**IMPROVES INDOOR
AIR QUALITY**

Most people won't complain about air quality, they will just stay away.
Is your Air Quality keeping people away?

AIRWAY INTERNATIONAL - THE SCIENTIFIC AIR CONDITIONING HYGIENE SPECIALISTS

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AIRWAY INTERNATIONAL

Improve IAQ

Reduce Energy

AIRWAY INTERNATIONAL

- **Service division available for holistic management of HVAC hygiene**
- **BIO-CLENS coil cleaning**
- **BIO-STAT residual antibacterial coil treatment**
- **BIO-TREAT residual air handler wall ceiling and floor treatment**

PURPOSE OF THE PRESENTATION

- **Part 1 of this presentation has been prepared to highlight areas of concern relating to bio-contamination of air-conditioned buildings and offer some alternatives in relation to reducing mycotoxin & endotoxin contaminant levels using patented Epiguard products.**
- **Part 2 deals specifically with energy in VAV systems relating to time based filter resistance v dust loading in air filter testing**

IAQ or ENERGY

**Whether improved air quality or reduced
energy consumption is your goal**

AIRWAY INTERNATIONAL

**offers a range of services and products
specifically designed to meet these objectives**

Public Health and Safety Implications of HVAC Systems

- ➔ It has been long recognised that air conditioning systems can contribute substantially to health and safety issues in commercial and public applications.**
- ➔ Legionella has been the most obvious manifestation of these problems via water borne and air carried gross pathogens.**
- ➔ Over the last 15 years research has demonstrated that air conditioning components, such as dust filters and cooling coils, are a separate source of airborne microbiological contamination.**

IAQ Concerns in USA

- **U.S regulatory authorities cite IAQ as one of the top 5 key environmental health risks of our time**
- **Many studies have been completed in micro contamination research of indoor air**
- **In Australia both government and industry are increasingly aware of lost productivity caused by low level mycotoxin & endotoxin exposure**

What is SBS ?

According to the World Health Organisation sick building syndrome is an excess of work-related irritations of the skin and mucous membranes and other symptoms, including headache, fatigue, and difficulty concentrating, reported by workers in modern buildings (WHO 83).

There was perception that all was O.K. in Australia until this.

“ Bill for indoor pollution put at \$12 billion dollars a year ”

- (Sydney Morning Herald 18 March 1998).***

“ The airborne chemical cocktail Australians inhale in their homes and offices is costing the nation nearly \$12 billion dollars a year in sickness and lost productivity, according to the first comprehensive estimate of the economic toll of indoor air pollution ”.

Air conditioning Implicated

“Air conditioners invariably accumulate bacteria and fungi. The cooling coil, drip tray and drain are particularly susceptible. Even regularly cleaned units can accumulate significant biofilm between cleaning cycles. Improper use of disinfectants may increase Macromolecular Organic Dust (MOD) levels due to increasing the level of dead bacteria cells and fragments, loosely termed (Bacterial Endotoxins)”.

*Even visibly clean units can harbour substantial biofilm.
(Hugenholtz 92)*

F4 FILTERS REDUCE 20-40% OF ATMOSPHERIC DUST ?

F4 filters do not exist in any internationally recognised testing standard apart from Australia. F4 Current Industry Average (CIA) efficiency is approx.30% As various standards call for a minimum of 20% initial, this would mean by world standards in excess of 40% or F5. Filters demonstrating under 90% to AS1324.# 4 Test Dust when claiming 20% initial to # 1 Test Dust should be well investigated to ensure total standard compliance.

An important feature of dust accumulation inside air-conditioners , is that it helps in creating bio-contamination.

If sedimented on wet surfaces they are very likely to support the growth of micro-organisms.

(Hugenholtz 92)

No Reason

- *SBS has been recognised for nearly two decades and yet little preventative action has been taken to eradicate it. This is probably due to the mystery which has surrounded the phenomenon and the difficulty in explaining outbreaks.*
- *In 75% of reported outbreaks of SBS symptoms studied by Menzies et al. no explanation could be found for the outbreaks. (Menzies 93)*

MORE RECENT INFORMATION

- *Rylander et.al has been able to correlate SBS symptoms with varying levels of Macromolecular Organic Dust MOD components. For example he has shown that :*
- *endotoxins in air cause fever in humans at a level of 1-2 micrograms/cubic metre*
- *acute bronchoconstriction at a level of 0.1-0.2 micrograms/cubic metre*
- *mucous membrane irritation and dry cough, at a level of .02-.05 micrograms/cubic metre.*
 - *This type of research is taking the mystery out of SBS.*

Strategic Alliance Partner

Novapharm Research (Australia)

- ◆ A world leading R & D company in the field of health care infection control technology
- ◆ Leading edge patents and proprietary technology in the areas of antiseptics, disinfection & enzymatic cleaning
- ◆ Proven commercial track record and strong marketing support program
- ◆ International network of technical & commercial strategic alliances
- ◆ An affiliate of one of Australasia's leading private health care groups

RECENT ACHIEVEMENTS

- 1996** **First Multi-enzyme Biofilm Stripping System**
- 1996** **First Full Spectrum Triclosan Antiseptic**
- 1996** **New Skin Barrier Lotion**
- 1997** **Comprehensive Intercompatible Antiseptics**
- 1997** **PVP/DCP/ZnP Complex**
- 1997** **New “Kills Germs” Treatment for Textiles**
- 1997** **Intermediate level ultrasonic nebuliser disinfection validated**
- 1997** **Antiseptic (Triclosan) Barrier Cream validated**

RECENT ACHIEVEMENTS

- 1998** **Endoscope Cleaning Device**
 - 1998** **Ultrasonic Nebuliser-based Sterilisation
validated**
 - 1998** **Ultrasonic Skin Asepsis**
 - 1999** **Ultrasonic Room Disinfection/Deodoriser**
 - 1999** **Air conditioning coil treatment**
 - 1999** **Air conditioning dust filter treatment**
-

TECHNOLOGICAL BUILDING BLOCKS

- CHG Activation Proprietary
- Triclosan Activation Patent Appl.
- PVP/I Custom Complex Patent
- PVP/I-Triclosan Patent
- Inter-compatibility Proprietary
- Triclosan Complex Patent Appl.
- Ultrasound Nebuliser Disinfection Patent Appl.
- Multi-enzyme Formulations Proprietary
- Migrating Biocides Patent Appl.
- Substantive Barrier Resins Proprietary
- Hydrogen peroxide/triclosan complex Patent Appl.

SYNERGISTIC CORPORATE PHILOSOPHY

Fundamentals – All products must:

- ➔ **have no significant human health and safety implications**
 - ➔ **be suitable for continuous, long-term operation**
 - ➔ **comply with all toxicological & environmental standards**
 - ➔ **be based on patented or proprietary technologies**
 - ➔ **have efficacy better than, or equal to the market leader**
 - ➔ **exhibit superior cost efficiency**
 - ➔ **meet and exceed claims and expectations**
-

The COIL-PRO SYSTEM

A systems approach which incorporates individual dust filter, refrigeration/ heating coil and duct treatments.

The Epiguard technologies are a highly effective, cost efficient range of technologies which can be incorporated at both the point of manufacture and applied on site as part of routine maintenance.

The Epiguard technologies meet and exceed the most stringent environmental and human health and safety requirements on a global basis.

