

Laser Egg

Aisha Khan

IEN Consultants, www.ien-consultants.com

August 2016



WHO

- WHO Air Quality Guidelines

- Mainly outlined 6 pollutants:

-SO₂

-NO₂

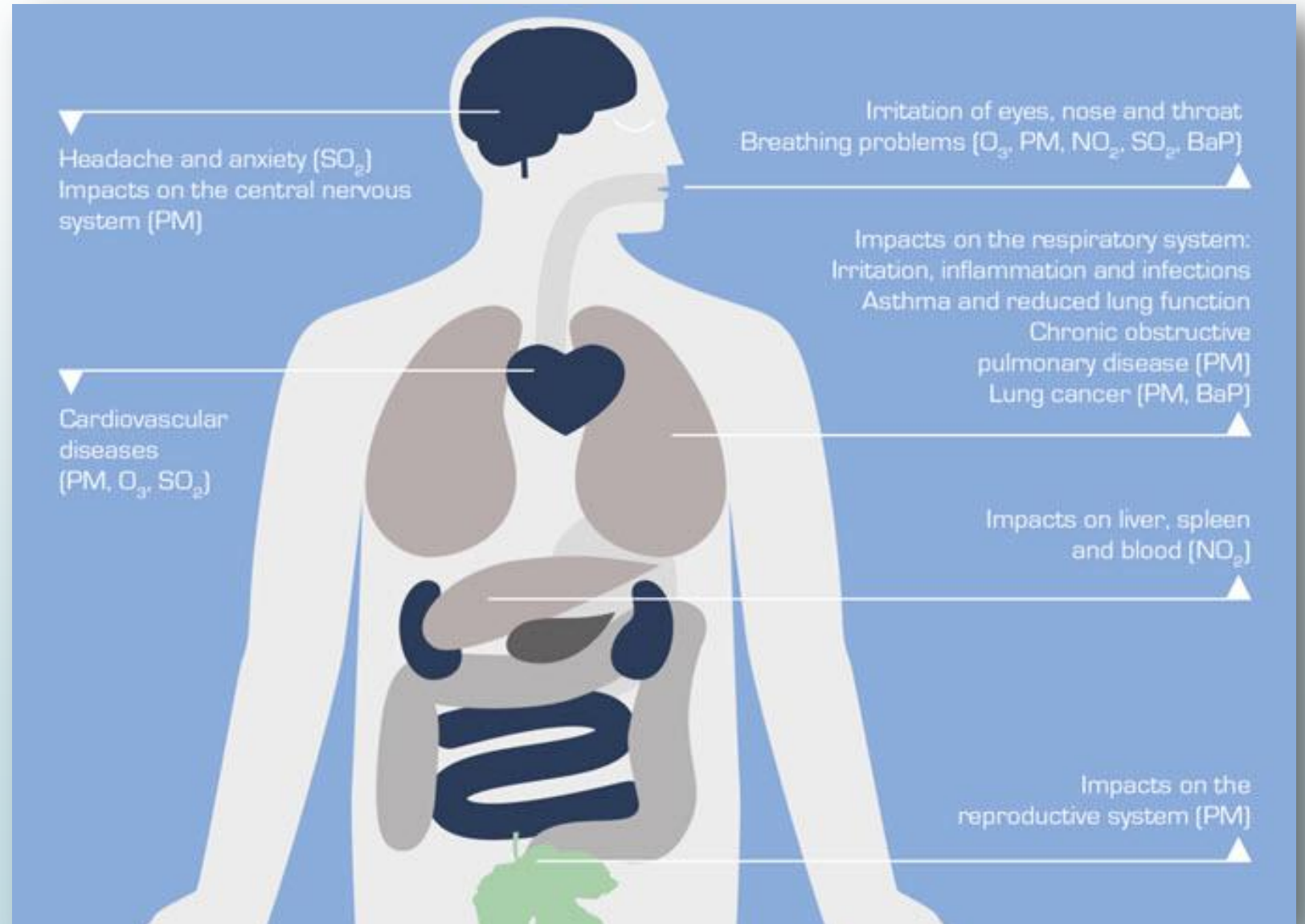
-CO

-O₃

-PM_{2.5}

-PM₁₀

- According to WHO, over 2 million premature death/year can be attributed to urban pollution with high levels of these pollutants.

