The size of the prize for UV LED

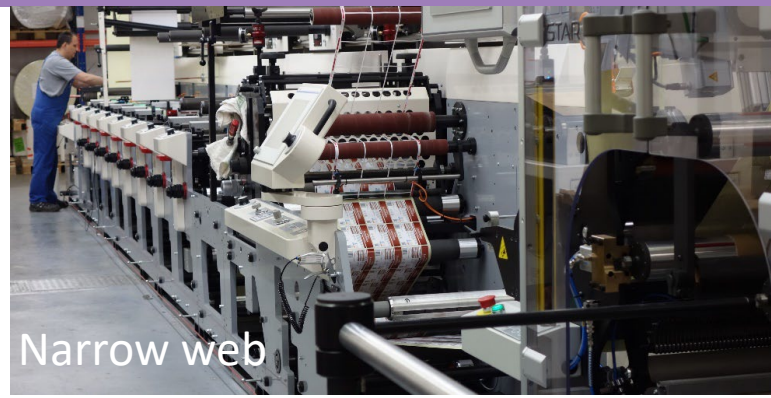
Robert Rae Managing Director – Sales

UV solutions for demanding printing applications

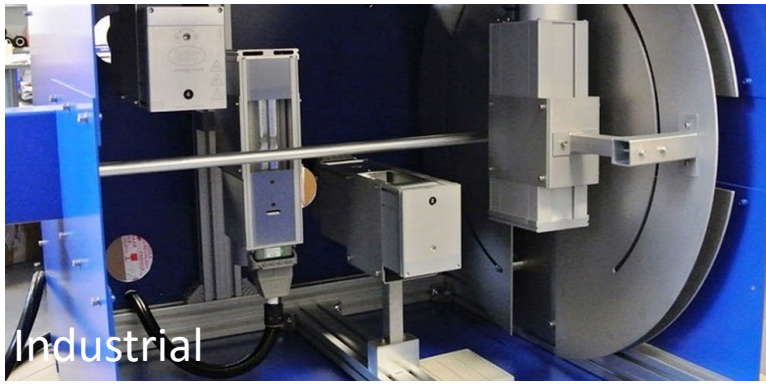
...engineering UV

GEW … engineering UV


Sheetfed


Narrow web


Wide web


Industrial

Founded 1991

Graphic Arts Only

>£60m turnover

Offices: UK, DE, USA

Over 22,000 UV systems installed

100% family owned

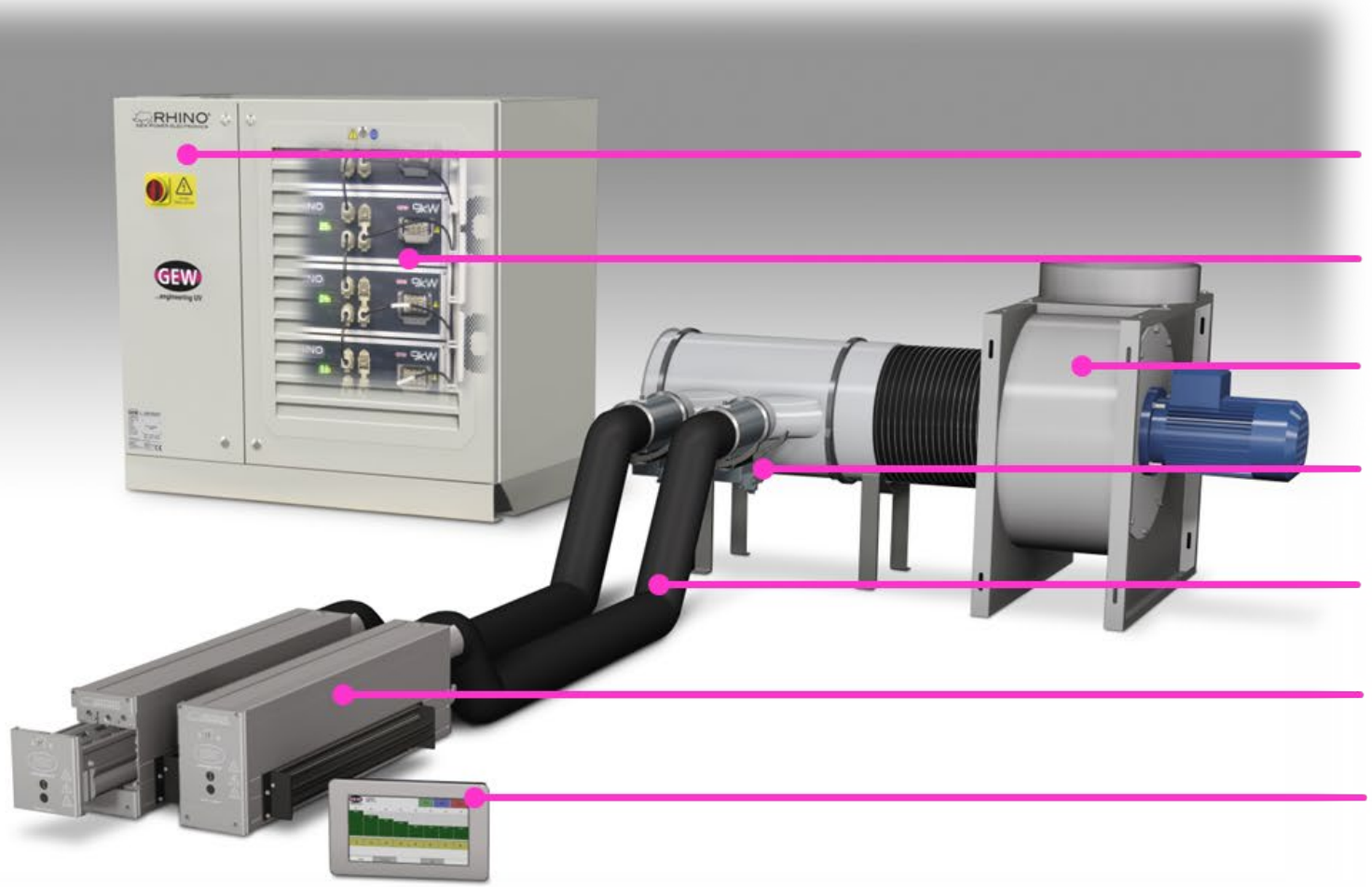
3 factories: >18,000m²

>6000 UV units per year


Special applications


Digital

Typical UV system



- Power distribution
- Power supplies
- Exhaust fan/chiller
- Autodamper valve(s)
- Exhaust ducting/hoses
- UV lamphead(s)
- Touch screen control
- Cables
- Mounting & shielding

