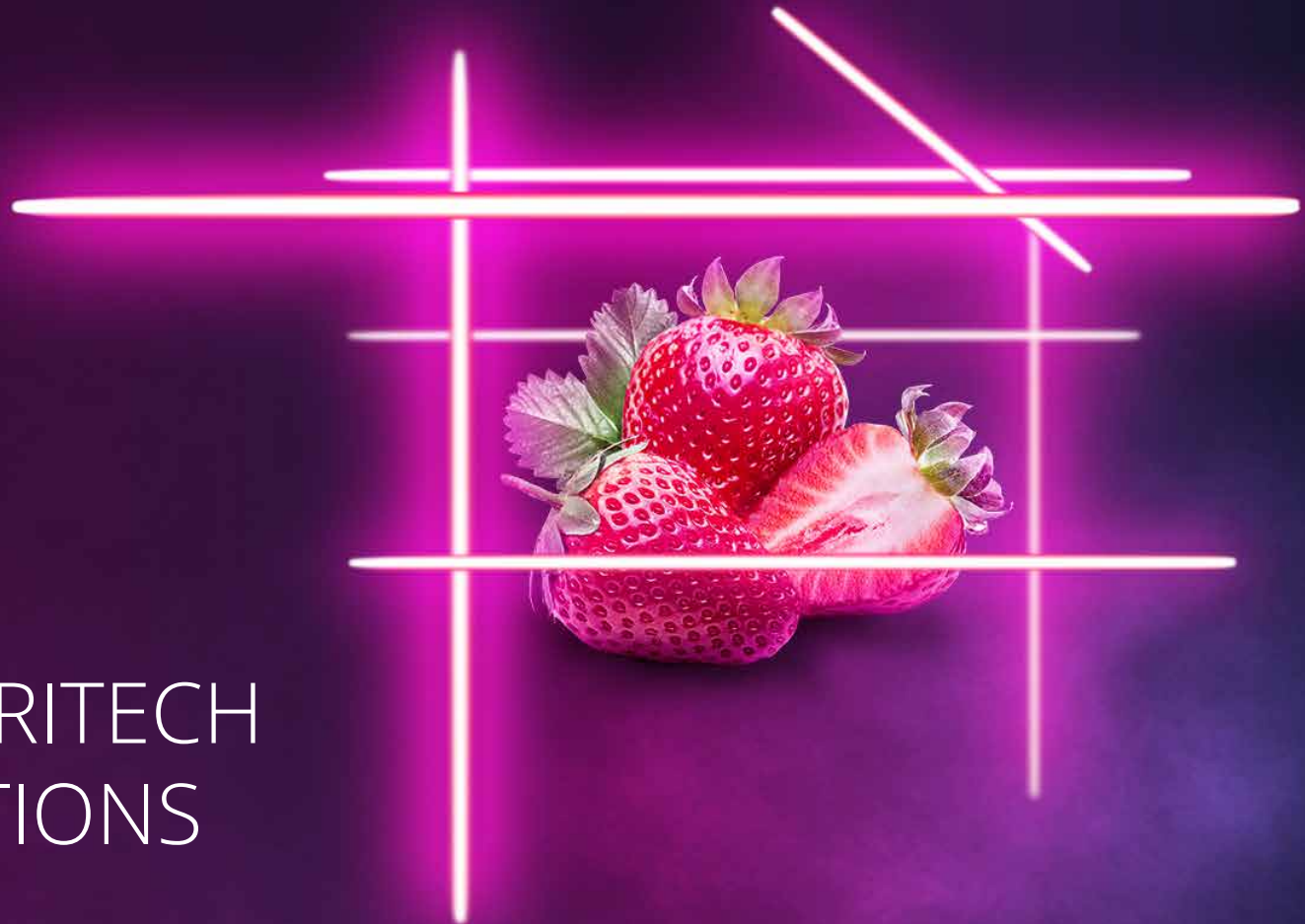


**TUNGSRAM™**



# TUNGSRAM AGRITECH INDOOR SOLUTIONS

Tailored to your needs

# Tungram has a 125-year-long track record and unique assets and capabilities

Over 125 years  
of reliable operations

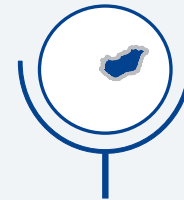
# 1896

World-class innovation  
heritage



5 plants for advanced  
lighting technologies  
and components

**4000** employees in  
Hungary and globally



Established sales  
network in

**100+** countries:  
**95+%** export



20+ Tungram subsidiaries  
globally offers access  
for Hungarian SME's



Ceramics, metal, glass,  
plastics and tooling  
capabilities

# Tungram Agritech - The Green Evolution

We are in the middle of a global change, and food security has been and will continue to be a key priority. As an innovative company, Tungram Agritech is convinced that the key to success is the application of new technologies. With 120 years of knowledge in the field of lighting techniques, we are focusing specifically on greenhouse lighting and vertical farms. Our aim is to offer world-class quality LED lighting and smart-solutions to growers and farmers for use in their precision indoor farming operations.

