

**Submission
No 252**

**INQUIRY INTO PERFORMANCE OF THE NSW
ENVIRONMENT PROTECTION AUTHORITY**

Name: Mr John Priest

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The Hon Robert Brown MLC
Chair, General Purpose Standing Committee No 5
Legislative Council
NSW Parliament, Macquarie Street
SYDNEY NSW 2000

10/11/2014

Dear Chair,

RE: Submission to Inquiry into the performance of the NSW Environmental Protection Authority

Further to 1. (b) (v) of the Inquiry's terms of reference, please find attached my submission concerning the regulation of cruise passenger ships at the White Bay Cruise Terminal at Balmain. As you will see this submission has been extensively referenced from a variety of sources both local, and international and aims to give the Inquiry a well-researched fact based observation of a critical time sensitive issue that is affecting Sydney residents' health.

I would like to formally present this submission to the Inquiry. As has been illustrated there are two parts to a successful solution (Ultra-Low Sulphur Fuels like those used by Sydney Ferries and Shore Power like that used by the Australian Navy). This allows Sydney residents to benefit from a growing cruise ship industry, without costing them their health. This submission focuses primarily on Shore Power, which in addition to Ultra-Low Sulphur fuels, is a cost effective solution.

John Priest

Shoreside Power – Cold Ironing

Shoreside Power is the solution Sydney needs for a healthy & prosperous cruise ship industry

Air emissions from cruise ships, have negative effects on air quality and impact communities near ports. While docked in port, cruise ships generate the electricity they need by either operating on-board engines or accessing electricity by plugging into shoreside power connections at the dock (also known as cold ironing), which are used in over 100 merchant berths worldwide.

“In Southern California, port activities are major contributors to smog and soot pollution that are responsible for 5,400 premature deaths, 2,400 hospitalizations, 140,000 incidences of asthma and respiratory problems, and nearly one million lost work days each year.”¹ Marine engines burning dirty bunker fuels emit air pollutants that can lead to, or exacerbate, health problems like asthma, bronchitis, and lung cancer. Shoreside electrical connections can substitute for on-board generation of power while the ship is docked, substantially reducing this pollution. Many cruise lines have already begun to use shore power to reduce emissions.

Benefits of Shoreside Power

- **Greatly Reduced Toxic Emissions.** Implementation of shore power substantially reduces air pollution and the release of toxic contaminants. Power generation is also moved out of urban areas, further reducing Australians’ exposure to emissions. ***“It has been demonstrated that, in 10 hours of stop of a cruise ship its emissions drop from 1.47 to 0.04 tonnes of nitrogen oxide, and from 1.23 to 0.04 tonnes of sulphur oxide.”***² A reduction in these pollutants would improve the health of Sydney residents.
- **Improve Noise Pollution.** Shore to ship power removes substantial amounts of noise pollution. Current Sydney Ports Monitoring showed that 75% of observed ships at White Bay Cruise Terminal have breached noise limits. Noise breaches of up to 15db have been recorded, which is a noise 40 times as powerful as the mandated limit. Shore to Ship power would enable cruise ships to reduce engine noise and comply with noise regulation.

Availability

- **Shore to Ship Power is used in North America, Europe and Asia:** ***“this technology is already available in approximately 100 merchant berths worldwide”***³. The application of shore to ship power is also being examined for over an additional 100 berths. Also numerous Navies, including the Australian Navy employ shoreside power.
- **Ships visiting Sydney Harbour already have Shoreside power capabilities:** Multiple ships visiting Sydney are able to utilize Shoreside power, including the Oosterdam and Sun Princess who are scheduled to visit Sydney 10 and 17 times respectively in 2014.

Implementation

- **Installation of shore power in a few ships will cause a significant pollution reduction.** ***“The cruise ship berths are the most realistic targets for implementation of shore power in the near future, given their proximity to the city centre and the global tendency for cruise ships to use shore power. Two ships and one berth accounted for 42% of visits, and one of those ships accounting for 12% of visits, already has a shore power connection”***⁴. Upgrading an additional 7 ships would enable over 80% of all cruise ship visits to use shoreside power.