UV & UV LED Products

water-cooled

lamphead style

cassette style

Leo LED®

air-cooled

cassette style

Aero LED®

UV Curing Technologies…

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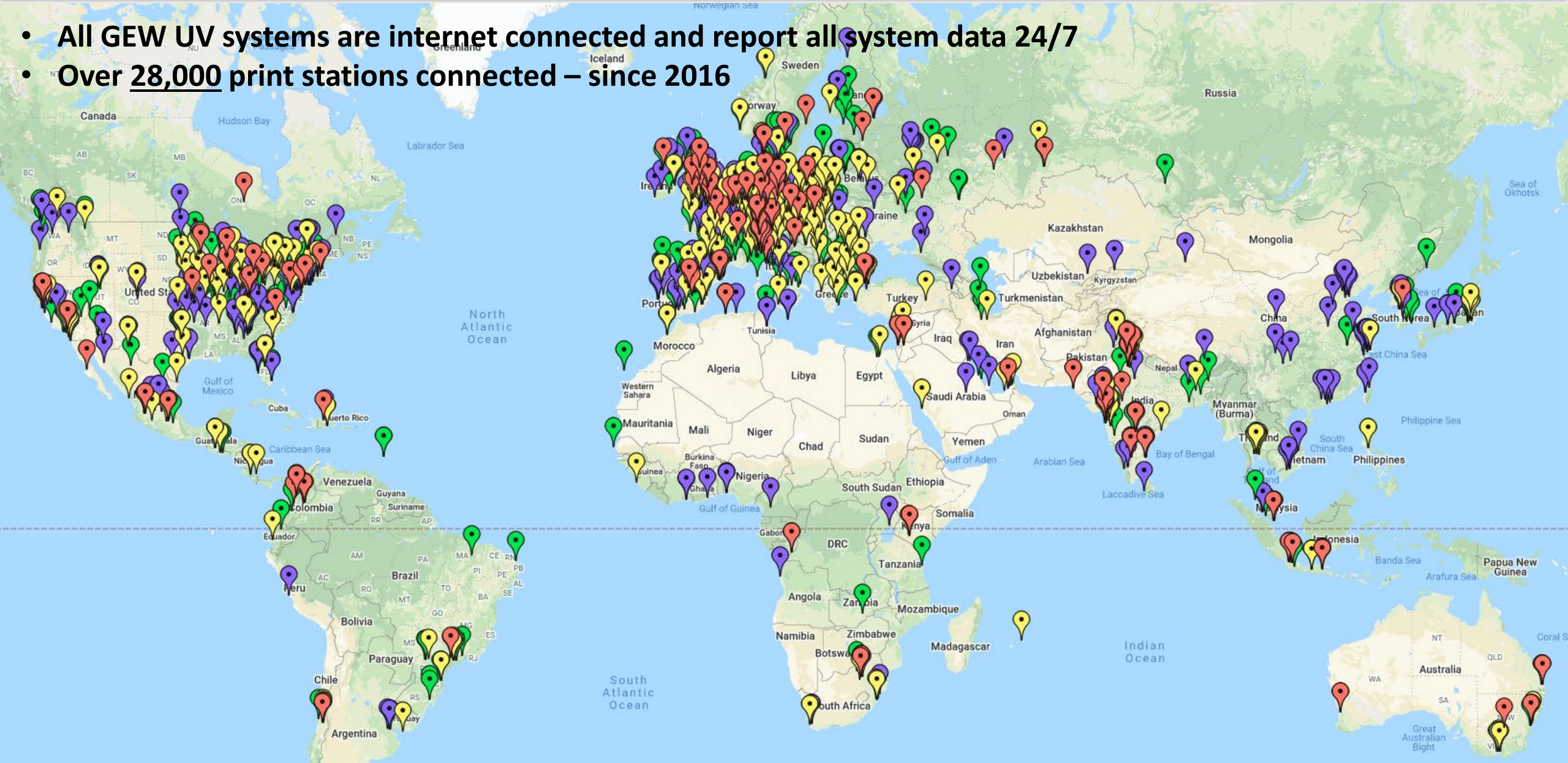
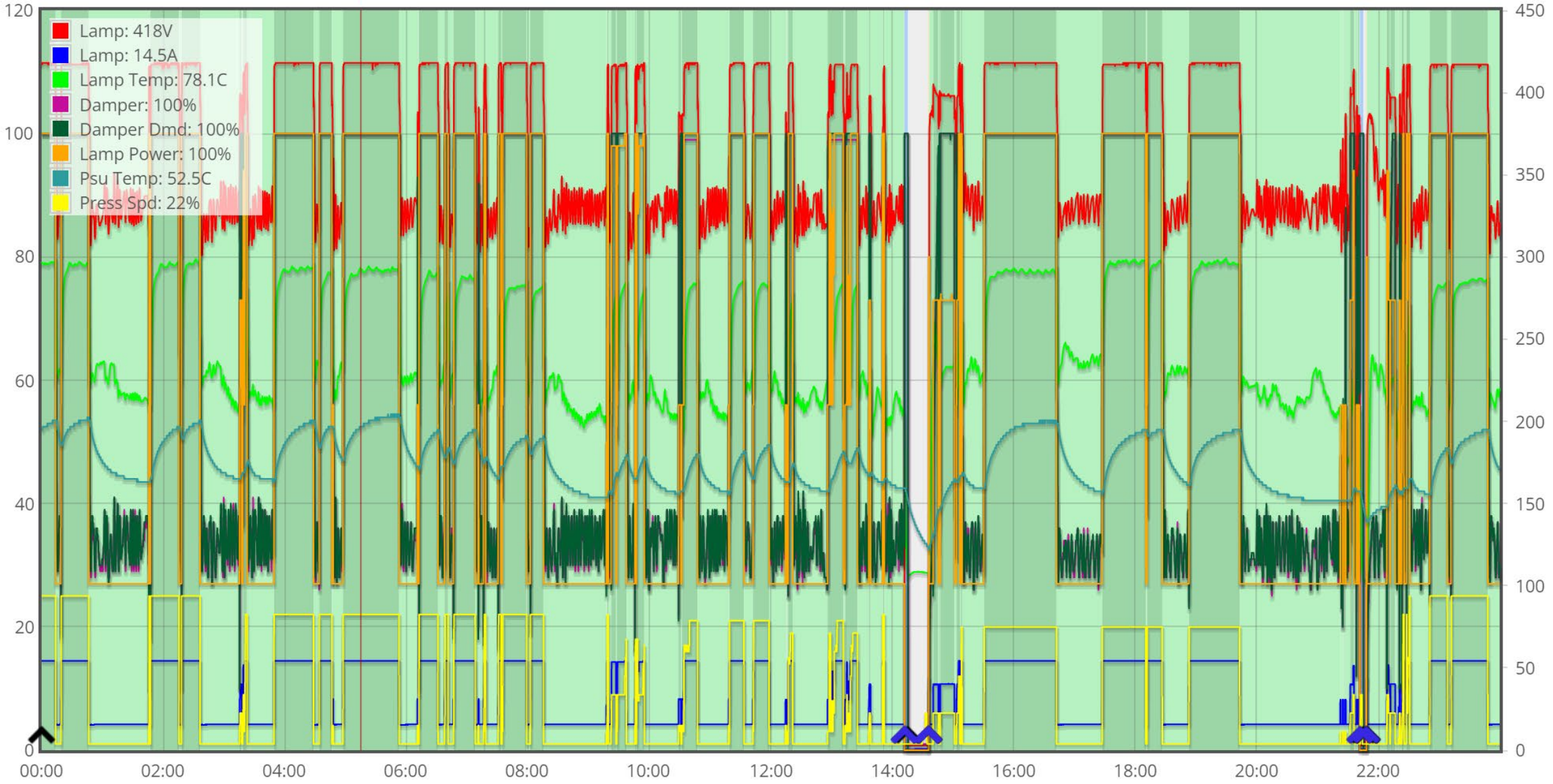
GEW Remote Monitoring System

- 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!