The COIL-PRO SYSTEM

ENERGY MANAGEMENT

PUBLIC HEALTH RISK MITIGATION

AIR CONDITIONING DUST FILTER TREATMENT

EPIGUARD FT

**AIR CONDITIONING COIL CLEANING AND BIO-STATIC
TREATMENT SYSTEM**

BIO-CLENS

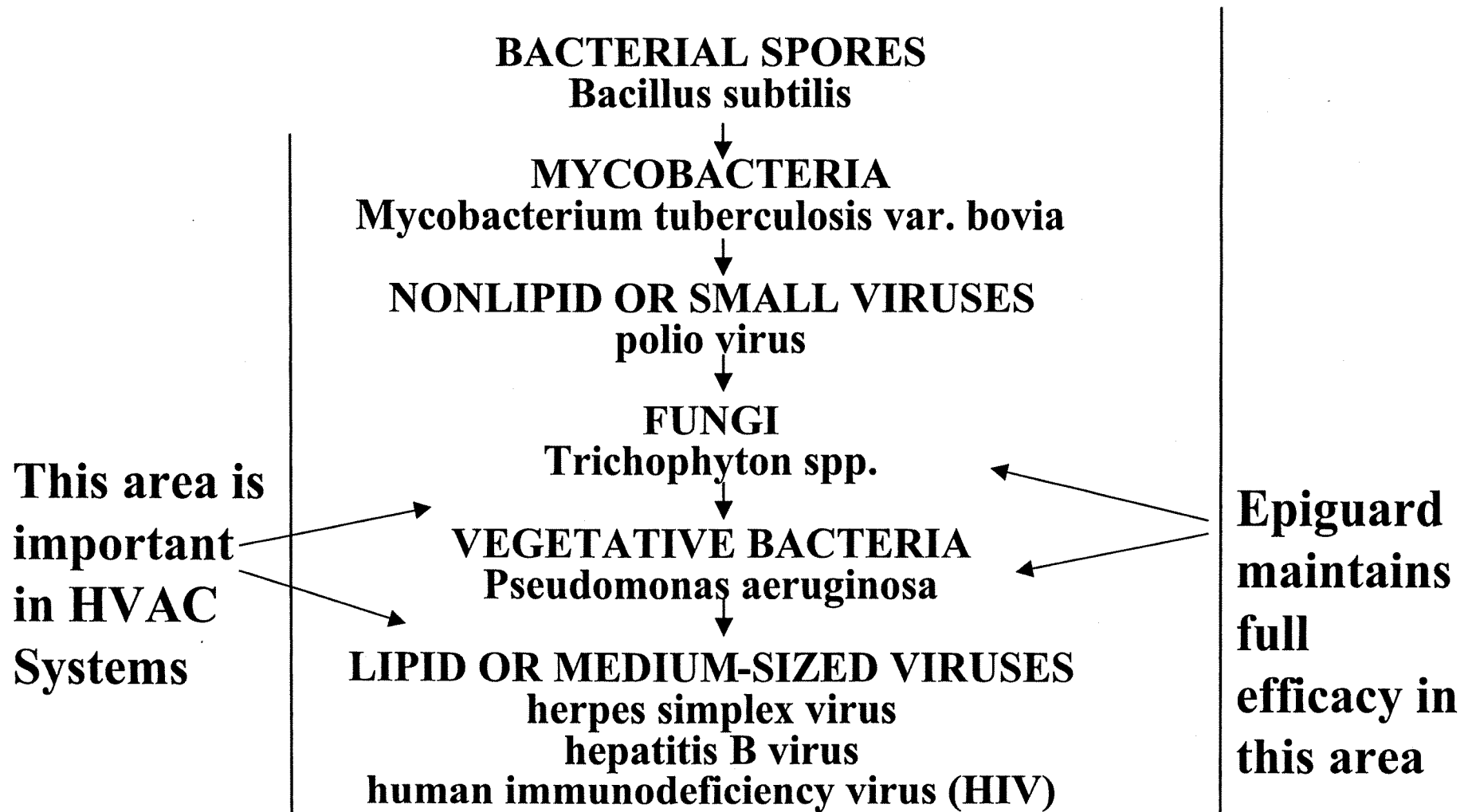
BIO-TREAT

BIO-STAT

AIR CONDITIONING DUCT DISINFECTION

EPIGUARD US

Decreasing Order of Resistance to Germicidal Chemicals



COIL COATING (OEM)

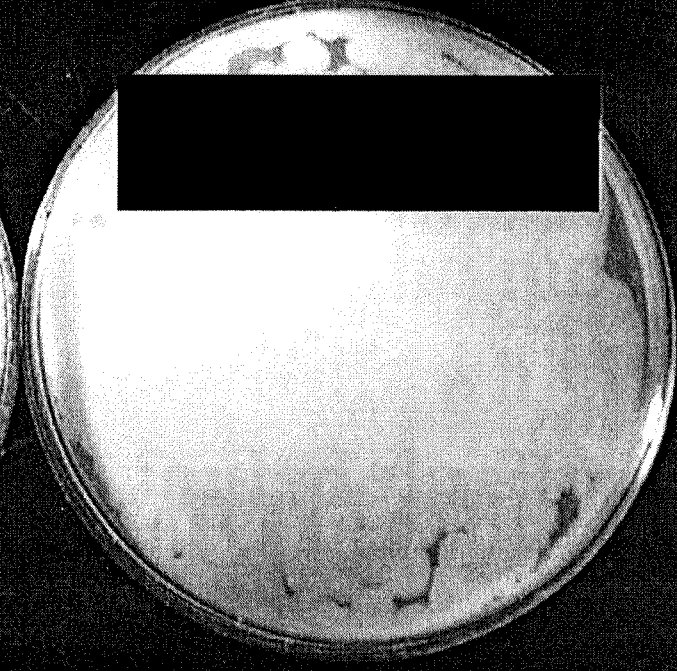
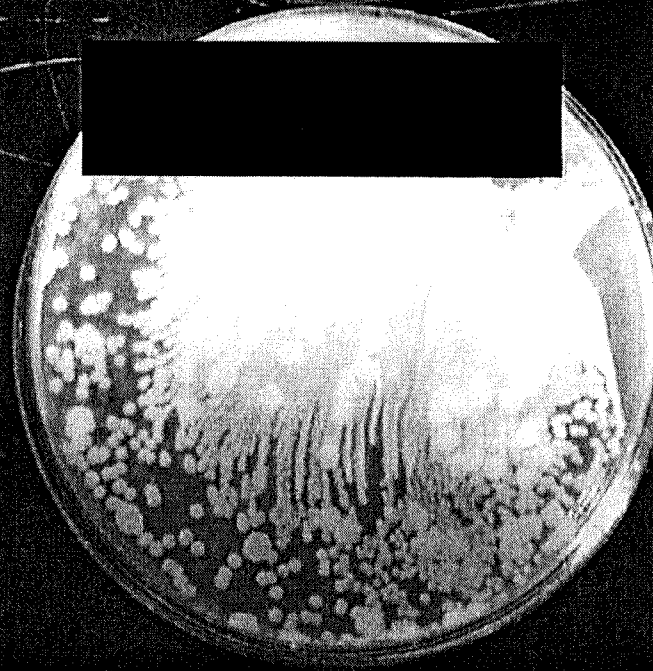
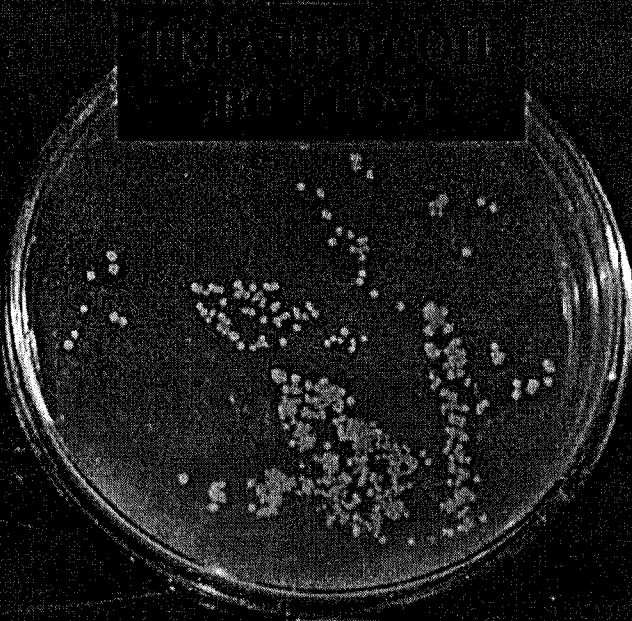
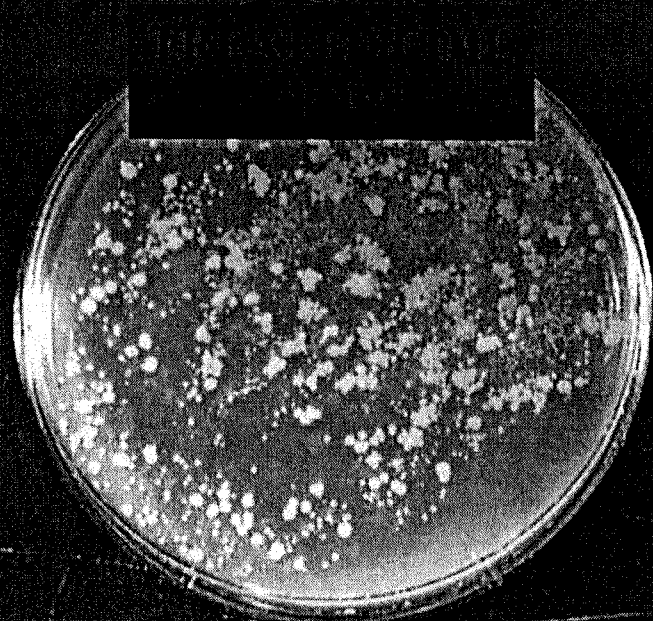
- **At least 2 years continuous performance**
- **Application versatility**
- **Prevents biofilm**
- **Maintains heat exchange & air flow**
- **Cost effective – reduces ongoing energy cost**
- **Patented, world leading technology**
- **No toxicological implications**

