

Disaster Resilient Cities:
**Forecasting Local Level Climate Extremes &
Physical Hazards for Kuala Lumpur**

Work Package 0 Deliverable D0.3
Report on Air Pollution Thematic
Workshop, held 24-28 July 2017 at UKM

Final report

Prepared for
UK & Malaysian partners

21 September 2017

Report Information

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Contents

1. EXECUTIVE SUMMARY	2
2. WORKSHOP AGENDA	3
24 JULY. ADMS-URBAN TRAINING DAY ONE	3
25 JULY. ADMS-URBAN TRAINING DAY TWO.....	3
26 JULY. EMIT TRAINING DAY ONE.....	3
27 JULY. EMIT TRAINING DAY TWO	4
28 JULY. DISCUSSION OF THE DEVELOPMENT OF THE MODEL INPUT INVENTORY FOR KUALA LUMPUR.....	4
3. NOTES OF WORKSHOP DISCUSSIONS	5
4. ATTENDEES	7
5. PHOTOGRAPHS	8

1. Executive summary

CERC and UKM provided a thematic workshop on air pollution and associated analysis and modelling software, to promote knowledge sharing. The workshop took place over five days, 24-28 July 2017, at the Universiti Kebangsaan Malaysia (UKM).

There were sixteen attendees at the workshop, from CERC, UKM, Universiti Sains Malaysia (USM), Department of Environment, and Malaysian Meteorological Department.

The workshop included:

- Training in the use of CERC's software ADMS-Urban and EMIT by two highly experienced trainers from CERC (Dr Patricia Gilmour and Dr Catheryn Price), with worked examples and demonstrations;
- Discussion of project Work Package 2.8 i.e. development of the ADMS-Urban model input inventory for Kuala Lumpur. There was a particular focus on data availability (how to obtain data) assimilating and organising data, and the next steps.

The training and discussions were extremely valuable and fruitful.

2. Workshop agenda

24 July. ADMS-Urban Training Day One

The first day of the training gave an introduction to ADMS-Urban and the Atmospheric Boundary Layer. Specific topics covered were as follows:

- Introduction to boundary layer meteorology and pollution dispersion
- Introduction to the ADMS-Urban software
- Setting up a modelling scenario in ADMS-Urban
- Modelling a single Point source
- Modelling a single Road source
- Visualising input and output data using the ADMS Mapper

25 July. ADMS-Urban Training Day Two

On day two of the ADMS-Urban course the ideas introduced on day one were extended further. The following topics were covered in detail:

- Choosing meteorology data – types of meteorological input
- Calculating Short-term and Long-term concentrations
- Modelling multiple sources and creating groups
- Modelling a small Road Network – Current and Future scenarios
- Modelling street canyons, road tunnels and urban canopy flow
- Modelling chemistry effects
- Determining the major contributor to SO₂ concentrations
- Particulate emissions from buses
- Discussion of modelling studies, gridded source data, validation, background parameters, emission inventories

26 July. EMIT Training Day One

The first day of the EMIT training gave an introduction to what an EMIT database looks like. Key features such as the structure of the database and how to create a new database, source parameters used and where they are stored, as well as route types were discussed. Specific topics covered were as follows:

- Introduction to Emissions Management Toolkit (EMIT) interface and structure
- Adding Sources to a New EMIT Database
- Discussion of Route Types
- Sharing Groups and Copying Sources in EMIT

- Emission Factors and Sources
- Setting up a Small Scale Low Emission Zone
- Viewing and Manipulating data using the EMIT Mapper

27 July. EMIT Training Day Two

On day two, ideas introduced on day 1, were extended, illustrating methods of importing and exporting data. The application of EMIT for a traffic management scheme was investigated, as well as further applications of EMIT. The following topics were covered in detail:

The EMIT Import Wizard

Output from EMIT

Traffic management

– current and future years

– speed and vehicle type restrictions

28 July. Discussion of the development of the model input inventory for Kuala Lumpur

The last day of the workshop consisted of a group discussion on data availability, assimilating and organising data, and how to approaching this aspect of the project.

