variable-renewable-energy-process

Collection of tools to process and interact with variable renewable energy data

Photovoltaic

1. Solar energy output

$$E = A * r * GHI * \mu$$

where,

E = Energy (Wh)

A = Total solar panel area (m2)

r = Solar panel efficiency (default value = 0.159) [1]

GHI = Global Horizontal Irradiation (Wh / m2)

μ = Coefficient for losses (range between 0.5 and 0.9, default value = 0.9)

2. Solar power output

$$P = E/\Delta t$$

where,

P = Solar panel power output (W)

E = Energy (Wh)

Δt = Time step (hour)

3. Solar per unit output

$$\begin{aligned} cf &= P/\bar{P} \\ &= \frac{A * r * GHI * \mu}{\Delta t * \bar{P}} \\ &= GHI * \frac{A * r * \mu}{\Delta t * \bar{P}} \\ &= GHI * K \\ K &= \frac{A * r * \mu}{\Delta t * \bar{P}} \end{aligned}$$

where,

cf = Capacity factor (p.u.)

P = Solar panel power output (W)

$\bar{P}$ = Maximum power output of the installed solar panel (Wp)

A = Total solar panel area (m2)

r = Solar panel efficiency (default value = 0.159) [1]

GHI = Global Horizontal Irradiation (Wh / m2)

μ = Coefficient for losses (range between 0.5 and 0.9, default value = 0.9)

Δt = Time step (hour)

K = Coefficient factor constant (constant parameter based on solar panel m2/Wh)

Typical Value

Symbol	Value	Unit	Note
A	1.63350	m2	[1]
r	0.159	-	[1]
μ	0.90	-	-
$\bar{P}$	260	W	[1]
K	0.00089905	m2/Wh	-

Contributing

1. Git FIlter

   We use `nb-clean` to clean notebooks metadata.

   ```
   pip install nb-clean
   nb-clean add-filter --preserve-cell-outputs
   ```

2. Render README.md

   The README.md can be rendered using `pandoc README.md -o README.pdf`