COIL CLEANER

- ☞ Lifts all accumulated dirt & biofilm**
- ☞ Improves heat transfer**
- ☞ Provides power/cost savings**
- ☞ Easy, efficacious against all fungi & bacteria**
- ☞ Prepares surfaces for coating**
- ☞ Ensures no coating buildup**
- ☞ Versatile and simple to apply**
- ☞ Unique proprietary technology**

ANTIMICROBIAL COIL COATING

- **Applicable to all coils after cleaning**
 - **Similar to OEM coil coating technology**
 - **At least 12 months cont.efficacy against all fungi & bacteria**
 - **Cost effective - economical**
 - **Versatile and easy to apply**
 - **No toxicological implications**
 - **Patented technology**
-



MAXIMISE COIL EFFICIENCY

On site evaluation of the

COIL-PRO System

**indicates a coil efficiency
improvement of 5-15% based on
the initial degree of bio-fouling of
the coils.**

MAXIMISE COIL LIFE

Biofilm exudes acidic substances which react with aluminium fins associated with A/C coils.

By eliminating biofilm the need for expensive coil replacement is for the most part negated. As is replacing coils which have become completely fouled due to years of neglect

COIL SURROUNDS CLEANER/TREATMENT

- ★ **Cleans and protects damp walls, ceilings, floors from bacterial and fungal colonisation**
- ★ **Effective for at least 12 months**
- ★ **Recommended as part of any antimicrobial coil maintenance**
- ★ **Easy to apply**
- ★ **Cost effective – economical**
- ★ **Patented technology**

**THE BASIS OF HUMAN HEALTH RISK ASSOCIATED WITH
“SICK BUILDING SYNDROME”
vis-à-vis AIR CONDITIONING**

The human health risk resulting from fungal and bacterial colonisation of dust filters is associated with a significant decrease in immune response.

This decrease is in response to fungal spores, mycotoxins and endotoxins. This work has been performed independently in both Scandinavia and the US.

Novapharm has an on-going consulting relationship with Georgia State University, the leading US authority on the subject and an adviser to the EPA, CDC and most states of the US. GSU has independently validated much of Novapharm's technology and is on call for on-going work.

It has been demonstrated (Dr R Simmons et.al, GSU) that the vast bulk of the microbial colonisation of air filters does not occur on the fibre surface, but on the surface of the filtrate (dust particles, etc).

This explains the published findings that none of the currently available treatments are efficacious.

As described hereafter **Epiguard FT is mobile and is formulated to migrate into the filtrate, protecting the whole filter environment from microbiological colonisation. This technique is the subject of an international patent application.**

REPORTED RATES OF AIR CONDITIONING DUST FILTER CONTAMINATION

An extensive study of a wide variety of spent air conditioning dust filters of the bag variety was undertaken. These bags were representative of Sydney CBD, North Sydney, Chatswood, Parramatta and Wollongong. In all cases the level of bacterial and fungal colonisation was in the range of

Log 4 to Log 7/gram.

This is in line with the levels reported in the eastern and south eastern states of the USA.

Concerns relating to the counts both here and in the US relate to both the quantity and the preponderance of fungi and fungal spores.

CURRENT ANTIMICROBIAL TECHNOLOGIES APPLIED TO AIR FILTERS

Two approaches exist for rendering air filters antimicrobial:

- 1. An antimicrobial material such as triclosan is incorporated into the polymer mix prior to extrusion into the fibres from which non-woven fabrics are made and converted into air filters.**
- 2. Fibres or finished non-woven fabric is coated with an antimicrobial treatment which is cross-linked onto the surface, as is done for non-woven kitchen wipes.**

EPIGUARD FT: MODE OF ACTION

Epiguard FT is an aqueous air filter treatment composed of:

- **A powerful humectant system that ensures moisture take-up even at low temperature & humidity**
- **A synergistic water soluble biocidal system with low toxicity actives, approved as cosmetic preservatives**
- **A surface tension modifying system which ensures creep along fibres and penetration into filtrate, even against strong air streams**

ANTIMICROBIAL TREATMENTS COMPARATIVE EFFICACY

Epiguard FT AAF Scandfilter

New Filter Challenge Tests:

E.coli	- - -	-	- -
Staph Aureus	- - - -	- -	- - -
Pseud. Aeruginosa	- -	-	-
Aspergillus Niger	- - -	-	- - -

Used Filter Challenge Tests:

E.coli	-	+ + +	+ +
Staph Aureus	- - -	+ +	+
Pseud. Aeruginosa	-	+ + + +	+ + +
Aspergillus Niger	- -	+ + +	+ +

- or + indicate degree of reduction or increase of challenge dose

RESULTS OF A 14 MONTH TRIAL IN A SYDNEY CBD BUILDING, YORK STREET

METHODOLOGY

One bank of new filters was replaced at this site. Six of the filters were treated with Epiguard FT. Each treated filter in the installation was surrounded by untreated filters.

Each month a segment (approx. 20 mm x 20 mm) was cut from a treated filter and an adjacent untreated filter. The hole created was sewn shut.

The cut segments were weighed and then sonicated in a measured quantity of sterile water and the microbiological population of bacteria and fungi measured as colonies/gram filter.

RESULTS

For the first three months there was little difference between treated and untreated filters, both giving readings of between 200 and 500cfu/gram.

