



Solar Subgroup

Progress



Background

DOE/CE-0279

Characterization of U.S. Energy Resources and Reserves

December 1989



U.S. Department of Energy
Assistant Secretary Conservation
and Renewable Energy
Office of Research and Technology
Integration

Washington, DC 20585

In 1989, the United States
Department of Energy noted

“Data on estimated resources and reserves levels for major energy sources... are developed using a carefully delineated set of definitions and assumptions. However, ...resource and reserve estimates are not necessarily undertaken in a coordinated and parallel fashion across the full range of energy sources... Energy sources also do not have consistent reporting timeframes or equal levels of ongoing activities to update and refine previous estimates. Additionally, there has been little or no attempt to assemble and present energy resources information in a single, comprehensive data set...”
(page 3, DOE 1989).

In 1989, the United States Department of Energy noted

“resource... ..estimates are not necessarily undertaken in a coordinated or parallel fashion across a full range of energy sources”

In many ways the situation has not changed much since then

30 years on from the Department of Energy Report

The UNFC provides an opportunity to use a “carefully delineated set of definitions and assumptions” to “estimated resources” for “major energy sources” “in a single, comprehensive data set” with “consistent reporting timeframes”

What incentive is there to classify solar energy using the UNFC?

Who might benefit from this?

But why did it take 30 years?

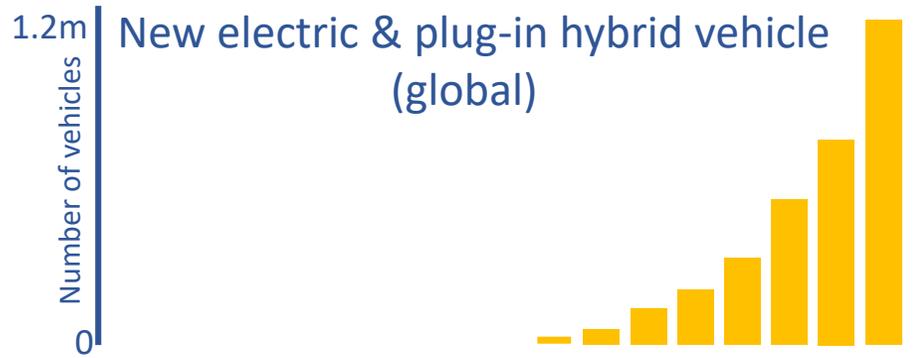
Billions of dollars have been invested in solar energy

Why start classifying solar energy resources in a way that is comparable with non-renewable energy resources now?

