Review of the Load-based Licensing Scheme

Issues paper

Published by:

NSW Environment Protection Authority (EPA)
59–61 Goulburn Street, Sydney
PO Box A290
Sydney South NSW 1232

Report pollution and environmental incidents
Environment Line: 131 555 (NSW only) or info@environment.nsw.gov.au
See also www.epa.nsw.gov.au/pollution

Phone: +61 2 9995 5000 (switchboard)
Phone: 131 555 (NSW only – environment information and publication requests)
Fax: +61 2 9995 5999
TTY users: phone 133 677, then ask for 131 555
Speak and listen users: phone 1300 555 727, then ask for 131 555

Email: info@environment.nsw.gov.au
Website: www.epa.nsw.gov.au

ISBN 978 1 76039 030 3
EPA 2015/0397

October 2016

Have your say

You are invited to provide a submission or comments on this issues paper. An overview is provided at the end of each major section or chapter, with focus questions to help you explore and frame your response to the options presented. Your feedback on any of the issues outlined in this issues paper is welcome, together with any other matters relevant to the scope of the review.

This issues paper is also available at:
www.epa.nsw.gov.au/licensing/lbl/lblreview.htm

Please provide your comments to the EPA by:

- Emailing LBL.Review@epa.nsw.gov.au
- Phoning 131 555
- Posting your submission to:

  LBL Review
  Regulatory Reform and Advice Branch
  Environment Protection Authority
  PO Box A290
  Sydney South NSW 1232

Submissions close at 5 pm on Friday 23 December 2016.

Abbreviations

AAQ NEPM	National Environment Protection (Ambient Air Quality) Measure
BOD	Biochemical oxygen demand*
CPI	Consumer price index
EET	Emission estimation technique
EPA	NSW Environment Protection Authority
FRT	Fee rate threshold
GMR	Greater Metropolitan Region
HRSTS	Hunter River salinity trading scheme
LBL	Load-based licensing
LCP	Load Calculation Protocol
LRA	Load reduction agreement
NEPM	National Environment Protection Measure
NPI	National Pollutant Inventory
NO_X	Nitrogen oxides*
OECD	Organisation for Economic Co-operation and Development
PCBs	Polychlorinated biphenyls*
PAHs	Polyaromatic hydrocarbons*
PFU	Pollutant fee unit
POEA Act	*Protection of the Environment Administration Act 1991*
POEO Act	*Protection of the Environment Operations Act 1997*
POEO General Regulation, the Regulation	Protection of the Environment Operations (General) Regulation 2009
$PM_{2.5}$	Particulate matter less than 2.5 µm in diameter
PM_{10}	Particulate matter less than 10 µm in diameter
PQL	Practical Quantitation Limit
PRP	Pollution reduction program
STS	Sewage treatment system
SO_X	Sulfur oxides*
TSS	Total suspended solids*
TRP	Technical Review Panel
VOCs	Volatile organic compounds*

*Defined in Schedule 2 of the POEO General Regulation

Contents

List of figures and tables

List of boxes

Executive summary

The NSW Environment Protection Authority (EPA) is seeking stakeholder feedback to inform a comprehensive review of the load-based licensing (LBL) scheme.

The LBL scheme aims to encourage cleaner production through the application of the 'polluter pays' principle that requires some environment protection licensees to pay part of their licence fees based on the load of certain air and water pollutants their activities release to the environment. By tying fees payable to pollutant loads, the scheme provides an ongoing economic incentive for licensees to improve their environmental performance beyond the levels required by regulation or licence conditions alone.

While air and water quality in NSW is generally good by world standards, there are still many challenges that require focussed attention. For example, while air quality overall has improved significantly since the 1980s, the levels of ground level ozone and particulates remain a concern to human health in some areas of the State. Water quality and the impacts of pollution on riverine aquatic ecosystems, particularly in the major rivers of the Murray–Darling Basin and in densely-populated coastal catchments, also remain of concern (EPA 2015a).

The LBL scheme plays an important complementary role within the EPA's wider regulatory and policy framework, which works together to protect and improve air and water quality in NSW by seeking to reduce industrial pollutant emissions.

This issues paper is one of the first steps in the LBL review process. Its purpose is to provide information about the performance of the LBL scheme and to seek stakeholders' feedback to inform the first comprehensive review of the scheme since its introduction in 1999. This paper does not seek to recommend specific changes to the LBL scheme or LBL fees, but rather looks at the scheme in detail, identifies a range of issues and various potential options for its improvement, and considers feedback already received, including a survey of LBL licensees.

The LBL scheme plays an important, complementary role within the EPA's wider regulatory and policy framework for managing pollutants, and is implemented under the *Protection of the Environment Operations Act 1997*, the Protection of the Environment Operations (General) Regulation 2009 (POEO General Regulation) and the Load Calculation Protocol (LCP). The review will have a strong focus on the aspects of the scheme that are set out in the POEO General Regulation and the LCP, as well as the scheme's operational elements.

A well-designed and effective LBL scheme will be environmentally beneficial, reasonable, equitable, clear, easy to use and administer, responsive, flexible, cost-effective and efficient. This issues paper includes an analysis of how effective LBL has been, using a range of indicators, including: the usefulness of pollution load data collected under LBL; the incentives LBL provides for harm reduction; trends in LBL emissions since the scheme began; fees paid for specific pollutants and whether these reflect the EPA's environmental priorities; feedback from LBL licensees; and a comparative review of similar schemes in other OECD jurisdictions. This analysis reveals pollutant trends that show overall, LBL licensees are releasing most assessable pollutants in lower quantities than eleven years ago, especially in critical zones. Liable LBL pollutant fees paid, however, show that some licensees may not currently have sufficient incentive to reduce discharges of some pollutants, including fine particulates (PM_{10}) to air, metals to water and biochemical oxygen demand (BOD) to water.

While not recommending specific changes to the LBL scheme, this paper includes a description of significant and complex environmental issues in NSW that a strengthened and better targeted load-based licensing scheme may help to address.

Feedback collected via a survey of licensees shows that 40% of respondents think that the scheme provides an incentive for them to improve their environmental performance, and 17% said it was a major driver for improvements they had made. But many licensees also

said that fees were too low to provide an adequate incentive for further pollutant reductions; for example, when compared with the cost of the upgrades needed to reduce emissions.

The comparative review revealed that the NSW LBL scheme is unique in its combination of pollutants targeted; the incentives it provides to reduce pollution; its flexibility; and its use of varying weightings to recognise the harmfulness of different pollutants and their relative impacts on specific receiving environments.

Since LBL is part of a broader regulatory framework, it is difficult to be definitive about the contribution LBL has made in achieving environmental improvements, providing incentives generally and implementing the polluter pays principle; however, while the analysis suggests there are a number of ways the scheme could potentially be improved, it also demonstrates that the scheme has provided effective incentives to many licensees to improve their environmental performance. As the LBL review progresses, the EPA will weigh up the potential environmental and health benefits associated with any proposal to improve the scheme with the potential costs of those changes and alternative approaches.

The issues paper goes on to consider a range of key elements of the LBL scheme in detail: assessable pollutants and whether the right pollutants are included; correct targeting of critical zones; inclusion of appropriate scheduled activities; and whether pollutant load limits are being used effectively. The effectiveness of LBL is further explored with a detailed look at fees and whether they provide the incentive needed for licensees to improve their environmental performance when compared to the costs of abatement and other possible approaches such as sustainable effluent reuse and green offsets.

Issues apart from LBL fees that affect costs and revenue are also considered in detail, such as ways to minimise compliance costs, how to improve load reduction agreements and how revenue generated under the LBL scheme could be ‘recycled’. Governance and administration issues including compliance assurance, administrative flexibility and the role of the LBL Technical Review Panel are also dealt with in detail.

The Load Calculation Protocol provides licensees with the prescribed techniques for estimating and reporting pollutant loads, and is the link between the legislative requirements of the POEO General Regulation and the information provided by licensees to the EPA annually. The EPA is aware of a number of issues with the LCP, primarily centred around its complexity, flexibility and currency, and various sections of this issues paper touch on specific changes that could be made to the LCP to increase the flexibility and responsiveness of the scheme and reduce compliance costs.

Elements of the LBL scheme are highly complex and a wide range of potential options for change are presented in this issues paper. Due to this complexity and the inter-dependence of many of the options put forward, this paper does not attempt to cost the various options or provide estimates of potential changes to LBL fees. Any future proposal to change the LBL scheme may have a compounding, discounting or neutral effect on fees for any particular sector or individual licensee, depending on the specific features of that proposal.

Each major topic covered in this issues paper is followed by an overview of the issues raised and any options for change presented. A series of focus questions are also provided to assist stakeholders to explore these options and frame their responses.

Following the close of the consultation period for this issues paper, the EPA will prepare a proposal paper for further public consultation that takes into account the comments and views received on the issues paper. That proposal paper would include more refined plans for any proposed improvements to the LBL scheme together with a cost benefit analysis and an assessment of the likely financial impacts on licensees. An assessment of the wider potential effects of the proposal, such as the impacts that may be felt by other industry sectors, would also be included where appropriate.

That paper will closely consider how all the elements of a revised scheme would fit together and complement the EPA's broader regulatory framework. The EPA will also consider whether transitional arrangements are needed to help licensees prepare for any changes.

The purpose of the LBL review is to ensure the scheme is fulfilling its potential in achieving emission reductions effectively and efficiently, and while this issues paper does not set out a proposal for change, it is the start of a genuine consultation process which it is hoped will garner substantial input from a wide range of stakeholders.

1. Purpose and overview

This chapter provides background information about the review of the EPA's Load-Based Licensing (LBL) scheme and this issues paper:

- Introduction and purpose of this issues paper
- Background to the LBL scheme
- Purpose and objectives of the LBL review
- Scope, deliverables and timeframes for the LBL review
- Structure of this issues paper
- Next step – Proposal paper.

1.1 Introduction and purpose of this issues paper

The NSW Environment Protection Authority's (EPA) is currently conducting the first comprehensive review of the load-based licensing (LBL) scheme since its introduction in 1999. The purpose of this issues paper is to provide information about the performance of the LBL scheme and to seek stakeholders' feedback to inform a comprehensive review of the scheme's efficiency and effectiveness to date. This paper does not seek to recommend specific changes to the LBL scheme nor LBL fees, but rather looks at the LBL scheme in detail, identifies a range of issues and various potential options for its improvement, considering feedback already received, including a survey of LBL licensees.

Elements of the LBL scheme are highly complex and a wide range of potential options for change are presented in this issues paper. Because the precise impact some of these options might have on the fee structure of the scheme is dependent on other potential amendments, the paper does not attempt to estimate potential changes to fees. Depending on the specific features of any future proposal to change the LBL scheme, there may be a compounding, discounting or neutral effect on fees for any particular sector or individual licensee.

Following the close of the consultation period, the EPA will prepare a proposal paper (see section 1.6 below) for further public consultation that takes into account the comments and views received on the issues paper.

1.2 Background to the LBL scheme

The LBL scheme aims to encourage cleaner production through a 'polluter pays' principle that requires some environment protection licensees to pay part of their licence fees based on the load of pollutants their activities release to the environment. By tying fees payable to pollutant loads, the scheme provides an ongoing economic incentive to achieve additional environmental outcomes to those required by regulation or licence conditions alone. The scheme is implemented under the *Protection of the Environment Operations Act 1997* (POEO Act), the Protection of the Environment Operations (General) Regulation 2009 (POEO General Regulation) and the Load Calculation Protocol (LCP). The scheme was introduced on 1 July 1999 and this is the first comprehensive review of its efficiency and effectiveness.

Chapter 2 of this issues paper gives a brief overview of how the LBL scheme works, with a more detailed overview available in a separate fact sheet: *NSW EPA's Load-based Licensing Scheme: Overview and facts about load-based licensing*. Appendix A outlines key changes made to the scheme since its introduction.

1.3 Purpose and objectives of the LBL review

The purpose of the LBL review is to ensure the scheme is fulfilling its potential in achieving emission reductions effectively and efficiently.

The objectives of the review are to:

- assess whether changes are needed to ensure the LBL scheme achieves its objectives as per clause 13 of the POEO General Regulation (see Box 1-1)
- improve the effectiveness of the LBL scheme in driving reductions in air and water pollutant emissions, where required
- improve the efficiency and ease of use of the LBL scheme for licensees and the EPA
- ensure the LBL scheme has a complete range of tools.

Box 1-1: Objectives of the LBL scheme as set out in clause 13 of the POEO General Regulation

(a) To provide incentives to reduce the load of pollutants emitted based on the polluter pays principle and to do so within an equitable framework.

(b) To reduce pollution (in particular, assessable pollutants) in a cost-effective and timely manner.

(c) To give industry incentives for ongoing improvements in environmental performance and the adoption of cleaner technologies.

(d) To provide incentives that are complementary to existing regulation and education programs for environment protection.

To support the review, the EPA has already sought to identify issues, trends and opportunities, via:

- a comparative review of similar load-based schemes in other Australian and international jurisdictions (see Section 3.7)
- an analysis of LBL emission and fee data, and National Pollutant Inventory data (see Section 3.4 and Section 3.5)
- a survey of LBL licensees (see Section 3.6), and
- a literature review analysing the costs and benefits of a selection of pollutant fees (see Section 4.3.1).

1.4 Scope, deliverables and timeframes for the LBL review

The scope of the review is broad and will cover consideration of:

- assessable pollutants – reduction in loads attributable to the scheme, fees paid for each pollutant, whether pollutants need to be added/subtracted from the scheme
- industries included in the scheme and whether additional industries should be subject to the scheme or some removed
- effectiveness of the mechanisms that address the relative environmental impact of emissions in general or where they are released into a specific area/type of receiving environment (e.g. critical zones and pollutant weightings)
- effectiveness of other aspects of the scheme and whether they are duplicative or in conflict with other parts of the POEO regulatory framework

- complexity of the scheme and fee formula and whether it efficiently adopts a polluter pays approach
- ease of use, efficiency, transparency and costs of the scheme for licensees and the EPA
- effectiveness of the scheme tools to assist LBL licensees to reduce their loads of assessable pollutants, and
- role and function of the Technical Review Panel.

The review will have a strong focus on the aspects of the scheme that are set out in the POEO General Regulation and the LCP, and the operational elements of the scheme. The review may also recommend further investigations that might be conducted to improve the scheme in the longer term. The key deliverables of the review are described in the Table 1.1.

Table 1-1: Key deliverables of the LBL review

Deliverable	Purpose	Public consultation
1. Issues Paper	To provide information about the performance of the LBL scheme and to seek stakeholders' feedback on a range of issues and options for improving the scheme.	Yes
2. Proposal paper	To present and consult on a specific proposal (a combination of potential changes) for improving the LBL scheme, taking into account the results of public consultation on the issues paper.	Yes
3. Report on the review	To present the outcomes of the review including the results of consultation and a description of any recommended changes to the Regulation and Load Calculation Protocol.	Yes – as a package.
4. Amendment Regulation	Technical amendments to the Regulation and Load Calculation Protocol to implement any proposed changes to the LBL scheme.	
5. Updated Load Calculation Protocol.		

The review process and anticipated timeframes are outlined Figure 1-1 below.

Check the EPA's LBL Review webpage at www.epa.nsw.gov.au/licensing/lbl/lblreview.htm for updates on the review process.

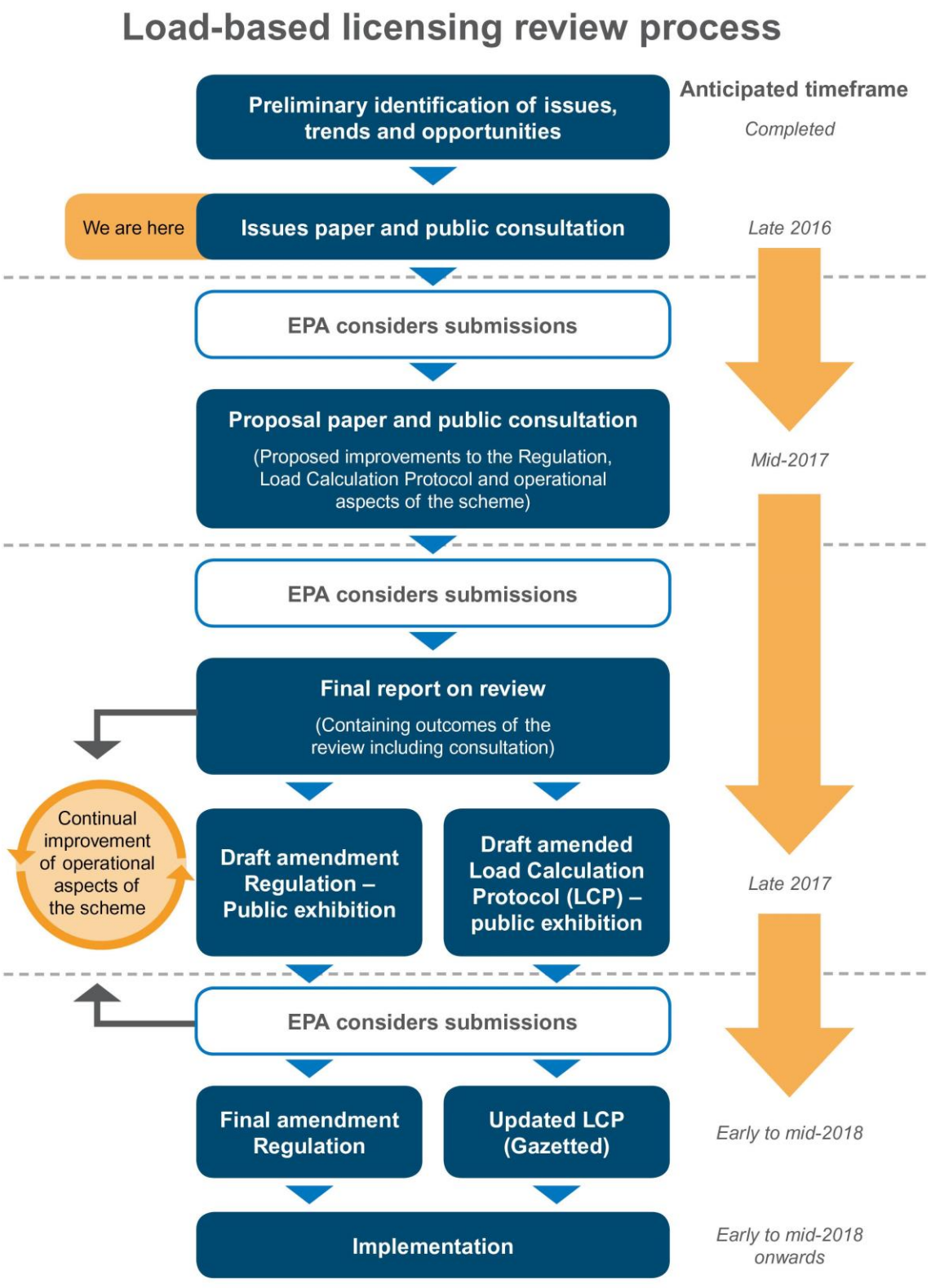

Figure 1-1: The LBL review process

1.5 Structure of this issues paper

This issues paper is structured as follows:

1. **Purpose and overview of the review**
2. **How was LBL intended to work?** – the role of LBL, its place in the regulatory framework and future directions
3. **How effective has LBL been?** – the effectiveness of the scheme and how the review is seeking to improve it
4. **Review of specific elements and issues** – specific elements of the scheme in detail and options for improving the effectiveness of these elements

Appendix A: Key changes to the LBL scheme – a list of the main changes to the scheme since its implementation

Appendix B: 2014 Comparative Review of Load-Based Licensing Fee Systems – a summary of the key issues and findings of a review of load-based licensing schemes in OECD jurisdictions, conducted by BDA Group on behalf of the EPA

Appendix C: 2014 Industry LBL Survey – an overview of the survey and its results

Appendix D: Further Information on Particulates – provides further information on particulate emissions to air

Appendix E: Data for selected charts – data tables for certain complex charts shown in the issues paper.

1.6 Next step – Proposal paper

The EPA will consider the results of consultation on this issues paper and develop a proposal paper for further public consultation. That proposal paper would set out any proposed improvements to the LBL scheme (a proposal), arising through the review.

A cost benefit analysis would be included with the proposal paper that considers the likely changes in a range of costs, including environmental damage costs, abatement costs, compliance costs and administrative and regulatory costs.

The proposal paper would also include an assessment of the likely financial impacts on licensees (e.g. the likely changes to liable LBL fees by industry sector) and an assessment of the wider potential effects of the proposal, such as the impacts that may be felt by other industry sectors, where appropriate.

The EPA will ensure that any proposed improvements to the LBL scheme complement the EPA's broader regulatory framework for protecting the environment.

While preparing the proposal, the EPA will also consider the need for transitional arrangements. For example, where the proposed changes to the scheme are likely to have a significant financial impact on licensees or particular premises, the EPA may consider a staged introduction of some aspects of the new LBL requirements to give those licensees adequate time to prepare for the change. This is consistent with the approach taken when the LBL scheme was first introduced.

2. How was LBL intended to work?

This chapter outlines the original intentions of the LBL scheme and how it relates to other aspects of the EPA's regulatory framework:

- The EPA's regulatory framework
- Using economic incentives to reduce emissions
- The original intent of the LBL scheme

2.1 Introduction

The LBL scheme is a key component of the EPA's regulatory framework. The various components of this framework are designed to complement each other in a way that protects the environment while allowing flexibility (the right mix of approaches can be used for each set of circumstances), but also minimises the administrative burden and cost of regulation to industry and government. The original intention behind the introduction of LBL is best understood when viewed within this wider context, as a complementary tool in the EPA's regulatory framework (described below).

2.2 The EPA's regulatory framework

The EPA uses many regulatory approaches and tools to regulate industrial activities and promote emission reductions. These include legislation, economic incentives, policy, education, licensing, investigation, and compliance and enforcement action, all working together as illustrated in Figure 2-1.

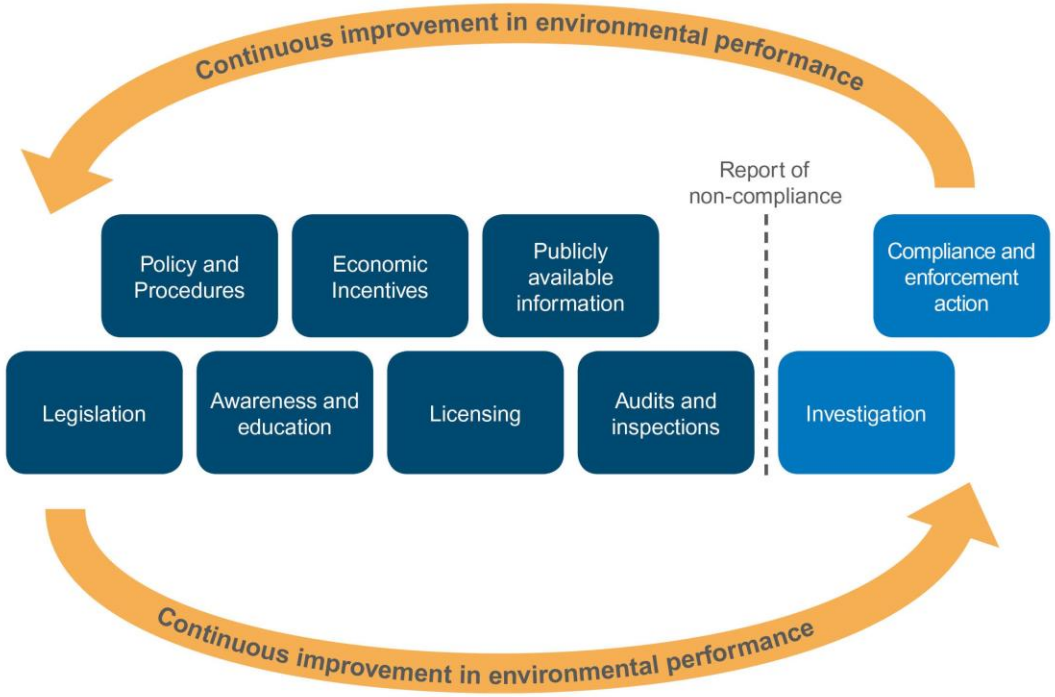

Figure 2-1: How the components of the EPA's regulatory framework work together

The EPA uses relevant **legislation** to actively promote compliance and deliver improved environmental outcomes by assisting those it regulates to understand their legislative obligations.

Clear and appropriate **policy and procedures** underpin and guide EPA regulatory decisions, approaches and strategic directions.

The EPA uses proactive **awareness and education programs** to increase industry and community understanding of environmental issues and improve compliance with environment protection regulation. Education and communication approaches are tailored to the needs of sometimes diverse industry sectors.

The EPA uses a range of **economic incentives** such as levies, trading schemes, and pollutant load fees to encourage waste avoidance and resource recovery, regulate timing and quantity of discharges, and reduce air and water emissions. Pollutant load fees are an important tool in the LBL scheme (see Section 2.4 below), designed to complement the EPA's other regulatory approaches to reducing pollution.

Environment protection **licensing** sets out the environmental performance required of those licensed (e.g. through the use of pollutant concentration limits, pollution reduction programs and other licence conditions), and enables this performance to be regularly monitored, analysed and reported. Licensing also includes **risk-based licensing**, discussed in Section 2.3 below.

Publicly available information (such as several online public registers maintained by the EPA) creates accountability by providing information about specific companies, circumstances or events, such as environment protection measures and regulatory actions.

The EPA uses **audits and inspections** to assess compliance and the environmental performance of individual operators or industry sectors. Tools include: comprehensive compliance audits; statewide strategic environmental compliance and performance reviews; focused compliance audits and routine site inspections.

Investigations conducted by the EPA are a key means of assessing reported or detected incidents of alleged environmental harm or other breaches of legislation, and of determining priorities for further compliance and enforcement action.

The EPA uses a variety of **compliance and enforcement actions** to address environmental concerns and non-compliances. These range from advisory letters and formal warnings, to variation, suspension or cancellation of regulatory instruments, to penalty notices and prosecution.

For more information about any of these elements, refer to the EPA's Compliance Policy (EPA 2013a) or the EPA website: www.epa.nsw.gov.au.

2.3 Using economic incentives to improve performance

One of the benefits of economic incentives (or market-based instruments) as a form of environmental regulation is that they have the potential to provide greater flexibility and to reduce emissions at substantially lower cost than the traditional command-and-control approach to regulation (USEPA 2003, Tietenberg 2006).

2.3.1 Risk-based licensing and load-based licensing

For the purposes of risk-based licensing, the EPA is currently undertaking a risk assessment of all licensed premises, considering both day-to-day operations and also the potential for pollution incident risk. This will allow the EPA to better target regulatory efforts towards high-risk and poor-performing licensees. Risk-based licensing also considers a licensee's environmental performance in the calculation of its administrative fee, taking into account the licensee's compliance history and any regulatory actions taken by the EPA. It also

recognises environmental management systems and practices and environmental improvements put in place by the licensee to reduce environmental risk.

LBL and risk-based licensing both provide economic incentives, although their roles are quite different. LBL is intended to provide a financial incentive to licensees to reduce the loads (and impact) of the pollution they discharge to the environment. It is also designed to allow the EPA to minimise and manage the potential development of cumulative impacts. Risk-based licensing on the other hand provides a financial incentive for licensees to improve their performance, and subsequently minimise their facilities' environmental risk profile[1]. The licence administration fee also ensures that licensees requiring the greatest regulatory effort bear the cost of that regulation.

Fees paid under LBL and risk-based licensing do not overlap because they cover different matters; however, the EPA will be mindful of the potential for 'double-dipping' as the LBL scheme is reviewed. It is possible for a licensee to receive a legitimate reduction in both their administration fee and the level of pollutant load fees they are liable for if they put in place an environmental improvement program that is not a requirement of their licence, and the same program leads to a reduction in loads of assessable pollutants.

Box 2-1: What are 'cumulative impacts'?

'Cumulative impacts' or 'cumulative effects' have been defined as 'the net result of environmental impact from a number of projects and activities' (Sadler 1996).

Cumulative impacts can result from actions that individually may be minor, but collectively could result in significant changes to the environment or communities.

2.3.2 Emission trading schemes and green offsets

The POEO Act also includes provisions to enable the development of tradeable emission schemes (Part 9.3A) and green offset schemes and works (Part 9.3B), which are other potential economic incentives available to the EPA for use in specific circumstances. The Hunter River Salinity Trading Scheme (HRSTS) is an example of an emissions trading scheme implemented by the EPA. In this case, the scheme aims to improve and maintain the health of a specific waterway.

It is anticipated that this review will result in improvements to the way pollution data is collected and reported for the LBL scheme (see Section 4.5.1), and that this will create a stronger base of pollution data that can be used to help identify the need for, and develop and implement future green offset works and schemes and trading schemes.

If any green offset schemes or pollution trading schemes (or other market-based approaches) are developed in the future, the LBL scheme may need to be modified to provide appropriate discounts to participants in those schemes. This would ensure the incentives do not duplicate each other; and more importantly that licensees are not required to pay twice for the same load of pollutants discharged to the environment. This is the case in the Hunter, where participants in the HRSTS who are also subject to LBL are given a discount on their assessable loads of salt emissions to the Hunter River. Issues with the uptake of green offset works to reduce pollutant fee under the LBL scheme are discussed in Section 4.3.6.

[1] A facility's risk profile is based on an assessment of air, water and noise impacts and the potential for a pollution incident to occur.

2.4 The original intent of the LBL scheme

The LBL scheme was introduced to encourage cleaner production by applying the 'polluter pays' principle, defined as 'requiring those who generate pollution and waste to bear the cost of containment, avoidance or abatement'[2]. LBL was intended to provide a financial incentive to licensees to improve their environmental performance beyond statutory limits and other requirements; to **move them beyond compliance**. LBL is designed to complement traditional regulatory approaches to environmental protection. LBL is implemented under the POEO Act, the POEO General Regulation and the Load Calculation Protocol (LCP) – for further information about this, refer to: *NSW EPA's Load-based Licensing Scheme: Overview and facts about load-based licensing*. The specific objectives of the LBL scheme are set out in the POEO General Regulation and reproduced in Box 1-1.

The original Regulatory Impact Statement (EPA 1998) for the LBL scheme and the Minister's Second Reading Speech[3] set out the intent and key features of the LBL scheme, including:

- provide a framework for managing cumulative impacts of pollution (see Box 2-1 above)
- provide a financial incentive for licensees to improve their environmental performance beyond statutory limits and other requirements; to move them beyond compliance
- better protect the environment while allowing industry the flexibility to find low-cost methods of pollution reduction
- distribute fees equitably to help ensure fair competition and equal treatment under the law
- increase public transparency with the reporting of pollutant loads
- eventually apply LBL fees to more (or all) licensees as suitable load calculation techniques were finalised
- increase LBL fees over time to fully implement the polluter pays principle
- increase the use of load limits on licences over time, to better control cumulative impacts
- use LBL as an administrative platform to implement a range of emission trading schemes.

In general, LBL operates at a different level to other tools that might be applied to protect against acute and localised impacts, such as pollutant concentration limits and other licence conditions. LBL assists the management of impacts which cover a broader area, such as airsheds, regions, or waterways. Aspects of the scheme such as critical zones, enable emission reduction incentives to be tailored to the specific pollutants of most concern for an area, thereby helping to manage the development of cumulative impacts. The use of a critical zone weighting of seven for volatile organic compounds (VOCs) in the Sydney airshed is a good example of this.

LBL is only one of the tools the EPA uses to regulate industrial activities and to promote emission reductions. It was never intended to be a standalone mechanism for controlling pollution emissions in NSW, but rather to complement the range of regulatory approaches and tools at the EPA's disposal. For example, in addition to matters like licence and statutory limits, LBL fees are one of the factors that licensees consider when determining the need for plant upgrades. LBL fees change the economics of these decisions and provide an incentive for licensees to implement plant improvements sooner than they may have otherwise if LBL fees were not part of the equation. An example of this is described in Box 4-4.

[2] See section 6(2)(d)(i) of the *Protection of the Environment Administration Act 1991* (POEA Act).

[3] See NSW Hansard, Legislative Assembly, 13 November 1997, Ms Allan (Blacktown – Minister for the Environment) Pollution Control Amendment (Load-Based Licensing) Bill.

3. How effective has LBL been?

This chapter examines the effectiveness of the LBL scheme by considering the following:

- The usefulness of pollution load data
- Incentives for harm reduction
- What do emission trends suggest?
- What does the LBL fee data suggest?
- What are LBL licensees saying?
- How does the LBL scheme compare to similar schemes?
- Can LBL's cost-effectiveness be determined?
- How could better targeting improve the scheme's effectiveness?

3.1 Introduction

A review of LBL-like incentive schemes (Section 3.7) revealed that measuring reductions in pollution attributable to such schemes is difficult. The EPA is considering LBL's effectiveness by looking at a range of indicators:

- the usefulness of pollution load data
- incentives for harm reduction
- trends in LBL emissions since the scheme commenced
- trends in non-LBL emissions compared with LBL emissions
- fees paid for specific pollutants under a number of scenarios and the extent to which they reflect the EPA's priorities for improving environmental performance
- feedback from LBL licensees on whether the scheme provides incentives to improve
- how the NSW LBL scheme compares to similar schemes in other OECD jurisdictions
- cost-effectiveness, including net public benefits.

3.2 The usefulness of pollution load data

Along with the National Pollutant Inventory (NPI) which was introduced around the same time, the introduction of the LBL scheme created a new requirement for industry to estimate pollutant loads emitted to the environment, which are published on the EPA's public register. This data has:

- helped industry to better identify and characterise significant sources of pollution and has facilitated improved processes (e.g. see Box 3-1 below)
- assisted government decision-making, by providing the EPA with information about trends in pollution, the spatial exposure of populations and the change in pollution intensity for various industries
- along with NPI data, informed the wider community, who now have access to information about pollution in their local area. The LBL industry survey (Section 3.6) confirmed that one of the key drivers for pollution load reductions over time was a desire to improve the organisation's reputation as a good corporate citizen (36.7%).

Box 3-1: Reduced NO_X emissions from a Sydney-based licensee

A licensee in the Sydney basin operates three large gas-fired boilers.

As a result of load-based licensing, the licensee installed continuous emissions monitoring systems to directly measure its NO_X loads to air. This monitoring identified that three identical boilers were emitting significantly different NO_X concentrations.

Once alerted to the issue, the licensee used the monitoring systems to identify when and why these differences were occurring. They subsequently upgraded the burners in the two boilers with higher NO_X emissions, leading to both reduced NO_X emissions from the site and reduced natural gas consumption – saving money and improving performance.

3.3 Incentives for harm reduction

LBL recognises that some methods of pollution load management can reduce environmental harm by sustainably using the pollutant load as a resource, e.g. nutrients in agricultural applications. Licensees are given incentives to apply such methods through 'load weighting' factors that reduce fees. In many cases, these methods achieve superior environmental protection at much lower cost than the sophisticated treatment technologies that would be used to meet traditional requirements.