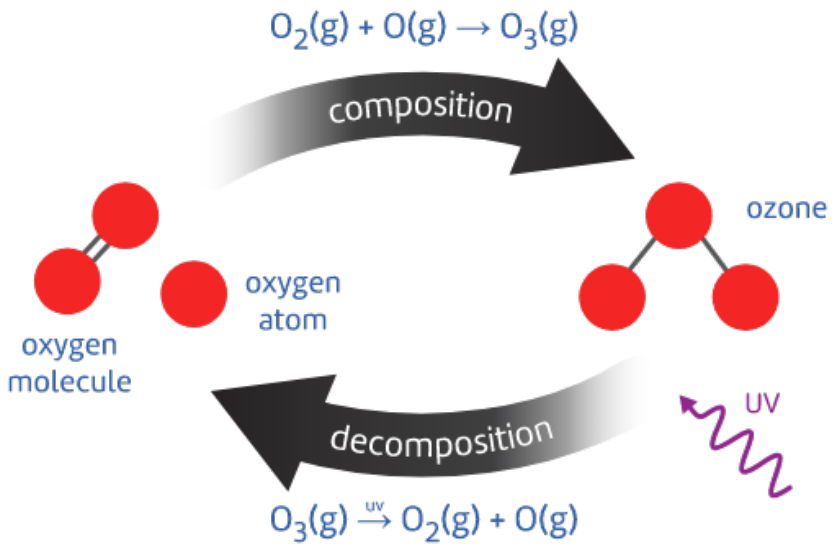
No Ozone

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

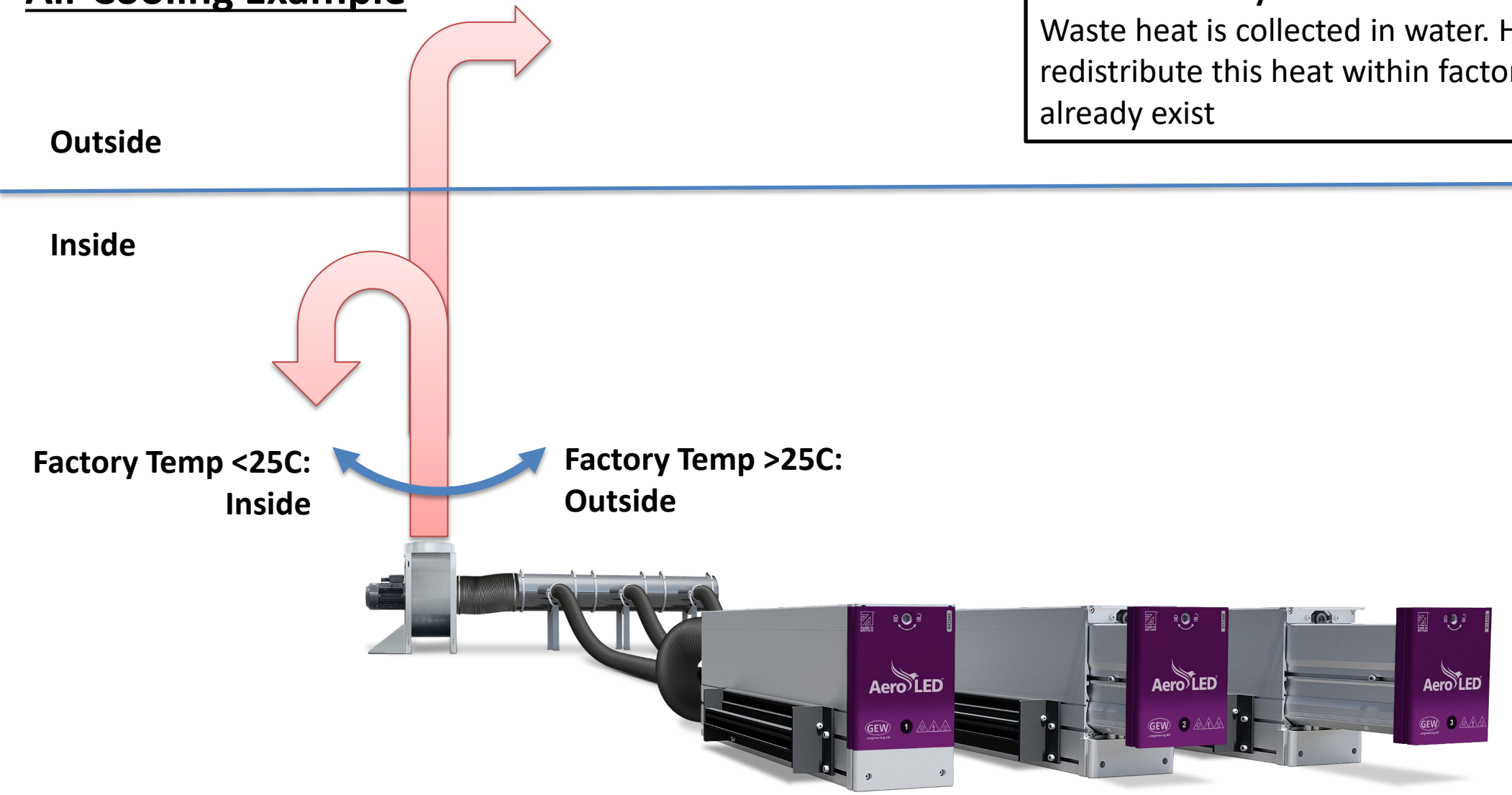
- Main benefit - LED systems do not require ducting out of building
- LED diodes ~ 50% efficiency
- Typical 8 lamp 45cm LED → 12.6kW heat into press room
- Two shift operation → 60-70kWh per day
  - Enough to heat 2 average UK homes @ 33kWh per day