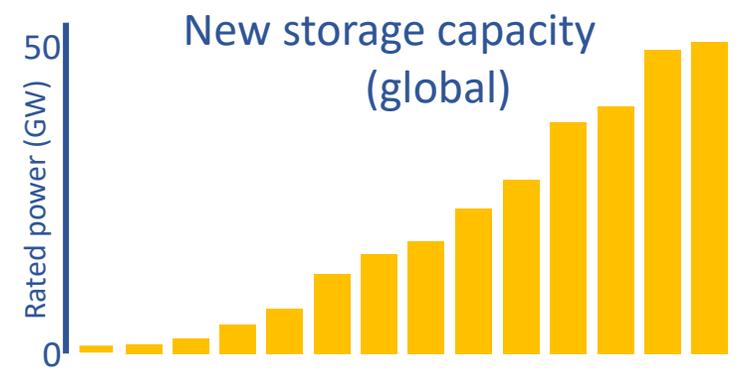


Context

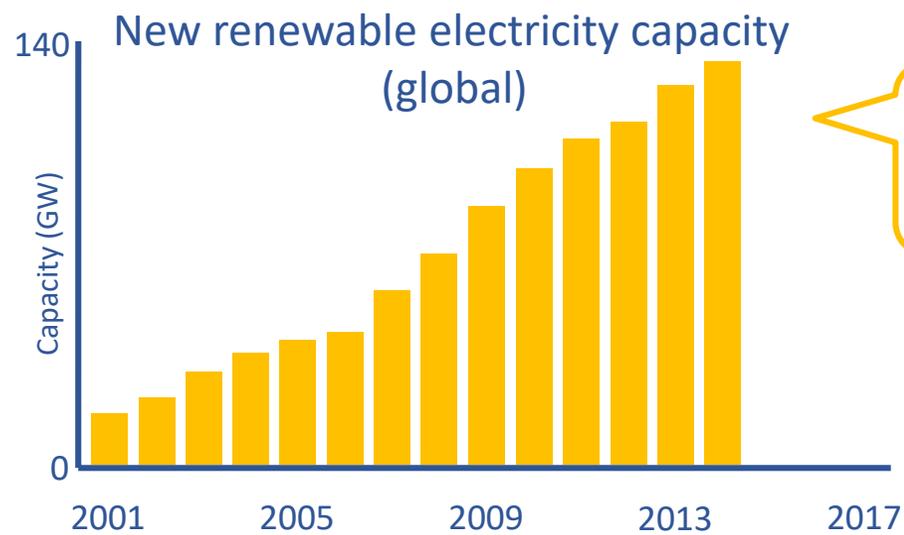
Energy systems are
changing rapidly



Transport energy demand is changing and will require more electricity and materials



New storage promises to help address intermittency



Renewable electricity capacity is growing rapidly

But intermittency remains a technical challenge



Electric vehicles are becoming a reality



The storage of electricity is being implemented at ever greater scales



Renewable energy installations are consistently exceeding expectations



There is a risk of further climate regulation



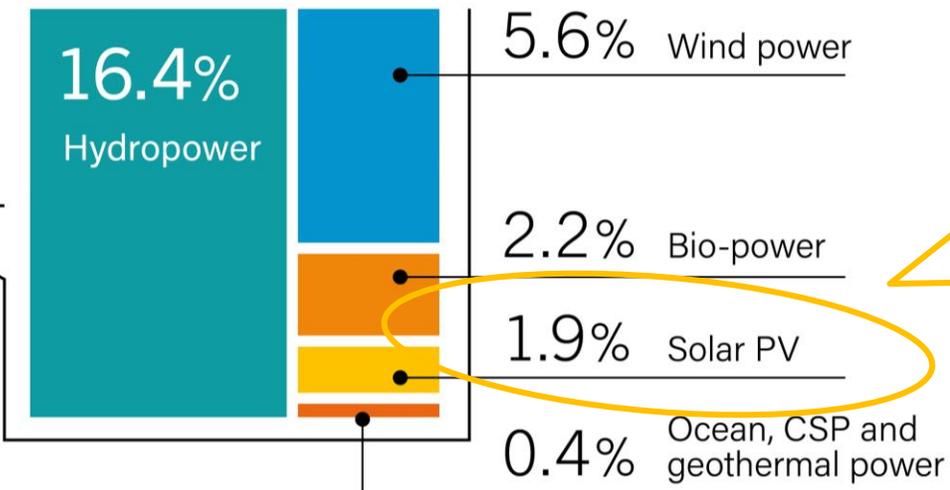
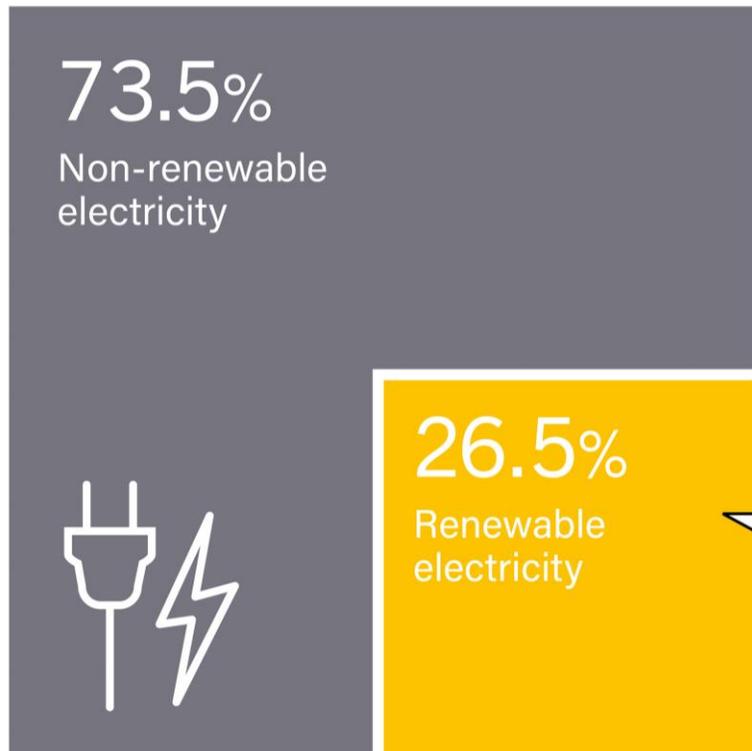
Institutional investors are seeking greater information on climate exposure



