

Where Vertical Farming & Plant Science Meet

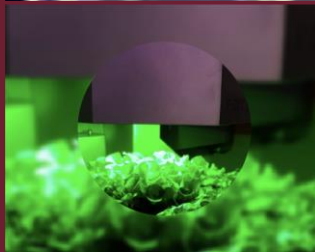
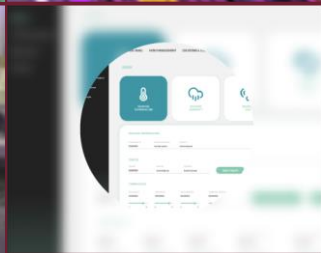
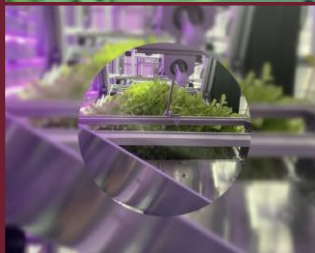
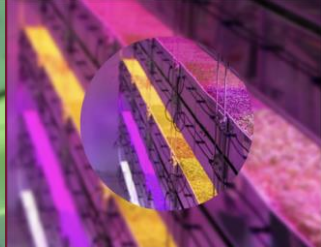
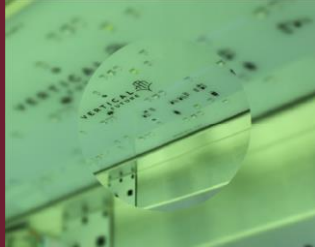




Overview

Vertical Future: a technology driven Vertical Farming & Research Company

- Founded in 2016
- Design, build, and license market leading hardware and software solutions
- Successful R&D function
- Highly-experienced team of 40 staff

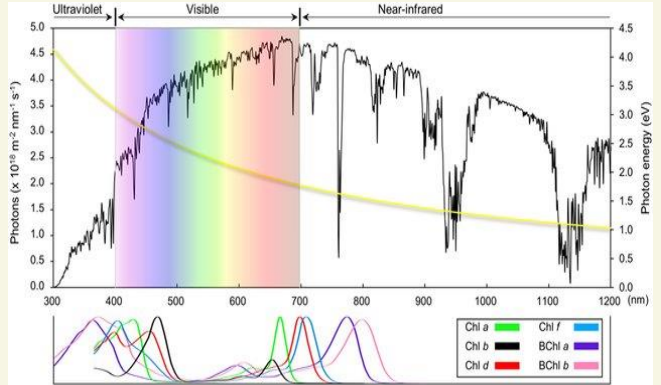




Plants & the Solar Spectrum

Photosynthesis & visible light

- Photosynthesis uses visible light
- Chlorophyll a & b main receptors
- Blue light has more energy than red
- Much green light reflected or transmitted
- Light splits water \rightarrow O₂



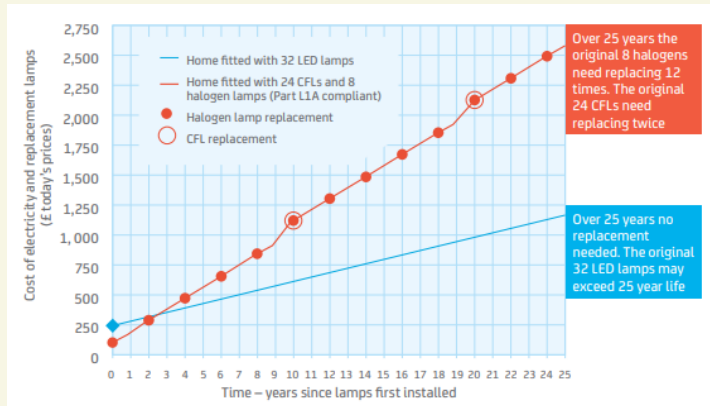
Cardona et al., 2018



The Lighting Revolution

LEDs and Moore's Law

- LEDs becoming very cheap
- Spectrum is tuneable
- But what do plants want?



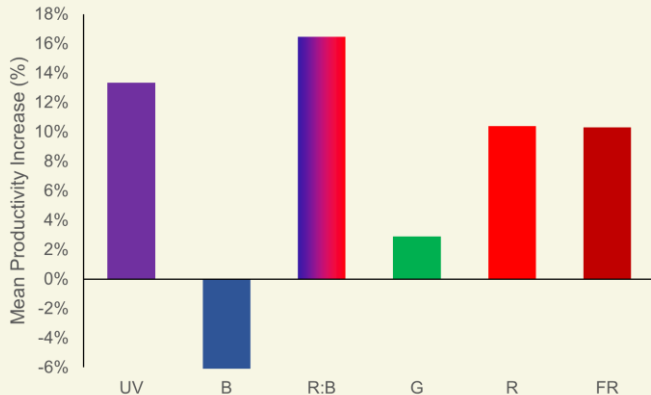
Source: Energy Saving Trust



Tuning the LED Recipe

Yield affected by spectrum

- Not all interventions are equally valuable
- Trade-off between cost and impact
- Trade off between yield and quality



Source: Multiple Published Studies

Tuning the LED recipe

LEDs and genotypes



	g/seed	Fe (mg/kg)	Zn (mg/kg)	Mn (mg/kg)
Giant Winter	2.04	6.95	4.91	14.5
Matador	1.11	4.63	5.93	15.8
Amador	1.55	5.96	5.45	15.7
Viroflay	1.92	5.44	4.81	13.2



Summary

Plants use visible spectrum ++ for photosynthesis
Photomorphogenesis vs quality
Little understanding of the best light recipes
Trade off between yield and quality
More opportunities post harvest

Photosynthesis

How does CEA
compare to
sunlight?

01

Environment

What is
the optimal
tuning?

02

Yield & Quality

How do we
balance our
needs?

03

Also...

Pre seeding &
post harvest;
GxE

04



Our future is looking up



Thank you for your time and attention.

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