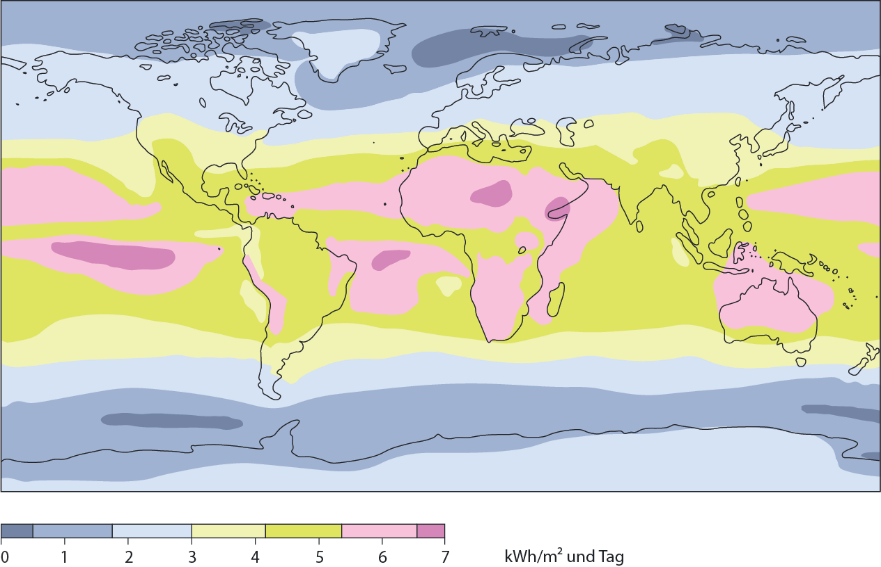
## **Abschätzung des Beitrags der Solarenergie**

[#Energieversorgung](https://www.lehrplanplus.bayern.de/fachlehrplan/realschule/10/physik/wpfg1) #Energieträger #Energieumwandlungen #Energie

#kWh&J #Leistung #Wirkungsgrad #leichter\_Dreisatz #Prozentrechnung

Solarenergie – Arbeitsblatt 1 – Seite 1 von 2

1. Beurteile mit Hilfe der Grafik die   
   grundsätzliche Eignung des Standorts Deutschland zur Nutzung von Solarenergie.



*kWh pro m² und Tag*

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1. Der Wirkungsgrad von Solarzellen liegt bei ca. 20 %. Bestimme mit Hilfe der obigen Grafik die el. Energiemenge, die durch Fotovoltaik (PV) pro m² und Tag in Deutschland genutzt werden kann.

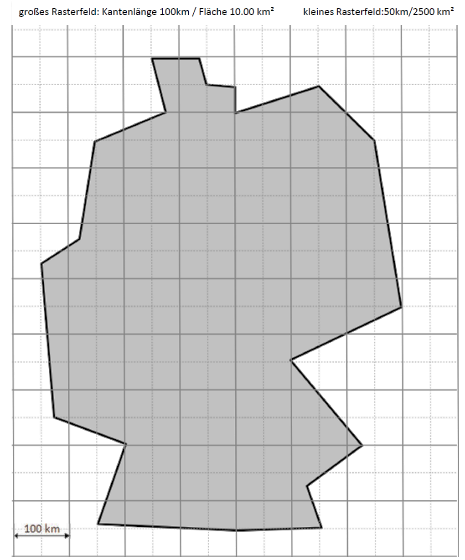
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1. Ein Bild, das draußen, Baum, Outdoorobjekt, Solarzelle enthält.

   Automatisch generierte BeschreibungDie Dachflächen in Deutschland betragen ca. **1500 km².** Zusätzlich werden bereits heute PV-Anlagen auf Freiflächen zur Stromerzeugung installiert. Nehmen wir an, dass in Zukunft auf ca. **3000 km²** der Freifläche Deutschlands (das entspricht ca. 1 %PV installiert wird.

Schätze die el. Energiemenge in kWh pro Tag ab, die man per PV auf Dächern und Freiflächenanlagen in Deutschland nutzen könnte.

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1. Markiere den dafür benötigten Flächenanteil für PV‑Anlagen in der nebenstehenden Deutschlandkarte.

Solarenergie – Arbeitsblatt 1 – Seite 2 von 2

Ein großes Kästchen entspricht bei einer Kantenlänge von 100 km einer Fläche von 100 km · 100 km = 10 000 km2.