At a minimum renewable energy is a hedge against these changes and at best it is an opportunity to invest in a global energy transformation

Solar energy is used for heating, lighting, electricity generation, and other uses

Electricity generation 2017

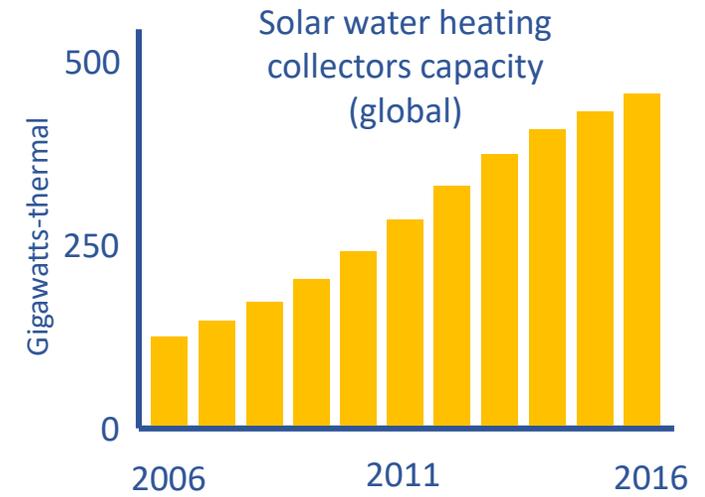
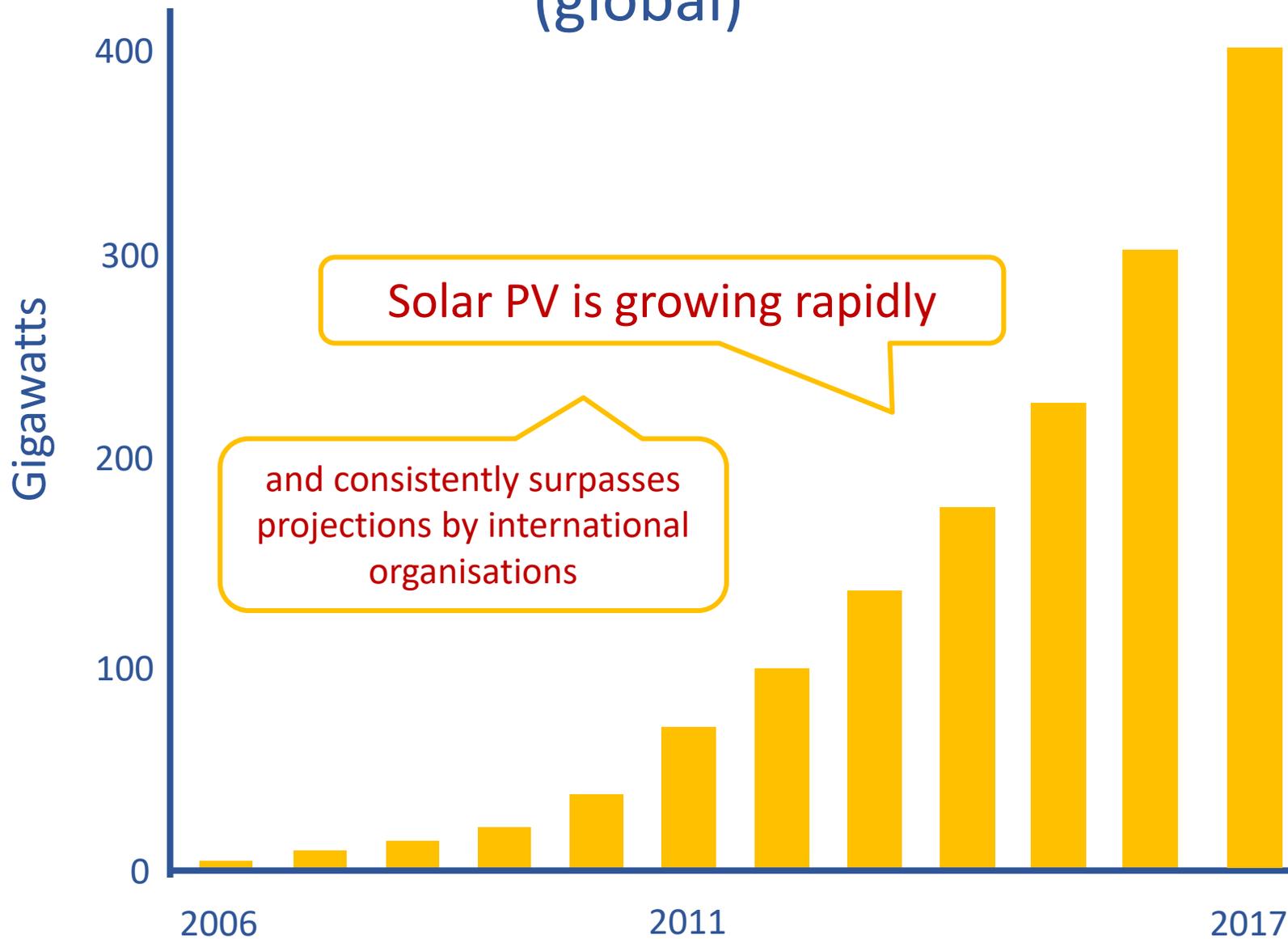