One method of harm reduction currently eligible for discounts is **effluent reuse**. The sustainable reuse of treated wastewater, to irrigate crops or in industrial processes (e.g. cooling water), can reduce liable fees on assessable pollutants in that effluent, provided strict environmental management criteria and other regulatory requirements are met. The effluent can be reused where it was generated or transferred for reuse beyond the licensed premises. See Section 4.3.6 for a discussion of weighted loads for effluent reuse.

3.4 What do emission trends suggest?

Trends in pollution over time can provide an indication of how effective the LBL scheme has been. The EPA has undertaken an analysis of emission loads reported to LBL and the NPI over the eleven years from 2003–04 to 2013–14[4]. A review of trends in this data shows that LBL licensees are releasing most assessable pollutants in lower quantities than eleven years ago when considered as total loads release across NSW as a whole.

3.4.1 Trends in LBL air emissions

Trends in total loads emitted to the NSW environment for the majority of LBL assessable air pollutants were stable or trending downwards over the eleven years from 2003–04 to 2013–14. Notable changes include:

- loads of benzene, fine particulates (PM_{10}), coarse particulates and VOCs decreased by more than 50%
- loads of SO_X, benzo(a)pyrene equivalent and hydrogen sulfide decreased by 20–50%, and
- loads of fluoride increased by 21% (due mainly to increases in reported emissions from the electricity generation sector).

Figure 3-1 shows linear trends for various assessable air pollutant emissions under the LBL scheme from 2003–04 to 2013–14. The top chart shows a downward trend for all LBL emissions to air combined, followed by charts for individual air pollutants, grouped according to the levels at which they are generally discharged (in kg/year). A different y-axis scale is used for each group, in order to reveal the trend for every pollutant type, even those which are found at much lower concentrations. For example, NO_X and SO_X are emitted in significantly larger quantities than other pollutants, so they are shown in a chart with a larger

[4] The NPI data used in this paper is based on revised data released by the Australian Government on 15 April 2016.

kg/year emission scale. For simplicity, rather than plotting each data point (as shown in the top 'overall' chart) the charts for individual pollutants show only basic linear trends.

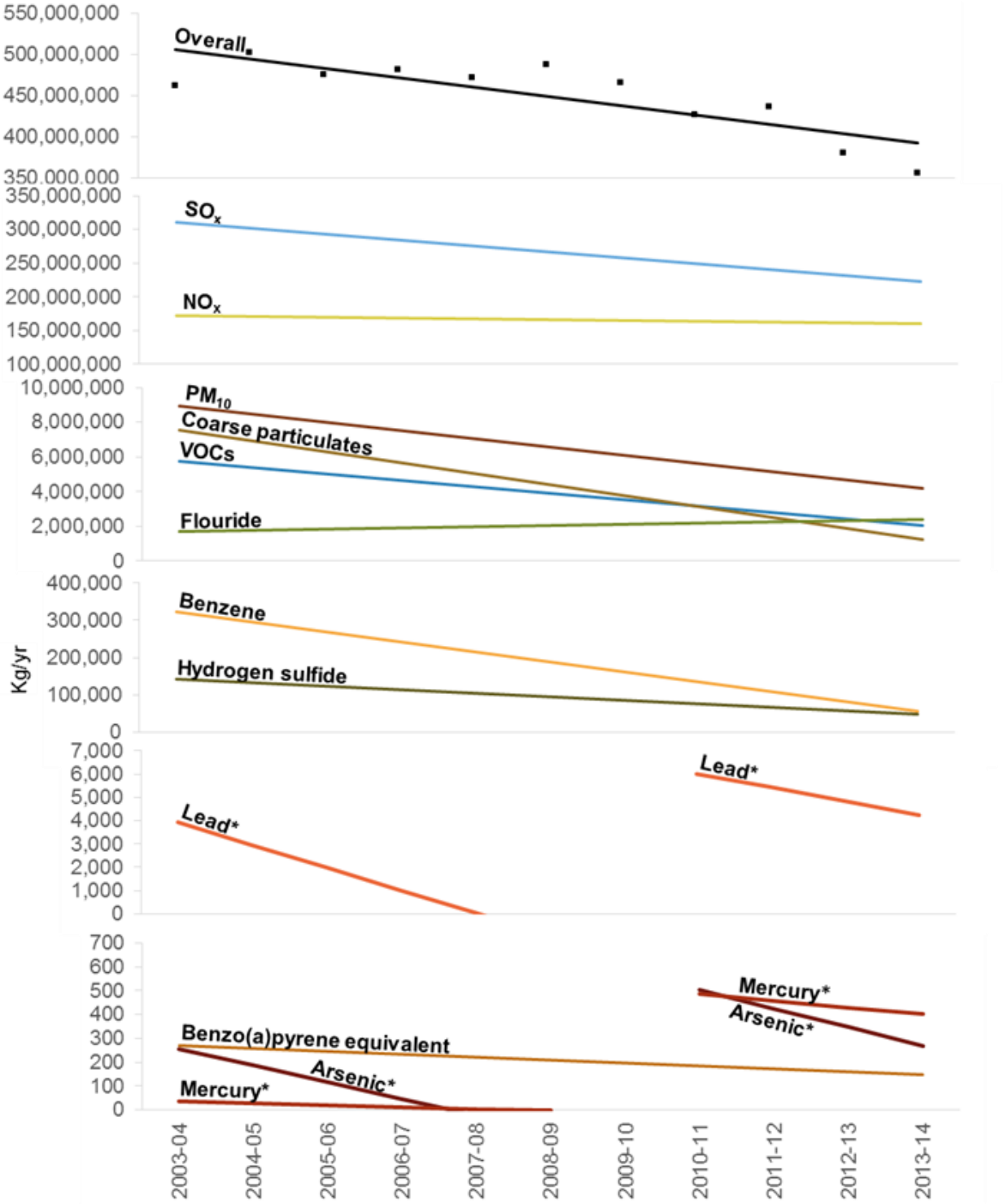

Figure 3-1: Emissions of LBL assessable air pollutants in NSW from 2003–04 to 2013-14, by mass (linear trend lines)

* The changes in lead, mercury and arsenic emissions shown are strongly influenced by two things: closure of the Pasminco Cockle Creek Smelter in Boolaroo in 2003–04 and a 2009 amendment to the POEO General Regulation that added arsenic, lead and mercury as assessable air pollutants to additional scheduled activities. Data for these pollutants is incomplete for 2009–10 due to variations in licensees' anniversary dates; therefore the three 2009–10 data points have been excluded from the charts.

3.4.2 Trends in LBL water emissions

Trends in total loads discharged to NSW waterways for LBL assessable water pollutants were more varied over the eleven years from 2003–04 to 2013–14. Notable changes include:

- loads of arsenic, cadmium, 'pesticides and PCBs' and selenium decreased by over 60%
- a slightly increasing trend in combined water emissions, driven mainly by increases in biochemical oxygen demand (BOD) (9% increase) and nitrogen (8%), and
- a slight increasing trend was also evident in loads of some pollutants emitted in smaller quantities including mercury, oil and grease and phenolics.

Note: Load increases were predominately from sewage treatment systems and are related to growing populations in NSW coastal cities. The increasing trend in phenolics is due to production increases in the 'petroleum and fuel production'[5] activity groupings in 2012–13.

Linear trends for these emissions can be seen in Figure 3-2. Again, the charts use different scale ranges for the annual loads discharged to allow the trends of the pollutants with smaller loads to be seen more clearly. For example, nitrogen, TSS and BOD are emitted in significantly larger quantities than other pollutants, so they are shown with a larger kg/pa emission scale. For simplicity, rather than plotting each data point as shown in the top 'overall' chart, the charts for individual pollutants show only basic linear trends.

3.4.3 Trends in critical zones

While trends show that LBL assessable pollution emissions have dropped across NSW generally, in some areas emissions from LBL licensees have remained relatively stable and in others emissions have decreased significantly. Decreases in VOC emissions to air, and salt and nutrient emissions to water are more evident in areas where LBL fees are proportionately higher due to critical zone weightings, than in unweighted areas. More detailed data on LBL emissions to air and water in critical zones is presented in Section 4.2.2.

This contrast in emission trends between the highly weighted and unweighted critical zones suggests that the resulting higher fee payable on emissions in these zones is providing LBL licensees in these areas with additional incentives to improve their performance.

[5] Note: The classification of the 'petroleum and fuel production' scheduled activity grouping changed in 2014 (see Appendix A).

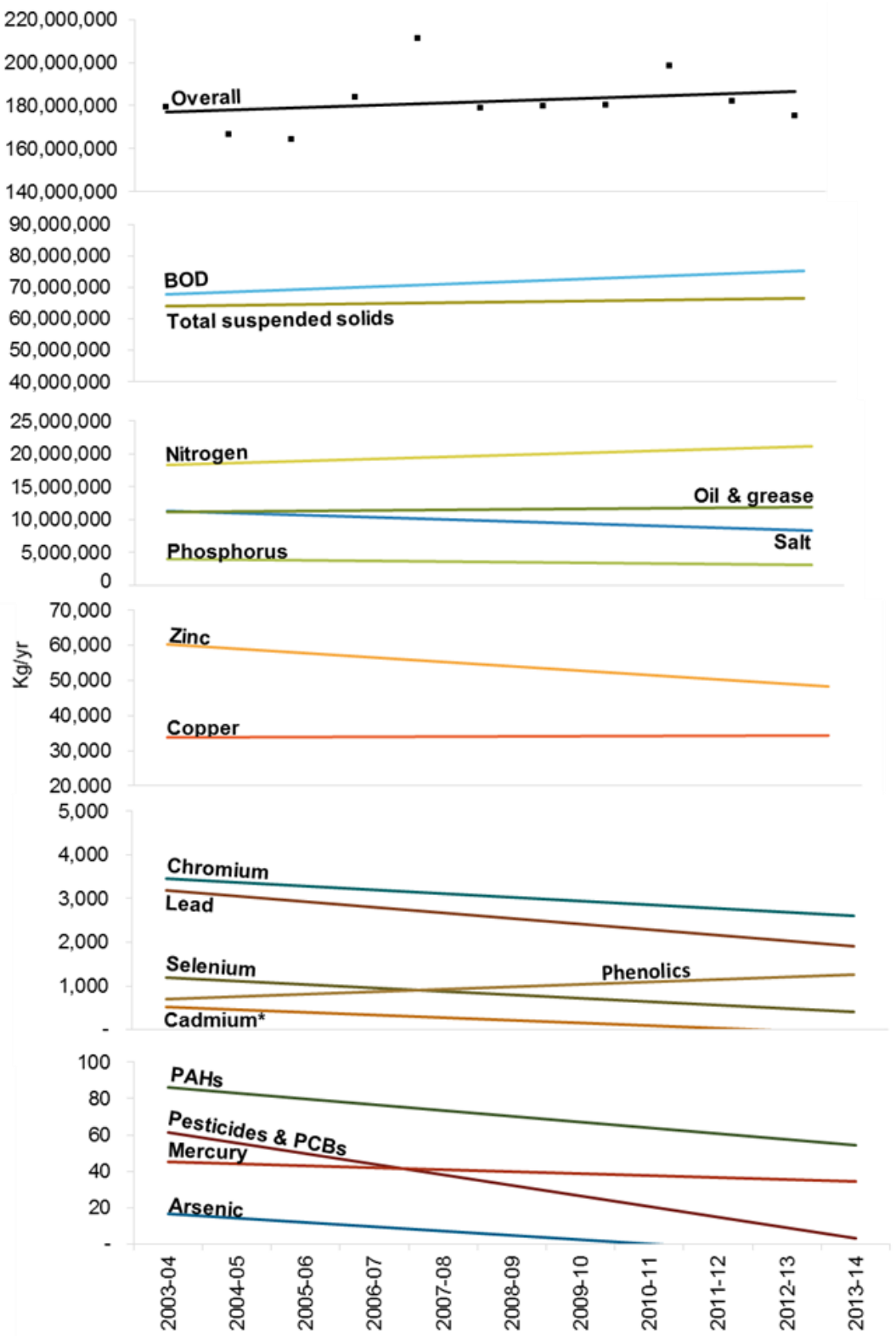

Figure 3-2: Emissions of LBL assessable water pollutants in NSW from 2003–04 to 2013-14, by mass (linear trend lines)

*Please note that while the cadmium line trends to zero in 2011–12, 2012–13 and 2010–14, the actual loads reported for these years were 71 kg, 67 kg and 72kg respectively.

3.4.4 Emission intensity

The NSW economy has been growing over the last eleven years and production levels have fluctuated (influenced for example by the global financial crisis). The population of NSW has increased by 11.9% from 6.6 million people in June 2003 to 7.5 million people in June 2014.

The change in 'emission intensity' over time is a useful indicator of the performance of an industrial facility with respect to emissions (and other regulatory approaches). The emission intensity of an activity measures the amount of pollution per unit of production. So for example, many 'sewage treatment system' activities have been servicing an increasing population and treating an increasing quantity of sewage; however, as discussed above, these plants have generally been reducing the loads of LBL assessable pollutants they discharge to the environment. Even where loads have been stable, the emission intensity has reduced due to the increased population being serviced, i.e. kilograms per 1000 people.

The extent to which this improved performance is due to licence requirements, other regulatory approaches or LBL specifically cannot easily be determined. For example, some environmental improvements are made by licensees for non-LBL related reasons (e.g. to meet regulatory standards, to replace worn out equipment) but have a spin-off effect of lowering licence fees as pollution is reduced. In such a case, the LBL scheme may not have been the catalyst for change, but it may have provided an additional economic incentive for the licensee to proceed. It would be difficult to 'rate' what contribution the LBL scheme made in such cases, as it was only one of a number of contributing factors.

While it is not possible to directly correlate changes in emissions to changes in industrial activity, Figure 3-3 below, from the 2012 State of the Environment Report (EPA 2012a) compares pollution loads to a number of indicators of industrial and commercial activity and pressures such as changing population and energy consumption, over the period 1992–2008. The report found that 'emissions of NO_X steadily increased by 32% across the GMR [Greater Metropolitan Region] between 1992 and 2008, similar to the rate of increase in energy consumption which is mostly supplied from coal-fired power stations. Between 1992 and 2008, emissions of PM_{10} have risen increasingly quickly in the region by 48% overall, largely due to increased coal mining. Emissions of VOCs in the GMR decreased overall by 6% '.

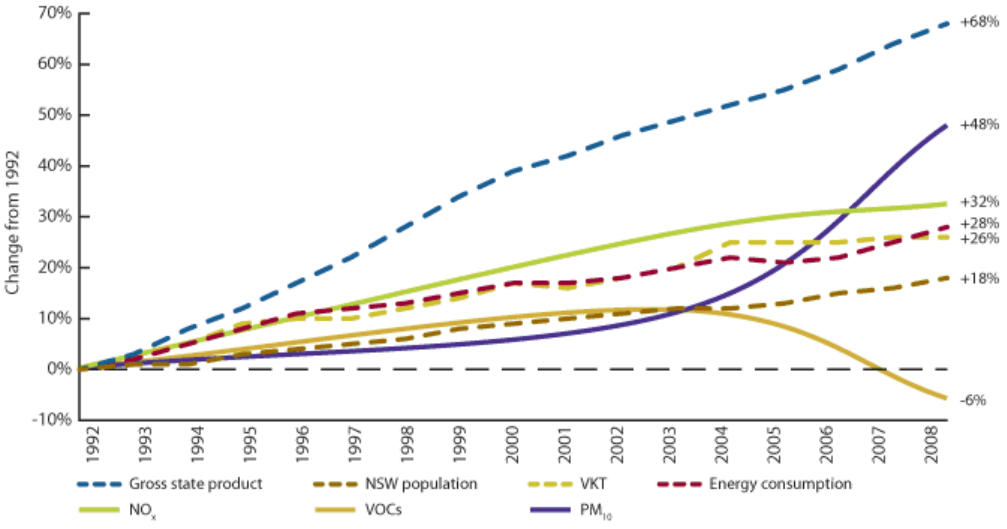

Figure 3-3: Trends in air emissions in the GMR[6] from 1992–2008, compared with key NSW statistics

Source: Figure is from the 2012 NSW State of the Environment Report (EPA 2012a). Sources cited in 2012a: ABS 2009; ABS 2010; ABARES 2011; BITRE 2011; EPA 2012b.

[6] The definition of GMR in relation to Figure 3-3 is: the areas of NSW having Australian Map Grid (AMG) coordinates at the south-west corner at (Easting: 21000, Northing: 6159000, Zone 56) and north-east corner at (Easting: 420000, Northing: 64320000, Zone 56).

3.4.5 If LBL pollutant loads are decreasing, what does this mean for the future of the LBL scheme?

NSW still has many **significant and complex environmental issues** that a strengthened and better targeted LBL scheme may help to address. The following outlines how standard regulatory approaches are producing diminishing returns and cumulative impacts are expected to develop or worsen unless new complementary environment protection measures are put into place.

Increasing loads of PM_{10} emitted to air from mining

Total loads of LBL assessable pollutants emitted to NSW from LBL premises have generally been reducing over the last eleven years (see Figure 3-1 and Figure 3-2); however, this is not the whole picture. Other data sets illustrate that emissions from some industrial activities are growing significantly and suggest that cumulative impacts have developed in specific geographic areas. For example, while PM_{10} emissions to air from LBL premises decreased from 2003–04 to 2013–14, NPI data from 2009–10 to 2012–13 shows an increase in PM_{10} from mining; coal mining in particular, with a small decrease in PM_{10} emissions in 2013–14 (see Figure 3-4 below and Figure 4-1). Mining is not currently captured by the LBL scheme, so these emissions are not reflected in the LBL trend data.

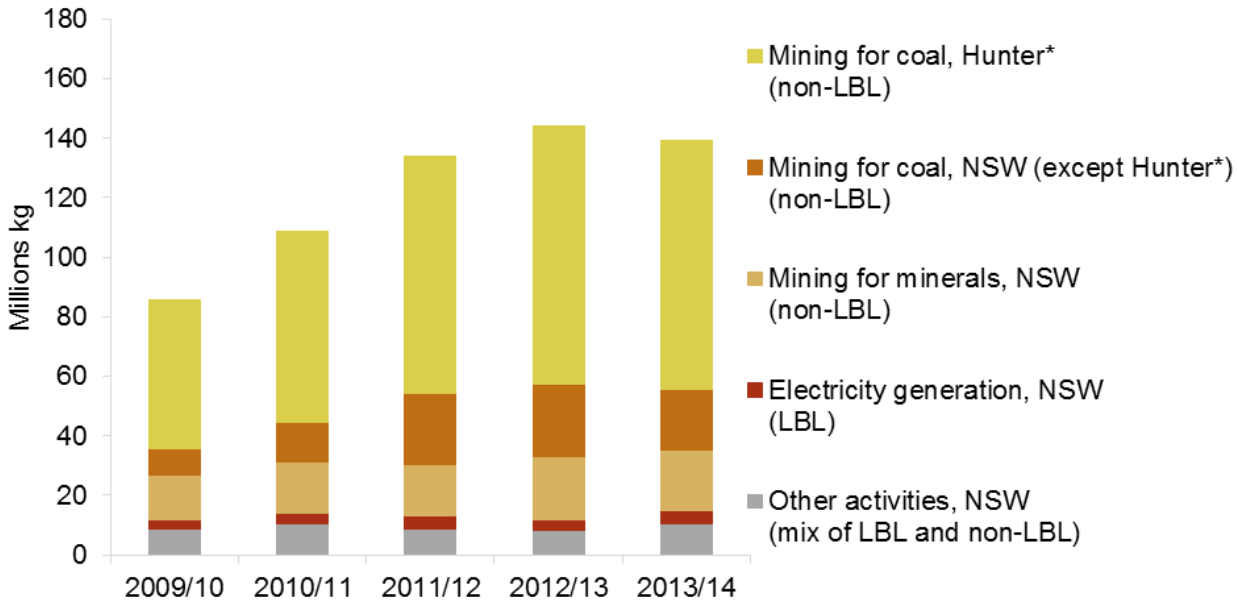

Figure 3-4: Trends in PM_{10} emissions to air by source in NSW, 2009–10 to 2013-14, National Pollutant Inventory [7]

Coal mining in the Hunter Valley

Figure 3-4 also shows that **coal mining** is emitting generally increasing loads of PM_{10} in the Hunter Region in particular. Coal production in the Hunter Valley is increasing and this is expected to continue (e.g. ACIL Tasman 2009 projected a 26% increase in coal movements production in the Hunter Valley-Newcastle between 2014 and 2024).

Box 3-2 below describes how this growth is likely to result in annual average $PM_{2.5}$ concentrations that exceed the **AAQ NEPM (**National Environment Protection (Ambient Air

[7] *'Hunter' in figure 3-4 includes: Dungog, Gloucester, Great Lakes, Muswellbrook, Singleton and Upper Hunter local government areas. See Appendix E for a table of data for Figure 3-4

Quality) Measure**) standards for $PM_{2.5}$** in Singleton and Muswellbrook. Further information on particulates can also be found in Appendix D.

Neither coal mining nor $PM_{2.5}$ (as a stand-alone pollutant) are currently included in the LBL scheme. This review of LBL will be considering whether the range of pollutants and scheduled activities captured by the LBL scheme remain appropriate, or whether changes may be required (see sections 4.2.1 and 4.2.3). The EPA will consider a range of relevant information sources (including the results of relevant studies) and data when considering whether any additional pollutants or activities should be included in the LBL scheme.

Box 3-2 Challenges meeting the $PM_{2.5}$ standard in Muswellbrook and Singleton

Following the recent review of the National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM), Commonwealth, state and territory Environment Ministers met on 15th December 2015 and agreed to new Ambient Air Quality Standards for $PM_{2.5}$ and an annual average Ambient Air Quality Standard for PM_{10}, as part of the National Clean Air Agreement.

$PM_{2.5}$ is a subset of PM_{10} and is mainly produced from combustion processes; e.g. on-road and non-road vehicle exhaust (including mine machinery) and wood fires (see Box 4-1 and Appendix D for more detail).

The new AAQ NEPM Ambient Air Quality Standards for $PM_{2.5}$ are 8µg/m^3 (average annual – i.e. long term) and 25µg/m^3 (24-hour – i.e. short term). Previously the AAQ NEPM only prescribed an annual $PM_{2.5}$ 'Advisory Reporting Standard' of 8µg/m^3 (not an ambient air quality standard).

Predictive modelling commissioned by the EPA (Pacific Environment 2014) shows that an annual average $PM_{2.5}$ Ambient Air Quality Standard of 8 µg/m^3 is unlikely to be attained in Singleton and Muswellbrook into the future as coal production in the Hunter Valley is expected to continue to increase (e.g. ACIL Tasman 2009).

The modelling also shows that all man-made particulate emissions need to be reduced by 50% to meet the new standard. Adding mines to the LBL scheme and including $PM_{2.5}$ as an assessable pollutant could be part of the solution to ensuring that any AAQ NEPM Ambient Air Quality standard for $PM_{2.5}$ can be met in Singleton and Muswellbrook into the future. Other initiatives may include measures applied through the environmental planning regime and incentives for upgrading domestic wood heaters to cleaner alternatives.

Reducing human exposure to $PM_{2.5}$

LBL also has a role in providing an increased and ongoing incentive for licensees to reduce emissions of $PM_{2.5}$ emissions to air more generally by bringing $PM_{2.5}$ into the LBL scheme. $PM_{2.5}$ has human health impacts at even low concentrations (this is further discussed in Section 4.2.1). Relatively higher pollutant fees for $PM_{2.5}$ could be charged for licensees in areas located around highly populated areas and areas where the new AAQ NEPM Ambient Air Quality standards may not be met in the near future due to pressures from industrial activities.

Secondary $PM_{2.5}$ particulates

The formation of secondary $PM_{2.5}$ and its contribution to regional air quality is another complex issue where standard regulatory approaches need to be complemented by other measures. Primary $PM_{2.5}$ is emitted directly from stationary and mobile fuel burning activities (such as coal-fired power stations and on-road and off-road diesel vehicles). Secondary $PM_{2.5}$ is formed in complex atmospheric reactions from precursors such as sulfur dioxide,

nitrogen oxides, ammonia and reactive organic gas emissions. These reactions generate secondary $PM_{2.5}$ in the form of sulfates, nitrates and carbon.

Coal-fired electricity generation emits $PM_{2.5}$ **and** the secondary particle precursors sulfur dioxides (SO_2) and nitrogen oxides (NO_X).

A recent study by The Australian Nuclear Science and Technology Organisation (ANSTO 2012) analysed eleven years of air sampling data collected in the Richmond area of **Western Sydney** to determine the contribution of NSW coal fired power stations to loads of $PM_{2.5}$ in the greater Sydney metropolitan area. It found that NSW power stations, despite being many kilometres outside the greater Sydney metropolitan area, still had a significant impact on the mass of $PM_{2.5}$ measured in Richmond; i.e. within the metropolitan area. Up to 50% of the total mass of sulfate (secondary $PM_{2.5}$) and 18% of the total $PM_{2.5}$ in the greater Sydney region can be attributed to emissions from NSW's eight coal-fired power stations.

Increasing the LBL incentives for licensees to reduce emissions of SO_2 may assist to address this issue.

Box 3-3: Western Sydney – cumulative nutrient impacts on the Hawkesbury–Nepean River

The Hawkesbury–Nepean River is an iconic waterway and an important environmental and economic asset for NSW. In the next 20 years, Sydney's population is predicted to grow by 1.6 million people, with 900,000 additional people added to Western Sydney (DPE 2014). Most of this growth will be located in the North West and South West Growth Centres, which are largely within the Hawkesbury–Nepean Catchment.

A number of studies have shown that diffuse- and point-source pollution, reduced river flows and water extraction are all contributing to algal blooms and excessive aquatic weed growth in the river. Elevated nutrient loads associated with urban stormwater runoff and sewage effluent discharges are also contributing to poor waterway health more generally. This means the river does not support a healthy aquatic ecosystem and the community cannot safely use the waterway for recreational and commercial activities.

The NSW Government has implemented a range of initiatives to manage nutrient loads and protect the Hawkesbury–Nepean River. This includes nutrient load limits on sewage treatment licences under the LBL scheme. The health of the river has improved from being quite poor in some areas; however, significant improvements are still required before the river can meet the desired water quality objectives.

The condition of the river could deteriorate in the future due to the predicted population growth in Western Sydney, including (among a number of pollution sources) the associated increase in sewage treatment, unless new approaches are taken that reduce or avoid the impact of increasing nutrient loads. Licence conditions have limited the impacts of effluent discharges into the river to date and will remain a crucial component of the suite of actions that will need to be implemented to maintain the health of the Hawkesbury–Nepean River.

The LBL scheme will become an even more important tool for combating chronic and cumulative nutrients impacts as environmental pressures from population growth and land-use change come to bear. One of the challenges for the review of the LBL scheme will be to ensure incentives for reducing nutrients in the Hawkesbury–Nepean Catchment are set at the right level to encourage additional improvements.

Population pressures in Western Sydney

The EPA anticipates that increasing development, land-use change and other pressures have a significant potential to cause degradation to air and water quality in a number of other geographical areas in NSW as well. This includes **Western Sydney** where increasing

population growth and increased commercial and industrial activity may result in significant environmental impacts if we continue on a business as usual trajectory. See Box 3-3 above which describes cumulative impact issues due to increasing loads of nutrients in the Hawkesbury–Nepean Catchment.

Studies (e.g. Nicholson *et. al.,* in prep.) also indicate that parts of Western Sydney (such as Upper South Creek, Cawdor and Ropes Creek) have a high risk of developing significant land and waterway salinity issues, in part due to projected land-use change. This information will inform the review of critical zones (see Section 4.2.2) and the need to prioritise parts of Western Sydney with regards to salinity in particular.

Mining water discharges

Considerable work is underway to address the environmental impacts of mining (especially to address particulates to air).

Water discharges from mining activities can have high levels of salinity and metals. The environmental impacts of these discharges are regulated via conditions of environment protection licences and the Hunter River Salinity Trading Scheme (for licensees that discharge to specific sections of the Hunter River); however, there is emerging evidence that additional measures are required to address the potential impacts of the constituents of saline mine water discharges (e.g. ionic composition, metals/metalloid contamination) across the state (see Box 3-4 below). Additional measures may also be required in order to address salinity impacts from coal mines within the Hunter River catchment that are not able to be practically managed via the Scheme, such as in the Goulburn River sub-catchment (EPA 2016).

Box 3-4: Hunter Catchment Salinity Assessment

In 2013, the EPA commissioned the Office of Environment and Heritage to undertake a Hunter Catchment Salinity Assessment (EPA 2013c) to inform the review of the Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002. This involved a desktop review and gap analysis of available water quality data (primarily salinity/conductivity) and aquatic ecological health data in the Hunter River Catchment upstream of Singleton, to assist in the evaluation of the effectiveness of the Hunter River Salinity Trading Scheme.

One of the findings of the salinity assessment was that further investigation is required in order to understand the full environmental effects of the different constituents of saline water discharged by participants into the Hunter River. Ionic composition (e.g. water that is high in sodium bicarbonate) and complex mixtures of metals, metalloids and non-metallic inorganic constituents in mine water discharges are emerging issues in the scientific literature (e.g. Cardno Ecology Lab Pty Ltd 2010 cited in EPA 2013c).

The EPA continues to negotiate pollution reduction programs (PRPs) with mines to ensure discharges contribute to restoring or maintaining the relevant NSW Water Quality Objectives. Examples include PRPs negotiated for Springvale Colliery and Angus Place Colliery in the Upper Coxs River catchment and Berrima and West Cliff coal mines in the Southern Coal Fields.

Over and above conditions on environment protection licences, the LBL scheme has the potential to play an important role in driving desired water quality outcomes at the catchment level; including providing price signals to ensure licensees are putting in place measures to reduce pollutants of concern discharged to NSW waterways. As such, this review of LBL will be considering whether bringing additional scheduled activities into the LBL scheme might be an appropriate regulatory response to ensure that licensees have appropriate incentives to reduce their impact on water catchments.

3.5 What does the LBL fee data suggest?

As part of the review, the EPA is considering whether the liable LBL pollutant fee charged for each assessable pollutant reflects the level of additional incentive needed to address actual and potential load impacts associated with each pollutant across NSW generally, and in specific areas such as the Hunter, Illawarra and Sydney and specific types of water catchments. The following considers whether the data for 2013–14 in particular reflects current EPA priorities and whether changes may be required within the LBL scheme.

Box 3-5: What are 'liable' LBL pollutant fees?

The term 'liable' LBL pollutant fees refers to fees that licensees would have been liable for had they paid both pollutant load fees and an administration fee. It does not represent the actual amount paid in fees as this is complicated by the load/administrative fee discount (see Section 4.3.7). This issue affects water pollutants in particular.

3.5.1 Air emissions and fees

Figure 3-5 shows that as a proportion of total liable LBL air pollutant fees, NO_X, SO_X and fine particulates (PM_{10}) make up the majority. This has been a consistent trend over the eleven years to 2013–14. As shown in the previous section, NO_X and SO_X consistently make up the bulk of air emissions on a mass basis.

The EPA has been steadily increasing its efforts to refine and apply regulatory approaches to PM_{10}, to minimise human exposure to this class of pollutant in particular (e.g. Upper Hunter Air Particles Action Plan; Dust Stop and diesel programs for coal mining).

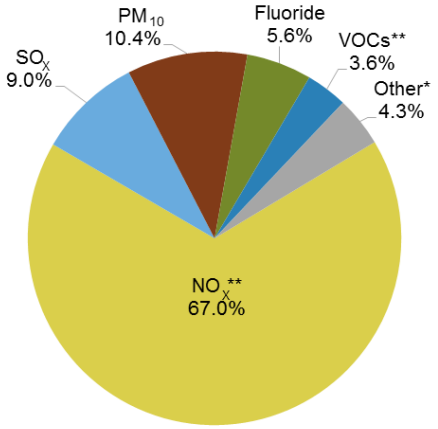

Figure 3-5: Liable LBL fees for assessable air pollutants in NSW (2013-14)[8]

As a percentage of total liable LBL air pollutant fees, the most recent LBL data (2013–14) shows that PM_{10} accounted for 10.4% across NSW, and 6.7%, 7.1% and 9.4% in the Sydney basin, Newcastle/Hunter and Illawarra regions, respectively. This does not reflect EPA priorities around reducing particulate emissions.

Particulates

Scientific evidence now indicates that **PM_{10}** and **$PM_{2.5}$** in particular have a significant impact on human health (see Appendix D), while larger particulates are largely an amenity issue (e.g. visible dust plumes in the air, soiling of clothes and dust depositing on surfaces such as cars, roofs, or furniture). It is estimated that about 90% of human health costs from air pollution are due to particulates specifically, the remainder appears to be largely due to ground-level ozone.

In LBL, coarse particulates have a particle size greater than $PM_{10,}$ and fine particulates are less than PM_{10}. Fine particulates (PM_{10}) as defined under the LBL scheme are not currently differentiated into $PM_{2.5–10}$ and $PM_{2.5}$. $PM_{2.5}$ is a subset of PM_{10}; however, the review is considering separating PM_{10} into two fractions: $PM_{2.5–10}$ and $PM_{<2.5}$ (see Section 4.2.1). This will allow different pollutant weightings and critical zones (and associated weightings) to be applied to these fractions and allow targeted incentives to be applied to $PM_{2.5}$ in particular.

[8] Figure 3-5: *'Other' includes lead (1.2%), benzene (0.6%),coarse particulates (0.6%), mercury (1.2%), arsenic (0.3%), hydrogen sulfide (0.3%) and benzo(a)pyrene equivalent (0.1%). **NO_X and VOCs include NO_X (summer) and VOCs (summer) respectively.

As a percentage of total air pollutant load fees, coarse particulates are 0.6% across NSW, and 0.2%, 0.1%, and 3.8% in the Sydney basin, Newcastle/Hunter and Illawarra regions, respectively. Licensees paid between $0 and $32,919 for coarse particulates ($2,389 on average). The review is considering whether coarse particulates ($PM_{>10}$) can be removed from the LBL scheme to allow the EPA to focus on PM_{10} and $PM_{2.5}$ (see Section 4.2.1). An additional benefit of this approach is that actions which address $PM_{2.5}$ and PM_{10} often also address coarse particulates.

NEPM pollutants

The National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM) standards cover six common air pollutants: particulate matter (PM_{10} and $PM_{2.5}$), ground-level ozone, sulfur dioxide, nitrogen dioxide, carbon monoxide and lead. Ambient air quality monitoring data is one of the sources of information being used to consider whether the current set of assessable air pollutants and associated pollutant weights and critical zone weightings need to be amended.

Air toxics make up a small percentage of assessable air fees. Current indications suggest that most air toxics are not a regional issue and may be best managed through licence conditions and associated pollution reduction programs where there is evidence that a localised hotspot has developed or has the potential to develop.

Figure 3-6 shows the liable LBL air pollutant fee for each scheduled activity grouping during 2013–14 (the most recent full year of LBL data). The figure shows that 'electricity generation' licensees are liable for 67% of assessable air fees across NSW as a whole, and six scheduled activity groupings are collectively liable for 96% of these fees.