Ein kleines Kästchen entspricht bei einer Kantenlänge von 50 km einer Fläche von 50 km · 50 km = 2 500 km2.

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1. *Ein Bild, das Karte enthält.

   Automatisch generierte Beschreibung*Bestimme mithilfe des Ergebnisses aus Aufgabe 3 die el. Energiemenge, die pro Person und pro Tag in Deutschland (ca. 80 Millionen Einwohner) durch die obigen PV-Anlagen genutzt werden könnte.

*Landwirtschaftl.*

*Nutzfläche 50%*

*Wälder 30%*

***andere Flächen* *11%***

*bebaute*

*Fläche (6%)*

*Gesamtfläche 357.581 km²*

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1. Diskutiere welche Probleme bei der Nutzung von Freiflächen für PV-Anlagen auftreten können und biete (soweit möglich) Lösungsvorschläge für diese Probleme an.

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## **Abschätzung des Beitrags der Solarenergie - *Lösungen***

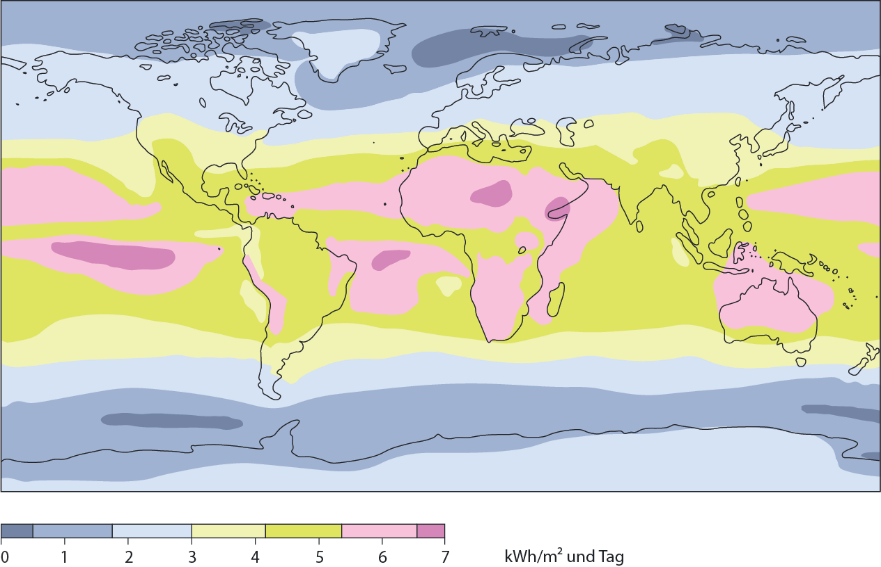
[#Energieversorgung](https://www.lehrplanplus.bayern.de/fachlehrplan/realschule/10/physik/wpfg1) #Energieträger #Energieumwandlungen #Dreisatz

#Energie #Umrechnung\_kWh-J #Leistung #Wirkungsgrad #Prozentrechnung

**Lösungen** zur Solarenergie – Arbeitsblatt 1 – Seite 1 von 2

1. Beurteile mit Hilfe der Grafik die   
   grundsätzliche Eignung des Stand-ortes Deutschland zur Nutzung von Solarenergie.

* *die Polarragionen erhalten zwar noch weniger,*
* *große Teile Afrikas, Lateinamerikas sowie Südasiens erreichen jedoch das Doppelte bis Dreifache der Einstrahlung (bis zu 7 kWh pro m² und Tag).*
* *Regionen mit maximaler Einstrahlung sind jedoch Wüsten- bzw. Trockengebiete, z. B. Sahara sowie Naher Osten)*
* *Im weltweiten Vergleich ist dies eher im unteren Mittelfeld,*



*kWh pro m² und Tag*

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| *Deutschland erhält (im Jahresmittel) eine Einstrahlung von ca. 2 bis 3 kWh pro m² und Tag.* |  |  |  |  |  |  |  |  |  |  |  |
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1. Der Wirkungsgrad von Solarzellen liegt bei ca. 20 %. Bestimme mit Hilfe der obigen Grafik die el. Energiemenge, die durch Fotovoltaik (PV) pro m² und Tag in Deutschland genutzt werden kann.

*geg.: η = 20 % = 0,20; E auf, pro m² = 2 bis 3 ≈ 2,5 (in 1 Tag)*

*ges.: Enutz*

*Lsg.:*

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| *(in 1 Tag)* |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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1. Ein Bild, das draußen, Baum, Outdoorobjekt, Solarzelle enthält.