- Managing waste heat is a big opportunity with LED!

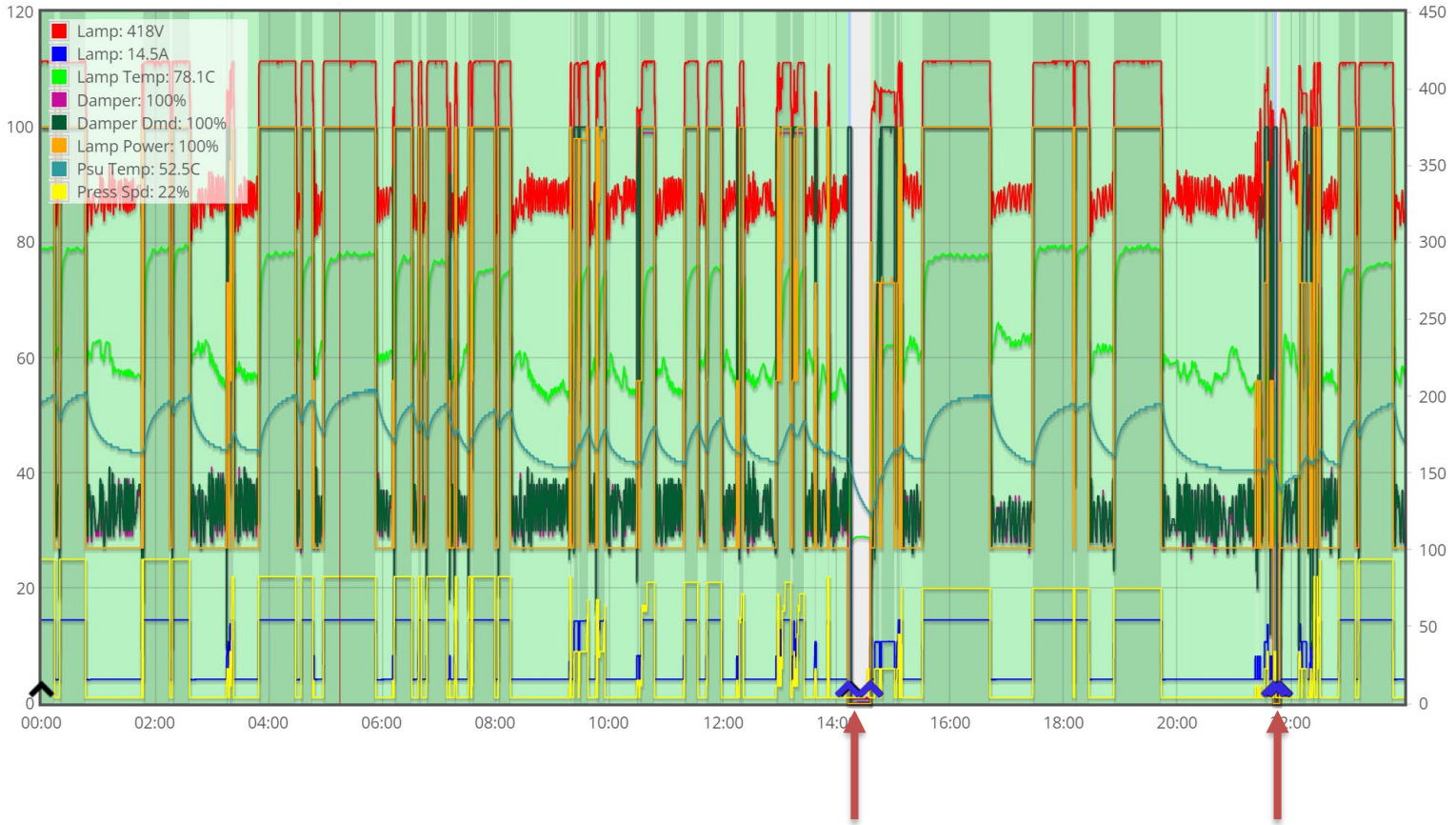
Waste Heat Management

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

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THE BIG ONE: Energy Savings

1. **Installed Power**
2. **Energy Consumption**

Free up mains capacity

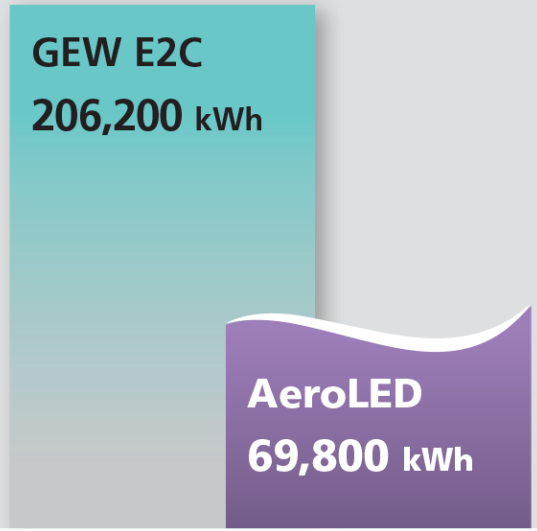
Electrical Requirement†

GEW E2C	65 kVA
AeroLED	26 kVA