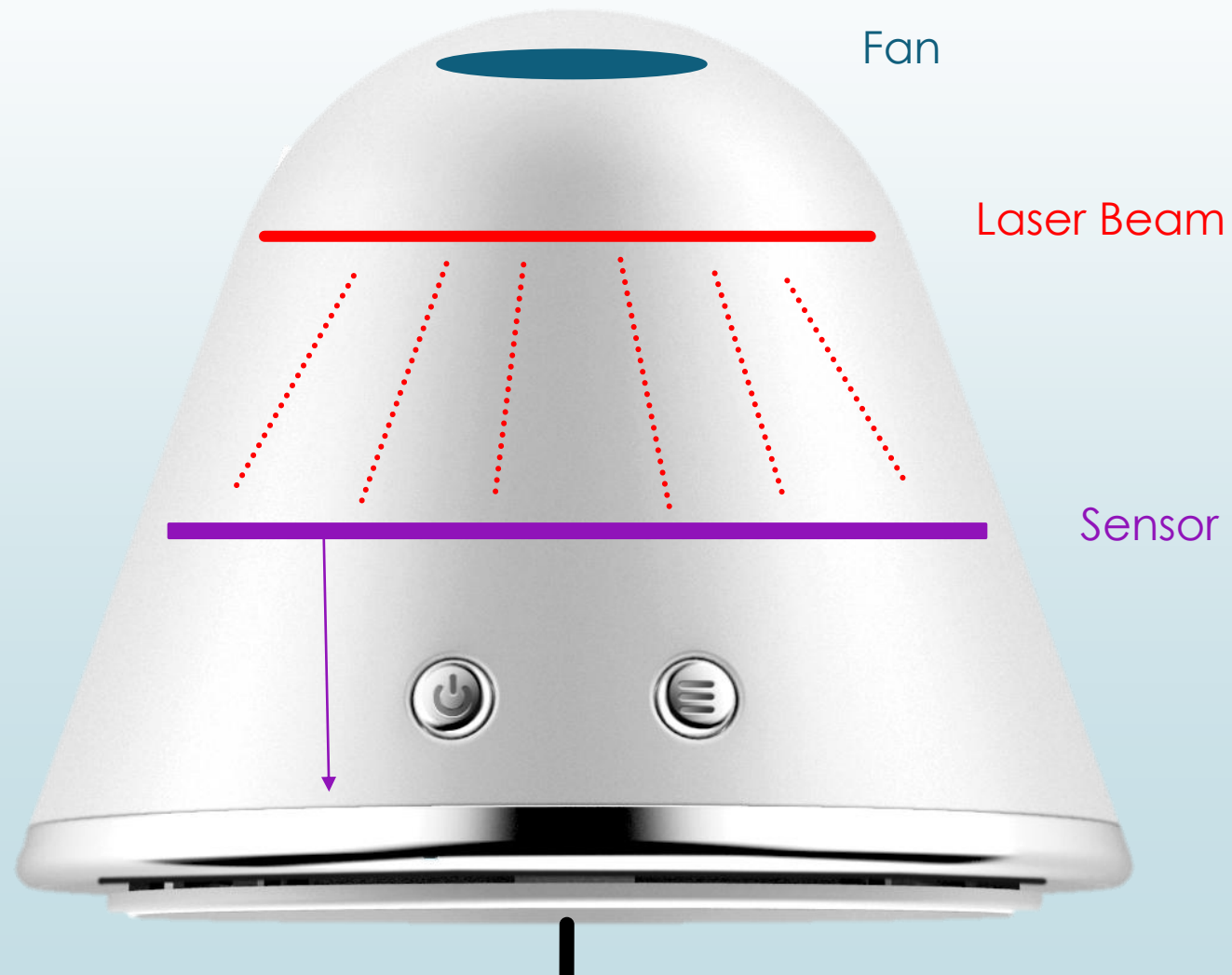


Smart Air Quality Monitoring

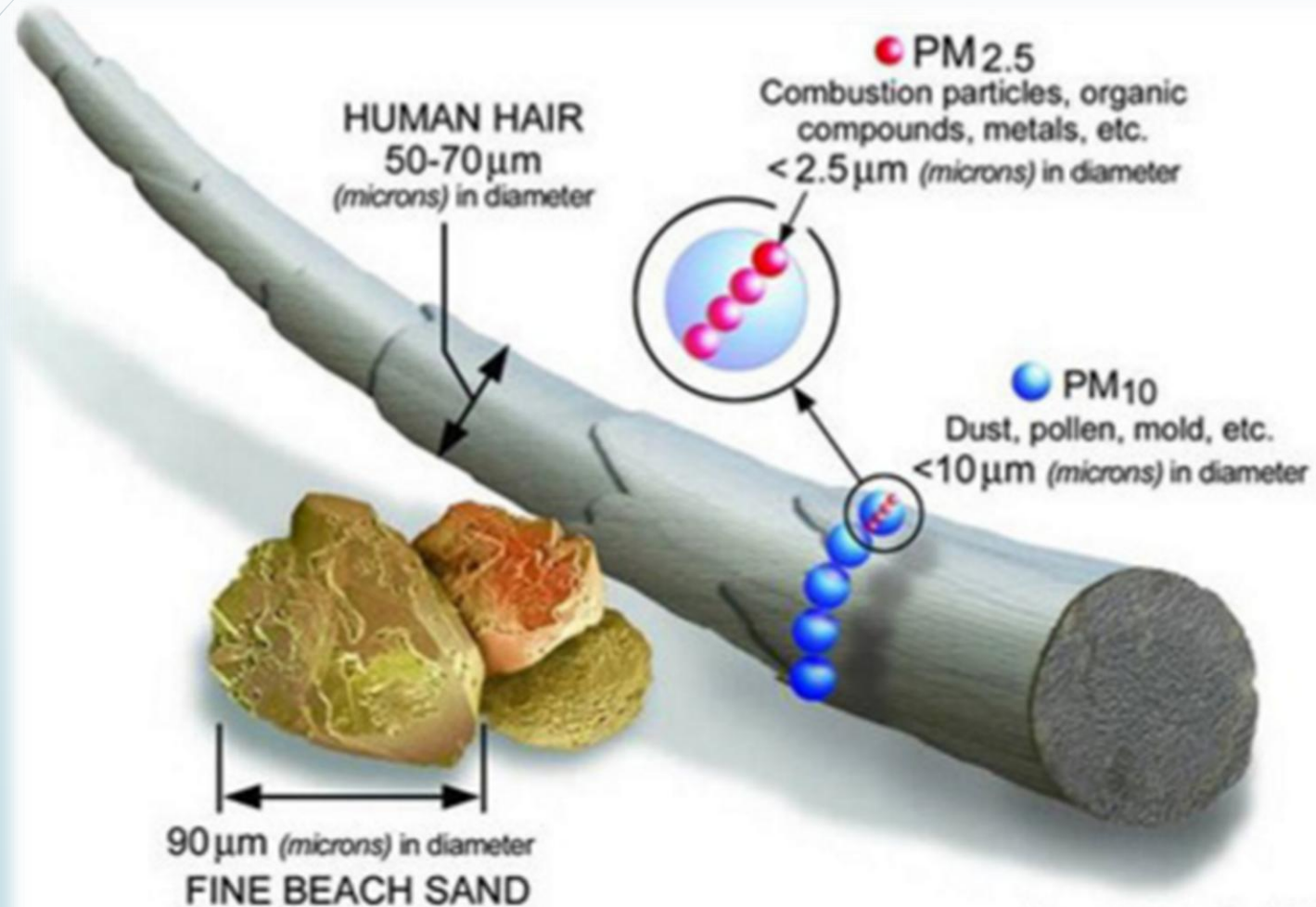
- Measurements taken every 0.1 seconds
- Monitor on the go from smartphone
- Export data
- Automatically recalibrates
- $\pm 10\%$ accuracy
- Measures Air Quality in:
 - PM Concentration
 - AQI (US and China)
 - Particle Count