## WHAT WE OFFER



### Customized LED solutions

- Light tailored to Customer needs
- Well-designed lighting plan
- Simple installation



### High quality from Europe

- Compliance with EU standards
- Outstanding product service
- Long term warranty



### Reliability and expertise

- Highest quality components
- Qualified engineers
- Crop Advisors

## 8 reasons to choose Tungram Agritech LED solutions






Several important factors need to be considered when selecting the lighting system for your crop. We are highlighting only the main advantages of our LED products, but our experts are always available to explain and tell you more.

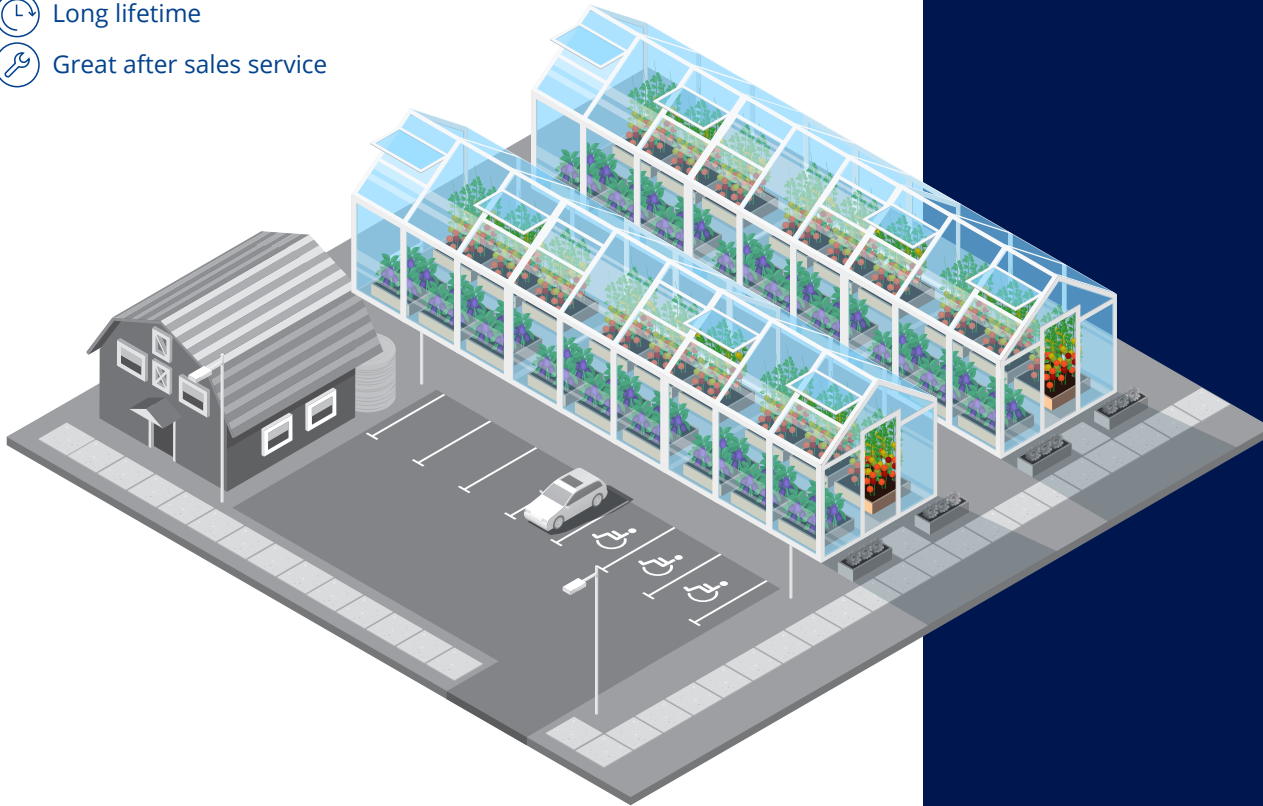
- ⬆ High luminous efficiency
- ⊕ Unlimited spectral variations
- ⊕ Controllable light intensity
- ⚡ Energy efficiency
- ⌚ Long lifetime
- 🌀 Effective heat management
- ☀ Uniform illumination
- 💎 Durability





