

# Preserving our air quality

How Avertas Energy minimises emissions

Turning waste into energy is a proven, safe and modern process used all over the world with great success.

The process we use results in very low emissions which provides certainty of minimal impact on local air quality.

Our sophisticated technology removes compounds from our emissions, including potential pollutants.

Our emissions will be well below the international standards that have been set for this important project for Western Australia.



# The big picture - energy from waste

The energy from waste process is used world-wide to help preserve the environment by diverting post-recycled waste from landfill and preserving valuable land for more important uses like housing and farming.

By using waste to produce energy, communities do not have to use coal or gas fired power and this results in a reduction of carbon emissions to the atmosphere.

The Avertas Energy facility will deliver the same benefits for Western Australia and help our communities meet their waste management targets.

## Energy from waste plant

- Reduces emissions
- Byproducts: outputs bottom ash, non-ferrous and ferrous metals for re-use

## Waste delivered from landfill, trucked to plant

400,000 tonnes p.a. of non-recyclable waste diverted from landfill

## Waste management

- Household
- Local industry
- Waste to landfill
- Recyclable waste



## Electricity generation

Secure baseload renewable power delivered into the Western Australian grid

## Waste generation

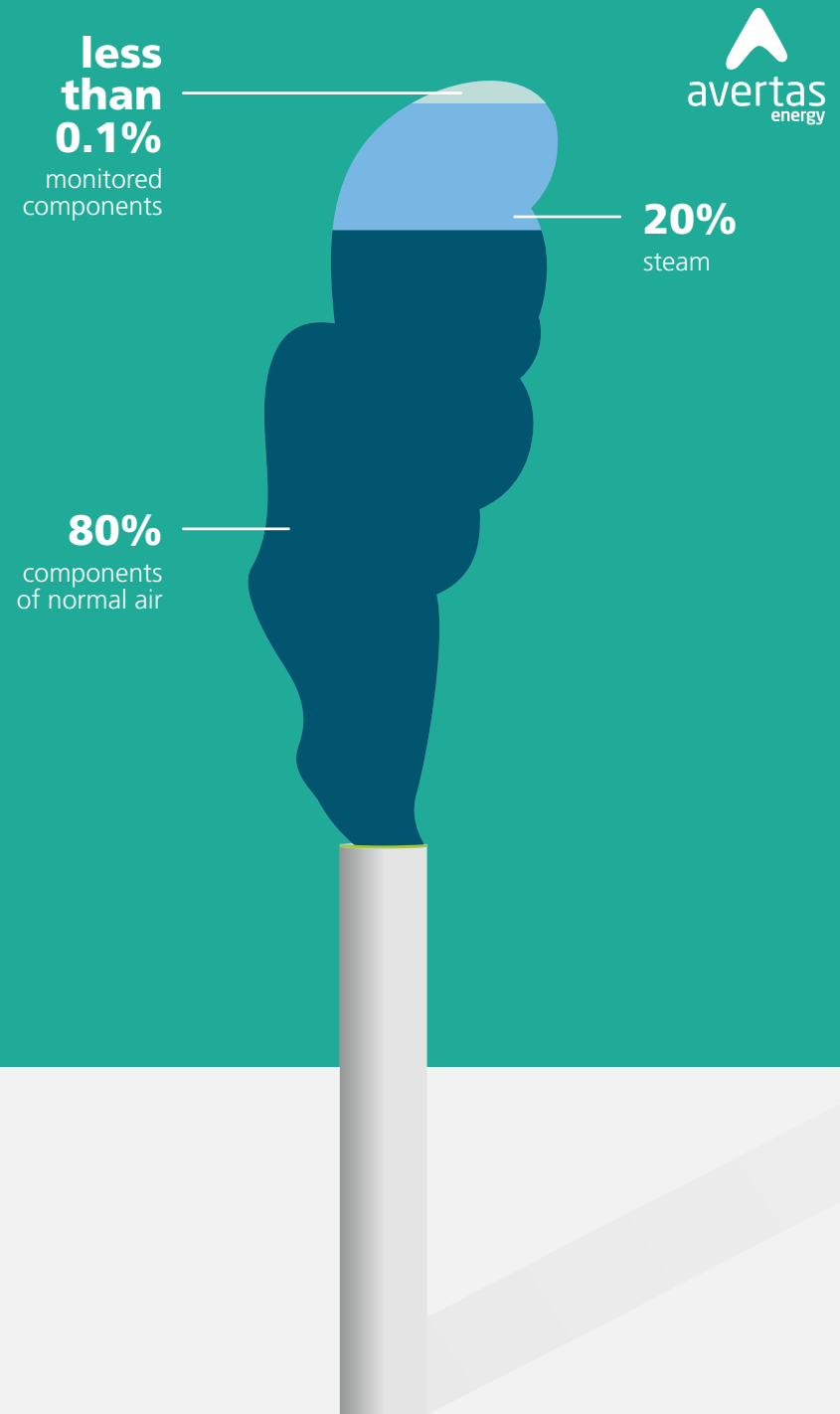
- Municipal
- Industrial

# What's in our emissions

Most of our exhaust gas is made up of components of normal air – mostly nitrogen, oxygen, argon and carbon dioxide.

About 20 per cent of the volume of our daily emissions is steam, which you may be able to see in a plume from our stack during cold weather.

Emissions of compounds that are considered pollutants are strictly controlled and in total make up much less than 0.1 per cent of the volume flow.