60% SAVING

Cut your energy costs

Energy Consumption†



>65% SAVING

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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)

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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*

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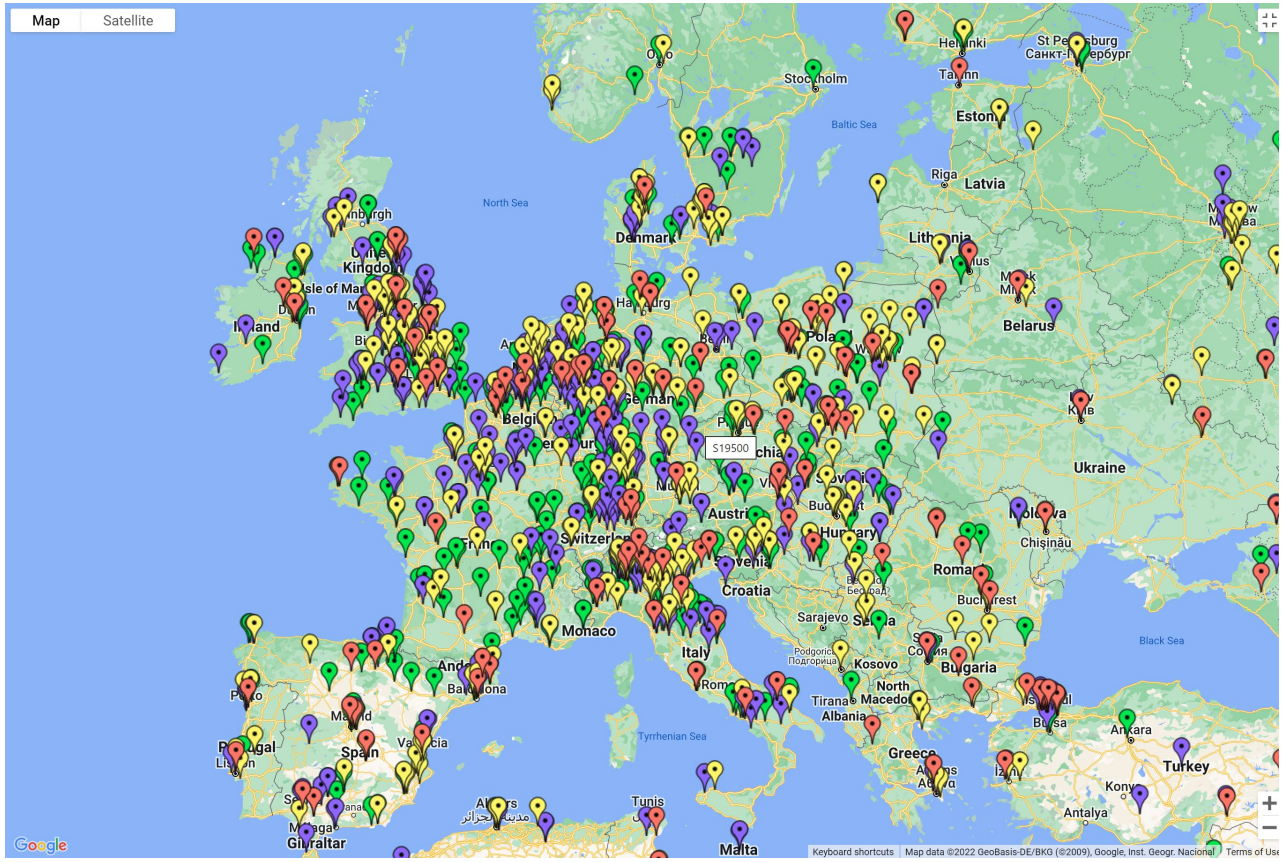
Operating Cost Comparison – worked example

