CLEAN ENERGY SOLUTIONS CENTER
ASSISTING COUNTRIES WITH CLEAN ENERGY POLICY

INTERNATIONAL SOLAR ALLIANCE

International Solar Alliance Expert Training Course: Session 14

Introduction to Solar Subsidies

In partnership with the Clean Energy Solutions Center (CESC)

January 2019

Supporters of this Expert Training Series

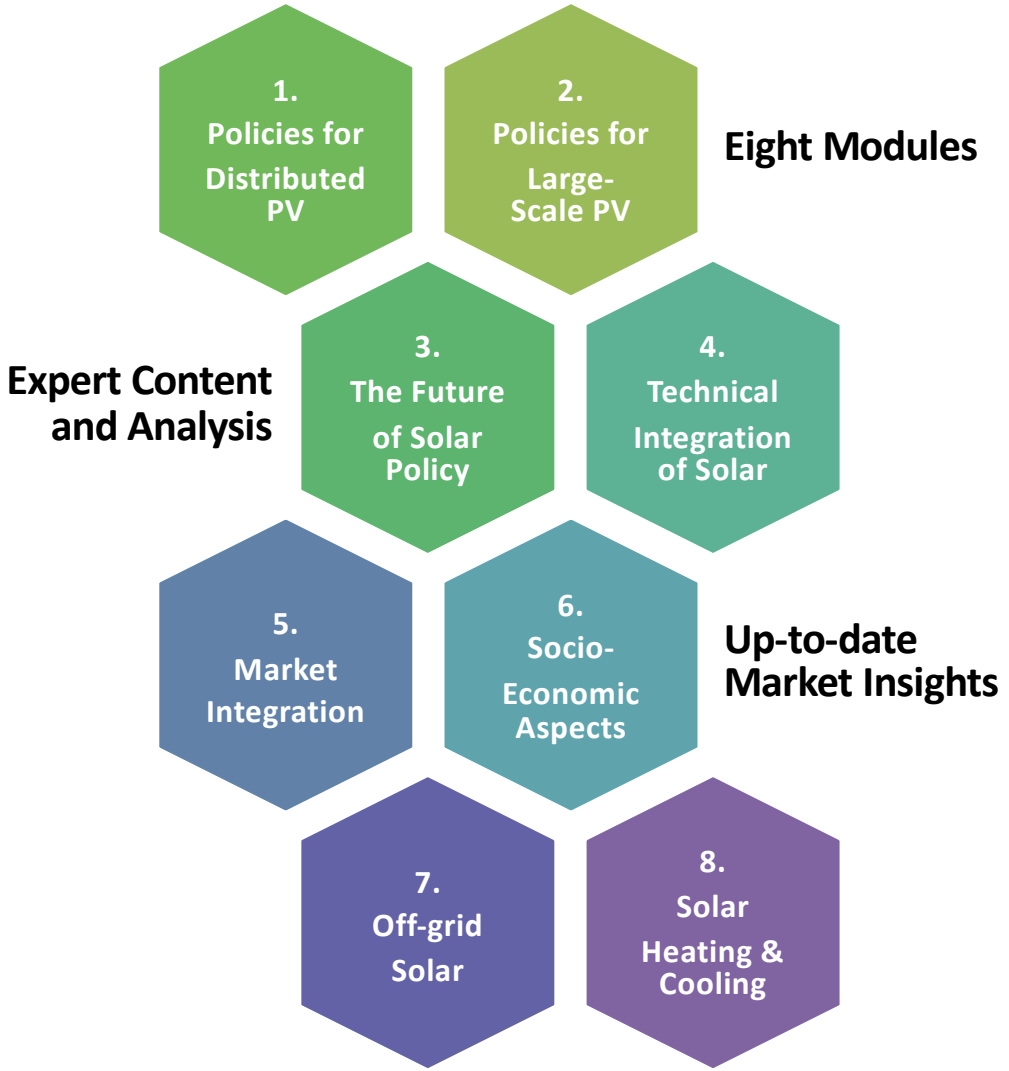
INTERNATIONAL SOLAR ALLIANCE

CLEAN ENERGY SOLUTIONS CENTER

ASSISTING COUNTRIES WITH CLEAN ENERGY POLICY

Overview of Training Course Modules

This Training is part of Module 3, and focuses on the issue of Solar Subsidies



Overview of the Presentation

1. Introduction: Learning Objective
2. History of Solar Subsidies
3. Overview of Solar Subsidies
4. Concluding Remarks
5. Further Reading
6. Knowledge Check: Multiple-Choice Questions

1. Introduction: Learning Objective

Learning Objectives

- Understand the history of renewable energy subsidies
- Understand the various forms of subsidies that exist
- Understand how subsidies have evolved over time as renewable energy costs have declined
- Understand the future of renewable energy subsidies, as well as the role of both market design and framework conditions in scaling-up solar power

2. History of Solar Subsidies

Subsidy: Definition

Subsidy, noun. Oxford English Dictionary

A sum of money granted by the state or a public body to help an industry or business keep the price of a commodity or service low.

i. A sum of money granted to support an undertaking held to be in the public interest.

ii. A grant or contribution of money.