Source: Volumes calculated by independent consulting engineering group [Ramboll](#) using a standard data book and 1/2 hour limit values from the Avertas Energy facility.

# We meet international best standards

We have strict limits set by the WA Department of Water and Environmental Regulation (DWER) on our licence, which means compounds released into the atmosphere are kept at a very low level.

Compounds include substances commonly found in car exhausts and other industrial emissions such as sulphur dioxide and oxides of nitrogen; dust and particulate matter; dioxins and furans; and heavy metals.

The limits that apply to Avertas Energy are exactly the same standards applied to about 450 energy from waste facilities in Europe and the UK, some of which are located within residential suburbs and close to homes.

The standards are known as the European Union Industrial Emissions Directive (IED) and are among the strictest of their type in the world.

mg/Nm <sup>3</sup> 11% O <sub>2</sub>		
	Kwinana licence limit*	Our expected emission release
Continuous Monitoring	Daily average values	
Particulate matter (PM)	10	2
Total Organic Compounds (TOC)	10	1
Hydrogen Chloride (HCl)	10	5
Sulphur Dioxide (SO <sub>2</sub> )	50	20
Nitrogen Oxides (NO <sub>x</sub> )	200	180
Carbon Monoxide (CO)	50	10
Periodic Monitoring	30 minutes to eight hours sampling period	
Hydrogen Fluoride	1	0.1
Mercury	0.05	0.005
Other heavy metals	0.5	0.05
Lead	included above	0.02
Cadmium and Thallium	0.05	0.003
Cadmium	included above	0.002
Dioxins/Furans, toxicity equivalents	0.0000001	0.00000002

\*Same as the European Union Industrial Emissions Directive

Source: Licence limits from [DWER](#). Avertas Energy expected emission release as calculated by independent consulting engineering group [Ramboll](#).

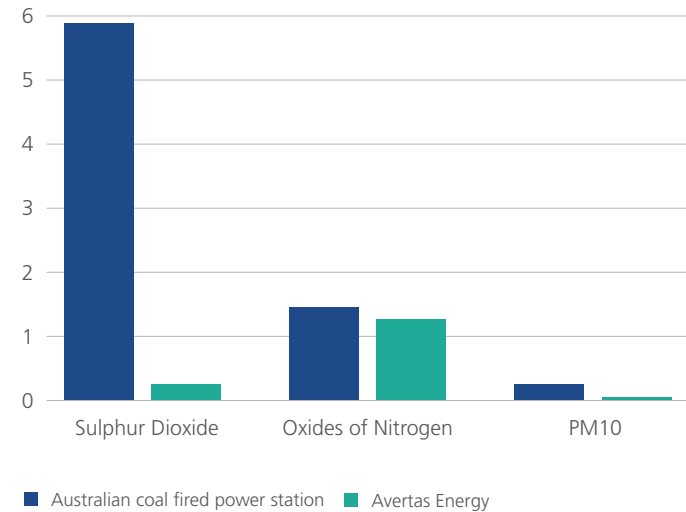
# Compared to our industry peers

Lots of Western Australians live near all sorts of factories, industrial works and even just busy roads.