Solar PV generates a small fraction of global electricity

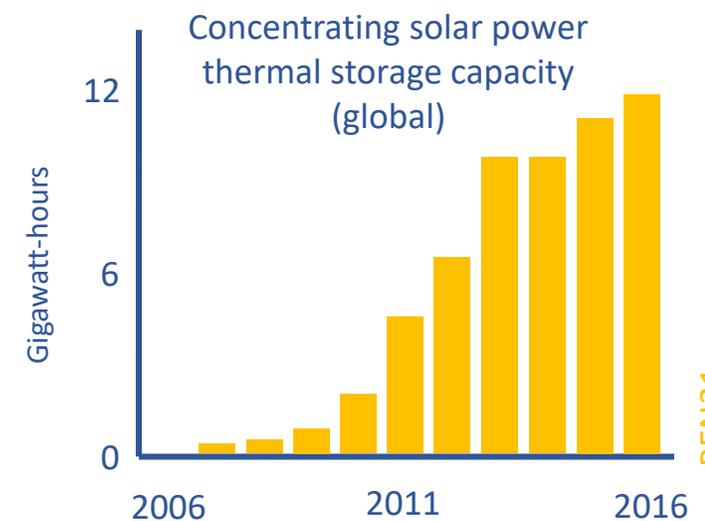
Up from 1.5% in 2016

Source: REN21 2018 GSR

Solar photovoltaic capacity (global)



CSP and solar water heating are also growing





Solar energy is an important part of the renewable energy mix



It is suitable for household, agricultural, industrial and utility scale electricity generation and is also a valuable source of heat and light



The technologies required to utilise solar energy can be deployed at almost any scale



Unlike most competing sources of energy, solar can be deployed at the same location as, or very close to, users



Like other technologies, the price comes down with increased deployment and learning



As such, we can only expect solar to become more cost effective

Solar energy promises to be an increasingly important resource



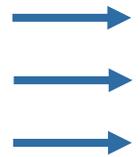
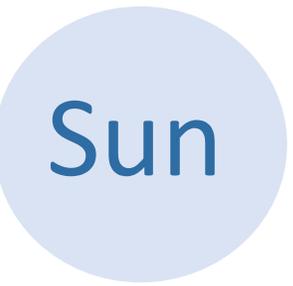
Solar resources



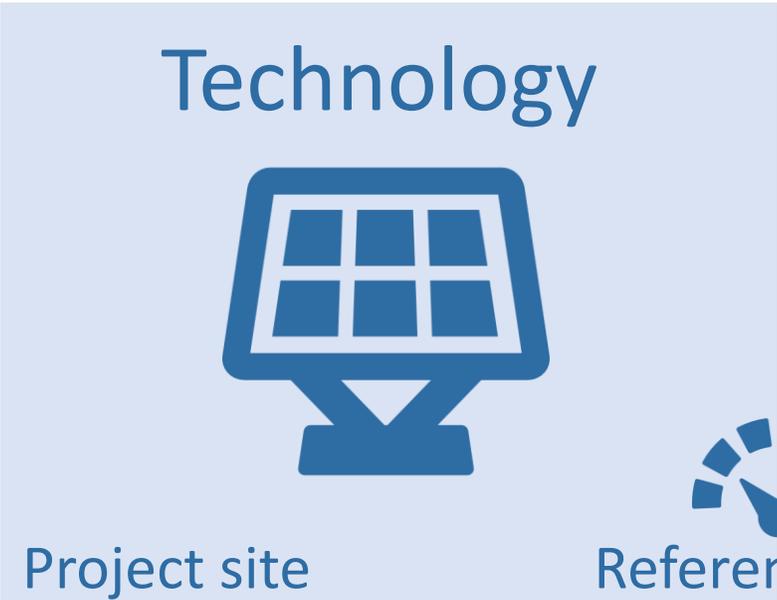
What are solar
resources?