# Greenhouse Solutions by Tungram Agritech

-  Outstanding light distribution
-  Low energy cost
-  Increased profit
-  Long lifetime
-  Great after sales service

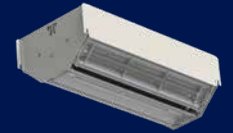


Tungram Agritech products are designed for installations in new or already established greenhouses.

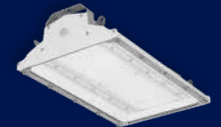
FLexiGrow Toplight  
Single/Double/  
Triple



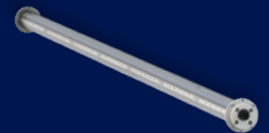
LEDfan Toplight



Toplight  
Research



Interlight





GREENHOUSE  
LED LIGHTING

## FLEXIGROW TOPLIGHT SINGLE/DOUBLE/ TRIPLE MODULE

The Tungram Linear Toplight Double module with its outstanding PPF reaching up to 3580  $\mu\text{mol/s}$ , and 4.0  $\mu\text{mol/J}$  efficacy is the ideal choice for the replacement of the traditional 1000W High Pressure Sodium lamp. Similarity in the mounting and cabling options allow smooth transition from the existing HPS lighting system into LED based solution offered by Tungram.



High Efficiency, high output & investment optimized versions



Flexible spectrums, special wide beam solution



Up to 55% energy saving





GREENHOUSE  
LED LIGHTING

## LED FAN TOPLIGHT

The unique design of LEDFan uses an innovative solution to provide better heat management solution for the greenhouse. Besides the energy saving on lighting and heating costs, it increases plant growth and yield by lowering humidity, which reduces CO<sub>2</sub> loss, nutrient deficiencies and the risk of plant diseases.



Wide spectrum with 2870  $\mu\text{mol/s}$



Reduced heating cost (up to 15%)



