
**National Environment Protection Council
Proposed Diesel Emissions
National Environment Protection Measure
PREPARATORY WORK**

**IN-SERVICE EMISSIONS PERFORMANCE
PROJECT 2
*PHASE 1: DRIVE CYCLES***

1. OBJECTIVES

- 1.1 To establish for Australian cities, typical urban driving patterns of diesel engined vehicles and derive an urban emissions drive cycle(s) from those driving patterns.
- 1.2 To establish a composite drive cycle(s) based on typical diesel vehicle urban drive cycles identified in objective 1.1.
- 1.3 To identify vehicle based causes of increased emissions; and short in-service diesel emission tests potentially suitable for use in Australia as in-service enforcement procedures.

2. BACKGROUND

This project is one of a series of projects encompassing the preparatory work identified to be carried out prior to developing a Diesel Emissions National Environment Protection Measure (NEPM) for consideration by the National Environment Protection Council (NEPC).

The emissions of most interest in relation to diesel vehicles are oxides of nitrogen (NO_x) and fine particles, (also known as fine particulates). NO_x is a precursor to the formation of photochemical smog. There is also evidence that NO_x reacts with other pollutants to form particles.

Fine particles have been identified as the major health risk in vehicle emissions. The smaller the particle the greater the risk. Whilst diesel vehicle emission standards in the Australian Design Rules (ADRs) have only recently included particles (by reference to standards applying in Europe, US and Japan), local vehicle standards have for some time placed limits on emissions of visible smoke.

Light duty diesel vehicles under 3.5 tonnes GVM are subject to the same certification drive cycles as petrol engined vehicles. These drive cycles are conducted on a vehicle (chassis) dynamometer and require complex emissions analysis equipment. For heavy duty vehicles (those over 3.5 tonnes GVM) various heavy-duty diesel engine emission certification tests are in use overseas. However, they are all performed on an engine dynamometer rather than a vehicle dynamometer.

All certification testing is currently carried out overseas due to the fact that there are no diesel engine manufacturers in Australia. In addition there are no facilities in Australia capable of undertaking certification level emissions tests for diesel vehicles.

To date emission factors used for local airshed inventory calculations for heavy duty diesel engine vehicles are those derived from the US engine certification test data which may be inappropriate for Australia. Project 2 aims to obtain a more accurate and representative measure of the actual amount of pollutants emitted from the Australian diesel vehicle fleet by testing vehicles over a vehicle driving cycle based on actual local on-road conditions and driving patterns.

Because of the factors above, it has not been possible to use existing data to reliably establish what current diesel emissions are or to predict the actual (on the ground and in the air) outcomes of changing the way diesel emissions are currently controlled. Accordingly, the likely ramifications of various scenarios for diesel NEPMs cannot be evaluated or quantified.

Further, there is no consistent approach to in-service diesel vehicle emission tests here or internationally, with a range of free acceleration and loaded tests being used.

The focus of this project is to provide reliable data on diesel vehicle driving patterns and in-service fleet emissions to assist in establishing the emissions performance of the existing vehicle fleet. The project also seeks to identify suitable short tests for vehicle evaluation and opportunities for reducing emissions by inspection and functional tests. The information obtained will assist in developing a sound technical basis for scoping the development of a NEPM.

The In-service emissions project has two distinct phases.

Phase 1 (this task) comprises four areas of investigation:

- development of representative urban emission drive cycles;
- development of a composite urban emission drive cycle(s);
- investigation of the literature regarding short in-service emission tests for diesel powered vehicles; and
- identification of the vehicle components and systems which impact on diesel vehicle emissions and possible non-invasive means to identify vehicles with faults which lead to excessive emissions. The activities associated with each area of this Phase are outlined under SCOPE below.

Phase 2 of the project is an emissions test program applying the information obtained in Phase 1 to a representative sample of vehicles selected from the in-service diesel fleet. The aim of the testing is to:

- establish actual emission levels produced by the Australian diesel vehicle fleet; and
- evaluate a selected group of short in-service emission tests for their ability to identify vehicles producing excessive emissions.

Phase 2 is the subject of a separate project specification, which will not be let until Phase 1 is completed and evaluated.

