

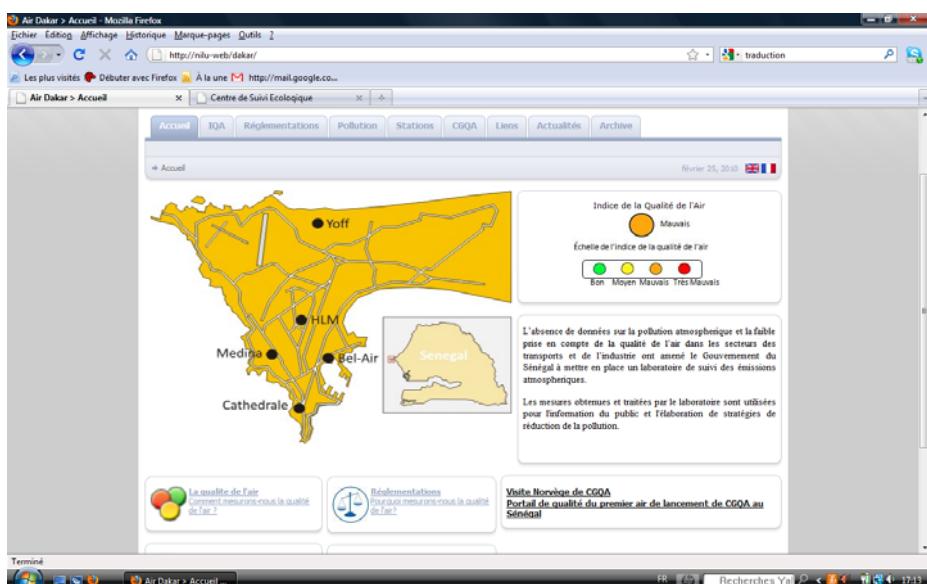
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| Projet: | ASSISTANCE TECHNIQUE A LA MISE EN PLACE DU LABORATOIRE CENTRAL ET DES STATIONS DE MESURES POUR L'AMELIORATION DE LA QUALITE DE L'AIR EN MILIEU URBAIN DE DAKAR |
| Contrat: | No 003/C/FND/05 |

Air Quality Web portal in Dakar

Operational and editorial procedures

Aminata Mbow Diokhane, Vo Thanh Dam and Cristina Guerreiro



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Summary

The current report presents the operational and editorial procedures for the Air Quality Web portal in Dakar, operated by the Centre de Gestion de la Qualité de l'Air de Dakar (CGQA). The procedure to set up the Air Quality Index (AQI) in AirQUIS is described and illustrated in Annexe A. In Annexe B a short description of how AirQUIS calculates the AQI for the different measurement station types is given, as well as the procedure CGQA has to follow to determine the AQI for the whole Dakar city to be presented daily on the Air Quality Web portal.

The operational and editorial procedures for the Air Quality Web portal in Dakar have been described by Aminata Diokhane, under supervision of NILU and validated by NILU.

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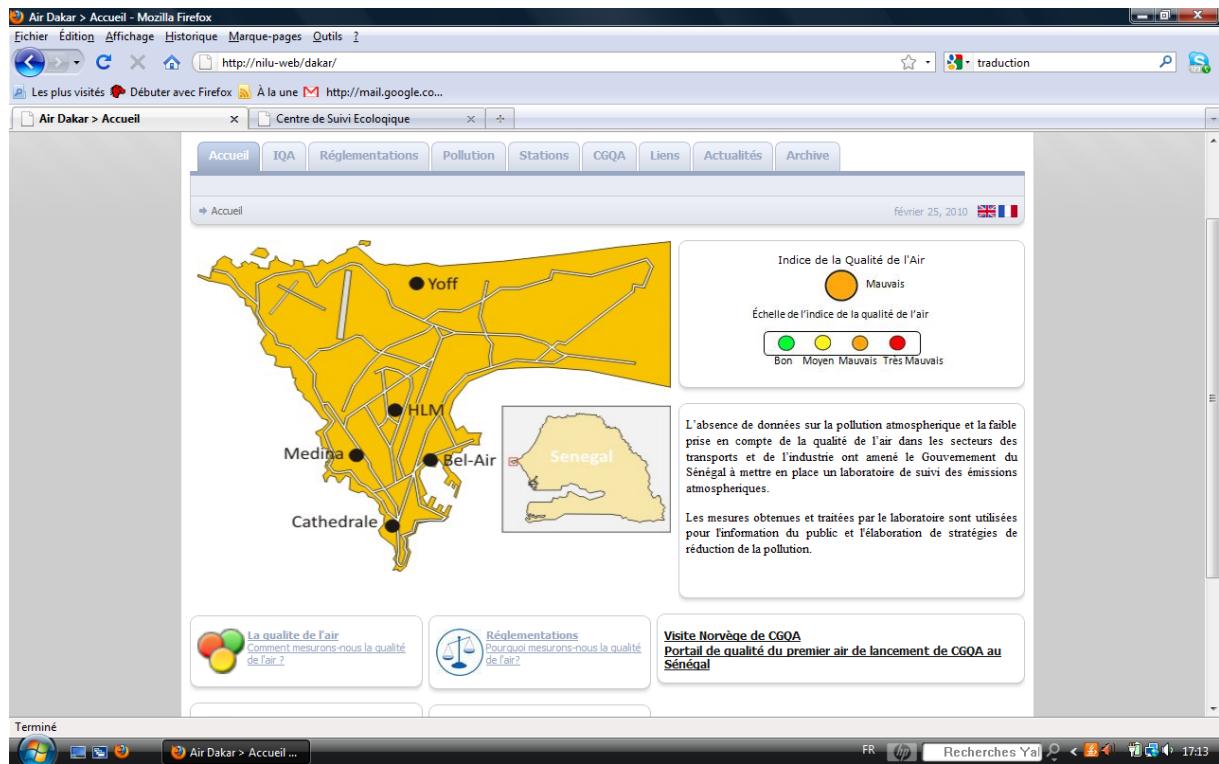
1. Introduction

The Norwegian Institute for Air Research (NILU) was asked by the Conseil Exécutif des Transports Urbains de Dakar (CETUD) for support in establishing a Central Laboratory with an Air Quality Management System for Dakar. This project is part of the component entitled as “Amélioration de la qualité de l’air en milieu urbain” (QADAK) of the “Programme d’Amélioration de la Mobilité Urbaine” (PAMU) operated by the Conseil Exécutif des Transports Urbains de Dakar (CETUD).

The current report presents the operational and editorial procedures for the Air Quality Web portal in Dakar, corresponding to the project deliverable 10d. The procedure to set up the Air Quality Index (AQI) in AirQUIS is given in Annexe A. In Annexe B a short description of how AirQUIS calculates the AQI for the different measurement station types is given, as well as the procedure CGQA has to follow to determine the AQI for the whole Dakar city to be presented daily on the Air Quality Web portal.