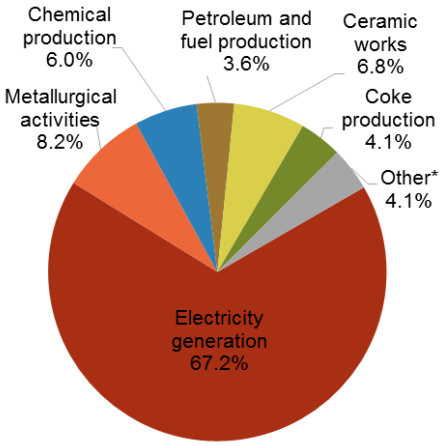

Figure 3-6: Liable LBL fees for assessable air pollutants in NSW – by scheduled activity grouping (2013-14)[9]

Air fees by major region

The following pie charts show the percentage of liable LBL air pollutant fees for the Sydney basin, Newcastle/Hunter and Illawarra regions, respectively.

Fees in the Sydney basin

Figure 3-7 below shows that ground-level ozone/photochemical smog precursors (NO_X and VOCs) accounted for 85.7% of liable LBL air pollutant fees in the Sydney basin[10] (70.6%for NSW generally, see Figure 3-5) in 2013–14 (the most recent full year of LBL data). On a *mass* basis, SO_X made up 26.6%, NO_X 49.5%, VOCs 18.5%, PM_{10} 3.9%, coarse particulates 0.8%, and all other assessable air pollutants 0.7%.

Figure 3-8 below shows that 'ceramic works', 'petroleum and fuel production' and 'chemical production' activity groupings together accounted for 82% of liable LBL air fees for this region in 2013–14.

PM_{10} accounted for 6.8% of total liable LBL air pollutant fees in this region (Figure 3-7 below). This is fairly indicative of the EPA's general priorities for minimising loads of pollutants for the Sydney basin; however, particulates have become increasingly important and these charts do not reflect EPA priorities in this respect.

[9] Figure 3-6: *'Other' includes chemical storage (2.0%), cement or lime works (1.5%), paper or pulp production (0.6%), waste disposal (thermal treatment) (0.1%), waste (<0.1), and resource recovery (<0.1%).

[10] 'Sydney basin' is defined in the POEO (General) Regulation.

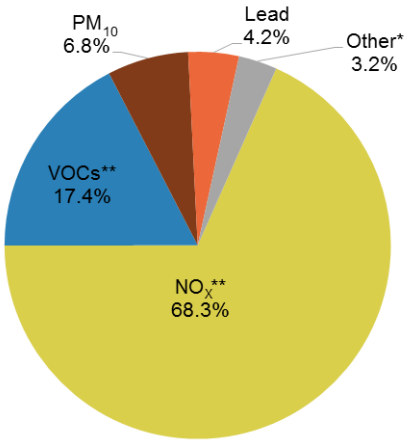

Figure 3-7: Liable LBL fees for assessable air pollutants in the Sydney basin (2013-14)[10],[11]

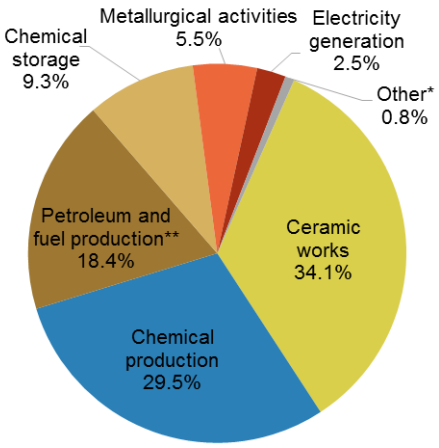

Figure 3-8: Liable LBL fees for assessable air pollutants in the Sydney basin (2013-4), by scheduled activity grouping [10],[12]

Further consideration will be given to whether these figures reflect the EPA's current priorities taking into consideration AAQ NEPM data and other data sets (see Section 4.2.1).

Fees in the Newcastle/Hunter region

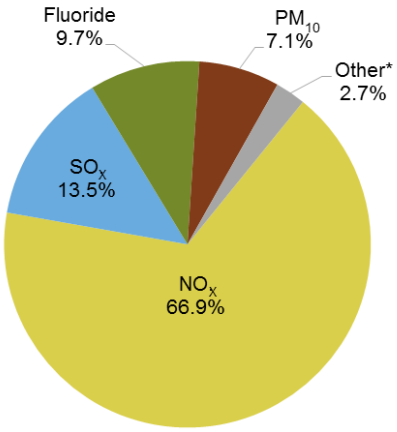

Figure 3-9: Liable LBL fees for assessable air pollutants in the Newcastle/ Hunter region (2013-14)[13],[14]

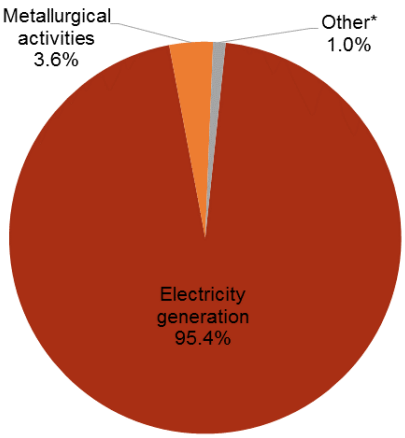

Figure 3-10: Liable LBL fees for assessable air pollutants in the Newcastle/ Hunter region (2013-14), by scheduled activity grouping [14],[15]

[11] Figure 3-7: *'Other' includes arsenic (0.9%), SO_X (0.7%), fluoride (0.6%), benzene (0.6%), coarse particulates (0.2%) , hydrogen sulfide (0.1%), mercury (0.1%), and benzo(a)pyrene equivalent (<0.1%). **NO_X and VOCs include NO_X (summer) and VOCs (summer) respectively.

[12] Figure 3-8: *'Other' includes paper or pulp production (0.5%) and waste disposal (thermal treatment) (0.3%). ** The classification of the 'petroleum and fuel production' scheduled activity grouping changed in 2014 (see Appendix A).

[13] Figure 3-9: *'Other' includes mercury (1.7%), VOCs (0.3%), lead (0.2%), arsenic (0.2%), coarse particulates (0.2%), benzene (<0.1%), benzo(a)pyrene equivalent (<0.1%) and hydrogen sulfide (<0.1%).

[14] 'Newcastle/Hunter' includes: Cessnock, Dungog, Gloucester, Great Lakes, Lake Macquarie, Maitland, Muswellbrook, Newcastle, Port Stephens, Singleton, and Upper Hunter local government areas.

[15] Figure 3-10: *Other includes: Chemical production (0.6%), Chemical storage (0.4%), Ceramic works (<0.1%) and Petroleum and fuel production (<0.1%). Note: the classification of the 'petroleum and fuel production' scheduled activity grouping changed in 2014 (see Appendix A).

In 2013–14, the majority of liable LBL air pollutant fees in the Newcastle/Hunter region[14] were for NO_X, SO_X, fluoride and PM_{10} (see Figure 3-9 above). On a *mass* basis, SO_X made up 61.4%, NO_X 37.1% and all other assessable air pollutants 1.6%.Figure 3-9 above shows that in 2013–14, PM_{10} accounted for 7.1% and SO_X 13.5% of total liable LBL air pollutant fees. This does not reflect the EPA's current priorities for these pollutants in the region. The EPA has been expending a considerable amount of regulatory effort to better address PM_{10} in this area in particular.

Figure 3-10 above shows that 'electricity generation' activities accounted for the vast majority of liable LBL air pollutant fees in the Newcastle/Hunter region in 2013–14.

The EPA's consideration of which licensed activities should be subject to the LBL scheme (see Section 4.2.3) and more importantly, changes needed to reflect the EPA's regulatory priorities (such as increasing the liable fees for PM_{10} and introducing $PM_{2.5}$) are expected to affect how these pie charts looks in the future.

Fees in the Illawarra region

The majority of liable LBL air pollutant fees in the Illawarra region[16] in 2013–14 were for NO_X, PM_{10}, benzene and metals (Figure 3-11), which reflects the heavy industry in the area. This is demonstrated in Figure 3-12 where 'metallurgical activities' and 'coke production' make up 87.2% of air pollutant fees for the region. On a *mass* basis, SO_X made up 39.2%, NO_X 52.4%, coarse particulates 3.8%, PM_{10} 3.3% and all other assessable air pollutants 1.3%. Again this does not reflect the EPA's priorities for regulating PM_{10}.

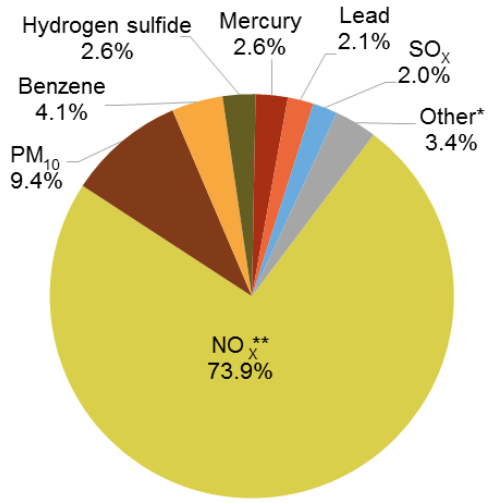

Figure 3-11: Liable LBL fees for assessable air pollutants in the Illawarra region (2013-14)[16, 17]

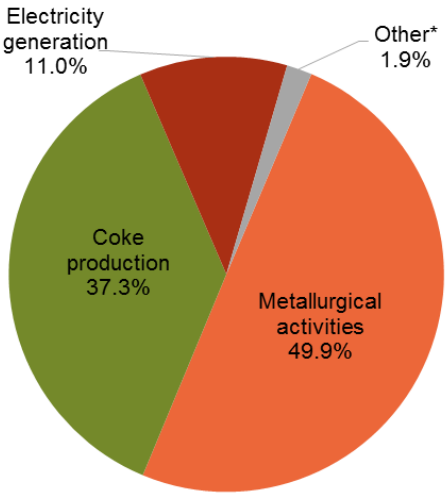

Figure 3-12: Liable LBL fees for assessable air pollutants in the Illawarra region (2013-14),by scheduled activity groupings [16, 18]

[16] 'Illawarra region' is defined in the Protection of the Environment Operations (Clean Air) Regulation 2010 as Wollongong City, Shellharbour City, Shoalhaven and Kiama local government areas.

[17] Figure 3-11: *'Other' coarse particulate (1.8%), benzo(a)pyrene equivalent (0.7%), VOCs (0.6%) and arsenic (0.3%). **NO_X includes NO_X (summer).

[18] Figure 3-12: *'Other' includes cement or lime works (1.9%), chemical storage (<0.1%) and ceramic works (<0.1%).

Fees for the rest of NSW

For the rest of NSW (i.e. NSW excluding the Sydney basin, Newcastle/Hunter and Illawarra regions), the majority of liable LBL air pollutant fees in 2013–14 were for NO_X (63.1%), PM_{10} (19.2%) and SO_X (10.7%). On a *mass* basis, NO_X made up 46.6% of air emissions, SO_X 51.5%, PM_{10} 1.1% and all other air pollutants 0.9%.

Figure 3-13 shows that the 'electricity generation' sector is responsible for more than 90% of these emissions.

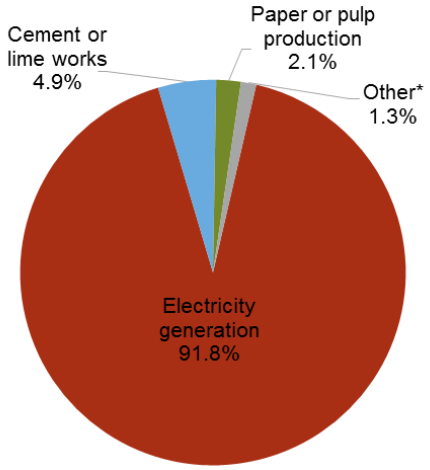

Figure 3-13: Liable LBL fees for assessable air pollutants in NSW excluding the Sydney basin, Newcastle/Hunter and Illawarra regions (2013-14), by scheduled activity groupings [19]

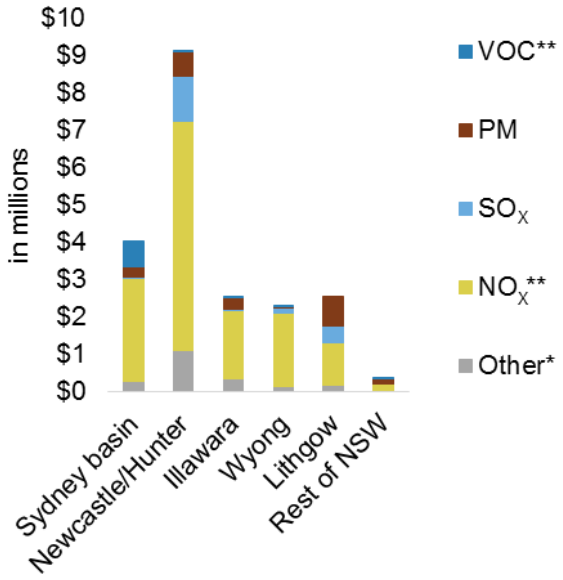

Figure 3-14: Liable LBL fees for assessable air pollutants in NSW, by region (or LGA), 2013-14[20]

Overall – fees by region

Figure 3-14 shows overall liable LBL air pollutant fees by region for 2013–14. Wyong and Lithgow LGAs are also shown separately to remove the influence that the electricity generation sector would otherwise have on the results for the 'rest of NSW' data. This figure shows, for example, that SO_X and particulates are concentrated in the Newcastle/Hunter and Lithgow areas, where electricity generation is a significant contributor.

Post-pollutant review – air

Once the assessable pollutant review is completed (see Section 4.2.1), additional consideration will be given to the need to adjust air pollutant-specific parameters (such as pollutant weightings and critical zones) to ensure liable LBL air pollutant fees reflect current EPA priorities.

[19] Figure 3-13: *'Other' includes ceramic works (0.8%), metallurgical activities (0.3%), waste (0.1%), petroleum and fuel production (<0.1%), chemical storage (0.1%), and chemical production (<0.1%), and resource recovery (<0.01%).

[20] Figure 3-14: *'Other' includes coarse particulates, fluoride, benzo(a)pyrene equivalent, benzene, hydrogen sulfide, lead, mercury and arsenic. **NO_X and VOCs include NO_X (summer) and VOCs (summer) respectively. See Appendix E for a table of data for Figure 3-14.

3.5.2 Water emissions and fees

Figure 3-15 shows that as a proportion of total liable LBL water pollutant fees, total suspended solids (TSS), nutrients (phosphorus and nitrogen) and 'oil and grease' made up the majority of fees for water emissions in 2013–14. This has been a consistent trend over the eleven years to 2013–14. As shown in Section 3.4 (Figure 3-2) BOD and TSS consistently make up the bulk of water emissions on a *mass* basis.

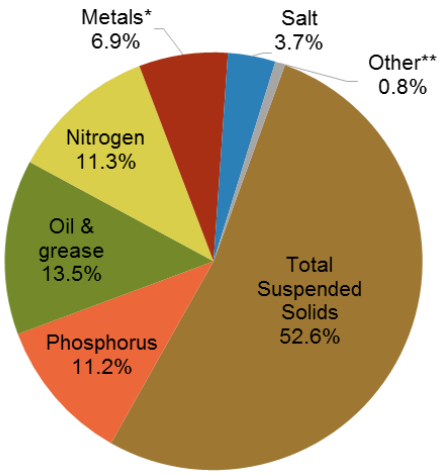

Figure 3-15: Liable LBL fees for assessable water pollutants in NSW (2013-14)[21]

In 2013–14, BOD[22] only made up 0.03% of liable LBL water pollutant fees; however, it made up 42% of the loads that LBL licensees reported. Over 99% of BOD reported under LBL was from 'sewage treatment system' (STS) activities. In 2013–2014 large STSs paid between $0 (BOD discharged to open coastal waters) and $648 ($107 on average for estuarine and enclosed waters) for BOD, and small STSs were liable to pay between $0 and $146 ($9 on average).

Fifty-seven per cent of small STSs received a fee discount in 2013–14 by only paying an administration fee and did not pay a load fee (see Section 4.3.7 for more information on the administrative/load fee discount).

These fees do not appear to be providing an incentive for STSs to reduce BOD emissions. Both BOD and TSS are general indicators of how well an STS is working and could be expected to have environmental impacts of similar importance. It has been suggested that some STSs have improved their performance in response to load limits applied to their plants for some pollutants, rather than the fees they pay (or are liable for). It is also possible that in some cases TSS and BOD are driven to lower levels by requirements to reduce other pollutants such as nutrients (phosphorus and nitrogen).

Given the similarity in their potential environment impacts, the difference in the proportion of total water fees liable for TSS (52.6%) and BOD (<0.1%) indicates that BOD and TSS-specific parameters need to be reviewed to ensure that licensees are given a similar level of incentive to reduce them, as a minimum.

The EPA now has a greater focus on the regulation of toxicants (including metals) and salt compared to when LBL was established. The EPA is further investigating parameters associated with toxicants and other stressors; these will be reviewed to ensure that water fees reflect current EPA priorities. The EPA will be reviewing the range of scheduled activities and pollutants that are captured by the LBL scheme and considering whether this reflects current EPA priorities (see sections 4.2.1 and 4.2.3).

In 2013–14, two scheduled activity groupings accounted for 98.7% of liable LBL water pollutant fees, namely 'sewage treatment systems' and 'electricity generation', being liable for 93.8% and 5.2% of fees respectively.

[21] Figure 3-15: *'Metals' includes copper (5.1%), lead (0.7%), mercury (0.6%), cadmium (0.4%), chromium (0.2%) and zinc (<0.1%). **'Other' includes: pesticides & PCBs (0.6%), selenium (0.1%), phenolics (0.1%), BOD (<0.1%) and PAHs (<0.1%).

[22] Biochemical oxygen demand has the lowest weighting of all pollutants: 1 for enclosed waters, 0.5 for estuarine waters, 0 for open coastal waters.

This is expected to change once coal seam gas facilities (and other recently added activities under 'petroleum exploration, assessment and production', see Appendix A) start paying load fees.

Water fees by type of receiving water

The following charts show the proportion of liable LBL fees represented by each assessable water pollutant, differentiated by the type of receiving water: open coastal, estuarine and enclosed waters.

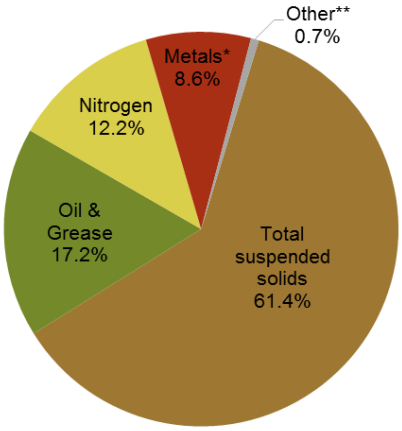

Figure 3-16: Liable LBL fees for assessable water pollutants in NSW, open coastal waters (2013-14)[23]

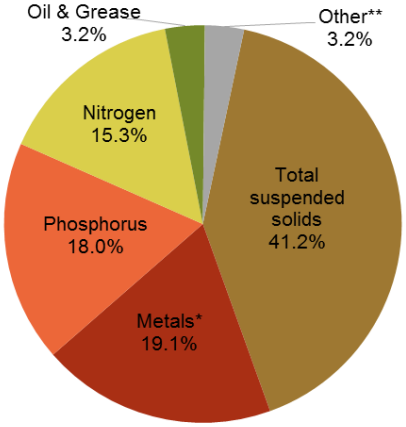

Figure 3-17: Liable LBL fees for assessable water pollutants in NSW, estuarine waters (2013-14)[24]

These three charts show that the liable LBL water pollutant fees for the emission of metals to open coastal and enclosed waters only represented a small percentage of all liable water fees in 2013–14 (8.6% for open coastal waters and 0.2% for enclosed waters). As mentioned above, this does not seem to reflect the EPA's current focus on these pollutants (also see Section 3.4.5 regarding emerging issues).

Figures 3-17 and 3-18 show that nutrients (nitrogen and phosphorus) make up one third to one half of liable LBL water pollutant fees for both estuarine and enclosed waters (33.3% and 56.3% respectively).

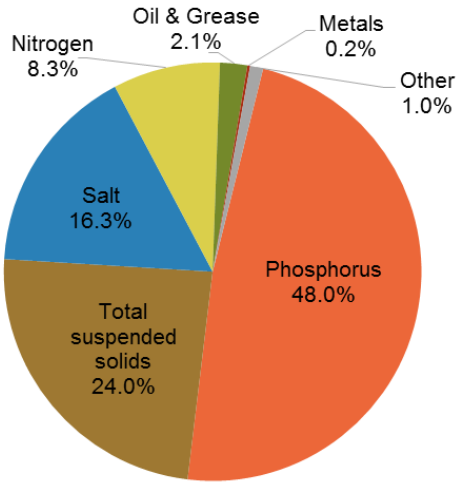

Figure 3-18: Liable LBL fees for assessable water pollutants in NSW, enclosed waters (2013-14)[25]

Figure 3-18 is expected to change once coal seam gas facilities (and other recently licensed activities under 'petroleum exploration, assessment and production', see Appendix A) start paying load fees.

[23] Figure 3-16: *'Metals' includes copper (6.3%), lead (0.8%), mercury (0.8%), cadmium (0.5%), chromium (0.2%) and zinc (<0.01%). **'Other' includes phenolics (<0.1%), pesticides & PCBs (0.6%), PAHs (<0.1%) and selenium (<0.1%).

[24] Figure 3-17: *'Metals' includes copper (16.1%), chromium (0.9%), lead (1.86%), mercury (0.2%) and zinc (0.1%). **'Other' includes phenolics (1.5%), selenium (1.3%), PAHs (0.3%) and BOD (0.1%).

[25] Figure 3-18: *'Metals' includes copper (0.1%), lead (0.1%), chromium (>0.1%), mercury (<0.1%), cadmium (<0.1%) and zinc (<0.1%). **'Other' includes selenium (0.5%), pesticides & PCBs (0.4%), BOD (0.1%) and phenolics (<0.1).

Reported salt and metal species in particular are expected to increase as a result.

Post-pollutant review – water

Once the assessable pollutant review is completed (see Section 4.2.1), consideration will be given to the need to adjust water pollutant-specific parameters to ensure water fees reflect current potential environmental harm, and EPA priorities and focus, specifically:

- TSS compared to BOD, i.e. whether the pollutant weighting(s) for BOD should be increased to provide an adequate incentive for STSs to reduce it
- metals and other toxicants.

If the pollutant weighting for BOD is not increased, consideration will be given to whether:

- BOD can be adequately addressed through licence-specific requirements and should be removed from the scheme (for LBL reporting and fee purposes), and
- if it is removed, whether BOD load limits might be retained on STS licences (where required). This would retain the important role played by load limits and simplify the scheme, especially for small STSs, many of which are not currently paying any load fees due to the administrative/load fee discount (see Section 4.3.7).

3.6 What are LBL licensees saying? – 2014 LBL industry survey

The EPA sent an online survey to the approximately 167 organisations which hold the 250 licences in the LBL scheme. Seventy responses were received (a 42% response rate).

Appendix C provides an overview of the results of the survey.

40% of respondents to the LBL industry survey agreed that LBL has provided an incentive to reduce emissions. Those that specifically did not agree (21%) stated that:

1. fees were too low
2. technology was not available for them to reduce emissions, and/or
3. there were other main drivers for pollutions reduction.

Seventeen per cent of respondents reported that LBL was a *major* driver in their emission reductions; however, more respondents reported that the main drivers were other factors including general maintenance and upgrades (52%), being a good corporate citizen (37%) and pollution reduction programs (PRPs – an EPA licensing tool).

3.7 How does the LBL scheme compare to other similar schemes?

The EPA engaged BDA Group to prepare a *Comparative review of load-based licensing fee systems* which examined pollution emission incentive fee schemes in OECD countries, to identify successful system characteristics and to assess the extent to which they are applicable and transferable to the NSW context.

Appendix B contains a summary of the results of the comparative review and the full report can be accessed here: www.epa.nsw.gov.au/licensing/lbl/lblreview.htm.

The comparative review found that:

1. Real incentives require fee levels to exceed the cost of emission abatement.
2. The incentive force of fees needs to be maintained (i.e. not eroded by inflation).
3. The environmental effects of incentives can be compromised by exemptions.
4. It was important to be judicious and cautious with rebates.
5. It was important to ensure incentives are complementary to broader regulatory settings.
6. Large emission reductions are typically associated with direct emission measurement.

The comparative review noted (page 16):

Environmental taxes for pollution control and natural resource management are an increasingly important part of environmental policy in OECD countries. Environmental taxes

can serve to discourage behaviour that is potentially damaging for the environment and can provide incentives to lessen the burden on the environment and to preserve it by 'getting the price right'. The economic rationale for their use comes from their ability to influence markets in a cost-effective way.

Emerging trends in emission reduction incentive schemes seem to be:

- an increasing focus on the selection of pollutants with some schemes broadening the range of pollutants covered, and others reducing the number of pollutants
- the use of thresholds to determine liable activities remains common and unchanged; however, a number of schemes have refined thresholds to exempt fees being paid below minimum loads (or their tax/fee value)
- many jurisdictions have increased pollutant fee rates (e.g. fees in France and the Czech republic are moving towards externality pricing)
- fee waivers, similar to load reduction agreements, are a common feature of schemes
- the use of rebates and subsidies has been amended/reviewed in some jurisdictions where rebates appeared to be reducing the effectiveness and efficiency of incentives.

The comparative review also found:

- while few schemes have been subject to significant overhauls over their lifetime, none have been abolished either
- identifying pollution reductions attributable to a scheme is difficult
- getting the level of fees right has been essential in making these schemes effective.

3.8 Can LBL's cost-effectiveness be determined?

It is difficult to determine the contribution LBL has made to the improvements licensees have achieved. Therefore, it is also not possible to directly compare the cost-effectiveness of LBL with other approaches that the EPA could have used, such as introducing additional statutory limits for the range of pollutants covered by the LBL scheme; however, we can consider whether LBL appears to be providing a sufficient incentive for licensees to act.

The load-based fee imposes an additional cost on the production of certain products and services that generate pollution. It provides polluting industries with a financial incentive to reduce the amount of pollution created from their production processes. In theory, where the cost of reducing emissions is lower than the fee that would be liable for the same load, rational licensees will implement abatement measures and avoid paying the fee; however, if the cost of abatement is higher than the fee, licensees will be more likely to pay the fee and either absorb the additional cost, or seek to pass it on to their customers.

Theoretically, market-based schemes (which provide a financial incentive to improve performance) can achieve the same environmental outcomes as the traditional way of regulating polluting activities – setting emission standards – but at lower cost (if the scheme is appropriately structured). This is because each licensee will face a different set of costs to reduce pollution, depending on the characteristics of their operation. Charging a pollution load fee means that businesses with low costs of abatement have an additional incentive to implement improvements, and those with high costs of abatement can continue to operate.

To determine the cost-effectiveness of the LBL scheme, the EPA would need to determine the extent to which the scheme's benefits to the community (from avoided environmental and health damage) outweigh the costs to industry (from reducing pollution and complying with the scheme's requirements), and the cost to government for administering the scheme. Where the benefits from imposing load-based fees outweigh the costs, the LBL scheme could be said to be delivering 'efficient' outcomes.

While it will not be possible to do this in a definite sense, there are a number of indications that some licensees need more incentive to improve their performance in places where it will make a significant difference to human and environmental health.

Section 4.3 discusses the approaches being considered to ensure LBL is effective in providing an incentive for licensees to improve their performance and specifically to ensure that the level of load fees is appropriate.

3.9 How could better targeting improve the effectiveness of LBL?

During this review, the EPA will attempt to define the role of LBL in more detail; for example, its role in obtaining environmental improvements across NSW (and within specific areas), versus those of statutory requirements, site-specific licence conditions (such as limits and pollution reduction programs) and other regulatory approaches. See Section 3.4.5 for examples of the types of issues where LBL is expected to play a role over and above standard regulatory approaches. This will help the EPA to develop amendments to the scheme and to allow future reviews to better assess whether it is achieving its role.

3.9.1 Potential for developing a more targeted scheme

LBL assessable pollutant load trends across NSW as a whole indicate that industrial emissions have generally decreased over the past eleven years (Section 3.4). Conversely, Section 3.4.5 provides an example of emissions that are not currently captured under the scheme which have increased significantly over the last four years alone; namely PM_{10} from mining activities. This suggests that LBL, together with the rest of EPA's regulatory framework, is working effectively; however, it is difficult to determine the contribution that LBL has made in achieving these reductions.

Given this general reduction, it appears that the best role for the LBL scheme now (over and above providing licensees with a general incentive to improve their performance) is to provide a more substantial incentive for licensees to reduce emissions in areas where the current regulatory approaches are not sufficient. This approach is illustrated in Section 3.4.5)

As such the EPA is considering how the scheme could be better targeted to provide additional incentives where there appears to be the potential for cumulative impacts to develop (or they already exist), (see Section 3.4.5) and where evidence suggests that more needs to be done generally to reduce emissions (e.g. $PM_{2.5}$ – see Section 4.2.1).

3.9.2 Potential for developing a more responsive scheme

The LBL scheme includes a number of mechanisms that enable it to provide targeted incentives for licensees to improve their environmental performance where that improvement is needed the most. Chief among them are pollutant weightings and critical zone weightings. During this review, the EPA is looking at options to ensure that the scheme is more responsive to available information and less reliant on information that is difficult to obtain. This includes ways to allow relevant LBL parameters to be adjusted relatively quickly.

An example of an area in which the EPA is considering ways to make the scheme more responsive, is in combating cumulative impacts that may be developing in a regional airshed (see Box 3-2) or a waterway (see Box 3-3); a waterway may be reaching the limit at which it can assimilate additional nutrients, for example. Refinements to the scheme could include methods to enable pollutant weightings, critical zone weightings and other relevant factors to be updated more easily and quickly, while still providing transparency and certainty; in other words, adjusting the scheme parameters more promptly in response to new information and the EPA's changing priorities.

Chapter summary and focus questions for stakeholders

Chapter 3 – How effective has LBL been?

Since the scheme operates across a broad range of industry sectors and within a complex regulatory framework, it is not possible to be definitive about the contribution LBL has made in achieving environmental improvements, providing incentives generally and implementing the polluter pays principle; however, while the EPA's analysis to date suggests there are a number of ways the scheme can be improved, it also demonstrates that the scheme has provided effective incentives to many licensees to improve their environmental performance.

What do emission trends suggest? How LBL could play an important role in tackling significant and complex environmental issues into the future

Pollutant trends show that overall, LBL licensees are releasing most assessable pollutants in lower quantities than they were eleven years ago, especially in critical zones.

Other sources of data and information show that NSW still has many significant and complex environmental issues that a strengthened and better targeted load-based licensing scheme would help to address.

What does the LBL fee data suggest?

The analysis of liable LBL pollutant fees indicates that changes are needed for the scheme to ensure that licensees are given greater incentives to reduce discharges of a number of pollutants: PM_{10} to air, metals to water and biochemical oxygen demand (BOD) to water in particular. Fees for these pollutants do not appear to reflect EPA priorities.

What are LBL licensees saying?

Forty per cent of licensees who responded to the survey said that the scheme provides a range of incentives for them to improve their environmental performance and 17% said it was a major driver for improvements they had made. But many licensees also said that fees were too low when compared with the cost of the upgrades needed to reduce emissions.

How does the LBL scheme compare to similar schemes?

The comparative review revealed that the NSW LBL scheme is unique in its combination of pollutants targeted; the incentives it provides to reduce pollution; its flexibility; and its use of varying weightings to recognise the harmfulness of different pollutants and their relative impacts on specific receiving environments. Operators of other schemes found it difficult to determine the amount of emission reduction that could be linked to their particular scheme; however, getting the level of fees right was recognised as essential in making these schemes effective. The comparative review also highlighted a number of improvements and issues to be considered as the LBL scheme is further developed; for example, how to avoid the perverse incentives that can be created where revenue recycling and subsidies are used.

Can LBL's cost-effectiveness be determined?

To determine the cost-effectiveness of the LBL scheme, the EPA would need to determine the extent to which the scheme's benefits to the community (from avoided environmental and health damage) outweigh the costs to industry (from reducing pollution and complying with the scheme's requirements), and the cost to government for

administering the scheme. Where the benefits from imposing load-based fees outweigh the costs, the LBL scheme could be said to be delivering 'efficient' outcomes. While it will not be possible to do this in a definite sense, there are a number of indications that some licensees need more incentive to improve their performance in places where it will make a significant difference to human and environmental health.

How could better targeting improve the effectiveness of LBL?

During the review the EPA is considering how the scheme could be better targeted to provide additional incentives where there appears to be the potential for cumulative impacts to develop (or they already exist), and where evidence suggests that more needs to be done generally to reduce the emissions ($PM_{2.5}$ to air is an example of this – see Box 3-2). The review will also look at options to ensure the scheme is more responsive to available information and less reliant on information that is difficult to obtain. This includes ways to allow relevant LBL parameters to be adjusted relatively quickly.

Focus questions

1. How can the LBL scheme best complement other regulatory approaches?
2. What should the role of LBL be?
3. What shouldn't its role be?
4. Do you think the LBL scheme has been effective? Why or why not?
5. What does an effective LBL scheme look like?

4. Review of specific LBL elements and issues

This chapter looks at a number of specific elements of the LBL scheme in greater detail, outlining issues and various options for improving the effectiveness of these elements:

4.1 Introduction

In considering the specific elements of the LBL scheme covered in this chapter, the following overarching criteria were used to guide the EPA's appraisal of each element and any issues already identified for it. The criteria were also used to evaluate potential options for change:

- Is it environmentally beneficial? (e.g. does it support better environmental outcomes?)
- Is it reasonable and equitable? (e.g. does it ensure that licensees are treated consistently? Are reasonable costs being imposed on licensees through the application of the 'polluter pays' principle?)
- Is it clear and easy to use and administer? (e.g. is it straightforward, without losing effectiveness? Are licensees clear about their obligations and able to plan their businesses accordingly?)
- Is it responsive and flexible? (e.g. is it able to be adapted to emerging issues, new research and information?)
- Is it cost-effective and efficient? (e.g. does it help to achieve the scheme's objectives at reasonable cost to licensees, government and community?)

These criteria will continue to guide the review of each of the elements and issues discussed in this paper as the review of the LBL scheme progresses.

Due to the complexity of this chapter, a summary and focus questions are provided at the end of each major section. Each issue discussed in this section and the options explored often have strong linkages to other issues and options discussed throughout this paper. The strongest linkages have been highlighted with cross-referencing.

Many of the options proposed are mutually exclusive; however, some are complementary.

4.2 Key elements of the LBL scheme

This section examines important elements of the scheme, specifically:

- assessable pollutants and whether the scheme captures the right pollutants across the scheme and for specific licensees (Section 4.2.1)
- critical zones and whether areas of highest concern are appropriately targeted (Section 4.2.2)
- scheduled activities and whether the appropriate activities are included in the scheme (Section 4.2.3)
- load limits and whether they are being used effectively (Section 4.2.4).

Other important elements of the scheme that specifically influence fees are discussed in Section 4.3.

