Review on Demand Control Ventilation

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Ways of ventilation

☐ Ventilation rate procedure

a minimum quantity of cfm per person based on maximum occupancy, i.e. 30 cfm per person

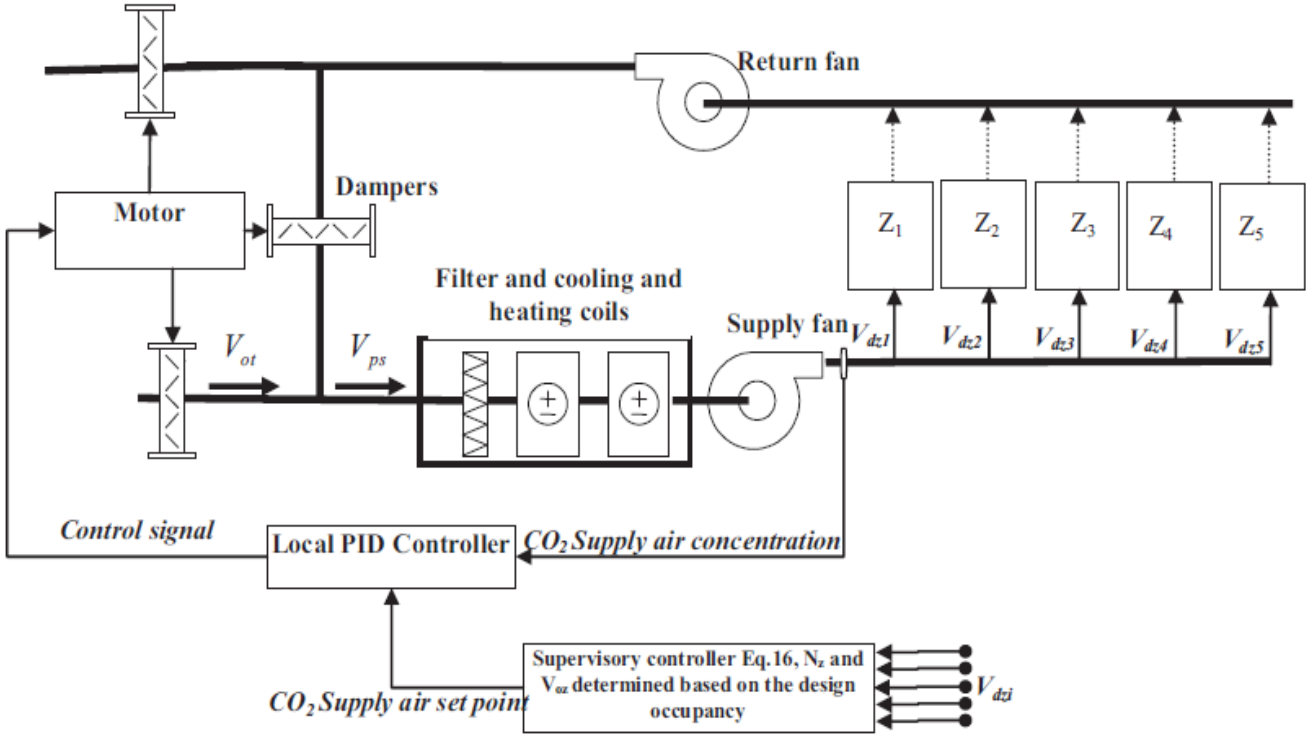
☐ Indoor air quality (IAQ) procedure

vary outdoor air ventilation rate (from 0% to 100% of the design outdoor air) as long as the pollutant concentration remains below a recommended level