Commercial resources

Irradiation is the energy from the sun that reaches earth's surface



Irradiation



Technology includes: solar photovoltaic systems, concentrating solar power, solar water heating and other technologies

Operational, pre-operational and designed projects



= Potentially useful energy (estimated at the reference point)



Other resources

Potentially accessible energy and projects at various stages of development



United Nations

Economic and Social Council

ECE/ENERGY/GE.3/2018/6

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**Economic Commission for Europe
Committee on Sustainable Energy
Expert Group on Resource Classification**

Ninth session
Geneva, 24-27 April 2018
Item 7(c) of the provisional agenda
**Development, maintenance and application of the United Nations
Framework Classification for Resources:
Renewable energy resources**

**Draft Specifications for the application of the United Nations
Framework Classification for Resources to Solar Energy**

**Prepared by the Solar Energy Sub-group of the Renewable Energy
Working Group of the Expert Group on Resource Classification**

Summary

This is a preliminary draft of the Specifications for the application of the United Nations Framework Classification for Resources to Solar Energy (Solar Specifications) which will evolve following comments from the Expert Group on Resource Classification. The document has been reviewed by the Technical Advisory Group of the Expert Group which noted that while it is enthusiastic about the progress made, further work and discussion is required on how to ensure integration with the United Nations Framework Classification for Resources (UNFC). In particular, issues to be resolved include: clearer consistency with the E and F categories of UNFC; and terminology consistent with UNFC, e.g. avoiding the term "reserves" since this can cause confusion. To help the Expert Group in its review of the draft Solar Specifications, footnotes have been added to indicate issues raised by the Technical Advisory Group.

Please recycle 



GE.18-05424(E)



1805424

draft Solar Specifications



Economic Commission for Europe

Committee on Sustainable Energy

Expert Group on Resource Classification

Ninth session
Geneva, 24-27 April 2018

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Development, maintenance and application of the United Nations

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Made available last year for review and testing by the Expert Group on Resource Management

So what's happened since then?

The Solar Specifications were reviewed by the Technical Advisory Group (TAG)

The Solar Specifications were reviewed by the TAG again

Apr

Jun

Dec

Jan

2018

2019

The Solar Specifications were revised by the Solar Subgroup

Definitions

The TAG highlighted that some definitions in the Solar Specifications differ from the UNFC

The Solar Subgroup have spent two years reviewing the UNFC and Renewable Specifications, and put a great deal of effort into ensuring terms are meaningful to solar professionals and consistent with the UNFC

Completion of the Solar Specifications depends on UNFC language being updated

The Solar Subgroup is glad to see progress on revising UNFC language as this has helped ensure the UNFC is meaningful in the context of solar energy

Projects

The TAG highlighted that the UNFC focuses exclusively on project level resource assessments which may be aggregated up

The Solar Subgroup had included national (GIS based) assessments in the specifications as these can be important to governments and international organisations

Aggregation

The TAG noted that aggregation requirements have not been made clear

The Solar Subgroup noted that other methods exist, and have been applied, for classifying and making solar resource estimates

Solar Specifications vs other documents

Solar Specifications content will be agreed with the EGRM and consistent with updated UNFC language

Other solar resource classification guidance may be developed in other documents outside of the EGRM

For example by solar professional organisations or solar industry associations in the same way the SPE have the PRMS, or AUSIMM have the JORC Code

It is important that solar resource classification guidance supports the needs and interests of solar energy

At 10th Session of EGRM ask the Expert Group whether, having addressed these issues, the next draft can be issued for public comment with Bureau approval, and without going back to EGRM

The revised draft is submitted to TAG for review who make recommendation to Bureau

Since the Specifications partly depend on updates to UNFC language, it may be necessary to wait until the UNFC language has been updated

Apr

May

Jun

Jul

???

