Appliances Guide
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Energy efficient copiers

Country

China

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1 Subtypes and markets

Typical size

Copiers are classed as color or monochrome copiers. Most copiers on Chinese market are monochrome copiers. Figure 1 shows the color capabilities distribution of copiers in China.

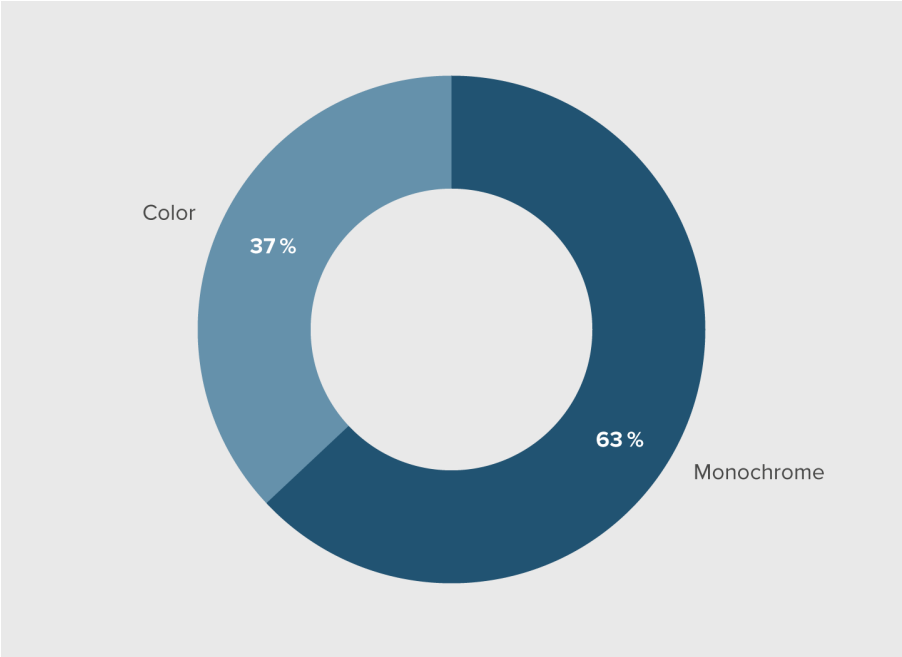

Figure 1: Color capabilities distribution of copiers

Most copiers are designed for paper sizes smaller than A3. A4 is the most common size. Copiers with the copy speed between 20-40 pages per minute (PPM) are the most popular ones on the market. The following two figures show the copy speed distribution of color copiers and monochrome copiers.

