



Out-of-home Video  
Advertising Bureau  
Europe

DRAFT



# OVAB Europe White Paper Content & Power Consumption

Version 1.0

Bas van Heek & Florian Rotberg | September 2014

# Content & Power Consumption | Contents



Introduction	p. 3
Definition	p. 4
Colour	p. 5
Brightness	p. 6
Example	p. 7
Recommendation	p. 8





- A LED display is a light emitting technology that generates colours by changing the intensity of the individual light sources (LEDs)
- Therefore the colour of the depicted image has enormous effect on power consumption and hence on operational costs
- Depending on colours and backgrounds used in advertisement on LED displays, power cost can be reduced by numbers up to 75%
- The white paper gives an overview of the implications the colour of an image has concerning the power consumption of a LED display. It also includes an OVAB Europe recommendation for power saving principles



- LED display: Array of light-emitting diodes (LED) used as a video display
- LED pixel: Group of LEDs that can together depict all colours within the RGB (red-green-blue) colour spectrum
- LED: Light-emitting diode that controls the light intensity emitted by the diode through the units (W) of the electrical current that powers the diode
- Power consumption: LED display power consumption is defined by the sum of the individual power consumption of the LEDs on the display according to the colour and brightness emitted, plus the power consumption of the controller, power supply and the heat management system of the display
- The white paper concerns LED displays only



# Content & Power Consumption | Colour



- Each LED in a RGB pixel has an individual power consumption
- The display also consumes power if the brightness of the display is zero (e.g. the colour depicted is black)
- The colour depicted by the display is an additive creation of the three RGB diodes defined by the intensity of the individual brightness

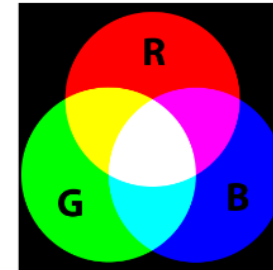


Fig. 1. Colour creation on RGB display (source: Wikipedia)

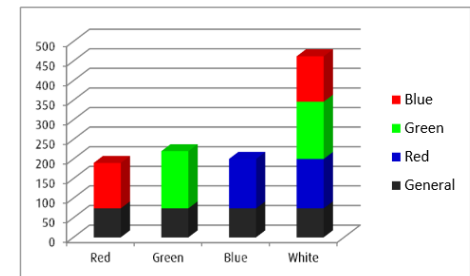


Fig. 2. Power consumption per Color and total for 1sqm LED display (source: Barco)

➤ The power consumption of the LED display is directly related to the colour depicted. E.g. an image with a mostly black background will consume substantially less power than an image with mostly white background

General (BLACK)	74W
Full RED	74 + 116 = 190W
Full GREEN	74 + 146 = 220W
Full BLUE	74 + 126 = 200W
Full WHITE	74 + 116 + 146 + 126 = 460W

Fig. 3. power consumption per colour on 1sqm of a typical LED display is displayed. In the table, the following power consumptions are shown, assuming maximum intensity (source: Barco)



- The brightness of the LED display has a direct impact on the power consumption
- The brightness has a direct impact on LED lifespan
- The brightness has an indirect impact on the general acceptance of LED displays in urban areas concerning neighbourhood acceptance and building permits

➤ Brightness control is essential for the management of the OPEX (e.g. monitoring and factoring in real time light situation on location, 18/7 operations etc.)

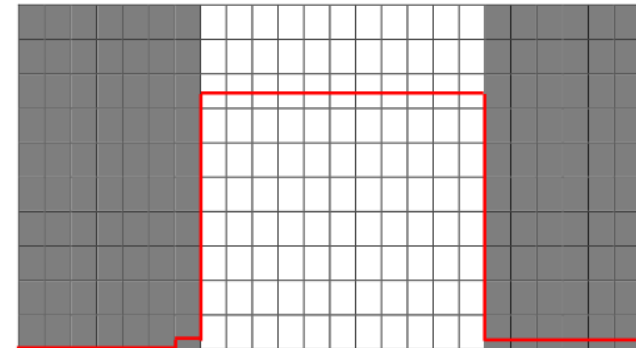


Fig. 4. Average brightness in the case:

- Automated brightness control enabled:
- Maximum brightness setting: 75% of max
- Brightness during calculated night-time: 3%
- Display Off: midnight to 6am
- (source: Barco)

Image	Power/billboard	Power/ billboard/year		
	W	kWh	\$/kWh	\$
White (100%)	25,200	220,752	0.14	30,905
White (35%)	11,700	102,492	0.14	14,348

Fig. 5. Power consumption and cost 100% vs 35% average brightness (source: Barco)

# Content & Power Consumption | Example



Campaign example: Two Apple campaigns and what the impact is on power consumption and cost (source: Barco):

The average colour of both images:

Image	R	G	B	RGB
Black	32	27	26	32,27
White	232	228	226	232

We now convert this into power on our typical LED display:

- Black:  $74 + 32/256 \times 116 + 27/256 \times 146 + 26/256 \times 126 = 117 \text{ W}$
- White:  $74 + 232/256 \times 116 + 228/256 \times 146 + 226/256 \times 126 = 420 \text{ W}$

Cost Impact (60sqm billboard/year):

Image	power W	power/year kWh	\$/kWh	\$
Black	7.020	61.495	0.14	8.609
White	25.200	220.752	0.14	30.905



Fig. 6. Reference advertisement 'black' and 'white' (source: Apple/Barco)

**Difference:  
72,1%**



- Colour and brightness is directly related to the power consumption (OPEX) and lifespan of a LED display
- LED display operators should discuss content colour with the agencies and advertising clients to create awareness and/or factor possible power costs due to the colour of the content into their pricing model
- LED display operators should implement a brightness monitoring and management workflow into their daily operations





# Contact



For more Information please contact OVAB Europe

Christine Koller  
OVAB Europe Office Munich

**Christine.Koller@ovab.eu**  
**Phone: +49 89 2000416-17**

OVAB Europe e.V.  
Rosenheimer Str. 145e  
81671 Munich / Germany

This presentation includes information provided by OVAB Europe, Barco N.V. & invidis consulting GmbH