2019

2020

After the EGRM, the Solar Subgroup (SG) addresses the issues raised in the review. The TAG review team assists in this process, as requested by SG

Bureau decides whether revised draft is issued for public comment



Opportunities and challenges

Billions of dollars have been invested in solar energy and billions more will be invested with or without the Solar Specifications

The Solar Specifications need to be pragmatic if they are to make any difference



**Possible
applications**

Developers

Use the Solar Specifications to monitor and manage project development

Governments

Use the Solar Specifications for national solar energy assessments

Use assessments to inform policy and energy security

Use assessments to attract developers and investors

Financiers

Use the UNFC and Solar Specifications as a template for projects seeking finance

Use the UNFC as criteria for finance

Reporting by public companies

Include solar commercial resources with oil and gas commercial resources

Include solar energy in Reserve Replacement Ratios

The users mentioned in the previous slide already have solar information and systems

Adoption of the Solar Specifications shouldn't create unnecessary work or bureaucracy

**Terms and definitions
are important**

The terms used in the UNFC can be an impediment to engagement

Terms like mining, extraction and deposit from the UNFC are not relevant to renewable resources

Other terms like project are relevant to both renewable and non-renewable resources

Using generalised language that is meaningful to both renewable and non-renewable resources is important for uptake of the UNFC and its application to solar

**The UNFC is sophisticated
but complex**

The UNFC elegantly brings together the E, F and G axes to form a sophisticated 3 dimensional classification scheme

However, having a third dimension makes the classification scheme complex

Simplified 2 dimensional tables are much easier to explain, apply and engage users with

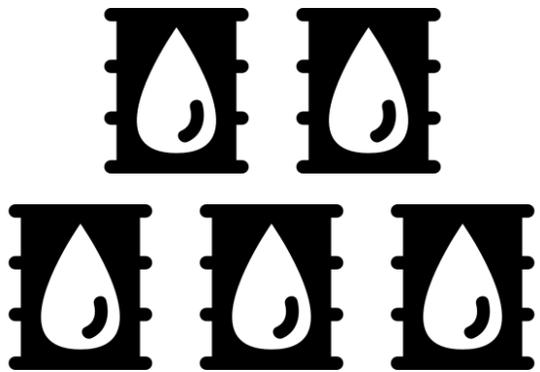
It is difficult to explain a 3 dimensional classification scheme or engage new users

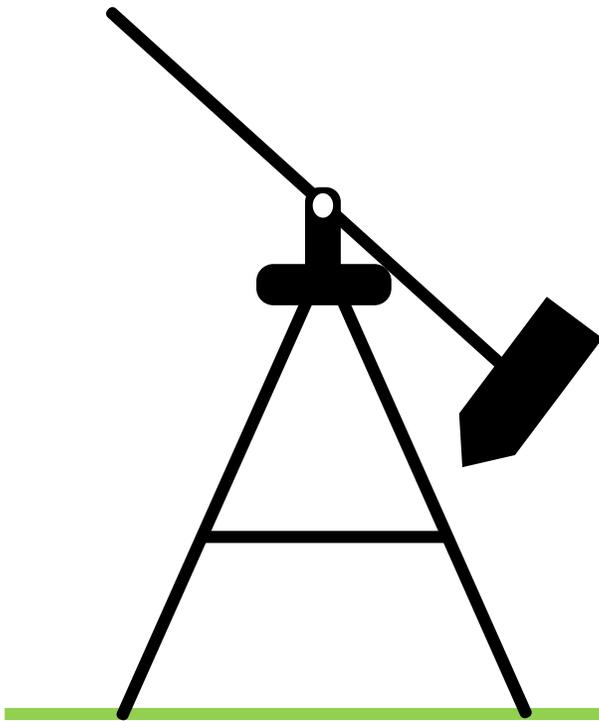
Governments and international organisations want national solar resources estimates

For example compiled using the SEEA or estimated using other methods (e.g. NREL)

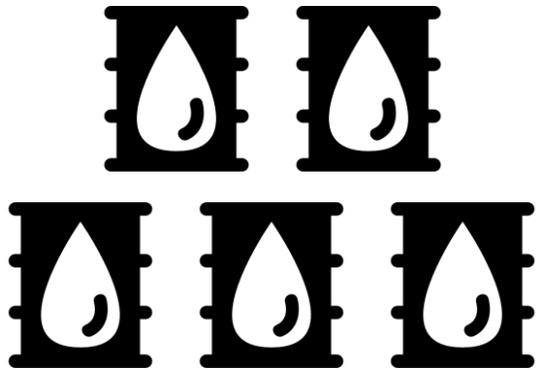
Informing policy and potential opportunities