So we compared our emissions to our peers.

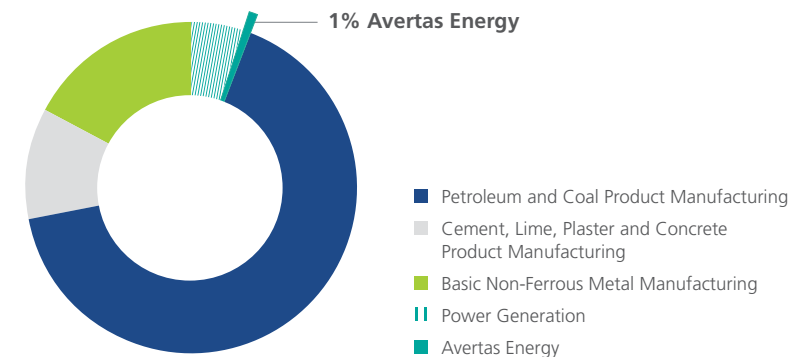
Per kilowatt hour, Avertas Energy will produce less dust, sulphur dioxide and oxides of nitrogen than a normal Australian coal-fired power plant and we are a minor contributor to the overall proportion of sulphur dioxide in the Kwinana airshed.

Emissions per megawatt hour (kg/MWh)



Source: Coal-fired power station data from the [National Pollutant Inventory](#).

Maximum permissible quantities of sulfur dioxide for each industry in the Kwinana area



Source: [Redetermination of maximum permissible sulfur dioxide quantities under the Environmental Protection \(Kwinana\) \(Atmospheric Wastes\) Policy 1999](#).

# Keeping Kwinana's air clean

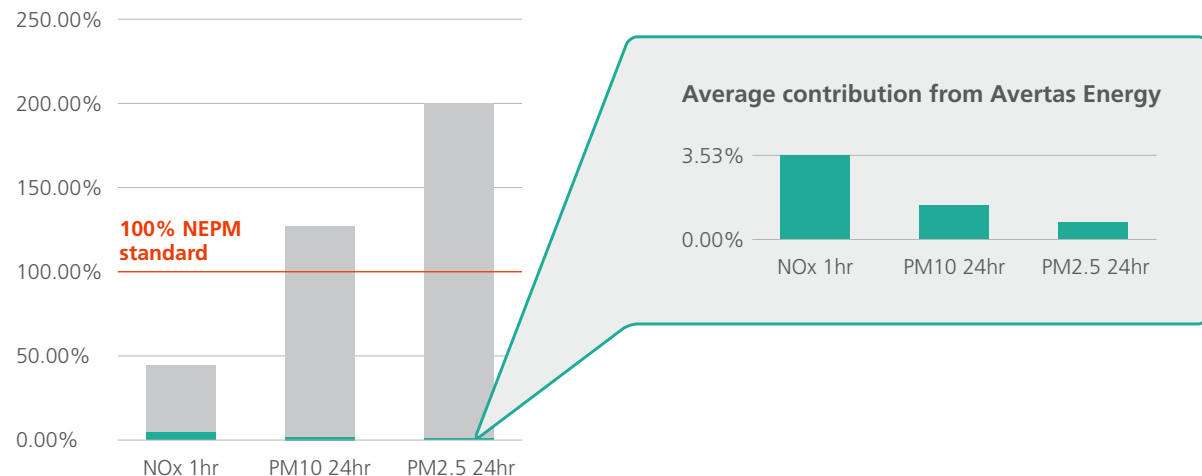
Just as important as keeping our emissions well below licenced levels is ensuring our operations do not significantly affect the ambient air quality in the Kwinana Industrial Area. Ambient air quality monitoring is conducted in Western Australia by DWER. The monitoring stations provide a representative measure of the air quality likely to be experienced by the general population. Our modelling shows Avertas Energy will contribute a maximum of 3.7% of any compound measured at any location.