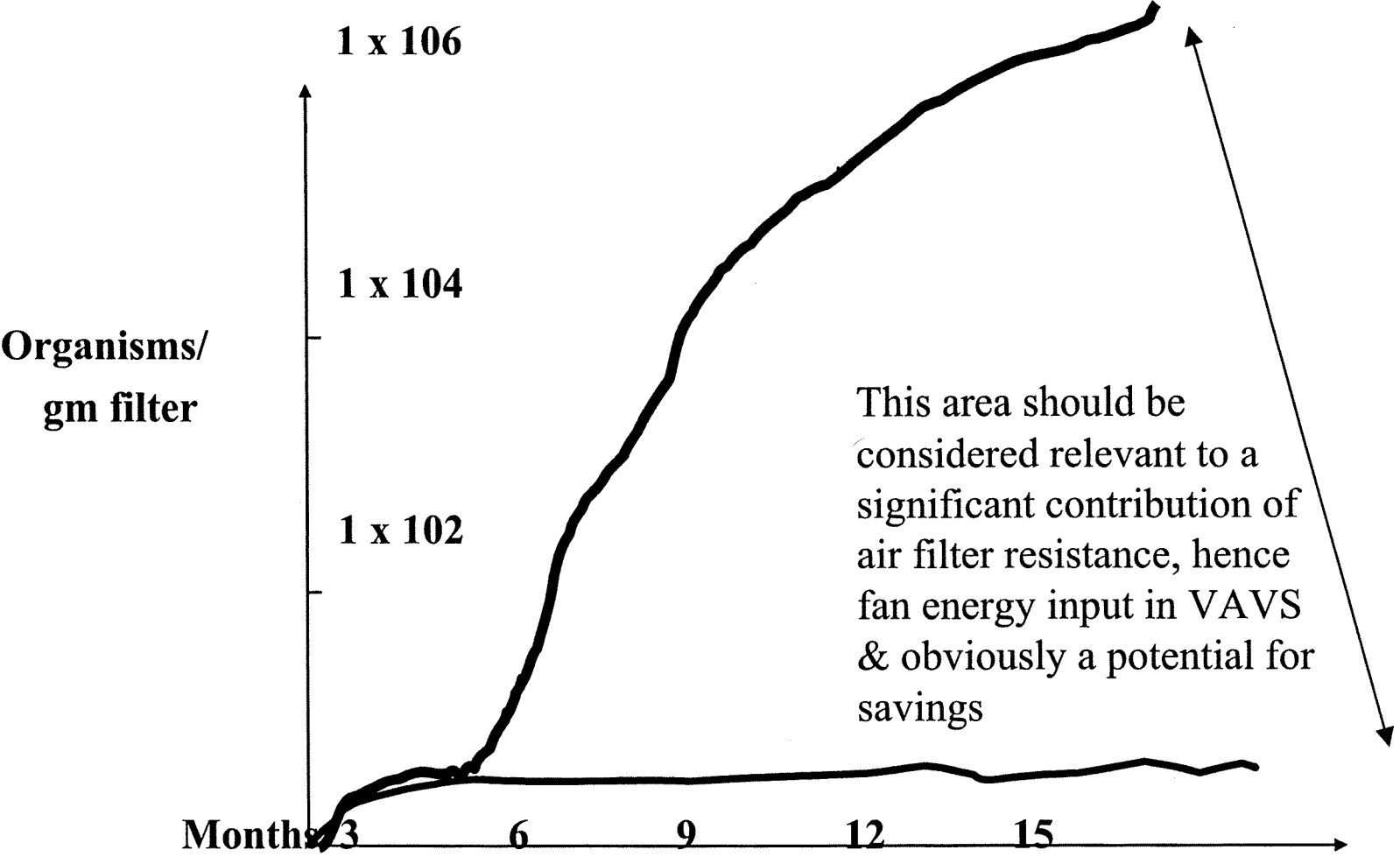
6th month readings were: untreated 40,000/gram; treated 300-350/gram.

9th month readings were: untreated 280,000/gram treated 280-330/gram.

12th month readings were: untreated 2,070,000/gram; treated 400-450/gram.

14th month readings were: untreated 2,900,000/gram; treated 410-450/gram.

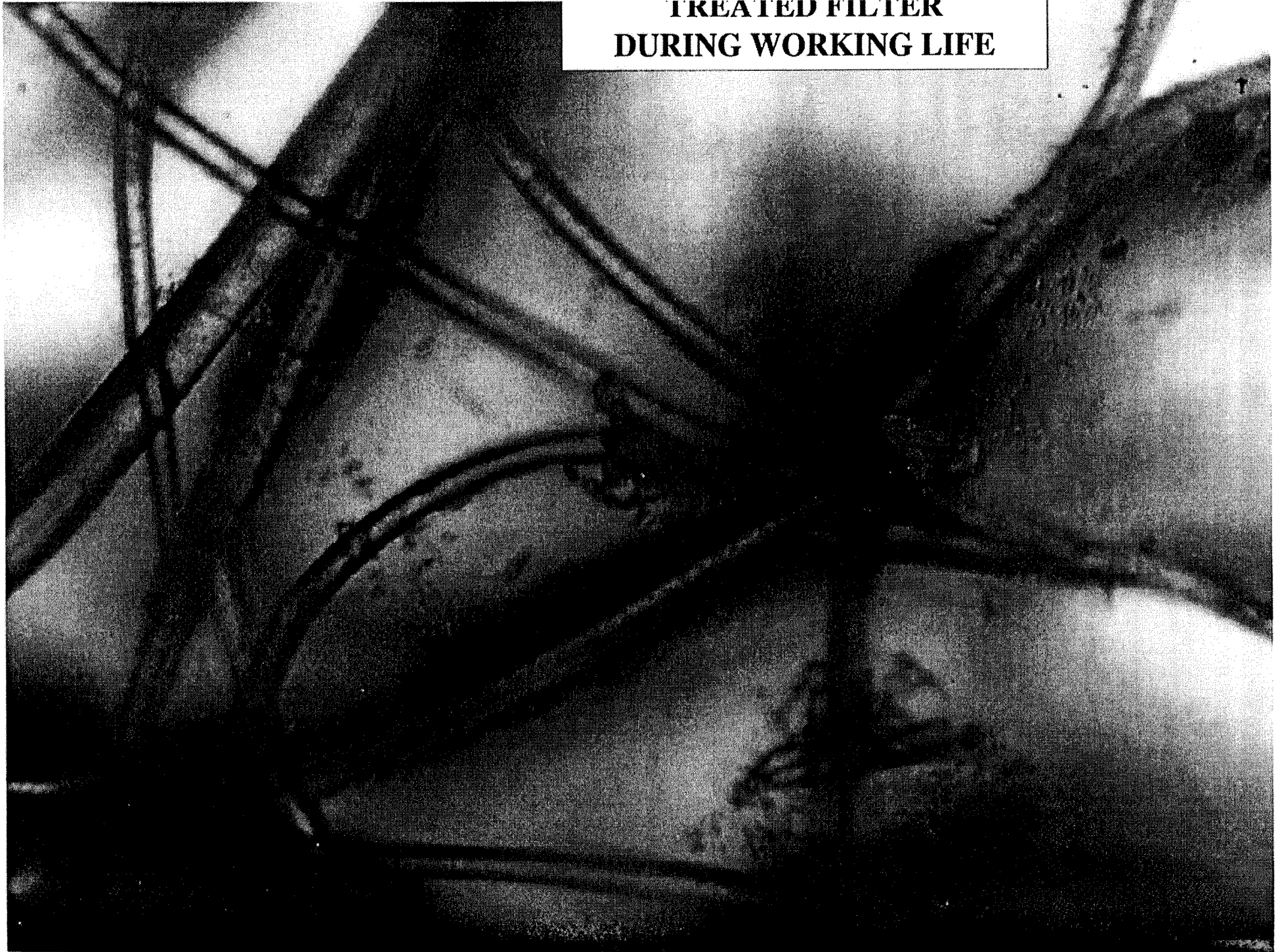
Typical Comparison of Microbiological Colonisation Untreated Filter -v- Epiguard Treated Filter