3. SCOPE

The successful tenderer for Phase 1 is required to undertake the following tasks:

3.1 Development of Urban Emissions Drive Cycle (UEDC)

The successful tenderer will be required to establish typical urban driving patterns and develop urban emissions drive cycle(s) (UEDC) that typify diesel vehicle driving conditions for each ADR vehicle category over typical driving conditions and derive an UEDC(s) from those patterns for Australia's major cities (Adelaide, Brisbane, Melbourne, Perth and Sydney).

The tenderer is invited to propose a suitable methodology for gathering driving data and developing the UEDCs. Possible strategies may include:

- data logging of a representative sample of diesel vehicles in an Australian city(ies);
- manipulation of existing data on diesel vehicle movements; and
- analysis of traffic flow data and vehicle performance characteristics

3.2 Composite Urban Emission Drive Cycle

Modes selected from the UEDCs identified in task 3.1 are to be used to establish a composite UEDC for the ADR vehicle categories. The composite UEDC must be suitable for use in testing a representative sample of diesel engined vehicles from the ADR categories for establishing a current emissions profile for the Australian diesel engined fleet. It must also be suitable for use in the evaluation of short in-service vehicle emission tests designed for identifying vehicles that are exceeding their design emission standards.

Because of limitations of dynamometer and emissions measurement equipment in Australia, the UEDCs and the composite UEDC(s) need to be loaded model type of tests (including steady state) and must not take more than 15 minutes in total dynamometer time to conduct.

The approach proposed by the tenderer must include an explanation of the rationale and methodology used to develop the UEDC(s) and the composite UEDC(s) and an indication of how they can be adapted, if necessary, for use in different Australian cities.

3.3 In-Service Short Test Evaluation

The successful tenderer will identify and propose five (5) in-service short exhaust emissions tests for evaluation. It is expected that a number of loaded (dynamometer based) and unloaded (free acceleration) tests would be considered.

The approach proposed by the tenderer must include an explanation of the methodology (ie: literature search, industry survey, etc.) that will be used to select candidate tests.

Selected short tests must meet the following minimum criteria:

- suitable for identification of excessive emissions of one or more of emissions of NO_x, particles, and smoke;
- must identify emissions under those vehicle operating conditions that are most likely to result in poor emissions performance;
- be objective;
- be precise in measurement so as to be repeatable;
- simple and easily applied;
- assist in the identification of the reason for high emissions;
- cost effective and suitable for widespread use such as vehicle registration; and
- ability to be correlated to original design emission standards, or to identify high emitting vehicles.

3.4 Vehicle based causes of increased emissions

The tenderer will identify common vehicle based causes of increased emissions from diesel engined vehicles, and propose potential non-invasive methods for readily identifying vehicles with excessive emissions. These will include the possibility of simple inspections of components and of functional tests. The approach proposed by the tenderer must include an explanation of the methodology (ie: literature search, industry survey, etc.) that will be used to identify such causes.

4. OUTPUT

The consultant is required to provide the following:

- 4.1** a detailed Report identifying typical Australian urban driving patterns of diesel engined vehicles, and the derived urban emission drive cycles for the relevant ADR vehicle categories and composite urban emission drive cycle(s). This report will include drive cycle analysis from data logging “real world” vehicle operating conditions, or alternative means approved by the Project Manager.
- 4.2** a draft Report providing the essential elements for:
 - identifying all the short in-service exhaust emission tests assessed;
 - specifying the recommended 5 short in-service exhaust emission tests suitable for testing on a representative sample of in-service

- diesel engined vehicles,
- identifying vehicle based causes of increased emissions from diesel engined vehicles for vehicles in each ADR category; and
- proposing non-invasive methods for identifying high emitting vehicles.

4.3 a final Report explaining in detail the proposed composite urban emission drive cycle(s), including justification for the proposed cycle and the assumptions that underlie its development. The consultant will also be required to make an oral presentation of the project findings to the Project Team. The report will also provide justification for the choices and detailed test procedures for each of 5 recommended short tests;

5. MILESTONES

An initial meeting between the successful tenderer and the project Team will be held when that tenderer is selected and immediately following the signing of the contract. The project will commence upon the contract being signed by all parties.

Outputs as identified in section 4.0 will be delivered by close of business on the Friday of the assigned week following project commencement, as indicated below:

Output 4.1	Week 13
Output 4.2	Week 17
Output 4.3 (draft)	Week 19
Output 4.3 (final)	within two weeks of receiving comments on the draft final report, from the Project Manager.