The high level of background concentrations of PM10 and PM2.5 can be largely attributed to bushfires.

The predicted concentrations of PM10 and PM2.5 attributable to Avertas Energy may be much lower. This is because we've used the figure for Total Suspended Particulates - or all particulates smaller than PM50.

- Average maximum contribution from Avertas Energy
- Average background concentration

**Predicted contribution of Avertas Energy emissions to exposure levels in the Kwinana Industrial Area**



Source: Background concentrations collated from the following publicly-available information: [Kwinana Background Air Quality Study](#). [DWER ambient monitoring reports](#). Avertas Energy contribution calculated by independent consulting engineering group [Ramboll](#).

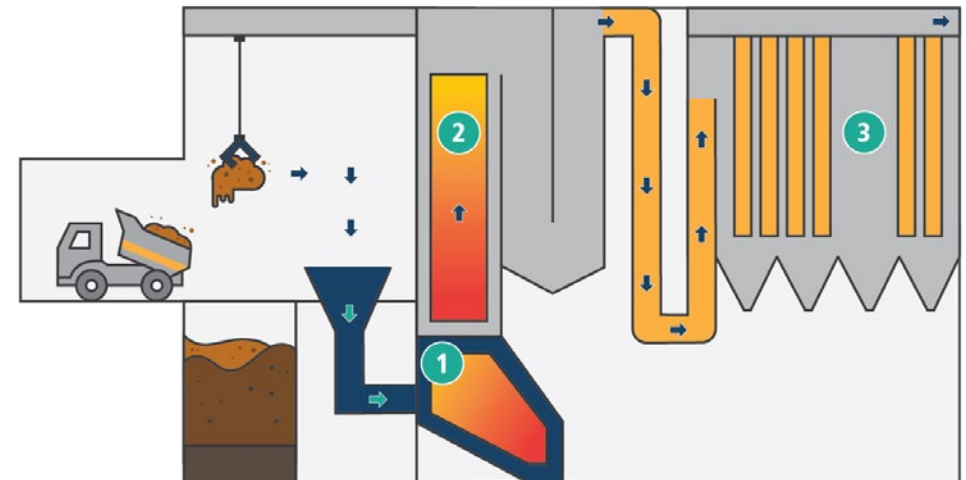
# How we keep our air clean

Our state-of-the-art plant is fully enclosed and emissions from our energy recovery process are carefully managed to remove and reduce compounds going into the air.

We use a sophisticated three-step process to which includes:

- Step 1:** Achieving a minimum of 850°C for at least two seconds in the boiler to completely combust organic compounds and destroy dioxin and furan generation
- Step 2:** Our DeNOx system involves spraying urea into the furnace to turn potentially harmful nitrogen oxides into water and nitrogen that present no risks; and
- Step 3:** Our semidry flue gas cleaning system captures acid gases, dioxins, furans and heavy metals in a bag filter.

Together, these steps ensure our emissions are well within international standards, our license limits, and contribute a small fraction to local particulate and other emissions.





# Continuous monitoring keeps us in check

We expect our emissions to remain well below our licenced limits, and to demonstrate this we will have a Continuous Emissions Monitoring System (CEMS) providing a permanent around-the-clock record of the emissions from our two boilers.