Mechanism



PM 2.5 and PM 10 $\mu\text{g}/\text{m}^3$



- Particulate Matter with a diameter of $\leq 2.5 \mu\text{m}$
- Particulate Matter with a diameter of $\leq 10 \mu\text{m}$

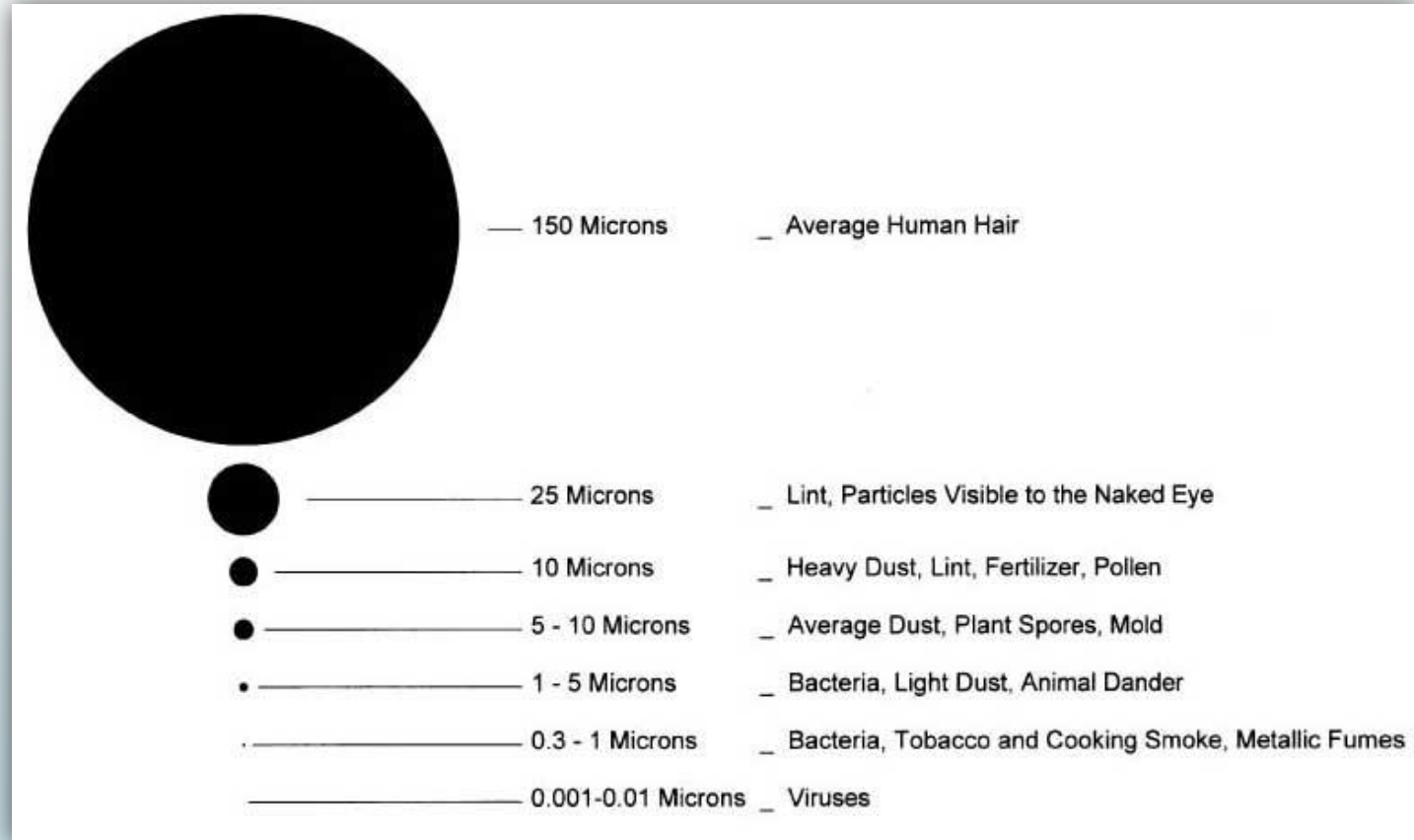
Image courtesy of the U.S. EPA

Particle Count

- ▶ 0-65536 Particles/0.1L
- ▶ $>0.3\mu\text{m}$
- ▶ Office Average: 1173.06
- ▶ Outside = 8136
- ▶ $>2.5\mu\text{m}$
- ▶ Office Average: 0