¹ Senator Barbara Boxer “Legislative Hearing on the Marine Vessel Emissions Reduction Act of 2007, S.1499. Thursday, February 14, 2008”

² Giulia Arduino, David Carrillo Murillo, Claudio Ferrari “KEY FACTORS AND BARRIERS TO THE ADOPTION OF COLD IRONING IN EUROPE”

³ On the MOS Way The progress of cold ironing worldwide <http://www.onthemosway.eu/blog/green-ports-and-green-shipping/2013/07/11/the-progress-of-cold-ironing-worldwide/#sthash.zMkL3ndv.dpuf>

⁴ Pae Holmes Potential Measures for Air Emissions from NSW Ports Preliminary Study - Prepared for the NSW office of Environment and Heritage 23 June 2011

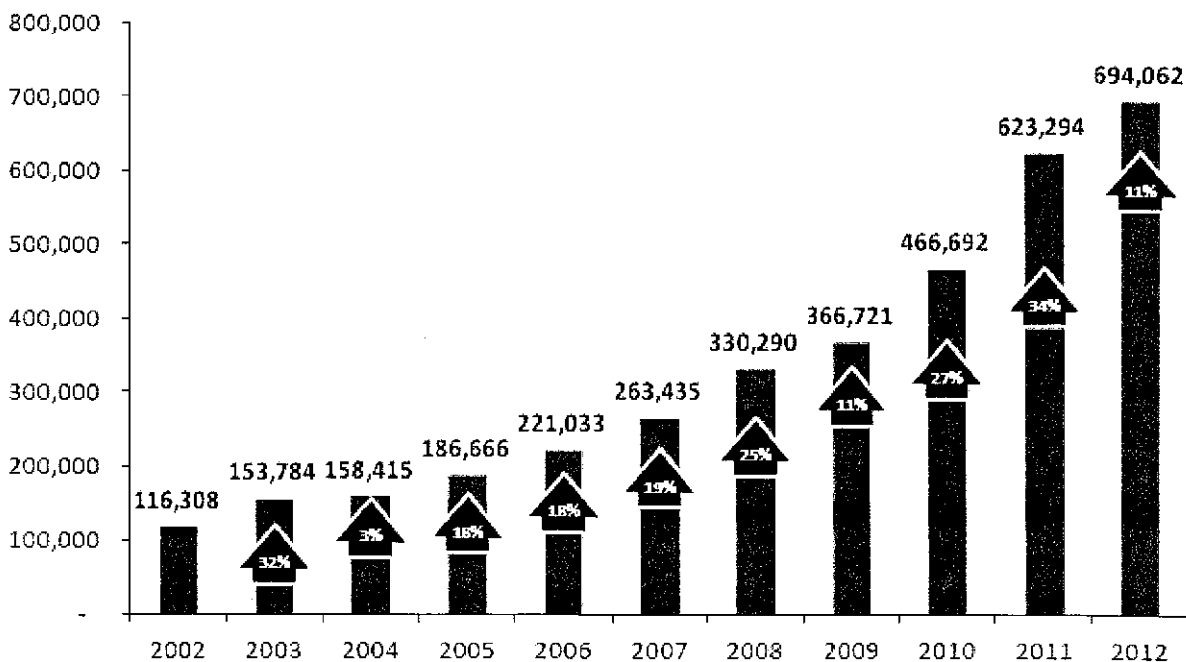
- **Carnival, the world's largest cruise firm uses Shoreside power:** Carnival operates 100 ships under 10 brands including Princess Cruises and Holland America. In 2009 Carnival stated *"Carnival has taken the lead in the cruise industry in developing shore power for cruise ships in Juneau, Alaska; Seattle, Washington; and Vancouver, British Columbia. Carnival is engaged in planning shore power in several other United States and European ports and participates in a working group that is establishing international standards for shore power."*⁵ Projects included building a shore to ship power facility for their ships in Seattle for \$1.7m US.⁶

COSTS

- **"Numerous feasibility studies have come to the outcome that cold ironing is financially feasible. The types of vessels that are more cost effective to implement shore power systems are the containerships and reefers and large scale passenger ships including cruise ships. Especially the last ones are the perfect candidate for provision of electrical power by shore sided systems due to the numerous calls on an annual basis and the powering needs while at berth... The benefits of plugging in the ships on-grid are indisputable for the local atmosphere. The environmental degradation of residential areas nearby ports is severe and directly linked to health hazards and cancer related diseases"**⁷

Industry Growth

Total passenger numbers 2002-2012



CLIA (Cruise Lines International Association, Australasia) Cruise Industry Report Australia 2012, available at www.cruising.org.au

- **More ships means more pollution:** The cruise ship industry in Australia is rapidly growing. Total passenger numbers in 2012, were 6 times 2002 numbers⁸. 275 Cruise Ships will visit Sydney Harbour in 2014⁹ increasing to 397 visits in 2017. Cruise ships are increasing in passenger capacity and engine size¹⁰. All this growth means an ever increasing amount of pollution will be released in Sydney Harbour.