- GEW analysed subset of UV systems:
  - Continental Europe (excluding Russia)
  - Arc lamp systems
  - Narrow web – 30cm ≤ Arc length ≤ 70cm
  - Printing machinery ≥ 5 lamps per system (i.e. not converting machines)
  - Minimum of 12 months connection
- We found:
- 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
Total energy cost	**14,268 EUR**	**4,013 EUR**	

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
Total Maintenance cost	**8,608 EUR**	**1,400 EUR**	**Total cost of Maintenance**

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

Total operating cost	E2C	AeroLED	Notes
Total annual operating cost	22,876 EUR	5,413 EUR	Estimated annual operating cost

Comparison		Notes
Annual savings from AeroLED	**17,463 EUR**	Estimated annual savings of AeroLED system over arc system
Energy saved annually	**51,274kWh**	71.9% reduction in energy usage annually
Carbon footprint reduction	**22.61 Tonnes of CO_2**	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	**€139,704**
Energy Saved Annually	51,274 kWh	102,548 kWh	**410,192 kWh**
CO_2 Reduction	22.6 tonnes	45.2 tonnes	**180.8 tonnes**

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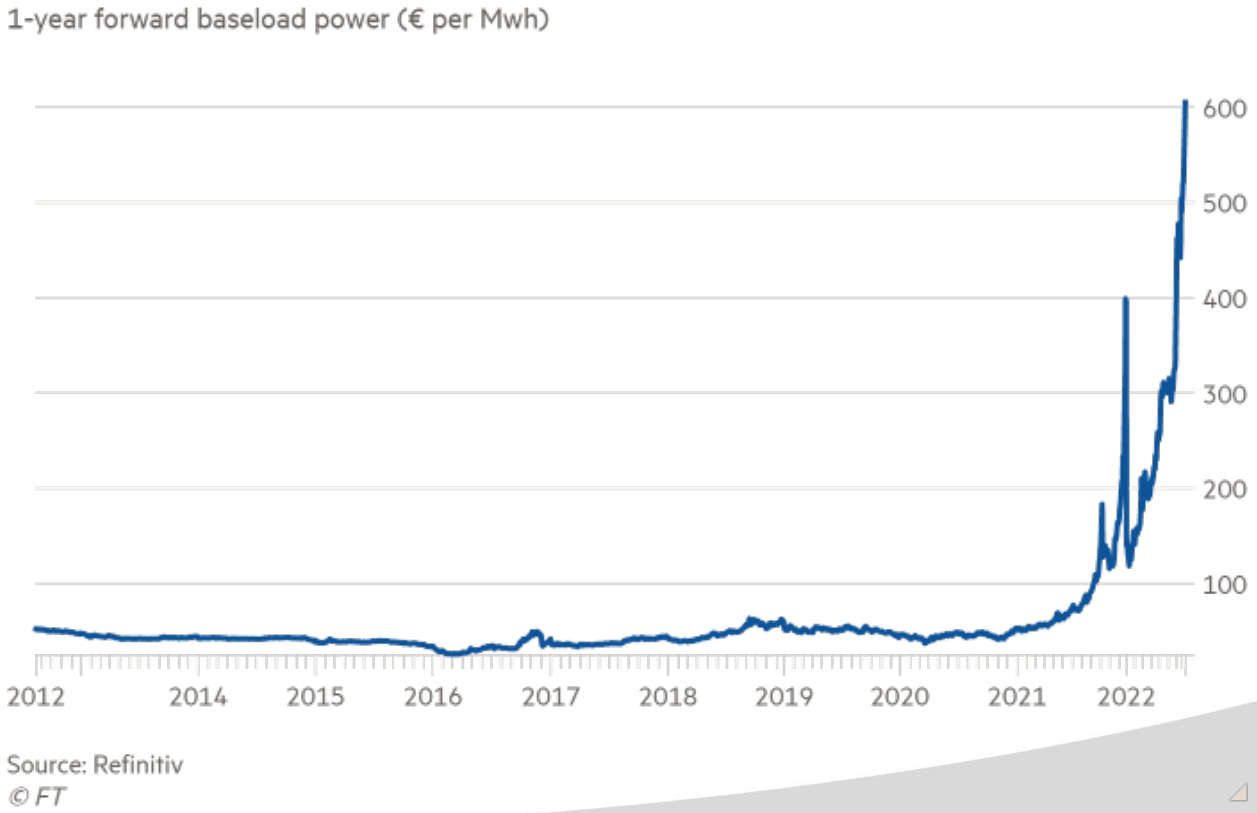
Sensitivity to energy price