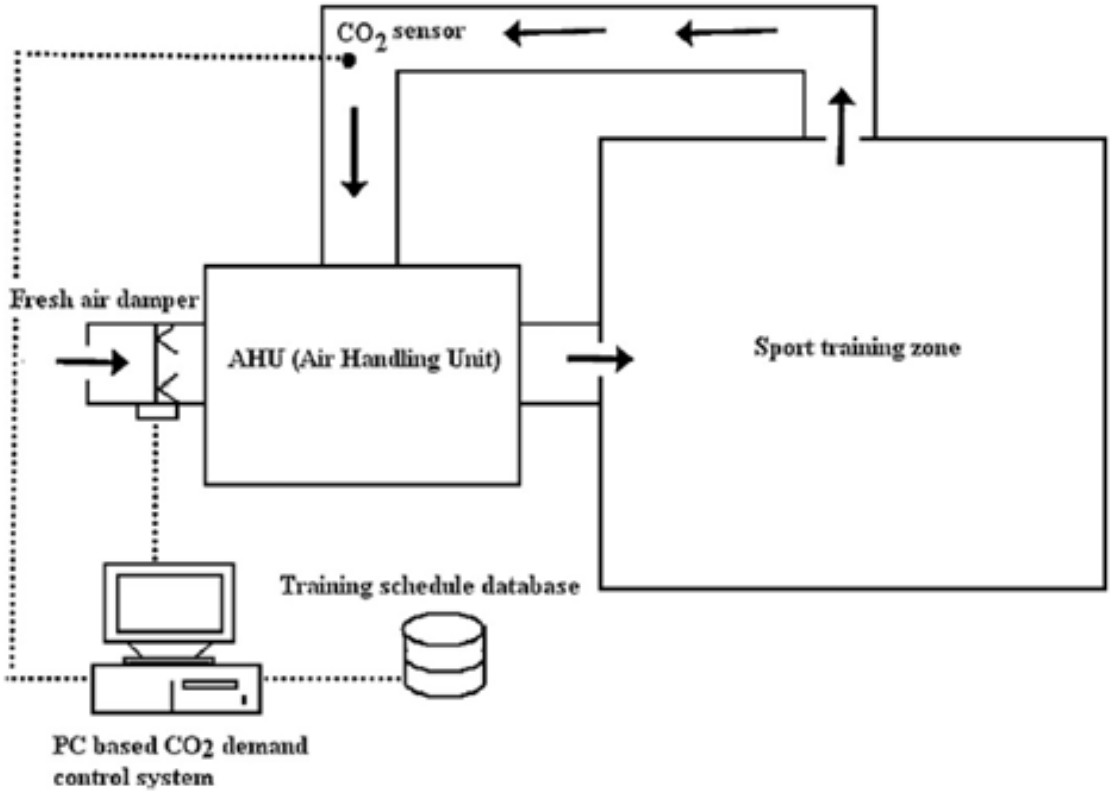
Demand control ventilation

CO_2-DCV strategy

Control strategy with a typical VAV system



DCV-CO2 strategy

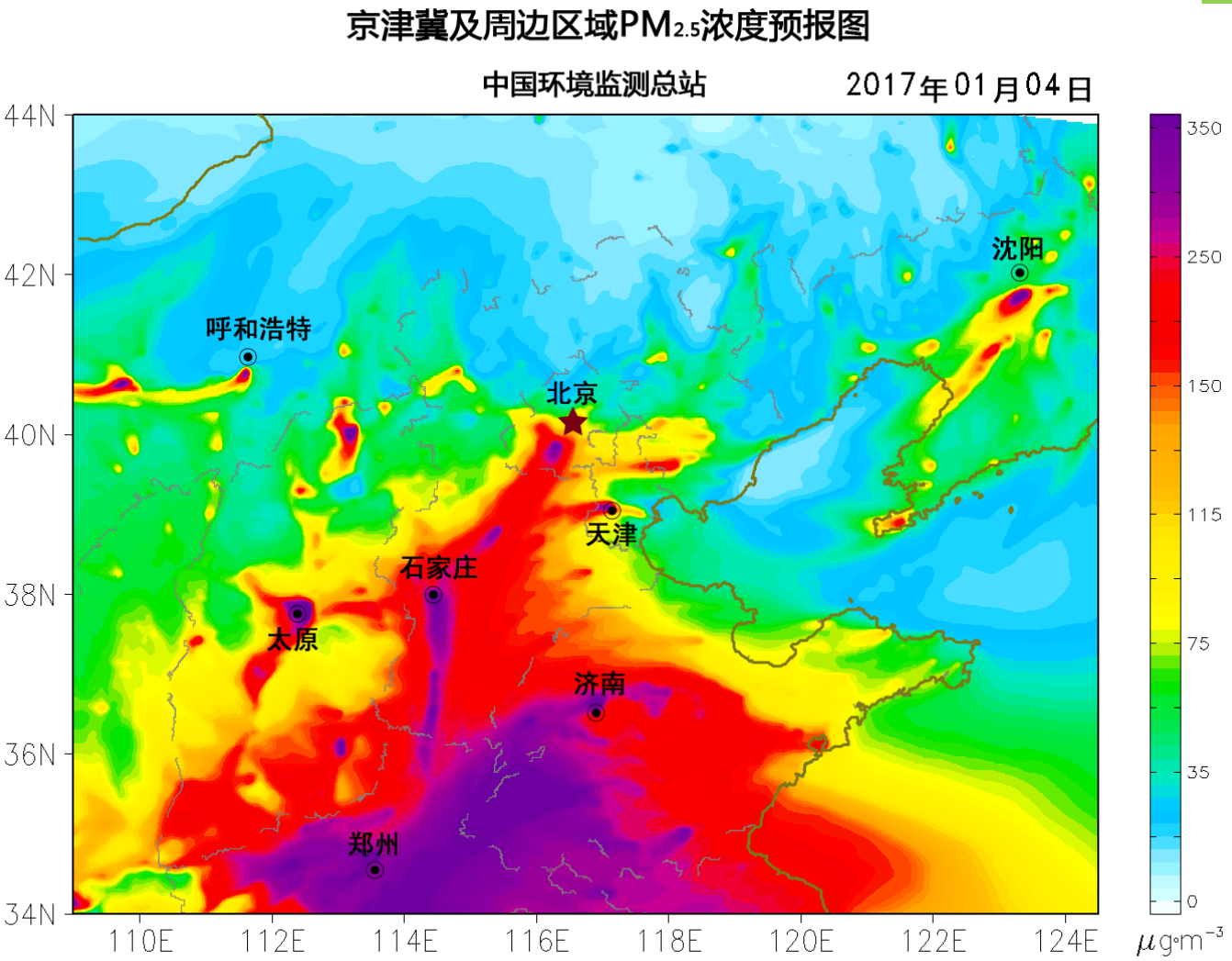


Existing problem of CO_2-DCV

1. it cannot reflect the air volume requirement of building-generated indoor pollutants
2. it will result in energy waste that inaccuracy in design ventilation rate
3. all strategies are operated under the assumption that it's enough clean for outdoor air