2. Web portal home page

The temporary URL name for the web portal in Nilu intranet is <http://nilu-web/dakar>. It gives access to the home page below for any user:



This page is split into the following modules:

- a Home (“Accueil”) page which contains Dakar map with representation of all measurements stations and the small Senegal map
- a module on the right side which displays the Air quality index and the AQI legend. This should be displayed on each page.
- a module which introduces the problem of air quality in Senegal, below the AQI module in the right side
- Five modules on the bottom that directly give access to the AQI (“IQA”), Regulations (“Réglementations”), Pollution, CGQA pages and News.

The screenshot shows the homepage of the Air Dakar website. At the top, there is a navigation bar with links like "Accueil", "Édition", "Affichage", "Historique", "Marque-pages", "Outils", and a search bar. Below the navigation bar, there is a toolbar with icons for "Les plus visités", "Débuter avec Firefox", "À la une", and a link to "http://mail.google.co...". The main content area features a map of Dakar with several black dots indicating measurement stations labeled "Yoff", "HLM", "Medina", "Bel-Air", and "Cathédrale". To the right of the map is a box titled "Indice de la Qualité de l'Air" (Air Quality Index) with a yellow circle icon labeled "Mauvais" (Bad). Below it is a color scale legend: green (Bon), yellow (Moyen), orange (Mauvais), and red (Très Mauvais). A small inset map of Senegal is also present. Another box contains text about the lack of data on atmospheric pollution and the establishment of a laboratory for monitoring emissions. Below the map are four smaller boxes: "La qualité de l'air" (How do we measure air quality?), "Réglementations" (Regulations), "Visite Norvège de CGQA" (Norway visit of CGQA), and "Pollution" (Pollution). The bottom of the screen shows the Windows taskbar with icons for various applications and the system tray.

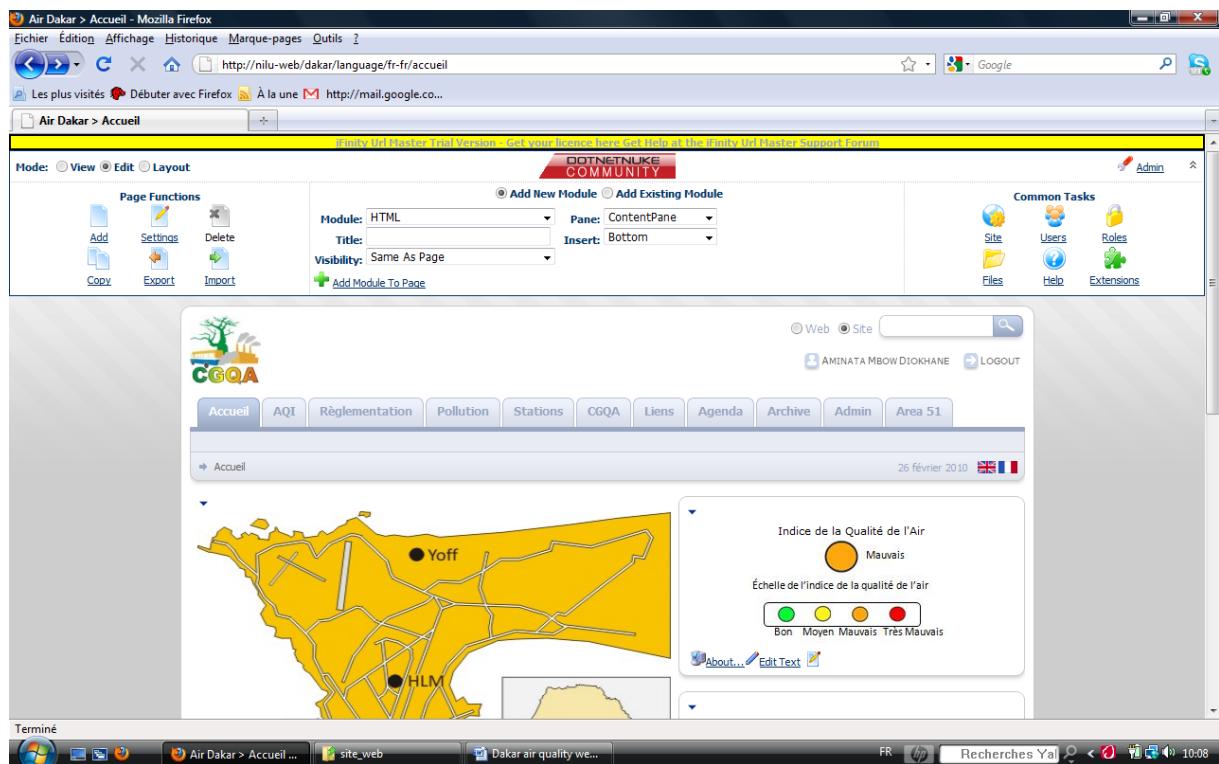
Pages can also be opened via the following tabs (below the “Login” icon):

- AQI (“IQA”) for information about the Air Quality Index,
- Regulations (“Réglementations”) for information about regulations on Air Quality in Senegal,
- Pollution which explains the general concept of pollution,
- Stations which contains information about the 5 measurement stations in Dakar,
- CGQA which is a brief presentation of CGQA,
- Links (“Liens”) which gives links to other organizations web site,
- Events (“Agenda”) which gives special events and coming events for CGQA,
- Archive which gives a chronological archives of events.

3. Editing pages

To create new modules or edit pages and add content to the web portal, user must have a login name and password. At present, 2 users accounts ("aminata" and "mbaye") have been created by the administrator for editing and adding content.

When connected under one of these names (see image below), pages content and settings can be edited and modified.



Additional options are added to the portal and in the upper left side a "View", "Edit" and "Layout" buttons are available.

Below each module some clickable links (bottom left side) and a contextual menu (upper left side) enable to edit text, import or export module content, change settings, move the module to another location, etc...

Contents can be copied from word and pasted. Some menus are available for formatting text.

An example is shown below with the "CGQA" page.

