# ENPRO ENVIROTECH PTY LTD

# Innovative sustainable solutions and services for reduction of carbon footprint

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# ABOUT US

- Enpro Envirotech Pty Ltd was established in Australia during 2016
- A long and successful project history in water, wastewater, and waste management, with an emphasis on renewable energy
- Integrate suitable and practical technologies, embedding a sustainability concept that reduce the greenhouse emissions, with lower operating costs
- Partners in Japan, Middle East, India, New Zealand and China
- Provide services and technologies in sustainable environment management

**Enpro is committed in the fight for environmental protection and against global warming!**

# ENPRO TECHNOLOGIES

Enpro provides innovative technologies for related to sustainable environment management, energy efficiency and renewable energy

- Waste (organic) to energy - Biogas
- Waste to compost in 24 hrs- Foodie technology
- Waste (plastic) to Fuel- Gasolysis
- Water filtration with Wyuna separation
- Water- Quantum water technology
- Wastewater treatment with Jet Aeration/Oxygen
- Wastewater- Biopipe treatment
- Wastewater Truck/car wash Recycle system
- Energy efficiency with thermo-reflective paint
- Energy efficiency with Steam Turbine
- Carbon dioxide to valuable algae
- Prebiotics for soil rejuvenation

# ENPRO SERVICES

Enpro provides consultancy and project management services in sustainable water, wastewater and waste management and renewable energy

- Feasibility study
- Mapping and Planning
- Governance framework
- Detailed situation review (Environmental, Economic)
- Design, drawing, detailed engineering of solid waste and wastewater treatment systems
- Commissioning and trouble shooting
- Training, workshops and operation transitions

# ENPRO TECHNOLOGIES

## Waste (organic) to Energy (biogas)

| Waste streams | Components In system | Outputs | Revenue |
|---|---|---|---|
| Manure, biosolids, Food waste, Biomass Waste, other organic waste | Receival<br>In feed<br>Digester tank<br>Mixing system<br>Gas storage<br>Gas cleaning<br>Gas utilisation<br>Digestate utilisation<br>Pipe/valves pumps<br>Control system | Biogas<br>Biomethane<br>Electricity<br>BioCNG<br>Elemental sulfur<br>Carbon dioxide<br>Digestate rich in N,P,K and other micronutrient | Avoided cost<br>Electricity<br>Fuel<br>Gate fees<br>Renewable incentives<br>Treatment cost |
| Wastewater from brewery, dairy, food processing, abattoir, starch and other industry | | | |

**Technology implementation advantages**

*** Waste management**

*** Greenhouse gas reduction**

*** Renewable energy generation**

*** Employment generation**

# ABOUT THE TECHNOLOGY

**Bioenergy generation from solid waste and wastewater**
Mature, well proven Anaerobic Digestion technologies for Bioenergy generation

- EnMoCAL: Enpro Modified Covered Anaerobic Lagoon
- EnMoMix: Enpro Modified Mixed Anaerobic Reactor
- EnUASB: Enpro Upflow Anaerobic Sludge Blanket Reactor

- BIOGAS CAN BE USED TO GENEATE ELECTRICITY OR BURN INTO BOILER OR CONVERT INTO BIOCNG
- THE DIGESTATE CAN BE UTILISED AS BIOFERTILISER
- RECOVERY OF CO2 AND ELEMENTAL SULFUR ALSO POSSIBLE FROM BIOGAS
- REDUCTION IN GREENHOUSE GAS AND TOWARDS CARBON NEUTRAL CONCEPT