Table1. IAQ Control Indexes about Health

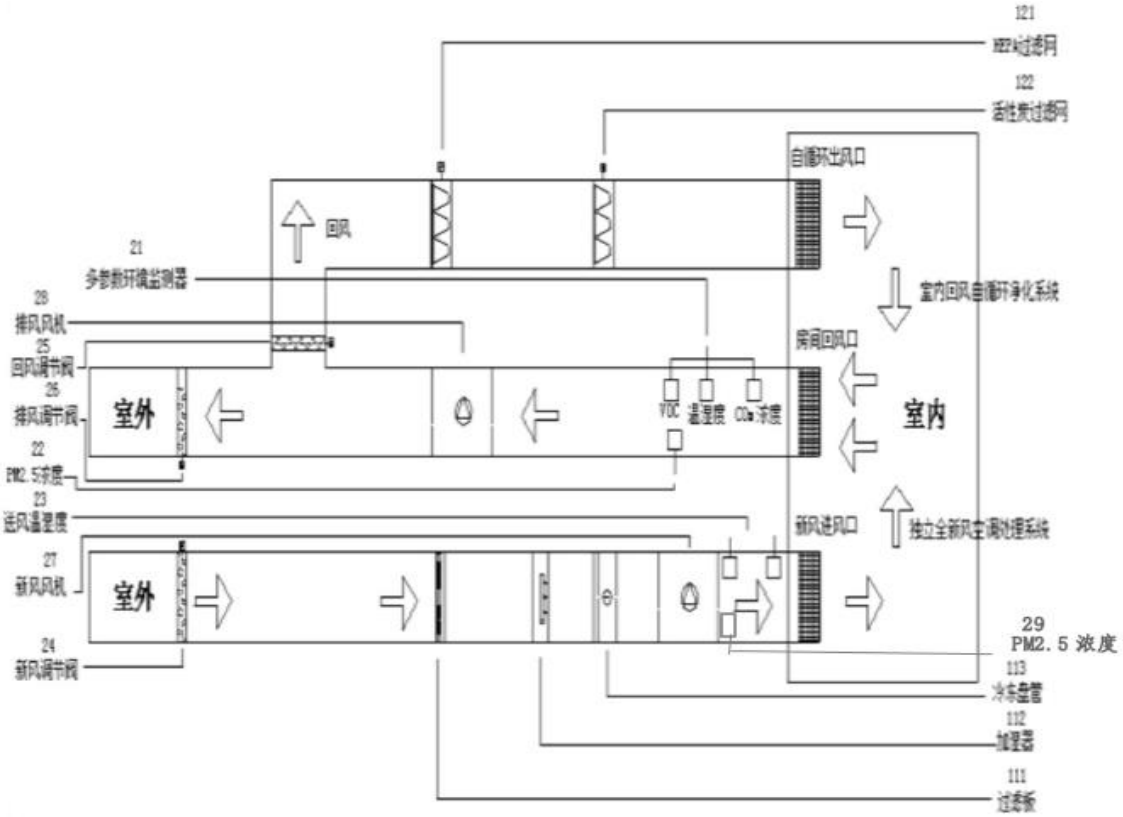
Parameter type	Number	Species	Reference value	Note
Chemical	1	SO_2(mg/m³)	0.5	1h mean value
	2	NO_2(mg/m³)	0.24	1h mean value
	3	CO(mg/m³)	10	1h mean value
	4	CO_2 (%)	0.1	Day mean value
	5	NH_3 (mg/m³)	0.2	1h mean value
	6	O_3(mg/m³)	0.16	1h mean value
	7	HCHO(mg/m³)	0.1	1h mean value
	8	C_6H_6(mg/m³)	0.11	1h mean value
	9	C_7H_8(mg/m³)	0.2	1h mean value
	10	C_8H_{10}(mg/m³)	0.2	1h mean value
	11	B(a)P(mg/m³)	1	Day mean value
	12	PM10(mg/m³)	0.15	Day mean value
	13	TVOC(mg/m³)	0.6	8h mean value
Biological	14	Colonies number（cfu/m³）	2500	Instrument measurement
Radiological	15	Rn（Bq/m³）	400	Year mean value


京津冀及周边区域PM2.5浓度预报图
中国环境监测总站
2017年01月04日
44N
42N
40N
38N
36N
34N
110E
112E
114E
116E
118E
120E
122E
124E
呼和浩特
北京
沈阳
天津
石家庄
太原
济南
郑州
350
250
150
115
75
35
0
μg·m⁻³