Once edited, the source version (html code) of the page can be viewed and modified by clicking on the source button.

```


La création du Centre de Gestion de la Qualité de l'Air (CGQA) a été possible grâce à un financement du Fonds Nordique de Développement qui a financé la composante 4 du Programme d'Amélioration de la Mobilité Urbaine (PAMU) mis en œuvre par le Conseil Exécutif des Transports Urbains de Dakar (CETUD).



En raison de ses objectifs de veille environnementale sur la pollution atmosphérique, le CGQA a été placé sous la tutelle de la Direction de l'Environnement et des Etablissements Classés (DEEC). Ce centre dispose aujourd'hui d'un laboratoire de référence et de cinq stations fixes de mesure de la pollution de l'air répartis à travers la ville de Dakar. Ces stations fixes sont complétées par un laboratoire mobile qui effectue des mesures dans des endroits ciblés.



Les missions du CGQA sont :

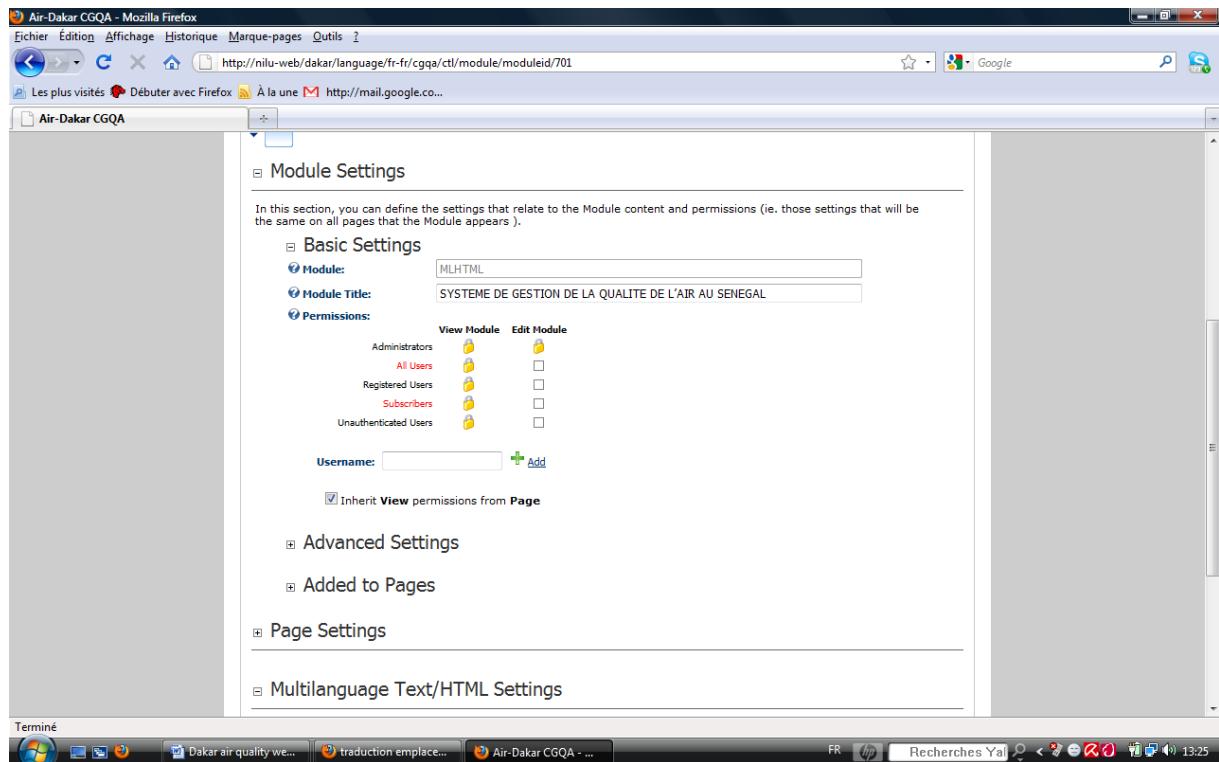


- <li>> assurer la veille sur la pollution de l'air ambiant,</li>
- <li>> évaluer les rejets de polluants à la source,</li>
- <li>> favoriser la mise en place un observatoire de la qualité de l'air,</li>
- <li>> informer le public sur l'état de la qualité de l'air,</li>

```

The “settings” link enables to define the page and module settings (see below) such as:

- Module title
- Users permissions on the module (who can view and/or edit the module)
- Pages settings
- Multilanguage settings
- Etc...



4. AQI update

The AQI is manually updated depending on the calculation from Airquis.

Four different images files containing the current AQI and legend have been created for this task:

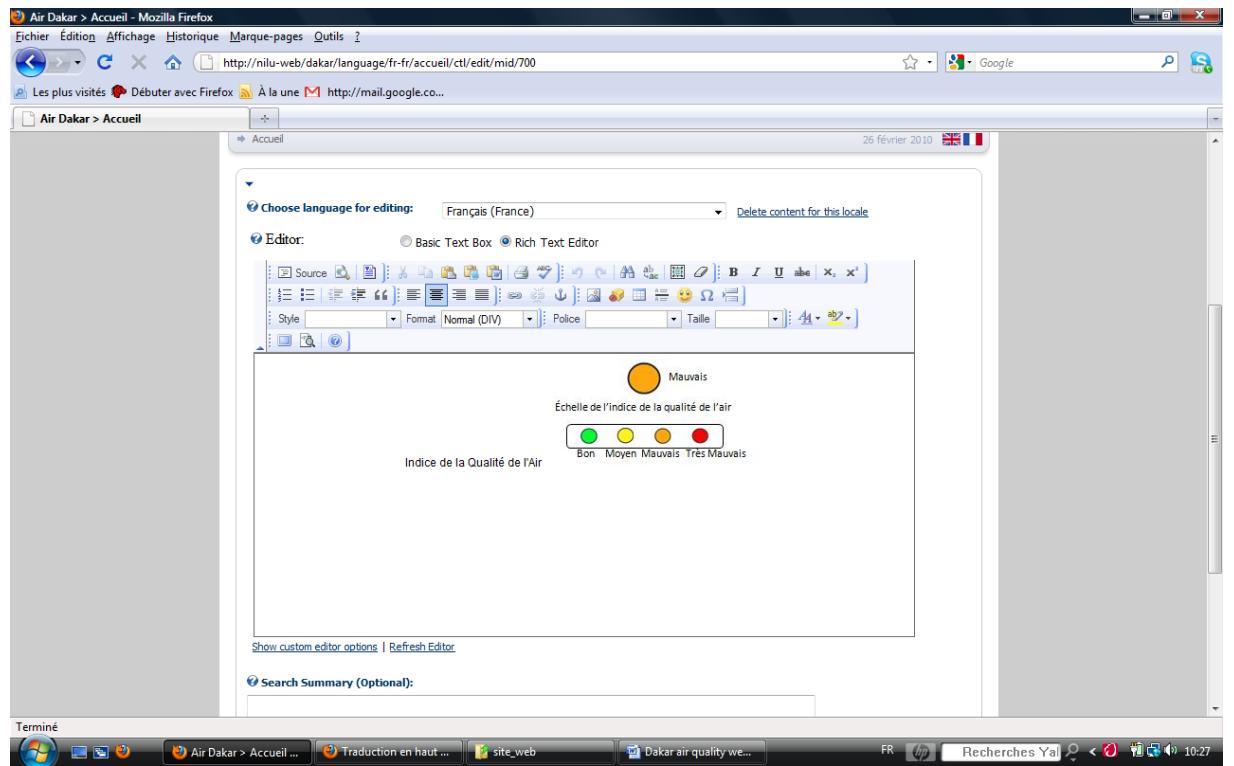
- indice_bon.jpg (green circle + legend) for a good AQI,
- indice_moyen.jpg (yellow circle + legend) for a moderate AQI,
- indice_mauvais.jpg (orange circle + legend) for a unhealthy AQI,
- indice_tres_mauvais.jpg (red circle + legend) for a very unhealthy AQI.