⁵ Carnival Corporation Corporate Sustainability Summary 2009: Updated 29 April 2011 & PLC. p. 37 <http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9OTE1NjV8Q2hpbGRIRD0tMXxUeXBIPtM=&t=1>

⁶ C40 Cities Port of Seattle Cuts Vessel Emission by 29 percent Annually and Saves 26% on Energy Costs per Call. as http://www.c40.org/case_studies/port-of-seattle-cuts-vessel-emissions-by-29-annually-and-saves-26-on-energy-costs-per-call

⁷ PAPAOUTSOGLOU G. THEODOROS School of Naval Architecture & Marine Engineering

National Technical University of Athens A Cold Ironing Study on Modern Ports, Implementation and Benefits Thriving for Worldwide Ports 2012

⁸ CLIA (Cruise Lines International Association, Australasia) Cruise Industry Report Australia 2012, available at www.cruising.org.au

⁹ Sydney Ports Corporation Cruise Schedule, Last Accessed 31/1/2014 available at http://www.sydneyports.com.au/port_operations/cruise_schedule

¹⁰ Sea Cruise Down Under Report Economic Impact Assessment of the Cruise Shipping Industry in Australia 2013

Appendix – Health Impacts

Introduction

Cruise Ships in Sydney Harbour are generating large amounts of toxic pollution, damaging the health of residents. Cruise ships have large power requirements even when stationary and are burning dirty bunker fuel. This bunker fuel contains many contaminants including Sulphur Dioxide, Particulate Matter and Nitrogen Oxides. The health effects of these pollutants are serious and can cause premature death. Ultra low sulphur fuels and shore to ship power would substantially reduce these health impacts on Sydney residents. North America and Europe have recognised these risks and have already adopted widespread low emissions zones and started to implement shore power for ships.

Background

- Cruise ships consume large amounts of power whilst at port (unlike standard ships). While in port these ships generate an average of 11 megawatts an hour, enough to power over 14,000 Sydney homes¹
- 2,500 passengers and crew are carried by the average cruise ship
- Total passenger numbers in 2012, were 6 times 2002 numbers²
- 275 Cruise Ships will visit Sydney Harbour times in 2014³
- 84% of the passengers are Australian² - not international visitors
- Cruise ships are increasing in passenger capacity and engine size¹⁶
- The approval and construction of the White Bay terminal is the same as approving the construction of a power station in the centre of Sydney without the equivalent governing regulation, pollution controls and safety protocols.
- Sydney Residents are getting sick as a result of cruise ships emissions

Who is affected

- All Sydney residents are affected by Cruise Ship air pollution.
- Most affected are the residential areas of Balmain, Pyrmont, Rozelle, Glebe, and Lilyfield by the high volume of sulphur and particulate air pollution emanating from the newly established Cruise Ship terminal at White Bay 4 and 5.
- This terminal has been established in a residential area without proper regard for the massive power generation requirement for the Cruise Ships "Hotelling" needs while in port.

Health Impacts

There are very serious known health effects from these pollutants ranging from respiratory complaints, a number of different types of cancers through to premature death.^{10,11,12,13}

Sulphur dioxide (SO₂): Cruise ships in Sydney Harbour will release 500 tonnes of SO₂ (White Bay Cruise Terminal: 102 tonnes) whilst hotelling in 2014

- Sulphur dioxide is a toxic gas with a pungent, irritating and rotten smell. It can remain in the atmosphere for many days and combine with other pollutants creating acids and particulates. These particles penetrate deeply into sensitive parts of the lungs. Sulphur Dioxide and Particulates can persist in the atmosphere and be transported considerable distances. The effects of sulphur dioxide are felt very quickly and most people will feel the worst symptoms in 10 or 15 minutes after breathing it in.¹⁹
 - Health effects include
 - Bronchoconstriction
 - Increased asthma symptoms
 - Increased visits to emergency departments and hospital admissions
 - Respiratory illnesses
 - Emphysema
-

- Bronchitis,
- Can aggravate existing heart disease, leading premature death

Nitrogen Oxides (NOx): Cruise ships in Sydney Harbour will release 662 tonnes of NOx (White Bay Cruise Terminal: 136 tonnes) whilst hotelling in 2014

