

# The size of the prize for UV LED

**Robert Rae**

Managing Director – Sales

**UV solutions** for demanding  
printing applications



# GEW ... engineering UV



Sheetfed



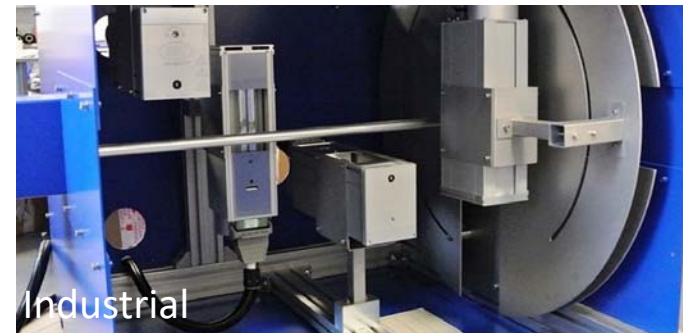
Narrow web



Wide web

Founded 1991  
>£60m turnover  
Over 22,000 UV systems installed  
3 factories:  
>18,000m<sup>2</sup>

Graphic Arts Only  
Offices: UK, DE, USA  
100% family owned  
>6000 UV units per year



Industrial

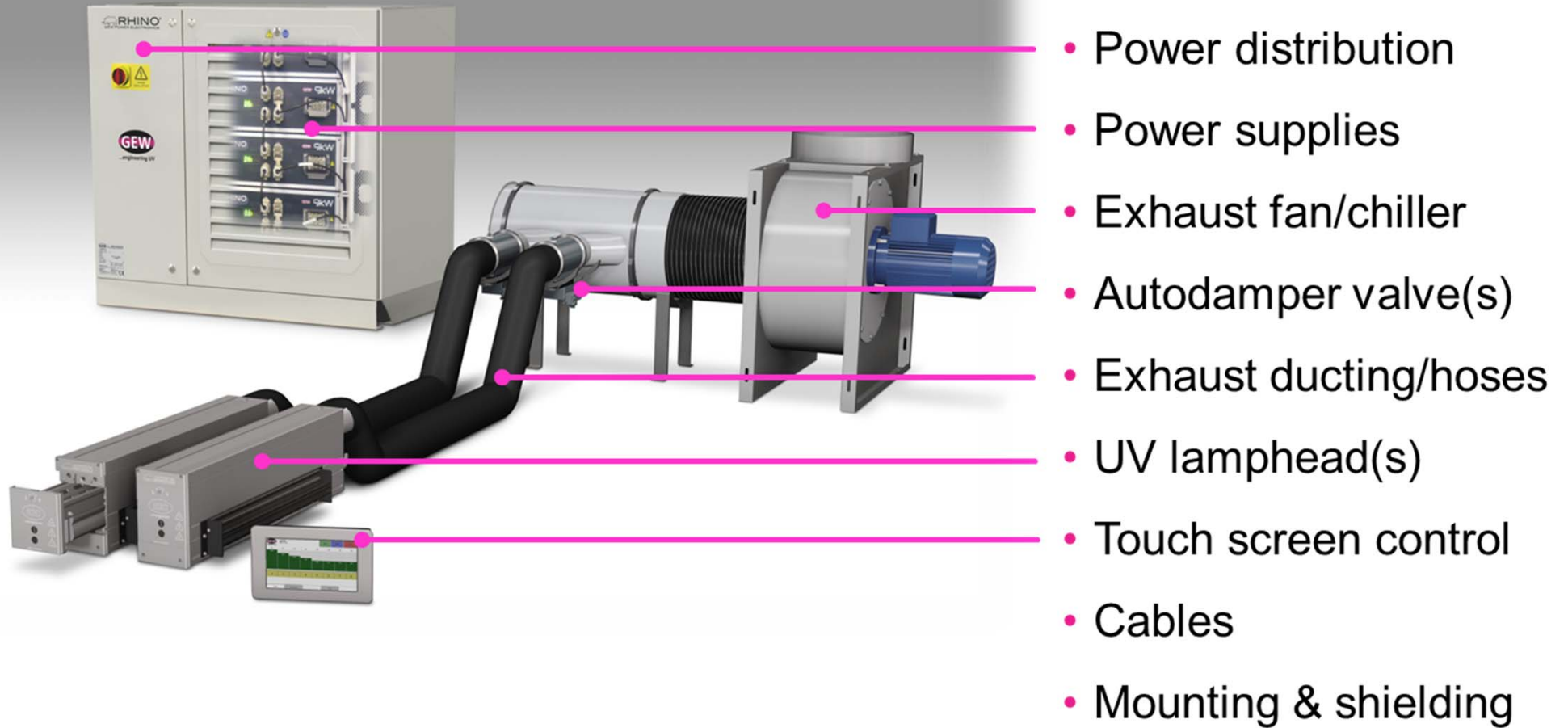


Special applications



Digital

# Typical UV system



# UV & UV LED Products

water-cooled



lamphead style



cassette style



air-cooled



cassette style

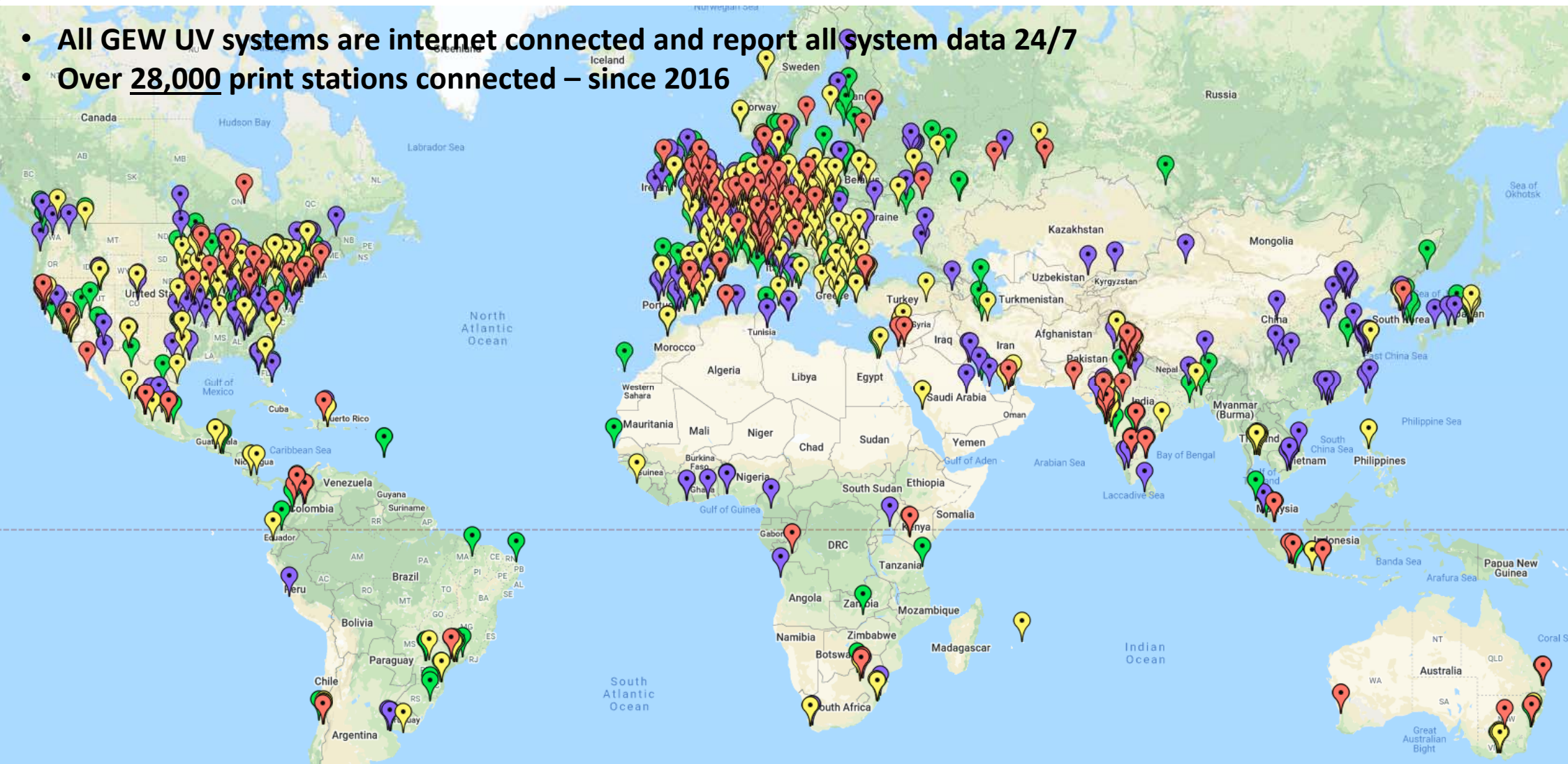


UV Curing Technologies...

