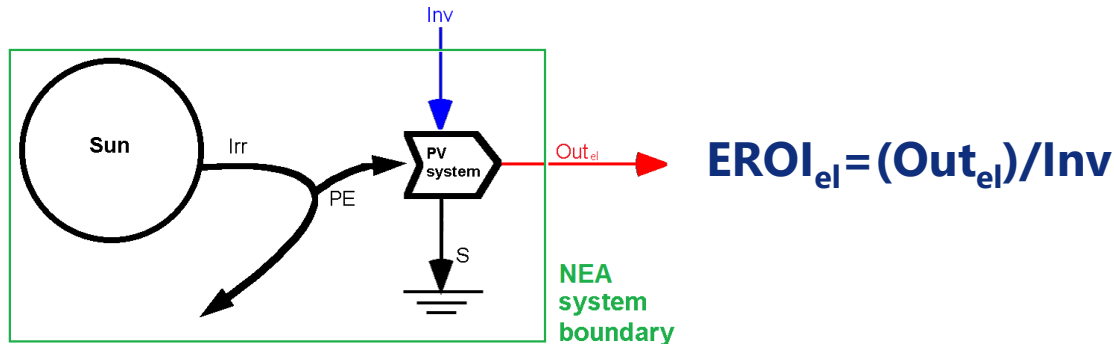


# Net Energy Analysis of Photovoltaic Electricity



- Net Energy Analysis (NEA) quantifies the extent to which a given energy source provides a net energy gain (i.e., an energy surplus), after accounting for all the energy losses occurring along the supply chain, together with all the required energy ‘investments’.
- This report provides an in-depth discussion of the key NEA for Photovoltaic systems, namely energy return on investment (EROI), and how this is to be interpreted vis-à-vis the LCA metrics cumulative energy demand (CED) and non-renewable cumulative energy demand (nr-CED).



# Net Energy Analysis of Photovoltaic Electricity



Table S-1 presents the key differences between

- $EROI_{el}$  /  $EROI_{PE-eq}$ , and
- CED / nr-CED per unit output

Acronyms, abbreviations and symbols:  
 PE = primary energy; PE-eq = equivalent primary energy; Out = energy output; Inv = energy investment; el = electricity;  $\eta_G$  = life cycle energy efficiency of the electric grid (G); nr = non-renewable.

Metric	$EROI_{el}$	$EROI_{PE-eq}$	CED	nr-CED
Formula	$\frac{Out_{el}}{Inv}$	$\frac{Out_{PE-eq}}{Inv} = \frac{(Out_{el}/\eta_G)}{Inv}$	$\frac{(PE+Inv)}{Out_{el}}$	$\frac{(PE_{nr}+Inv_{nr})}{Out_{el}}$
Units	[MJ/MJ <sub>oil-eq</sub> ]	[MJ <sub>oil-eq</sub> /MJ <sub>oil-eq</sub> ]	[MJ <sub>oil-eq</sub> /MJ]	[MJ <sub>oil-eq</sub> /MJ]
Meaning of the numerator	Energy delivered ('returned') to society, <u>in units of electricity</u>	Energy delivered ('returned') to society, <u>in units of equivalent primary energy</u>	<u>Total primary energy</u> harvested from nature	<u>Non-renewable primary energy</u> harvested from nature
Meaning of the denominator	Sum of energy carriers diverted from other societal uses (excluding energy delivered to society), <u>in terms of their total primary energy demand</u>		Energy delivered ('returned') to society, <u>in units of electricity</u>	
Distinction between renewable and non-renewable energy?	No, not normally made		Yes, generally recommended	
Main purpose	Economical/effective use of available energy carriers		Efficient use of primary energy resources	Sustainable/ efficient use of non-renewable primary energy resources
Temporal perspective	Short term		Long term	