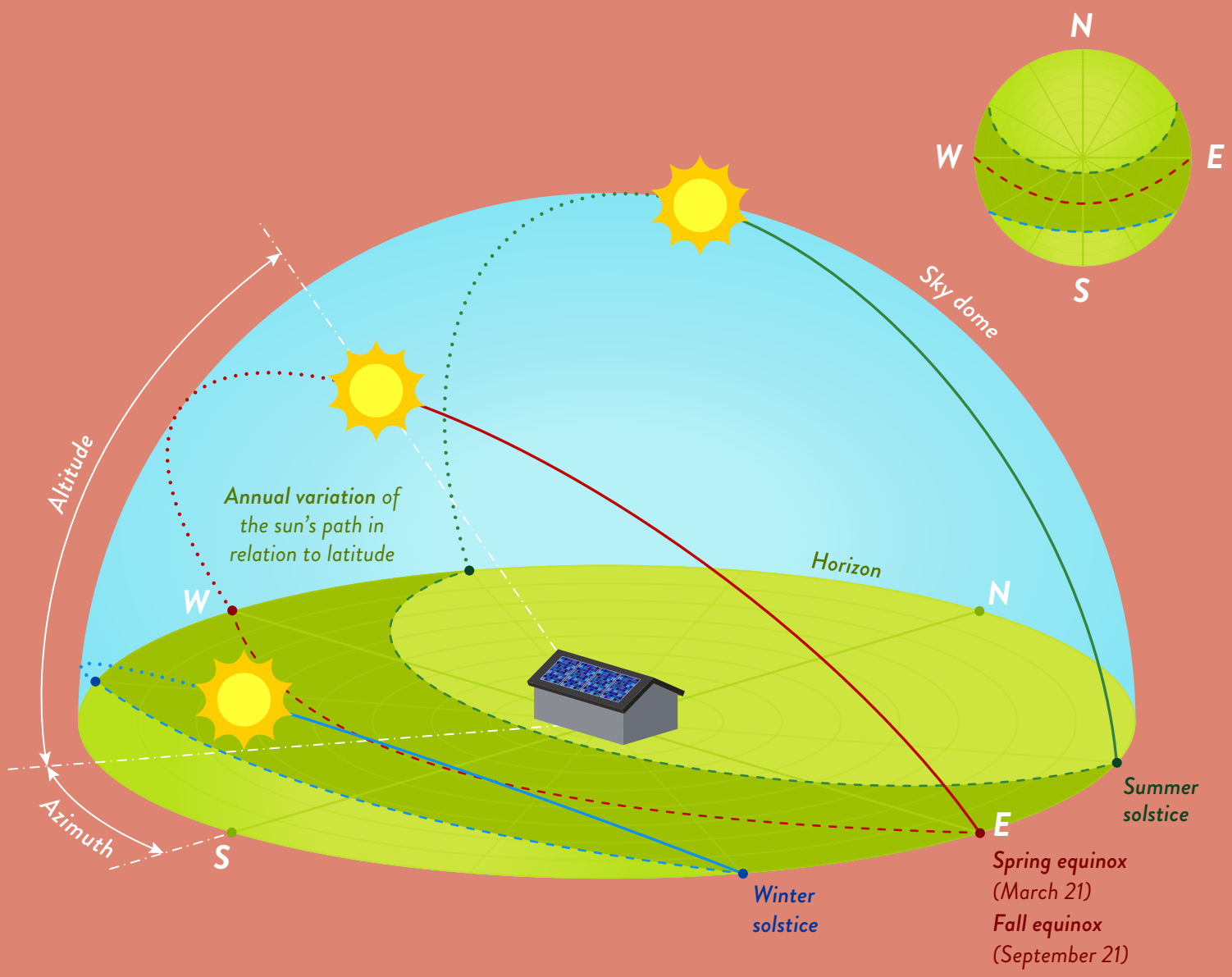
ecoblock™

POWER DISTRIBUTION 101:

KNOW YOUR *SOLAR ENERGY*



01 *WHAT IS SOLAR RADIATION?*

Solar radiation, or **sunlight**, refers to the **electromagnetic energy emitted by the sun**. Solar radiation can be converted into usable forms of energy, such as heat and electricity, through three main types of solar technology: **photovoltaics (PV)**, **concentrating solar power (CSP)**, and **solar heating and cooling (SHC) technologies**.

