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# What is an energy efficient TV?

## Trying to find the best TV in China and in Europe

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# Why an international TV test

- Topten: shows the most energy efficient appliances online, based on official regional standards
  - Global presence of Topten allows comparing apparent Best Available Technology (BAT): in China, Europe and the USA
  - Data from Topten: Energy Consumption of Chinese TVs seemed to be significantly higher than of EU- and US TVs
- **a test project was launched, including a high efficiency TV from China and one from Europe:**
- “Are Chinese TVs less efficient than European TVs, or is it only the declaration that differs?”
  - “What are differences in testing and declaring?”

# Topten shows Best available Technology

Best of Europe – 110 to 120 cm

http://www.topten.eu/english/consumer\_electronics/tv/110\_to\_120\_cm.html

Best of Europe – 110 to 120 cm

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Recommendations TVs Selection Criteria Television sets XLS Download

compare								
Brand	Philips	Philips	Philips	Philips	Philips	Sharp	Philips	Philips
Model	46PFL4508K	47PFL5008K	46PFL4908K	46PFL4208K	46PFL5007K	46LE540E	46PFL3607K	46PFL3208K
Similar Models		47PFL5028K / 47PFL5038K			46PFL5507K / 5527K / 5537K	46LE542E		
Electricity costs (€ in 10 years)	100	106	106	115	122	124	128	130
Screen diagonal (cm)	117	119	117	117	117	117	117	117
High Definition	Full HD	Full HD	Full HD	Full HD	Full HD	HD	Full HD	Full HD
DVB Receiver	DVB T/C	DVB T/C	T/C/S (CI+)	DVB T/C/S2	T/C/S (CI+)		T/C/S (CI+)	DVB T/C/S2
Technology	LED	LED	LED	LED	LED		LED	LED
Power On (Watt)	44	47	47	51	55	54	57	58
Power Standby (Watt)	0.3	0.3	0.3	0.3	0.15	0.5	0.3	0.3
Efficiency Index	0.15	0.16	0.17	0.18	0.19	0.20	0.20	0.20
Energy class	A++	A++	A+	A+	A+	A+	A+	A+
yearly kWh	64	65	69	74	76	79	83	85
Available in countries	on demand	on demand	on demand	on demand	on demand	EU	on demand	on demand

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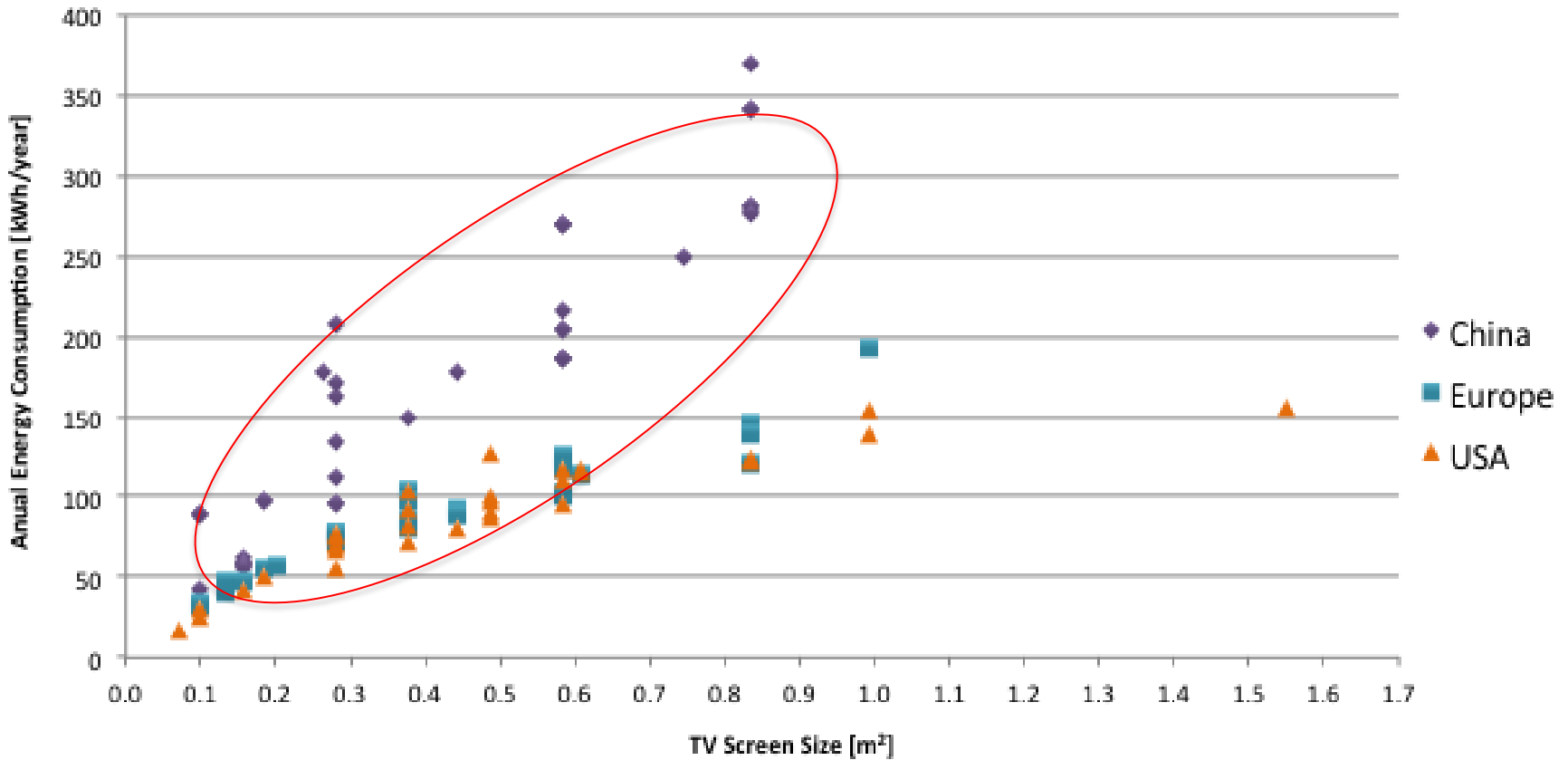
European Climate Foundation

