



# OSRAM Horticulture Lighting

OSRAM Munich / NH  
Light is OSRAM

**OSRAM**



# Contemporary megatrends are inherently changing the world's food system



## Growing Population

- >9bn people by 2050
- 70% increase in food production needed
- 70% of population in cities
- 60 Mega-Cities with >3m people



## Scarce Natural Resources

- 80% of arable land already in use
- 70% of fresh water used for food production
- 65% of water lost due to evaporation or runoff
- 30% of fossil fuels used by the food sector



## Changing Consumer Preferences

- 2.500 km from field to fork
- 50% of planted crops not harvested
- 14% of food contaminated with pesticides
- 0,1% of used pesticides reach the target pest

**“We need more food, harvested close to urban areas, grown in a more efficient and sustainable manner, producing healthier and more nutritious crops all year-round!”**

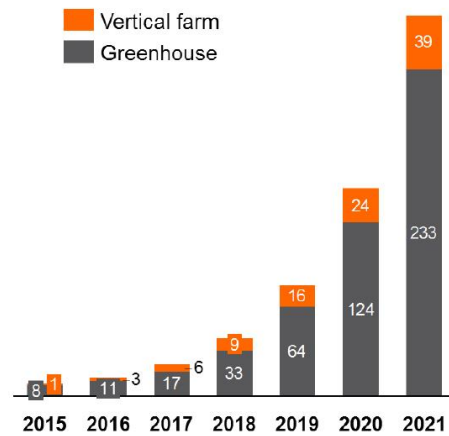
# Horticulture is a rapidly growing market

## Market Drivers

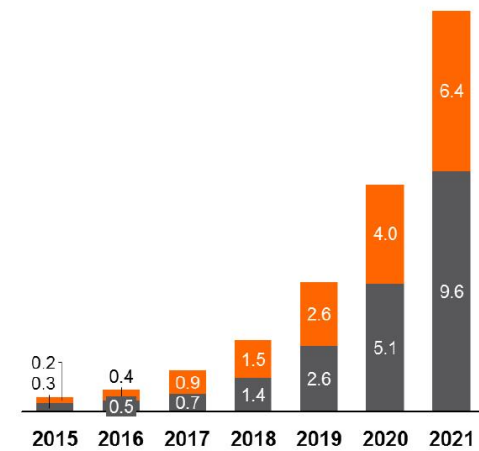


## Market Outlook

**LED lighting installations**  
[sq. ft. million]



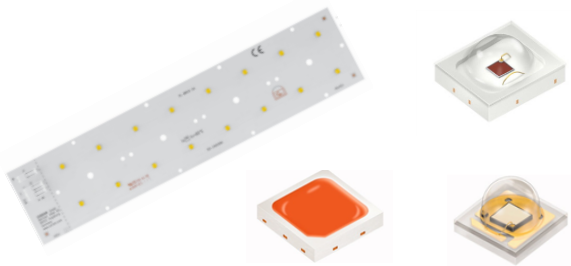
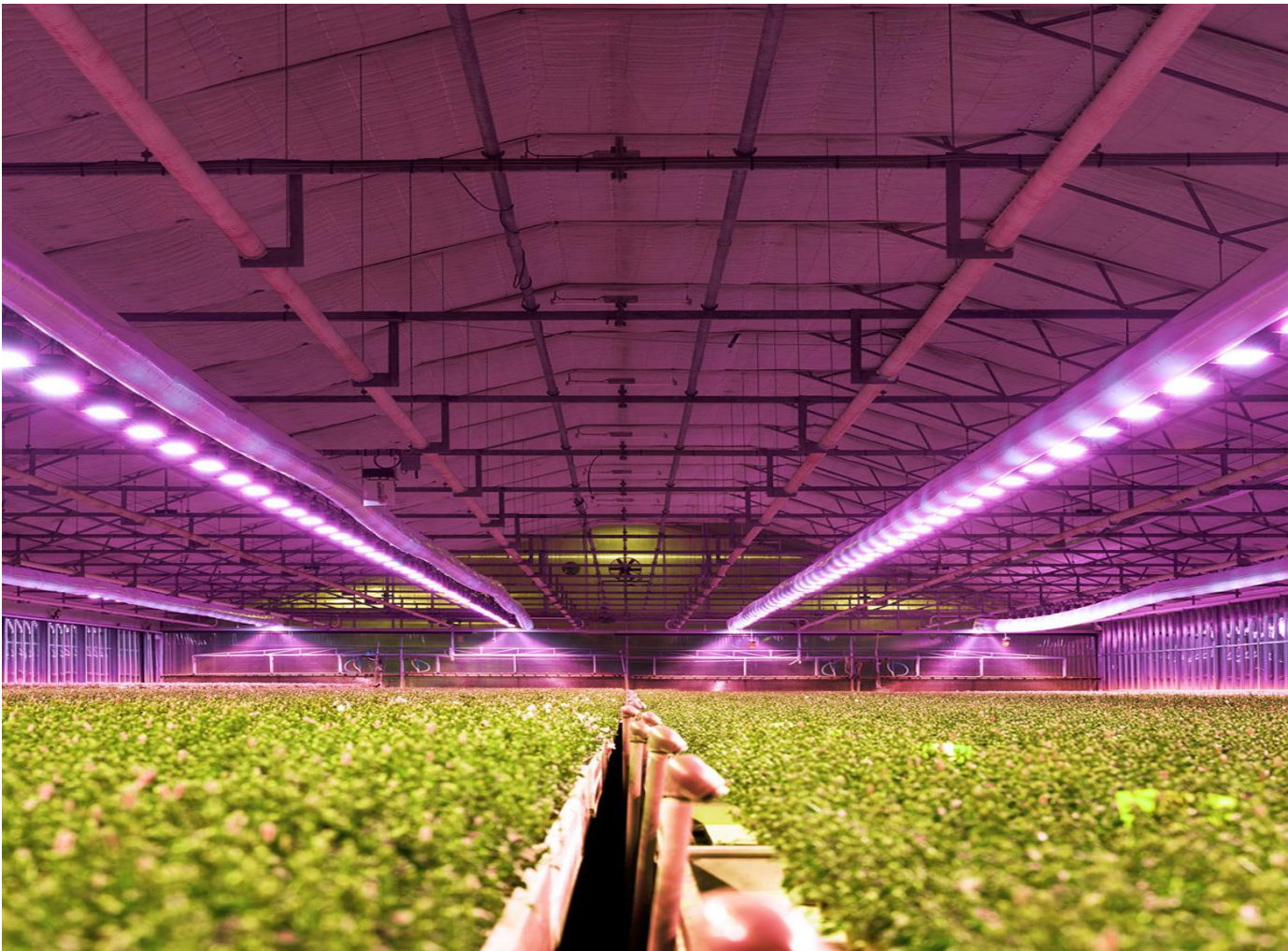
**LED luminaire units <sup>1)</sup>**  
[million]