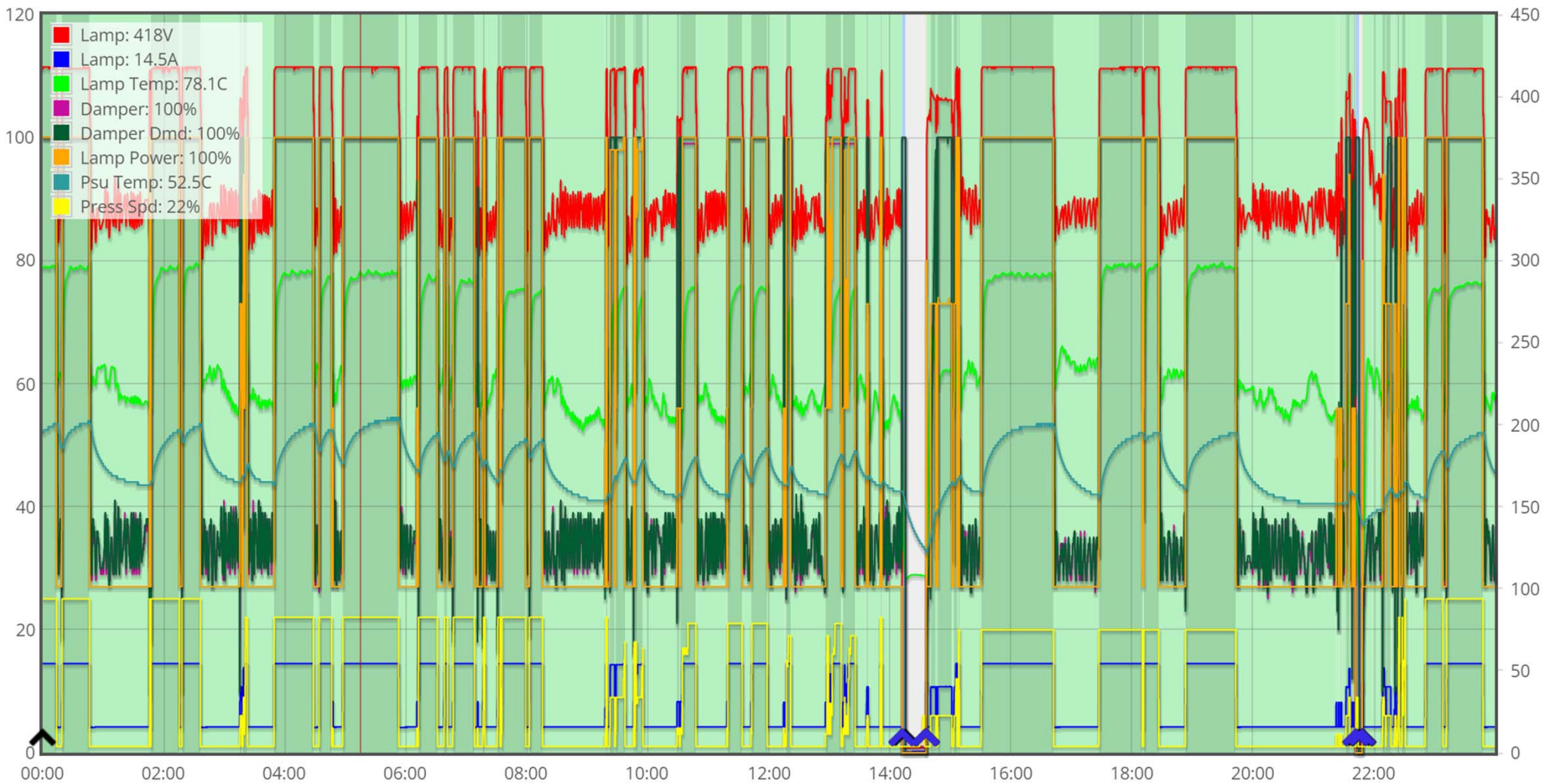


# GEW Remote Monitoring System

- All GEW UV systems are internet connected and report all system data 24/7
- Over 28,000 print stations connected – since 2016



# GEW Remote Monitoring System



# Sustainability Benefits of LED

- No Mercury
- No Ozone
- Higher press efficiency - no warm-up / cool down
- Large installed power savings
- Large operational energy savings

# No Mercury

## ROHS II Regulation



- Scope excludes *Large-scale stationary industrial tools (LSSITs) & Large-scale fixed installations (LSFIs)*
  - In GEW opinion most NW presses are out of scope (not legal opinion)
- For small % remaining Exemption 4f is extended until minimum July 2024
- UV industry uses very small amounts of Mercury:
  - All GEW UV lamps sold in Europe = <5 kg Mercury
  - 2018 EU member states used ~40 tonnes of Mercury in dental fillings alone!

UV Curing Technologies...