6. REPORTING

6.1 Progress Reports

The successful tenderer will provide fortnightly summary progress reports, commencing two weeks from the agreed date of commencement. Progress reports must be lodged with the Project Manager in writing (typed) by letter, fax or e-mail.

Each progress report must include a clear statement of whether or not the project is running on time and a brief summary of progress since the previous progress report.

The contractor will be required to report to meetings of the Project Team after completion of Output 4.1, and as required.

6.2 Project Report

The final project report must meet the Project Manager's requirements in terms of style and format. All reports, and data gathered under this project, must be supplied to the NEPC Service Corporation in a printed form and in an electronic format fully compatible with Microsoft Word 97 and Microsoft Excel 97.

6.3 Output Review

A working group has been established to oversee the project design and implementation. The working group will review the progress reports and provide direction and recommendations to the Project Manager as required during the course of the project. The working group will also review all outputs including draft and final reports and may submit output findings and reports to outside experts for additional review.

7. PROJECT MANAGEMENT

The NEPC Service Corporation Project Manager is Mr Marc Thompson.

Project proposals must specify a person from the tenderer organisation who will be responsible for the project. The nominated person will be required to report to the Project Manager and/or the Project Technical Committee on the progress of the project in accordance with Part 6.1 and on any difficulties envisaged which might affect the project outcome or timetable. The successful tenderer will notify the Project Manager of any proposed alteration to the personnel assigned to the completion of this project, prior to any such alteration.

8. SUBMISSION OF TENDERS

8.1 Tender Requirements

Tenders must be submitted in writing as specified in section 11 and must include at least the following:

- a demonstrated understanding of the Project Brief and an appreciation of the scope of the task;
- the name and position within the organisation of the person nominated to be responsible for the project and percentage of their working time to be devoted to the project;
- state the details of the qualifications and experience, including recent relevant projects, of all persons who would work on the project, the percentage of their working time committed to the completion of this project and an indication of the role they would undertake, including details of any sub-contracting arrangements;
- a proposed methodology for the project, in sufficient detail to establish that the tenderer understands the issues and requirements of the project, thus ensuring successful outcomes;

- the total cost of the project, including outline estimates of costs other than fees (eg purchase of supporting data);
- the proposed dates for beginning and completing the project and a suggested schedule of output delivery and milestones, including identification of any constraints perceived by the tenderer;
- proposed method of vehicle data logging including type and frequency of data collection;
- a proposal for progress payments through the course of the project;
- details of quality assurance and best practice principles applied by the tenderer; and
- any other information the tenderer considers would facilitate evaluation of the tender or establish their suitability to undertake the project.

The proposal should be no longer than 15 pages (excluding CVs).

8.2 Criteria for Selection

The selection of the successful tenderer will be based on the following:

- demonstrated understanding of the project requirements;
- experience in, or demonstrated capacity to successfully undertake vehicle data logging and the analysis of data from that process (if data logging is the proposed method);
- quality control procedures and specifications of the equipment/measuring system to be used;
- approach and methodology proposed;
- ability to complete the project within the project time frame;
- knowledge of and access to information on operation of diesel vehicles in Australian capital cities;
- suitability of the proposer to undertake the work; and
- demonstrated ability to interpret the results in a scientifically rigorous manner and to present the findings by oral presentations and written reports.

The proposal must be submitted to:

Mr Marc Thompson
Project Manager
NEPC Service Corporation
Level 5, 81 Flinders Street
Adelaide SA 5000
Phone: 08 8419 1202
Fax: 08 8224 0912
E-mail: mthompson@nepc.gov.au

by the time and date specified in the covering letter. Tenders by facsimile or e-mail will be accepted provided the originals are mailed the same day.

9. PROJECT BUDGET

The contract will be awarded on a fixed cost basis and progress payments made in accordance with an agreed schedule.

It is expected that this project will be completed for a cost between \$40,000 and \$50,000.

10. FURTHER INFORMATION

Clarification of any issues relating to this project prior to the awarding of the contract may be obtained by contacting Mr Thompson.

11. TENDER FORMAT

All tenders are to include a table of contents with relevant criteria grouped under the following headings:

1. Introduction
2. Appreciation of the study requirements
3. Approach and methodology
4. Experience and expertise applicable to the project
5. Key personnel: qualifications and experience
6. Capacity to complete the work on time
7. Timetable, budget and fee structure