Better climate, lower humidity<sup>6</sup>







GREENHOUSE  
LED LIGHTING

# TOPLIGHT RESEARCH MODULE

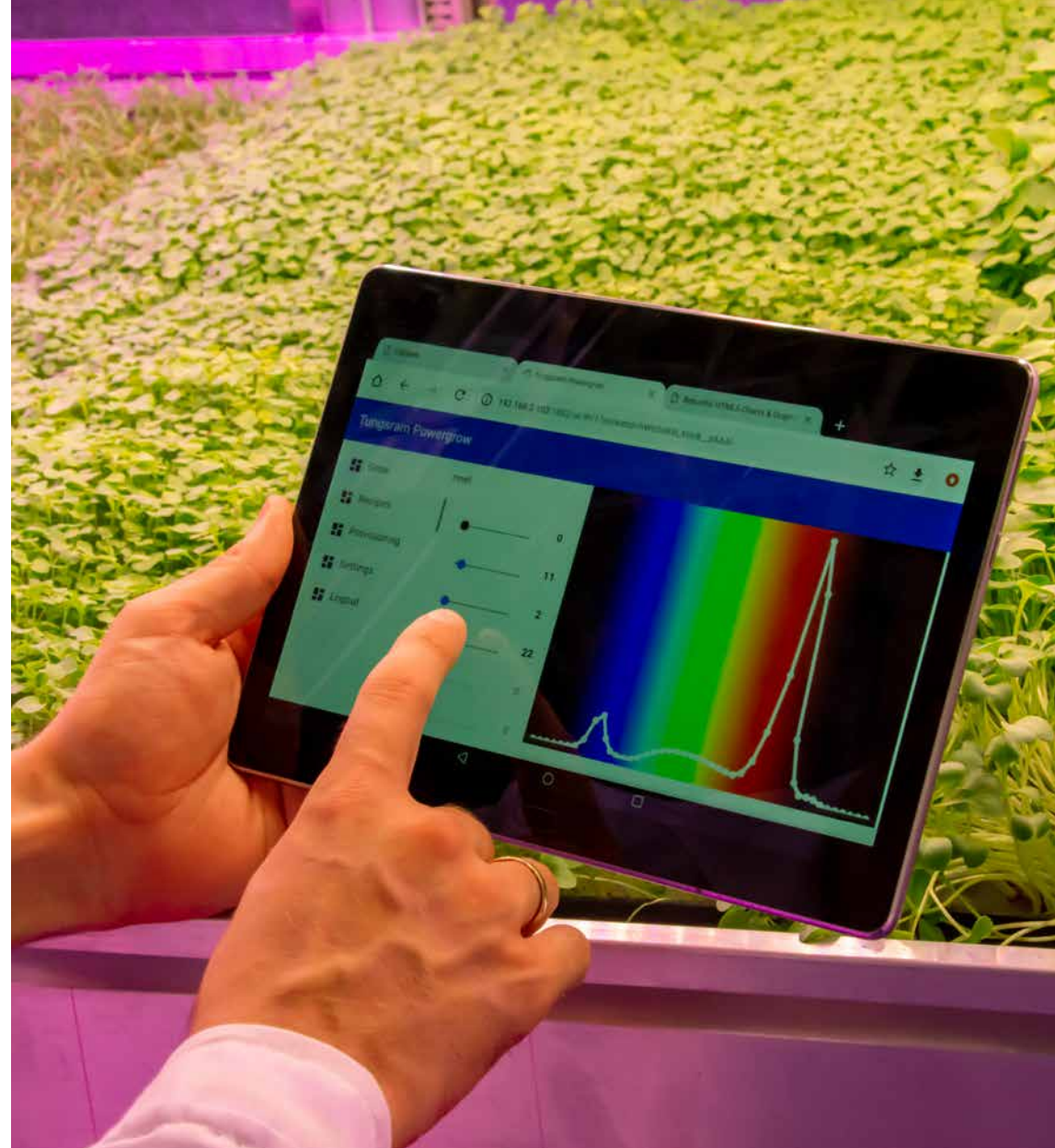
The Research module of the Tungram Agritech Toplight Series allows users to experiment with different mix of wavelengths and light intensity to define and finetune the most optimal light for given phenophases of all kinds of autotroph organisms to achieve the targeted quantity and quality of primary and secondary metabolites.



Uniform light distribution



Wireless control







GREENHOUSE  
LED LIGHTING

## INTERLIGHT

The Tungram Interlight LED solutions serve as a supplementary light source in greenhouses to light the lower, shadowed parts of the canopy. Growers can choose from PPF 141-357  $\mu\text{mol/s}$  modules, supplying the high wired plants' entire surface with proper amount of light to maximize yields and ultimately improve taste and nutritional value of horticultural produces.



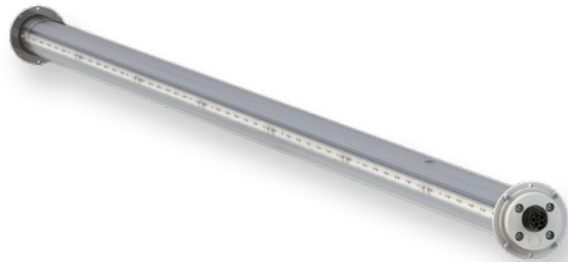
Extremely high system efficacy up to 3,42  $\mu\text{mol/J}$








Low energy cost



Ease of installation and maintenance



# Vertical Farm Solutions by Tungfram Agritech

-  Stable production, high quality crops
-  Long lifetime
-  High energy efficiency
-  Controllable growing system
-  No maintenance cost



Tungfram Agritech products are designed for precision indoor vertical farming.

Vertical Farm  
Lightbar



Growth  
Cabinet





VERTICAL FARM

# VERTICAL FARM LIGHTBAR OPTIONS

Fix-spectrum lightbar

Tungram's LED lightbar solution was designed for indoor multilayer growing facilities. The highly efficient modular system is customizable to provide the most suitable amount of photosynthetically active photons and light uniformity to ensure the best results.