- **Every 5c/kWh → €20,400 per year**

LED Adoption in Europe

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



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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 CO_2
  - >€100,000,000 @ 0.2€/kWh

- That is just the GEW installed base… just narrow web… just Europe…

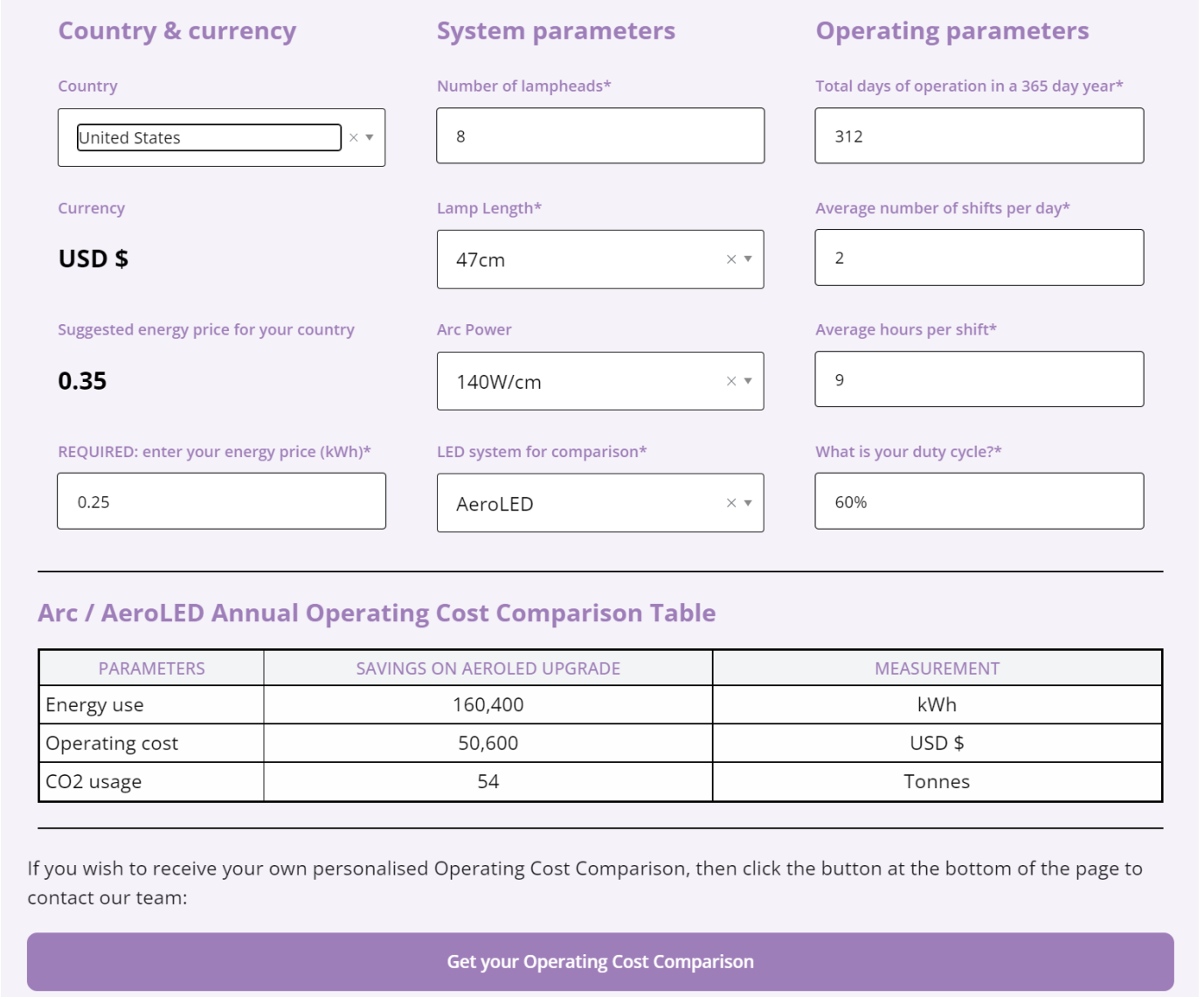
...engineering UV

GEW Online energy saving calculator

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



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	✔	✘	✘	✘
E2C & eBrick system	✔	✔	✘	✘
Any other system	✔	✔	✔	✔

AeroLED®
Air-cooling UV Curing System

The fastest, most affordable route to LED printing.

AeroLED®

Air-cooled UV Curing System

Robert Rae Managing Director – Sales

UV solutions for demanding
printing applications

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