Compare to outside particle count to see if air filter is effective.

(should remove 99.97% $0.3\mu\text{m}$ particles).



AQI

Air Quality Index Levels of Health Concern	Numerical Value	Meaning
Good	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk
Moderate	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy	201 to 300	Health alert: everyone may experience more serious health effects
Hazardous	301 to 500	Health warnings of emergency conditions. The entire population is more likely to be affected.

Office
Average US:
14.75

Office
Average CN:
5.06



AQI

- Both the US and China use this calculation but they have different breakpoints.

$$I = \frac{I_{high} - I_{low}}{C_{high} - C_{low}}(C - C_{low}) + I_{low}$$

where:

I = the (Air Quality) index,

C = the pollutant concentration,

C_{low} = the concentration breakpoint that is $\leq C$,

C_{high} = the concentration breakpoint that is $\geq C$,

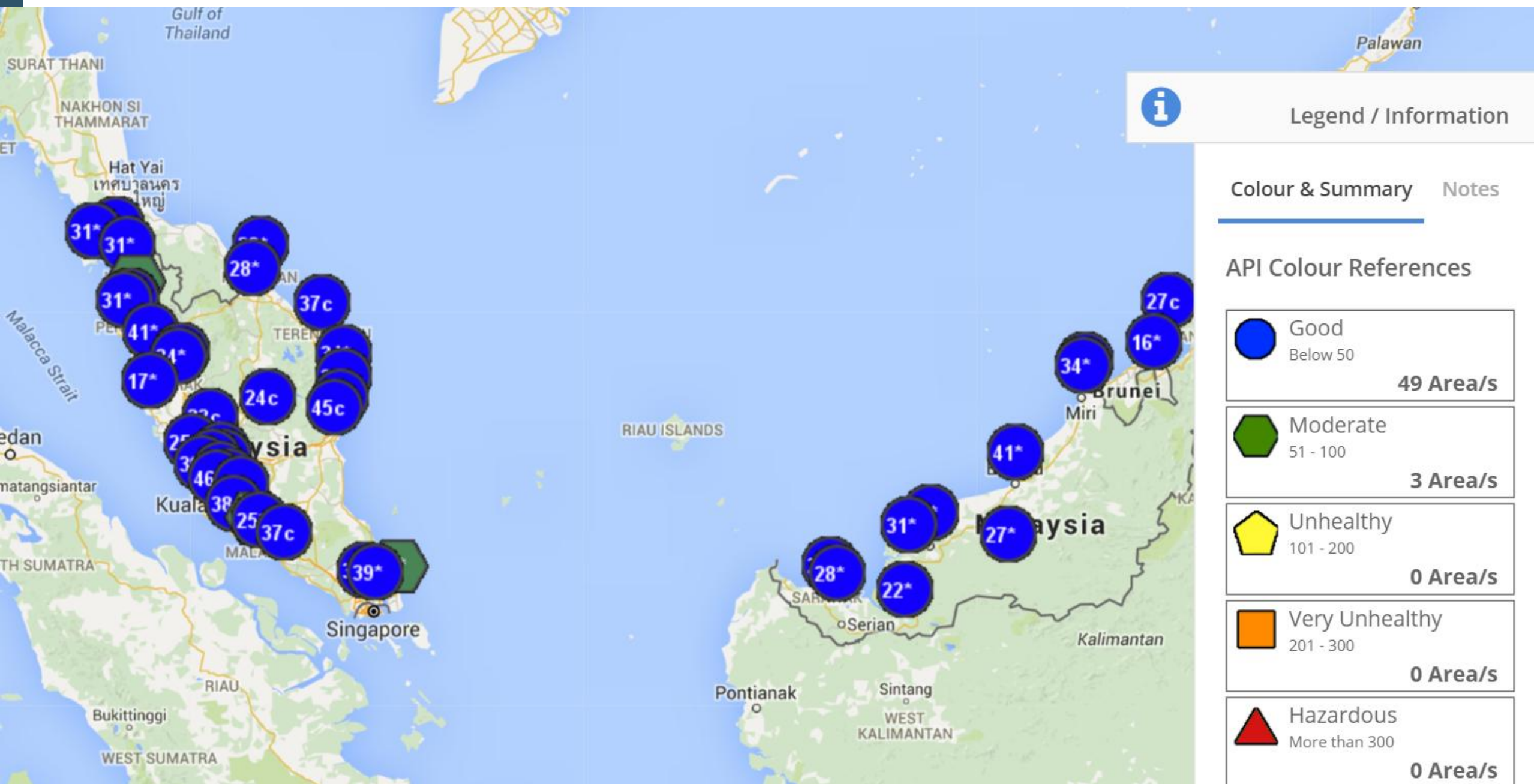
I_{low} = the index breakpoint corresponding to C_{low} ,

I_{high} = the index breakpoint corresponding to C_{high} .