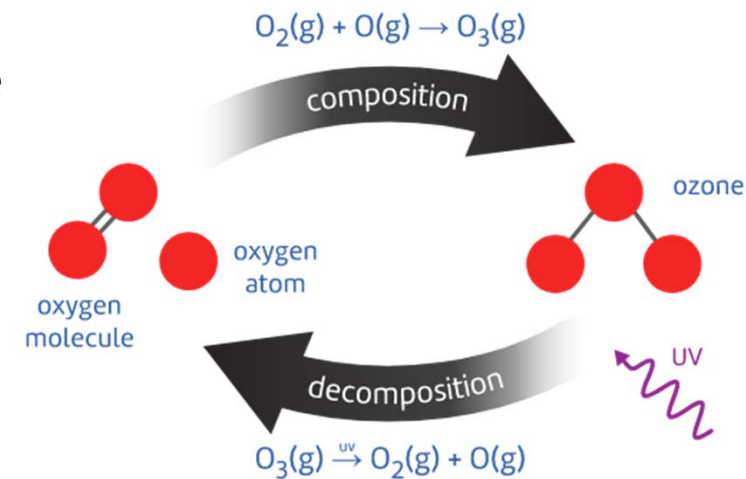
# No Ozone

## Ozone Generation

- Average 45cm 8 lamp UV system → ~3kg of ozone per year
- ½ Life ~1day → 8g residual ozone per year per system → negligible

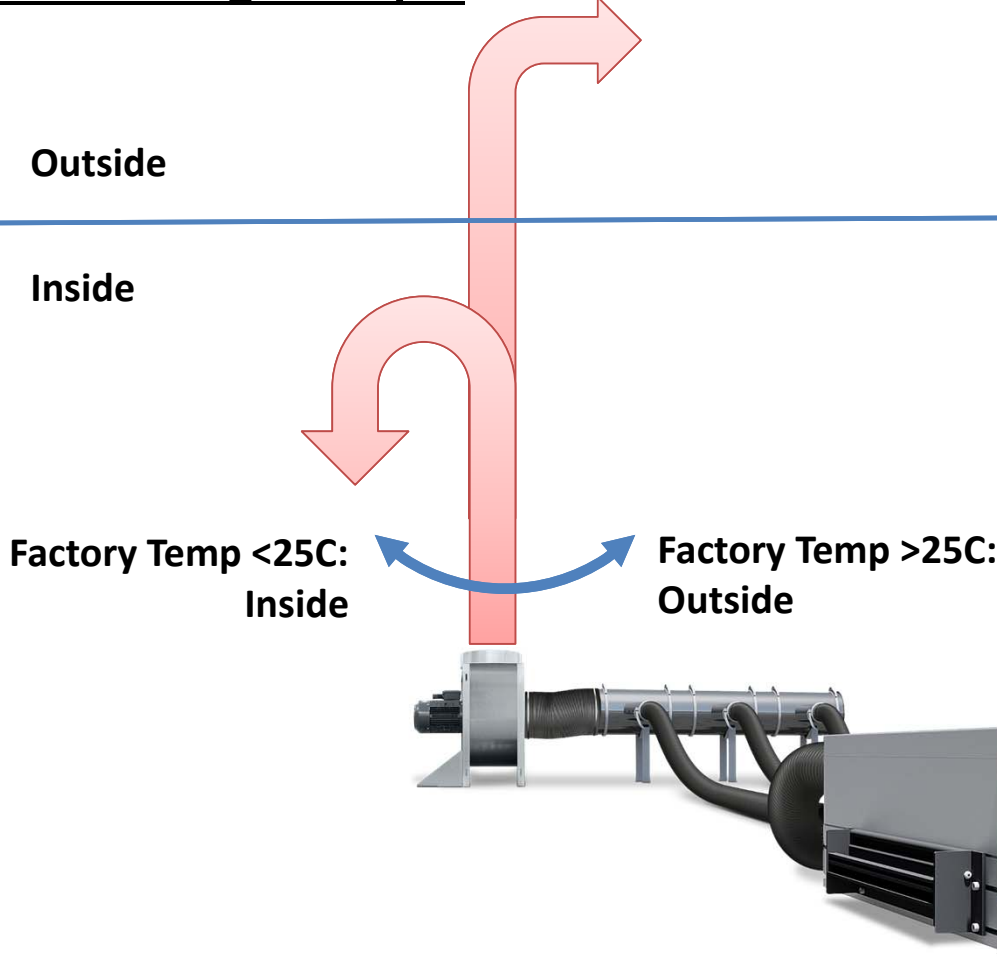
## Extraction Requirements

- Main benefit - LED systems do not require ducting out of building
- LED diodes ~ 50% efficiency
- Typical 8 lamp 45cm LED → 12.6kW heat into press room
- Two shift operation → 60-70kWh per day
  - Enough to heat 2 average UK homes @ 33kWh per day
- Managing waste heat is a big opportunity with LED!