<sup>1)</sup> Source: SU Horticulture report Nov 2016

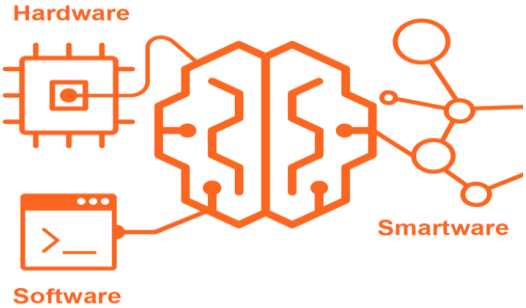
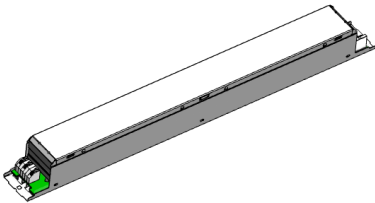


# Complete Greenhouse Solutions as key success factor



Luminaire  
Components

Driver  
Modules  
LEDs



Smart Controls

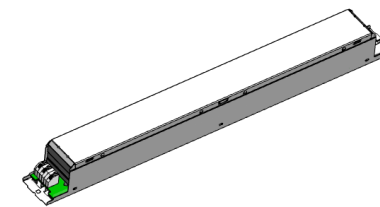


# LED Drivers for Horticulture applications



## OSRAM LED Drivers for Horticulture

- Very high efficiency
- High flexibility thanks to wide operating range
- Global usage, multiple voltages
- High surge /burst robustness
- Enable easy and fast programming
- Operate in high ambient temperatures

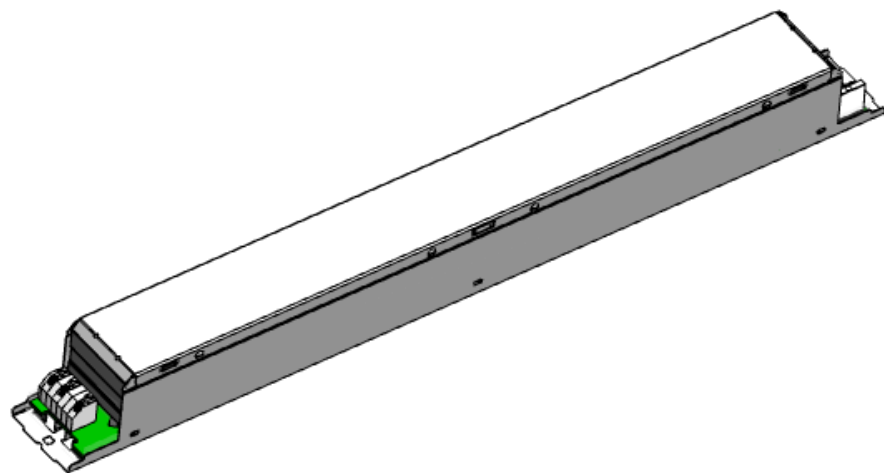
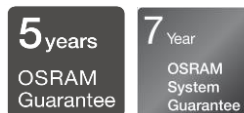