3. Notes of workshop discussions

On 28 July there was a discussion of the status of Work Package 2.8 within the project i.e. development of the ADMS-Urban model input inventory for Kuala Lumpur. This work package is led by CERC and UKM. The discussions were extremely valuable and fruitful.

The training in the emissions inventory toolkit EMIT gave the UKM group involved in the project an idea of what emissions data are required; the ADMS-Urban training covered other model input data requirements. Specific focus was on:

- data availability (how to obtain data),
- assimilating and organising data, and
- the next steps on this Work Package.

Particular items discussed are summarised below:

a. Emissions data

There is a lack of detailed emissions data for Kuala Lumpur and also confidentiality issues relating to some data. However, strong reassurance was given by CERC staff that detailed data are not required in the first instance; some emissions data can be calculated by a top-down approach using scaling factors to fill in gaps. EMIT includes special features that facilitate this approach; this feature was covered during the EMIT training course.

b. Electronic file management

The need for strict electronic file management was highlighted. When performing a series of emissions calculations (using EMIT) or air dispersion modelling (using ADMS-Urban) it is important to set up a file structure that provides a clear indication as to the difference between runs (e.g. using 'readme' files and dates within the directory names).

c. Meteorological data

CERC advised the UKM group that they did not need to use a met site within the model domain. Inspection of meteorological data recorded at Subang and Kuala Lumpur International Airport should be undertaken (for example looking at wind roses and data ranges). The results of these analyses should be discussed, possibly with representatives from Met Malaysia, in order to decide which site is most representative of the meteorology within Kuala Lumpur (note that the model adjusts for the change in surface roughness between the meteorological site and the model domain).

d. Background data

Prof Talib was concerned about double counting of emissions when using ADMS-Urban to carry out air quality modelling. The group discussed that the background data needs to be from outside the modelling domain, and CERC explained the approach of using a wind-direction dependent upwind background file. An alternative approach is to use the hourly minimum concentration over all sites as background, although care is required for the NO_x chemistry pollutants (that is, the O₃ and NO₂ background concentrations must come from the site of minimum NO_x).

e. Dispersion modelling

There is no need to wait until a full emissions inventory has been compiled. It is a good idea to set up meteorological and background data inputs and perform preliminary runs. Results from these preliminary model runs can be discussed with CERC.

4. Attendees

The sixteen participants and their organisations are listed here:

Dr Patricia Gilmour: *Cambridge Environmental Research Consultants (CERC)*

Dr Catheryn Price: *Cambridge Environmental Research Consultants (CERC)*

Prof. Dr. Mohd Talib Latif: *School of Environment and Natural Resource Sciences, Universiti Kebangsaan Malaysia (UKM)*

Assoc. Prof. Dr. Liew Ju Neng: *School of Environment and Natural Resource Sciences, Universiti Kebangsaan Malaysia*

Assoc. Prof. Dr. Yusri Yusup: *School of Industrial Technology, Universiti Sains Malaysia (USM)*

Dr. Fatimah Ahamad: *Institute of Climate Change, Universiti Kebangsaan Malaysia*

Mrs. Nor Hafizah Baharudin: *School of Environment and Natural Resource Sciences, Universiti Kebangsaan Malaysia*

Dr. Murnira Othman: *School of Environment and Natural Resource Sciences, Universiti Kebangsaan Malaysia*

Mr. Famey Yusoff: *School of Environment and Natural Resource Sciences, Universiti Kebangsaan Malaysia (UKM)*

Mr. Mohd Nor Irwan Othman: *Department of Environment*

Mrs. Zaleha M. Rashid: *Department of Environment*

Mrs. Rupidah Idris: *Department of Environment*

Mrs. Ili Liyana Othman: *Department of Environment*

Mr. Ahmad Fairudz: *Malaysian Meteorological Department*

Mrs. Hanashriah Hassan: *Malaysian Meteorological Department*

Mrs. Azliyana Azhari: *Institute for Environment and Development (LESTARI), Universiti Kebangsaan Malaysia*

5. Photographs