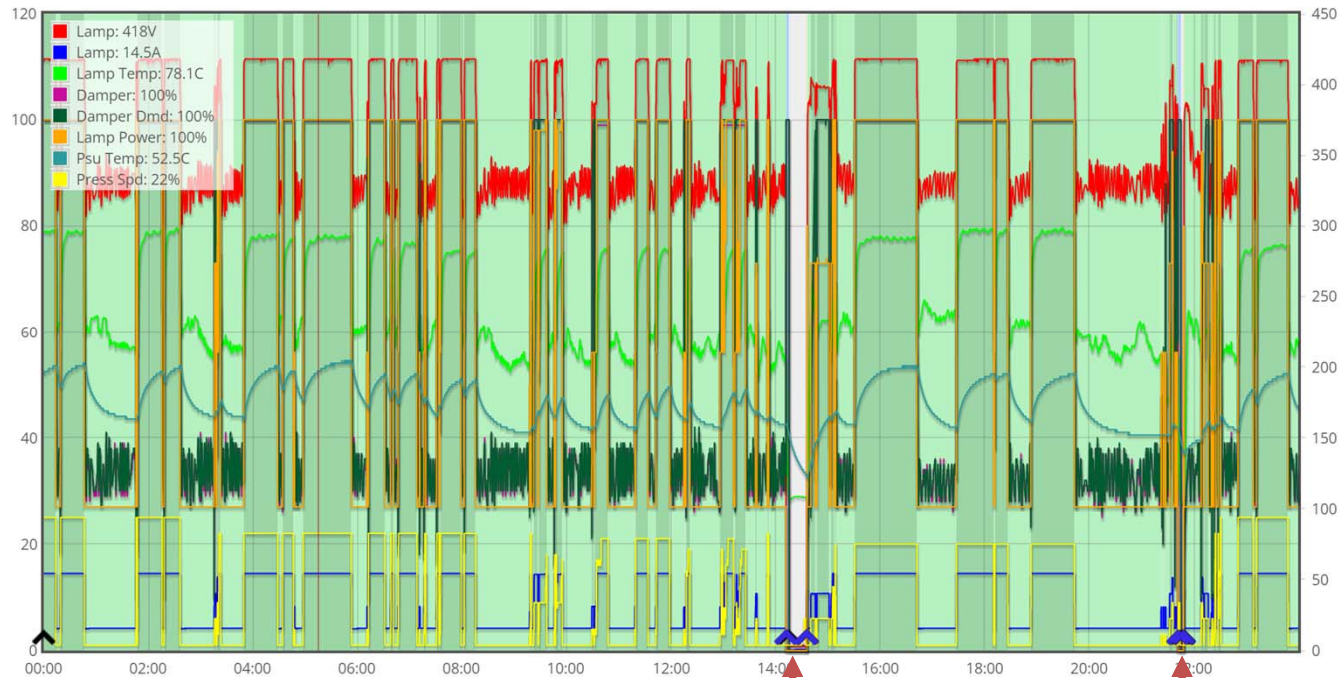
# Waste Heat Management

## Air Cooling Example



**Water cooled systems:**  
Waste heat is collected in water. Heat exchangers can redistribute this heat within factories; solutions already exist

# Lamp warm up / cool down lost time



UV stops – not “UV fault” related

## Conservative Example:

- Efficient 3 shift label operation
- 2 UV stops per day is common
- 5 minute cool down
- 1 minute warm up
- 312 days per year = >60 hours per year
  