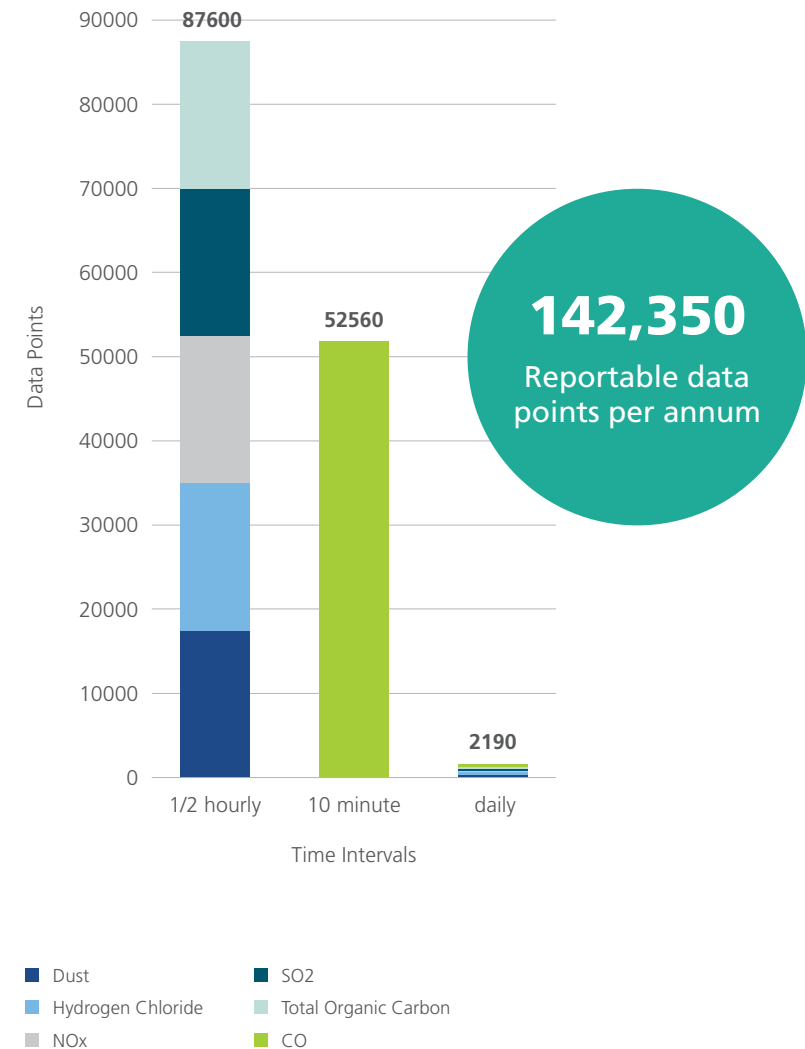
That system will record 142,350 individual data points for compounds from each boiler.

Any exceedances of the limits set by our licence is reportable within 24 hours, and our CEMS record will be submitted to DWER on a quarterly basis so they can check that we are keeping emissions low and below the limits

In addition, like all other relevant industries, we will annually report our emissions to the National Pollutant Inventory (NPI) and these will be publicly available.

Of course, until the energy from waste facility opens in 2021 there will be no emissions monitoring or reporting by Avertas Energy.

Continuous monitoring data points



# Keeping our noses clean

Waste that comes to the Avertas Energy facility is delivered by covered trucks and emptied into an entirely closed storage area.

The storage has been specially designed to house waste – it has a slightly negative air pressure which stops unpleasant odours from escaping. Air used for combustion for the boilers is drawn from the bunker and tipping hall.

Waste material is rapidly processed at the facility as new deliveries are arriving all the time, so there is no time for waste to build up and start decomposing.