Subsidy, noun. Dictionary.com:

A direct pecuniary aid furnished by a government to a private industrial undertaking, a charity organization, or the like; usually given to promote commercial enterprises.

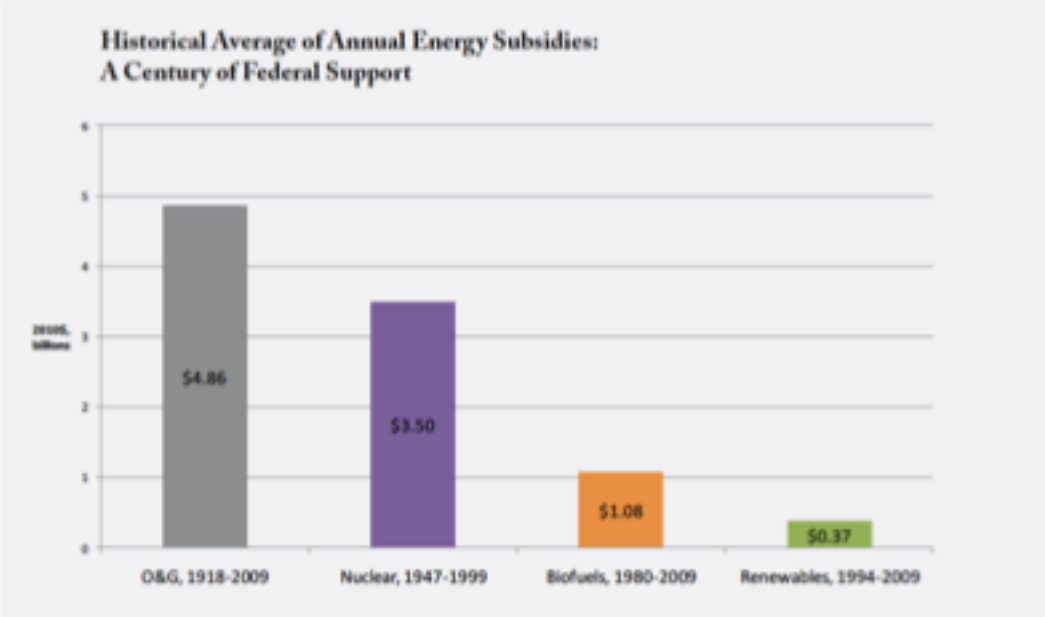
History of Solar Subsidies

- The term “subsidy” is often used pejoratively (i.e. negatively)
- Subsidies are frequently equated with some form of “***market distortion***”: they indicate that a technology is expensive, or not yet competitive
- In recent years, a growing number of solar projects around the world are becoming “**subsidy free”.** For more information on this, see **Session 15 on Subsidy-Free Solar**

History of Solar Subsidies

Historically, the vast majority of subsidies in the energy sector have gone to fossil and nuclear technologies

US Energy Subsidies: 1947 - 2009

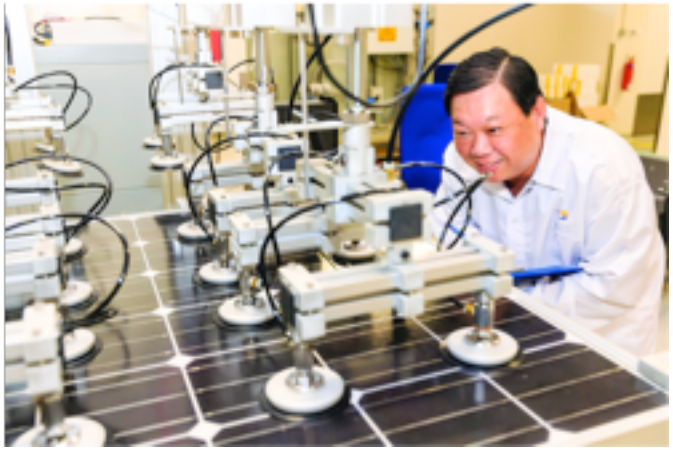


http://www.dblpartners.vc/wp-content/uploads/2012/09/What-Would-Jefferson-Do-2.4.pdf?597435&096c73

History of Solar Subsidies

- The emergence of solar power was also supported by the creation of publicly-funded national laboratories (e.g. US Solar Energy Research Institute (SERI), later NREL), the Fraunhofer Institute in Germany (1972), etc.