- €200/hr = €12,000 per year

## Consider:

- UV fault stops:
  - Shutter faults
  - Failed lamp striking
  - Overheating

# THE BIG ONE: Energy Savings

- 1. Installed Power
- 2. Energy Consumption

**Free up** mains capacity



### Electrical Requirement<sup>†</sup>

GEW E2C	65 kVA
AeroLED	26 kVA



**Cut your** energy costs



### Energy Consumption<sup>†</sup>

GEW E2C  
206,200 kWh

AeroLED  
69,800 kWh



...engineering UV

# LED reduces installed power

## Mercury Arc System

*air-cooled*

**E2C**

E2C-45-8 @ 140 wpc



### Power

- RHINO cabinet: 62kVA

## UV LED System

*air-cooled*

**AeroLED**

AERO-45-8 @ 53 wpc



### Power

- RHINO cabinet: 27kVA

*AeroLED reduces power 66% (35kVA)*

# LED reduces installed power

Retrofit 2 machines with AeroLED → save enough power for another press

**E2C**  
E2C-47-8



**RHINO cabinet:** 93A  
**Press:** 63A\*  
**Total:** 156A

**x2 = 312A**

**AeroLED**  
AERO-47-8



**RHINO cabinet:** 45A  
**Press:** 63A\*  
**Total:** 108A

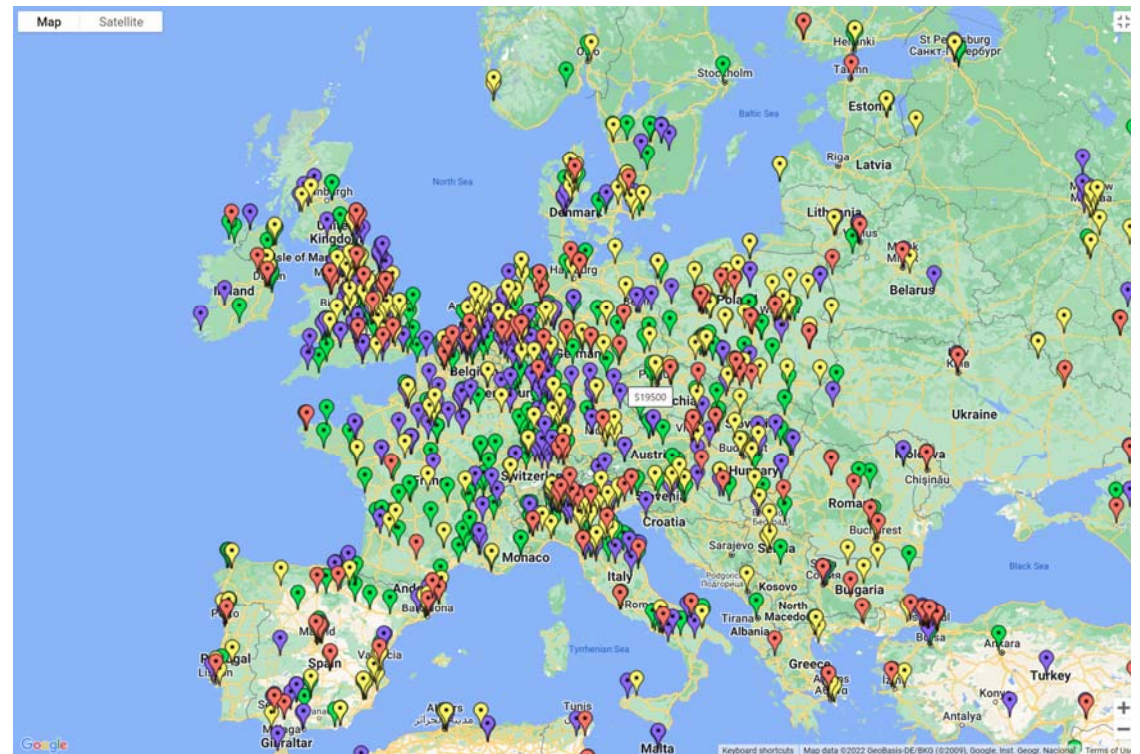
**x3 = 324A**

UV Curing Technologies...

*\*typical "simple" 8 x colour flexo press*

# Operating Cost Comparison – worked example

- Analysed subset of UV systems:
  - Continental Europe (excluding Russia)
  - Arc lamp systems
  - Narrow web –  $30\text{cm} \leq \text{Arc length} \leq 70\text{cm}$
  - Printing machinery  $\geq 5$  lamps per system (i.e. not converting machines)
  - Minimum of 12 months connection
- 1,610 machines
- 9,532 lamps
- 2.72m hours printing
- 3.13m hours standby
- 46% duty cycle average



# Operating Cost Comparison - worked example

## AeroLED (air cooled LED) vs E2C (air cooled arc lamp)

Assumptions	
Mains Voltage (V)	400V
Mains Frequency (Hz)	50Hz
Duty cycle	46%
Days per year	312
Shifts per day	1
Hours per shift	6
Energy cost	0.2 EUR

UV system specifications	E2C	AeroLED	Notes
Length	47cm	47cm	Length of lamp / LED array
Power	140W/cm	53W/cm	Input power of lamphead
Number of UV lamps	8	8	Number of UV lampheads on the press

Energy cost	E2C	AeroLED	Notes
System Annual Power	71,340kWh	20,066kWh	Estimated annual power of the system
GEW Chiller Annual Power	0,000kWh	0,000kWh	Estimated annual power of the chiller
UV System Energy cost	14,268 EUR	4,013 EUR	Estimated annual energy cost of system
GEW Chiller Energy cost	0 EUR	0 EUR	Estimated annual energy cost of chiller
<b>Total energy cost</b>	<b>14,268 EUR</b>	<b>4,013 EUR</b>	

Maintenance cost	E2C	AeroLED	Notes
Cost of lamps	3,248 EUR	0 EUR	Estimate of consumable lamps
Cost of hazardous waste	160 EUR	0 EUR	Estimate of lamp waste disposal
Other maintenance costs	5,200 EUR	1,400 EUR	Estimate of other costs of maintenance
<b>Total Maintenance cost</b>	<b>8,608 EUR</b>	<b>1,400 EUR</b>	<b>Total cost of Maintenance</b>

Please note assumptions are based on GEW's long experience manufacturing UV systems.