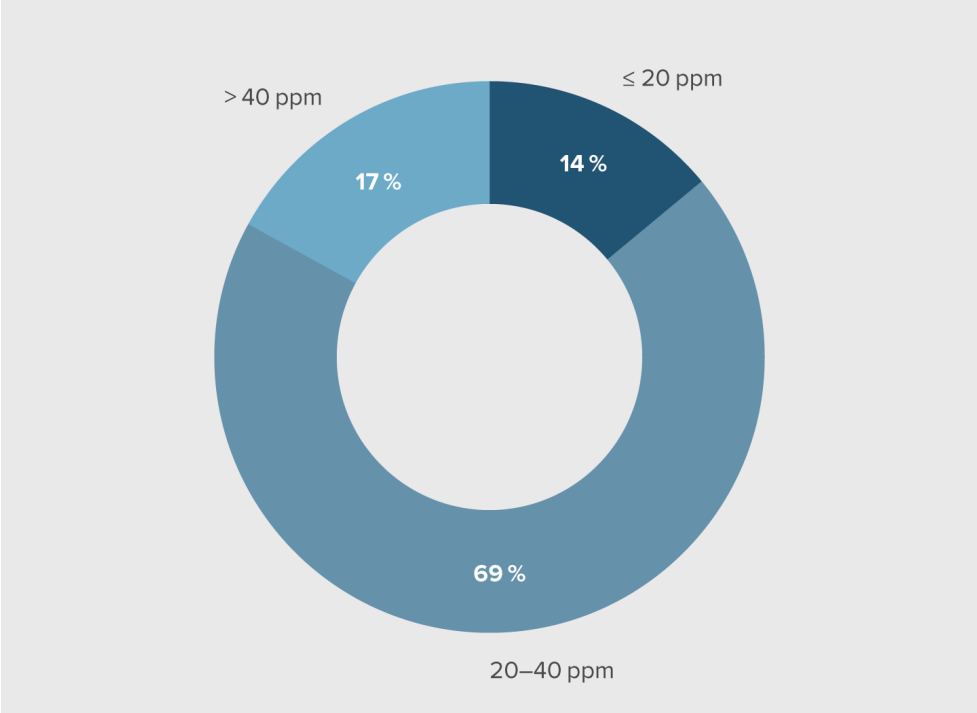

Figure 2: Speed distribution of color copiers

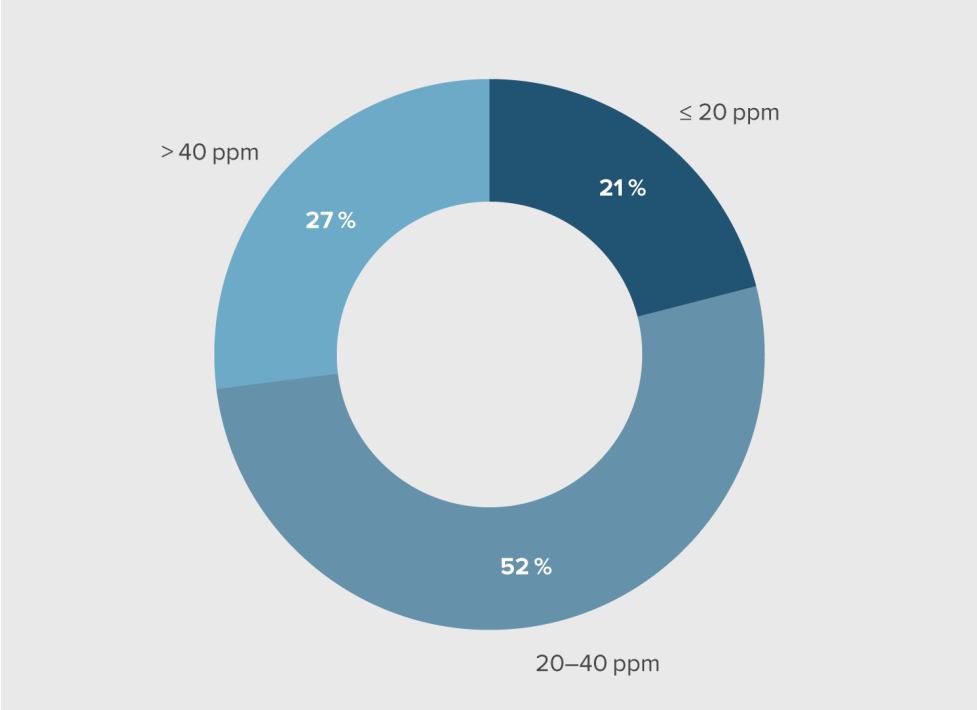

Figure 3: Speed distribution of monochrome copiers

Main types of technologies

After almost 50 years of development, single function copiers are seldom available on the market. The multiple functions copiers integrated with faxing, scanning and printing are the mainstream technology on the market.

Typical usage pattern and relevant parameters

National standard <GB2125102-2014> sets Typical Energy Consumption per week (TEC) as the main energy efficiency indicators for copiers. The appendix C of this standard sets a detailed calculation method of TEC.

Current numbers for stock and market volumes

China produced about 6.5 million copiers in 2011, which increased about 16.8% compared to 2010. In 2011, the domestic sale of copiers was about 0.58 million, which increased about 5.5% whereas the market stock of copiers was 3.8 million, increasing about 18% compared to 20101.

2 Efficiency range and user savings

The following table gives a comparison between a typical inefficient appliance and the best available technology.

Level	**Typical Inefficient appliance. If MEPS is implemented: Appliance just complying to minimum requirement (MEPS)**	**Typical appliance purchased (BAU – Business As Usual)**	**Best Available Technology (BAT)**	**Typical appliance in the stock (over all appliances in use)**	**Expected future BAT (Best not yet Available Technology)**
Typical Capacity / Size	30 PPM				
Category	**Monochrome**	**Monochrome**	**Color**	**Color**	**Color**
Type	Copier with multiple functions	Copier with multiple functions	Copier with multiple functions	Copier with multiple functions	Copier with multiple functions
Lifetime (years)	5	5	5	5	5
Qualitative classification of the provided service (e.g.: washing performance /etc.)	☐ Poor ☐ Low ☑Average ☐ Good ☐ Excellent ☐ No information	☐ Poor ☐ Low ☑Average ☐ Good ☐ Excellent ☐ No information	☐ Poor ☐ Low ☐ Average ☑ Good ☐ Excellent ☐ No information	☐ Poor ☐ Low ☑Average ☐ Good ☐ Excellent ☐ No information	☐ Poor ☐ Low ☐ Average ☑Good ☐ Excellent ☐ No information