Malaysia- API

- Does not yet include PM2.5 concentrations
- Works by publishing the pollutant with the highest API as the overall API

Good Low pollution without any bad effect on health	Below 50
Moderate Moderate pollution that does not pose any bad effect on health	51 - 100
Unhealthy Worsen the health condition of high risk people who is the people with heart and lung complications	101 - 200
Very Unhealthy Worsen the health condition and low tolerance of physical exercises to people with heart and lung complications. Affect public health.	201 - 300
Hazardous Hazardous to high risk people and public health.	More than 300



Singapore PSI

- Include PM2.5 as of 2014
- The pollutant with the highest sub PSI represents the overall PSI

PSI Value	PSI Descriptor
0 - 50	Good
51 - 100	Moderate
101 - 200	Unhealthy
201 - 300	Very unhealthy
Above 300	Hazardous

International Standard Index?

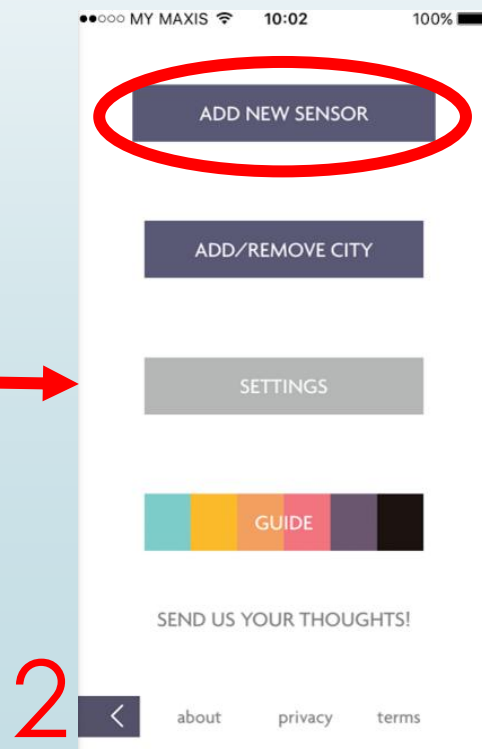
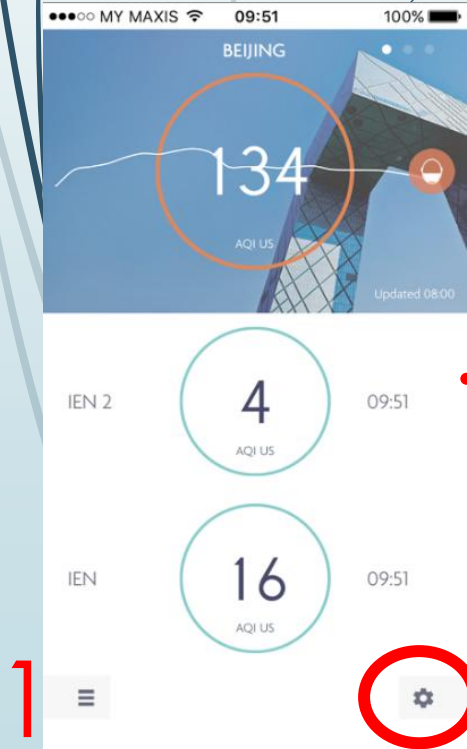
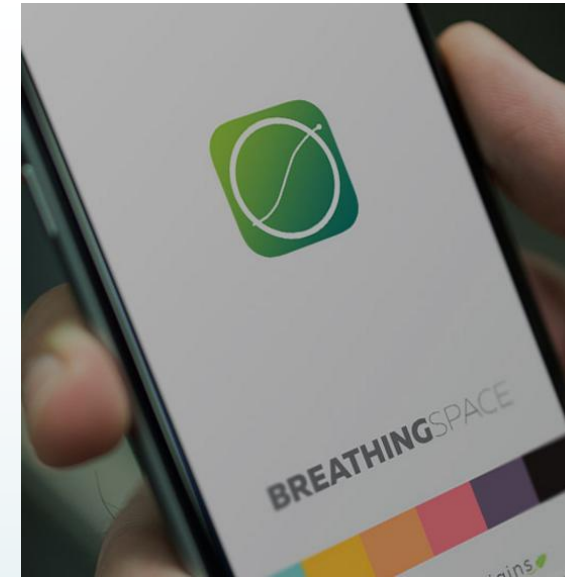
- There is no international standard index.
- Many countries have AQI systems similar to US / China.
- But they have different concentrations at their breakpoints.
- Some countries have not yet incorporated PM2.5 so only measure 5 pollutants.
- The UK, Canada, Hong Kong and Europe all have different scales.
- Better to use PM

Index Bands



The App <http://app.origins-china.com/>

- Breathing Space
- Available free on iOS and Android.
- Multiple phones can link to the same Laser Egg.
- Multiple Laser Eggs can link to the same phone.
- To link a Laser Egg to the app: (2 mins)



Follow Simple Instructions on screen.