**Untreated Filter During
working Life Showing
Fungal Elements**



**TREATED FILTER
DURING WORKING LIFE**



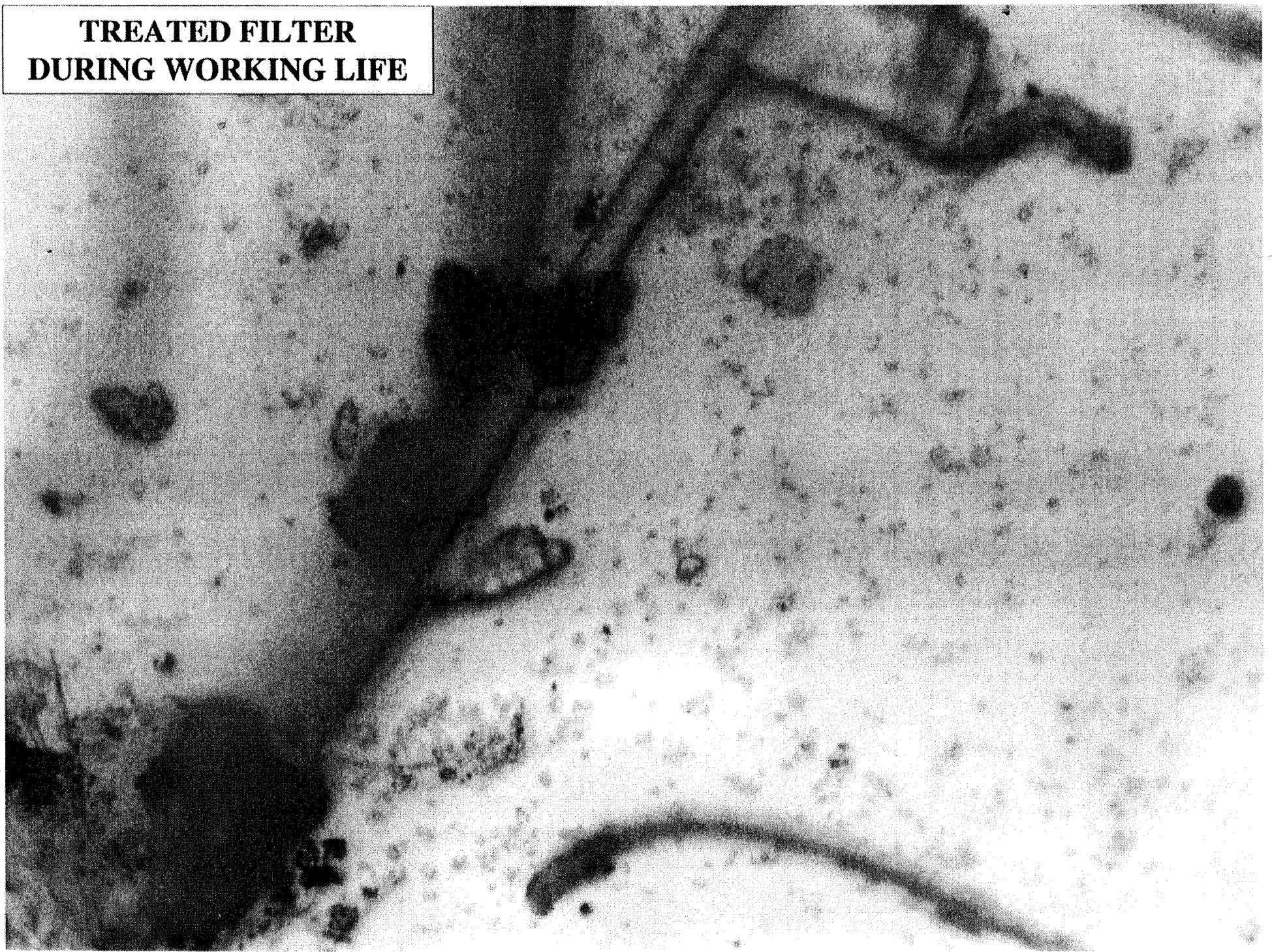


**UNTREATED FILTER
AT END OF WORKING LIFE**

Fungi

**The main cause
of pressure drop
is fungal growth**

**TREATED FILTER
DURING WORKING LIFE**



WHAT ARE THE ENERGY IMPLICATIONS?

Apart from being undesirable in air, fungi create resistance to air hence requiring further fan energy input to satisfy pre determined comfort requirements of the supplied space.

Recent studies by the AGO & other energy authorities cite HVAC as a major contributor to GHG emissions.

NON-RESIDENTIAL ENERGY CONSUMPTION

- **Non residential buildings in Australia consumed 151.1 Pj in 1990 and is projected to grow to 289.1 Pj by 2010 on a BAU growth scenario**
- **An increase of 91%**
- **Electricity accounts for 89% of GHG emissions from this sector**

G H G KEY CONTRIBUTORS

- **1990 32225 kT CO2 pa**
- **2010 62779 kT CO2 pa BAU**
- **Kyoto protocol commitment is 108% of 1990 emissions = 34803 Kt CO2**
- **Cooling 28 %**
- **Air Handling 22 %**
- **Lighting 21 %**

Application	Base Year 1990		Year 2010	
	Energy PJ	CO2-Kt pa	Energy PJ	CO2-Kt pa
Air Handling	23.5	7017	43.5	13007
Cooling	27.4	7854	50.9	14588
Pumping	4.2	1248	7.8	2347
Heating				
Electricity	4.3	1298	7.1	2439
Gas	33.2	1970	69.9	4153
Petroleum Products	9.1	679	13.1	984
Coal	3.5	312	2.3	200
Wood	0.7	0	0.2	0
Processes				
Electricity	2.9	847	5.3	1569
Gas	3.9	230	8.3	484
Petroleum Products	1.5	111	2.1	158
Coal	1.5	131	0.9	83
Wood	0	0	0	0
Other				
Electricity	12.8	3809	23.6	7060
Petroleum Products	0.3	26	0.4	33
Lighting	22.4	6694	5.5	15673
Totals	151.2	32226	289.1	62778

Source: Environmental Gains from the Design of Energy Efficient and Sustainable Buildings
Deo Prasad, Associate Professor, Director SOLARCH Group, University of New South Wales

ENERGY x BUILDING TYPE

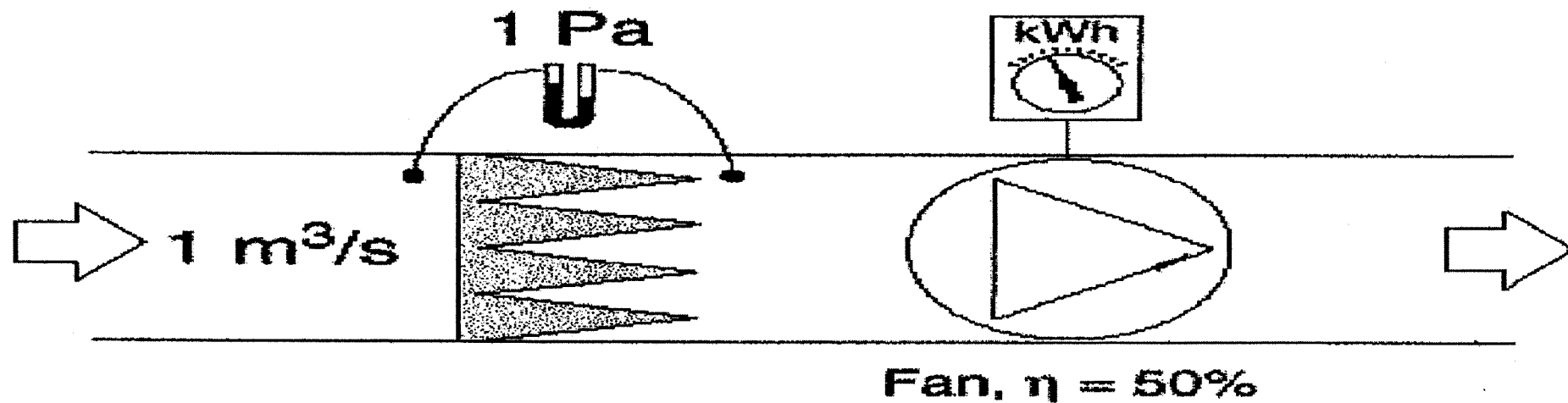
- Offices 27%**
- Hospitals 13%**
- Commercial Service & Public Administration 12%**
- Food Stores 10%**
- Other 38%**

The following quantifies to some degree how air energy is consumed and offers insight into design and management of A/C systems.