WWF

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# Topten international comparison

## Topten International Comparison: TV



# The project

- 1 efficient TV from China, 1 from Europe
- TV models selected from Topten product lists
- Both TVs tested in 2 Chinese and 1 European testing institutes
- Both TVs tested and rated according to the
  - Chinese Energy label and relevant measurement standards
  - EU Energy label and relevant measurement standards

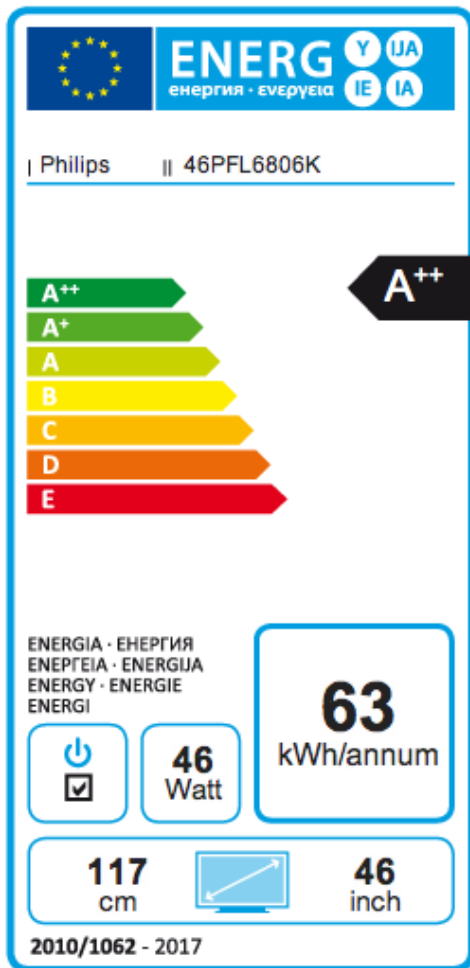


Image: [www.computerbase.de](http://www.computerbase.de)



Image: [www.taboa-buying-agent.com](http://www.taboa-buying-agent.com)

# TV Energy Labels



# Selection of TVs from Topten lists

- Screen diagonal: 46 inch / 117 cm
- Selected were those TV models with lowest On mode power

Brand	Hisense	Samsung	Skyworth	Haier
Model	LED46K200	UA46R31A0D	UA46R3100D	47E800A
Price (RMB)	4399	5799	11500	7999
Electricity cost (10 years, kWh)	435	495	935	570
Annual electricity consumption (kWh)	87	99	223	114
Display area (inch)	46	50	48	47
Image format	16:9	16:9	16:9	16:9
Display resolution	1920*1080	1920*1080	1920*1080	1920*1080
Brightness (cd/m <sup>2</sup> )	300	2	>250	2
Backlight type	LED	LED	LED	LED
High definition	1080p	1080p	1080p	1080p
On mode power (W)	46	96	96	105
Standby mode power (W)	0.50	0.50	0.50	0.50
Energy efficiency index	2.10	2.10	2.10	2.10
National energy efficiency grade	1	1	1	1