4.2.1 Assessable pollutants – are the right pollutants being captured?

How it works now

The LBL scheme aims to help manage the load (annual mass emitted) and cumulative impacts of pollutants, rather than the concentration of discharges and any acute or localised impacts. The scheme targets 12 air pollutants and 17 water pollutants. The pollutants are weighted so that fees paid per kilogram are higher for pollutants that are more harmful.

Pollutant weightings for water pollutants also consider the particular nature of various NSW receiving environments (i.e. different pollutant weightings apply for open coastal, estuarine and enclosed waters). See *NSW EPA's Load-based Licensing Scheme: Overview and facts about load-based licensing* for a list of the LBL pollutants and pollutant weightings.

Indications that change is needed

Over the past 16 years, refinements in pollutant definitions, classification and measuring; changes in pollutant regulation and reporting requirements under other schemes; and improvements in our understanding of the long-term environmental and health impacts of pollutants and changes in EPA regulatory priorities as a consequence of this knowledge, mean that it is necessary to review the pollutants addressed though the scheme.

Definition and classification of existing LBL pollutants

Since the LBL scheme commenced, there have been some improvements in pollutant definitions and classifications; for example, greater clarity could be provided on the chemical substances included under the terms 'VOCs', 'PAHs', and 'chromium'.

There may also be opportunity to improve the consistency of substance classifications within the scheme, and in relation to other pollutant reporting schemes such as NPI and international nomenclature; for example defining $PM_{10–2.5}$ as coarse particulates and $PM_{2.5}$ as fine particulates[26], a more consistent approach to classifying and reporting PAHs (reported to water) and benzo(a)pyrene equivalent (a measure of PAHs as 'equivalent to B(a)P', reported to air as a proxy for all PAHs).

There may also be value in examining the effectiveness of having NO_X (summer) and VOCs (summer) in the Sydney basin as separate assessable air pollutants in the scheme, as it adds a layer of complexity and is possibly not working optimally to provide an incentive to reduce pollution during the summer months, especially as the profile of major VOC emitting industries has changed for the Sydney basin (e.g. major oil refineries have become primarily storage, blending and distribution facilities).

Improved understanding of environmental and health impacts

Over the past 16 years there have been many improvements in our understanding of the environmental and health impacts of pollution and new pollutants of concern have been identified internationally. It may be appropriate to include new pollutants with high load-based environmental impacts in the LBL scheme if the benefits were clear, e.g. $PM_{2.5}$ (see Box 4-1).

It might also be advantageous to remove specific pollutants from the scheme if there is no longer a clear benefit from including them; for example, BOD is an assessable water pollutant, but is prescribed the lowest of all pollutant weightings, results in very small fees being paid (see Section 3.5.2), and appears to provide little (if any) incentive for (mainly) 'sewage treatment system' activities to reduce their BOD emissions.

It may also be beneficial to remove coarse particulates as an assessable air pollutant, as they are largely an amenity issue (see Box 4-1). A number of air toxics may also be able to be removed from the scheme, if they would be better managed through licence conditions and pollution reduction programs to tackle localised hotspots or potential hotspots.

[26] This would align LBL with international nomenclature, refer to Section 2.1 of the NSW Coal Mining Benchmarking Study, www.epa.nsw.gov.au/resources/epa/140075coalminestudy.pdf.

Box 4-1: Particulate matter and LBL: how an improved understanding of pollution may lead to changes in LBL

Under LBL, particulate matter to air is classified as 'fine particulates' (PM_{10} – less than 10 micrometres (µm) in diameter, including the internationally recognised PM_{10} and $PM_{2.5}$ fractions) and 'coarse particulates' (greater than 10 µm in diameter).

PM_{10} is associated with significant health impacts, including a variety of lung and heart problems. Both long-term (years) and short-term (hours or days) exposure to PM_{10} has been linked to health problems. Size determines the extent of penetration of particulates into the respiratory tract (with very small particles even able to enter the blood stream), which directly influences the potential health effects. While there is no safe level of $PM_{2.5}$ exposure, the risk of health impacts decreases with lower levels of exposure (WHO 2000).

The latest evidence shows that ambient levels of PM_{10} and $PM_{2.5}$ can exceed AAQ NEPM Ambient Air Quality standards in both rural and urban areas (see DECCW 2010a, EPA 2012a, Pacific Environment 2014). Therefore, they are pollutants of high concern in those regions. The AAQ NEPM was recently reviewed and varied on 15 December 2015, An environment protection standard for $PM_{2.5}$ was introduced, along with a new standard for PM_{10}.

The LBL review will consider whether to split the current 'fine particulates' category into $PM_{2.5}$ and $PM_{2.5–10}$, to reflect the weight of scientific evidence and growing concern around the significance of the health impacts associated with the $PM_{2.5}$ fraction. This would enable the EPA to specifically target $PM_{2.5}$ where evidence shows that this is warranted (see Box 3-2), including potentially assigning a higher pollutant weighting.

It is now widely acknowledged that concerns about particulates larger than PM_{10} are generally related to amenity rather than serious health impacts. Coarse particulates make up only a very small proportion of overall LBL air emission fees (<1%). The review will consider whether to remove coarse particulates from the LBL scheme, thus enabling the EPA to focus its LBL incentives on smaller particulates. An additional benefit of this approach is that actions which address $PM_{2.5}$ and PM_{10} often also address coarse particulates.

Additional detail is provided in Appendix D.

Additional analysis and work

The EPA is reviewing the list of LBL pollutants to ensure the most appropriate ones are included in the scheme. A preliminary list will be assembled first and then refined to include only those pollutants with sufficient priority to warrant inclusion in the scheme; especially those pollutants that are most contributing to pollutant load-effects in NSW. Contaminants that are sufficiently controlled by other regulatory instruments (e.g. Stockholm Convention on Persistent Organic Pollutants), or are deemed to be better addressed by specific licence conditions will not be included.

Pollutant weightings will also be reviewed as part of this process based on the latest scientific evidence. This may also include a review of the receiving water classifications for water pollutants. Option 1 in Section 4.2.2 'critical zones' below describes how pollutant weightings could be better targeted to the specific geographical area, further developing and expanding the principles of the 'critical zone' approach. For example, pollutant weightings could be specified for each individual catchment (for water pollutants) and local government area (for air pollutants), based on the relative priority of reducing the pollutant in that area. This area-by-area approach may also remove the need to link pollutant weightings to different receiving-water types (i.e. open coastal, estuarine and enclosed waters). This

approach would also simplify the pollutant load fee formula, effectively combining the variables PW and CZ into a single variable; an area-specific pollutant weighting.

Potential options for change

Following the review of pollutants mentioned above, there will be two options for consolidating and finalising the list of pollutants to be included in LBL. Note that not all pollutants would necessarily be applied to all activities (depending on the outcome of the review of activities included in the scheme – see Section 4.2.3).

***Option 1**: Similar to the status quo – include a broad list of pollutants that have actual or potential load effects in NSW*

Pros	Cons
• An inclusive approach which aims to improve the coverage and environmental benefits of the scheme	• A larger number of pollutants could make the scheme complex and difficult to administer • Increased licensee compliance costs; need to monitor/estimate a greater number of pollutants • May reduce cost-effectiveness and efficiency

Possible variations within this option

Depending on the number and nature of pollutants, it may be possible under this option to implement less rigorous emission estimation and reporting requirements for some pollutants of lower concern. Similarly, it may be possible to reduce or remove the requirement to pay load fees for these pollutants.

Would an amendment to the Regulation be required for this option?

Yes, altering the pollutants covered under the scheme would require an amendment.

***Option 2**: Focus on the highest priority pollutants*

Only the pollutants of greatest concern would be included in the scheme.

Pros	Cons
• Would streamline the scheme and allow licensees to focus their efforts on pollutants of highest concern • Could be tailored to reflect the pollutants the EPA is focusing its regulatory effort on for a set period • Would improve cost-effectiveness and efficiency • Would remove fees for lower priority pollutants	• Some pollutants (of lower concern) may be removed from the scheme even if they present a load issue, which may reduce the incentive for licensees to reduce these emissions; however, these pollutants can still be managed by licence conditions, where warranted

Possible variations within this option

Under this option, pollutant weightings could be increased for the reduced list of pollutants that remain in LBL. This would act as a greater incentive and driver to reduce emissions of the pollutants of greatest concern, and emission estimation and reporting requirements for these pollutants could also be strengthened.

Another variation could see pollutants ranked differently in different areas (or critical zones), allowing targeting of specific pollutants in places where they are a particular concern. It may be possible to still apply load limits on licences for pollutants that are removed from the LBL scheme, thus ensuring that there is an ultimate 'cap' on these pollutant loads, where appropriate. Option 3 in section 4.2.4 discussed the potential benefits of this approach in detail.

Would an amendment to the Regulation be required for this option?

Yes, altering the pollutants covered under the scheme would require an amendment.

4.2.2 Critical zones – are areas of highest concern appropriately targeted?

How it works now

Under the LBL scheme, there are a number of critical zones designated for selected pollutants to air and water. These zones reflect areas where pollutants are likely to have a more harmful impact on the health of the environment and/or community; for example, they may have a higher population density or be more environmentally sensitive. Critical zones are weighted so that licensees emitting selected pollutants within them pay comparatively higher fees per kilogram of that substance. See *NSW EPA's Load-based Licensing Scheme: Overview and facts about load-based licensing* for current LBL critical zones and weightings, including maps.

Existing air critical zones:

- apply to NO_X and VOCs
- have the same weightings for both NO_X and VOCs which are either two or seven, largely dependent on the size of the population
- primarily cover LGAs where industry is co-located with a higher population.

Existing water critical zones:

- apply to salts and nutrients ('total nitrogen' and 'total phosphorus')
- have weightings of three
- for salts and nutrients overlap to some extent but cover different areas
- reflect areas with limited capacity to assimilate these pollutants, based on the environmental condition and pressures from regulated point sources in 1998
- apply to the majority of inland catchments – designated as 'enclosed waters'
- do not include coastal catchments (with the exception of the Hawkesbury–Nepean), which were assumed to have a relatively good capacity to dilute and flush pollutants.

Indications that change is needed

Critical zones appear to have been an effective component of the LBL scheme. Trend analysis demonstrates that, in general, emission loads for premises within critical zones decreased more quickly than premises within unweighted zones. For example, over the 2003–04 to 2013–14 period:

- salt loads to water decreased by 99% in critical zones, but decreased by only 65% in non-critical zones
- nitrogen to water decreased by 19% in critical zones but rose by 10% in non-critical zones
- phosphorous to water decreased by 55% in critical zones, but decreased by only 25% in non-critical zones, and
- loads of VOCs to air decreased by 55% and 71% in critical zones 2 and 7 respectively but increased in non-critical zones.

There have been many changes to the industrial, demographic and environmental landscape of NSW over the past 16 years with new issues and priorities emerging for these areas:

- New industrial sectors have emerged (e.g. coal seam gas) and some have changed in nature (e.g. Sydney's major oil refineries have become primarily storage, blending and distribution facilities).
- Populations have grown in both metropolitan and regional areas.
- Pressures on the environment and in particular catchments have changed.

A priority of the LBL review is to ensure that LBL licensees are given appropriate incentives to reduce the pollutants that are currently of highest concern in each region. A review of critical zones and their corresponding weightings is an important component of this. Since the LBL scheme was developed, monitoring and regulation of air and water catchments has improved, particularly regarding pollutant concentrations and loads.. There is also a large range of new data available on environmental health, vulnerability, resilience and values.

New data is also available on tidal flows and dilution or flushing capacity in coastal catchments that shows many coastal catchments in NSW have only intermittent connections to the ocean and consequently relatively poor flushing capacity. Consideration will be given to whether critical zones should be applied to some coastal areas.

Additional analysis and work – review of critical zones

The EPA is currently reviewing all components of critical zones. This includes the criteria for determining critical zones (or priority areas), the available datasets, boundaries, associated pollutants and their weightings within specific critical zones. More broadly, the review is considering whether 'critical zones' as they have been traditionally used under LBL, are the most efficient way of signalling priority areas of concern in NSW and whether the principles of the critical zone approach could be further developed or expanded to capture, rank and prioritise all areas of the State. This review is closely linked to the pollutant review discussed under Section 4.2.1.

The EPA has determined the following criteria for critical zones (or priority areas), which will be applied through the review. Critical zones are areas:

- where environmental, social and/or economic attributes are high in value or importance, and there is a high impact risk associated with cumulative loads
- where established environmental quality thresholds, standards or guidelines are exceeded or likely to be exceeded
- with low resilience or limited capacity to assimilate and recover from exposure to specific pollutants, and
- with significant cumulative pollutant loads (total mass – from all point and non-point sources), and contributing licensed industry.

Critical zone pollutants and weightings

The review of critical zones together with the review of pollutants (see Section 4.2.1) may recommend new, revised and/or confirmed critical zones and associated pollutants, or may recommend an alternative approach for providing licensees with appropriate incentives to reduce pollution in priority areas.

The method for deriving weightings for the critical zones (or priority areas) will include an assessment of the magnitude of the emissions within the critical zone, exposure of the population and/or environment in the critical zone, and potentially a consideration of abatement costs and damage costs (see Section 4.3.4).

This work is crucial to the proposed new direction of the LBL scheme. It is proposed to better complement the EPA's regulatory framework by driving emission reduction in critical zones (or priority areas) in particular, especially where a cumulative impact has developed or has a significant potential to develop; see Box 3-2 which describes cumulative impacts relating to particulates. Elsewhere, it is proposed that the scheme will continue to provide an incentive for licensees to improve their performance, but fees may not necessarily reflect the cost of abatement/damage.

Potential options for change

Option 1: *Continuing with the status quo approach - based on the EPA's review of critical zones and the latest available evidence and data, provide updated critical zone locations and weightings for priority pollutants*

As discussed above, the EPA's current review of critical zones will result in a prioritisation of the relative vulnerability of different areas of the State to different pollutant types. This information can be used to develop new, revised and/or confirmed critical zones and associated pollutants, continuing with the status quo 'critical zones' approach.

Pros	Cons
• Continues with the accepted critical zones approach – the status quo • Uses the latest available evidence to assign critical zones for priority pollutants in priority areas, signalling the most vulnerable areas of the State	• Continuing with the critical zones approach provides limited opportunity to rank or prioritise (or provide a relative incentive) to those areas of the State or pollutants that are not captured by specific 'critical zones'.

Option 2*: Further developing and expanding on the principles of the 'critical zone' approach, rather than creating critical zones over some discreet areas, assign area-specific weightings across the State*

The current review of critical zones is effectively identifying the relative priority of reducing loads of pollutants (specific or grouped) released to different areas of the state based on land-based pressures, environmental health and values, and resilience of that area to various pollutants using the most recently available data. This prioritisation effectively identified (priority) areas that are more vulnerable to a range of pollutant types.

For the review, areas for water are being ranked and prioritised based on appropriate natural landscape features (e.g. by catchment), to align with the overland flow (drainage) patterns. For air, areas are being prioritised by population-based divisions (e.g. by local government area - LGA). The resultant priority areas could be used to determine new critical zones, or alternatively, could be applied to a different component of the LBL fee formula.

For example, once an area is prioritised, an area-specific pollutant weighting could be applied to reflect the relative vulnerability of that area to a specific pollutant. By using a matrix approach, each assessable pollutant would be assigned a specific pollutant weighting for a specific area.

For water pollutants, this approach could also remove the need for the existing receiving-water specific pollutant weightings (i.e. open coastal, estuarine and enclosed waters). As each catchment or sub-catchment would receive a unique weighting, there may no longer be a need to specify the receiving water type, thus further reducing complexity.

Pros	Cons
• Provides a more detailed prioritisation of areas overall, which reflects the relative vulnerability of each area to specific pollutants • Simplifies the load fee formula by effectively combining the variables PW and CZ into a single variable; an area-specific pollutant weighting • Removes the need for receiving-water specific pollutant weightings • Provides more flexibility in how pollutant weightings are assigned and allows for individual adjustment of weightings as new information is made available.	• This approach requires a large 'matrix' to specify the pollutant weighting for each area (e.g. catchment or LGA), which would be complex to include in a Regulation. However, the matrix could be included as a separate document that is gazetted and referred to in the Regulation. In addition, an online, user-friendly 'portal' (e.g. drop down menu) could be used to assist licensees to easily identify the relevant pollutant weightings.

Would an amendment to the Regulation be required for this option?

Yes. Any change to critical zones or weightings would require an amendment.

4.2.3 Scheduled activities – are appropriate activities included?

How it works now

The LBL scheme was designed to capture the most significant industrial point-source emissions, where technically feasible and practical, so that licensees have an additional incentive to reduce their emissions of the target pollutants. Examples are coal fired power-stations and large sewage treatment plants, which account for 67%and 83% of LBL emissions to air and water respectively. This approach was based on analysis which indicated that a relatively small number of operations emitted most of the target pollutants to the NSW environment. As such, 11% of all environment protection licence holders (274 of 2568) are currently subject to the LBL scheme.

The LBL scheme uses a multi-tiered approach to specify which licensees are included in the scheme and which pollutants they need to pay a load fee for, if applicable:

- Is the premises licensed for an activity that is included in the scheme?
- Is their licensed production capacity equal to or greater than the threshold for inclusion in the scheme?
- Which pollutants are listed as assessable for the licensed activity?

These considerations are stipulated in Schedule 1 of the POEO General Regulation.

Some activities have a higher threshold for inclusion in the LBL scheme than the licensing trigger. For example, a facility which recovers waste oil requires a licence if it has the capacity to process more than 20 tonnes of waste oil per year or store more than 2000 litres of waste oil at any time; however, it will only be subject the LBL scheme if its annual production capacity exceeds 20,000 tonnes.

Indications that change is needed

There are a number of potential inequities in the way scheduled activities are currently included in the LBL scheme. This review will consider whether the inequity is real and significant, whether it can be addressed and whether there is a good justification for treating some licensees differently. Potential inequities include:

- Only a subset of all licensed facilities are subject to LBL and required to pay pollutant load fees.
- Some licensed facilities discharge significant quantities of LBL assessable pollutants but are not included in the LBL scheme.
- Some LBL facilities are not required to determine and report on the load of some LBL assessable pollutants that they actually discharge in significant quantities, i.e. they are not listed as an assessable pollutant for the activity or because the pollutant is not commonly released by other facilities in the sector.
- Some LBL facilities do not discharge an LBL assessable pollutant which is common to the sector due to the characteristics of the operation, but are still required to estimate and report on the loads of that pollutant.

An examination of pollution data submitted to NPI for 2013-14 shows that there are significant emissions of some pollutants reported to NPI that are not captured by the LBL scheme.

For example:

a) The scheduled activity 'mining for coal' is responsible for a significant proportion of the following pollutant emissions in NSW: PM_{10} to air (75%), chromium to water (75%), selenium to water (71%), arsenic to water (61%), $PM_{2.5}$ to air (51%), VOCs to air (31%), arsenic to air (23%), PAHs to air (23%), lead to water (23%) and NO_X to air (16%).
b) The scheduled activity 'mining for minerals' is responsible for a significant proportion of the following pollutant emissions in NSW: lead to air (80%), arsenic to air (63%) and PM_{10} to air (15%).
c) The scheduled activity 'coal works' is responsible for 16% of selenium emissions to water in NSW.

The 2013-14 NPI data also shows that there are significant emissions of some pollutants reported to NPI by activities that are currently included in the LBL scheme, however, they are not required to report or pay fees on those particular pollutants under LBL. For example:

a) 'electricity generation' – reports significant emissions of cadmium to water (48%), lead to water (16%), chromium to water (15%), arsenic to water (21%) and VOCs[27] to air (11%)
b) 'sewage treatment' – reports significant emissions of hydrogen sulphide to air (69%)
c) 'metallurgical activities' – reports significant emissions of phenolics to water (32%), and
d) 'petroleum and fuel production'– reports significant emissions of cadmium to water (17%).

Looking at specific pollutants in detail, figure 4-1 below shows the reported releases of PM_{10} from industrial facilities that report to LBL and NPI. The figure shows that the LBL scheme is capturing only a small fraction of the total PM_{10} emissions to air from industrial activities in NSW and that 'mining for coal' and 'mining for minerals' (neither of which are currently captured by the LBL scheme) clearly dominate the emissions profile when examining NPI data, accounting for around 90% of industrial emissions in 2013–14. This figure also shows that PM_{10} emissions from coal mining activities have been increasing in the four years from 2009–10 to 2012–13, with a small decrease in 2013–14.

Similarly, the LBL scheme currently only captures a fraction of VOC emissions to air. 'Mining for coal', 'mining for minerals' and 'electricity generation'[28] currently account for around 42% of VOC emissions collectively; however, none of these emissions are captured by the LBL scheme.

[27] Note: VOCs is currently an assessable pollutant for the scheduled activity 'electricity generation from diesel'. However, VOCs is not an assessable pollutant for 'electricity generation from gas' or 'electricity generation from coal'.

[28] While 'electricity generation' is an LBL activity, coal and gas fired generators are not required to report on or pay fees for VOCs under the scheme. Note: diesel fired generators are required to report on VOCs.

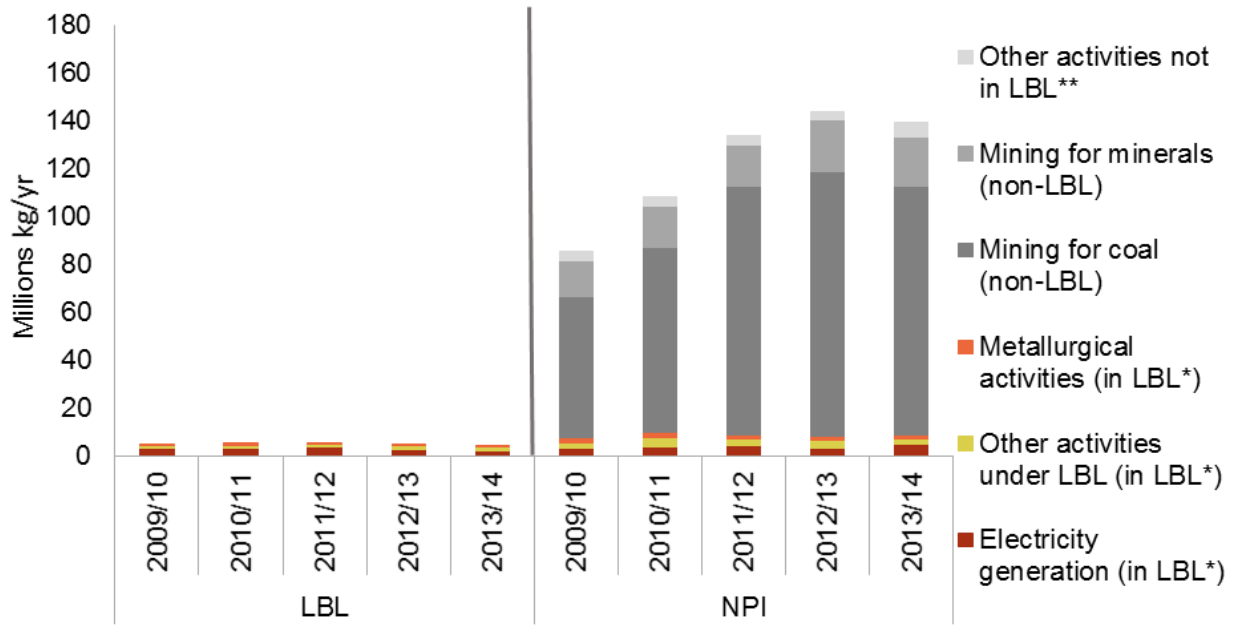

Figure 4-1: PM_{10} air emissions in NSW by industry activity, reported to LBL (first four columns) and NPI (last four columns)[29]

Figure 4-2 shows that metals[31] discharged to water from 'mining for coal' facilities in NSW are not insignificant. In the Hunter region[32] in 2013–14, 23.6% of reported metals emissions to water were from the coal mining industry and 76.4% were from the electricity generation industry. These are significant sources of metals not currently captured under the LBL scheme.

Sectors that release significant quantities of pollutants sourced from diffuse or fugitive sources (e.g. the mining sector) were originally excluded from the LBL scheme because the techniques used to estimate emissions from diffuse sources were not readily available. However, improvements in emissions estimation have been made for a broad range of industry sectors, including diffuse emissions from mining activities. NPI has developed over

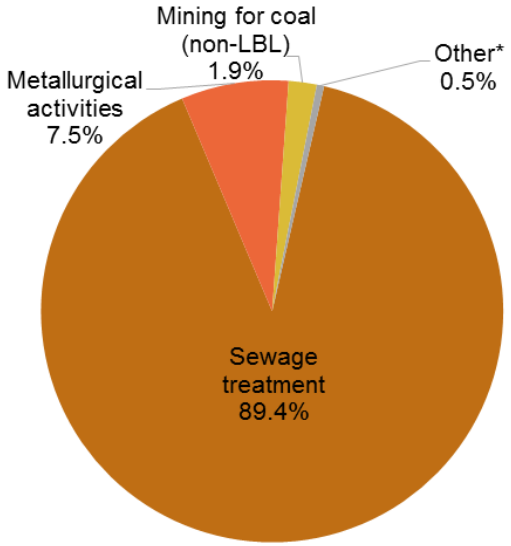

Figure 4-2: Metal emissions to water in NSW by industry activity, reported to NPI (2013–14)[30]

[29] See Appendix E for a table of data for Figure 4-1. * Activities listed as 'in LBL' – note that for the same type of activity (e.g. 'metallurgical activities'), NPI generally captures a larger number of premises because it includes those that fall below the LBL licensing thresholds. This explains why the NPI data tends to have a slightly larger stacked-bar for these activities compared to LBL data. **'Other activities not in LBL' includes 'other EPA licensed activities (non-LBL)' and 'non-licensed activities'.

[30] Figure 4-2: *'Other' includes Electricity generation** (0.4%), Chemical production activities** (<0.1%), Petroleum and fuel production** (<0.1%), 'other LBL activities' (<0.1%), Mining for minerals (non-LBL) (<0.1%), and 'other EPA licensed activities (non-LBL)' (0.1%).**NB: these activities are subject to LBL but are not required to report metal emissions to water.

[31] 'Metals' includes: cadmium, chromium, copper, lead, mercury, and zinc. The metals aluminium, beryllium cobalt, lithium, magnesium, manganese, nickel and tin are not included as these are not reported to LBL.

[32] 'Hunter' region includes: Dungog, Gloucester, Great Lakes, Muswellbrook, Singleton and Upper Hunter local government areas.

100 different Emissions Estimation Technique Manuals[33] covering a broad range of industry sectors. These are currently used by over 850 NSW facilities and mean that many activities can be reconsidered for inclusion in LBL.

The benefits of different types of thresholds – production capacity, emission loads, production inputs

For most pollutants, the current **production capacity thresholds** do appear to be capturing facilities releasing the most significant quantities of each assessable pollutant; however, while production capacity seems to be a good indicator of the amount of pollutant likely to be discharged into the environment, the EPA is considering whether there is a more equitable approach to determining which facilities should or should not be included in the scheme.

An **emission load threshold** is one possible alternative approach. Pollutant emission thresholds are used internationally, for example by the US EPA, to ensure that pollutant fees are proportionate to the amount of emissions released and smaller emitters are not required to estimate and report emissions. The *Comparative review of load-based licensing fee systems* found that some OECD countries also use this approach (see Appendix B). Adopting this approach could simplify the LBL scheme and lower the administrative burden and compliance costs for small emitters.

While thresholds can be useful, there are costs for both the EPA and licensees associated with determining whether a licensee has exceeded a threshold. These issues will need to be considered during the review if thresholds are pursued.

Thresholds for inclusion in the LBL scheme could also be based on **production inputs**, rather than emission outputs. The NPI requires reporting of a pollutant if a facility 'uses' a certain amount of that substance. Use of a substance means the handling, manufacture, import, processing, coincidental production or other use of the substance. For example, the amount of fuel used is also a strong indicator of the emissions that are produced by an activity; however, while this approach is useful for pollutants discharged during the combustion process, it is less applicable to activities that do not use fuel.

[33] www.npi.gov.au/reporting/industry-reporting-materials/emission-estimation-technique-manuals

Box 4-2: The benefits of setting a NO_X emission threshold for LBL

In 2013–14, NPI data showed that the top seven NO_X generating facilities in NSW (which released 73.1% of total NO_X emissions to air) were LBL licensees. Another 6.3% of NO_X emissions to air came from other LBL licensees and 20.6% of emissions came from non-LBL licensees.

For a number of LBL licensees required to report NO_X under the LBL scheme, their emissions are actually very low. For example, according to LBL data, in 2013–14, of the 85 licensees which reported NO_X emissions under LBL, 15 reported that no NO_X (zero kilograms) was emitted and three reported emitting less than 40 kilograms of NO_X (which equates to around $10 or less in liable LBL fees). In these situations, it is likely that the compliance costs associated with reporting the NO_X emissions (e.g. measuring the NO_X loads) would far exceed the amount of liable NO_X load fees.

In response to this type of scenario, some LBL licensees have requested that the requirement to report NO_X emissions be removed when the estimated fees are insignificant (e.g. resulting in less than $10 in LBL fees); however, proving that the emissions are insignificant can require two or more stack tests or other expensive measurement techniques.

An alternative to excluding very small or 'insignificant' NO_X emissions could be to set a NO_X emission threshold for LBL that captures a significant proportion of NO_X emissions, while better targeting requirements to estimate and report them.

For example, an LBL threshold of 10,000 kg of NO_X emitted per year, could capture approximately 99.7% of the NO_X emissions reported to NPI in NSW, which equates to 214 facilities; a large increase compared to the 85 licensees currently reporting NO_X emissions under LBL. By comparison, a threshold of 200,000 kg of NO_X per year could capture approximately 96.1% of the NO_X emissions reported to NPI in NSW, which equates to 54 facilities. This would appear to be a more cost-effective approach.

Additional analysis and work

Given that there are a variety of ways to choose which licensees are subject to the LBL scheme (see Options 1–5 below), the EPA intends to design a process for the review of activities once feedback has been received on the options outlined in this issues paper. Other EPA work currently underway will also inform this analysis.

If the EPA's proposal paper recommends that additional scheduled activities (industrial sectors) be included in the LBL scheme, the EPA would also determine whether appropriate emission estimation techniques already exist for each assessable pollutant that that industry would be liable to pay fees for under the proposal. Where appropriate methodologies are not already include within the LCP, the EPA would develop new methodologies (or adopt or adjust methodologies that might already exist for a different purpose) in consultation with the industry in question and other appropriate stakeholders.

The EPA will also be updating the LCP to reduce complexity, ensure equity across the scheme (see Section 4.6), and reflect changes made to the Regulation via this review.

Under the LCP, each scheduled activity is divided into a number of sub-activities called components. Different components have different point sources, different load estimation techniques and may require different pollutants to be reported. Not all component processes undertaken at facilities have load calculation methods detailed in the LCP. This means some emissions being released by a facility may not be captured within the LBL scheme, and conversely some pollutants may have been inappropriately assigned to some components and would warrant review. These could be fugitive or point-source emissions.

Improvements in emissions modelling have been made for a broad range of industry sectors, particularly for emissions from diffuse sources. Components formerly excluded from the LCP that now have readily available methods to estimate emissions could be considered for inclusion.

The EPA intends to produce an updated, simplified and streamlined LCP as a companion product to this review, i.e. in addition to the legislative, policy and administrative changes recommended during this review. This would also reduce red tape and compliance costs for the regulated community.

Potential options for change

There are a number of possible ways that the LBL scheme could be modified to ensure the right activities are being captured.

***Option 1**: Extend the LBL scheme to cover all EPA licensees*

This would mean including all EPA licensed activities in the scheme regardless of their activity type (scheduled activity) or their size (production capacity).

Note: Licensees currently licensed for noise only would continue to be excluded from the scheme.

Pros	Cons
• All licensees would have an incentive to reduce their emissions • Most consistent with the 'polluter pays' principle • Premises with small production capacities but high emissions would be captured • All licensees would know they are subject to the scheme	• Additional compliance costs would be incurred by all licensees not currently subject to LBL regardless of the amount of pollution they emit • Diminishing returns – in many cases the additional regulatory burden would result in a negligible amount of addition assessable pollutants being captured by the scheme

Possible variations within this option:

EPA licensees (i.e. individual facilities) with lower emissions (e.g. under a set load threshold) would have to report loads and pay fees, but would be given simpler methods to calculate their loads (e.g. permitted to use a default emission factor, aligning with NPI where possible). Thus the higher the discharge, above a load threshold, the more effort needed to accurately determine the emissions load; if below a threshold, licensees would still be required to report but would use a generic emission factor. This would reduce the impact of cons listed above.

Would an amendment to the Regulation be required for this option?

Yes, altering the activities covered under the scheme would require an amendment.

***Option 2**: Extend the LBL scheme to cover all EPA licensed activities; however, exclude certain licensees through the use of thresholds or triggers*

This would mean including all EPA licensed activities in the LBL scheme regardless of their activity type (scheduled activity); however, exclude certain individual licensees. The scheme could be set up to include one or more of the following exclusions:

a. licensees with smaller production capacities (those under an activity-specific production capacity threshold)
b. licensees who do not trigger certain pollutant emission, production-input or 'use' thresholds for the pollutant, and/or
c. licensees who do not have approval to discharge in dry weather (an exclusion for water pollutants only).

The specific pros and cons of each of these **exclusions** are considered below.

Pros	Cons
• **2a only** – While production rates change, production capacity rarely changes year to year, except with further planning consent. This makes it clearer for a licensee whether they are in or out of the LBL scheme • **2b only** – Consistent with the NPI approach • **2c only** – This approach would be more cost-effective and efficient for water pollutants	• **2a only** – Does not consider actual emissions; just because a facility is small, does not necessarily mean its emissions are not significant • **2b and 2c** – Less clear/transparent to the community and prospective licensees than Options 2a and 3 (below), because the regulation would not specify which scheduled activities are subject to LBL; however, dry-weather discharge limits are specified on licences

Would an amendment to the Regulation be required for this option?

Yes, altering the activities covered under the scheme would require an amendment. Altering the LBL thresholds would also require an amendment to the Regulation.

***Option 3**: Keep the current basic structure, but refine the coverage of the LBL scheme so that the highest emitting EPA licensed activities are captured, in order to cover more than 80% of assessable pollutant emissions*

This would include reviewing the current range of scheduled activities and production thresholds included in the scheme and their associated assessable pollutants.

Pros	Cons
• Consistent with the purpose of the scheme in capturing the most significant industrial emissions • Would allow assessable pollutants to be targeted to those activities that contribute a significant proportion of the total load of each assessable pollutant, i.e. if the activity contributes a negligible percentage it would not be monitored, estimated and reported on • Cost-effective because it minimises the issue of diminishing returns, where a greater number of licensees are included but only a small additional amount of pollution is captured	• Some licensees may release pollutants in significant quantities that are not characteristic of their scheduled activity. This is likely to be a rare situation; may be more of an issue where the discharge is into a critical zone that targets the pollutant

Possible variations within this option:

- Remove all production capacity thresholds so all premises licensed for the activity are subject to LBL regardless of the level of production. This would simplify the scheme.
- Within critical zones, provide a mechanism for licensees who are not subject to LBL under Option 3 alone, but who emit a significant load of one of the pollutants of concern for that critical zone, to be pulled into the LBL scheme. This would require discharge thresholds (or a threshold of another type) to be specified for the target pollutants. Thresholds could be specified for all critical zones, or just the highest priority ones, as appropriate. This would address the con above to a significant extent; more targeted (in relation to critical zones) than Option 3 alone, more cost-effective and efficient (compared to Options 2a–2c) and more reasonable and equitable (compared to Option 3 alone).