English version is available for each file; this gives a total of 8 jpeg files.

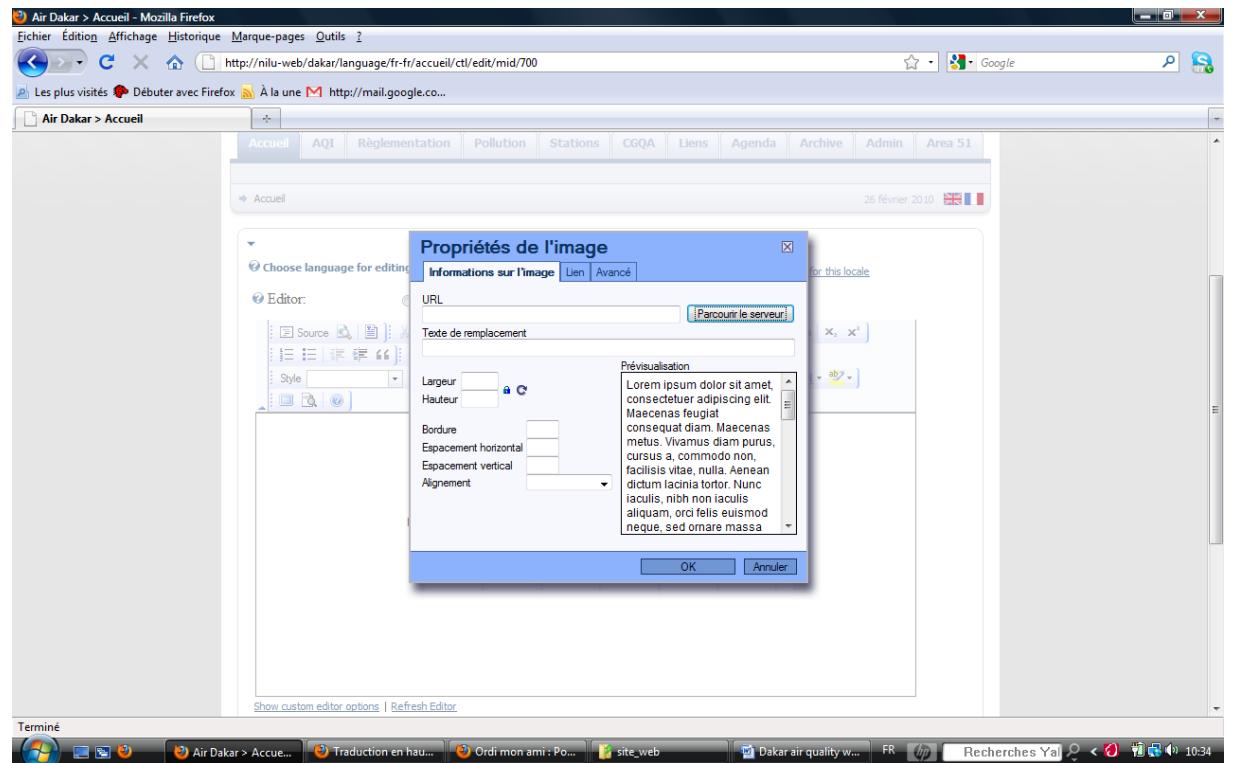
These files are permanently stored in the hard drive.

The following steps explain how to update the AQI:

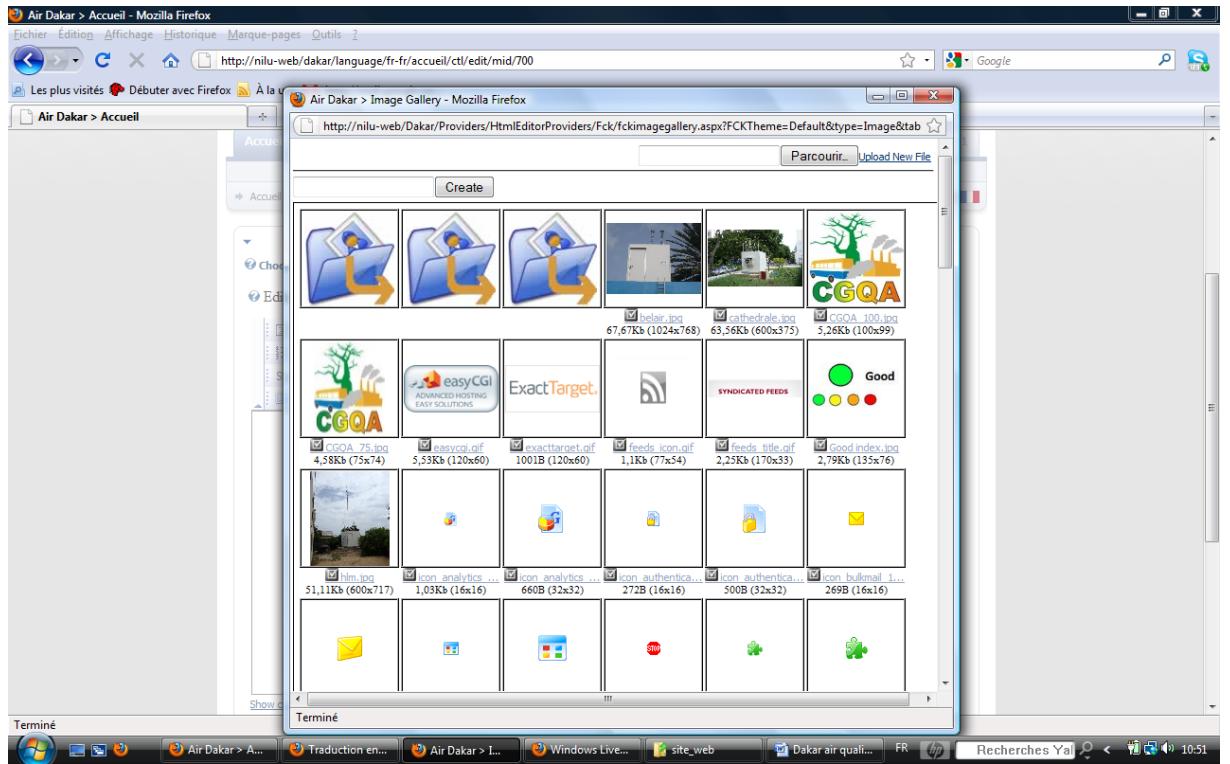
- Click on edit text to edit the AQI module.