**Oil and gas companies could be
one of the main users of the
Solar Specifications**

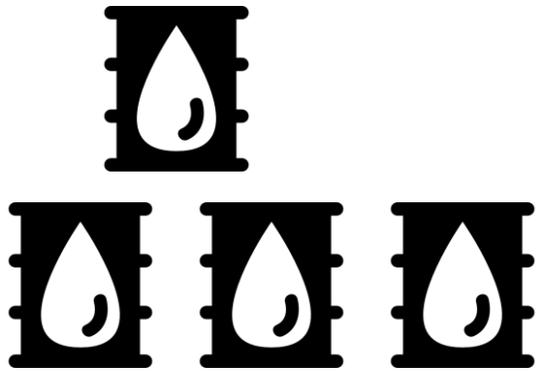
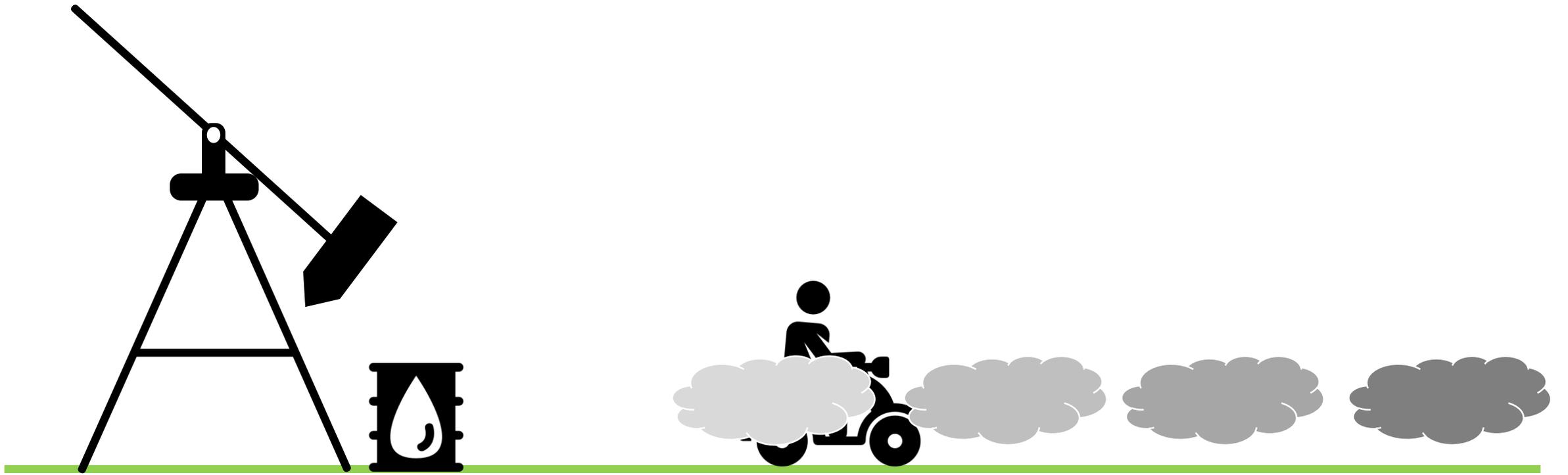




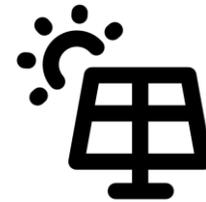
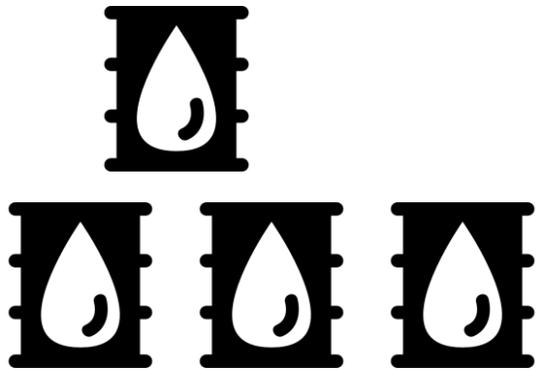
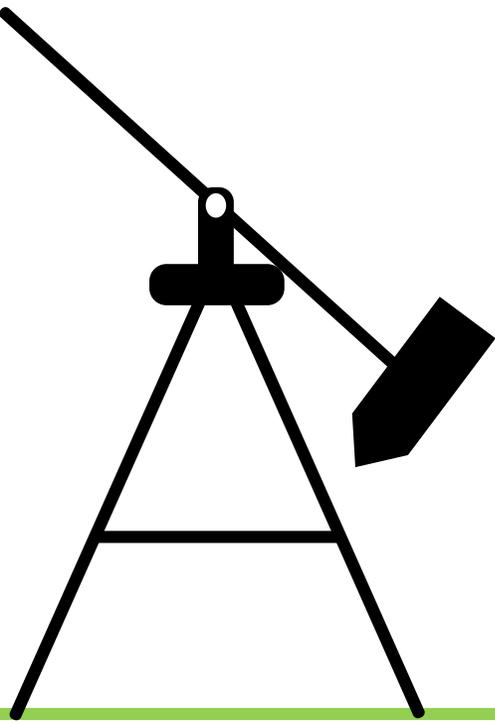
Extraction