Would an amendment to the Regulation be required for this option?

Yes, altering the activities covered under the scheme would require an amendment. Altering the assessable pollutants for each activity would also require an amendment to the Regulation.

***Option 4**: Allow more flexible application of pollutants to each LBL activity (complementary to Options 1-3)*

This means that for any of the Options 1–3 above, a 'core' set of assessable pollutants could be specified for each scheduled activity, and a mechanism could also be provided for additional 'optional' assessable pollutants to be added at the discretion of EPA authorised officers (this would address the con listed in Option 3 above). This would be based on site-specific or regional circumstances. Licensees could apply to the EPA to have pollutants removed (e.g. where a change in process means they no longer emit that pollutant).

Pros	Cons
• Would increase flexibility and enable licences to be tailored for site-specific circumstances • Specified 'core' pollutants would give licensees certainty about what they would typically be required to report on	• More administrative work for the EPA in justifying the addition of optional pollutants • less clear/transparent to the community and prospective licensees than Options 2a and 3; the Regulation only specifies a core set of assessable pollutants for each scheduled activity subject to LBL

Possible variations within this option:

There are many different ways that a 'core' and 'optional' set of assessable pollutants could be applied to different activities. For example, the 'core' pollutants could be specified in the Regulation, while the 'optional' pollutants are specified in the LCP.

Would an amendment to the Regulation be required for this option?

Yes, altering the assessable pollutants for each activity would require an amendment.

***Option 5**: Pursue a combination of two or more of Options 1 to 4*

4.2.4 Load limits – are load limits being used effectively?

How it works now

While load fees are intended to act as an incentive for licensees to reduce their emissions, annual 'load limits' are also applied to some facilities to cap the discharge of specific pollutants at a specified maximum allowable load, where this may be required.

A load limit is the maximum mass of a particular pollutant that a facility can legally discharge each year (e.g. a 5000 kg per year phosphorus load limit may apply to a sewage treatment plant). Exceeding a load limit is a breach of a licence condition (and is prosecutable). Load limits were intended to provide a mechanism for preventing the deterioration of receiving environments; in practice, their use seems to be most appropriate for managing impacts where a water body is nearing its sustainable load of a specific pollutant (e.g. nutrients) and additional measures are needed to better manage that risk.

Adding a load limit to a licence is not a requirement of the legislation, but rather is an operational licensing decision for the EPA. The EPA's primary criteria for determining appropriate load limits are:

- ensuring that satisfactory environmental outcomes are achieved within the particular receiving environment, and
- the limit can be practically achieved.

Load limits may be renegotiated to allow for the commencement of new activities at the premises or a significant expansion of existing activities, where appropriate. Load limits are set at a point which enables licensees to carry out their licensed activities.

When the LBL scheme was introduced, it was envisaged that load limits would be progressively added to LBL licences for most assessable pollutants. In 2013–14:

- 233 of 274 LBL licences (85%) had load limits on one or more assessable pollutants
- where load limits had been applied:
    - the assessable load emitted was less than 25% of the load limit in 58% of cases
    - the assessable load emitted was less than 50% of the load limit in 78% of cases
    - the assessable load emitted was between 50% and 100% of the load limit in 19% of cases
    - load limits were exceeded in only 3% of cases; the majority from the sewage treatment industry.

The above suggests that in many cases the load limits were either too high or were ineffective; however, it also questions whether they were needed at all for these premises.

EPA regulatory officers have the discretion to impose load limits; however, there is no current EPA operational policy relating to the setting of such limits.

Indications that change is needed

Load limits were not intended to constrain production. Planning consents and environment protection licences already specify allowable scales of production (where required); however, early in the scheme's implementation, some licensees expressed a concern to the EPA that load limits unnecessarily constrained their production. They argued that load limits effectively limited licensees' flexibility to make commercial decisions to increase production in response to demand. Licensees were also concerned that regular breaches would occur where facility emissions are variable due to changes in production levels.

Some 'sewage treatment system' licensees report that complying with load limits has a greater influence on their efforts to reduce emissions than avoiding higher load-based fees once the fee rate threshold (FRT) has been surpassed.

The above information suggests that load limits are a valuable regulatory tool in some circumstances, but that the role of load limits needs to be reviewed.

Potential options for change

Option 1*: Develop an operational policy on the application of load limits*

Develop guidance for assessing when a load limit is warranted and for determining appropriate load limits, to allow load limits to be used in a strategic and consistent manner. An operational policy on the application and use of load limits could aim to:

- avoid any unnecessary constraint on the plant's production
- consider whether and when the use of short-term or temporary limits might be appropriate (e.g. to account for seasonal variations)
- provide transparent and transferable procedures for setting load limits
- increase LBL licensees' and EPA staff understanding of the function of load limits
- provide guidance on how to set load limits according to the condition of the receiving environment
- allow flexibility for industry to increase production levels but not emissions intensity
- complement critical zones by using load limits to put a total cap on emissions at specific facilities, where there is evidence of a need to target a specific pollutant in priority areas.

Pros	Cons
• Provides a better understanding of the role of load limits and consistent application of them • May provide cost savings, including time spent justifying why a load limit is/is not included on a specific licence	• Minimal – EPA would need to commit resources to developing the guidance; this is offset by cost savings – see pros

Would an amendment to the Regulation be required for this option?

No, a load limit policy could be developed without an amendment to the Regulation.

***Option 2**: Abolish load limits*

If load limits are found to be ineffectual across the board, a decision could be made to remove them from existing licences and to discontinue their use.

Pros	Cons
• Would avoid instances where load limits were used inappropriately (however, this risk could be avoided via the guidance proposed in Option 1)	• The tool is working in some instances; could lose the benefits that load limits are providing and the EPA would need to find another approach to achieve the same outcome

Would an amendment to the Regulation be required for this option?

No, removing load limits from the scheme would not require an amendment to the Regulation as they are an operational tool only.

***Option 3**: Decouple load limits from the LBL scheme and allow them to be used for any licensees where warranted, including non-LBL premises (complementary to option 1)*

Load limits would be retained as a regulatory tool and used for any licensee where the total load of a specific pollutant (either LBL or non-LBL pollutants) released from the premises needed to be regulated. For example, this would allow load limits to be used:

- for non-LBL licensees – adding load limits for LBL assessable pollutants and also potentially for non-LBL pollutants
- for LBL licensees – adding load limits for non-LBL pollutants or LBL pollutants that are not listed as assessable for their activity (e.g. it may be appropriate to remove BOD as an assessable water pollutant; however, retain BOD load limits for STSs), and/or
- in critical zones, for a particular pollutant – using load limits for both LBL and non-LBL licensees might be appropriate to ensure that all licensees are contributing to the protection of a compromised waterway, for example.

Pros	Cons
• Could be used across any licence when warranted, e.g. where the receiving environment is constrained in its ability to assimilate specific pollutants • Would extend one of the useful tools of the current LBL scheme to non-LBL licensees without bringing them into the scheme and subjecting them to increased compliance costs • Where load limits are currently working they could be retained, where they do not appear to be being effective, they could be removed	• There may still be instances where load limits are used inappropriately; however, this risk could be avoided via the guidance proposed above in Option 1

Would an amendment to the Regulation be required for this option?

No, adding load limits to a licence is a policy decision.

***Option 4**: A combination of Options 1 and 3*

This would deliver the benefits of both Options 1 and 3, plus address the con of Option 3.

Section summary and focus questions for stakeholders

Section 4.2 – Key elements of the LBL scheme

Assessable pollutants – are the right pollutants being captured?

Over the past 16 years, refinements in pollutant definitions, classification and measuring; changes in pollutant regulation and reporting requirements under other schemes; and improvements in our understanding of the long-term environmental and health impacts of pollutants, mean it is necessary to review the pollutants addressed though the scheme.

***Option 1**: Similar to the status quo – include a broad list of pollutants that have actual or potential load effects in NSW*

***Option 2**: Focus on the highest priority pollutants*

Topic focus question

1. Are there any particular issues with the current LBL pollutants, including the pollutants captured, definitions and weightings?

Please also refer to the **Section focus questions** below.

Critical zones – are areas of highest concern appropriately targeted?

A review of critical zones and their corresponding weightings is an important component of ensuring that LBL licensees are given appropriate incentives to reduce the pollutants that are currently of highest concern in each region.

***Option 1:** Continuing with the status quo approach – based on the EPA's review of critical zones and the latest available evidence and data, provide updated critical zone locations and weightings for priority pollutants*

***Option 2**: Further developing and expanding on the principles of the 'critical zone' approach, rather than creating critical zones over some discreet areas, assign area-specific pollutant weightings across the state*

Please refer to the **Section focus questions** below.

Scheduled activities – are appropriate activities included?

There are a number of potential inequities in the way scheduled activities are currently included in the LBL scheme. The review will see if the inequity is real and/or significant, if it can be addressed, and whether treating some licensees differently is justified.

***Option 1**: Extend the LBL scheme to cover all EPA licensees*

***Option 2**: Extend the LBL scheme to cover all EPA licensed activities; however, exclude certain licensees through the use of thresholds or triggers*

***Option 3**: Keep the current basic structure, but refine the coverage of the LBL scheme so that the highest emitting EPA licensed activities are captured, in order to cover more than 80% of assessable pollutant emissions*

***Option 4**: Allow more flexible application of pollutants to each LBL activity (complementary to options 1-3)*

***Option 5**: Pursue a combination of two or more of Options 1 to 4*

Please refer to the **Section focus questions** below.

Load limits – are load limits being used effectively?

Data collected and feedback from licensees suggest that load limits are a valuable tool in many instances, but that their role needs to be reviewed and better articulated.

***Option 1**: Develop an operational policy on the application of load limits*

***Option 2**: Abolish load limits*

***Option 3**: Decouple load limits from the LBL scheme and allow them to be used for any licensees where warranted, including non-LBL premises (complementary to option1)*

***Option 4**: A combination of Options 1 and 3*

Topic focus questions

1. Do you have any feedback/experience on the use of load limits that would assist the EPA to consider this issue?

Please also refer to the **Section focus questions** below.

Section focus questions

1. Do you consider any of the options described for assessable pollutants, critical zones, scheduled activities or load limits to be preferable? If so why?
2. Do you consider any of the options to be impractical or unworkable in some way? If so, why?
3. Do any of the options offer additional benefits or issues that the EPA should consider?
4. Do you have any other suggestions for improvement?

4.3 The LBL fee

In this section, the question of the effectiveness of LBL is further explored with a detailed look at fees and whether they appear to provide the level of incentive needed for licensees to improve their environmental performance when compared to the costs of abatement and other possible approaches, i.e. whether fees are generally set at the right level and whether there is justification for raising fees:

- effective fee setting, including setting fees to reflect 'abatement costs' and/or 'damage costs' and whether fees should be raised and in which situations (Section 4.3.1)
- key components of the fee calculation in detail (pollutant fee unit, pollutant weighting, critical zone weightings for targeted pollutants and fee rate threshold factors) and options to achieve a more effective load-based fee in a range of circumstances, specifically how fees could be raised (Sections 4.3.2 to 4.3.5)
- the weighted load discount and how it could be improved to further encourage actions to reduce the environmental harm of pollutant discharges (Section 4.3.6)
- the current administrative/load fee discount and how it is eroding the effectiveness of the LBL fee incentive, and the proposed removal of this discount (Section 4.3.7).

4.3.1 Effective fee setting

Theoretical basis for load-based fees

The cost of pollution to the community (e.g. damage to human health and the environment) is generally 'external' to a licensee's decision-making framework because the business is not usually directly impacted by these costs. Charging the polluter a fee for the pollution emitted from their premises is one way to correct this market failure. Charging a fee for pollution helps licensees to 'internalise' these otherwise external costs and acts as incentive for them to reduce this pollution if the fees are set at an optimal level (e.g. sufficiently high).

The *Comparative review of load-based licensing fee systems* (see Appendix B) found that environmental taxes and fees for pollution control and natural resource management are an increasingly important part of environmental policy in OECD countries. The comparative review report provides some examples of how NSW LBL fees for air and water pollutants compare to other OECD jurisdictions. One example, for SO_X, is provided in Figure 4-3.

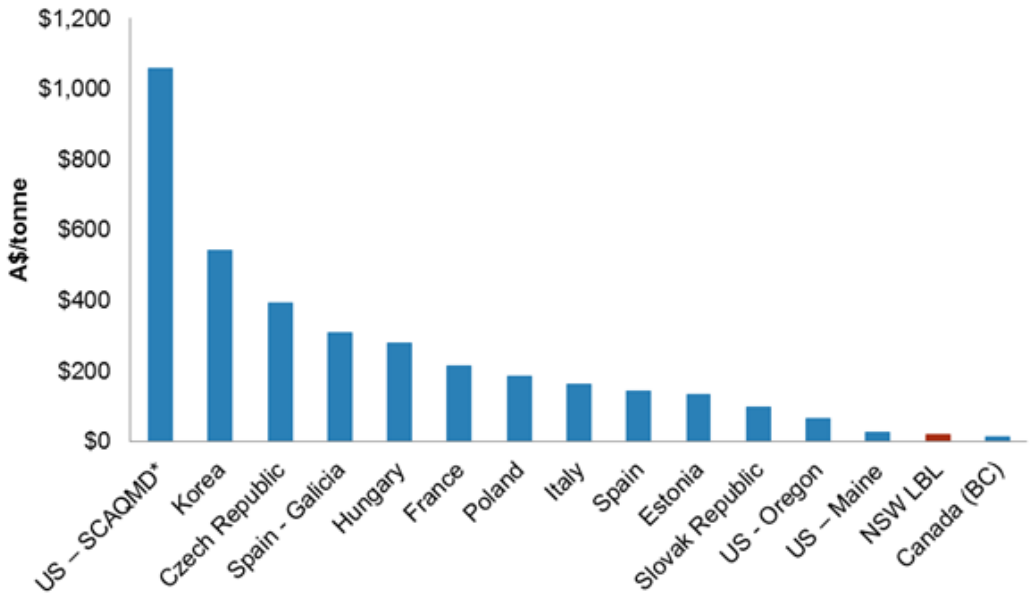

Figure 4-3: Fees for SO_X air emissions by country (highest fee payable, A$/tonne)

*SCAQMD: South Coast Air Quality Management District

Box 4-3: Optimal load-based fees – looking at abatement and damage costs

In theory, optimal load-based fees (per kg of pollution emitted) would be set at the point where the cost of abating an additional kg of that pollution (the marginal '**abatement cost**') is equal to the cost of the damage that would be caused by an additional kg of pollution (the marginal '**damage cost**').

In practice, an 'optimal' load-based fee means that, on a per kg basis:

- the fee is high enough to be sufficient incentive for licensees to put measures in place to **reduce** pollution, and
- the additional cost to the licensee is appropriate because it approximates the health and environmental damage costs that would be **avoided** for each kilogram of the pollutant that is **not emitted** into the environment.

How NSW load-based fees have been set in practice

When the LBL scheme was implemented, pollutant load-based fees were designed to provide a financial incentive for licensees to reduce their emissions; however, rather than being set at an optimal level that would significantly drive emission reductions, they were initially set at a level that would allow the scheme to be established without providing a sudden shock of additional compliance costs. It was envisaged that fees would be increased over a period of time until they reached the point at which pollutant fees began to approach abatement costs (recognising that there is a range of abatement costs for most pollutants).

This was done to ensure that the scheme framework was operating successfully (including methodologies for determining loads) and to enable licensees subject to the scheme to become familiar with it before more significant costs were imposed on them.

Over the last 16 years, there have been occasions where the EPA has responded to new problems and emerging evidence by increasing the fee payable for some pollutants in specific circumstances, for example:

- In 2004, pollutant weightings for all air pollutants were increased, providing a further incentive for major generators of air pollutants to reduce their emissions. The evidence at the time suggested that air pollutant fees would need to be significantly increased to provide a sufficient incentive for licensees to reduce their pollution.
- In 2007, additional LBL fees were applied to LBL licensees in the Sydney basin area that emit NO_X and VOCs in the summer period when air quality problems are worse.

These changes are further described in Appendix A.

Indications that change is required – setting more effective fees for the future

The EPA has been considering whether the current load-based fees are providing an incentive for licensees to improve their environmental performance and whether fees should be raised. These issues are being considered in the context of the complementary role that LBL fees play in the regulatory framework.

There are indications that:

- fees are significant enough to ensure that LBL is providing an incentive for licensees to improve their performance in some circumstances, **but**
- fees do not match the costs of abatement in most circumstances; that is, LBL does not appear to be providing a significant incentive for all LBL licensees to invest in additional abatement measures across the board.

The EPA commissioned a study (ACIL Allen 2014) to compare the load-based fees, abatement costs and damage costs of five LBL pollutants. Air emissions examined were PM_{10}, NO_X and VOCs. Water emissions examined were phosphorus and nitrogen. The full report can be found on the EPA website: www.epa.nsw.gov.au/licensing/lbl/lblreview.htm.

The study specifically considered the effectiveness of load-based fees to act as a disincentive to pollute by comparing fees with the cost of pollution abatement. The potential for net social benefits from reducing pollution was assessed by comparing the cost of abatement with the cost of environmental damage; however, the question of whether LBL generally is effective is a broader question that requires a broader range of issues to be considered, especially the role of the scheme (see Section 3).

The study found that airborne emissions of PM_{10} are an obvious area where the community would benefit from increasing load-based fees (due to resulting predicted decreases in loads and associated reduction in health impacts) and these benefits would outweigh the cost of pollution abatement, especially in areas with high population densities; however, more work is needed to determine whether the likely avoided 'damage' if NO_X and VOC emissions to air were reduced would justify the relatively high costs of abatement. The study also found that there is a large range in costs to reduce nitrogen and phosphorus emissions to water and insufficient information applicable to the Australian context to determine the value of avoided environmental damage.

Whether or not current LBL fees match the cost of abatement/damage is just one part of the analysis. The other part of the analysis involves considering whether we have justification for change – is raising fees justified?

The information collected to date indicates that the EPA's regulatory framework (which includes LBL) is generally reducing the loads of LBL assessable pollutants emitted to the NSW environment (when considered as aggregates); however, **some pollutants**:

- present a risk to human health even at low concentrations (where there is no safe exposure limit) and continued effort is needed to reduce the extent to which people are exposed to those pollutants (e.g. $PM_{2.5}$ see Box 3-2).
- while stable or decreasing across the state generally, are a pollutant of concern in some specific geographical areas where they are likely to be (or are) contributing to cumulative impacts (e.g. SO_X to air in the Hunter). NPI data indicates that PM_{10} to air is also an example of this (see Figure 4-1).

Proposed approach

It is proposed to better target the LBL scheme by providing a significantly increased incentive for licensees to reduce **specific pollutants**, in **specific areas**, where the evidence suggests it is warranted. This is where the LBL scheme has the greatest potential to complement conventional regulatory approaches. It is proposed to design the scheme so that liable pollutant load fees match abatement or damage costs (or are approaching these costs) for pollutants of concern in specific geographical areas.

There are a number of ways that this can be achieved; for example, by increasing critical zone weightings for specific pollutants (see Section 4.3.4).

Outside of these priority areas, it is proposed that LBL would continue to provide a moderate incentive and a signal for LBL licensees to improve their environmental performance beyond compliance with licence conditions and any statutory requirements. LBL fees would continue to effect licensees' consideration of pollution abatement options, especially when upgrades or augmentation is needed due to other factors such as plant expansions. LBL fees will continue to provide incentives for licensees to implement plant improvements sooner than they may have otherwise if LBL fees were not part of the equation.

An alternative approach is to simply provide a generalised increase in fees, which would increase the incentive across the board for all licensees, all pollutants and all areas. This could be achieved by increasing the pollutant fee unit (PFU) (e.g. multiplying the current PFU by a factor of two, resulting in a general doubling of fees across the board). This is discussed in Section 4.3.2. It is not currently proposed to increase fees significantly across the board because the regulatory framework is generally effective in protecting the environment and there does not appear to be a need to drive emission reductions in a significant way across NSW.

The fees that licensees are liable to pay per kilogram of a specific pollutant is dependent on a number of factors: the assessable load, the pollutant fee unit, the pollutant weighting, the critical zone weighting (for that pollutant) and the applicable fee rate threshold (for that industry and the pollutant in question). Each of these factors are important components of the LBL fee calculation, which is described in detail in *NSW EPA's Load-based Licensing Scheme: Overview and facts about load-based licensing.*

4.3.2 Pollutant fee unit – a way of increasing fees across the board

How it works now

The pollutant fee unit (PFU) is the dollar value component of the load-based fee calculation formula and it is consistently applied in the calculation of all pollutant load fees regardless of the pollutant or activity in question (see *NSW EPA's Load-based Licensing Scheme: Overview and facts about load-based licensing*). The Regulation contains provisions that increase the dollar value of the PFU each financial year to keep pace with the consumer price index (CPI) (clause 19(7)).

As there is only a single PFU value in the Regulation, altering the PFU is a way of proportionally increasing the pollutant load fee across the board for all activities and pollutants. This is a fairly blunt approach, but it may be appropriate in certain circumstances. For example, if on the completion of the LBL review it is decided that the role of LBL is to significantly drive down emissions of **all** assessable pollutants within the LBL scheme **across NSW**, then increasing the PFU (e.g. by doubling it) would be a straightforward way of achieving this.

If the above is deemed to be appropriate, the EPA will need to determine the level that the PFU needs to be set to so it results in fees which exceed the cost of abatement for all pollutants. To achieve this, the EPA will first need to:

- finalise the changes that are needed to other aspects of the scheme to determine how they are likely to affect fees, and/or
- commission additional advice on the assessable pollutants within the LBL scheme for which the EPA does not have sufficient information on the range of abatement costs.

The pollutant trends in Section 3.4 (and data sets on the health of the environment) would seem to suggest that the PFU does not need to be increased to the point where it significantly drives emission reductions for all LBL licensees across all of NSW. As discussed in Section 3.9 it is proposed to better target LBL to ensure it provides the greatest additional incentive for licensees to invest more in approaches to improve their performance where there is sufficient evidence to justify this approach, e.g. to better protect the environment and human health against the development of cumulative impacts due to particulate emissions; see Section 3.4.5 for examples.

Potential options for change

Option 1*: Maintain the status quo – a standard increase in the PFU to account for CPI*

Under this option the PFU would continue to increase each year to account for CPI only. Annual scheduled PFU increases would be as specified in the Regulation now. Any

additional incentive required would be implemented through adjustments to other components of the LBL fee calculation (e.g. pollutant and/or critical zone weightings). This would allow better targeting of the incentive, rather than applying it across the board.

Pros	Cons
• Would ensure that the load-based fees keep pace with CPI • Allows better targeting of incentives (e.g. it could allow critical zone weightings to be used to ensure pollutant load fees approach abatement costs or damage costs), where this is warranted • Complements other approaches discussed in this paper	• Needs to be combined with other options in this paper to ensure that licensees have appropriate incentives to reduce pollution; however, this is a minor con as a combination of other options should allow incentives to be targeted in a more precise way

Would an amendment to the Regulation be required for this option?

Yes, continuing to increase the PFU over time to account for CPI would require amendments to the Regulation from time to time.

***Option 2**: Apply a moderate increase to the PFU*

Under this option, the PFU would be increased by a moderate amount (e.g. by a factor of two) from what it currently is in the Regulation, based on a generic abatement cost level that is applied to all pollutants across all industries.

This approach would be worthwhile in the event the LBL review indicates a significant across-the-board increase in fees is required (rather than a targeted increase in fees in specific areas through the use of increased critical zone weightings, for example).

Pros	Cons
• This is a simple way of increasing fees and the incentive to reduce pollution across the board (i.e. a proportionally uniform cost increase for all licensees)	• Applying a generic increase in fees (rather than a targeted increase for specific pollutants in specific areas) is a blunt approach. The fee level would need to match an average/generic abatement cost across all industries for all pollutants • Increased costs would not be distributed amongst licensees according to the environmental impact of their emissions and so the incentive would not be as well targeted as an approach that, for example, focused on raising fees in a priority area

Would an amendment to the Regulation be required for this option?

Yes, altering the PFU amount would require an amendment to the Regulation.

4.3.3 Pollutant weightings – a generalised increase in fees across the board for a pollutant

Increasing the pollutant weighting for a specific pollutant would be a way of achieving a generalised increase in fees across the board for a particular pollutant. This would be beneficial if evidence emerges that suggests, for example, that a particular pollutant is more harmful than originally thought and there is a need to drive down emissions of that pollutant in a uniform fashion across NSW.

The current review of assessable pollutants (see Section 4.2.1) is likely to recommend a number of changes to pollutant weightings based on such evidence. The review may also recommend the addition or removal of pollutants from the LBL scheme.

There are specific weightings given to different types of receiving waters for water pollutants. Altering any of these specific water weightings could be used as a way to target emission reductions into 'enclosed waters', for example.

The options presented in Section 4.2.1 (assessable pollutants) discuss these and other possible approaches.

4.3.4 Critical zone weightings for target pollutants – a way of increasing fees for specific pollutants in specific areas

Critical zone weightings are multipliers used to account for the sensitivity of a specific geographical area of NSW to a specific pollutant (see *NSW EPA's Load-based Licensing Scheme: Overview and facts about load-based licensing*). They are used where there is a need to drive down pollutants that are contributing to a cumulative impact and/or exceedences of standards (e.g. National Environment Protection (Ambient Air Quality) Measure goals; see Box 3-2). Section 4.2.2 discussed critical zones in general and outlined the review that is currently underway to examine and re-prioritise critical zones and target pollutants across NSW. Option 2 in section 4.2.2 also discussed the possibility of expanding on the principles of the 'critical zone' approach by assigning area-specific weightings that reflect the relative priority of reducing the emissions of each specific pollutant across the state, rather than focussing on discreet areas and a small number of pollutants only.

In this section, we examine how the critical zone weightings could be used to alter the overall load-based fee that licensees are required to pay, in priority areas. Three options are presented below.

Potential options for change

***Option 1**: Maintain the status quo – assign critical zone weightings for target pollutants to reflect the relative priorities for reducing each pollutant in those areas*

This option is consistent with the original approach to assigning critical zone weightings. Weightings would be assigned moderately, and would not be based on an absolute figure (such as to match abatement or damage costs as discussed in Options 2 and 3). Rather, the weightings would be set to reflect the relative priority of one pollutant in a critical zone over another.

Pros	Cons
• Ensures licensees are given more incentive to reduce the pollutants with the greatest potential to contribute to cumulative impacts in the critical zone, compared to licensees outside the critical zone • Would be easier to update over time than other options as it does not need to consider abatement costs, allowing critical zone weightings to be updated more frequently	• Would not account for the range of abatement costs for the target pollutants; the fees paid for the release of target pollutants in these areas may not be as high as the cost of abating these pollutants – therefore, it is likely to result in less abatement than the options below

Would an amendment to the Regulation be required for this option?

Yes, altering the critical zones and weightings under the scheme would require an amendment to the Regulation.

***Option 2**: Assign critical zone weightings for each target pollutant based on abatement costs*

Such weightings would take into account:

- the relative priorities for reducing each pollutant in those areas, and
- the cost of abating each target pollutant.

Under this option, the critical zone weightings for each target pollutant within the critical zone would be designed so that the resulting fee represents (or is approaching) a reasonable abatement cost (on a $/kg basis) for that pollutant (e.g. the average or median cost of abatement). There is likely to be a range of abatement costs, depending on the target pollutant and the industries within the critical zone.

This approach is simplified when combined with the removal of fee rate thresholds (see Section 4.3.5, Option 1).

Pros	Cons
• Provides an even greater incentive than Option 1, as the liable fee would be close to the cost for implementing abatement measures (on a $/kg basis) • Considers the cost of abatement and whether the additional fee is reasonable • Especially useful when there is a small number of industries that are contributing most of the load from licensed premises) • Load reduction agreements could be used to smooth the impact of implementing abatement measures • Any additional advice that needs to be obtained is likely to have additional uses (i.e. to inform the development of other regulatory approaches, including specific pollution reduction plans for licensees not subject to the LBL scheme) • Revenue recycling might be able to assist licensees who have significant abatement costs due to the characteristics of their industry/premises (see Section 4.4.3)	• The EPA may need to commission additional advice to gain a better understanding of abatement costs for some pollutants and some industries; however, cost can be minimised (via appropriate selection of target pollutants) and would be offset if the advice informs other regulatory decisions and results in additional abatement compared to other options • There may be a large range of abatement costs due to the number of industries in the area. The EPA may also need to consider the profile of the industries in the critical zone to ensure the target fee (on a $/mass basis) is 'reasonable' • The cost of abatement may exceed the damage costs that can be attributed to the target pollutant, making it less reasonable than the other options considered (see possible variation below)

Possible variations within this option

Where the abatement cost is greater than the damage cost, the damage cost could be used instead.

Would an amendment to the Regulation be required for this option?

Yes, altering the critical zones and weightings under the scheme would require an amendment to the Regulation.

***Option 3**: Assign critical zone weightings for each target pollutant based on damage costs*

Such weightings would take into account:

- the relative priorities for reducing each pollutant in those areas, and
- the damage cost of each target pollutant on environmental and human health.

This approach is simplified when combined with the removal of fee rate thresholds (see Section 4.3.5, Option 1).

Pros	Cons
• Provides an even greater incentive for licensees to reduce the target pollutants than Option 1 (and potentially Option 2), as the fee they would be liable for would be close to the damage cost (on a $/mass basis) and damage costs are generally greater than abatement costs • Better aligned with the protection of environmental and human health • Load reduction agreements could be used to smooth the impact of implementing abatement measures • Revenue recycling might be able to assist licensees who have significant abatement costs due to the characteristics of their industry/premises (see Section 4.4.3)	• The EPA will need to commission additional advice to gain a better understanding of the damage costs for some pollutants; this is likely to be more difficult to determine than abatement costs; the costings are likely to be generalised damage costs (e.g. not catchment specific) • Damage costs may be significant (e.g. PM_{10} abatement costs range from $3637/tonne – $104,361/tonne, damage costs are as high as $525,313 in highly populated areas)

Would an amendment to the Regulation be required for this option?

Yes, altering the critical zones and weightings under the scheme would require an amendment to the Regulation.

4.3.5 Fee rate thresholds – a way of penalising poor performance

How it works now

There is also a more complex fee formula that is used to calculate the liable pollutant load-based fee for 'poor performers' under the scheme, which includes the addition of a pre-determined fee rate threshold (FRT) as part of the calculation (see *NSW EPA's Load-based Licensing Scheme: Overview and facts about load-based licensing* for a full description of how the FRT operates). This formula is applied only when a licensee's assessable load of a pollutant is greater than the FRT.

The concept of FRTs was introduced to act as an additional incentive for poor performers. FRT factors are prescribed in the Regulation for each pollutant and activity and are intended to represent a level of emission intensity (kg per unit production) that can be reasonably achieved in the sector using modern technology; however, the FRT factors apply for all licensees in the activity regardless of their scale of operation.

Indications that change is needed

It has been difficult to obtain Australia-specific information which can inform each FRT factor. Ensuring these numbers are current requires them to be reviewed on a regular basis.

The FRT approach has the potential for inequity to develop between licensees because different FRT factors are applied for the same pollutant, depending on the scheduled activity (but regardless of the scale of production). EPA staff keep up to date with current abatement technologies; however, a weakness of the current approach is that it assumes the EPA has equally accurate and current information for all scheduled activities subject to LBL and all assessable pollutants. In practice, the EPA has very detailed information for some activities/pollutants and less or very little information for others. Where the latter is true, the FRT factors are more likely to be set too high; that is, licensees within those sectors would be unlikely to be above the FRT even though some may be classified as poor performers. As a result, licensees with similar processes may needlessly have different incentives to reduce their emissions of the same pollutant.

The issue of poor-performance (or under-performance) is arguably best dealt with via specific licence conditions which take into account the specifics of the premises and the receiving environments. In fact, where the EPA has evidence that the licensee is underperforming compared to similar facilities (as opposed to committing an offence), it is

generally addressed through conditions of their licence. This approach enables the following to be incorporated into the licence:

- any site-specific investigations that must be carried out or commissioned by the licensee to inform the development of future licence requirements, such as pollution reduction studies
- pollution reduction programs, including appropriate timeframes and any required staging of improvements that consider the licensee's ability to pay
- site-specific monitoring and reporting requirements.

This approach is enforceable. Where the licensee does not comply with a licence requirement, the EPA would determine the appropriate regulatory response in accordance with the EPA's Compliance Policy (EPA 2013a).

Potential options for change

***Option 1**: Remove fee rate thresholds*

One way of simplifying the scheme would be to remove the FRT from the load-based fee calculation formula and remove FRT factors from the Regulation altogether. The more complex of the two fee formulae for determining the load-based fee could then be removed (see *NSW EPA's Load-based Licensing Scheme: Overview and facts about load-based licensing*).

Removing FRTs from the LBL scheme would completely remove the need for the complex FRT formula, which is used for poor performers, and would result in a single formula being applied to all LBL licensees.

Other components of the pollutant load fee formula could then be varied to ensure the level of incentive is maintained and sufficient to drive emission reductions where appropriate (for example, critical zone weightings, see Section 4.2.2).

The EPA would continue to manage poor performance through site-specific licence conditions (e.g. pollution reduction programs).

Pros	Cons
• Significantly simplifies the fee calculation • Removes inequity between licensees where different FRT factors are applied for the same pollutant, depending on the scheduled activity • Improves the longevity of the scheme as FRT factors would not need to be reviewed at regular intervals to ensure they kept pace with changes in technology and other cleaner production approaches • Enables other options proposed in this issues paper to be applied in a more straightforward way (e.g. determining the specific weighting that would need to be applied to pollutants of concern within critical zones to ensure that the total pollutant fee (on a $/mass) basis matched the average abatement cost for that pollutant)	• The incentive currently provided by the FRT would need to be achieved using another mechanism (e.g. critical zone weightings), where appropriate information exists; however, addressing poor performance through licence conditions (rather than a fee penalty) is more appropriate as it allows the improved performance requirements to be tailored to the premises and the receiving environment

Would an amendment to the Regulation be required for this option?

Yes, removing the FRTs would require an amendment to the Regulation.

***Option 2**: Replace fee rate thresholds with a fee formula that increases in a different way*

Under this option, the FRT would be removed (as described in Option 1 above) and an *incremental* load-based fee per kg would be introduced instead, that continuously increases with the amount of pollution emitted per unit production. This is quite different to the current

approach which applies a flat fee for each kilogram of pollution emitted and then doubles that rate at a specified FRT.

One possibility is a fee calculation based on a quadratic equation that increases non-linearly with the quantity of pollution emitted per unit production, providing a continuous incentive for a licensee to reduce pollution.