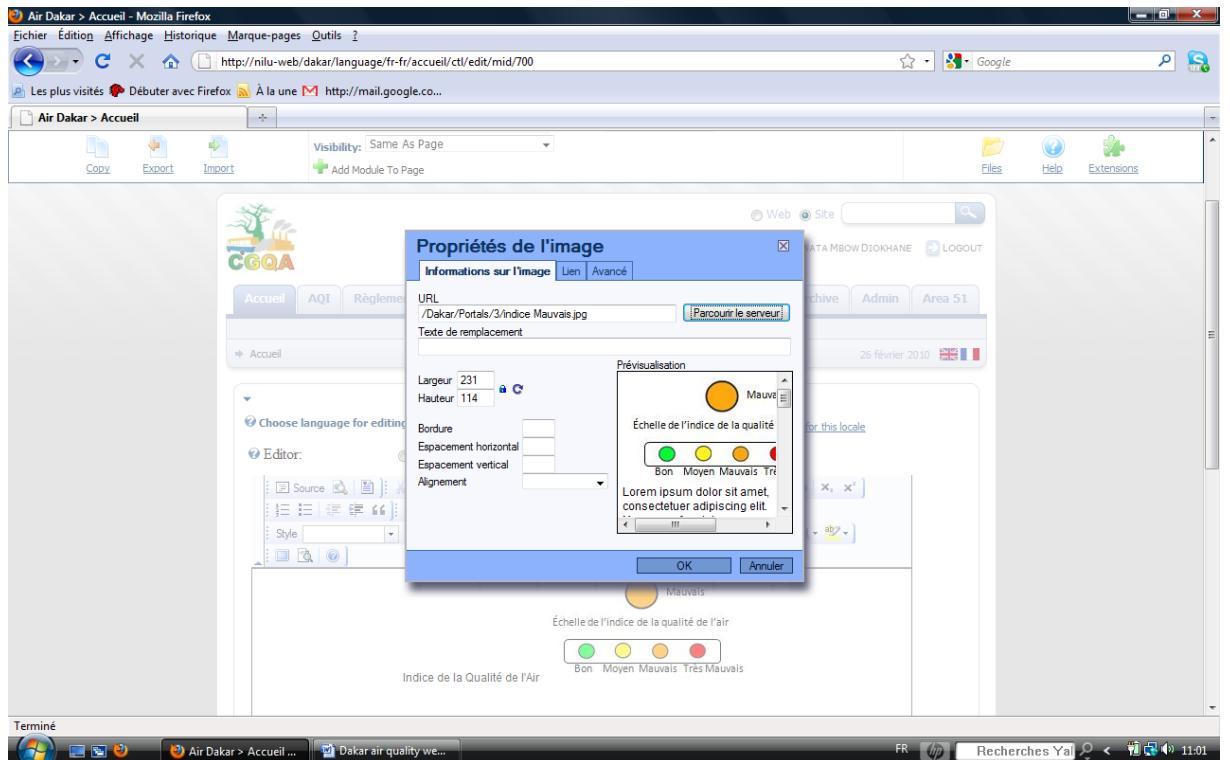
- In the menu bar, click on the icon insert/edit image. This opens the following window:



- b) Click on the button Browse server (“Parcourir le serveur”) to open the folders and choose the file if available or upload the file from its original location.



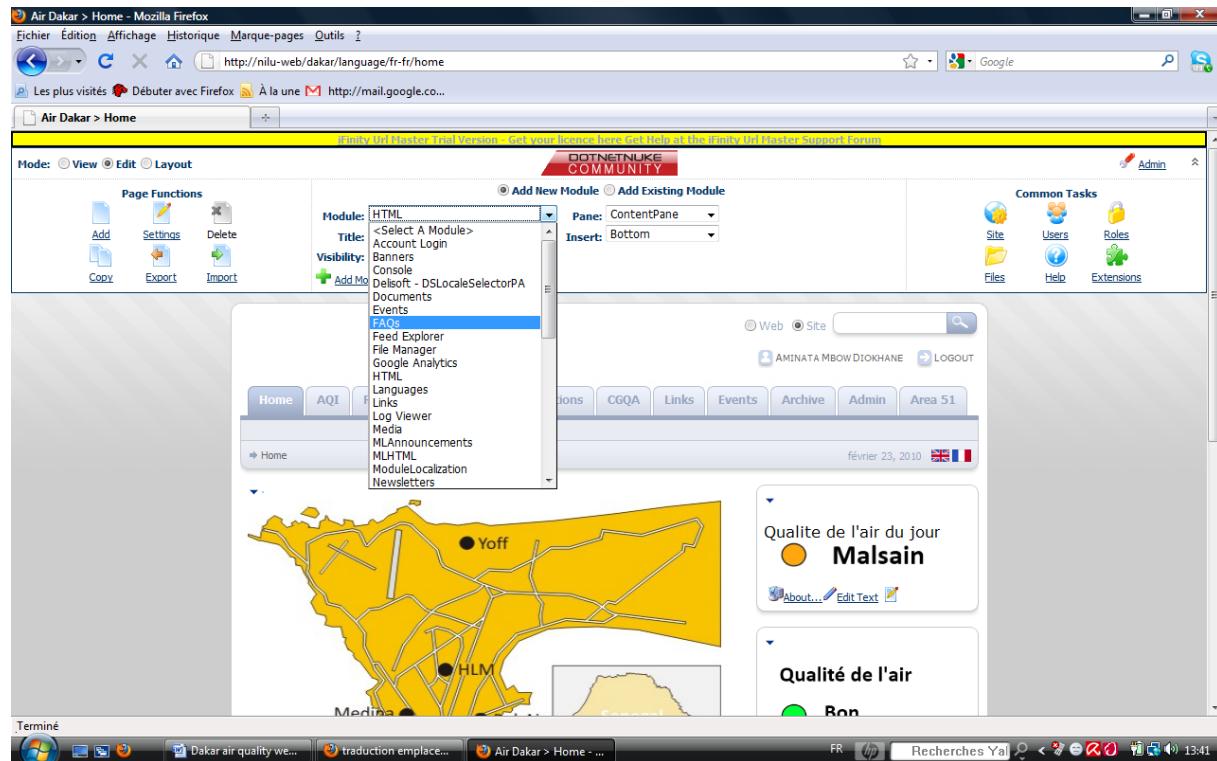
- c) Once the image is chosen, the display size (width and height) can be changed if necessary.



- d) Click on button ok to validate and display the image in the web site.

5. FAQ Management

Some pages (AQI, Regulations, etc ...) are setup as Frequently Asked Questions (FAQs)s. FAQs are added via the “Add new module” button (middle top) and select FAQs in the module list (see below).



Below the Faqs module a “Add New FAQ” link enables to access the editor for creating questions and answers. For advanced formatting of the faqs, the module settings can be viewed (in Page Functions module on the upper left corner). For example in AQI Faqs module questions numbers and the word “answer” are not displayed.