1

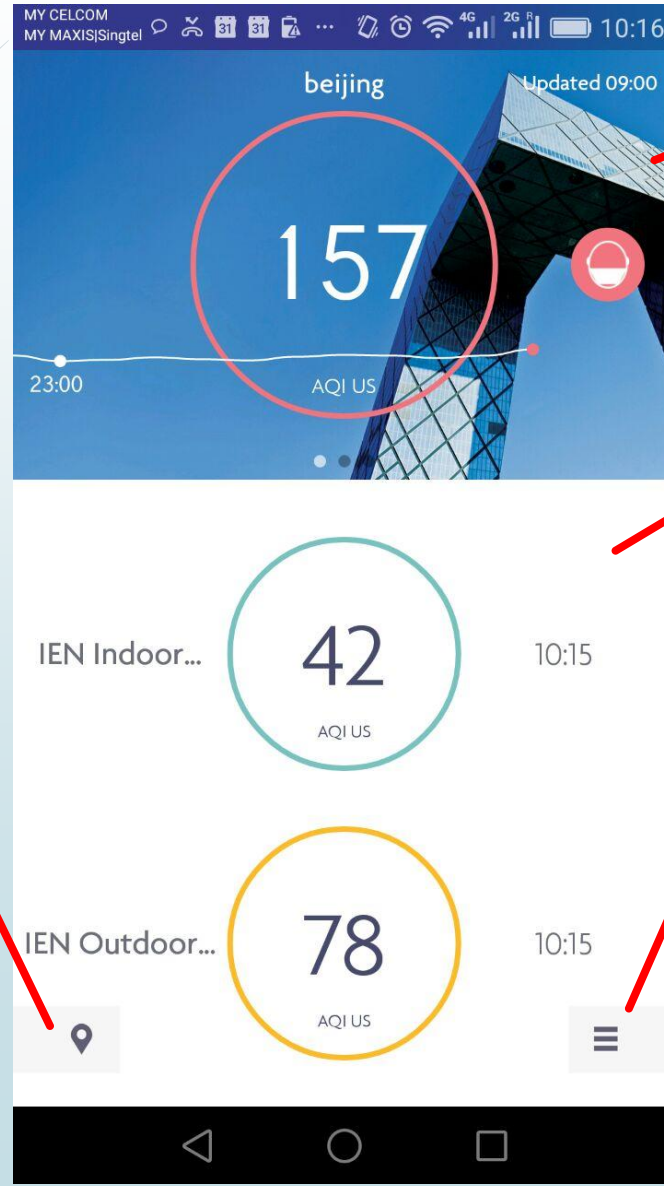
2

3

4

The Homepage

Map link to search for nearby online Laser Egg readings



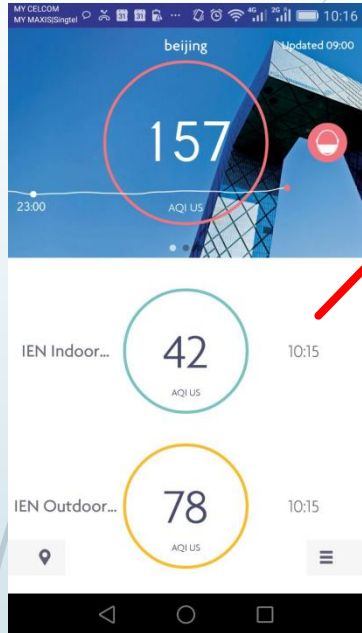
Shows real time Beijing, Shanghai and Hangzhou AQI. (Swipe left or right to change city)

All Laser Eggs linked to your phone can be viewed here.

Go to settings to:

- Add a Laser Egg
- Choose between US or China AQI
- Change units
- Change Location Settings
- See a guide
- Add/ Remove a city to your homepage.