Luminaire  
Components

Driver

# Horticulture Driver: OT FIT 380 D NFC HF L

Piece of mind – ready for multiple applications, global installations & hassle free usage



## Family / System

- Non-isolated product, 380W
- Optimized for Greenhouse applications with OSRAM OS LEDs



## Highlights

- Global usage, CE approval and cURUS (UL recognized)
- Multiple applications due to wide range  $V_{in}$  200 – 400V
- Constant Lumen Output (CLO) integrated
- High surge robustness 4kV/4kV
- Very low LF and HF ripple to avoid machine disturbances

## Benefits

- Very high efficiency up to 97%
- Integrated inrush current limiter
- Very wide operating windows, up to 1.4A and 550Vout
- Simple & fast NFC programming





# Module & LEDs for Horticulture applications



## OSRAM modules and LEDs

- Provide you the quality & knowledge of the global market leader in horticulture LEDs
- Offer a maximum of flexibility (modules as a base, customized recipes)
- Enable all possible & useful powerclusters, efficiencies & colours
- Enable you in every phase of growth to maximize the results



Luminaire  
Components

Modules  
LEDs

# OSRAM has a strong footprint in the Horticulture market

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## Trust the market leader

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**„WIR HABEN MIT  
OSRAM  
DIE BESTEN ERFAHRUNGEN  
GEMACHT...“**

Nicht nur in ihrer Heimatregion Stuttgart hat die Firma GROWKING längst eine feste Größe – hier wurden seit Jahren moderne LED-Leuchten höchster Qualität entwickelt, die immer dem technisch Möglichen der Gegenwart entsprechen – und das zu einem erstaunlich günstigen Preis.  
Wir sprechen mit Thomas Brändle, dem Inhaber und Geschäftsführer von GROWKING, unter anderem über seinen Einsatz in der Branche und geschäftliche Zukunftspäne.  
Text: Martin Müncheberg / Fotos: Growking



**„I believe that Osram has  
the best LEDs in the world“**

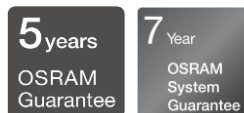
The end customer of customer Lohuis could double its tomato biomass output within the first cycle. Using a interlight solution with a mix of Oslon SSL and Osconiq P 2226 offers good performance and high homogeneity.

Osram Opto Semiconductors  
is the **Global Market Leader**  
with a total market share  
of >50 % in  
Horticulture LEDs



# Horticulture Module: PrevaLED Brick HC

## Piece of mind – the perfect base for multiple Horticulture recipes



### Family / System

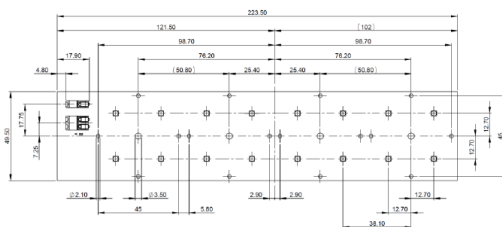
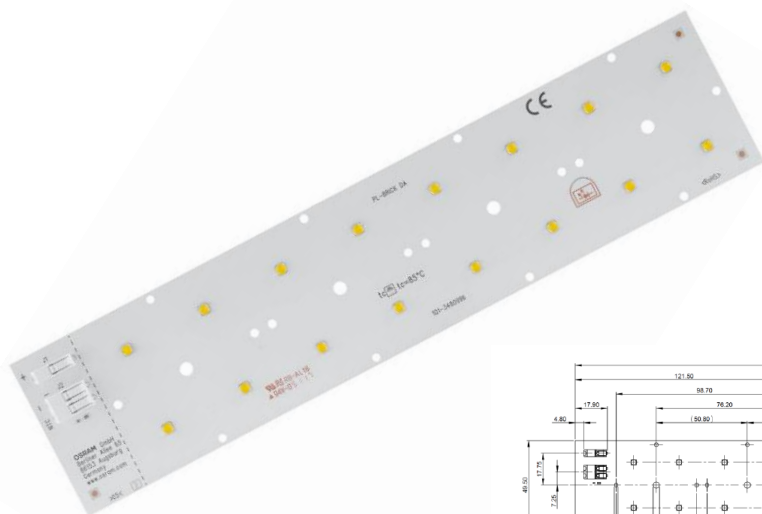
- PL BRICK HP family (Zhaga 15) as base
- PL BRICK HP 2x4, 2x6, 2x8 & 2x6 IP possible

### Highlights

- 3 standard products to cover >80% of applications
- Customized adjustments of selected LEDs possible
- Perfectly aligned to OSRAM OPTOTRONIC Horticulture portfolio
- Compatible with many third party optics, e.g. from LEDIL