Yearly energy consumption ***Please precise the energy considered (electricity, gas,):*** ***kWh***	570	143	94	179	80
If applicable: yearly energy consumption for further energy carriers (which one?)	No	No	No	No	No
If applicable: yearly water consumption	No	No	No	No	No
Purchase cost in (currency) RMB	42000	24000	53000	3600	
Operation & Maintenance cost	2100	1200	2650	180	
Labelling class (for the aforementioned labels)	2	1	1	1	1

3 Performance and information requirements

Mandatory requirements

<GB21251-2008> defines 3 energy efficiency tiers based on TEC and off-mode power. Tier 1 is the most efficient and tier 3 is the minimum energy performance standard (MEPS). However, from November 2011, tier 2 replaces tier 3 as the MEPS. The following table shows the energy efficiency requirement of EES.

Table 2: Energy efficiency requirement of EES

Types	**Copying speed (p/min)**	**Energy efficiency tiers**					
		1		**2**		**3**	
		TEC (kWh)	Off-mode pow-er (W)	TEC (kWh)	Off-mode pow-er (W)	TEC (kWh)	Off-mode pow-er (W)
Mono-chrome copiers with copying function	p≤12	1.2	1	1.5	2	1.8	3
	12<p≤50	0.16p-0.8	1	0.20p-1	2	0.25p-1.25	3
	p>50	0.64p-25	1	0.80p-31	2	1.00p-38	3
Color copi-ers only with copying function	p≤50	0.16p+1.5	1	0.20p+2	2	0.25p+2.5	3
	p>50	0.64p-22.5	1	0.80p-28	2	1.00p35	3
Mono-chrome copiers with multiple functions	p≤20	0.16p+1.6	1	0.20p+2	2	0.25p+2.4	3
	20<p≤69	0.36p-2.2	1	0.44p-2.8	2	0.53p-3.4	3
	p>69	0.64p-22.4	1	0.80p-28	2	1.00p-34	3
Color copi-	p≤32	0.16p+4.	1	0.20p+	2	0.24p+6.	3

ers with multiple functions		0		5		0	
	32<p≤61	0.36p-2.2	1	0.44p-2.8	2	0.53p-3.4	3
	p>61	0.64p-20	1	0.80p-25	2	1.00p-30	3

According to the market research of Top10, almost all copiers on Chinese market from 2010 belong to tier1, meaning that the energy efficiency classification scheme lost their function to guide consumers in purchasing.

The newer version of <GB21251> has been approved and will be implemented from January 2015. The new version integrates the EESs of copier, printer and fax machines into one standard.

The new standard does not include the copier machines with a speed higher than 70 PPM. There are still three energy efficiency tiers but the energy efficiency requirements for each tier have been strengthened. The new standard keeps TEC as the main parameter to classify the energy efficiency tiers. The following table shows the energy efficiency classification requirements in the new standard.

Table 3: Energy efficiency requirements in <GB 21251-2014>

Types	**Speed (P/min)**	**TEC (kWh)**		
		Tier 1	**Tier 2**	**Tier 3**
Monochrome copier, mono-chrome printer, monochrome fax	P≤5	≤0.20	≤0.30	≤1.00
	5<P≤20	≤0.03*i+o.o3	≤0.04*i+0.10	≤0.06*i+0.65
	20<P≤30	≤0.03*i+0.02	≤0.06*i-0.30	≤0.10*i-0.20
	30<P≤40	≤0.06*i-0.90	≤0.11*i-1.80	≤0.10*i-o.20
	40<P≤65	≤0.09*i-2.10	≤0.16*i-3.80	≤0.35*i-10.30
	P>65	≤0.09*i-2.10	≤0.20*i-6.40	≤0.35*i-10.30
Color copier, Color printer, Color fax	P≤10	≤0.70	≤1.30	≤0.10*i+2.80
	10<P≤15	≤0.04*i+o.30	≤0.06*i+o.70	≤0.10*i+2.80
	15<P≤30	≤0.04*i+o.30	≤0.15*i-o.65	≤0.10*i+2.80
	P>30	≤0.09*i-1.20	≤0.20*i-2.15	≤0.35*i-5.00
Monochrome multifunction	P≤5	≤0.30	≤0.40	≤1.50
	5<P≤30	≤0.03*i+0.15	≤0.07*i+0.05	≤0.13*i+0.85