Air-Dakar AQI - Mozilla Firefox Fichier Édition Affichage Historique Marque-pages Outils ? http://nilu-web/dakar/language/fr-fr/aqi/ctl/edit/mid/735/itemid/5 Google Les plus visités Débuter avec Firefox À la une http://mail.google.co...

Air-Dakar AQI

Category: <Select Category>

Question: Editor: Basic Text Box Rich Text Editor

Qu'est-ce que l'AQI

Show custom editor options | Refresh Editor.

Answer: Editor: Basic Text Box Rich Text Editor

L'indice de qualité de l'air (IQA) indique l'état journalier de la qualité de l'air. Il renseigne sur le niveau de pollution de l'air et les impacts sanitaires qui peuvent en découler après quelques minutes ou des jours après l'exposition à

Show custom editor options | Refresh Editor.

Update Cancel Delete

Terminé

Windows Live Hotm... Air-Dakar AQI - Moz... Dakar air quality we... Recherches Ya... 08:29

Air-Dakar AQI - Mozilla Firefox Fichier Édition Affichage Historique Marque-pages Outils ? http://nilu-web/dakar/language/fr-fr/aqi/ctl/moduleid/735 Google Les plus visités Débuter avec Firefox À la une http://mail.google.co...

Air-Dakar AQI

Advanced Settings

Added to Pages

Page Settings

Default Sorting: Date (oldest first)

Enable AJAX:

Item Template

Question Template:

```
<div Class="Normal">
<b>[QUESTION]</b>
</div>
```

Answer Template:

```
<div Class="Normal" Style="padding: 5px;">
<b></b> [ANSWER]
</div>
```

Loading Template:

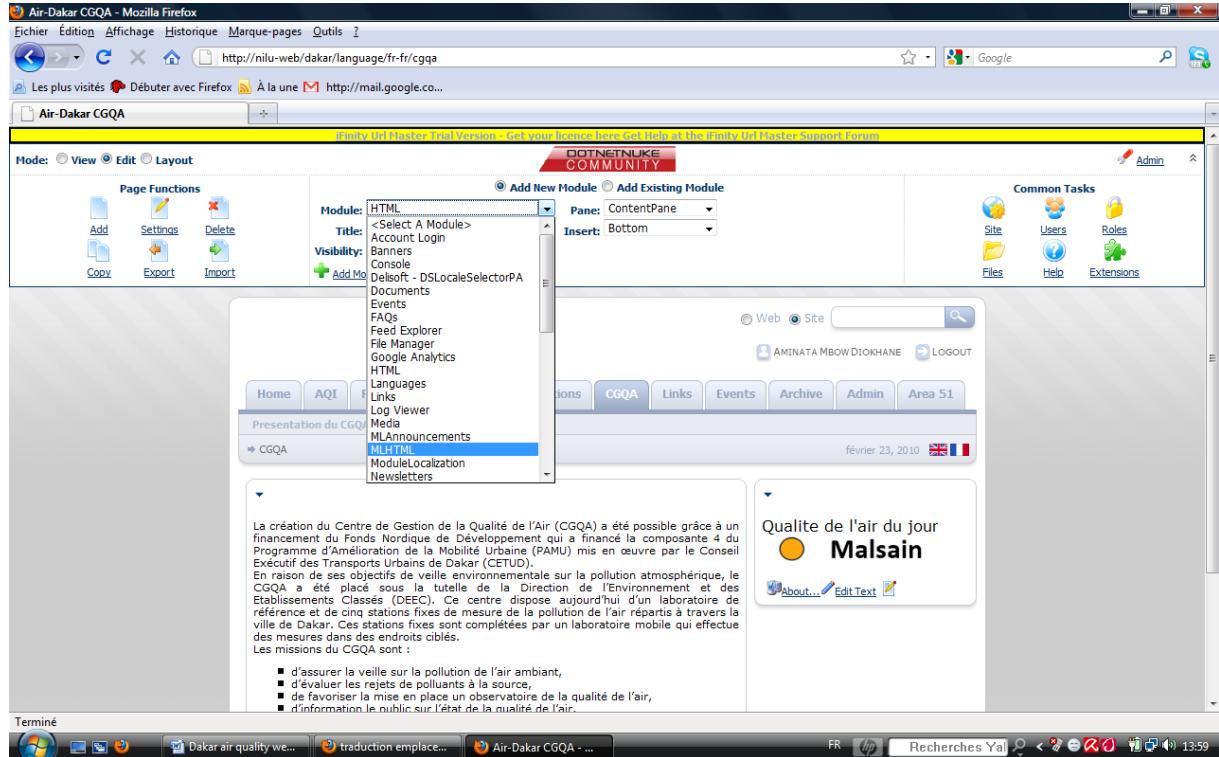
```
<div Class="Normal" Style="padding: 5px;">Loading...
</div>
```

Terminé

Windows Live Hotm... Air-Dakar AQI - Moz... Dakar air quality we... Recherches Ya... 08:33