Pros	Cons
• Potentially provides additional incentives for all licensees to reduce their emissions as the incentive could be optimised • Simplifies the fee calculation by collapsing the two formulae into a single formula (however, the single formula would be more complex)	• The formula for this approach would be complex to implement • Would make it hard for licensees to understand the fee implications of changes they might implement (although an online tool may assist) • Appropriate incentive curves would need to be determined for each pollutant. This would require a substantial amount of work, information/data costs to complete the review of LBL • Substantial ongoing scheme administration costs to update the curves at regular intervals

Would an amendment to the Regulation be required for this option?

Yes, replacing the FRTs would require an amendment to the Regulation.

***Option 3**: Maintain the status quo approach – update fee rate thresholds for current reasonably available technology*

Under this option, the current FRT structure and formula would be retained; however, the FRT factors for each pollutant and activity would be updated so the levels reflect the most current reasonably available pollution control techniques and technology. This would involve quite extensive research and analysis, but would enable FRT factors to be updated across the board. The FRT factors would need to be reviewed at regular intervals to maintain the right level of incentive for poor performers.

Pros	Cons
• FRT factors could be revised over time to adapt them to improved emission control technologies, and the incentive could be optimised	• Significant ongoing administrative work and costs to keep FRT factors up to date

Possible variations within this option:

- It would also be possible under this option to remove FRT factors for some pollutants where adequate information is not available for the Australian context; however, that would create inequities if different approaches were applied to different industries. If this approach was applied to different pollutants, rather than different industries, the inequities would presumably be reduced.
- It may be possible to increase the responsiveness and flexibility of this option by prescribing FRT factors in the LCP or another guideline (rather than in the Regulation) so that it can more easily be adapted over time (see Section 4.5.2).

Would an amendment to the Regulation be required for this option?

Yes, updating FRT factors would require an amendment, as would removing FRT factors from the Regulation and placing them in another location such as the LCP.

4.3.6 Weighted load discounts – recognising harm reduction

LBL recognises that certain methods of pollution load management can reduce environmental harm without reducing pollution loads. Licensees are encouraged to apply

such methods through the provision of 'load weighting' factors that reduce fees. The three methods of harm reduction currently eligible for discounts are:

- effluent reuse (discussed below)
- flow-optimised discharges (including participation in the Hunter River Salinity Trading Scheme – the available discount is specified in the Load Calculation Protocol)
- green offset works.

Issues relating to effluent reuse and green offsets are discussed below.

Weighted loads for effluent reuse

As stated in Section 3.3, one method of harm reduction currently eligible for fee discounts is effluent reuse. The sustainable reuse of treated wastewater, to irrigate crops or in industrial processes (e.g. cooling water), can reduce liable fees on certain assessable pollutants in that effluent (an example is provided in Box 4-4 below). This is provided strict environmental management criteria and public health requirements are met and any necessary planning consents and/or approvals from the Department of Primary Industries, Water (DPI Water) have been granted and are being complied with.

For licensees who have water discharges, the incentive works in two ways – it influences the choice of management option, as well as the treatment level. For example, in certain circumstances, appropriately treated water discharges from sewage treatment systems (STS) can be beneficially reused for watering certain crops, sports fields, parks and gardens. This can provide nutrients and water in dry inland areas, for example, where potable water supplies are constrained. Where sewage effluent is being reused in this way, it may not require the same high level of treatment at the STS to reduce its nutrient content, potentially reducing treatment costs.

Keeping these discharges out of local waterways while putting them to good use and reducing wastewater treatment costs can be a win/win/win outcome. However, other costs may be applicable where effluent is being reused, such as for treatments to reduce pathogen concentrations, for the storage and transport of effluent, and for ongoing monitoring, if required. In addition, approvals under other legislation (such as the *Local Government Act 1993*) are required for effluent reuse schemes. Reuse may be more cost-effective when a plant is designed with reuse in mind to minimise these costs.

The LBL review will consider whether changes are needed to make it easier and more cost-effective for licensees to reuse effluent where it is appropriate to do so and it can be done sustainably. This includes reviewing effluent reuse provisions in the Regulation and requirements specified in the LCP (see Section 4.6), with the aim of matching the record-keeping, assessment and reporting requirements to the level of risk of the effluent application; i.e. a tiered approach that minimises the requirements for low-risk applications. The use of weighted loads generally will also be considered.

Consideration will also be given to streamlining reporting requirements for effluent reuse under the POEO Act and other regulatory frameworks.

Box 4-4: Effluent reuse case study – Greengrove Effluent Irrigation Scheme, Dubbo

The Greengrove effluent irrigation facility, commissioned in 2004, is Dubbo City Council's first recycled water irrigation facility, developed as part of a long-term sewage management strategy. Greengrove is a farm located on the northern outskirts of Dubbo, and recycled water is used for irrigation on it and two adjacent private farms. The scheme is highly successful in terms of benefits for Council, the community, the environment and the local farming industry[34], and it has won a number of environmental and water industry awards.

Projected ongoing LBL fees for effluent discharge to water, estimated at $250,000 per year, was a key reason Council developed an effluent reuse scheme rather than a new tertiary sewage treatment plant (STP) for high-level water treatment. The existing STP could not meet stringent environmental standards for effluent discharge or OH&S standards and the high cost of constructing a new STP, compared with the cost of developing an effluent reuse scheme, also contributed to this decision.

The total cost of the scheme was around $6 million[35] and management costs of Greengrove are around $260,000 per year.[36] The sale of fodder crops grown on the farm contributes to operational costs; however, the environmental and sustainability goals for Greengrove mean that it cannot be operated to maximise returns. Conversely, the private farms using effluent from the scheme aim to obtain a return on their capital investment. In terms of cost, pursuing the Greengrove option resulted in significant advantages including avoided costs from a new tertiary STP and ongoing LBL fees, but it also resulted in a range of other social and environmental benefits that have not been quantified.

The Dubbo Sewerage Scheme services a population of approximately 40,000 and 15,000 premises, and every year it treats about 2800 ML of sewage. Sewage is treated at the Dubbo STP and stored in two effluent storage ponds with a total capacity of 1090 megalitres (ML). Treated sewage is pumped 12 km to Greengrove where irrigation covers a 208 ha area.

Large quantities of effluent normally discharged to rivers can contaminate water supplies and increase salt levels. By reusing effluent in projects like Greengrove, the effluent becomes a valuable resource that can be used to grow 'drought proof' fodder for livestock.

This scheme allows Council to reuse up to 1300 ML annually of treated effluent in a safe, sustainable and environmentally friendly way. Approximately 45% of the effluent is used to irrigate Greengrove farm, with the remaining 55% purchased for irrigation by the two adjacent farms. Council's environment protection licence allows discharge of up to 9500 kL/day of effluent to the river; however, the scheme uses all of the treated sewage with no release to the river in most years. LBL fees would be payable on any effluent discharged, and this provides an effective financial disincentive for discharge to the river.

All of the farms in the scheme use the effluent to irrigate fodder crops, which are then harvested and sold commercially. Annually, 2700 dry tonnes of high quality fodder is produced for local livestock, irrespective of season. Irrigating only fodder crops avoids issues associated with human consumption of potential pathogens in the effluent. It also ensures a net export of nutrients off the irrigated areas to avoid nutrient build-up or runoff.

[34] Commercial benefits for the local farming community include increased availability of stock fodder and availability of recycled effluent for irrigation at a reasonable price.

[35] Including environmental studies, design and pre-construction, groundwater monitoring bores, pipe supply and construction, centre pivots and on-farm infrastructure, pumps and project management. The purchase price of the Greengrove property was $800,000 and the property was purchased in 1998.

[36] Including weed control, environmental monitoring and general management costs.

Weighted loads for green offset works

For the purposes of LBL, a green offset work is action taken outside of an LBL licensee's premises that reduces the load of one or more assessable pollutants being discharged to air and water; these offsets would ideally be located within the same airshed or catchment to ensure they benefit the same local community.

Box 4-5: Principles of green offsets

The following principles were proposed in the NSW Government's 2002 concept paper – Green offsets for sustainable development.

Principles of offsets

- Environmental impacts must be avoided first by using all cost-effective prevention and mitigation measures. Offsets are then only used to address remaining environmental impacts.
- All standard regulatory requirements must still be met.
- Offsets must never reward ongoing poor environmental performance.
- Offsets will complement other government programs.
- Offsets must result in a net environmental improvement.

Offsets must be:

- ***enduring*** – they must offset the impact of the development for the period that the impact occurs
- ***quantifiable*** – the impacts and benefits must be reliably estimated
- ***targeted*** – they must offset the impacts on a 'like for like or better' basis located appropriately – they must offset the impact in the same area
- ***supplementary*** – beyond existing requirements and not already being funded under another scheme
- ***enforceable*** – through development consent conditions, licence conditions, covenants or a contract.

Part 9.3B of the POEO Act establishes the legislative framework for green offset works and green offset schemes. Box 4-5 above is an excerpt from a 2002 concept paper which set the basis for pollution and other environmental offset programs.

Since 2002, NSW Government agencies have further developed the principles of offsets to suit specific types of environmental applications. For example, NSW has established a robust biodiversity banking and offsets scheme – BioBanking[37] and offset approaches have been developed to address residual contaminated land impacts[38].

The experience gained from the development and implementation of these and other offset schemes and works could help to inform the development of an offset policy to complement the LBL scheme; see option 1 below.

Licensees who implement or contribute to green offset works may be able to claim a weighted load for relevant assessable pollutants where they have meet the requirements of the Load Calculation Protocol and any additional requirements specified by the EPA and other relevant approval authorities.

---

[37] BioBanking is a market-based scheme that provides a streamlined biodiversity assessment process for development, a rigorous and credible offsetting scheme as well as an opportunity for rural landowners to generate income by managing land for conservation. http://www.environment.nsw.gov.au/biobanking/

[38] For more information on the offsets framework under the *Contaminated Land Management Act 1997* see http://www.epa.nsw.gov.au/clm/offsetframework.htm

Only one green offset work has been implemented and claimed as a weighted load since LBL commenced; the **Billabong Creek Green Offsets Project**. See Box 4-6 below for more information. The project involved the Norske Skog paper mill in Albury contributing significant funding to the establishment, operation and maintenance of a salt interception scheme. The project allowed Norske Skog to offset the loads of salt effectively removed from Billabong Creek (off-site) against the loads of salt discharged from its premises (on-site). The facility was still required to meet all licence requirements including salinity limits.

Limited uptake of green offsets

The uptake of green offset schemes and works is likely to have been low because:

- pollutant load fees are currently too low to encourage serious exploration of potential offsets
- it can be difficult to determine and validate reductions in emissions from these sorts of initiatives. For example, it can be difficult to estimate the baseline emissions for the target source of pollution (especially for diffuse sources) and the effective reduction in emissions achieved via the offset arrangement over time
- the EPA has minimal guidance for licensees and EPA officers on the types of green offsets works that might be eligible for weighted-load discounts under the LBL scheme.

Box 4-6: Green offset case study: Billabong Creek Green Offsets Project

Norske Skog Paper Mills (Australia) Limited operates a pulp and paper mill at their facility in Ettamogah NSW (approximately 12 kilometres north of Albury) in the Upper Murray River Catchment. The activity is captured under the LBL scheme and the licensee is liable to pay LBL fees for a range of air and water pollutants, including salt to water. Salinity is one of the most significant environmental challenges facing the Murray–Darling Basin.

In 2009, the mill sought approval to discharge slightly saline waste water directly into the Murray River as part of a planned expansion. Prior to this, waste water was discharged onto a nearby forestry plantation as part of an effluent irrigation scheme. However, the uptake of waste water and nutrients by plantation forestry was less than originally predicted and the soil was becoming impacted by the waste water salinity levels – as a result, the long-term viability of total reuse of waste water was uncertain.

Green offset – Billabong Creek Salt Interception Scheme

As part of a green offset arrangement, Norske Skog was permitted to discharge an average of three megalitres (ML) of wastewater into the Murray River each day when the flow in the river flow exceed 1800 ML/day, in return for funding the continuous operation of the nearby Billabong Creek Salt Interception Scheme. The scheme is estimated to reduce the salinity at Morgan, South Australia by 0.1µS/cm, which is the point of measurement for the Murray–Darling Basin Salinity Strategy.

The scheme prevents saline water entering the waterway from the saline shallow aquifer, by pumping out water from the deep freshwater aquifer and releasing this into Billabong Creek. This action reduces the pressure on the shallow aquifer from rising groundwater levels and prevents saline water from entering the creek. The scheme aims to prevent at least twice as much salt from entering Billabong Creek as the Norske Skog paper mill discharges into the Murray River. The interception scheme is owned and operated by the DPI-Water and costs around $100,000 to $140,000 per year (DECCW 2009).

The offset arrangement (and 2:1 offset ratio) allowed Norske Skog to expand and delivered a net benefit by reducing the overall salt load to the system. In combination with ongoing effluent reuse, the green offset works have allowed the company to achieve a significant reduction in their LBL salt fees. During the 2013-14 financial years the company saved over $239,143 in salt load fees through a combination of effluent reuse and the green offsets and their net savings were approximately $139,200.

Challenges and learnings

Challenges with the offset arrangement to date include:

- establishing a robust model to estimate the level of salinity reduction actually achieved
- negotiations between three parties with different institutional arrangements and requirements (including the EPA, Norske Skog and the DPI-Water)
- ensuring that the community is effectively engaged and all perceived risks and concerns are appropriately managed
- although the offset location is geographically close to the Norske Skog site, the improved water only reaches the Murray River 400 km downstream (although the primary salinity concerns are further downstream at Morgan, South Australia), and
- the offset arrangement only deals with salt, which is just one component of the discharge effluent. BOD, nutrients and trace metals are not addressed through the arrangement (but are limited through licence conditions).

The offset arrangement has been operating for five years and is currently under formal review to ensure the scheme is delivering the required salt savings and the offsetting arrangement remains appropriate. The learnings of this review will be valuable for the future application of green offsets for other LBL premises.

Potential options for change

Option 1*: Develop a green offsets policy to complement the LBL scheme*

Under this option, the EPA would develop a green offsets policy for use in conjunction with the LBL scheme. The policy could build on the learnings from previous work done by the EPA and OEH (and predecessor agencies) in developing offset principles and running pilot and full offsetting programs and schemes (e.g. pollution offsets, biodiversity offsets and biobanking).

An LBL green offsets policy could address issues such as:

- the characteristics that an offset would need to meet to be eligible to be used to offset pollutant load fees that the licenced premises would otherwise be liable for
- the monitoring and reporting that would need to be carried out;
- the weighted load discounting factors that would be applied to account for the uncertainties inherent in emission reductions achieved via offsets (off-site actions) versus reductions achieved through on-site mitigation actions; for example the offset ratio might be 2:1 – in which case the offsets might need to achieve a reduction of 2 kg of $PM_{2.5}$ to reduce fees by the equivalent of reducing 1 kg of $PM_{2.5}$
- any grace period that might be provided before the green offset works were required to show reductions; i.e. if there is a lag time between the green offset being funded and the reductions being realised, when could pollutant load fee reductions be claimed?
- the period over which the saving could continue to be claimed.

Pros	Cons
• A green offsets policy would provide a transparent and consistent basis for licensees who might be interested in developing or contributing to a green offset work or scheme in order to receive a weighted-load discount against their relevant pollutant load fees. • Potential to achieve significant emission reductions off-site where further on-site measures are very expensive or technically unfeasible.	• Even with a policy, any green offset scheme or work will require extensive up-front planning, ongoing monitoring and reporting on top of standard LBL requirements – for both the licensee and the EPA.

Would an amendment to the Regulation be required for this option?

No, green offsets are already party of the regulatory framework.

4.3.7 Administrative/load fee discounts – eroding incentives

This section examines another major fee discount that affects the LBL fee, the administrative/load fee discount, and shows how the application of this discount is eroding the effectiveness of the LBL fee incentive.

How it works now

Currently, licensees subject to LBL are only required to pay whichever is the greater of their administrative fee ***or*** their load-based fees. This means that licensees whose administrative fee is greater than their load fees do not pay load fees at all and vice versa. In practice, all licensees pay an administrative fee at the beginning of their licence period, and at the end of the licence period, those who have a load-based fee greater than their administrative fee pay the difference between what has already been paid and the load fees owing.

Indications that change is needed

In 2013–14, just under half (45.5%) of all licensees under the LBL scheme were effectively required to pay only a load-based fee, since it exceeded their administrative fee.

If the EPA were to remove the administrative/load fee discount, 48 licensees would face an additional fee of less than $5000 each year. 59 larger premises would be liable for additional fees between $5000 and $20,000. 14 would be liable for between $20,000 and $75,000; four would be liable for between $75,000 and $300,000).

The current approach results in fee discounts to licensees of around $3.1 million per annum. More importantly, it reduces the effectiveness of the LBL scheme. Since close to half of LBL licensees do not pay load fees, they have little incentive to reduce these fees and the corresponding discharges of pollutants.

Potential option for change

Option 1*: Remove the current administrative/load fee discount – all LBL licensees pay the applicable administrative fee and load fees*

Other aspects of this review are considering how to ensure that LBL is appropriately targeted and captures the right licensees (Section 4.2.3) and the right pollutants (Section 4.2.1). This includes ways to remove from the scheme licensees who have negligible emissions (and/or negligible load fees) or stop them from incurring LBL compliance costs which exceed the load fees they would be liable for (if they were required to pay administration and load fees).

If licensees warrant inclusion in the scheme then it is appropriate that they pay both administrative and load-based fees to ensure the scheme is effective in providing an incentive for them to reduce their emissions of assessable pollutants.

Pros	Cons
• Licensees are subject to the full incentive effect of LBL	• Potentially increased costs for licensees; however, this would only be true for licensees who remain subject to the scheme and may be offset by effective fee reductions which result from other changes to the scheme being considered during this review

Would an amendment to the Regulation be required for this option?

Yes, removing the administrative/load fee discount would require a Regulation amendment.

Section 4.3 – The LBL fee

Section summary and focus questions for stakeholders

The pollutant fee unit, pollutant weightings, critical zones and industry-specific fee rate threshold factors have the greatest potential to influence fees. They can all be used to ensure that pollutant load-based fees are set at an appropriate level so licensees receive the right signals about the EPA's priorities and can recognise the areas where additional improvements are required. Administrative/load fee discounts on the other hand are eroding incentives to reduce discharges of pollutants.

Effective fee setting

It is proposed to better target the LBL scheme by providing a significantly increased incentive for licensees to reduce specific pollutants, in specific areas, where this is merited. This is where the LBL scheme has the greatest potential to complement conventional regulatory approaches. The plan is to shape the scheme so that liable pollutant load fees match or at least approximate abatement or damage costs for pollutants of concern in specific geographical areas.

Pollutant fee unit – a way of increasing fees across the board

Pollutant trends seem to suggest that the pollutant fee unit (PFU) does not need to be increased to the point where it significantly drives emission reductions for all pollutants from all LBL licensees across all of NSW.

Option 1*: Maintain the status quo – a standard increase in the PFU to account for CPI*

Option 2*: Apply a moderate increase to the PFU*

Please refer to the **Section focus questions** below.

Pollutant weightings – a generalised increase in fees across the board for a pollutant

Increasing the pollutant weighting for a specific pollutant would be beneficial if evidence emerges, for example, that a particular pollutant is more harmful than originally thought and there is a need to reduce emissions of that pollutant in a uniform way across NSW.

Please refer to the **Section focus questions** below.

Critical zone weightings for target pollutants – a way of increasing fees for specific pollutants in specific areas

Critical zone weightings for specific pollutants can be used where there is a need to drive down emissions in a particular geographical area; e.g. see Box 3-2. Such weightings could be further tailored to reflect either the cost of pollutant abatement, or the potential damage costs of the target pollutant for the environment and human health.

Option 1*: Maintain the status quo – assign critical zone weightings for target pollutants to reflect the relative priorities for reducing each pollutant in those areas*

Option 2*: Assign critical zone weightings for each target pollutant based on abatement costs*

Option 3*: Assign critical zone weightings for each target pollutant based on damage costs*

Please refer to the **Section focus questions** below.

Fee rate thresholds – a way of penalising poor performance

The fee rate threshold (FRT) approach may lead to inequities between licensees as varying FRT factors are applied for the same pollutant depending on the scheduled activity, but regardless of the scale of production for licensees within the same scheduled activity. Thus, licensees with similar processes may receive different incentives to reduce their emissions of the same pollutant. It is also difficult to get Australia-specific data to derive FRT factors. Poor performance may be better managed via licence conditions tailored to the details of the premises and receiving environment.

Option 1*: Remove fee rate thresholds*

Option 2*: Replace fee rate thresholds with a fee formula that increases in a different way*

Option 3*: Maintain the status quo approach – update the fee rate thresholds for current reasonably available technology*

Topic focus question

1. Has your business exceeded the FRT? If so, has this affected your decisions to reduce emissions?

Please also refer to the **Section focus questions** below.

Weighted loads – recognising harm reduction

Weighted loads can provide a discount to licensees who implement specific actions seeking to reduce the environmental harm of their discharges, such as effluent reuse and green offset works. This kind of discounting has the potential for positive environmental outcomes when the works are carried out in appropriate circumstances and with appropriate safeguards and approvals.

Option 1: *Develop a green offsets policy to complement the LBL scheme*

Topic focus questions

1. Are there any barriers under the LBL scheme to appropriate effluent reuse and the use of green offset works?
2. Are load fees providing an incentive for licensees to implement appropriate reuse management options and green offsets? If not, how could the incentive be improved?
3. If you've been considering effluent reuse or offsets, what has your experience been? What has stopped you from adopting these approaches?
4. Do you have any suggestions for how the LBL scheme can be amended to encourage additional effluent reuse, where appropriate?

Please also refer to the **Section focus questions** below.

Administrative/load fee discounts – eroding incentives

Because close to half of LBL licensees do not pay load fees due to the administrative/ load fee discount, they have little incentive to reduce load-based fees by reducing their discharges of pollutants.

Option 1*: Remove the current administrative/load fee discount – all LBL licensees pay the applicable administrative fee and load fees*

Please refer to the **Section focus questions** below.

Section focus questions

1. Do you consider any of the options described above for improving the pollutant fee unit, critical zone weightings, fee rate thresholds, weighted loads or the administrative/load fee discount to be preferable? If so why?
2. Do you consider any of the above options to be impractical or unworkable in some

way? If so, why?
3. Do any of the above options offer additional benefits or issues that the EPA should consider?
4. Do you have any other suggestions for improving the LBL fee?

4.4 Other issues affecting costs and revenue

This section discusses:

- ways to minimise compliance costs (Section 4.4.1)
- improving load reduction agreements (Section 4.4.2)
- the use (or 'recycling') of revenue generated under the LBL scheme (Section 4.4.3)

4.4.1 Compliance costs – are they being minimised?

A key component of regulation development and review is to ensure that the compliance costs of the regulated community are minimised. As part of the LBL review, the EPA is considering ways to reduce compliance costs for licensees across a number of areas, while still maintaining the integrity of the scheme.

How it works now

To comply with the requirements of the LBL scheme, licensees incur costs from having to monitor, estimate and report on their emissions. The Load Calculation Protocol (LCP) prescribes specific techniques that licensees are required to use to do this. The cost of complying with the LBL scheme may include the cost of:

- equipment needed to monitor emissions
- developing site-specific emission factors
- collating, storing and analysing data
- carrying out calculations and other administrative work
- obtaining assistance and/or advice from consultants, and/or
- reporting to the EPA.

Compliance costs vary widely between licensees depending on the nature of the activity and the number and nature of pollutant emissions that are required to be reported.

Licensees may also incur other costs associated with the LBL scheme such as payment of fees and abatement costs (e.g. the cost of installing pollution control equipment to reduce pollution loads). Administrative and load fees are discussed under Section 4.3.7 and abatement costs relative to load fees are discussed under Section 4.3.1.

Indications that change is needed

LBL licensee survey

The LBL licensee survey (see Appendix C) asked licensees to report expenditure related to monitoring, estimating and reporting on emission loads under LBL. Based on the results of this survey[39], the combined costs of these activities ranged from $0 to $1.1 million per licence per annum. The average and median compliance costs per licensee per annum were $68,176 and $52,500 respectively.

About 60% of respondents who answered this question indicated that their monitoring and reporting costs were more than their annual LBL fee. A small number of these respondents with relatively low LBL fees even reported that their compliance costs were over 1000% greater than their LBL fee.

[39] 67% of respondents answered this question.

A common view was that complying with the scheme was time consuming, complex, prone to error and in some cases onerous (particularly in relation to effluent reuse rules). Some specific issues raised and other observations included:

- The LCP is highly technical, time consuming to use and draws resources away from other environmental work.
- Consultants are used to do technical LBL work and company staff have a limited understanding.
- The LCP is not flexible enough, which increases costs.
- Onerous effluent reuse requirements in the LCP make the process less (or not) cost-effective.
- Licensees have created their own spreadsheets, programs and systems to manage the emission calculations.
- Producing an annual return in hard copy is inefficient.
- Negotiation of site-specific emission factors has helped some licensees reduce costs.
- Converting to online reporting for annual returns would make the process more efficient and reduce errors.
- High monitoring and reporting costs are sometimes being incurred for what were considered 'low-impact' pollutants.

A comment about monitoring, estimating and reporting

When considering compliance costs, it is important not to lose sight of the fact that the requirement for monitoring, estimating and reporting has greatly improved licensees' and the EPA's understanding of emission loads in NSW since LBL was introduced. Although in some cases a large effort is required to determine that only a small LBL fee may be payable, there are other benefits of improved awareness and understanding of emissions, allowing businesses to turn their attention towards opportunities to reduce emissions.

Potential options for change

As mentioned above, through the LBL review the EPA is considering ways to reduce compliance costs for licensees, while still maintaining the integrity of the scheme. Some avenues being considered include:

a. Better targeting of pollutants and activities and aligning reporting

   Some LBL licensees are paying large compliance costs for very low emissions. The review will be looking at how the scheme can be improved so licensees are only required to spend time and money monitoring, estimating and reporting on emissions produced in substantial quantities through their operations. This may include the amendment or introduction of production, emission or pollutant input thresholds (see Section 4.2.3). The EPA will also be looking closely at which pollutants are in the scheme and how pollutants are prescribed to certain industrial activities and whether these remain appropriate (see Section 4.2.1). The EPA will also be looking at ways that the LBL calculation and reporting process could be aligned with other reporting frameworks, such as NPI (explored in this section – see Option 3 below).

b. Improving the Load Calculation Protocol, reducing complexity

   A key component of the LBL review will be a review of the LCP. This will include looking at ways of simplifying the LCP and whether some of the more onerous reporting requirements can be removed or streamlined (e.g. effluent reuse). The review of the LCP is more thoroughly discussed in Section 4.6.

Some other more general options for reducing compliance costs are outlined below.

***Option 1**: Modernise the LBL calculation and reporting process (complementary to all options)*

Making it easier for licensees to calculate and report on their pollutant emission loads will help save administration work, time and costs. The EPA is considering whether modernising the LBL calculation and reporting process, through the development of an online LBL calculation and reporting portal, would help reduce compliance costs for LBL licensees.

Currently, LBL licensees independently calculate their emission loads and LBL fee and manually enter the results into their annual return, which is sent to the EPA. The EPA then manually enters the reported emissions into the Permit and Licensing Management System (PALMS) and checks the calculations, resulting in double handling of the information.

The LBL portal could include a range of functionalities to assist licensees, such as:

- load calculator tools (to assist licensees to make informed business decisions)
- online submission of annual returns
- licensee access to their own emission data from previous years
- the ability to produce emission trend graphs and figures and compare them with industry averages
- access to a range of LBL training materials, guidance and policies.

A level of public access to the LBL portal could also be considered (all annual returns are currently available on the EPA's public register).

Pros	Cons
• Automating this system through an online LBL portal would reduce the administrative burden for both licensees and the EPA • Would result in more accurate payments of fees, protecting LBL revenue and minimising errors • Would assist licensees to make informed business decisions	• It will take time (and resources) to develop a system that properly integrates with the EPA's systems while providing the desired functionality. This process may need to be implemented in a number of stages; however, the costs would be offset by reduced scheme administration costs and greater accuracy in LBL payments

Would an amendment to the Regulation be required for this option?

No, the development of an online LBL calculation and reporting portal is an operational change only.

***Option 2**: Increase training and access to EPA assistance by establishing an LBL Technical Unit (complementary to all options)*

Extensive training on the LBL scheme was provided by the EPA when the scheme was first introduced; however, the EPA does not currently run an LBL training program.

A renewed and ongoing LBL training and refresher program may assist licensees to keep up to date with LBL requirements, particularly in businesses with high staff turn-over. The program could help licensees develop and retain skills in-house, potentially reducing the need for external consultants.

The EPA is also considering the benefits of providing a central LBL Technical Unit, which could include capacity to provide an LBL 'help-desk' for technical questions from licensees. A specialised central LBL unit could be a resource for EPA regional officers and would provide a formal link with the OEH Contaminants and Risk Team. Option 1 in Section 4.5.1 also proposes that this unit include an auditing function.

Pros	Cons
• Would reduce licensees' need to commission expert advice • If licensees understand their LBL obligations (and the ways they can reduce their fees) to a better degree, they may be more likely to incorporate these considerations into their day-to-day operations and reduce their facility's environmental impact to a greater extent	• Additional resources would be required to build and maintain this capacity

Would an amendment to the Regulation be required for this option?

No, increasing training and access to EPA assistance is an operational change only.

***Option 3**: Improve the flexibility of emission estimation techniques (EETs) (complementary to all options)*

Emission estimation techniques (EETs) are used to estimate the emissions of each assessable pollutant from a facility. EETs are listed in the LCP for polluting activities and are currently prescriptive, with little flexibility.

Additional flexibility could be provided for estimating emissions on a risk basis. For example, facilities with low load releases could be permitted to use established EETs (e.g. aligning with NPI EETs). This would simplify the process for estimating emissions for those licensees and reduce compliance costs.

Conversely, high-risk pollutants and variable release volumes would be required to use more prescriptive EETs that provide more reliable estimates, possibly requiring periodic sampling.

This option would also reduce time spent by the EPA reviewing low volume estimates, as the estimate technique would be simpler. This would then allow the EPA to better scrutinise emission estimates for pollutants with high or variable volume releases, and to ensure these significant emissions have been adequately accounted for.

Pros	Cons
• Provides more choice for industry when choosing EETs (emission factor, emission estimate protocol, other) • Less time spent by the EPA reviewing low risk estimates; allows more effort to be spent on reviewing high risk estimates	• May result in greater uncertainty in estimates

Would an amendment to the Regulation be required for this option?

No, improving the flexibility of EETs would not require a Regulation amendment as they are prescribed in the LCP.

4.4.2 Load reduction agreements – a way of reducing fees so that funds can be spent on emission reduction works

How it works now

Load reduction agreements (LRAs) provide financial assistance to licensees by allowing them to invest funds, which would otherwise be paid in LBL fees, into pollution abatement measures to reduce their pollutant load(s). See *NSW EPA's Load-based Licensing Scheme: Overview and facts about load-based licensing* for more information about LRAs.

Indications that change is needed

LRAs have had limited use under the LBL scheme and have resulted in varied success. By 2008, around 30 LRAs had been entered into under the LBL scheme, with seven

agreements being successfully completed and six partially successful. Seventeen licensees did not achieve their agreed loads and therefore had to pay back fees owed for the LRA period. Approximately one-third of total LRAs were with local councils for their 'sewage treatment systems' and very few were for projects other than wastewater quality upgrades.

After 2008, the use of LRAs decreased significantly, and there are currently no LRAs in place. LRAs appear to be less successful than other regulatory tools in reducing emissions.

The EPA has learnt a number of lessons from the above experience:

- LRAs can be problematic where the planned works are dependent on third party funding that is not secured at the time of the agreement.
- The magnitude of the LBL fee reduction needs to be sufficient to provide an economic incentive for licensees to enter into LRAs. It is believed that LRAs were not popular amongst licensees with large air pollutant emissions because the savings offered were not sufficient given the costs of abatement measures.
- It is important to ensure agreed loads are realistic, achievable and sustainable.
- Pollution reduction programs (PRPs), a similar tool, have been more successful at achieving improved environmental outcomes than LRAs.

The results of the survey of LBL licensees validated the above findings (see Appendix C). Only 16.7% of respondents reported ever negotiating or seriously considering negotiation of an LRA and only 15.3% reported LRAs were a useful tool of the EPA.

It appears that fees payable need to more closely match the cost of abatement before more licensees consider applying for an LRA.

Potential options for change

Option 1*: Increase the flexibility of load reduction agreements (LRAs) (complementary to all options)*

The EPA could consider making LRAs more flexible in general to increase their uptake and use, and to reduce risks for licensees and the EPA, by:

- increasing or removing the statutory restriction on their maximum length
- allowing the EPA to renegotiate LRAs (where appropriate) when unforeseen circumstances arise (this is consistent with PRPs); this might include changing the final load(s) that must be achieved if it appears at a reasonably early stage that it will not be possible to achieve the forecast load reduction in full
- allowing LRAs to be terminated without penalty under appropriate circumstances (to be determined), i.e. only the load fee savings would need to be repaid
- enabling the EPA to waive a penalty where it is appropriate to do so, e.g. where the load reduction is likely to still be achieved, but the project is behind schedule for reasons that are beyond the control of the licensee.

The EPA could develop a policy to ensure:

- LRAs are only agreed to where there is a high likelihood of the project succeeding
- modifications to LRAs are only permitted when the EPA is satisfied that the licensee is still genuinely committed to the project (otherwise consideration should be given to terminating it), work is progressing and the agreed pollution reductions are very likely to be met within a reasonable timeframe
- if the term of LRAs is not fixed, that the length of the LRA is negotiated in a consistent way, taking into account a number of criteria, including (for example) the complexity of the works and the anticipated reduction in load(s)
- penalties for late or under-performance are calculated in a consistent and fair way.

Pros	Cons
• Could increase their uptake and deliver additional load reductions • Licensees are not penalised due to circumstances beyond their control – reducing risk for licensees • Greater fairness	• Increased uptake of LRAs would increase the regulatory effort needed to assess LRA applications and consider requests for LRA variations

Would an amendment to the Regulation be required for this option?

Yes, increasing the flexibility of LRAs would require an amendment to the Regulation.

***Option 2**: Raise the profile of LRAs (complementary to all options)*

Increasing licensees' awareness of the benefits of LRAs may increase their uptake. This could be delivered through any communication strategy or training that arises as a result of the LBL review. A similar process could be undertaken within the EPA, to improve officers' knowledge of these tools.

The creation of a designated LBL Technical Unit within the EPA could facilitate this internal and external education process (see Section 4.4.1).

Pros	Cons
• This option is relatively easy to deliver • Increasing the number of LRAs should deliver additional load reductions	• Increased uptake of LRAs would increase the regulatory effort needed to assess LRA applications and consider requests for LRA variations; however, this could be minimised via guidance and administrative processes that standardise the consideration of LRA applications. Increasing the flexibility of LRAs, as discussed in Option 1, would also reduce regulatory effort required

Would an amendment to the Regulation be required for this option?

No, raising the profile of LRAs would not require an amendment to the Regulation.