Up to 3.5  $\mu\text{mol}/\text{J}$



Customizable spectrum



Low heat radiation, remote driver



Super lightweight



Easy to mount







VERTICAL FARM

## VERTICAL FARM LIGHTBAR OPTIONS

4 channel production and  
6-8 channel research lightbar

Beyond the fix-spectrum LED modular lightbars, Tungram offers the 4-channel production (VFP) and the 6-8 channel research (VFR) modules within its Vertical Farming systems. These controllable units allow users to mix the wavelengths within the 400-750nm range, and dim each channel 0-100% to set the most versatile spectral variants and PPF density. The software can operate the lightbars remotely, which enables growers or researchers to manage the growing recipe in real time or via pre-defined programs and timed dimming to provide the most optimal light conditions in the different growth phases of the crops.



Controllable spectrum and light intensity



High system efficacy  $>3 \mu\text{mol/J}$



Wireless control



Data collection & analysis





VERTICAL FARM

## GROWTH CABINET

Tungram Agritech Growth Cabinet is a hydroponic based, sophisticated unit which provides you with the freshest microgreens, leafy greens, herbs, fruits and more all year round.



LED grow lights



Hydroponic system



Temperature control



Wireless control



Slideable trays



Ventilation



# Tungfram Agritech Remote Monitoring Systems

Tungfram Agritech's IT solution monitors and remotely controls the environment and the daily operation of indoor farms. The development includes remote management solutions on Android, iOS and Windows platforms to monitor and verify the functioning of the control equipments through a web interface. In addition to this, we are working to develop AI and machine learning solutions using the data currently collected by the sensors, which are monitoring specific conditions related to plants and their environment.



Maintain Ideal Micro-Climat



Enhance Irrigation and Fertilization Process



Control Infection & Avoid Disease



Prevent thefts & Increase Security



Optimize Yield



Enhance Chemical & Resource-Use Efficiency



Minimize manual Intervention



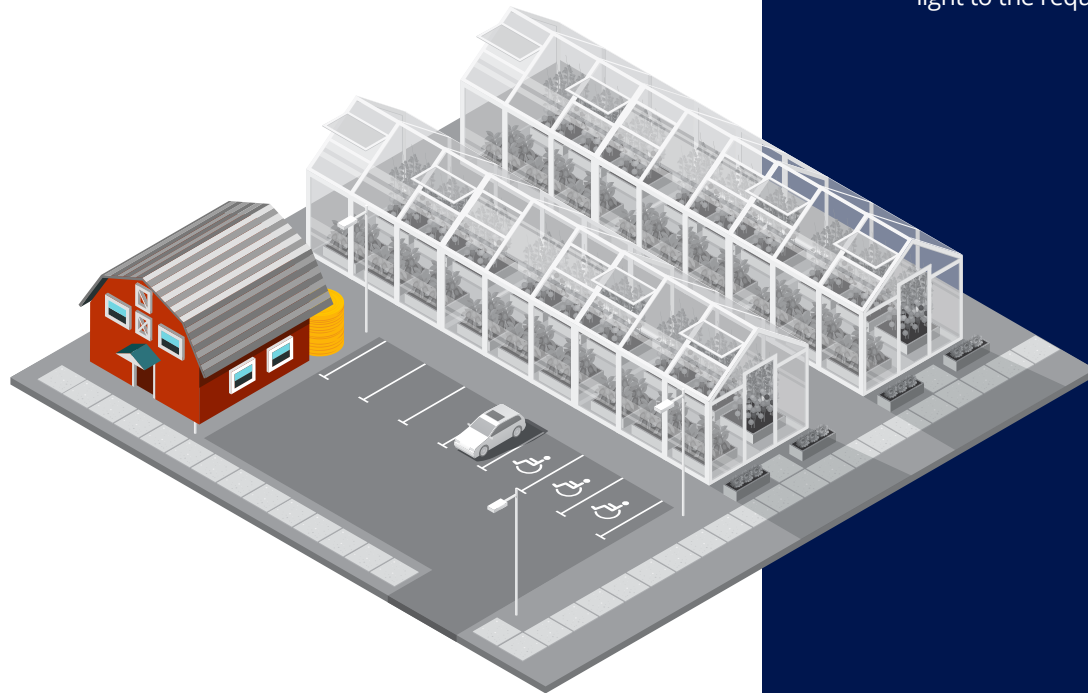


# Indoor Lighting Solutions by Tungfram

**Directional** - With LED's you can direct the light where you want it, thus no light is wasted. The directional nature of their output makes LEDs ideal for applications such as task lighting and recessed downlights.