- NOx includes Nitric Oxide (NO) and Nitrogen dioxide (NO₂) and is a by-product of burning fossil fuels. NOx is also a key component to the formation of ozone and photochemical oxidants and react with ammonia, moisture, and other compounds to form small particles. These small particles penetrate deeply into sensitive parts of the lungs.
- Health effects include^{17,18}
 - Triggers asthma attacks
 - Effects breathing and the respiratory system
 - Damages lung tissue
 - Can cause or worsen emphysema and bronchitis
 - Aggravates existing heart disease
 - Can lead to increased hospital admissions and premature death

Particulate Matter (PM): Cruise ships in Sydney Harbour will release 51 tonnes of PM (White Bay Cruise Terminal: 11 tonnes) whilst hotelling in 2014

- Fine particulate matter (PM) include an range of tiny particles, including diesel exhaust, sulphates and nitrates for power plants and other fossil fuel combustion, smoke, and industrial soot. These particles can become embedded in the deepest recesses of the lung, disrupting cellular processes. Population-based studies in cities around the world have demonstrated a strong link between elevated levels of PM in the air and premature deaths, hospital admissions, emergency room visits, and asthma attacks.
- Health affects include
 - Aggravated asthma,
 - Decreased lung function
 - Irritation of the airways
 - Coughing or difficulty breathing
 - Nonfatal heart attacks
 - Premature death

Other Pollutants Include: Benzene, Toluene, Volatile Organic Compounds and formaldehyde (over 700 kg)

- Other pollutants from cruise ships are extremely deadly and many are class 1 carcinogens. Benzene is carcinogenic to humans, causes cancer and no safe level of exposure can be recommended by the world health organization (WHO). Airborne benzenes are associated with an excess lifetime risk of leukaemia.

Air Pollution

- Cruise ships burn dirty bunker oil full of pollutants called Residual Fuel Oil. This cheaper fuel can contain up to 3.5% (average 2.7%) sulphur whilst road diesel is limited to 0.001% 3,500 times larger (a 350,000% increase). It is a residual oil and releases many pollutants when burnt as shown below.

Cruise Ship Hotelling Pollution (2014)			
Pollutant (tonnes)	Other Sydney Terminals*	White Bay Cruise Terminal	Total Pollution
Oxides of Nitrogen	525.99	135.59	661.58
Sulfur Dioxide	397.18	102.38	499.56
Particulate Matter 10 µm	40.79	10.52	51.31
Particulate Matter 2.5 µm	39.36	10.15	49.51
Volatile Organic Compounds	13.60	3.51	17.10
Benzene	0.27	0.07	0.34
Toluene	0.27	0.07	0.34

*Overseas Passenger Terminal, Athol Bay and Point Piper

Bunker Fuel

- Bunker Fuel is a cheap dirty viscous residual oil containing many harmful chemicals
- It is estimated that 9,500 tonnes of bunker fuel will be consumed in 2014 by cruise ships whilst hotelling in Sydney Harbour
- Hotelling air pollution produces large amounts of toxins, even when compared to national car emissions
- A 2013 Toyota Land Cruiser Prado (diesel) can travel around the world and emit less sulphur dioxide than a larger cruise ship can emit in 1 second^{4,7,8,14}
- 22 million diesel cars will emit the same amount of sulphur over a year as the Cruise Ships hoteling in Sydney Harbour will in 2014¹⁵
- Cruise ship emissions are focused into single emission points, concentrating toxic air pollution amplifying health risks
- Emissions are released in the heart of Sydney, not diluted across a wider area
- One kilogram of bunker fuel contains more sulphur than 2.5 tonnes of road diesel

Environmental Effects

- Acid Rain is created when NO_x and SO₂ react with water in the atmosphere. This acid rain kills trees, and damages structures, peels paint, corrodes steel and erodes stone.
- These compounds reacts with volatile organic compounds in the atmosphere to create toxic particles

The Solution

- **Immediate use of Ultra Low Sulphur Fuels whilst maneuvering and docking in Sydney Harbour.** The reduction of sulphur in fuel will significantly reduce toxic emissions, in particular Sulphur Dioxide and Particulate Matter. Lower viscosity fuels also enable quicker starts, and when combined with shore power remove the requirement of spinning reserves. The benefits of low sulphur fuels are well recognised and documented and are required in North America and Northern Europe
- **Installation of Shore Power facilities at the terminal and on board visiting ships.** This removes the vast majority of pollution from ships whilst hotelling and has the following benefits
 - Major noise reduction (as current monitoring by Sydney Ports documents regular noise breaches of up to 15db, which is a noise 40 times as powerful as the mandated limit)
 - Major Air Pollution Reduction
 - Shore power can be cheaper than bunker fuel power