Topten **China**:  
Hisense LED46K200, **Grade 1**

Brand	Philips	Philips	Philips	Panasonic
Model	46PFL6806K	46PFL5007K	46PFL5606K	TX-L47EWS
Electricity costs (€ in 10 years)	102	122	124	129
Screen diagonal (cm)	117	117	117	119
High Definition	Full HD	Full HD	Full HD	Full HD
Resolution	1920x1080	1920x1080	1920x1080	1920x1080
Brightness (cd/m <sup>2</sup> )	380	<0	400	n/a
DVB Receiver	T/C/S (CI+)	T/C/S (CI+)	T/C/S (CI+)	T/C/S (CI+)
Technology	LCD-LED	LED	LCD-LED	LCD-LED
Power On (Watt)	46	55	56	58
Power Standby (Watt)	0.15	0.15	0.15	0.15
Efficiency Index	0.16	0.19	0.19	0.2
Energy class	A++	A+	A+	A+
Available in countries	on demand	on demand	on demand	on demand

Topten **Europe**:  
Philips 46PFL6806K, **A++**



# TV test: Participating test institutes

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**CVC:** Guangzhou Vkan Certification & Testing Institute, China National Center for Quality Supervision & Test of Electrical Appliances. Guangzhou, China.



**NIM:** National Institute of Metrology. Beijing, China.



**VDE:** Association for Electrical, Electronic and Information Technologies VDE. Offenbach, Germany.



# TV test: Regulations, standards & definitions

	China	Europe
<b>Labelling regulation</b>	GB 24850: 2010	Regulation No 1062/2010
	MEPS, labelling scale and measurement standard in 1 document	Only basis for Label. No clear reference to measurement standard
<b>Efficiency Index: On mode power</b>	Brightness/Power [cd/W]	$P/P_{ref}(dm^2)$ [W/W]
<b>On mode power measurement</b>		
Test video	IEC 62087:2011, average 10 min.	
TV settings	Brightness adjusted to 8-greylevel-signal	Out of the box / 'Home' mode
	ABC off	ABC off

# CN test: settings adjusted to 8-greylevel pattern

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8-greylevel test pattern from GB 24850-2010

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# Results 1: EEI and Class

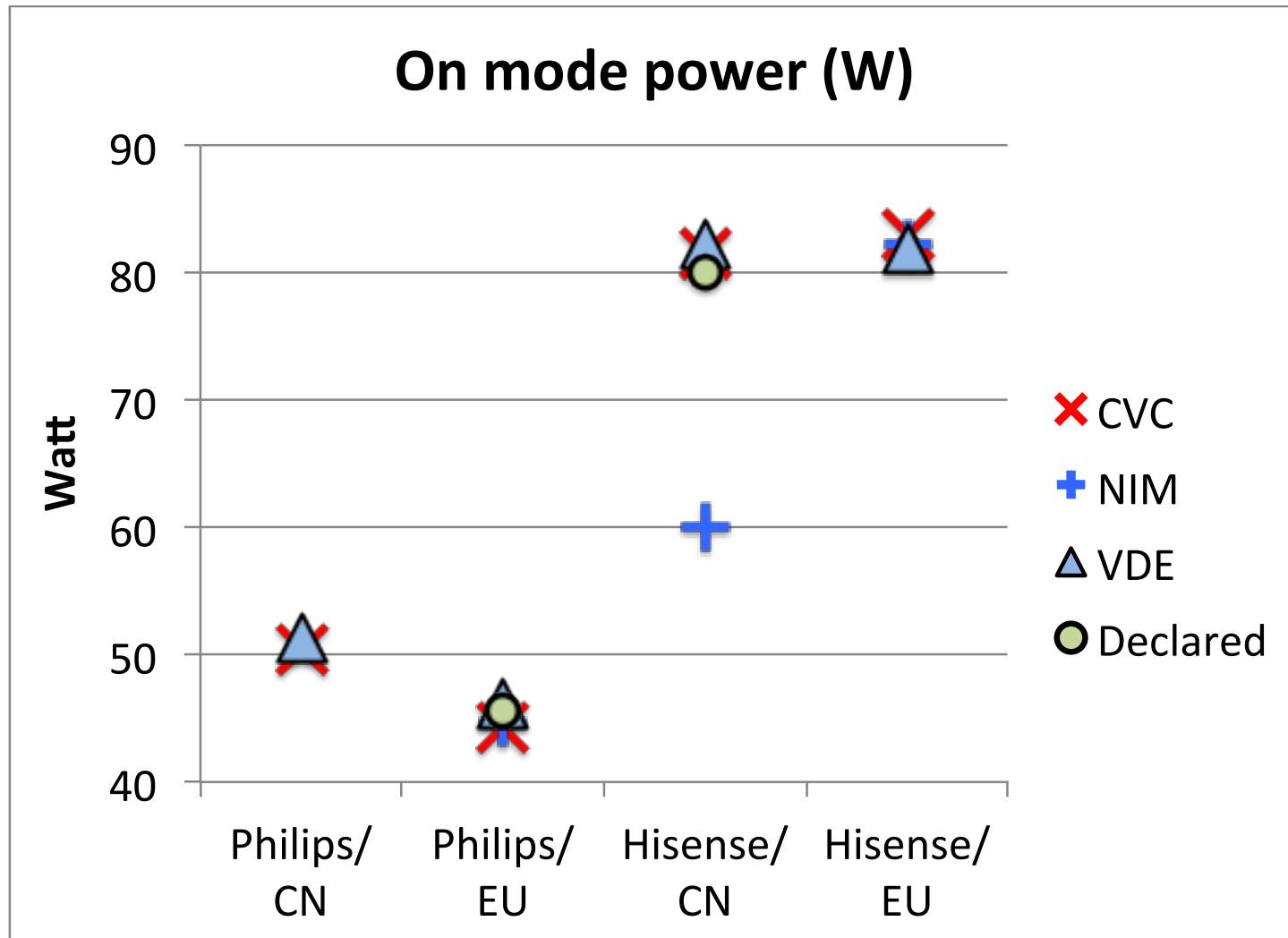
EU Energy Label				
	Philips 46PFL6806K		Hisense LED46K200	
	EEI*	Class*	EEI	Class
CVC	0.161	A+	0.302	B
NIM	0.163	A+	0.302	B
VDE	0.169	A+	0.301	B