# ABOUT THE TECHNOLOGY

**Waste to Energy Projects**

**Economic  Environmental and Social Advantages**

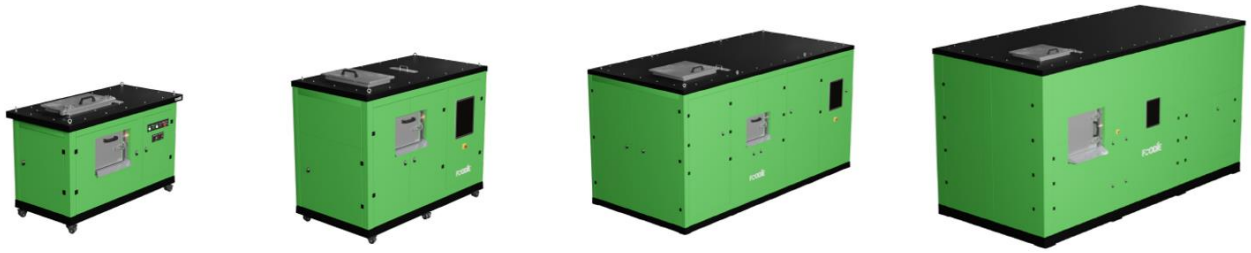
- Replacement of fuel in boiler or electricity or as a vehicular fuel
- Utilisation of digestate as biofertiliser
- Reduced biosolids handling and management cost for wastewater
- Reduced trade waste disposal charges
- Reduced carbon emissions
- Diversion of organic waste from landfill
- Replacing fossil fuel
- Sustainable management of organic waste
- Reduced NOx emissions utilizing digestate
- Employment generation
- Sense of belonging to the environment

# ABOUT THE TECHNOLOGY

**F2C – Food to compost**

Thermophilic composting for organic waste

- F2C is a fully automatic composting machine that converts all kinds of organic waste into compost within 24 hours
- It is one of its kind organic composting machine that incorporates state-of-art technologies that set it apart from the rest
- Reduction in volume of waste by 85-90%
- It is usually suitable for small amount of organic waste such as food waste, vegetable waste, green waste, etc.
- End users- Shopping malls, Aged care homes, Restaurants, small community, apartment etc.
- Typical range from 25kgs to 1 t/d



F-25 F-100 F-500 F-1000

# ABOUT THE TECHNOLOGY

## GASOLYSIS – Plastic waste to fuel

- Plastic waste is a universal problem in the world
- Plastic waste can be used to generate fuel in the process of Gasolysis
- Process in absence of oxygen
- Heated by self generated gas/oil
- More localised operations to eliminate plastic issues

| | | |
|---|---|---|
| Product Fuel Lit/day | : | 50% - 70% |
| Product Fuel Gas kg/day | : | 25% - 15% |
| Sludge (Carbon) kg/day | : | 25% - 15% |

# ABOUT THE TECHNOLOGY

## STERIWELL -MEDICAL WASTE TREATMENT

### Salient Features

**COMPACT**
Has shredding and sterlization in one single integrated chamber which is compact & provides great function.

**SAFE**
Easy to operate, no specific skills required.

**ECO-FRIENDLY**
No use of chemicals nor emission of harmful gases. Reduces volume of waste upto 70-80%.

**CONVENIENT**
Requires small space for installation and minimal civil amenities, quick and easy working.

**USER-FRIENDLY**
Fully automated process. Printing of cycle related data possible. Wheels facilitate easy movement. (10/20/40)

**FAST**
Ensures speedy treatment of medical waste with a short cycle time of 40 minutes.

**VERSATILE**
Processes all types of Regulated Medical Waste sharps, plastics, cardboard, pathalogical waste. glass, papers. bandages, cloth, etc.