### Benefits

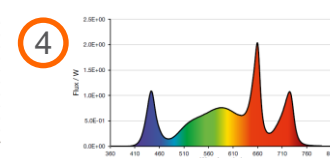
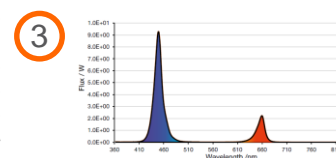
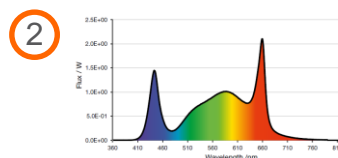
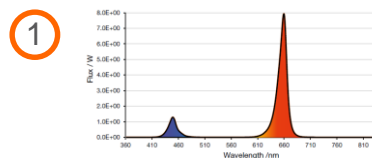
- Lifetime up to 100.000 hours,
- Robust and long life-time high power LEDs from the market-leader
- OSRAM OS offers complete portfolio of Horticulture LEDs which can easily be used for customized derivatives
- Customized adjustments of selected LEDs possible, if a special spectrum is required



# Horticulture LEDs – the right recipe for every need

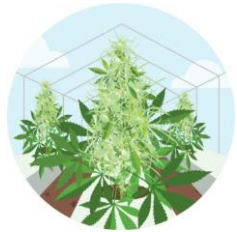





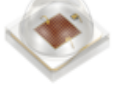
Target		Lighting condition	Deep blue 450 nm	Hyper red 660 nm	Far red 730 nm	White CRI 70 4000 K
Plant growth	①	Supplemental lighting	10 %	90 %		
	②	Sole-source lighting		20 %		80 %
Propagation		Supplemental lighting	75 %	25 %		
	③	Sole-source lighting	35 %	25 %	15 %	25 %
Flowering		Supplemental lighting	20 %	60 %	20 %	
	④	Sole-source lighting		20 %	20 %	60 %
Fruiting		Supplemental lighting		70 %	10 %	20 %
		Sole-source lighting		30 %	10 %	60 %





# Horticulture LEDs – the right recipe for every need



	Deep Blue	Blue	True Green	Lime	Yellow	Amber	Red	Hyper Red	Far Red	Purple	Mint
 OSCONIQ® P 2226	185 mW 64 %	9 lm 28 lm/W	36 lm 131 l/W	- -	20 lm 89 lm/W	- -	21 lm 100 lm/W	115 mW 55%	72 mW 40 %	- -	- -
 DURIS® S 5 PSLR DURIS® S 5 PSLM	480 mW 51 %	- -	170 lm 181 lm/W	- -	- -	45 lm 48 lm/W	24 lm 26 l/W	- -	- -	333 mW 35%	61 lm 197 lm/W
 OSLON® SSL	180 mW 63%	9 lm 28 lm/W	36 lm 131 lm/W	58 lm 198 lm/W	33 lm 111 lm/W	22 lm 102 lm/W	17 lm 81 l/W	- -	- -	124 mW 43 %	- -
 OSLON® Square	715 mW 72 %	41 lm 41 l/W	144 lm 152 lm/W	- -	76 lm 99 lm/W	100 lm 136 lm/W	68 lm 93 lm/W	450 mW 61 %	407 mW 60 %	- -	- -
	1450 mW 73 %	- -	- -	- -	- -	- -	- -	965 mW 65 %	- -	- -	- -

# Horticulture LEDs – the right recipe for every need



Type	Wavelength	CRI	Typ. If (mA)	Typ. Vf (V)	Typ. Power (W)	PPF [μmol/s]*	PPF/W [μmol/J]	Typ. Flux [mW/lm]	Typ. rad. Eff./lm/W
Duris® S5									
<b>GD PSLM31.14</b>	450		100	2,85	0,3	0,67	2,33	180 mW	63%
<b>GW PSLM32.UL</b>	PC-Lime		100	2,85	0,3	0,62	2,15	61 lm	197 lm/W
OSCONIQ® P 2226									
<b>GD DASPA2.14</b>	450		100	2,85	0,3	0,69	3,23	185 mW	64%
<b>GH DASPA2.24</b>	660		100	2,15	0,2	0,64	2,94	115 mW	55%
<b>GF DASPA2.24</b>	730		100	1,80	0,18	0,43	2,01	72 mW	40%
<b>GW DASPA2.xC</b>	White	65-80	100	2,85	0,3	0,58	2,00	41 lm @4000K CRI80	144 lm/W
OSCONIQ® P 3030									
<b>GD QSSPA1.14</b>	450		350	2,90	1,0	2,64	2,65	700 mW	70%
<b>GH QSSPA1.24</b>	660		350	2,10	0,7	2,40	3,52	440 mW	60%
<b>GF QSSPA1.24</b>	730		350	1,95	0,7	2,44	3,58	407 mW	60%
<b>GW QSSPA1.xM</b>	White	80-90	350	2,85	1,0	2,08	1,97	160 lm @5000K CRI70	160 lm/W
OSLON® SSL									
<b>GD CSxPM1.14</b>	450		350	2,85	1,0	2,70	2,71	715 mW	72 %
<b>GH CSxPM1.24</b>	660		350	2,08	1,0	2,47	3,56	450 mW	61 %
<b>GF CSxPM2.24</b>	730		350	1,95	1,0	2,44	3,58	407 mW	60 %
<b>GW CSxPM1.xM</b>	White	70-90	350	2,85	1,0	2,06	1,95	152 lm @4000K CRI70	152 lm/W
OSLON® Square									
<b>GD CSSRM2.14</b>	450		700	2,85	2,0	5,45	2,69	1450 mW	73 %
<b>GH CSSRM2.24</b>	660		700	2,15	1,5	5,02	3,41	910 mW	61%
<b>GH CSSRM3.24</b>	660		700	2,11	1,5	5,27	3,56	965 mW	65 %
<b>GW CSSRM3.PM</b>	White	70-95	700	2,80	2,0	4,90	2,43	335 lm @4000K CRI70	171 lm/W