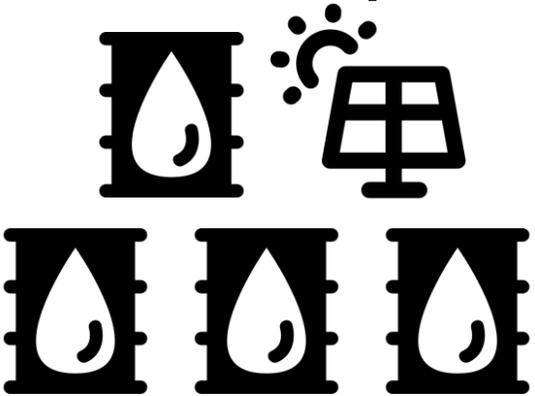
Commercial resources (BOE)



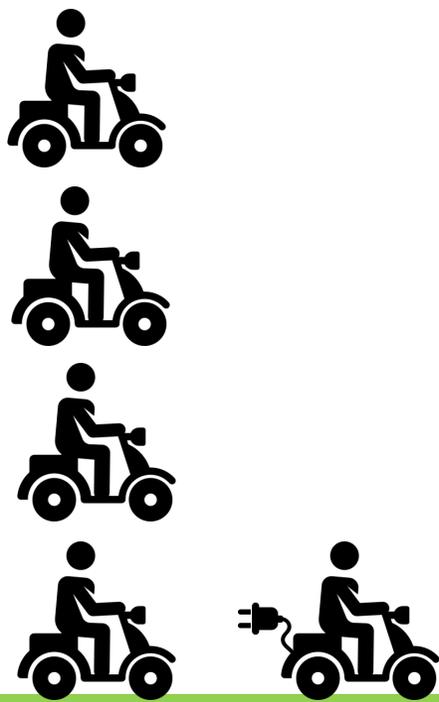
Energy transition



Energy transition

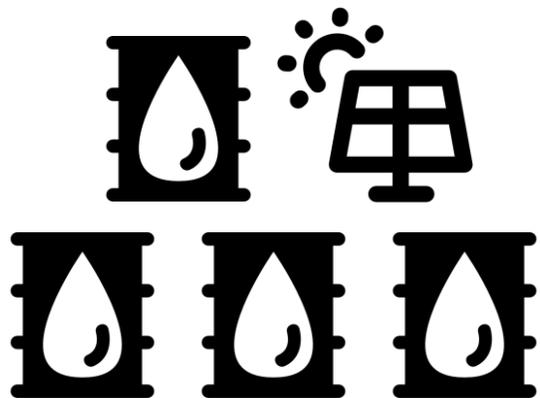


Commercial resources
including solar



Energy transition

Changing demand e.g. transport

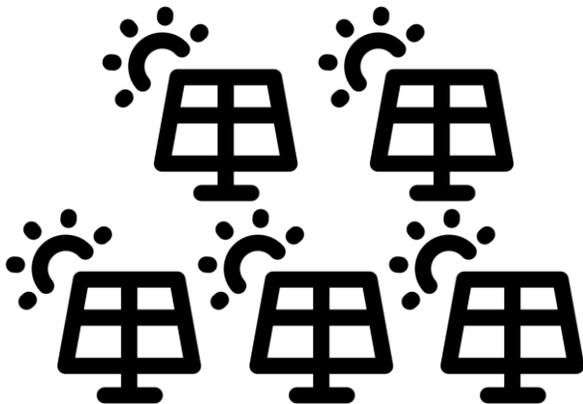


Commercial resources
including solar



Energy transition

Changing demand e.g. transport



Commercial resources
replacement



Lighting

Heating

Electricity generation

Photoelectrochemistry

The UNFC represents progress

A question remains as to who will classify solar resources using the UNFC

Solar Specifications can help us answer this question



Thank you

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