# Energy from waste around the world

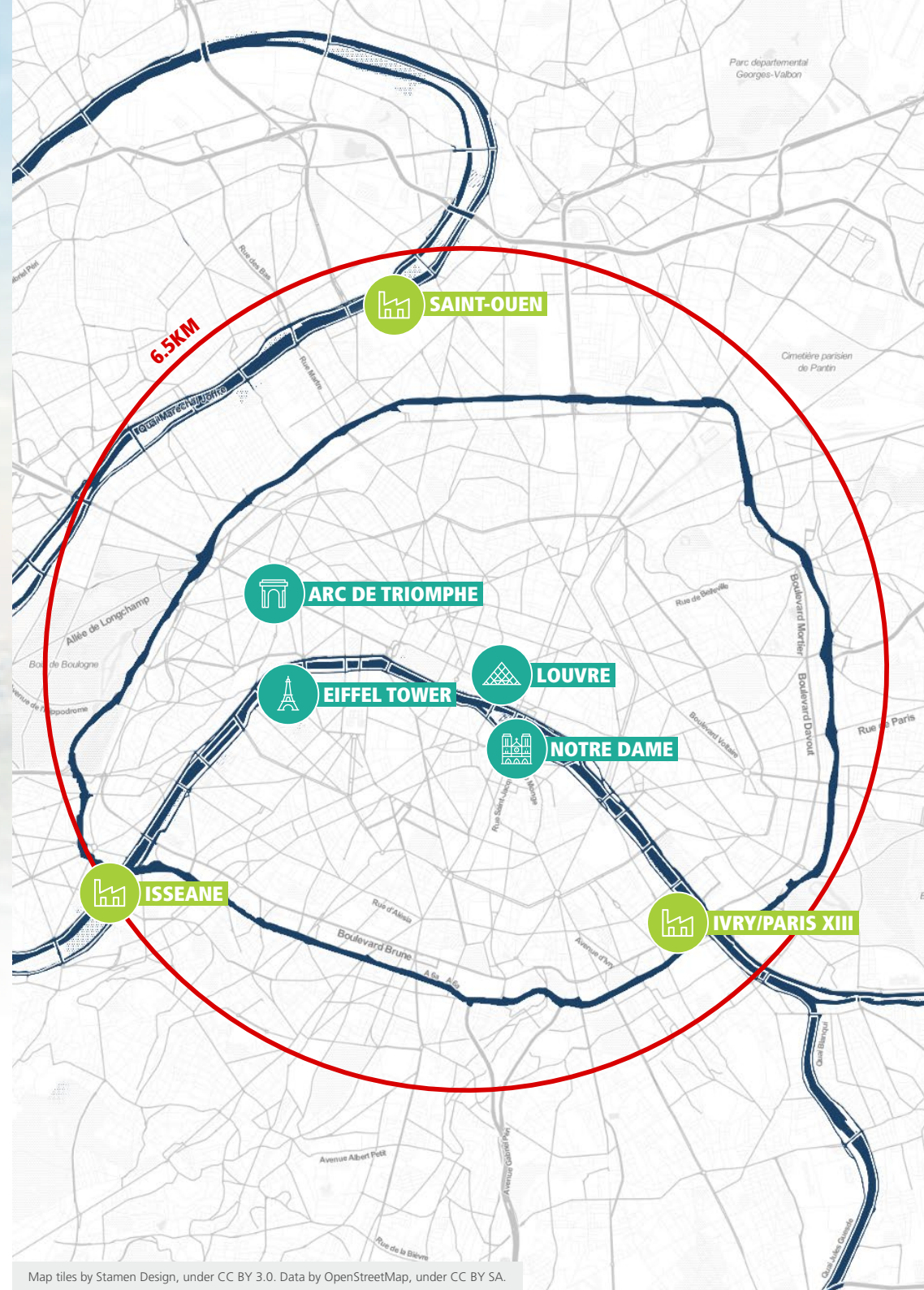
Facilities like Avertas Energy have been powering and heating homes and businesses around the world for years.

In fact, the world's biggest museum - the Louvre in Paris - is powered by energy from waste.

There are three energy from waste facilities within a 6.5km radius of the metro area of Paris, all of which fit seamlessly within the skyline in densely populated areas.

Check out where they are:

- Isseane is 4km from the Eiffel Tower
- Saint-Quen is 5km from the Arc De Triomphe
- Ivry/Paris XIII is 4.2km from Notre Dame





If you are interested in Avertas Energy please visit:  
**[www.avertas.com.au](http://www.avertas.com.au)**