Total operating cost	E2C	AeroLED	Notes
<b>Total annual operating cost</b>	<b>22,876 EUR</b>	<b>5,413 EUR</b>	Estimated annual operating cost

Comparison	Notes	
<b>Annual savings from AeroLED</b>	<b>17,463 EUR</b>	Estimated annual savings of AeroLED system over arc system
<b>Energy saved annually</b>	<b>51,274kWh</b>	71.9% reduction in energy usage annually
<b>Carbon footprint reduction</b>	<b>22.61 Tonnes of CO<sub>2</sub></b>	Estimated carbon footprint reduction per annum



# Size of prize for “average EU converter”

- 4x 8 colour 410mm machines
- 2 shifts per day, 6 days per week
- 6 hours run time during a shift
- 46% uptime (remote monitoring average)

	1 shift 1 machine	2 shifts 1 machine	2 shifts 4 machines
Annual Savings from AeroLED	€17,463	€34,926	<b>€139,704</b>
Energy Saved Annually	51,274 kWh	102,548 kWh	<b>410,192 kWh</b>
CO <sub>2</sub> Reduction	22.6 tonnes	45.2 tonnes	<b>180.8 tonnes</b>

# Sensitivity to energy price

- **Every 5c/kWh → €20,400 per year**



# LED Adoption in Europe

War in Ukraine → Energy Crisis → Soaring Electricity Prices → Adoption of LED curing



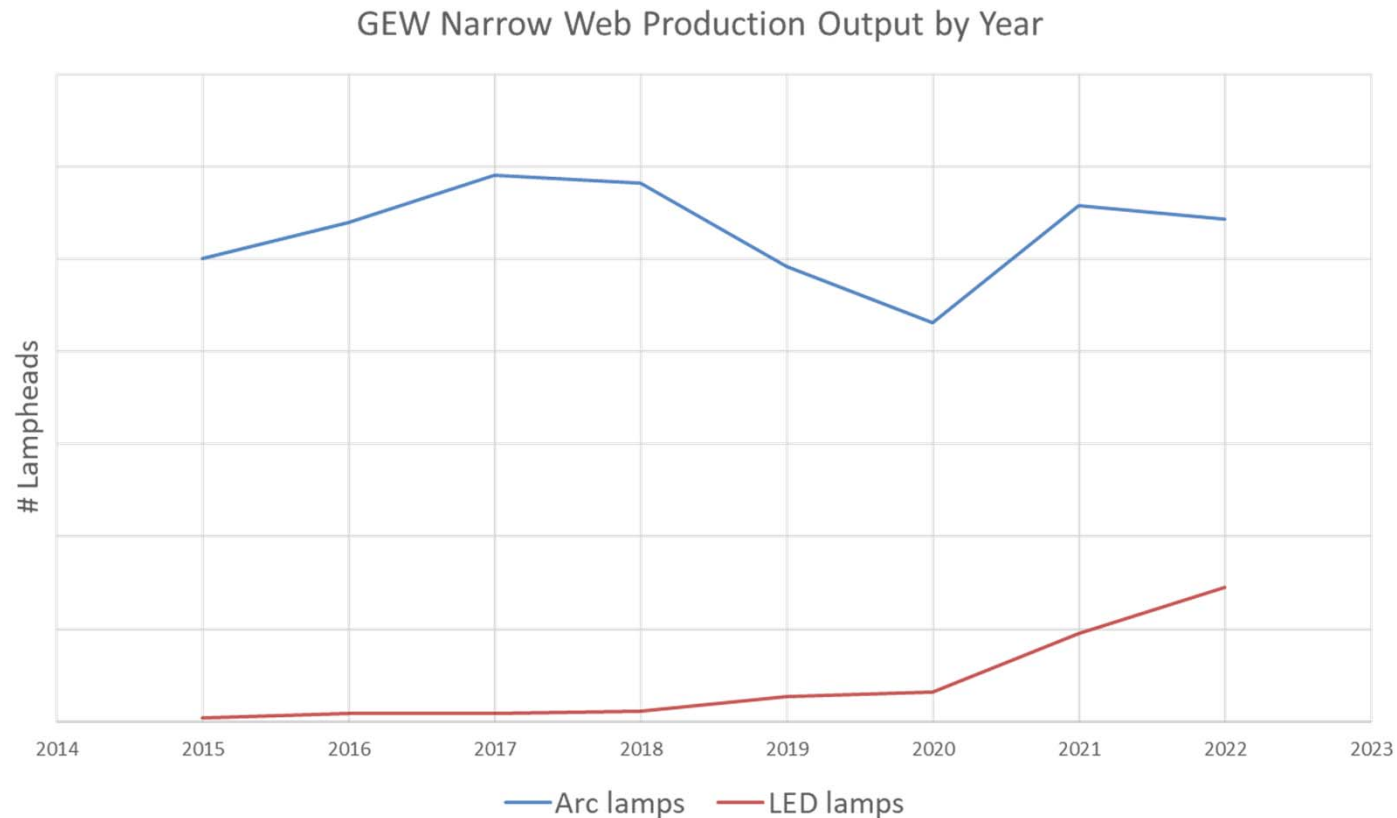
1-year forward baseload power (€ per Mwh)