- Publicly funded **research and development (R&D)** has been a foundation of solar support since the 1970s



History of Solar Subsidies

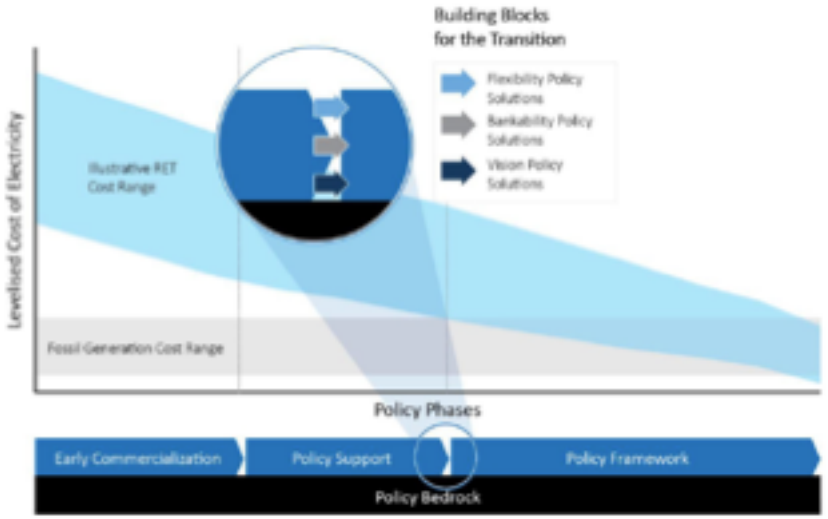
- As solar power has become a more mature technology, efforts have shifted beyond R&D into actual market support (purchase guarantees), price supports (e.g. FITs), and other policies (e.g. RECs, mandates, etc.)

- As solar subsidies have grown from 2005 - 2018, they have come under **increasing pressure** from policymakers, ratepayer advocates, and other interest groups: Spain, Czech Republic, Germany, Philippines, US, etc.

History of Solar Subsidies

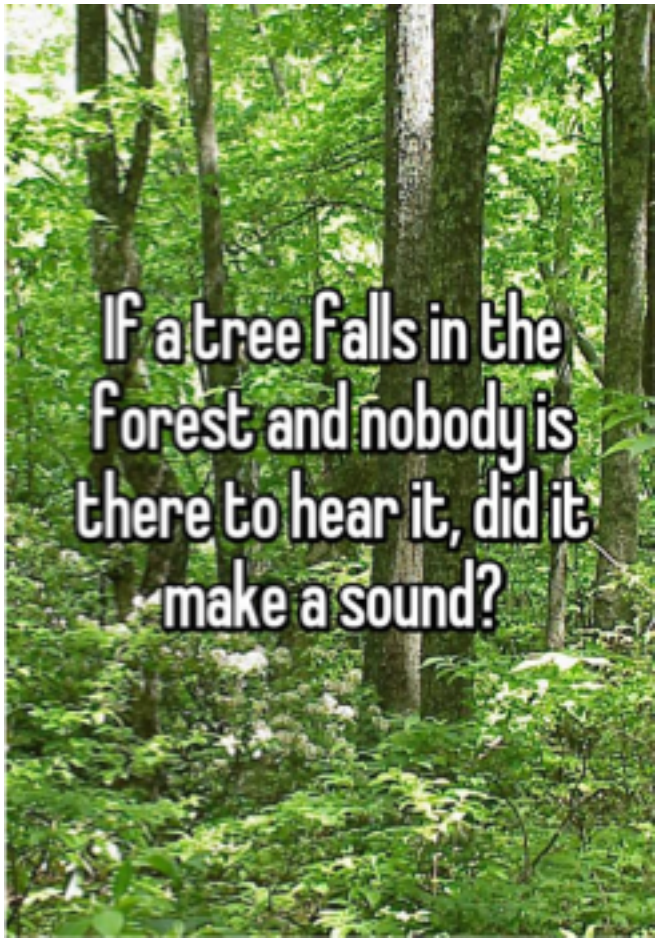
- Solar power subsidies were a core part of the ”**early commercialization phase**” of RE development

- However, as they diversified into a wide array of forms, and as solar costs have declined, **it is often unclear which policies constitute a subsidy, and which do not**



Source: IEA-RETD 2016: RE TRANSITION

- **If a Feed-in Tariff is offered at USD 2 cents/kWh, is it still a subsidy?**



Important to distinguish

Classic Subsidies: Few dispute that these constitute ”subsidies” in the traditional sense

- **Rebates**
- **Tax incentives**
- **Government-backed loans**
- **Cash grants**

vs.