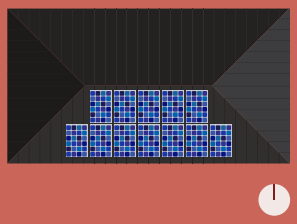
The amount of sunlight that strikes any given location on Earth depends on multiple factors, including **geographic location**, **local atmospheric conditions, landscape**, **the season**, and **time of day**.

02 *HOW DOES IT WORK?*

The sun strikes the Earth at different **angles** and in different **intensities**, ranging from **minimal intensity** at the **horizon (zero degrees)** to **maximal intensity directly overhead (90 degrees)**.

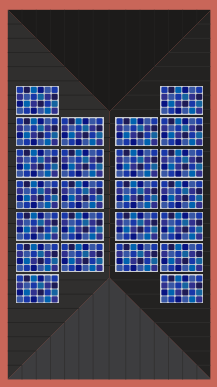
As the Earth travels around the sun, the **tilt** in the Earth's **axis of rotation** leads to longer days and shorter nights in the northern hemisphere—with the sun higher in the sky (closer to overhead)—from the **spring (vernal) equinox** to the **fall (autumnal) equinox** (roughly March 21 to September 22). The opposite is true in the **winter**: The northern half of the Earth tilts **away** from the sun, leading to shorter days and longer nights.

03 SOLAR PV CONSIDERATIONS



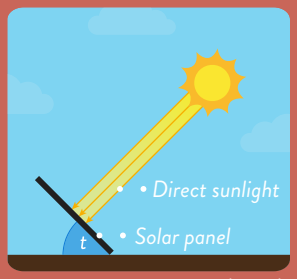
South orientation

For south-facing solar photovoltaic (PV) arrays, the building is oriented on its east-west axis, with the longer faces of the roof oriented north-south. In the northern hemisphere, PV panels that face true south receive the most exposure to direct sunlight and maximize the total amount of energy that is produced throughout the year.



East-west orientation

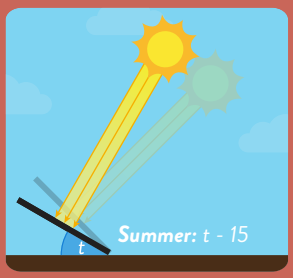
For east-west PV arrays, the building is oriented on its north-south axis, with the longer faces of the roof oriented east-west. Though they produce less overall power, more panels can be placed in the same footprint as a south-facing array. Notably, west-facing panels generate power when the electric grid is most constrained (and electricity prices are at their highest), resulting in savings.

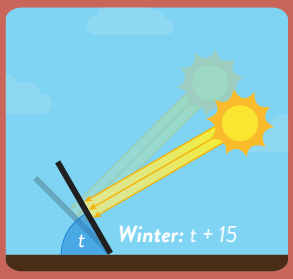


t = tilt angle

Fixed tilt angle

The tilt angle is the vertical angle, in degrees, of a solar PV system relative to the horizontal ground. A solar PV panel that lies flat on the ground has a tilt of zero degrees, whereas a panel that is perpendicular to the ground has a tilt of 90 degrees. To maximize total annual energy output, the tilt angle of a solar PV panels should increase with latitude.

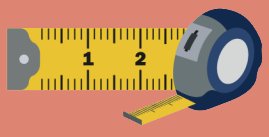




Seasonal tilt angle

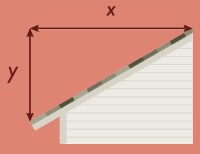
The angle of the sun changes with the seasons: The sun is lower in the sky during the winter and higher during the summer. Panels that can be adjusted for tilt (typically ground-mounted, not roof-mounted panels) might be adjusted seasonally to maximize electrical production. This is done by adding 15 degrees to your latitude in the winter and subtracting 15 degrees in the summer.

04 FACTORS AFFECTING ROOFTOP SOLAR POTENTIAL



Size

Shape



Slope

Shading

05 WHY SOLAR PRODUCTION?

Pros

+ Can **lower monthly utility bills** & provide **cost savings**
+ Reduces **CO_2 emissions**
+ Works in **any climate**
+ **Low maintenance**
+ Eligible for **federal solar tax credits**
+ Increases **property value**

Cons

+ Initial technology **learning curve**
+ High **installation & energy storage costs**
+ **Intermittent** energy source
+ **Dirt accumulation** impacts PV performance

Design by Eunice Chung

Sources: Therese Peffer, EcoBlock • Building Construction Illustrated • EnergySage • Gaisma • Lighthouse Solar • RatedPower • Solar Power World • U.S. Department of Energy • U.S. Energy Information Administration