We believe there are advantages in cleaner air.

However the payback of our HVAC risk mitigation system is reduced energy consumption.

Energy consumption 1 Pa - one year - 1 m³/s



Energy consumption 1 Pa - 1 m³/s - 1 year *)

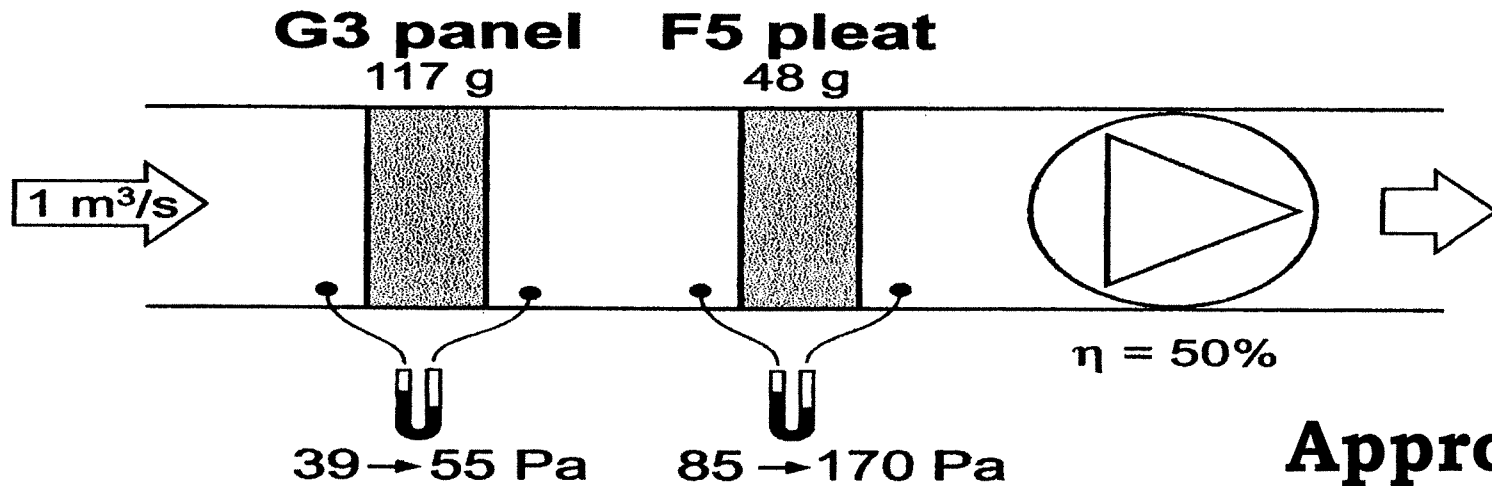
$$\frac{1 \text{ m}^3/\text{s} \cdot 1 \text{ Pa} \cdot 8760 \text{ h}}{1000 \cdot 0,5}$$

$$\approx 17 \text{ kWh/year}$$

*) Source: Electricity efficiency air filters. NI ITRK 1997.

Energy consumption

Dust concentration..... $10 \mu\text{g}/\text{m}^3$
 Flow rate..... $1 \text{ m}^3/\text{s}$
 Operating time..... 1 year



\$ 300.00

Average pressure drop

$$\frac{39 \text{ Pa} + 55 \text{ Pa}}{2} + \frac{85 \text{ Pa} + 170 \text{ Pa}}{2} = 174 \text{ Pa}$$

1 Pa, 1 year, $1 \text{ m}^3/\text{s} = 17 \text{ kWh}$

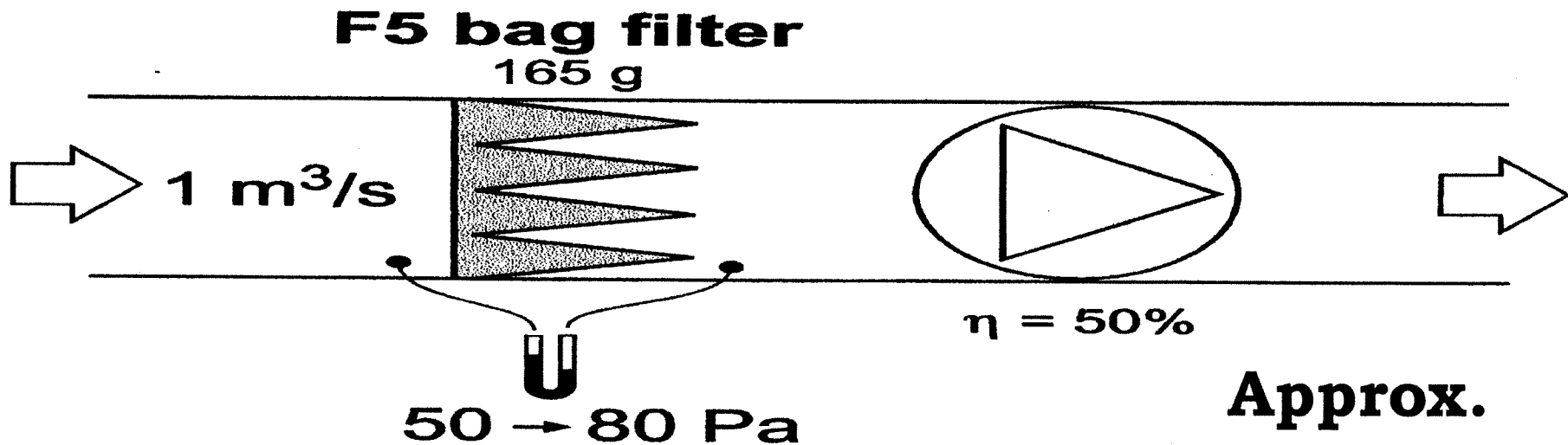
$$1 \text{ m}^3/\text{s} \cdot 174 \text{ Pa} \cdot 17 = \mathbf{3000 \text{ kWh/year}}$$