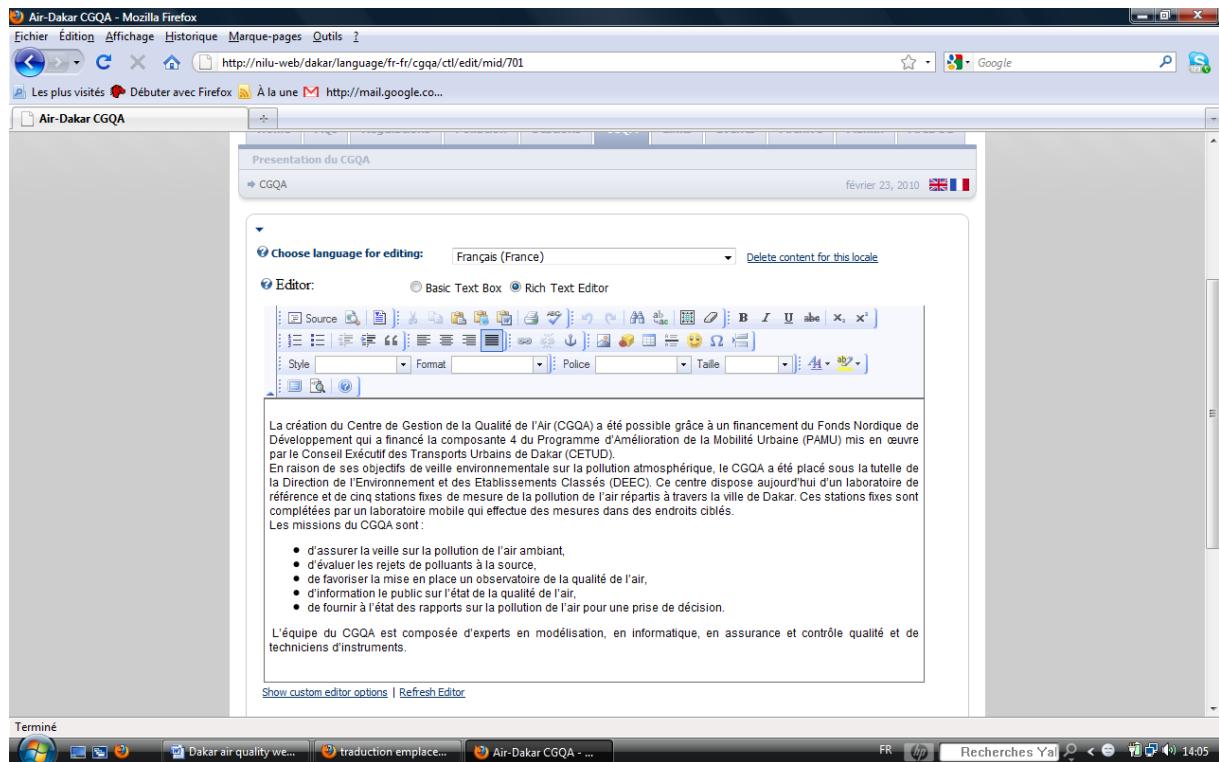
6. Language management

This portal uses French and English with French as the default language. To allow a module to be multilingual it should be set to MLHTML during its creation (see below):



Two flags are displayed in each page for switching from one language to the other.

The writing language for the page is chosen via the “choose language for editing” list displayed when the page is in edition, as shown below:

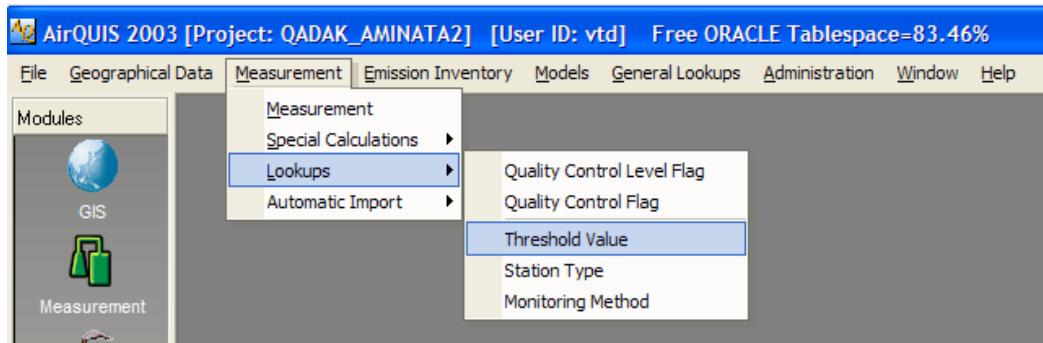


The available languages in this list depend on the administrator settings (here we have French and English).

Annex A – Setting up the AQI calculation in AIRQUIS

The necessary steps to set up the AQI calculation in AirQUIS are described here under:

1. Before setting up the Air Quality Indicator (AQI) calculation in AirQUIS, open the “Threshold Window” by following the main menu Measurement\Lookups\Threshold Value, as illustrated in the picture here under.



2. Check that the limit values (National Limit Values) have been set for both hourly and daily averaging times for all the components included in AQI calculation.

A screenshot of the "Threshold Value [10]" dialog box. The table lists 10 rows of limit values for different components. The columns are labeled: Value, Component, Unit, and Type. The data is as follows:

| | Value | Component | Unit | Type |
|----|----------|-----------|-------|--------|
| 1 | 30.00 | CO | mg/m³ | Hourly |
| 2 | 125.00 | SO2 | µg/m³ | Daily |
| 3 | 150.00 | PM10 | µg/m³ | Daily |
| 4 | 150.00 | O3 | µg/m³ | Hourly |
| 5 | 200.00 | NO2 | µg/m³ | Hourly |
| 6 | 99000.00 | CO | µg/m³ | Daily |
| 7 | 99000.00 | NO2 | µg/m³ | Daily |
| 8 | 99000.00 | O3 | µg/m³ | Daily |
| 9 | 99000.00 | PM10 | µg/m³ | Hourly |
| 10 | 99000.00 | SO2 | µg/m³ | Hourly |

3. Start to setup AQI Calculation by opening the Measurement Module in AirQUIS
4. Open the tree-view to see all the time-series available for the measurement stations.
5. Press “Ctrl” key and select all the time-series to be included in the AQI calculation. Click on the time-series again if you wish to deselect one series that was wrongly selected. To finish, click Reports\Daily Index on the menu of Measurement Module, as shown in the image here under:

The screenshot shows the 'Measurement' software interface. On the left, a tree view lists various monitoring stations and their parameters. On the right, a table titled 'Time Serie' displays the selected time-series. The table has columns for 'Station' and 'Time Serie'. The data includes entries for Bel-Air, Boulevard de la Republique, HLM4, Medina, and Yoff.

| Station | Time Serie |
|----------------------------|--|
| Bel-Air | BEL-SO2 (SO2) |
| Bel-Air | BEL-PM10 (PM10) |
| Boulevard de la Republique | REP-SO2 (SO2) |
| Boulevard de la Republique | REP-PM10 (PM10) |
| HLM4 | REP-O3 (O3) |
| HLM4 | REP-NO2 (NO2) |
| HLM4 | REP-CO (CO) |
| HLM4 | HLM-NOx (NOx) |
| HLM4 | HLM-Indoor temperature (Temperature) |
| HLM4 | Aggregated(Arithmetic Avg.): HLM-PM10 (PM10) |
| HLM4 | Aggregated(Arithmetic Avg.): HLM-WS (Wind Speed) |
| HLM4 | Aggregated(Arithmetic Avg.): HLM-SO2 (SO2) |
| HLM4 | Aggregated(Arithmetic Avg.): HLM-NO2 (NO2) |
| HLM4 | Aggregated(Arithmetic Avg.): HLM-PM10 (PM10) |
| HLM4 | HLM-RH (Relative Humidity) |
| HLM4 | HLM-Lower temperatur 2 m (Temperature) |
| HLM4 | HLM-WD (Wind Direction) |
| HLM4 | HLM-Net Radiation (Net Radiation) |
| HLM4 | HLM-BP (Barometric Pressure) |
| HLM4 | HLM-SO2 (SO2) |
| HLM4 | HLM-WS (Wind Speed) |
| HLM4 | HLM-Upper temperatur 10 m (Temperature) |
| HLM4 | HLM-PM10 (PM10) |
| HLM4 | HLM-O3 (O3) |
| HLM4 | HLM-NO2 (NO2) |
| HLM4 | HLM-NO (NO) |
| Medina | MED-NOx (NOx) |
| Medina | MED-NO (NO) |
| Medina | MED-Indoor temperature (Temperature) |
| Medina | Aggregated(Arithmetic Avg.): MED-PM10 (PM10) |
| Medina | Aggregated(Arithmetic Avg.): MED-NO2 (NO2) |
| Medina | Aggregated(Arithmetic Avg.): MED-PM10 (PM10) |
| Medina | MED-PM10 (PM10) |
| Medina | MED-NO2 (NO2) |
| Medina | MED-CO (CO) |
| Yoff | |