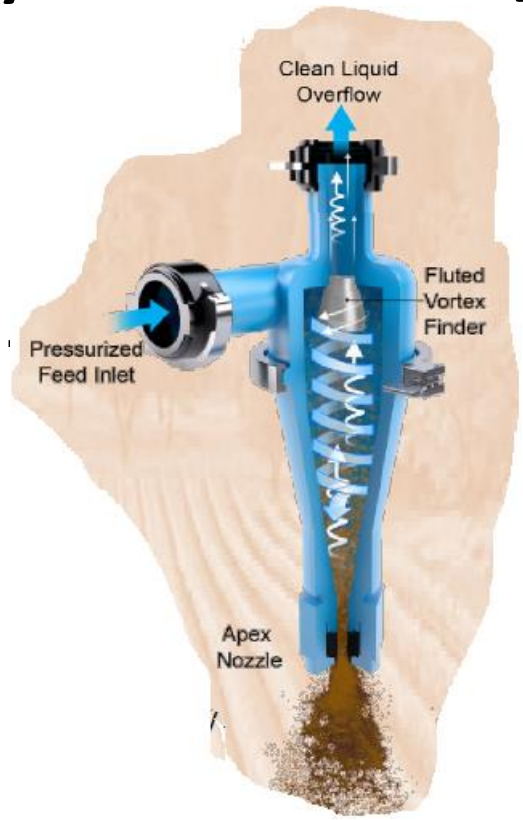
**EFFICIENT**
Performs both shredding and sterilization in a single system to render Bio Medical Waste totally harmless and safe.

| Model | Waste, kg/cycle | Total cycle time | Number of beds |
|---|---|---|---|
| Steriwell-10 | 1 to 1.5 | 45 min | 1 to 10 |
| Steriwell-20 | 2.5 to 3 | 45 min | 20 to 30 |
| Steriwell-40 | 4 to 5 | 45 min | 30-50 |
| Steriwell-125 | 12 to 15 | 45 min | 100-150 |

# ABOUT THE TECHNOLOGY

## Wyuna Separation technology for wastewater/water

- Lower capital costs, compared with traditional settling and clarifying methods
- Small footprint - saving valuable land
- Ideal for solid separation or resource recovery
- Environmentally friendly, reduced or no chemicals required
- Low operating costs, low energy needs and low maintenance
- End user applications- Winery, vegetable growers, wastewater treatment, Dairy, Meat industry, Cooling towers and many more…



# ABOUT THE TECHNOLOGY

**SOLARBEE – Solar Powered Water Circulators**

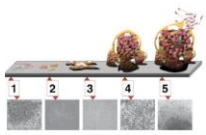
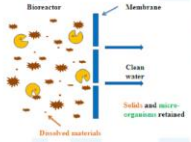
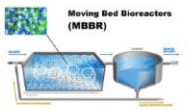
- Lakes, Ponds, tanks with Blue Green Algae
- Toxic chemical release by algae in water bodies
- Drinking water - uniform mixing of chlorine
- Wastewater- Reduced operation of aeration
- SOLARBEE is answer

Blue green algae control
Aeration
Drinking water quality
Water bodies cleaning

# ABOUT THE TECHNOLOGY

**Biopipe Sewage Treatment Plant**

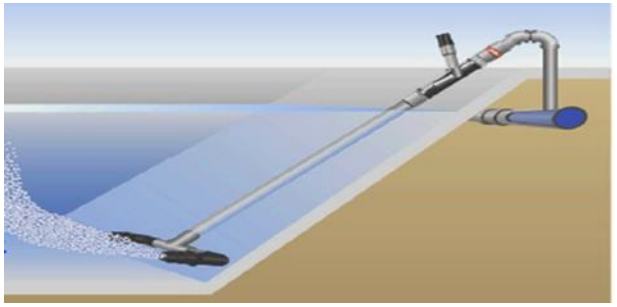
- BIOPIPE- a unique technology solutions for sewage treatment plant
- Attached biofilm technology
- Fully automated system
- No sludge generation in the system
- No odour and very less footprint
- No aerosols formation
- **Supplied in 15 countries all over the world and highly scalable**
- **System range from 10 m3/d to 1000 m3/d sewage reatment**

| BIOPIPE | MBR | 100 m3\day COMPARISON | SBR | MBBR |
|---|---|---|---|---|
|  |  | |  |  |
| 36 sqm | 150 sqm | FOOTPRINT | 150 sqm | 130 sqm |
| 120 kWh\day | 500 kWh\day | ELECTRICITY CONS. | 140 kWh\day | 300 kWh\day |
| 95%+ | 90% | EFFICIENCY | 90% | 85% |
| 100% | 80% | REUSABLE WATER | 80% | 80% |