**Energy efficient** - LEDs generally consume very low amounts of power. Depending on the existing lights and the particular LEDs installed, the savings could be more than 90%.

**Intelligence** - It can reduce our impact on the environment, make our surroundings more secure or boost comfort and productivity of any indoor space. Pairing Tungfram LED lighting with intelligent sensors and controls can help build smarter, more sustainable solutions.



## Office, Social and Commuting Areas

Our smart systems can help eliminating unnecessary lighting and costs in less used areas, while projecting the optimal amount and quality of light to the required surfaces.

Edgelit Panel



Torofi



Tudolio



IP54 Downlight



Integrated Bulkhead



Fireproof Downlight



Emergency Kit

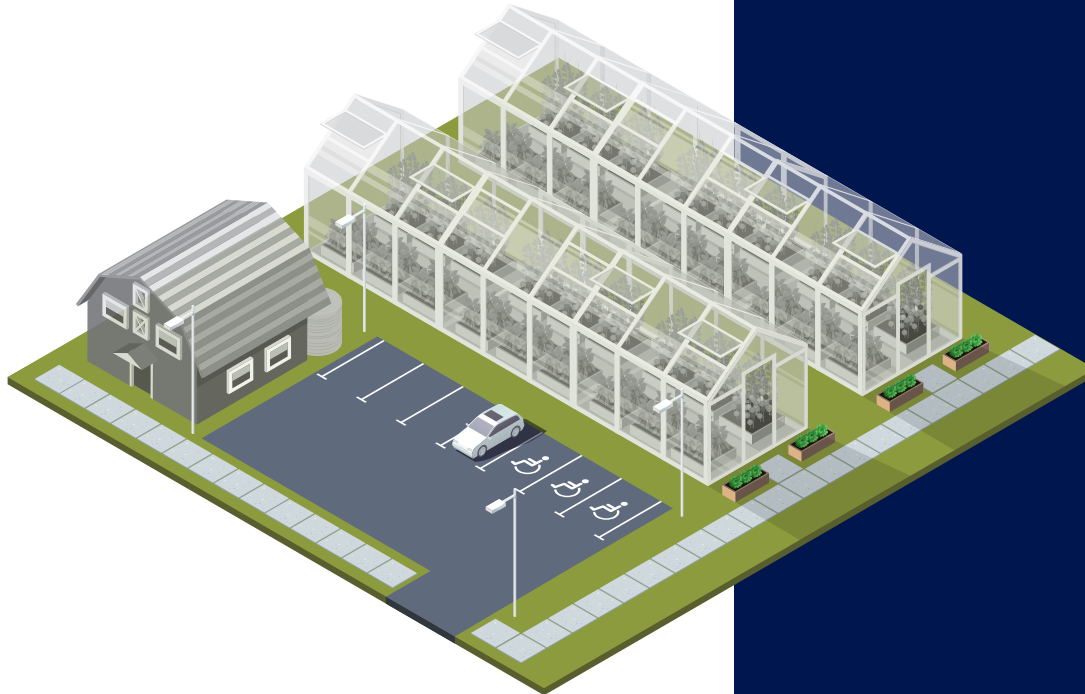


# Outdoor Lighting Solutions by Tungshram

**Better light** - Tungshram LED lighting is used everywhere from residential streets to highways, creating a bright white light that improves safety through improved visibility.

**Instant on** - LEDs turn on and off instantaneously. As LED lights need little heat to operate, they are always instant-on without any warm up time, even at low temperature.

**Durability** - Tungshram Outdoor LEDs are manufactured with durable materials. They can handle harsh weather conditions much better than traditional bulbs and lamps.



Assure safety and security by installing the necessary lighting outside.

SLBt



ALIX



Piko



Floodlight



**TUNGSRAM™**



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