# Where Do We Stand Today?

Software development has made an impact, OSRAM is gradually turning into an IT company.

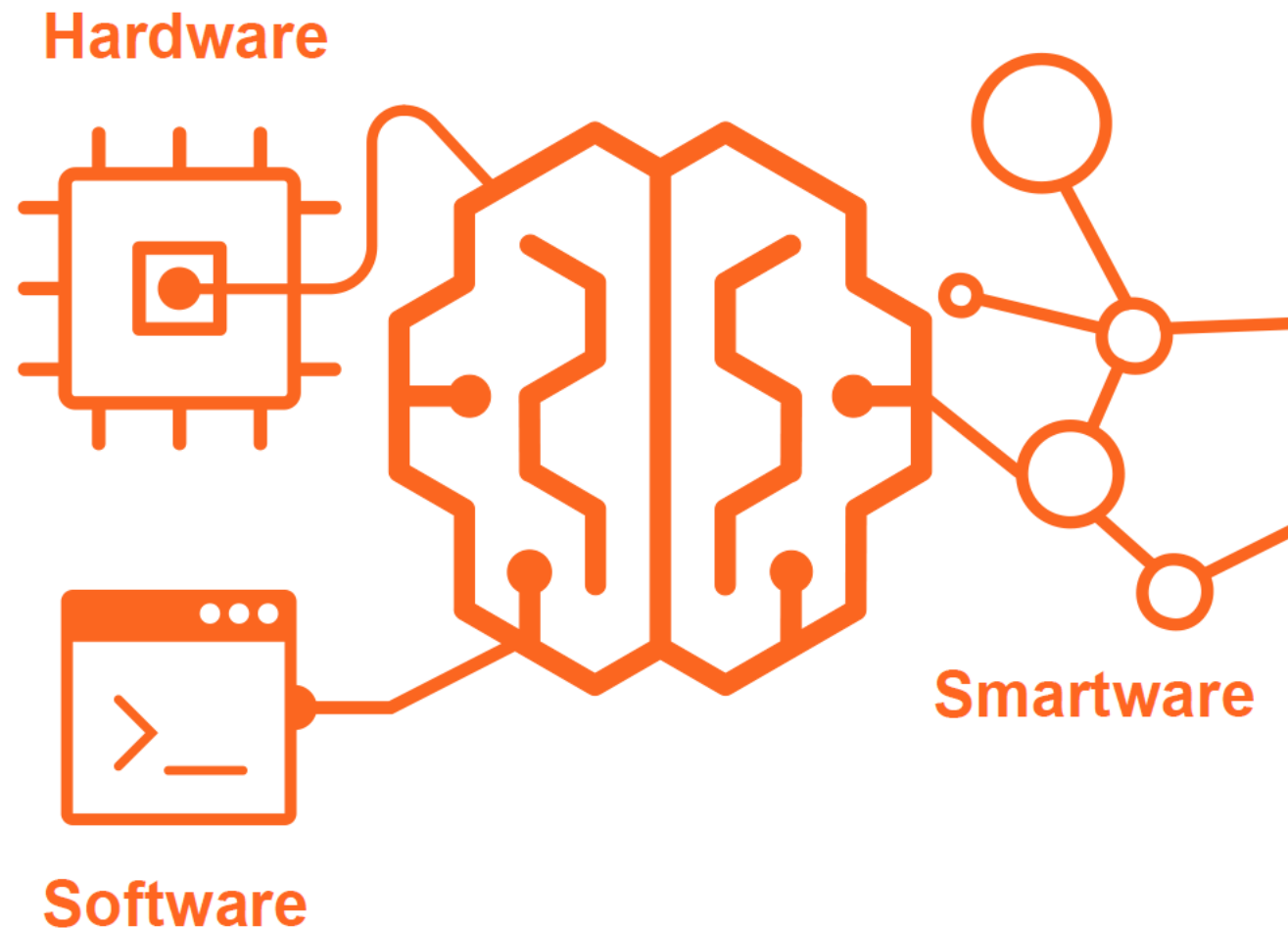
**OSRAM**



# From Hardware to Smartware

Our next step is aimed at leveraging both hardware and software development to create an integrated, open IoT platform. This platform will combine user centricity and developer friendliness to allow clients to unlock the full potential of IoT for lighting business and beyond.