# ABOUT THE TECHNOLOGY

**Advanced Jet Aeration with On-site Oxygen generation**

- With PCI Gases USA, on-site oxygen generation system and jet aeration micron size air bubbles produced resulting in greater surface area and high oxygen transfer efficiency
- No moving parts in aeration tank resulting in less maintenance
- Low power consumption, simple to run and maintain a centrifugal pump, resulting in Low Life Cycle Cost
- Eliminating cost for changing diffusers
- Increase in capacity of treatment plant by 40-50% using same infrastructure



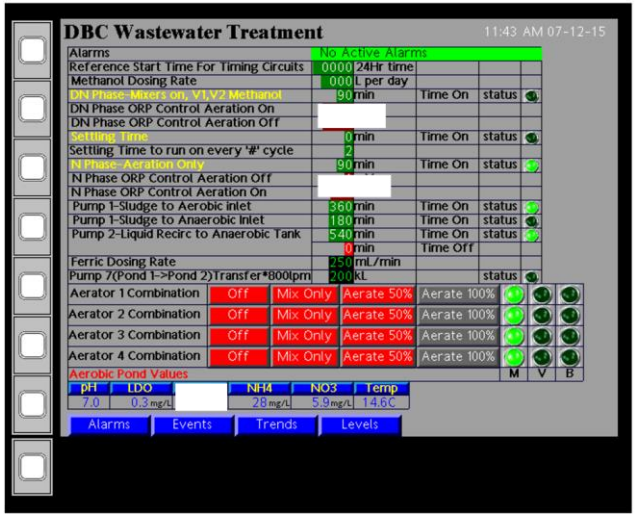
# ABOUT THE TECHNOLOGY

**ANRUPAnammox Technology for Nitrogen Removal**

- Savings $$$ on chemical consumption
- Savings $$$ on energy consumption (aeration)
- Reduce nitrogen levels cost effectively to the desired level

Disposal of wastewater with high level of nitrogen cause pollution with problems of algae growth, death of aquatic animals

CLEAN WATER BODIES WITH THIS TECHNOLOGY



# ABOUT THE TECHNOLOGY

**Truck/car wash water recycle**

- Simple skid mounted system can be supplied for treating truck/car wash water
- Low operating cost with generation of recycled water
- Reduce trade waste charges by diverting water from sewer line
- Achieve sustainability in the industry

# ABOUT THE TECHNOLOGY

**Dry Ice blasting for cleaning**


- Dry Ice can be used for cleaning the trucks cars, industrial precinct, warehouse
- It reduces the water usage completely and thus more environmental friendly
- Non abrasive, no chemicals
- Achieve sustainability in the industry

# ABOUT THE TECHNOLOGY

## Thermo-reflective Paint

A nano-technology based thermo-reflective paint manufactured in Japan
Multiple benefits

- Reduction in air-conditioning charges by 20-40%
- Environmental friendly
- Low VOC's generation
- Life cycle 8-10 years
- Can be applied on tiled or metal roofs