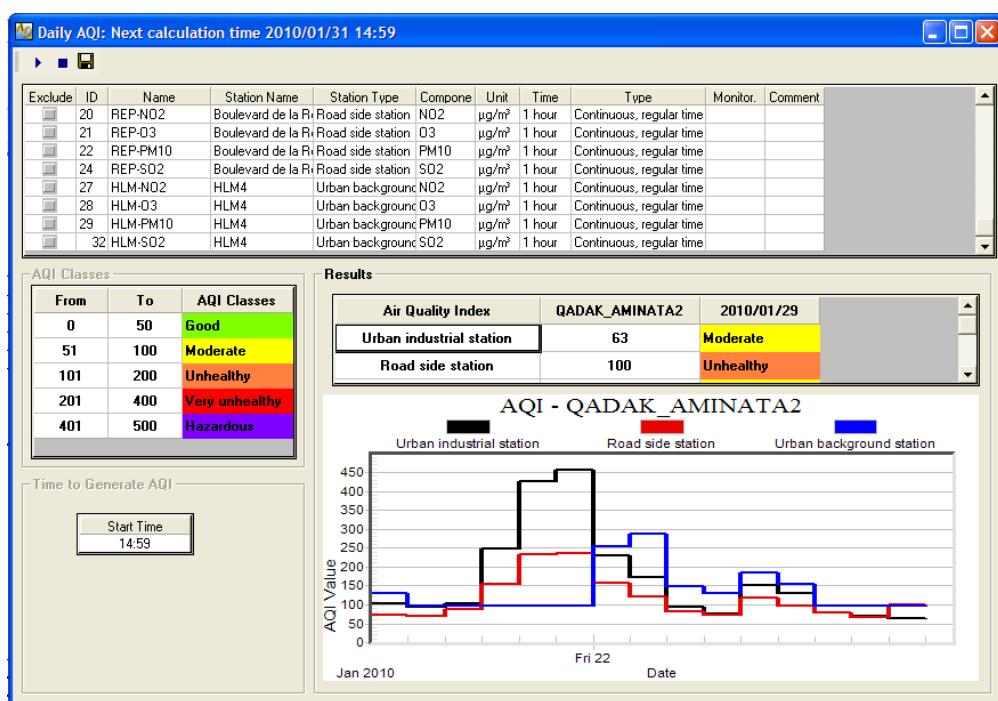
6. All the selected time-series should appear in the AQI (Air Quality Index) window.

The screenshot shows the 'AQI (Air Quality Index)' software interface. The main area displays a table of data with columns for Exclude, ID, Name, Station Name, Station Type, Component, Unit, Time, Type, Monitor, and Comment. Below this is an 'AQI Classes' table with color-coded ranges for AQI values. A 'Results' section is also present.

| Exclude | ID | Name | Station Name | Station Type | Component | Unit | Time | Type | Monitor. | Comment |
|---------|----|----------|-------------------|-------------------|-----------|-------|--------|--------------------------|----------|---------|
| | 20 | REP-NO2 | Boulevard de la R | Road side station | NO2 | µg/m³ | 1 hour | Continuous, regular time | | |
| | 21 | REP-O3 | Boulevard de la R | Road side station | O3 | µg/m³ | 1 hour | Continuous, regular time | | |
| | 22 | REP-PM10 | Boulevard de la R | Road side station | PM10 | µg/m³ | 1 hour | Continuous, regular time | | |
| | 24 | REP-SO2 | Boulevard de la R | Road side station | SO2 | µg/m³ | 1 hour | Continuous, regular time | | |
| | 27 | HLM-NO2 | HLM4 | Urban background | NO2 | µg/m³ | 1 hour | Continuous, regular time | | |
| | 28 | HLM-O3 | HLM4 | Urban background | O3 | µg/m³ | 1 hour | Continuous, regular time | | |
| | 29 | HLM-PM10 | HLM4 | Urban background | PM10 | µg/m³ | 1 hour | Continuous, regular time | | |
| | 32 | HLM-SO2 | HLM4 | Urban background | SO2 | µg/m³ | 1 hour | Continuous, regular time | | |

| From | To | AQI Classes |
|------|-----|----------------|
| 0 | 50 | Good |
| 51 | 100 | Moderate |
| 101 | 200 | Unhealthy |
| 201 | 400 | Very unhealthy |
| 401 | 500 | Hazardous |

7. To Exclude time-series from the calculation, check the “Exclude” box on the left side of the time-series ID.
8. Set up Start Time for the time you wish the AQI to be updated every day (06:00 for example). The Start Time must of course be set for a later time than the current time and date on the PC's clock.
9. Save AQI set up by clicking the Save button . Then click the Run button to activate the AQI calculation. The AQI icon on Windows Task Bar should turn from Red to Green
10. Below is an example for a successful AQI run:



Annex B – AQI calculation to input in the Web portal

In this annexe the method used by AirQUIS to calculate the AQIs for each station type in Dakar is described in points I and II. Point III describes the procedure to determine the AQI for Dakar, based on the AQIs calculated by AirQUIS for each station type.

- I. The calculation of AQI for each station by AirQUIS is done in the following way:

AQI station= Maximum (PM10 24 h average concentration/150; SO2 24 h average concentration / 125; NO2 1 hour maximum concentration / 200; O3 1 hour maximum concentration / 150; C0 1 hour maximum / 30000) x 100

Note: All concentrations are in $\mu\text{g}/\text{m}^3$.

- II. The calculation of the AQI for each station type in Dakar is done by AirQUIS based on the average of the AQIs for all stations within the same station type, as follows:

AQI traffic station= Average (AQI Medina, AQI Blv. Republique)

AQI industrial station = AQI Bel Air

AQI urban background station = AQI HLM4

Note: The regional background station at Yoff is shall not be included for the AQI calculation.

- III. The determination of the AQI for the whole Dakar must be done by CGQA as follows:

AQI Dakar= maximum (AQI traffic st, AQI industrial st, AQI urb backg st)

The level is defined for Dakar as:

Green-Good / Bon : AQI Dakar < 51

Yellow-Moderate / Moyen : AQI Dakar = 51-100

Orange- Unhealthy / Mauvais : AQI Dakar = 101-200

Red-Very unhealthy / Très mauvais : AQI Dakar >200



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| KEYWORDS | Air quality Web portal | AQI | Dakar | | |

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NILU is an independent, nonprofit institution established in 1969. Through its research NILU increases the understanding of climate change, of the composition of the atmosphere, of air quality and of hazardous substances. Based on its research, NILU markets integrated services and products within analyzing, monitoring and consulting. NILU is concerned with increasing public awareness about climate change and environmental pollution.



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