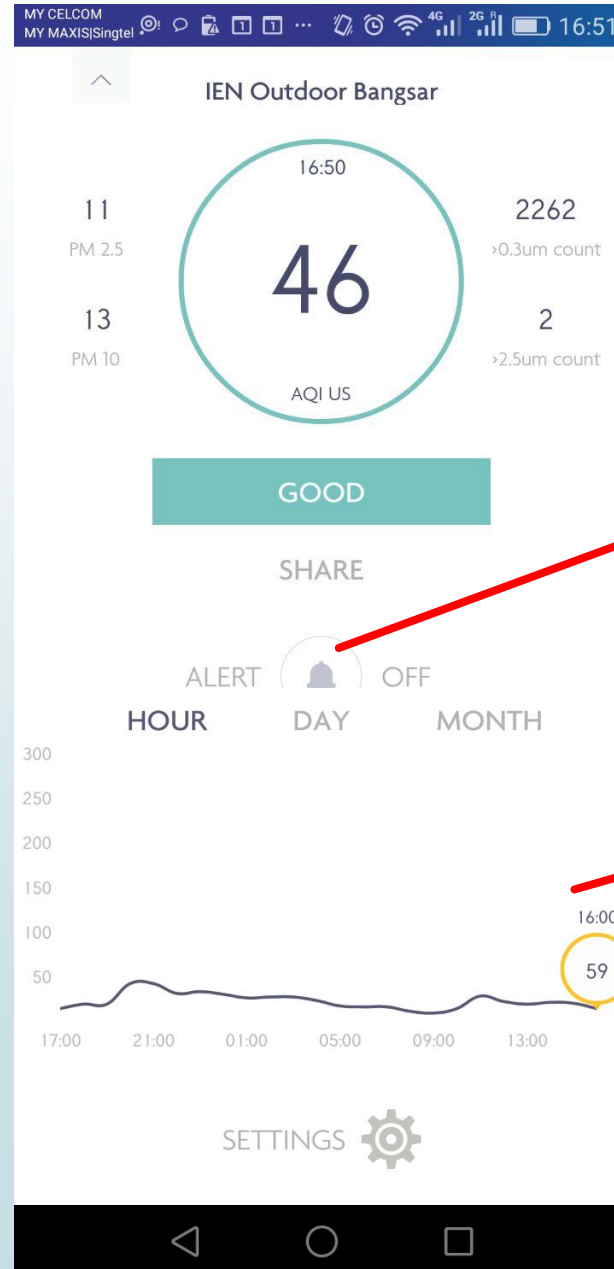
Viewing Data



Click on Laser Egg you would like to see more of:

NB. Reading increased by 4 between screenshots

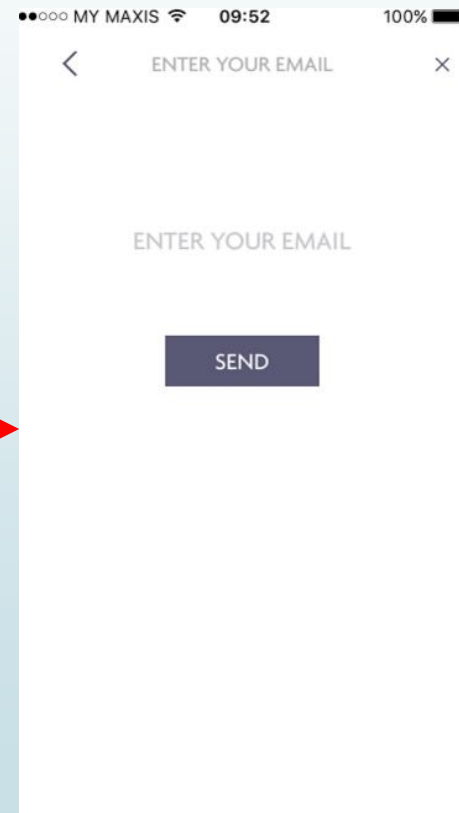
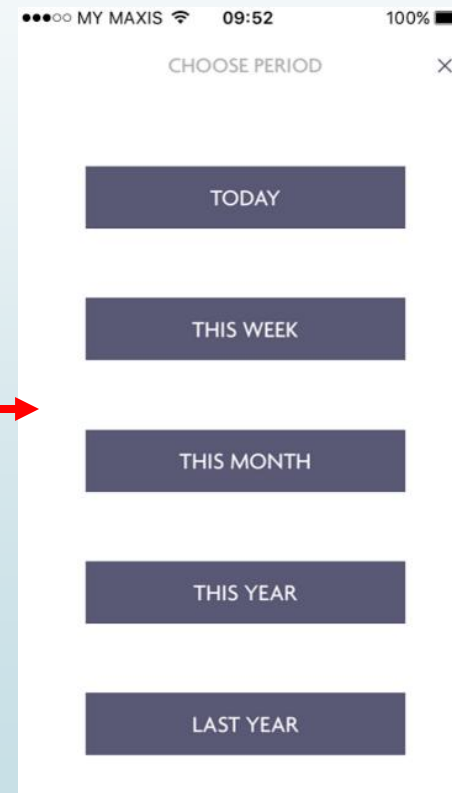
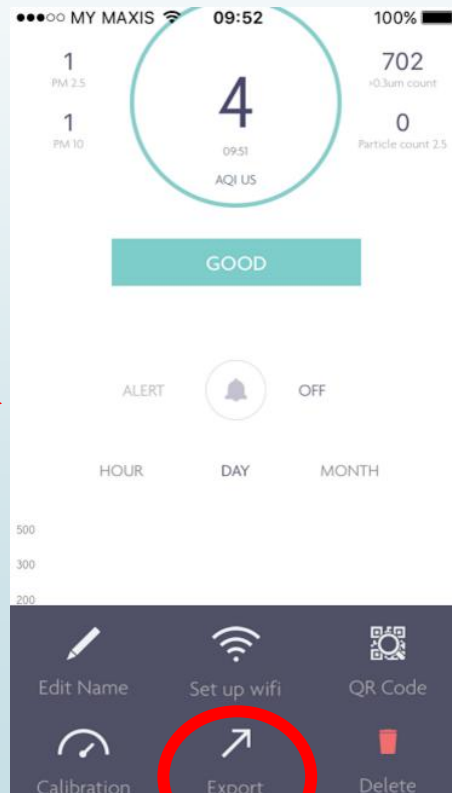
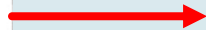
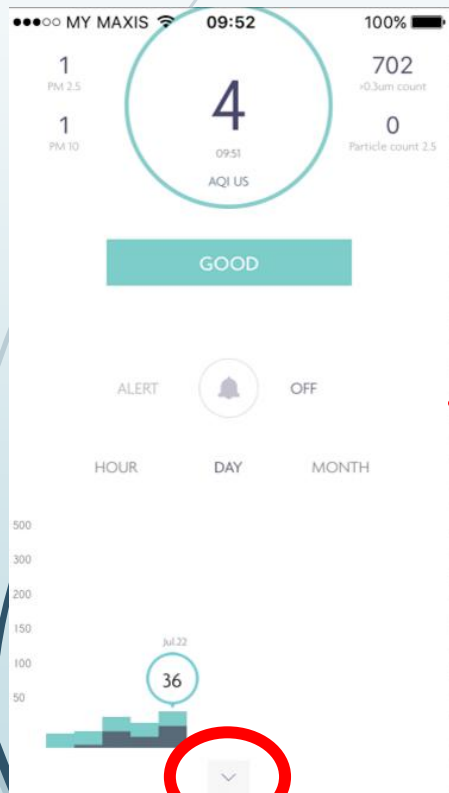
You can view measurements that the Laser Egg is taking.