Energy consumption

Dust concentration..... $10 \mu\text{g}/\text{m}^3$

Flow rate..... $1 \text{ m}^3/\text{s}$

Operating time..... 1 year

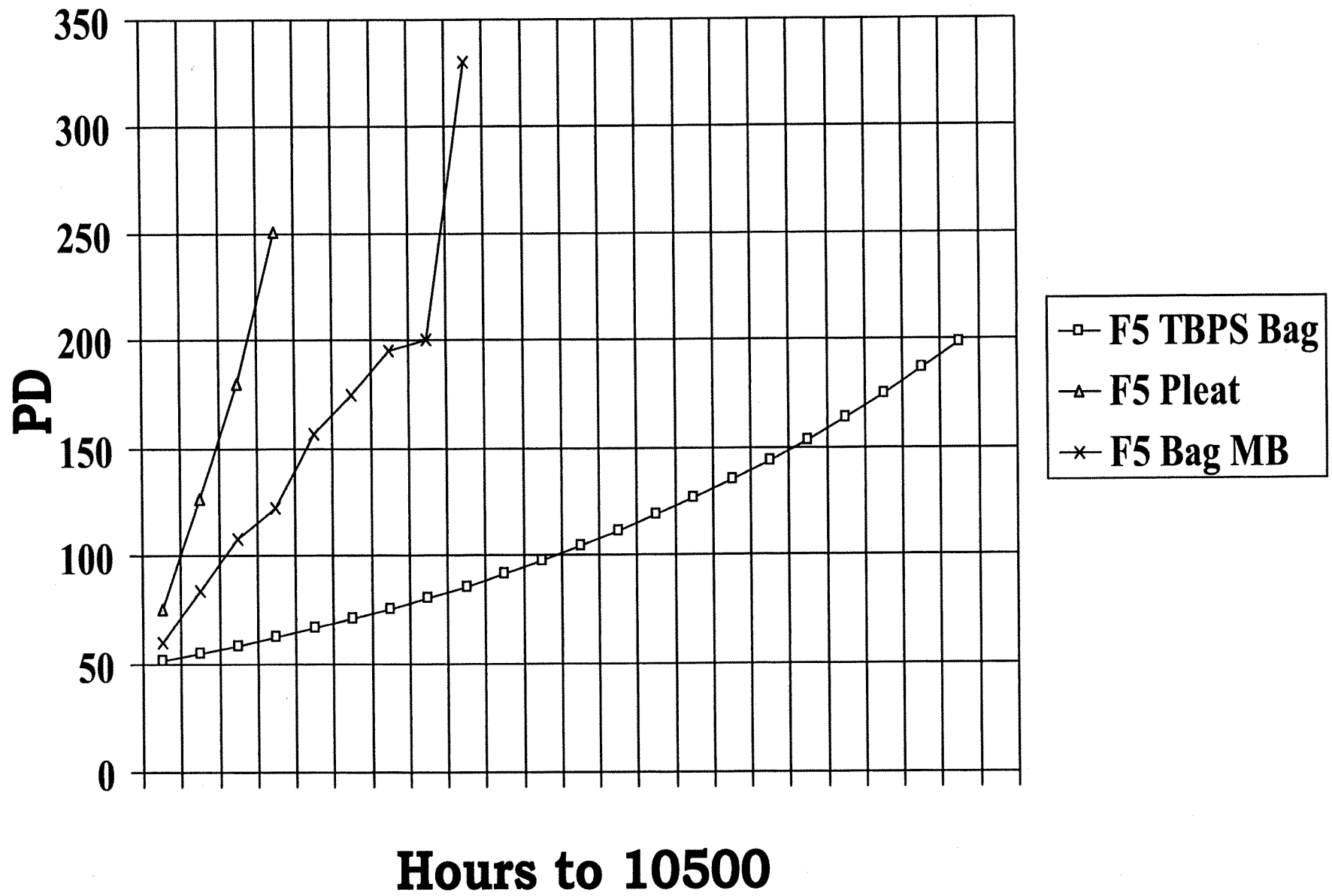


\$ 110.00

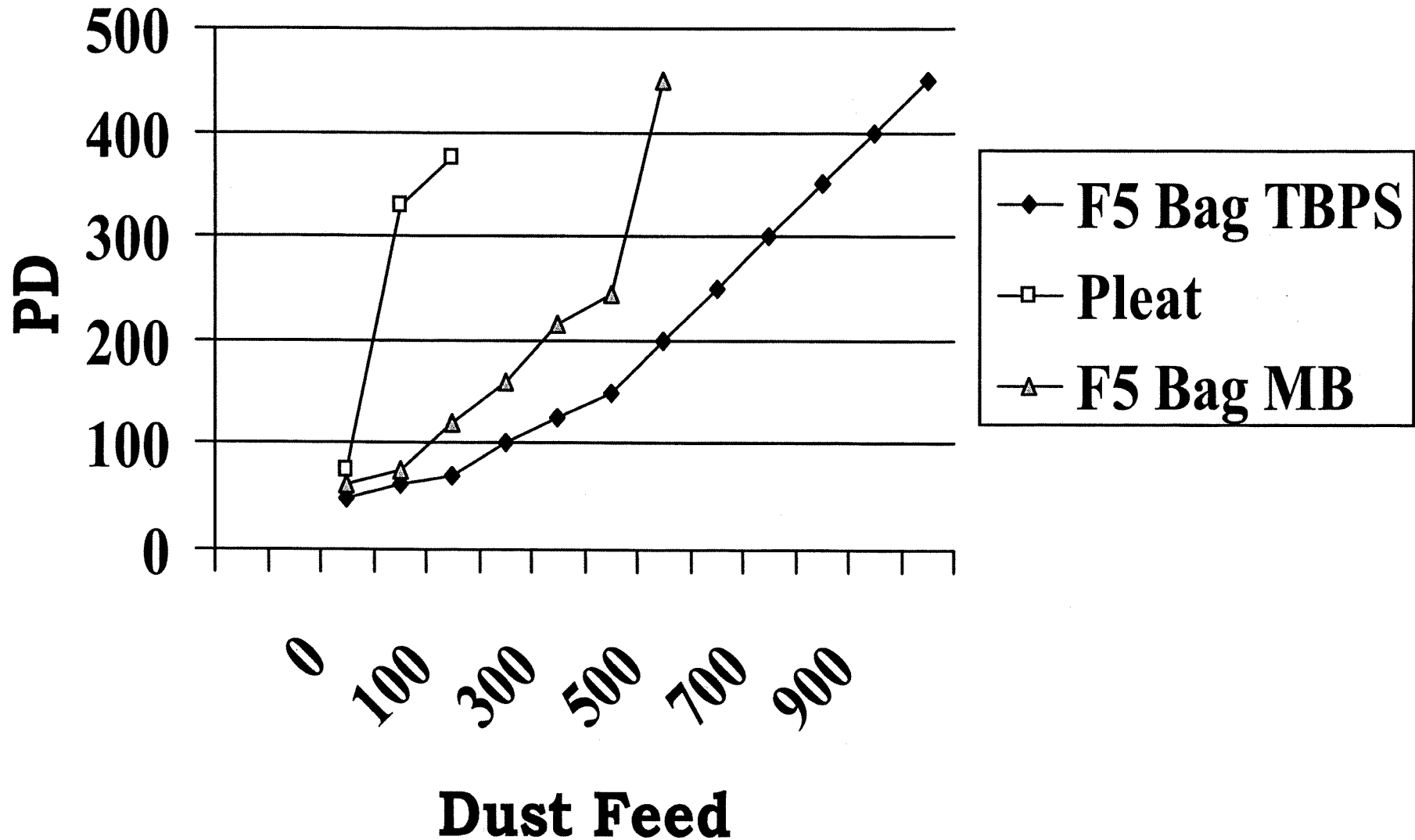
Average pressure drop

$$\frac{50 \text{ Pa} + 80 \text{ Pa}}{2} = 65 \text{ Pa}$$

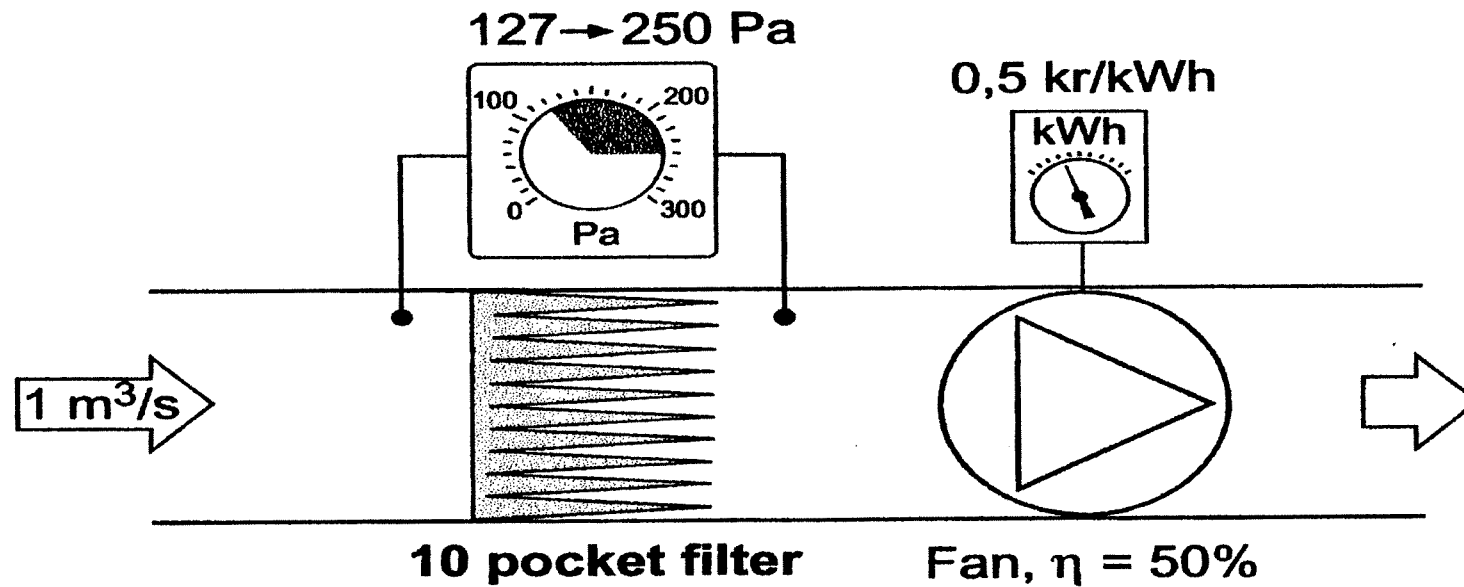
$$1 \text{ m}^3/\text{s} \cdot 65 \text{ Pa} \cdot 17 = 1100 \text{ kWh/year}$$



F5 Pleat v F5 TBPS Bag

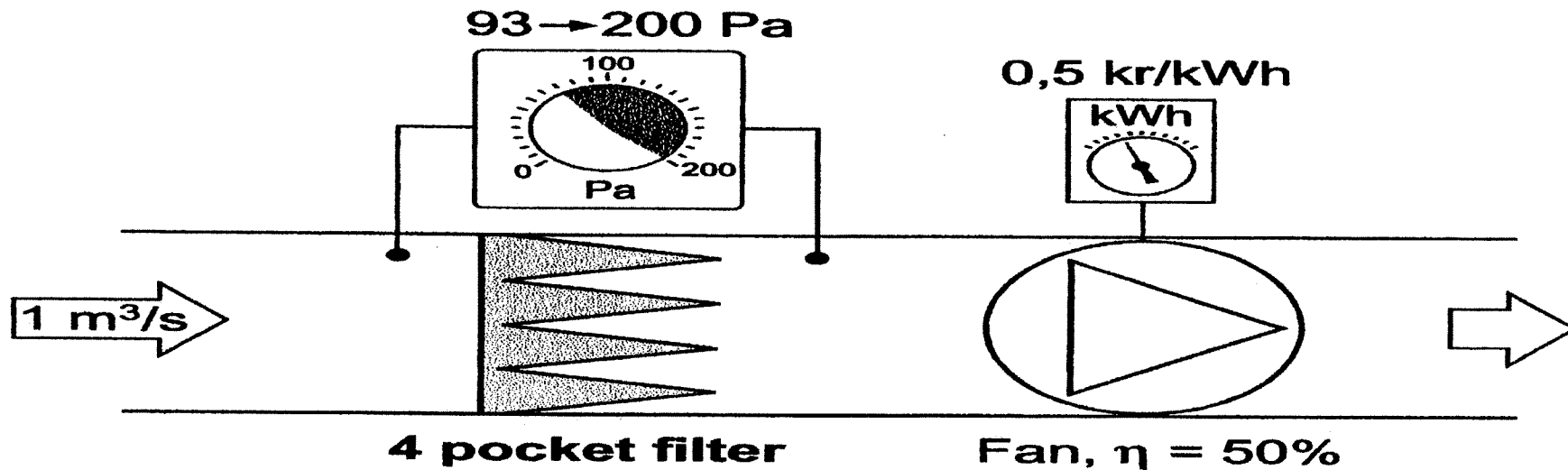


Electricity cost per year, Melt Blown, Filter class F7



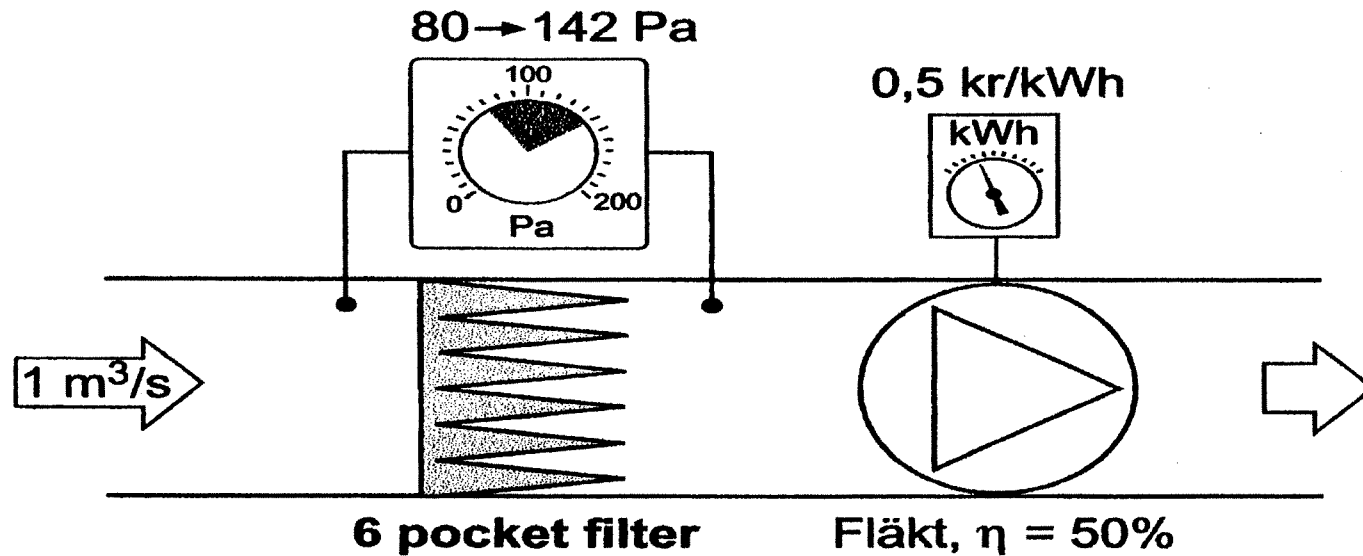
$$\frac{127 \text{ Pa} + 250 \text{ Pa}}{2} \cdot \$ 1.75/\text{Pa} = \$ 329$$

Electricity cost per year, Synsafe filter, class F7



$\frac{93 \text{ Pa} + 200 \text{ Pa}}{2}$	$\cdot \$ 1.75 / \text{Pa} = \$ 256.75$
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Electricity cost per year, Synsafe filter, class F7



$\frac{80 \text{ Pa} + 142 \text{ Pa}}{2} \cdot \$ 1.75/\text{Pa} = \$ 194.25$
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If you have Questions !

Do Not Hesitate to Contact Us

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OUR MARKET POSITION

AIRWAY International is a holistic HVAC hygiene specialist company.

We have forged particular corporate alliances to ensure leading edge IAQ technologies are implemented into the HVAC industry to the benefit of the air conditioning industry and the general community.

We accept people will have questions regarding our claims and we welcome them.

CONCLUSION

As can be seen by the proceeding information a significant amount of energy is attributed to air handling & cooling. As we see it there are 3 ways to decrease energy consumption in most A/C systems. They all take some investment to achieve, however are short term self funding.

- 1. Eliminate biofilm from A/C coils**
- 2. Eliminate fungal colonisation of air filters**
- 3. Review types of media and filter styles used especially in VAV systems**