End users

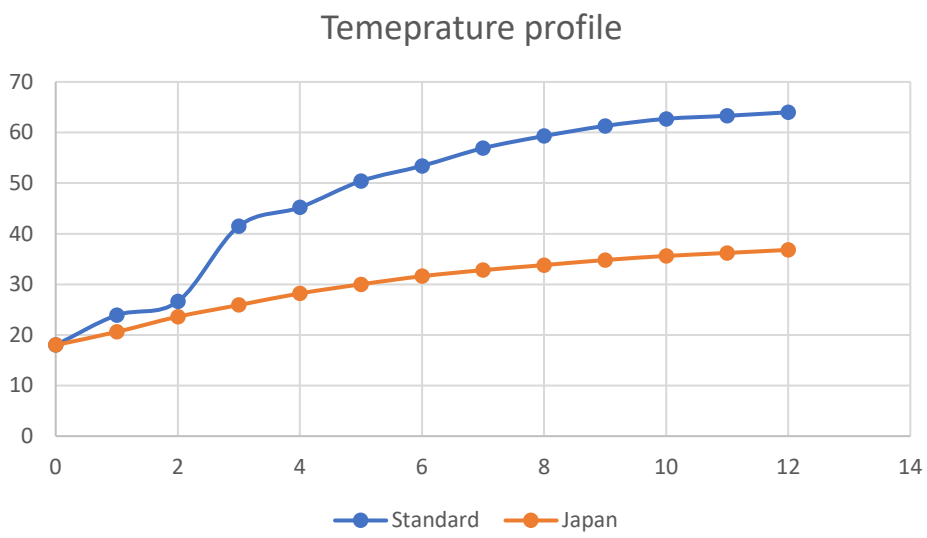
- Shopping complex
- Warehouse
- Industrial complex
- Many other locations with large roof area

Great amount of energy savings
Recorded Electricity Consumption
1st July to 25th August 2016 - 24,268 kWh
1st July to 25th August 2017 – 14408 kWh

Reduction in Electricity Consumption
9,860 kWh 40.6% reduction
Savings in Electricity Cost: 167,620 JP Yen (17 Yen/ kWh)

# ABOUT THE TECHNOLOGY

## Thermo-reflective Paint




Similarly, temperatures were checked in the daylight at different ambient temperatures, and about 8-12 DegC  difference was observed in standard coating and Japanese coating.

# ABOUT THE TECHNOLOGY

## STEAM TURBINES

- Typical boiler steam pressure 10 bar
- Required pressures in process 2-4 bar
- Steam pressure can be utilised for electricity generation
- Required pressure can be adjusted
- Example 5t/h steam, potential to generate 125kWe
- Simple pay back between 2-4 years

## OUR ORGANIC SOLUTION FOR IMPROVEMENT


# Soil Rejuvenator

**Creates the conditions for plant specific enrichment of microbes in rhizosphere**

- **It's not Biofertilizer**
- **It's a simulated mixture of nutrients; as produced from plant-microbe interactions**

## Advantages of Soil Rejuvenator

- Increases variety and abundance of bacteria Mimics root exudates
- Provides Nutrients to soil bacteria
- Creates biochemical network
- Redefines flow of nutrients
- Enhances plant-microbe interaction
- Promotes quorum sensing
- Reduce fertiliser usage significantly
- Improved biodiversity and soil carbon

- **Tested on Wheat, lentils, soya beans, Cotton, Corn, Potato, Rice, tomato, mango, orange, papaya, cashew, almond etc**
- **Increase in production by about 15-28%**
- **More Revenue for farmers**

## Eco-restoration for Carbon Credit with soil rejuvenator treatment

- Designed plan to gradually increasing the soil organic matter
  - Step 1:
  - Initial organic loading through green manuring type of plants with average life of 3-6months
  - Step2:
  - Herbs/shrub variety with average life of 1-2 year, to organic carbon to soil
  - Step 3:
  - Green belt selected tree varieties as preferred by agro-climatic zone with few introduced varieties to sustain the biodiversity

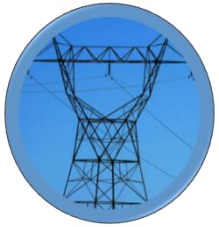
# ABOUT SERVICES

**Consultancy**

- Project Architecture works related to sustainable environment management including Assessment; Feasibility Studies, Mapping, Planning; Governance Framework; Detailed Situation Review (Economic, Financial, Political, Environmental, etc.); Structuring and Execution

**Project Implementation**

- Project Implementation works, including Design, Drawing, Detailed Engineering, Commissioning, Training and Operation Transition