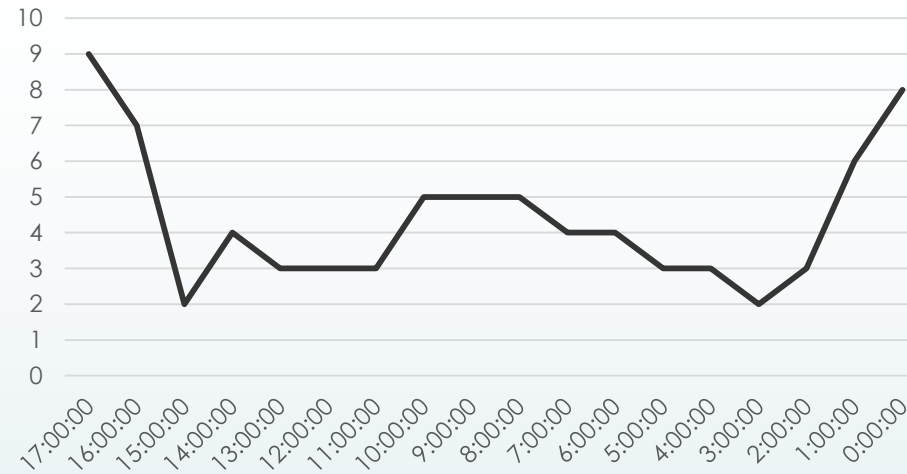
You can set an alert for an unhealthy AQI reading that you want to be informed about

Graphs and charts are automatically uploaded here by the app. You can view hourly, daily or monthly charts.

Exporting Data



pm 2.5 Concentration 20/07/16



PM2.5

- Office Average: **5.84**
- 25 µg/m³ 24 hour mean is official recommendation from the WHO

PM 10

- Office Average: **5.5**
- 50 µg/m³ 24 hour mean is official recommendation from the WHO

A	B	C
20/07/2016 19:00	-	-
20/07/2016 18:00	-	-
20/07/2016 17:00	9	9
20/07/2016 16:00	7	7
20/07/2016 15:00	2	1
20/07/2016 14:00	4	3
20/07/2016 13:00	3	3
20/07/2016 12:00	3	3
20/07/2016 11:00	3	3
20/07/2016 10:00	5	5
20/07/2016 09:00	-	-
20/07/2016 08:00	-	-
20/07/2016 07:00	-	-
20/07/2016 06:00	-	-
20/07/2016 05:00	-	-
20/07/2016 04:00	3	3
20/07/2016 03:00	2	3
20/07/2016 02:00	3	3
20/07/2016 01:00	6	6
20/07/2016 00:00	8	8
19/07/2016 23:00	7	7
19/07/2016 22:00	6	5
19/07/2016 21:00	8	7
19/07/2016 20:00	9	9
19/07/2016 19:00	9	8
19/07/2016 18:00	3	3
19/07/2016 17:00	1	1
19/07/2016 16:00	2	2
19/07/2016 15:00	2	1
19/07/2016 14:00	-	-
19/07/2016 13:00	3	2
19/07/2016 12:00	-	-
19/07/2016 11:00	12	11
19/07/2016 10:00	10	10
19/07/2016 09:00	-	-
19/07/2016 08:00	-	-
19/07/2016 07:00	-	-
19/07/2016 06:00	-	-
19/07/2016 05:00	-	-
19/07/2016 04:00	-	-
19/07/2016 03:00	-	-
19/07/2016 02:00	-	-
19/07/2016 01:00	0	1
19/07/2016 00:00	2	2
18/07/2016 23:00	5	4
18/07/2016 22:00	5	5
18/07/2016 21:00	3	3
18/07/2016 20:00	2	2
18/07/2016 19:00	3	2
18/07/2016 18:00	1	1
18/07/2016 17:00	0	0
18/07/2016 16:00	1	1
18/07/2016 15:00	0	0
18/07/2016 14:00	0	0
18/07/2016 13:00	1	1
18/07/2016 12:00	5	5
18/07/2016 11:00	7	7

Indoor and Outdoor Laser Egg Installation

IENT Consultants in Bangsar, Kuala Lumpur, Malaysia



Scan QR code to monitor real-time air quality readings (PM2.5, PM10 and AQI) on your smart phone via the Breathing Space app



82c91d46add1b6bc7c58989964e81712

INDOOR



Scan QR code to monitor real-time air quality readings (PM2.5, PM10 and AQI) on your smart phone via the Breathing Space app



16128d3d2cd36fe6f359df029d6b8907

OUTDOOR

Download Breathing Space app: <http://app.origins-china.com/>