***Option 3**: A combination of Options 1 and 2*

This would deliver the benefits of both Option 1 and Option 2 and address the con of Option 2.

4.4.3 Revenue – could a portion of revenue generated by the scheme be used ('recycled') to support the scheme to achieve its objectives?

How it works now

Currently all revenue generated by the LBL scheme is paid into the State's consolidated revenue. This is also the case in South Australia and Western Australia.

Indications that change is needed

The *Comparative review of load-based licensing fee systems* (see Appendix B) found that within other OECD jurisdictions, air and water pollution levies are generally imposed through separate schemes. Revenue may be applied in a number of different ways:

- through recycling to a particular facility or industry sector to fund additional pollutant abatement

- by 'earmarking' the revenue to apply to a designated purpose, generally associated with the impacts of pollution on the environment or human health
- to administrative costs, and/or
- to consolidated revenue.

Most water pollution levy schemes earmark revenues to finance improvements to water supply and treatment infrastructure. Alternatively, revenues are allocated to a general state environmental fund. Within the OECD only one jurisdiction earmarked the levy to both water infrastructure and to general environmental purposes, and only one scheme directed fees to consolidated revenue.

Revenues from air pollution levy schemes are applied to national environmental programs, revenue recycling linked to emissions abatement, and/or administrative costs.

The comparative review highlighted the need for very careful design of revenue recycling, which in other jurisdictions has sometimes resulted in either higher pollutions levels (subsidies fed into lower costs of production encouraging greater output) or higher levels of pollutants outside the incentive scheme. Additionally, there is the potential to skew investment to end-of-pipe solutions rather than other abatement options such as inputs, processes and products.

LBL licensees have suggested that part of their LBL fees (and the costs of monitoring or estimating loads) should be re-invested into implementing and maintaining pollution reductions or effluent treatment, thereby providing an incentive to reduce emissions and a way to ensure the LBL fees are used to reduce environmental impacts.

Potential options for change

A form of revenue recycling or earmarking could be implemented in NSW for a portion of the revenue generated by LBL. It will be essential that any form of revenue recycling or earmarking is applied equitably to ensure particular industries or premises are not unfairly advantaged.

***Option 1**: Establish a grants program for emission reduction initiatives at LBL premises*

One option being considered by the EPA is that a portion of LBL revenue be used to run a grants scheme similar to the Environmental Trust (or the former Stormwater Trust), or through an identified priority emissions program, such as the Priority Air Program funded through the Waste Environmental Levy Envelope (WELE).

An LBL grants program could:

- be fairly general and open to all industry sectors in LBL to target any type of pollutant on which load-based fees are paid
- target specific pollutants or industry sectors each year (e.g. reduction in target pollutants in critical zones, where the cost of abatement is very high)
- require licensees to apply to the EPA, providing information on their emission reduction proposal including what it will target, how, the anticipated emission reduction and the cost
- require licensees to match the dollars provided through a grant
- have proposals evaluated by a panel (possibly the Technical Review Panel) to ensure the proposal is likely to be effective and not have perverse outcomes including increasing emissions of other types of pollutants
- potentially be linked to load reduction agreements (see Section 4.4.2);
- require reporting/monitoring of milestones.

Pros	Cons
• Should result in additional environmental improvements • Could be targeted to assist licensees who have larger barriers to making environmental improvements • Could offset some of the impact of any increase in fees for some LBL licensees – possibility making the scheme variations more acceptable	• Would need to be carefully designed, e.g. to ensure it was equitable, did not provide funds to operators that could reasonably be expected to make the improvements without assistance, did not result in any perverse incentives, etc. • Could undermine the incentive provided by the pollutant load fee itself • Less revenue would be available for consolidated revenue

Would an amendment to the Regulation be required for this option?

Yes, it is likely that the use of LBL funds in this manner would need to be prescribed or allowed for in the Regulation.

***Option 2**: Fund other emission reduction activities*

Another form of revenue recycling/earmarking could be to apply funds to compliance programs or other specific EPA-funded programs targeting emission reductions. This could include programs to reduce fine particle pollution from off-road transport or domestic wood-heaters, in certain airsheds or to reduce priority pollutants in certain waterways.

Pros	Cons
• Would complement the regulatory framework by tackling other sources of LBL assessable pollutants	• LBL licensees are likely to be less supportive of this option and may argue that it is not reasonable for LBL revenue to be used to address pollution that was not generated by industrial premises • Additional EPA resources would need to be committed to designing, implementing and administering a scheme of this type, including compliance checks to ensure the improvements were realised • Less revenue would be available for consolidated revenue

Would an amendment to the Regulation be required for this option?

Yes, it is likely that the use of LBL funds in this manner would need to be prescribed or allowed for in the Regulation.

***Option 3**: Fund an LBL Technical Unit within the EPA and/or fund the Technical Review Panel*

A portion of revenue generated by the LBL scheme could be used to fund an LBL Technical Unit within the EPA (and/or provide additional resources to the existing Environmental Audit Unit) (mentioned under Sections 4.4.1and 4.5.1), in addition to the current level of technical support provided by OEH Science Division. Such a unit could support the administration and operation of the LBL scheme by:

- providing operational, policy and technical assistance to stakeholders, including assisting the use of LBL as a complementary tool to other regulatory tools
- providing administrative support to the Technical Review Panel (TRP)
- training external stakeholders and EPA staff to ensure the best outcomes from the scheme
- compliance checking and fee auditing, and
- maintaining the website and communicating with stakeholders.

A portion of LBL funds could also be used to renumerate TRP members, especially any increase in payments due to changes in the panel's role resulting from the review of the LBL scheme (see Section 4.5.3).

Pros	Cons
• This would provide a source of funding for implementing Option 2 in Section 4.4.2 above, the advantages of which are discussed in that section	• Less revenue would be available for consolidated revenue

Would an amendment to the Regulation be required for this option?

Yes, it is likely that the use of LBL funds in this manner would need to be prescribed or allowed for in the Regulation.

Section summary and focus questions for stakeholders

Section 4.4 – Other issues affecting costs and revenue

Compliance costs – are they being minimised?

A key component of regulation development and review is to ensure that the compliance costs of the regulated community are minimised. As part of the LBL review, the EPA is considering ways to reduce compliance costs for licensees across a number of areas, while still maintaining the integrity of the scheme.

Option 1*: Modernise the LBL calculation and reporting process* (complementary to all options)

Option 2*: Increase training and access to EPA assistance by establishing an LBL Technical Unit* (complementary to all options)

Option 3*: Improve the flexibility of emission estimation techniques (EETs)* (complementary to all options)

Topic focus questions

1. What compliance costs does your business incur as a result of the LBL scheme? Please indicate if you have already provided the EPA with this information through the LBL survey.
2. Are you incurring high compliance costs in relation to pollutants that you do not emit, or that you emit in very small quantities? Please give details.
3. To what extent do you use the same process to collect information for LBL and NPI reporting purposes?
4. Would an online LBL portal for calculating and reporting loads reduce processing time and compliance costs for your business? What functionality would you like to see in such a system?
5. How could the Load Calculation Protocol of the LBL scheme generally be improved to reduce compliance costs?
6. Would access to an EPA LBL Technical Unit assist you in working through technical questions? What services should this unit provide? Would you be prepared to pay for some specialist services?

Please also refer to the **Section focus questions** below.

Load reduction agreements – a way of reducing fees so that funds can be spent on emission reduction works

Load reduction agreements (LRAs) provide financial assistance to licensees by allowing them to spend funds which would otherwise be paid in LBL fees, on measures to reduce their pollutant loads; however, LRAs have been less successful than other regulatory tools in reducing emissions and no LRAs are currently in place.

Option 1*: Increase the flexibility of load reduction agreements (LRAs)* (complementary to all options)

Option 2*: Raise the profile of LRAs* (complementary to all options)

Option 3*: A combination of Options 1 and 2*

Topic focus questions

1. For licensees, what factors have deterred you from seeking LRAs for your activities?
2. Do you have clear information about your emissions to help you determine where an LRA might deliver the biggest benefits? If not, how could this be addressed?

3. Why have PRPs been more successful than LRAs at achieving positive environmental outcomes?

Please also refer to the **Section focus questions** below.

Section focus questions

1. Do you consider any of the options described above for improving compliance costs or load reduction agreements to be preferable? If so why?
2. Do you consider any of the above options to be impractical or unworkable in some way? If so, why?
3. Do any of the above options offer additional benefits or issues that the EPA should consider?
4. Do you have any other suggestions for improving these issues relating to costs and fees?

Revenue – could a portion of revenue generated by the scheme be used ('recycled') to support the scheme to achieve its objectives?

Currently all revenue generated by the LBL scheme is paid into the State's consolidated revenue. LBL licensees have suggested that at least part of their LBL fees should be re-invested in implementing and maintaining pollution reduction or effluent treatment, thereby providing an incentive to reduce emissions and a way to ensure the LBL fees are used to reduce environmental impacts.

Option 1*: Establish a grants program for emission reduction initiatives at LBL premises*

Option 2*: Fund other emission reduction activities*

Option 3*: Fund an LBL Technical Unit within the EPA and/or fund the Technical Review Panel*

Topic focus questions

1. Should there be some form of revenue recycling associated with the LBL scheme? If so, what should the revenue be used for?

Please also refer to the **Section focus questions** below.

Section focus questions

1. Do you consider any of the options described above for improving compliance costs, load reduction agreements or the use of revenue to be preferable? If so why?
2. Do you consider any of the above options to be impractical or unworkable in some way? If so, why?
3. Do any of the above options offer additional benefits or issues that the EPA should consider?
4. Do you have any other suggestions for improving these issues relating to costs and revenue?

4.5 Governance and administration issues

This section considers how governance and administration aspects of the scheme could be improved, specifically:

- compliance assurance (Section 4.5.1)
- administrative flexibility and whether improving it would make the scheme more responsive to new information (Section 4.5.2)
- The Technical Review Panel and whether its functionality and effectiveness could be improved (Section 4.5.3).

4.5.1 Compliance assurance – how could the EPA's compliance assurance functions be improved?

How it works now

The NSW Government and the community have an expectation that the EPA will actively promote compliance with the LBL scheme. LBL licensees also expect the EPA to monitor and enforce compliance to ensure the scheme is being adhered to by all participants, promoting equity in the scheme.

The EPA's Compliance Policy (EPA 2013a) summarises its approach to compliance and enforcement and explains how the EPA undertakes activities that achieve compliance and drive improved environmental performance.

As mentioned in Section 2.2, the EPA's regulatory framework consists of an integrated series of components, including legislation, policy, education, incentives, licensing, administration, audits, investigations and compliance and enforcement action.

The LBL scheme has been designed to provide an economic incentive to encourage licensees to minimise the environmental impact of their activities by reducing the load of assessable pollutants discharged to the environment. The extent to which the pollutant fees prescribed for the scheme are providing a real incentive to reduce pollution is discussed under Section 3.5 and Section 3.8; however, non-compliance with the scheme that leads to inaccurate reporting of emissions also impacts on the effectiveness of the economic incentive and the scheme in general.

The importance of reliable reporting

Reliable reporting of pollutant loads is important for several reasons:

1. **Environmental protection** – it helps to ensure that licensees pay a fee that reflects the environmental impact of the activity. Accurate and reliable reporting also provides certainty that any pollutant load limits that apply to the licence have not been breached and allows the cumulative load of pollution from multiple sources to be accurately identified.
2. **Incentive effect** – it helps to ensure that licensees are aware of the economic impact of their pollution emissions, which provides an incentive to reduce emissions.
3. **Quality assurance** – it helps to ensure that the licensees and the EPA have access to reliable emission data, which can inform the development of approaches to better regulate and manage these emissions, specific to the area and more generally.
4. **Community confidence** – it helps promote community confidence in the LBL scheme and licensees' environmental performance.
5. **Revenue protection** – it helps to ensure that the monetary benefits of the scheme are maximised for the community at large.
6. **Equity** – it promotes equity by avoiding negative impacts on any one licensee's competitiveness compared to similar premises (ensuring that all LBL licensees are paying the correct fee according to the requirements of the scheme).

Since the LBL scheme was introduced, the EPA has conducted a number of compliance checks on loads reported under LBL. This has included routine compliance checks through annual returns and also through focused LBL audits.

LBL annual returns – routine compliance checks

a. Role of the licensee

   The LBL scheme requires licensees to calculate pollutant loads. An LBL licensee carries out their load calculations on a 'self-assessment' basis and the EPA requires only the final load figures and subsequent fee calculations to be reported in the annual return.

   The annual return includes a statement of compliance with the licence conditions and the quantities of pollutant loads generated by the premises are also reported. The annual return must be signed by the licence holder or a person authorised to sign on the licence holder's behalf where the licence holder is a company.

b. Role of the EPA –

   Once the annual return is submitted to the EPA, it is registered as being received and checked for completeness by the EPA centrally before the reported data is manually entered into the Permit and Licensing Management System (PALMS). The reported LBL fee is checked against the LBL fee calculated by PALMS, and once confirmed, an invoice is issued to the licensee.

   The annual return is then forwarded to the relevant EPA regional office, where further reviews are conducted, including following up any reported non-compliances. Any apparent inconsistencies or concerns with the reported pollutant loads are followed up at this point. Furthermore, officers can look for trends in a licensee's annual return pollutant loads over a number of years to identify outliers representing potential errors.

   Ongoing regulatory oversight of LBL licensees by EPA regional officers is a core component of EPA regional operations. The relationship between the LBL licensee and their EPA regional office is vital as the regional officer is best placed to identify any peculiarities in the data (e.g. errors or inconsistencies in reported pollutant loads) and to understand the processes and the nature of the pollutants that are emitted from the site. LBL licensees will also usually contact the EPA regional office directly if there are concerns or questions relating to their LBL obligations.

   Once the annual return is approved by the EPA regional office, a range of compliance information is published on the EPA's Public Register, including reported pollutant loads.

LBL audits – thorough compliance checks

Assessing the level of compliance by checking annual returns is important, but it does not provide a high level of assurance of the accuracy and reliability of data used in the calculation of load fees. For the EPA to have greater assurance, it is usually necessary to undertake more detailed checks of the licensee's LBL monitoring regime, including the appropriateness of any emission estimation techniques used. This can be a time consuming and technical process, usually involving a site visit, and is not done routinely.

a. The EPA's compliance audit program

   The EPA has a dedicated compliance audit program and routinely targets a range of licenced premises, some of which have LBL requirements; however, as these audits are unannounced, the LBL component of licences is generally excluded from the scope of compliance audits. This is because audits of LBL requirements are time consuming and technical, and require the right person (often a consultant/person who estimated the pollutant load) to be present on site with full access to data. This is usually not possible with an unannounced audit.

b. Focused LBL audits

The EPA ran focused LBL compliance audit programs in 1999 (a pilot program) and from 2002–2005, to assess compliance with the LBL requirements. The audits were all announced and assessed compliance with the LCP and the LBL requirements of the Regulation and the respective licences. The audits highlighted errors in licensees' calculations of assessable loads, which translated into some significant underpayments of LBL fees and, to a lesser extent, overpayments.

Overall the program identified that licensees were genuinely attempting to comply with the LBL scheme and there was no evidence of deliberate attempts to evade fees; however, the low level of licensees' comprehension and compliance with scheme requirements resulted in errors in calculating assessable loads and consequent incorrect fee payments.

The results of the audit program helped to inform the EPA's management of the LBL scheme and many of the recommendations of the audit were implemented, including changes to the LCP.

Indications that change is needed

There is a need to ensure the compliance assurance process for reporting under LBL is robust and this will be especially important if LBL fees are increased for all or some LBL licensees (see Section 4.3.1) and if additional industry sectors are brought into the scheme (see Section 4.2.3).

Although the EPA does have some routine compliance checks in place (see above), a more systematic in-depth assessment process targeting reported load data and fees is required.

Potential options for change

The EPA will be considering a number of options for improving compliance assurance as part of the LBL review. Some avenues being considered (and detailed elsewhere in this issues paper) include:

a. Improving the LBL reporting process

Presented in Section 4.4.1 (Option 1), this option will involve making it quicker and easier to report pollutant loads and may include the online submission of annual returns and the provision of a range of LBL support tools and materials via an LBL reporting portal. These changes would also improve compliance assurance.

b. Capacity building – EPA LBL Technical Unit

Also presented in Section 4.4.1 (Option 2), this option would involve providing greater assistance to licensees in the form of training and access to information, which would reduce compliance costs. These changes would also help licensees avoid errors in load calculations and improve compliance assurance.

The capacity of EPA regional staff could also be strengthened by providing internal training, assistance and a range of tools to help with routine LBL compliance checks. The establishment of a central LBL Technical Unit within the EPA could assist with this type of capacity building; however, this would require specific funding (see Section 4.4.1, option 2).

One or a combination of the following options could be considered in addition to the above:

Option 1*: Introduce independent certification of LBL annual returns (complementary to Option 2)*

The POEO Act contains a Regulation-making power for the independent certification of LBL annual returns (Schedule 2, clause 9A). In 2003, the NSW Internal Audit Bureau recommended to the EPA that an LBL independent certification scheme be developed; however, this has not been pursued to date.

Adopting this option would involve requiring LBL annual returns to be checked by an independent third party and certified load data then being provided to the EPA. The cost of ensuring the accuracy and completeness of load data and fee calculations would thereby be transferred to the licensee.

There are many ways that such a certification scheme could be rolled out. In terms of frequency, an independent certification process could be required as a 'one-off', periodically (e.g. every five years to align with licence review), or annually. The requirement could apply to all licensees or a sub-set of licensees. The depth of the certification could vary depending on the circumstances, from desk-top certification through to a full site audit.

These factors would all affect the cost burden on licensees and the certification scheme would need to be carefully designed to ensure the requirement for each licensee is justified and proportional to the risk of inaccurate reporting impacting on LBL fees and load data.

A requirement for independent certification would most likely be combined with an EPA auditing function (described in Option 2 below) for increased assurance. For example, full independent certification including a site audit could be required for every LBL licensee at the time their licence is reviewed (every five years) and then a desk-top certification (less onerous and less costly) could be required annually for all licensees with reported LBL fees over $100,000. A component of an EPA LBL audit program could target reported fees in the $75,000–$100,000 range to remove any incentive to deliberately report inaccurate loads to avoid the certification requirement (i.e. by reporting loads that would result in fees of less than $100,000).

Under this option, the EPA would also continue to carry out periodic audits of LBL licensees in the normal way.

Pros	Cons
• Protects the integrity of the LBL scheme, especially data integrity and the incentive provided by the scheme • Would act as a significant deterrent to underreporting and other gaming practices • Ensures that revenue is better 'protected' • Would assist licensees to identify and rectify areas where they are not complying in full with their obligations • Would foster greater confidence in LBL licensees and the community that licensees are fulfilling their obligations	• Would increase some or all licensees' compliance costs; the level of increase would depend on the design of the obligation

Would an amendment to the Regulation be required for this option?

Yes, it is likely that implementing independent certification of LBL annual returns would require a Regulation amendment.

***Option 2**: Establish an ongoing program of focused LBL compliance audits (complementary to option 1)*

This option would involve undertaking an ongoing focused LBL compliance audit program, potentially to be run out of a centralised EPA LBL Technical Unit or via the EPA's existing Environmental Audit Unit (mentioned above and in Section 4.4.1). Such a unit may have an ongoing role to undertake LBL audits and a range of other support functions to both licensees and EPA staff.

Pros	Cons
This option shares all of the benefits of Option 1 above, with the following additional benefits: • Would allow any identified overpayments to be reimbursed • Allows systematic issues due to licensees' misunderstanding of various aspects of the scheme to be identified and addressed, e.g. through additional information guidance • Would assist in the identification of scheme components that are too complex, and the development of options for simplifying these aspects of the scheme • If advertised, would also serve as a deterrent to licensees who might be tempted to game the system • Would allow appropriate changes/safeguards to be developed where instances of systematic gaming were identified, including refinements to audit programs to investigate those practices/type of offenders • Would enable detailed information to be collected to support enforcement of serious offences (including gaming of the system)	• Would require additional resources to establish and operate. The level of funding required would depend on the design of the audit program; however, this would be offset by underpayment of pollutant load fees being avoided and/or identified and rectified.

Would an amendment to the Regulation be required for this option?

No, implementing an ongoing program of focused LBL audits is an operational change only.

4.5.2 Administrative flexibility – would more flexibility make the scheme more responsive?

How it works now

The key technical elements of the LBL scheme (such as assessable pollutants, pollutant weightings, fee rate thresholds and critical zones) are detailed within the Regulation, while the LCP prescribes the specific techniques to be used to estimate and report pollutant loads.

The Minister can amend the Regulation through a formal Regulation amendment process. As the Regulation amendment process is very resource intensive and time consuming for the EPA, changes are usually reserved until the Regulation is up for periodic review or automatic repeal unless there is a pressing need to change them. In contrast, the EPA has the power to amend the LCP via a notice in the *NSW Government Gazette* and this can happen relatively quickly and easily.

Indications that change is needed

As the time required to make changes to the technical components of the scheme set out in the Regulation is considerable, it is not possible to alter the scheme quickly if required. This limits the ability of the scheme to respond quickly to emerging issues. Emerging issues may include increased knowledge of the impacts of certain pollutants, the development of cumulative impacts in specific areas, or a significant change in the types of chemicals used in an industrial process (which may warrant inclusion as an assessable pollutant under the scheme).

Potential options for change

The scheme would be more dynamic and effective if it could be more easily adjusted to remain aligned with EPA priorities and environmental goals as these change. There is, however, a need to balance the advantages of increased flexibility with industry's need for certainty.

A faster amendment process would allow the EPA to respond more quickly to indications that a new cumulative impact is developing in a geographical area. It could (for example) enable a new critical zone to be added (or the parameters of an existing critical zone to be

adjusted) to better protect the area and people living within it. A streamlined amendment process would allow more administrative issues to be addressed more quickly, such as removing a pollutant from the scheme if it becomes a banned substance (such as some of the substances that comprise the assessable pollutant 'pesticides and PCBs').

While it is appropriate to require a Regulation amendment for any formal adjustment to the overall policy setting of the scheme, there may be operational components where it is appropriate to enable adaptation to occur more easily and quickly.

***Option 1**: Simplify the amendment of technical components of the LBL scheme by placing some outside the Regulation*

The process of updating technical components of the scheme could be simplified by taking some elements of the scheme out of the Regulation and putting them into the LCP or another guideline prescribed by the Regulation. In addition to permissible emission estimation techniques, these technical components could include:

- assessable pollutants
- pollutant weightings
- fee rate thresholds (if retained)
- critical zones and associated pollutants and pollutant-specific weightings.

It is proposed that pollutant fee units would remain in the Regulation or one of its schedules. This should provide some confidence to LBL licensees that fees could not be increased substantially without appropriate consultation with those likely to be most affected by any proposed increases.

Placing some or all of these components in a protocol would allow the EPA to respond to emerging issues more quickly and allow administrative issues to be addressed in a streamlined way.

Licensees may feel they have less certainty about load fees if this option were progressed and if technical amendments of this type were not subject to the checks and balances included in the Regulation amendment process. They may be concerned that changes to these components may occur more frequently, which would impact on their load fees and future budgets.

To balance this concern, the EPA would need to develop a transparent process for reviewing, assessing and amending technical elements and this may include an advisory role for the Technical Review Panel and an approval role for the Minister. The Technical Review Panel currently includes Ministerially appointed representatives of industry, local government, environment groups, the EPA and an independent adviser, and any proposed amendment could be objectively assessed in this forum.

The EPA would also need to develop processes to ensure that licensees are appropriately informed of the changes to the protocol and that the information licensees need to calculate load fees is easy to locate and use. If an online portal is developed as proposed in Section 4.4.1 (Option 1), this process could be automated and simplified for licensees; the software would call up the correct values.

If this option is pursued, it is recommended that all LBL parameters (values) be removed from the schedule of the Regulation and transferred into the LCP. Removing only some (as opposed to all) of the technical components needed to calculate load fees from the schedules may be confusing and time consuming for licensees when calculating load fees, because they would have to consult two documents (a protocol and the Regulation).[40]

[40] Note that licensees would still also need to consult the LCP to identify methodologies to calculate pollutant loads, as per the present situation.

Pros	Cons
• Would enable scheme parameters to be updated more quickly • Would allow the EPA to respond to emerging issues more quickly • If the technical detail of LBL is contained in one place (the LCP), it would make the scheme easier to use and administer	• Potentially less certainty for industry regarding assessable pollutants and other technical elements (medium- to long-term budget uncertainty); however, this information would be contained in the gazetted LCP

Would an amendment to the Regulation be required for this option?

Yes, removing most of the scheme parameters (values) from the Regulation and placing them in the LCP or elsewhere would require an amendment to the Regulation.

4.5.3 Technical Review Panel – is it required or could the functionality and effectiveness of the TRP be improved?

How it works now

The LBL Technical Review Panel (TRP) is a statutory, Ministerially appointed independent technical body established to advise the EPA on the contents of the LCP and on matters connected with licences and referred to it by the EPA. The fact sheet *NSW EPA's Load-based Licensing Scheme: Overview and facts about load-based licensing* provides an overview of the legislative and administrative arrangements for the TRP and lists the current members.

Indications that change is needed

The TRP had a key role during the implementation and initial operation of the LBL scheme. During that time a large component of their advice concerned the use of 'emission factors' that were sourced from published data, locally developed 'site-specific emission factors' or calculation methodologies. Their advice enabled approaches to become more standardised and refined through the LCP. As the scheme developed and broadened to include more pollutants, the TRP served an ongoing need for expert advice to the EPA.

The TRP met around five times a year for the first five years of the scheme. In the last five years, the TRP has met only once a year as the EPA received significantly fewer applications for site-specific emission factors and also required less advice on other LBL related matters.

The process for the Ministerial appointment of TRP members can be time consuming. This is due in part to difficulties in finding and retaining people with the right skills and experience.

Over time the TRP has become a body that is arguably underused by the EPA. This review provides an opportunity to consider the TRP's role and how this pool of specialist skills and expertise could be better utilised.

Potential options for change

Option 1*: Simplify the Technical Review Panel (TRP) member appointment process (complementary to options 2 and 3)*

Changing the appointment process for members of the TRP could reduce the time and resources needed to secure appointments.

Ways of simplifying the process could include:

- appointment being approved by the EPA Board rather than the Minister, and/or
- reviewing the composition of the TRP to ensure it has the appropriate skills and experience to provide the right advice, while increasing the pool of potential nominees.

Pros	Cons
• Should result in faster appointments • Easier to find suitable nominees • The EPA Board is independent of Government and appointments would be apolitical	• Any changes in the composition of the TRP (including skills, experience and qualification) would need to be carefully designed to ensure they do not undermine the integrity of the scheme, reduce quality of its advice and/or reduce licensees' and community confidence in its advice

Would an amendment to the Regulation be required for this option?

Yes, altering the TRP appointment process would require a Regulation amendment.

***Option 2**: Simplify and improve support for the TRP (complementary to options 1 and 3)*

Support for the TRP could be streamlined and improved by:

- reviewing the administrative processes (including applicable forms), including those TRP members need to complete to be paid for their services, and improving processes for providing information to TRP members
- reviewing the payments made to TRP members to ensure they are commensurate with the work members are required to do to provide informed advice, and reimburse TRP members for the costs associated with their appointments
- designating a role or position within the EPA that is primarily responsible for providing administrative support to the TRP; this role could sit within the LBL Technical Unit proposed in Section 4.4.1, Option 2.

Pros	Cons
• Supported more cost-effectively • Cost savings could be used to increase the TRP sitting fees and other payments • Appropriate payments could increase the pool of appropriately qualified people willing to take up an appointment on the TRP	• The costs associated with the TRP could increase; however, revenue recycling could offer a way to fund these cost increases (see Section 4.4.3)

Would an amendment to the Regulation be required for this option?

No, altering the administration and support for the TRP would not require an amendment.

***Option 3**: Strengthen links and processes connecting the TRP with EPA operations (complementary to options 1 and 2)*

Enhanced utilisation of the technical resource the TRP offers the EPA could be achieved by strengthening the links and processes that connect the TRP with EPA operation and policy sections. This could enhance its role as a complement to EPA operations by:

- strengthening the ongoing relationship and 'presence' of the TRP with managers of regional offices (and their teams), who operationalise LBL. If a designated LBL Technical Unit (as proposed in Section 4.4.1, Option 2) was established then the connections could be established via that unit
- establishing a gateway process or position which filters requests for TRP advice from EPA officers.

Pros	Cons
• Greater use of the collective skills and expertise of the TRP • Technical advice provided to EPA officers that is informed by TRP • Greater integration of the LBL scheme and other parts of the EPA's regulatory framework	• Likely to increase the workload of the TRP and associated costs • It may be more difficult to find TRP members who have the capacity to serve the TRP to this extent • Maintaining these links would increase the workload of any LBL Technical Unit that is established

Would an amendment to the Regulation be required for this option?

No, strengthening links and processes connecting the TRP with EPA operations is primarily an administrative arrangement.

***Option 4**: Abolish the TRP*

If the reduced workload of the TRP reflects a reduced relevance of their work to continued operation of the LBL scheme then the TRP could be abolished.

If this was considered the best option, consideration would need to be given to the following:

- Does the EPA have the resources and skills internally to carry out the work previously undertaken by the TRP?
- Would any changes to the LBL scheme arising from this review result in a reinvigorated role and demand for the TRP?

Pros	Cons
• Would potentially reduce the cost of the scheme	• The EPA might need to commission advice (currently provided by the TRP) from another source • May take longer to commission advice in this way • Greater potential for inconsistent advice, especially if advice is sought from different sources for similar matters

Would an amendment to the Regulation be required for this option?

Yes, abolishing the TRP would require an amendment to the Regulation.

Section summary and focus questions for stakeholders

Section 4.5 – Governance and administration issues

Compliance assurance – how could the EPA's compliance assurance functions be improved?

The compliance assurance process for reporting under LBL must be robust, especially if LBL fees are increased for all or some LBL licensees, and if new industry sectors are brought into the scheme. Although the EPA does have some routine compliance checks in place, a more systematic in-depth assessment process targeting reported load data and fees is required.

***Option 1**: Introduce independent certification of LBL annual returns* (complementary to option 2)

***Option 2**: Establish an ongoing program of focused LBL compliance audits* (complementary to option 1)

Topic focus questions

1. What would be the most effective way(s) for the EPA to help licensees improve the accuracy and reliability of their reporting under LBL?

Please also refer to the **Section focus questions** below.

Administrative flexibility – would more flexibility make the scheme more responsive?

Considerable time is needed to change the technical aspects of the scheme set out in the Regulation, so the scheme cannot be changed quickly in response to emerging issues. The scheme would be more dynamic and effective if it could be more easily adjusted to remain aligned with corporate priorities and environmental goals as these change.

***Option 1**: Simplify the amendment of technical components of the LBL scheme by placing some outside the Regulation*

Please refer to the **Section focus questions** below.

Technical Review Panel – is it required or could the functionality and effectiveness of the TRP be improved?

The LBL Technical Review Panel (TRP) is a statutory, Ministerially appointed independent technical body established to provide advice relating to LBL to the EPA. This review provides an opportunity to consider the TRP's role and how this pool of people with specialist skills and expertise could be better utilised.

***Option 1**: Simplify the Technical Review Panel (TRP) member appointment process* (complementary to options 2 and 3)

***Option 2**: Simplify and improve support for the TRP* (complementary to options 1 and 3)

***Option 3**: Strengthen links and processes connecting the TRP with EPA operations* (complementary to options 1 and 2)

***Option 4**: Abolish the TRP*

Please refer to the **Section focus questions** below.

Section focus questions

1. Do you consider any of the options described above for improving compliance assurance, administrative flexibility and the Technical Review Panel to be preferable? If so why?
2. Do you consider any of the above options to be impractical or unworkable in some

way? If so, why?
3. Do any of the above options offer additional benefits or issues that the EPA should consider?
4. Do you have any other suggestions for improving the governance and administration of the scheme?

4.6 Improving the Load Calculation Protocol

How it works now

The purpose of the Load Calculation Protocol (LCP) is to provide licensees with the prescribed techniques for estimating and reporting pollutant loads. The LCP provides the link between the legislative requirements found in the POEO General Regulation and the information provided by licensees in their annual returns. More details on the purpose and content of the LCP can be found in *NSW EPA's Load-based Licensing Scheme: Overview and facts about load-based licensing*.

Indications that change is needed

The EPA is aware of a number of issues with the LCP, primarily centred around its complexity, flexibility and currency, that are being considered as part of the LBL review. Many of these issues relate to technical requirements for the sampling and testing of pollutants or other cost-effective methods that can be used to reliably estimate emissions or to substantiate claims for undertaking activities that lower LBL fees.

The LBL licensee survey also helped to identify some issues. Depending on the outcomes of this review of LBL, there may also be a number of significant amendments required to the LCP.

The LCP has not been significantly revisited or revised since the LBL scheme commenced. While there have been six iterations of the LCP gazetted, these were only to implement various changes made to the Regulation over time (such as the addition of assessable pollutants and the addition and removal of activities) (see Appendix A for more detail).

Examples of areas for improvement already identified by the EPA and licensees are:

- consider whether the over 2000 different monitoring methods and emission estimation techniques (EETs) listed in Part B of the LCP remain appropriate and develop new EETs where needed
- consider better alignment of LBL estimation and reporting with other requirements such as NPI to ensure efficiency improvements and reducing costs
- consider the way the LCP prescribes 'component activities' and whether this remains appropriate (an alternative would be to simply require emissions to be reported for the whole of the site)
- consider improving the record-keeping requirements to include documentation of sampling and testing methods or any EETs used
- reconsider the current generic practical quantitation levels (PQLs) for water pollutants in the light of newer improved testing methods able to detect emissions at substantially lower concentrations
- reconsider the penalties for missed samples for water pollutants, which add 20–30% to the reported pollutant load (LBL data reliability issues)
- consider providing guidance on measuring wastewater flows
- review and simplify the 'flow-weighted concentration' calculation method (considered complex)
- review the adequacy of effluent reuse requirements and pollutant management factors in relation to current pollutants and any new pollutants that may be included within the LBL framework

- consider simplifying the current effluent reuse requirements to make it simpler and easier for licensees to use effluent reuse in appropriate ways to achieve a fee discount
- consider clarifying and updating the requirements for the offsite transfer of effluent
- reconsider the EETs and associated guidance for estimating and reporting fugitive emissions.

Potential options for change

Through the LBL review, the EPA is considering ways to improve the LCP and some sections of this issues paper touch on specific changes that could be made to the LCP to increase the flexibility and responsiveness of the scheme and reduce compliance costs. Options for improving the LCP already discussed in this paper include:

a. Bringing some elements currently sitting in the Regulation into the LCP

   As described in Section 4.5.2, one option being considered to improve the flexibility and responsiveness of the LBL scheme is to bring some elements of the scheme that currently sit in the Regulation, into the LCP. This would give the EPA greater ability to seek appropriate changes to the scheme (such as adding or removing assessable pollutants) without the need to go through a formal Regulation amendment process.