# ABOUT SERVICES

## Integrated Sustainable Environment Management

1. An evaluation of the environment (water, waste, wastewater and energy components) in city /industry/community
2. Potential solutions which are fit for purpose to reduce carbon footprint and achieve sustainability
3. A high-Level Conceptual Project/Solution Definition/s
4. A Prioritization, Resource Allocation, and Project Development Scoping and Costing
5. A Project Development Road Map / Plan
6. Strategy development for sustainable environment management
7. Benefits to the Local and Federal Government
8. We conduct mapping studies to assess current environment management to achieve CIRCULAR ECONOMY (CE) as well as RESOURCE RECOVERY at its best

# ABOUT SERVICES

## Training and Education

Enpro provides training and education in sustainable environment management

Encompass various topics including

- Harvesting clean energy from organic waste
- Wastewater treatment with innovative technologies
- Sustainable environment management
- Circular economy and carbon management

Also can design tailor-made training and education workshops/programs as per requirements of end user

# Projects examples

**CHINA :**
**0.5 MW electricity and biomethane for cooking**

INPUTS
- Co-digestion of pig manure and corn silage
- 60,000 pigs manure/d
- Additional 20 t/d agriculture biomass

BLACKBOX
- Pre-treatment
- Anaerobic Digestion EnMoMix
- Digestate Utilisation
- Water Utilisation

OUTPUT
- 0.5MW Electricity
- Partial Reticulation of biomethane in village
- Plant under construction

# Projects

## Supermarket Distribution centre :
## Carbon footprint reduction

**ISSUES**

- Solid waste plastic waste, water, energy management

**DRIVERS**

- Reduce 50% carbon footprint by 2030
- Clean and green image of the organisation

**Project solutions implementation**

- Thermoreflective coating on refrigerated railway containers and roofs to reduce diesel and electricity
- Rapid Thermophilic Composting system to eliminate transport of food waste and GHG emissions thereby
- Wrapping plastic waste to fuel and utilise it on-site trucks
- Truck wash water recycle to reduce disposal and achieve sustainability

# Projects

## AUSTRALIA :
## Feasibility and optimisation of waste to energy for Meat processing industry

ISSUES

- Biogas generation very less since installation of system
- The treated quality of wastewater- EPA Regulations

SOLUTIONS

- Data analysis
- Additional biochemical analysis
- Preparation of action plan
- Implementation of action plan

OUTCOOME

- Condition of Biogas system improving
- Biogas generation otpimised with increase by 20%
- Improvement in treated wastewater quality

# Projects

## AUSTRALIA :
## Rural council Environmental Feasibility

ISSUES

- Water, wastewater, energy management

DRIVERS

- Reduce blue green algae in lakes/ponds
- Odour control of wastewater treatment
- Food waste and plastic waste disposal
- High electricity bills for council operations

Outcome

- Preliminary meeting and discussions
- Data compilation
- Feasibility report encompassing various innovative technologies such as SolarBee, Biopipe sewage treatment, Hybrid solar and wind energy,  Thermophilic composting and Soil Rejuvenator.

# Projects

## PACIFIC ISLAND :
## Municipal Solid Waste Assessment and Workshop

ISSUES

- Solid waste management
- Lack of updated knowledge on new technologies

DRIVERS

- Sustainable and ethical waste management
- Awareness of community, government officials
- Reduction in greenhouse emissions

BENEFITS

- Knowledge of current greenhouse gas emissions
- Policy development around sustainable development
- Understand how resource recovery can be achieved
- Understanding of the new technologies for solid management

# Innvoative Project

**South Australia : Virginia**
**Sustainable practices in Greenhouse**

ISSUES

- Plastic string used for holding the plants in greenhouse
- Green waste after harvesting is contaminated with plastic

DRIVERS

- Eliminate plastic waste contamination
- Utilisation of waste streams as resources
- Reduction in greenhouse emissions


ACTION PLAN

- Replaced plastic strings with  compostable strings
- Trial for 14 weeks on cucumber plant in one of the greenhouse
- Successfully hold the plant with equal strength without any issues
- **Circular Economy and Resource Recovery with Carbon footprint reduction**

## WHERE FROM HERE…..


**Achieve SUSTAINABILITY……**

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