Source: Refinitiv  
© FT

# LED Adoption at GEW

GEW LED installations have roughly doubled each year since 2018



Approximately 5% of GEW installed base in Europe is now LED

# Size of the Prize

- **GEW NW installations in Europe in last 15 years**

Country  
Multiple selecti... ▾

State  
All ▾

City  
All ▾

End User Group  
All ▾

End User Name  
All ▾

System type  
All ▾

PSU Type  
All ▾

Arc type  
All ▾

Serial No.  
All ▾

**Number of Installed Systems**  
5,857

**Total Number of Lampheads**  
26,009

01/01/2007
18/11/2022

List of Systems by Customer Group

Serial No.	End User Name	Group	City	State	Press Type	System type	PSU Type	LHD QTY	Indi
MACHINE									
S16897					GALLU EM510	E2C ArcLED	RLT	2	142
S16899					LOMBARDI SYNCHROLINE	E2C	RLT	6	142
S16902					LOMBARDI FLEXOLINE	E2C	RLT	6	142
S16908					MA P5/P7 17	E2C	RLT	6	142
S16926					AUTOBOND	E2C	RLT	1	142
S16933					OMET X1 370	E2C	RLT	4	142
S16936					GALLU LABELMASTER 440	E2C	RLT	4	143
S16961					BOBST M5 430 EXCELLENCE	E2C	RLT	10	143
S16981					MA 2200 7 OLD	E2C	RLT	1	143
S16984					OMET X1 370	E2C	RLT	8	143
S16985					OMET X6 430	E2C ArcLED	RLT	11	143
S16987					GALLU LABELMASTER 440	E2C	RLT	4	143
S16988					ARSOM EM280	E2C	RLT	7	143
S16989					ARSOM EM280	E2C	RLT	3	143
S17007					MPS EF4 16	E2C	RLT	14	143
S17008					MA P5/P7 10	E2C	RLT	8	143
S17016					BOBST M5 430 EXCELLENCE	E2C	RLT	5	143
<b>Total</b>								<b>26,140</b>	

Number of Systems by Arc Type

Arc type	Systems QTY	LHD QTY
Arc	5,614	24,843
AER	1	119
BAS	1	
E2C	2,974	14,022
E4C	36	204
<b>Total</b>	<b>5,897</b>	<b>26,140</b>

List of Companies by Group

Group	End User Name	Contact No.
		C42710
		C42418
		C51226
		C28383
		C30767
		C56942
		C46074
		C46069
		C46051
		C46051
		C46046
		C46068
		C46053
		C46071
		C46047
		C46055
		C18154
		C51552
		C32947
		C24454

# Size of the Prize

- **1 lamp conversion saves >12,000kWh per year**
- Converting all GEW lamps to LED would save per year:
  - > 300,000,000 kWh
    - Enough electricity for 115,000 UK homes
  - >140,000 tonnes of CO2
  - >€100,000,000 @ 0.2€/kWh
- That is just the GEW installed base... just narrow web... just Europe...

# GEW Online energy saving calculator

[www.gewuv.com/roi\\_calculator](http://www.gewuv.com/roi_calculator)

GEW have launched an accurate online energy saving calculator: Quick, easy calculation of estimated savings when switching to LED

**Find out how much you could save**

### Country & currency

Country:

Currency: **USD \$**

Suggested energy price for your country: **0.35**

REQUIRED: enter your energy price (kWh)\*:

### System parameters

Number of lampheads\*:

Lamp Length\*:

Arc Power:

LED system for comparison\*:

### Operating parameters

Total days of operation in a 365 day year\*:

Average number of shifts per day\*:

Average hours per shift\*:

What is your duty cycle?\*:

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### Arc / AeroLED Annual Operating Cost Comparison Table

PARAMETERS	SAVINGS ON AEROLED UPGRADE	MEASUREMENT
Energy use	160,400	kWh
Operating cost	50,600	USD \$
CO2 usage	54	Tonnes

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If you wish to receive your own personalised Operating Cost Comparison, then click the button at the bottom of the page to contact our team:

[Get your Operating Cost Comparison](#)

# Return on investment:

## RETROFIT YOUR PRESS with **UV LED** in less than one day

IF YOU HAVE  
any of the  
list below

You will need these  
AeroLED system components:

	AeroLED Lamphead	RHINO/RLT & HMI	Fan & Ducting	Shielding	
E2C & RHINO/RLT system	✓	✗	✗	✗	→ 9,500
E2C & eBrick system	✓	✓	✗	✗	→ 6,500
Any other system	✓	✓	✓	✓	→ 10,000



**The fastest, most affordable route  
to LED printing.**





Air-cooled UV Curing System

**Robert Rae**

Managing Director – Sales

**UV solutions** for demanding  
printing applications