device	30<P≤50	≤0.08*i-1.40	≤0.11*i-1.15	≤0.35*i-6.00
	P>50	≤0.09*i-1.90	≤0.25*i-8.15	≤0.35*i-6.00
Color multifunction device	P≤10	≤1.00	≤1.50	≤0.10*i+3.50
	10<P≤15	≤0.02*i+0.80	≤0.10*i+0.50	≤0.10*i+3.50
	15<P≤30	≤0.06*i+0.20	≤0.13*i+0.05	≤0.19*i+2.00
	P>30	≤0.09*i-0.70	≤0.20*i-2.05	≤0.35*i-3.00

The new standard uses sleep-mode power to calculate the TEC instead of off-mode power in the 2008 version.

Mandatory comparative labelling scheme

China started the mandatory labelling scheme for copiers in March 2009. Figure 4 shows the label sample of copiers. In addition to energy efficiency tier, the label also includes basic identification information of the product, and TEC in kWh and off-mode power in W.

Figure 4: Energy label sample of copiers

Voluntary requirements

The voluntary energy conservation certification of copier was launched in September2009, which is managed by China Qualification Centre (CQC) now. At the beginning, tier 2 was the threshold of energy conservation certification, which means tier 1 and tier 2 copiers are qualified for applying the energy conservation label. The certification threshold was enhanced to tier 1 in 2012. Because tier 1 copiers have taken almost 100% market share, the energy conservation label of copier have lost its guiding function for consumers in some ways.

The following figure 5 shows the energy conservation label sample of copier. The label informs about the energy conservation certificated model, but it does not contain any energy consumption information of the product.

Figure 5: Energy conservation label sample

4 Test procedures and standards

The energy efficiency test method of copiers was introduced in the energy efficiency standard (EES) <GB21251-2008 Minimum allowable values of energy efficiency and energy efficiency grades for copy machines>, published in 2008. <GB 21251-2008> defines the typical energy consumption (TEC) and the off-mode power of the parameters to measure the energy efficiency performance of copiers. TEC is the weekly copier based energy consumption of active mode and off-mode[2]. <GB21251-2014> keeps the same testing and calculation method for copiers with <GB21251-2008>.

$$TEC=[(E_d*5)+(P_{ao}*48h)]/1000$$

E_d: daily energy consumption. Unit: W•h

P_{ao}: auto-off mode power of copier. Unit: W

$$E_d=E_{dj}+2E_1+E_{ao}$$

E_{dj}: energy consumption of daily work. Unit: W•h

E_1: daily energy consumption from the end of active mode to auto-off mode. Unit: W•h

E_{ao}: daily energy consumption of auto-off mode

$$E_{dj}=E_{j1}*2+[(M_{jd}-2)*E_j]$$

E_{j1}: the energy consumption of the first work. Unit: W•h.

M_{jd}: the typical work times of everyday

E_j: the average energy consumption of active mode. Unit: W•h.

$$E_{ao}=\{24h-[(M_{jd}/4)h+(T1*2)]\}*P_{ao}$$

T_1: the time from active mode to auto-off mode. Unit: h.

$$E_j=(E_{j2}+E_{j3}+E_{j4})/3$$

E_{j2}, E_{j3}, E_{j4}: energy consumption of the second, third and forth work. Unit: W•h.

Table 4: Typical work times of copier

Copy speed (P)	Typical work times
0<p≤8	8
8<p≤32	P
P >32	32

5 References

[1] CNIS (2012): China National Institute of standardization: White paper for the energy efficiency status of China energy-use products.

[2] <GB21251-2008 Minimum allowable values of energy efficiency and energy efficiency grades for copy machines>

[3] CNIS (2012): China National Institute of Standardization. Online: http://www.energylabel.gov.cn.

[4] CQC (2010): China Quality Certification Centre. Online: htttp://www.cqc.com.

[5] ETAO (2015): Online: http://www.etao.com.

[6] http://www.zol.com.cn