\*Incl. the 5% discount for the ABC, the A++ (EEI< 0.16) was confirmed by all institutes

China energy labelling standard				
	Philips 46PFL6806K		Hisense LED46K200	
	EEI	Class	EEI	Class
CVC	1.15 (1.34**)	2 (2**)	1.36 (1.50**)	2 (1**)
NIM	-	-	2.33	1
VDE	1.43**	1**	2.86**	1**

\*\*Measured with HDMI input terminal. Officially RF should be used.

# Results 2: On mode power



# Main results - summary

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1. According to the **EU Energy Label**, the **Philips 46PFL6806K is more energy efficient** than the Hisense LED46K200
2. According to the **Chinese Energy Label**, the **Hisense is more energy efficient** than the Philips TV
3. The **Hisense TV has a higher On mode power** than the Philips, for all measurements
4. The institutes reached **different results according to the Chinese standard**. Especially the (European) Philips TV was difficult to measure
5. For the **luminance** the institutes reached also different results according to the EU standard, even in factory settings.
6. All institutes failed to include the 5% discount for ABC for the EU Energy Label

# Conclusions 1: TV efficiency

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**Efficiency:**  
relative  
power

**China: power relative to screen size +  
brightness**

**EU: power relative to screen size**

**Sufficiency**  
: absolute  
power

**power**

## Conclusions 2: standards influence products

- Our results show: manufacturers optimise products very much according to (regional) standards and labels. Standards and labels strongly influence product design!
- Hence precise definitions of these are key
- There is no global agreement on the definition of 'TV efficiency'
- Harmonisation would facilitate performance comparison and trade of efficient products



# Conclusions 3: Settings matter!

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- Modern TVs with dynamic backlight have a complex menu!
  - Even small changes in several settings (backlight or LCD brightness, contrast, colour temperature, volume) can sum up to change the power by 30%
  - ‘factory settings’ of a TV are not necessarily clearly defined:
    - They can change over time with software updates
    - Choosing ‘factory settings’ in the menu does not necessarily reset all settings
- ➔ Requirement for a clear set of ‘factory settings’?
- ➔ Consider variability in forecasts and models!

# Conclusions 3: Strengths and weaknesses of the labels

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## EU Energy Label (and Ecodesign) regulation:

- + Favours **low power** relative to size
- + Considers **factory settings and maximum brightness** of TVs
- Favours **large** TVs
- **Compliance cannot be checked** from declaration (tuners, ABC)
- **Unclear references** to standards, 7 documents needed for test

# Conclusions 3: Strengths and weaknesses of the labels

## China Labelling Standard

- + 'All in one' – **1 document** contains all info, clear references to standards
- Favours **large and bright** TVs
- Different labelling scale for **Plasma TVs** - their low efficiency is not visible. Only Grade, EEI and Standby power are declared
- Measurement** based on adjustment to 8-greylevel-signal **not fully repeatable**; different settings are possible. Unclear how to change brightness for dynamic backlight. Dark room is not real-life condition

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**Thank you for your attention!**