**OSRAM**



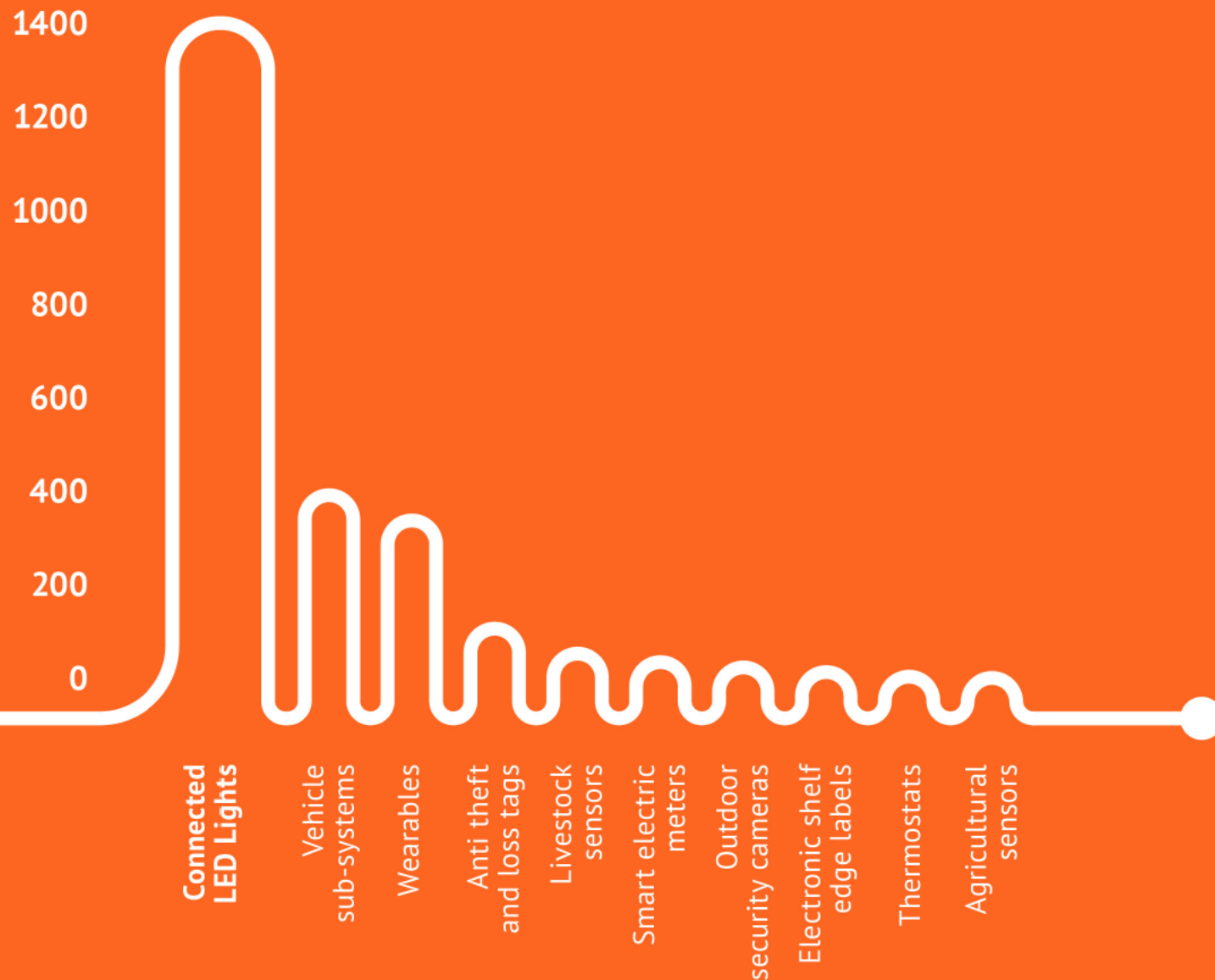


# Market Access

OSRAM is favored by a strong market entry point that plays to both its strengths and its heritage.