Conclusion

Immediate action is required. Residents are already sick from cruise ship air pollution. The use of ultra low sulphur fuels and the installation of shore power will substantially reduce the amount of Sulphur Dioxide, Particulate Matter, Nitrogen Oxides and other contaminants that Cruise Ships in Sydney Harbour are releasing. The health effects of these pollutants are serious and can cause premature death. North America and Europe have already recognised these risks and have already adopted widespread low emissions zones and started to implement shore power for ships. Our government must do the same.

Sources

- ¹ **ABS 2011 Census Data** *Average annual electricity consumption of electrified households in Sydney 2012* available at, 2/2/2014 http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/1GSYD
- ² **CLIA (Cruise Lines International Association, Australasia)** *Cruise Industry Report Australia 2012*, available at www.cruising.org.au
- ³ **Sydney Ports Corporation Cruise Schedule, Last Accessed 31/1/2014** available at http://www.sydneyports.com.au/port_operations/cruise_schedule
- ⁴ **National Pollutant Inventory, Australian Government, Department of the environment, Water, Heritage and the Arts** June 2008 – *Emission Estimation Technique Manual for Combustion Engines version 3.0*
- ⁵ **Sinclair Knight Merz** *White Bay Passenger Terminal Air Quality Assessment 2012 29 September*, Prepared for Sydney Ports.
- ⁶ **Page Holmes** *Potential Measures for the Air Emissions From NSW Ports Preliminary Study 2011* Prepared for the NSW office of Environment and Heritage
- ⁷ **MS Voyager of the Seas** http://en.wikipedia.org/wiki/MS_Voyager_of_the_Seas
- ⁸ **2013 Toyota Landcruiser Prado VX KDJ150R (Nov)** Redbook.com.au the Pricing Authority, <http://www.redbook.com.au/cars/research/used/details/2013-toyota-landcruiser-prado-kdj150r-686036?R=686036&Silo=spec&Vertical=car&Ridx=1&eapi=2>
- ⁹ **"Australian motorists drive an average 15,530km per year"** Source: Roy Morgan Single Source (Australia): March 2012 – February 2013, Australian Drivers n= 16,781 <http://www.roymorgan.com.au/findings/australian-moterists-drive-average-15530km-201305090702>
- ¹⁰ **Department of the Environment and Heritage, 2005 Sulphur dioxide (SO₂)** *Air quality fact sheet* <http://www.environment.gov.au/resource/sulphur-dioxide-so2>
- ¹¹ **By Roger Harrabin BBC environment correspondent** *EU faces ship clean-up call* <http://news.bbc.co.uk/2/hi/europe/3019686.stm>
- ¹² **The International Agency for Research on Cancer (IARC)** *WHO: Diesel Exhaust Causes Lung Cancer* <http://www.medpagetoday.com/HematologyOncology/OtherCancers/33226>
- ¹³ **European Study of Cohorts for Air Pollution Effects (ESCAPE)** *Air pollution and lung cancer incidence in 17 European cohorts: prospective analyses* <http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045%2813%2970279-1/abstract>
14. **National Pollutant Inventory, Australian Government, Department of the sustainability, environment, water, population and communities** 2012 – *Emission Estimation Technique Manual for Maritime operations Version 2.1*
- ¹⁵ **ABS 9309.0 - Motor Vehicle Census, Australia, 31 Jan 2013** <http://www.abs.gov.au/ausstats/abs@.nsf/mf/9309.0/>
- ¹⁶ **Sea Cruise Down Under Report** *Economic Impact Assessment of the Cruise Shipping Industry in Australia 2013*
- ¹⁷ **World Health Organisation** *WHO Air Quality Guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide (Global Update 2005) Summary of Risk Assessment*
- ¹⁸ **USEPA** *Health Effects of Nitrogen Dioxide* <http://www.epa.gov/air/nitrogenoxides/health.html>
- ¹⁹ **Australian Government Department of the Environment** *Sulphur Dioxide Air Quality Fact Sheet* <http://www.environment.gov.au/resource/sulphur-dioxide-so2>