   Automatisch generierte BeschreibungDie Dachflächen in Deutschland betragen ca. **1500 km².** Zusätzlich werden bereits heute PV-Anlagen auf Freiflächen zur Stromerzeugung installiert. Nehmen wir an, dass in Zukunft auf ca. **3000 km²** der Freifläche Deutschlands (das entspricht ca. 1 %PV installiert wird.

Schätze die el. Energiemenge in kWh pro Tag ab, die man per PV auf Dächern und Freiflächenanlagen in Deutschland nutzen könnte.

*geg.: (in 1 Tag, aus Aufgabe 2)*

*A = 1500 km² + 3000 km² = 4500 km² = 4500 ·*  *m² ges.:*

*Lsg.: 1 m²* ≙

*4500 · 10 6 m²* ≙  *(in 1 Tag)*

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1. Markiere den dafür benötigten gesamten Flächenanteil für PV‑Anlagen in der nebenstehenden Deutschlandkarte.

*geg.: A = 4500 km²*

*1 gr. Kästchen* ≙ *10 000 km²*

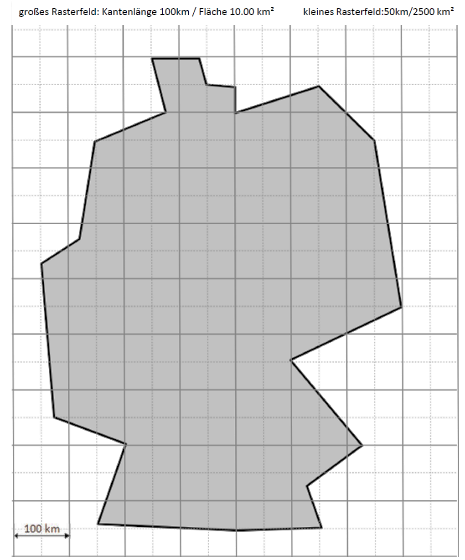
*1 kl. Kästchen* ≙ *2 500 km²*

*ges.: Anzahl der Kästchen in der Abbildung*

*Lsg.: 4500 km² : 2500 km² = 1,8*

*4500 km² entsprechen*

***fast******2 kleinen Kästchen.***



Ein großes Kästchen entspricht bei einer Kantenlänge von 100 km einer Fläche von 100 km · 100 km = 10 000 km2.

Ein kleines Kästchen entspricht bei einer Kantenlänge von 50 km einer Fläche von 50 km · 50 km = 2 500 km2.

*Landwirtschaftl.*

*Nutzfläche 50%*

*Wälder 30%*

***andere Flächen* *11%***

*bebaute*

*Fläche (6%)*

*Gesamtfläche 357.581 km²*

**Lösungen** zur Solarenergie – Arbeitsblatt 1 – Seite 2 von 2

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1. Bestimme mithilfe des Ergebnisses aus Aufgabe 3 die el. Energiemenge, die pro Person und pro Tag in Deutschland (ca. 80 Millionen Einwohner) durch die obigen PV-Anlagen genutzt werden könnte.

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|  |  |  |  |  |  |  |  |  |  |  |  |  | *geg.: (aus Nr. 3)*  *Anzahl der Einwohner n = 80 000 000*  *ges.:*  *Lsg.: Einwohner* ≙  *Einwohner* ≙  *Einwohner* ≙ |  |  |  |  |
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1. Diskutiere, welche Probleme bei der Nutzung von Freiflächen für PV-Anlagen auftreten können und biete (soweit möglich) Lösungsvorschläge für diese Probleme an.

*Solarpaneele…*

* *in Waldgebieten:*

***Problem:*** *Großflächige Rodung zur Vermeidung von Schattenbildung auf den Solarpaneelen 🡪 Verlust an Waldfläche*

* *auf landwirtschaftlichen Nutzflächen:*

***Problem:*** *Nutzungskonflikt zwischen Erzeugung von Nahrungsmitteln oder elektrischer Energie*

***Lösung****: hybride Nutzung, d. h. Installation der PV-Anlagen in mehreren Metern Höhe, damit die Fläche darunter für Bepflanzung und Bewirtschaftung nutzbar bleibt.*

*Einschränkung: Nur geeignet für Nutzpflanzen mit geringem Bedarf an Sonnenenergie*

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