

Circadian rhythms: AI can reduce vertical farm energy consumption by up to 27%

According to team calculations, a 10.000 m² vertical farm growing romaine lettuce could shave off at least 1,08M Eur per year from their energy bill.

KAUNAS, LITHUANIA, September 22, 2022 /EINPresswire.com/ -- Energy expenses are one of the



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Toma Zilinskyte, Product development manager at EasyFlow

main cost components in the [vertical farm](#) operation. By using AI to tap into plant circadian rhythms, vertical farm owners may reduce electricity consumption by up to 27%, additionally simulating a more natural environment for plant growth. According to team calculations, a 10.000 m² vertical farm growing romaine lettuce could shave off at least 1,08M Eur per year from their energy bill.

The term [circadian rhythm](#) originates from the Latin phrase 'circa diem' ('around a day'). Human bodies operate around a 24-hour cycle, where our bodily functions align to the master clock in the brain, preparing the body for sleep or activating the digestive system during the usual time of

meals.

And so do the plants. Linné's floral clock ensures that most flowers open during the day and close at night. By positioning their leaves upward during the day, many plants capture more sunlight throughout the day, repositioning them for the night cycle.

In scientific terms, the circadian clock regulates multiple pathways such as photosynthesis, seed germination, hypocotyl elongation, stomatal movement, flowering, and senescence. Light intensity and temperature are the main aspects of how plants react to their surroundings. When environmental conditions match the natural circadian rhythm of the plant, it can grow faster and avoid stress.

"In simpler terms, matching the environment with the internal clock of the plant helps to maximize the plant's productivity. While you cannot always create ideal growth conditions on an open field, vertical farms present a perfect simulated growth environment. By introducing AI and Computer Vision, this environment can be even better tuned to the daily cycles of the plant, resulting in lower energy costs and improved growth" - says Toma Zilinskyte, the Product

development manager at Computer Vision startup [EasyFlow](#).

After segmenting the different parts of the plant, the team employed a model for plant and leaf movement for automated circadian period estimation. Over a growth cycle, the team measured plant growth, the change in leaf length, and plant branching.

“By constantly monitoring plant environment with video cameras and employing AI video analysis, we have developed a pilot version of the classifier model to automatically identify the circadian rhythm of the plant” - says Toma Zilinskyte.

According to Toma Zilinskyte, such a model can then be used to provide recommendations on plant watering, fertilization, changing of light conditions, or introduction of additional stimuli.

“Introduction of AI would help farm owners to produce higher yields and replant faster, helping to reduce energy expenditure by more than a quarter”.

“Studies into plant circadian rhythms were the source to bring the next green revolution and led to new developments, including plant gene engineering. Machine vision presents another area how this research can be easily transformed into daily agricultural practice” - adds Toma.

EasyFlow will be presenting their pilot circadian rhythm product titled EasyGrow at VertiFarm exhibition on September 27-29th in Dortmund, Germany.

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