   Should some aspects of the Regulation be pulled out and placed in the LCP, the Regulation would need to be amended to reflect this.

b. Increasing the flexibility of emission estimation techniques (EETs)

   As described in Section 4.4.1, one option being considered for reducing licensees' compliance costs, is increasing the flexibility of EETs prescribed in the LCP, on a risk basis.

Reviewing the LCP in detail

Through the review of LBL, the EPA will also be reviewing the LCP in detail to address the many issues that have been raised (as outlined above) and also to align with the proposed changes to the Regulation.

The EPA anticipates releasing a revised draft LCP for public consultation at the same time as a draft amendment Regulation, so that stakeholders can better appreciate how all the proposed amendments mesh together as a whole.

Section 4.6 – Improving the Load Calculation Protocol

Section summary and focus questions for stakeholders

The Load Calculation Protocol (LCP) provides licensees with the prescribed techniques for estimating and reporting pollutant loads. It provides the link between the legislative requirements found in the POEO General Regulation and the information provided by licensees in their annual returns. The LCP has not been significantly revisited or revised since the LBL scheme commenced and the EPA is aware of a number of issues, primarily around its complexity, ease of use, flexibility and currency.

Topic focus questions

1. How could the LCP be improved to reduce complexity?
2. How could the LCP be improved to make it more current (up-to-date)?
3. How could the LCP be improved to make the scheme more flexible?

5. References

ABS (2009), *Australian Demographic Statistics*, ABS catalogue no. 3101.0, December, Australian Bureau of Statistics, Canberra, URL: http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/95D50E396E5AECFCCA2577AC00155848?opendocument

ABS (2010), *Australian National Accounts: State Accounts, 2009–10*, catalogue no. 5220.0, Australian Bureau of Statistics, Canberra, URL: http://www.abs.gov.au/AUSSTATS/abs@.nsf/allprimarymainfeatures/4CA40343852480A6CA257950001350B4?opendocument

ABARES (2011), *Energy Update 2011*, Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra, URL: http://www.agriculture.gov.au/abares/publications/display?url=http://143.188.17.20/anrdl/DAFFService/display.php?fid=pe_abares99010610_12c.xml

ACIL Allen Consulting (2014), *Comparison of Load-based License Fees with Marginal Abatement Costs (MAC) and Marginal External Costs (MEC) for Selected Pollutant*, prepared for the NSW Environment Protection Authority, Sydney, URL: http://www.epa.nsw.gov.au/licensing/lbl/lblreview.htm.

ACIL Tasman (2009) *Vision 2020 Project: The Australian Minerals Industry's Infrastructure Path to Prosperity*, prepared for NSW Minerals Council, Sydney, URL: www.minerals.org.au/file_upload/files/resources/vision2020/MCA_2020_Vision_NSW_report_FINAL.pdf

ANSTO (2012), *Application of positive matrix factorization, multi-linear engine and back trajectory techniques to the quantification of coal-fired power station pollution in metropolitan Sydney*; Cohen, DD, Crawford, J, Stelcer, E, Atanacio, AJ, The Australian Nuclear Science and Technology Organisation, Australia, URL:http://www.ansto.gov.au/AboutANSTO/MediaCentre/News/ACS049674

BDA Group (2014), *Comparative Review of Load Based Licensing Fee Systems*. Prepared for the NSW Environment Protection Authority, Sydney, URL: http://www.epa.nsw.gov.au/licensing/lbl/lblreview.htm.

BITRE (2011), *Road Vehicle-kilometres Travelled: Estimation from state and territory fuel sales*, Report 124, Bureau of Infrastructure, Transport and Regional Economics, Canberra, URL: http://bitre.gov.au/publications/2011/report_124.aspx

Cardno Ecology Lab Pty Ltd (2010), *Effects of mine water salinity of freshwater biota: investigations of coal mine water discharge in NSW.* Australian Coal Association Research Program and Cardno (NSW) Pty Ltd Trading as Cardno Ecology Lab, Brookvale New South Wales.

DECCW (2009) *Billabong Creek Green Offsets Project: Frequently asked questions*. Department of Environment, Climate Change and Water, October 2009. URL: http://www.water.nsw.gov.au/__data/assets/pdf_file/0012/549678/quality_salinity_salt_interception_billabong_creek_faqs.pdf

DECCW (2010a), *Current Air Quality in NSW*, Department of Environment, Climate Change and Water, Sydney, URL: www.environment.nsw.gov.au/air/cpairqual.htm.

DECCW (2010b), *Environmental compliance and performance report: management of dust from coal mines*, Department of Environment, Climate Change and Water, Sydney, URL: www.environment.nsw.gov.au/coalmining/coalmineecpr.htm.

DPE (2014), *State and Local Government Area Population Projections: 2014 Final*, Department of Planning and Environment, NSW Government, Sydney URL: http://www.planning.nsw.gov.au/projections

EPA (1998), *Regulatory Impact Statement: Proposed Pollution Control Regulation 1998*, NSW Environment Protection Authority, Chatswood, NSW.

EPA (2012a), *New South Wales State of the Environment 2012*, NSW Environment Protection Authority, Sydney, URL: www.epa.nsw.gov.au/soe/soe2012/index.htm.

EPA (2012b), *2008 Calendar Year Air Emissions Inventory for the Greater Metropolitan Region in NSW*, NSW Environment Protection Authority, Sydney, URL: www.epa.nsw.gov.au/air/airinventory2008.htm

EPA (2013a), *Environment Protection Authority Compliance Policy,* NSW Environment Protection Authority, Sydney, URL: www.epa.nsw.gov.au/legislation/130251epacompl.htm.

EPA (2013b), *Upper Hunter Air Particles Action Plan,* NSW Environment Protection Authority, Sydney, URL: www.epa.nsw.gov.au/aqms/130158uphuntap.htm.

EPA (2013c), *Hunter Catchment Salinity Assessment,* NSW Environment Protection Authority, Sydney, URL: http://www.epa.nsw.gov.au/resources/licensing/hrsts/130787HCSalinityAssFull.pdf

EPA (2013d), *Managing particles and improving air quality in NSW report,* NSW Environment Protection Authority, Sydney, URL: http://www.epa.nsw.gov.au/air/20130784ManPartStr.htm

EPA (2014), *Reducing Emissions from Non-road Diesel Engines: An information report prepared for the NSW EPA*, NSW Environment Protection Authority, Sydney, URL: www.epa.nsw.gov.au/air/rednonrddiesel.htm.

EPA (2015a), *NSW State of the Environment 2015,* NSW Environment Protection Authority, Sydney, URL: http://epa.nsw.gov.au/soe/soe2015/index.htm

EPA (2015b), *NSW Coal Mining Benchmarking Study: Best Practice Management for Reducing Non-Road Diesel Exhaust Emissions,* Final Report, NSW Environment Protection Authority, Sydney, URL: http://www.epa.nsw.gov.au/air/rednonrddiesel.htm

EPA (2016), Review of the Protection of the Environment Operations (Hunter River Salinity Trading Scheme) Regulation 2002: Report and recommendations, NSW Environment Protection Authority, Sydney, URL: http://www.epa.nsw.gov.au/resources/licensing/hrsts/150249-hrsts-review-report.pdf

Hibberd, MF, Selleck, PW, Keywood, MD, Cohen, DD, Stelcer, E and Atanacio, AJ (2013), *Upper Hunter Particle Characterisation Study*, CSIRO, Australia, URL: www.environment.nsw.gov.au/resources/aqms/UHFPCSFinal.pdf

OEH (2011a), *Coal Mine Particulate Matter Control Best Practice – Site Specific Determination Guideline*, NSW Office of Environment and Heritage, Sydney, November 2011, URL: www.epa.nsw.gov.au/resources/air/20110813coalmineparticulate.pdf.

Nicholson, A., Pavan, N., Winkler, M., Taylor, L., Cull, V., Copley, S., Jenkins, B., Muller, R., Wooldridge, A., Moore, L., Marchand, A. and Shoemark, A. (in prep.), *Hydrogeological Landscapes for the Hawkesbury–Nepean Catchment Management Authority, Western Sydney*. Available for download with accompanying dataset via the NSW Office of Environment and Heritage spatial data catalogue: http://mapdata.environment.nsw.gov.au/geonetwork/srv/en/main.home (dataset: Western Sydney Hydrogeological Landscapes May 2011 First Edition).

OEH (2011b), *Upper Hunter Valley open cut coal mine Interim Dust Assessment Handbook*, NSW Office of Environment and Heritage, Sydney.

Pacific Environment Limited (2014), *Upper Hunter Air Quality Particle Model*, Final Report, prepared for the NSW Environment Protection Authority, Pacific Environment Operations Pty Ltd, Sydney.

PAE Holmes (2013), *Methodology for Valuing the Health Impacts of Changes in Particle Emissions*, prepared for the NSW Environment Protection Authority, URL: www.epa.nsw.gov.au/resources/air/HealthPartEmiss.pdf.

Sadler, B (1996), *Environmental Assessment in a Changing World: Evaluating Practice to Improve Performance,* International Study of the Effectiveness of Environmental Assessment Final Report, International Association for Impact Assessment and Canadian Environment Assessment Agency, Canada, URL: www.commdev.org/userfiles/files/1726_file_EAE_10E.pdf.

Tietenberg, TH (2006), *Emissions Trading: Principles and Practice*, second edition, Resources for the Future, Washington DC, USA.

USEPA (2003), *Water Quality Trading Toolkit for Permit Writers*, 'Appendix B: Water Quality Trading Policy Statement', United States Environmental Protection Agency, Office of Water, Washington DC, USA.

USEPA (2013), *Particulate Matter: Health*, US Environmental Protection Agency, Office of Air and Radiation, Washington, DC, USA, URL: https://www.epa.gov/pm-pollution/particulate-matter-pm-basics.

WHO (2000), *Air Quality Guidelines – Second Edition,* World Health Organization, Geneva, Switzerland.

Appendix A: Key changes to the LBL scheme

The Regulation which enabled the LBL scheme[41] commenced in 1998. The pollutant fee unit was set to incrementally increase from $0 to $35 over the first few years to soften the impact of the new fee on LBL licensees. The scheme itself effectively started in 1999. There has not been a significant review of its efficiency and effectiveness since then; however, there have been several refinements.

Amendments to the Regulation

2001[42] – Changes were made to the rules for load reduction agreements (LRAs), mainly to ensure that their environmental benefits continue to accrue beyond the life of the LRA. The maximum term was also extended from three to four years and provisions were added to enable financial assurances to be included in LRAs.

2003[43] – Changes were made to specify that the fees payable by licensees on the termination or expiration of an LRA would be determined by reference to either the weighted or actual load of assessable pollutants.

2004[44] – The pollutant weightings for all air pollutants were increased[45] providing a further incentive for major generators of air pollutants to reduce their emissions. Evidence at the time suggested that the LBL scheme was providing stronger incentives for reducing water pollutants than air pollutants.

2007[46] – The pollutant fee unit was increased to $36.75 as a partial CPI catch-up of fees. New critical zone multipliers were also applied to the Sydney basin area for NO_X and VOCs in the summer period (December, January and February), when air quality problems are worse.

2009[47] – A suite of changes were made:

1. Arsenic, lead, mercury and benzo(a)pyrene equivalent emissions to air were added to some existing LBL activities[48] to improve LBL's coverage of significant industrial sources of these pollutants in NSW.
2. The activity 'cement or lime handling' was removed from the LBL scheme due to its very small emissions of assessable pollutants[49].
3. 'Carbon black production' and 'electricity generation from diesel' were added to the scheme.
4. A production threshold[50] was added to 'petroleum products and fuel production', below which assessable pollutants do not apply.

---

[41] The POEO General Regulation 1998

[42] Through the POEO (General) Amendment (Load Reduction Agreements) Regulation 2001

[43] Through the POEO (General) Amendment (Load-based Licensing) Regulation 2003

[44] Through the POEO (General) Amendment (Pollutant Weightings) Regulation 2004

[45] Generally, air pollutant weightings increased by an average of 45% (which translated to about a 20% increase in licence fees).

[46] Through the POEO (General) Amendment (Licensing Fees) Regulation 2007

[47] Through the Protection of the Environment Operations (General) Regulation 2009 (Regulation remake), see also DECC (2008) *Regulatory Impact Statement: Protection of the Environment (General) Regulation 2008*, Department of Environment and Climate Change, Sydney.

[48] Assessable air pollutants were added variously to the fee-based activities; 'aluminium production (alumina)', 'cement or lime production', 'coke production', 'electricity generation from coal', 'glass production – container', 'iron and steel production (iron ore)', 'iron and steel production (scrap metal)' and 'petroleum and fuel production'.

[49] Fine and coarse particulates

[50] 10,000 tonnes annual production capacity

5. Fee reduction threshold factors were refined for a large range of activities to better reflect average actual industry performance, in order to provide an incentive to poorly performing licensees.
6. A drafting error made in the 2007 amendments was corrected to ensure that premises which report air emissions of NO_X (summer) and/or VOCs (summer) are required to report the actual quantity of activity for the summer period.
7. Refinements were made to LRA rules to require the licensee to submit annual reports during the term of the LRA on the progress of the agreed works (to alert EPA officers to any issues or delays associated with the LRA).
8. The pollutant fee unit was increased to account for the CPI, up to 2012–13.

2013[51] – 'Coal seam gas assessment and production' was added as a scheduled activity (under the POEO Act) and assessable pollutants were included in the POEO General Regulation).

2014 – There were two separate amendment processes:

1. A new pollutant fee unit schedule was included to reflect the CPI, up to 2018–19[52].
2. The process of extracting a raw petroleum product and the production of petroleum products were differentiated as separate activities under the POEO Act and General Regulation. This was achieved by reclassifying all petroleum activities as either 'petroleum exploration, assessment and production' or 'petroleum products and fuel production'[53].

Amendments to the Load Calculation Protocol (LCP)

Modification of the LCP since it was first published in June 1999 has been minimal:

1. changes to reflect amendments to activity names in the Act
2. changes required due to the introduction of new activities and new assessable pollutants for specific activities within the LBL scheme (or amendment or removal of activities)
3. changes to enable licensees to apply for site-specific emission factors for all components of each LBL activity
4. a revised primary iron and steel production protocol
5. text changes to clarify issues raised by users and to simplify the language used in the document.

[51] Through the POEO Amendment (Scheduled Activities) Regulation 2013

[52] Through the POEO (General) Amendment (Licensing Fees) Regulation 2014, see also EPA (2013) *Regulatory Impact Statement: Protection of the Environment Operations (General) Amendment (Licensing Fees) Regulation 2013*, NSW Environment Protection Authority, Sydney.

[53] Through the POEO Amendment (NSW Gas Plan) Regulation 2014, available at www.legislation.nsw.gov.au/sessionalview/sessional/sr/2014-852.pdf.

Appendix B: 2014 Comparative review of load-based licensing fee systems – key issues and findings

The following provides a summary of the key issues and findings of the *Comparative review of load-based licensing fee systems* (the comparative review) commissioned by the EPA. The full report can be found here: *http://www.epa.nsw.gov.au/licensing/lbl/lblreview.htm*.

Study objective and parameters

The EPA appointed BDA Group to undertake a qualitative comparative analysis of economic incentive schemes (similar to LBL) operating in other Australian and international jurisdictions. The review was limited to market-based instruments/schemes which provide incentives for pollution reduction from individual premises and excluded trading schemes and schemes designed primarily to reduce carbon dioxide.

Key issues and findings

While there are many schemes that set a price on the release of pollution into the environment, the comparative review revealed that the NSW LBL scheme is unique in its combination of pollutants targeted; the incentive it provides to reduce pollution; its flexibility; and its use of different weightings to recognise the harmfulness of different pollutants and their relative impacts on different receiving environments.

In addition to Australia, the review identified 17 OECD countries with water discharge charging schemes and 16 OECD countries with air emission charging schemes. Three international schemes were selected for in-depth analysis: the Swedish NO_X scheme; the French industrial air emissions scheme[54]; and the Danish wastewater scheme. The study included an introduction to US schemes with a focus on schemes from Louisiana, Montana, Oregon, California, New Jersey and Maine. In general, fee-based schemes tend to be more frequent in Europe than in the United States, where trading schemes are more common.

The primary purpose of the majority of OECD schemes is to recover the costs of regulating emission sources. Many were more closely aligned with the role of the NSW EPA's risk-based licensing system.

Operators found it was difficult to determine the amount of emission reductions that could be linked to their scheme for a number of reasons, including:

- exemptions, subsidies, or rebates available to liable premises through the fee or other schemes
- the interaction of other applicable regulatory settings such as concentration limits.

The scale of the scheme: who pays and for what?

The study did not make any conclusions about an 'optimal' pollution abatement scheme. The scheme profiles were highly variable in the facilities included, the pollutants covered, the emission type (although point-source was most common) and the types of thresholds used.

Scheme effectiveness and efficiency

The review found that certain factors can impact on the effectiveness or efficiency of a scheme, including:

[54] The French air emissions scheme was in place from 1990 until 2000 when it was replaced by a new integrated scheme, the General Fee on Polluting Activities (TGAP). The French air emissions scheme is the subject of the in-depth analysis in the study but comment is provided on reforms introduced by the TGAP.

- *Fee rates* – Fees should be maintained in real terms (i.e. adjusted for inflation). Fees that are lower than the cost of abatement/externality costs (depending on a scheme's objectives) are less efficient (French air emissions scheme and Australian schemes in NSW, SA and WA).
- *Exemptions and fee caps* (Danish wastewater scheme, WA scheme) – Although exemptions for small/low emission facilities are common, exempting specified industries and facilities should be considered carefully. This can render the scheme less significant in terms of environmental effects and in promoting structural change in the economy.
- *Efficiency losses from the recycling of revenues through subsidies* (French air emissions scheme) can lead to increases in production and undermine gains made through reducing pollution loads.
- *Lack of price restraints* (either through market competition or through state-owned assets) (Danish wastewater scheme) that allowed permit fees to be passed on to the consumer, reduced the effect of the scheme.
- *Compliance flexibility* – Emission reductions can be optimised by allowing a facility to reduce overall emissions and/or population exposure, instead of prescribing emission reduction measures, which can exclude measures that target inputs (such as cleaner fuel), production processes, or optimal timing of discharges.
- *The role of monitoring in calculating emissions* – Large emission reductions are typically associated with emission measurement. Monitoring can bring attention to low-cost emission reductions that can be achieved by 'trimming' production processes. Conversely, lack of monitoring can impact on efficiency (French air emissions scheme).

  Alternatively some schemes (e.g. NSW LBL) are flexible as to whether emissions can be measured or estimated. If the estimate is at the high end, a facility may seek to access savings through monitoring.
- *Focusing on a single pollutant* can result in increases in other pollutants (Swedish NO_X scheme).

Australian schemes

NSW is the only Australian jurisdiction with a system designed to reduce emissions and implement the polluter pays principle through an economic incentive. Victoria, South Australia and Western Australia have schemes that charge on the pollutant load but:

- Victoria charges fees based on the load limit specified in the licence
- Both the South Australian and West Australian schemes limit the charges to recovery of licensing administration costs.

However, two features are worth further exploration:

- In South Australia, both production thresholds **and** actual emission thresholds are used to determine whether a premise is liable for load fees; this can remove the administrative and cost burden associated with estimating and reporting loads for premises with very low or zero pollutant loads.
- In Western Australia, licensees can receive fee refunds when measured emissions are less than the estimated emissions initially used to determine fee liabilities.

Appendix C: 2014 LBL industry survey

Aims of the survey

The EPA surveyed LBL licensees to ascertain industry experience and suggestions for improvement of the LBL scheme, including:

- views on LBL fees and whether they are working as an incentive to reduce pollution
- reasons for emission increases/reductions for various pollutants at individual premises
- the influence of LBL vs. other factors in any emission reductions
- the efficiency, equity and ease of use of the LBL scheme for the licensee
- experiences with load reduction agreements (LRAs)
- expenditure on pollution reduction
- overall perceptions of the scheme.

Sample size

An online survey was sent to 167 individuals (responsible for over 270 LBL licences). The survey was available for a two week period from 21 March to 7 April 2014. Responses were received from 70 licensees, equalling a 42% response rate. These 70 respondents were responsible for at least 50% of licences in the scheme.

Summary of findings

Overall, the respondents thought that the scheme was an appropriate way to deal with emissions and encourage emission reductions; however, many respondents also thought that participation in the scheme is time consuming, complex, resource intensive, expensive and involves ‘more red tape’.

When asked directly, 40% of respondents agreed LBL has been an incentive in reducing their pollutant emissions. Those who did not agree said that thresholds were too low for them to be included in the scheme, fees were too low, technology was not available for them to reduce emissions and/or that there were other main drivers for pollution reductions.

Several respondents provided additional comment, stating that:

- their loads are not high enough to pay LBL fees (because of the administrative/load fee discount)
- the costs of upgrades/capital works and maintenance are higher than LBL fees
- LBL fees are not a big enough cost to consider in upgrade cost–benefit analyses
- upgrades for production growth and avoiding licence non-compliances are bigger drivers of emission reductions than LBL fees
- it would be better to direct LBL fees and monitoring costs into pollution reduction upgrades
- opportunities to reduce fees are limited.

Figure C-1 below shows that the major drivers for reducing emissions were general maintenance (52%), good corporate citizenship (37%) and pollution reduction programs (33%), another EPA initiative. Only 17% stated that the LBL fees were a driver in reducing emissions.

Sixty-eight per cent of respondents stated their LBL fees were significantly lower than the cost of upgrading equipment to reduce emissions. An analysis of the financial costs provided by the respondents shows that LBL fees were less than the cost of upgrading equipment in 84% of the cases. On average these LBL fees were 18% of the cost of equipment upgrades. This suggests that LBL fees may not be a main driver in reducing emissions.

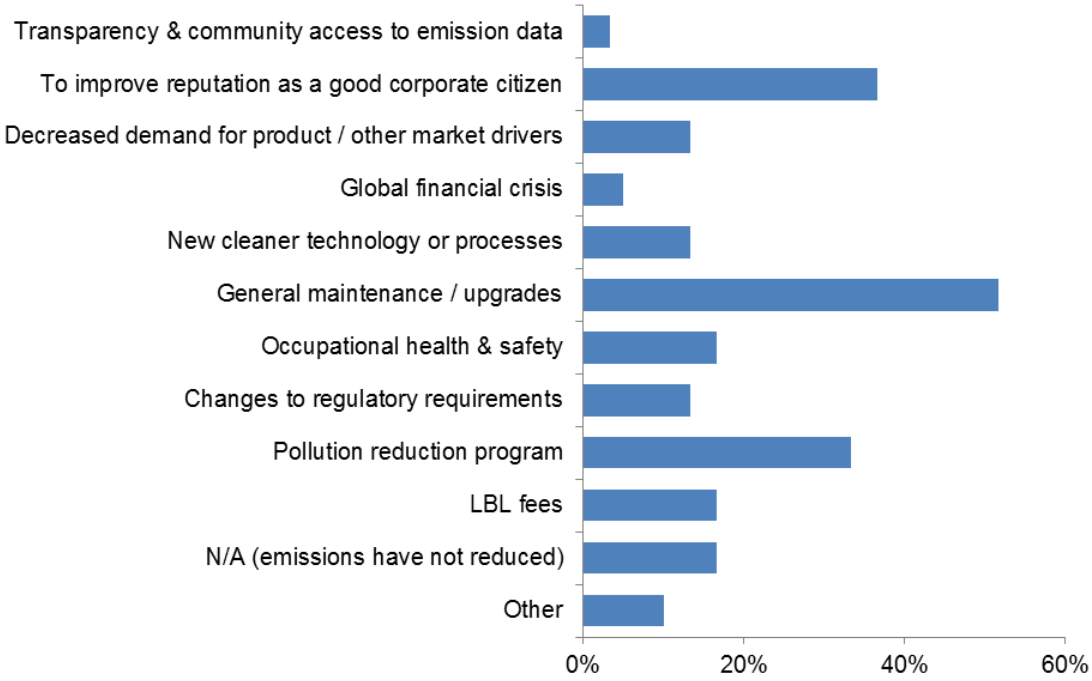

Figure C-1: If your emissions have reduced, what are the reasons?

The majority of respondents (65%) stated that their pollutant emissions have reduced because their plant or equipment has been upgraded or replaced. Other common reasons for emissions reductions include decreased production (20.0% of respondents), pollutants now being recycled, reused or treated on site (18.3%), or changes in production processes (18.3%).

Costs

The costs to respondents relating to participating in the scheme or abating pollution varied widely, with some respondents not paying anything at all and others paying up to $9 million for LBL fees, $2 million for monitoring, $250,000 for estimating and reporting loads and $500 million for equipment upgrades (across all of their licences). The average annual amounts spent per licence are $206,000 for LBL fees, $61,000 for monitoring, $7000 for estimating and reporting loads and $6.9 million for equipment upgrades. Overall, the LBL fees are only a small portion of compliance costs and are considerably lower than the costs associated with pollution abatement.

How easy is the scheme to understand and use?

The respondents understood the various components of the scheme relatively well and found them relatively easy to use. The majority of respondents understood the load calculation protocol (71%) and how fee rate thresholds work (56%). Close to half (49%) of respondents understood how to calculate possible fee reductions (32% did not, remainder neutral) and 32.2% of respondents understood critical zones and their impact on fees (34% did not). Fifty-three per cent of respondents found it easy to calculate/estimate their loads (24% found it hard), 44% found it easy to complete their LBL reporting requirements (25% found it hard), and 32% found it easy to calculate possible fee reductions (27% found it hard).

Several respondents commented that the scheme was highly technical, that their calculations are done by a consultant, and that estimating loads and completing reporting is too time consuming, costly and prone to error. It was suggested that online reporting with automatic calculations would reduce error, costs and time taken. It was stated that monitoring requirements are a disincentive to further reductions; that the scheme should account for variable flows with periodic sampling.

Respondents were asked how useful various components of the scheme were. Thirty-four per cent of respondents found effluent reuse useful (17% did not), 27.1% found site-specific emission factors useful (12% did not), 15% found load reduction agreements useful (20% did not) and 5.1% found flow-optimised discharges useful (12% did not). When asked specifically about load reduction agreements, only 16.7% of respondents had negotiated or seriously considered negotiating a load reduction agreement. Several respondents reported that effluent reuse is not cost-effective and there are many difficulties (and no drivers) in maximising effluent reuse.

Is the scheme equitable?

The survey respondents had mixed views on whether the scheme is applied equitably, with 26% thinking it was applied fairly and 22% thinking it was not. The remainder of respondents were neutral. Respondents perceived that the scheme was inequitable because load limits, assessable pollutants and fee rate threshold factors vary widely between industry sectors; many scheduled activities (e.g. mining for coal and mining for minerals) and non-scheduled activities (e.g. motor vehicles) that emit significant loads of pollution do not have to participate in the scheme; and many small premises that do not hold environment protection licences still produce large emissions. Respondents also stated that the scheme is a disincentive for production growth and for doing business in NSW; some critical zones are inappropriate; and that there are significant costs of monitoring pollutants with little environmental impact.

More generally, respondents stated that the environmental impact of each pollutant should be the major consideration of the scheme and fees. In line with this, it was suggested that annual limits and pollutants be fair across industries and be considered nationally, and that there be no fees required for pollutants with low impacts. It was also stated that part of LBL fees (and the costs in monitoring or estimating loads) should be re-invested into implementing and maintaining pollution reductions or effluent treatment, thereby providing an incentive to reduce emissions, a reward for non-polluters and a way to ensure the LBL fees are used to reduce environmental impacts.

Overall comments

Respondents were given the opportunity to provide additional input. Thirty-six respondents answered. Common themes were:

- The scheme is an appropriate way to deal with emissions and encourage emission reductions.
- LBL fees are not enough to be an incentive for emission reductions and do not justify upgrades.
- LBL fees do not consider whether cleaner processes and technology are or are not available.
- Environmental impact should be the major consideration of the scheme and fees, with no fees required for pollutants with low impacts.
- Greenhouse gases have an environmental impact and should be added to the scheme. This includes carbon dioxide, methane and nitrous oxide.
- Part of LBL fees should be returned for implementing and maintaining pollution reductions and effluent treatment, otherwise it is merely revenue raising.
- The scheme should be considered nationally, to level the playing field across states and not deter industry from investing in NSW.
- The scheme is a disincentive to business growth and production.
- It would be better to drive towards best practice/technology with a concentration limit first, and then a load limit calculated on the actual impact on the community and the environment.

Appendix D: Further Information on particulates

Emerging evidence about particulate matter

Both long (over years) and short-term (hours or days) exposure to airborne particulate matter has been linked to health problems. Size determines the possible extent of penetration of particles into the respiratory tract, which directly influences the potential health effects (WHO 2000). While there is no safe level of particulate matter exposure, the risk of health impacts decreases with lower levels of exposure. There is clear evidence that $PM_{2.5}$ constitutes the majority of particulate matter associated health effects.

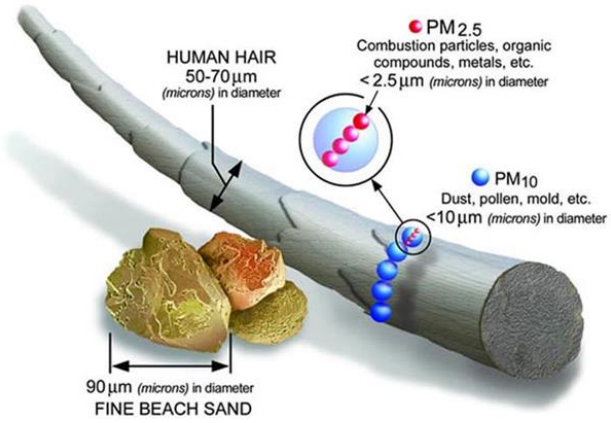

Figure D-1: The relative sizes of $PM_{2.5}$ and PM_{10}

Source: USEPA, 2013

Note: Image reproduced with permission from the USEPA, Office of Research and Development

$PM_{2.5}$ is a subset of PM_{10} and refers to all particles less than 2.5 µm in diameter. $PM_{2.5}$ is mainly produced from combustion processes including vehicle exhaust and wood fires. It has an atmospheric lifetime of days to weeks and is able to travel hundreds to thousands of kilometres once emitted to atmosphere.

Figure D-1 above shows the sizes of particulate matter such as $PM_{2.5}$ and PM_{10} relative to the average width of a human hair, which is 70 µm.

In Australia, the National Environment Protection (Ambient Air Quality) Measure (AAQ NEPM) is the overarching framework for the management and reporting of particulate matter pollution. The desired outcome of the AAQ NEPM is 'air quality that allows for the adequate protection of human health and well-being'. To achieve this, the AAQ NEPM specifies Ambient Air Quality Standards, against which each jurisdiction is required to monitor and report its performance. The AAQ NEPM includes Ambient Air Quality Standards for PM_{10} and $PM_{2.5}$. These standards were made more stringent by Commonwealth, state and territory Environment Ministers on 15th December 2015, as part of the National Clean Air Agreement.

Health benefits of reducing particle emissions

Improving ambient air quality by reducing particle emissions in particular will generate a range of health and amenity benefits. Possible benefits include lower risks of morbidity and mortality (e.g. cardiovascular and respiratory diseases, hospital admissions and premature mortality), improved visibility and less material damage (e.g. deposition of dust on external surfaces).

The EPA commissioned a recent report to outline methodologies for valuing the health impacts from changes in particulate emissions (PAE Holmes 2013). The valuation methodology used by PAE Holmes takes into account the location of the exposed population and estimated health costs from PM_{10} emissions ranging from $280,000 per tonne in the Sydney area to $360 per tonne in rural areas. A wider literature search by ACIL Allen (2014) found a higher range damage cost from PM_{10} of $525,313 per tonne. In comparison, the current average cost for PM_{10} under the LBL scheme is $500/tonne.

Appendix E: Data for selected charts

Figure 3-4: Trends in PM_{10} emissions (millions kg) to air by source in NSW, 2009–10 to 2013–14, National Pollutant Inventory

Source	2009–10 (Millions kg)	2010–11 (Millions kg)	2011–12 (Millions kg)	2012–13 (Millions kg)	2013–14 (Millions kg)
Mining for coal, Hunter* (non-LBL)	50.49	64.08	79.78	86.45	81.56
Mining for coal, NSW (except Hunter*) (non-LBL)	8.49	13.36	23.79	24.34	22.30
Mining for minerals, NSW (non-LBL)	14.86	17.24	17.57	21.36	20.53
Electricity generation, NSW (LBL)	3.08	3.44	4.02	3.31	4.60
Other activities, NSW (mix of LBL and non-LBL)	8.74	10.70	8.92	8.50	10.31

*'Hunter' includes: Dungog, Gloucester, Great Lakes, Muswellbrook, Singleton and Upper Hunter local government areas.

Figure 3-14: Liable LBL fees ($ millions) for assessable air pollutants, by region (or LGA), 2013–14

Air Pollutant	Sydney basin ($ Millions)	Newcastle/Hunter ($ Millions)	Illawarra ($ Millions)	Wyong ($ Millions)	Lithgow ($ Millions)	Rest of NSW ($ Millions)
VOCs**	$0.705	$0.030	$0.013	$0.000	$0.000	$0.000
PM_{10}	$0.275	$0.651	$0.215	$0.026	$0.801	$0.204
SO_X	$0.028	$1.235	$0.045	$0.141	$0.431	$0.003
NO_X**	$2.763	$6.112	$1.693	$1.957	$1.155	$0.290
Other*	$0.274	$1.101	$0.324	$0.140	$0.166	$0.074

*'Other' includes coarse particulates, fluoride, benzo(a)pyrene equivalent, benzene, hydrogen sulfide, lead, mercury and arsenic.

**NO_X and VOCs include NO_X (summer) and VOCs (summer) respectively.

Figure 4-1: PM_{10} air emissions (millions kg per year) in NSW by industry activity, reported to LBL (first four columns) and NPI (last four columns)

	LBL (Millions kg reported per year)					NPI (Millions kg reported per year)				
Industry	**2009–2010**	**2010–2011**	**2011–2012**	**2012–2013**	**2013–2014**	**2009–2010**	**2010–2011**	**2011–2012**	**2012–2013**	**2013–2014**
Electricity generation (in LBL*)	2.90	3.28	3.74	2.40	2.04	3.07	3.44	4.02	3.31	4.60
Other activities (in LBL*)	1.36	1.22	1.14	1.64	1.44	2.14	3.92	2.91	3.05	2.47
Metallurgical activities (in LBL*)	0.78	0.84	0.69	0.52	0.24	2.22	2.15	1.94	1.68	1.73
Mining for coal (non-LBL)	-	-	-	-		58.98	77.44	103.57	110.79	103.86
Mining for minerals (non-LBL)	-	-	-	-		14.86	17.24	17.57	21.36	20.53
Other activities not in LBL**	-	-	-	-		3.94	4.00	3.41	3.20	6.12

* Activities listed as 'in LBL' – note that for the same type of activity (e.g. 'metallurgical activities'), NPI generally captures a larger number of premises because it includes those that fall below the LBL licensing thresholds. This explains why the NPI data tends to have a slightly larger stacked-bar for these activities compared to LBL data.

**'Other activities not in LBL' includes 'other EPA licensed activities (non-LBL)' and 'non-licensed activities'.