**OSRAM**

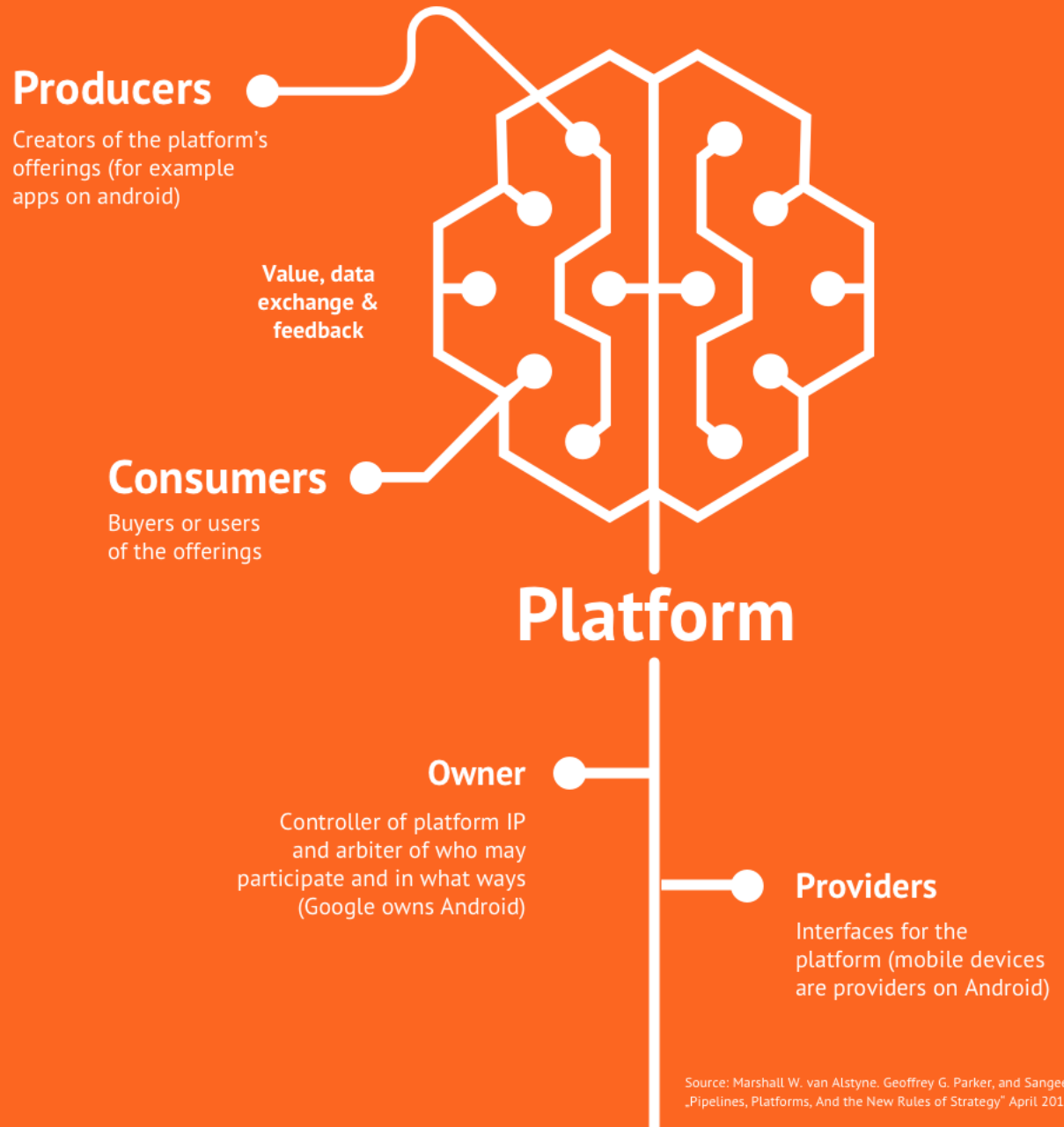
Shipments 2020 (Millions of units)



# The Players in a Platform Ecosystem

A platform provides the infrastructure and rules for a marketplace that brings together producers and consumers. There are four main roles that may shift rapidly from one role to another.

**OSRAM**





LIGHTELLIGENCE is backbone to many OSRAM IoT solutions & applications – In parallel our partners are starting to build their own cases

Applications



Smart Farming



Smart Office



Smart Retail



Smart Light Management



Luminaire Insights



Building Insights

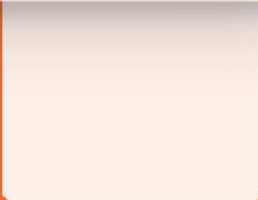


more to come ...