New strategy about DCV

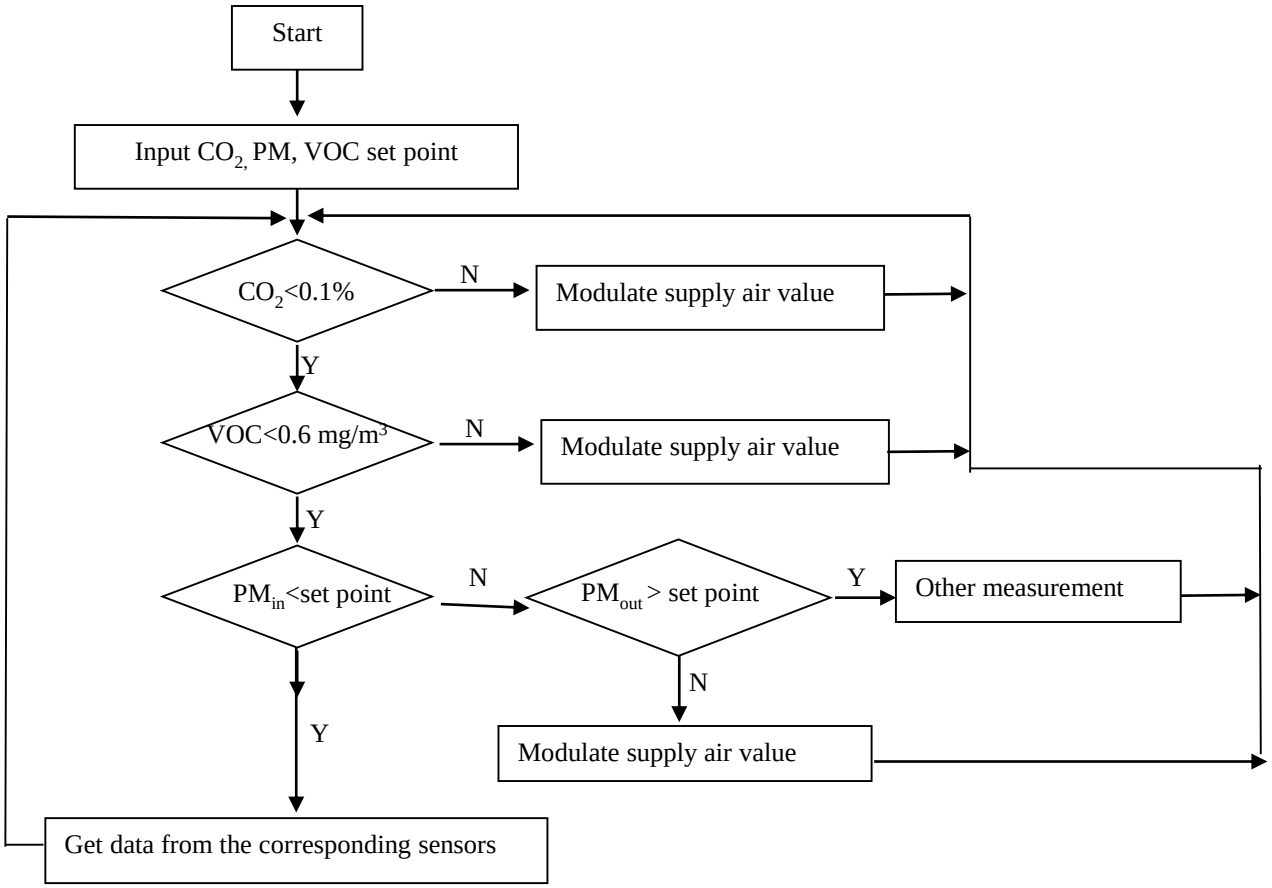
New strategy about DCV

Implication of strategy



Control index: indoor VOC concentration, indoor PM concentration, indoor CO2 concentration, indoor humiture, outdoor PM concentration and outdoor humiture.

Control flow chart



Summary

- The strategy presented above is based on the assumption that the data detected by sensor is accurate and effective. However, it's difficult to achieve higher precision with development of sensor technology at present. It is necessary to develop a new type of sensor for measuring the concentration of VOC, PM and other pollutants.
- Single factor analysis is made for various pollutants with the consideration that they don't effect each other. However, the various pollutants are mutually influenced in fact, and the impact on the human has not been analyze completely. The comprehensive index of air pollution needs to be further studied.
- The strategy are based on the requirement of IAQ rather than energy saving, so the set point of pollutants is need to be discussed.

Thank you