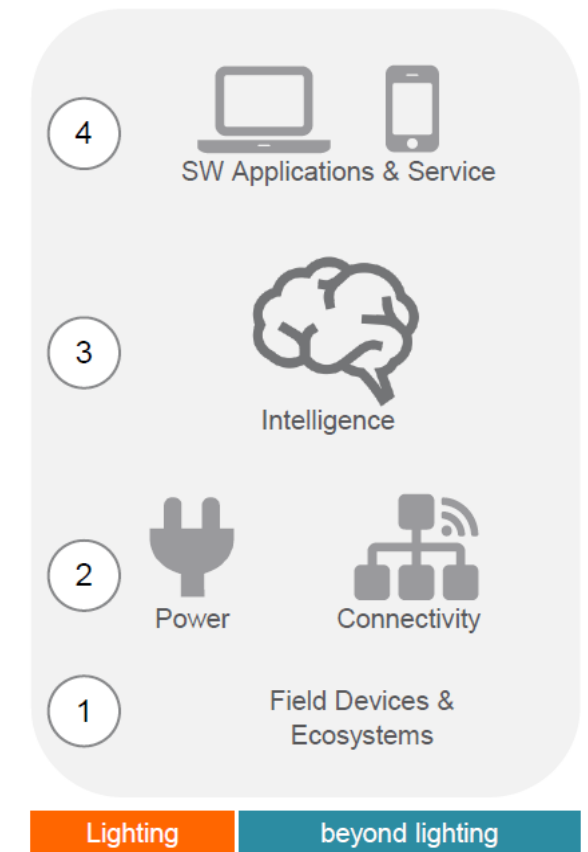
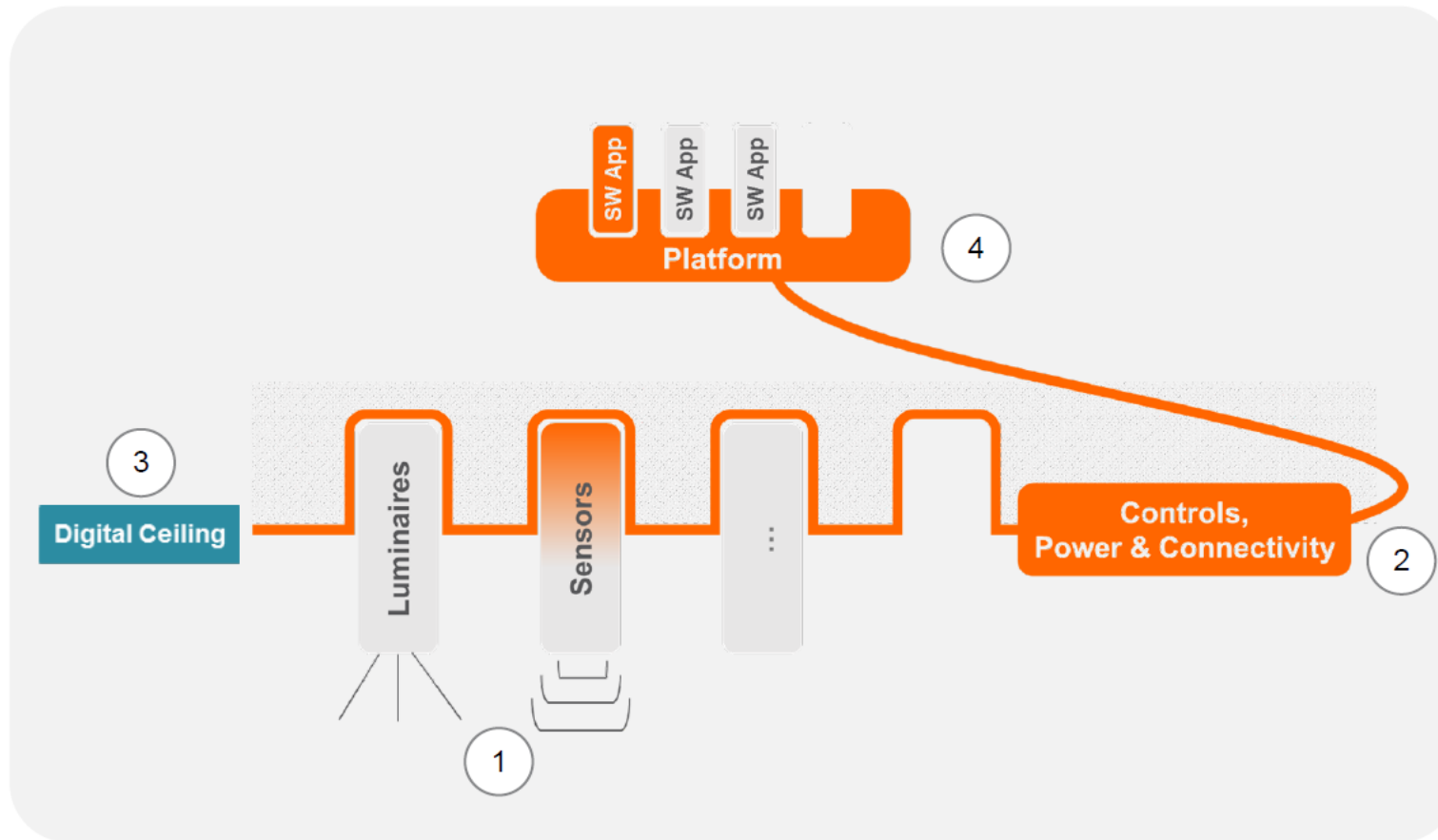
IoT Platform

LIGHTELLIGENCE®

Devices



# „Digital Ceiling“ is turning a Building into a Smart Connected Building



**Thank you.**