The overall Regulatory Framework in which investment takes place: these are less clear:

- Guaranteed grid access
- Stable contracts (e.g. PPAs)
- Market design
- Guaranteed off-taker

Example

- **Do the existence of contracts (5-year, 10-year, 20-year) represent a form of subsidy?**
  - Some argue yes, some argue no
  - And yet, long-term contracts protect projects from wholesale market prices: as such, they may represent policy support, even if their price is at or near market prices
- **What if the contracts are signed by private companies (e.g. corporate PPAs like Google, Apple, etc.)?**
  - Presumably not. These are private transactions agreed in an open market

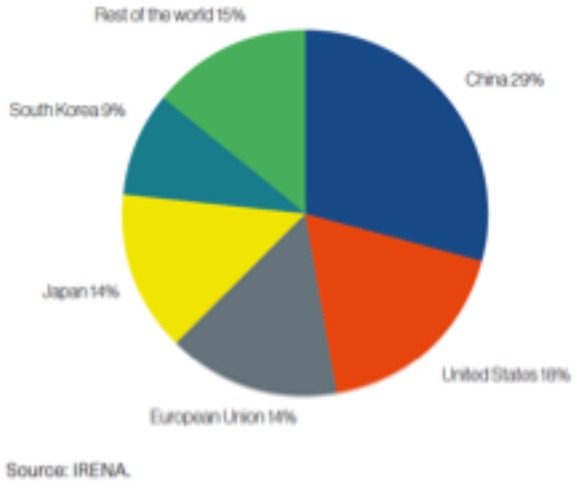
3. Overview of Solar Subsidies

1. Research and Development

- Many governments around the world invest in research and development (R&D) in solar power and other technologies
- R&D helps improve solar power technologies, and has played a critical role in making solar power a competitive energy supply source worldwide

Examples:
U.S. SERI (1974), Germany's Fraunhofer (1972)

Cumulative RE Patents (IRENA 2019)



Source: IRENA.

2. Investment Subsidies

- Many countries have offered direct investment subsidies or cash grants for solar power projects (sometimes called ”rebate programs”)
- Typically awarded in $/kW based on the total capacity installed: **capacity-based incentives ($/kW) vs. production-based incentives ($/kWh)**
- Often include caps on the total per-project subsidy that can be awarded

Examples:

- U.S. cash grants program, France’s investment subsidy, U.S. state-level investment subsidies

3. Tax Incentives

- Many countries provide special tax incentives for investing in renewable energy technologies like solar

- Tax incentives can involve either an **investment tax credit (ITC)**, a **production-based tax credit (PTC)**, or various forms of preferential tax treatment such as **accelerated depreciation** and **tax exemptions** (e.g. VAT exemptions on solar components)

Examples:

ITC and PTC in the U.S., VAT exemption in Kenya, accelerated depreciation in India

4. Low Interest Loans (Soft Loans)

- Many Governments, often in concert with local or national banks, have supported solar power development by providing so-called “soft loans” for solar power projects

- Such loans typically include both a preferential interest rate as well as a longer loan tenor, or duration

Examples:

- KfW in Germany (see also Germany’s 100,000 solar roofs program), Climate Investment Funds in Morocco, IFC and OPIC in Zambia

5. Government Mandates

- In some jurisdictions, Governments have mandated the use of solar power (either PV or solar heating) on certain buildings: often called "solar ordinances"

- Often such mandates are designed to encourage adoption of solar power in applications that already make economic sense

Examples:

- Solar hot water mandate: Israel, China, Spain, Jordan
- Solar PV mandate: France, California

6. Direct Government Investment

- In many cases, Governments have chosen to directly invest in solar power, either for free-standing **pilot projects**, or to supply government buildings, national parks, etc.
- Governments also often subsidize solar by giving **free land, or by paying for grid connection costs**
- In many regions around the world, governments also directly invest in technologies like solar PV as part of rural electrification projects

Examples:

- Japan, Germany, U.S., UAE

7. Feed-in Tariffs

- Governments establish cost-covering rates for the purchase of solar power (see **Session 5** for more details)

- Any additional costs (where applicable) that arise from these purchases are passed onto ratepayers (e.g. Germany) or taxpayers (e.g. Netherlands)

- Since FITs are set by governments, they represent a "**market intervention**": as such, FITs are considered by some to be subsidies, even if they are below retail prices, and below utility avoided costs

Examples:

- Japan, Germany, Ghana, Malaysia

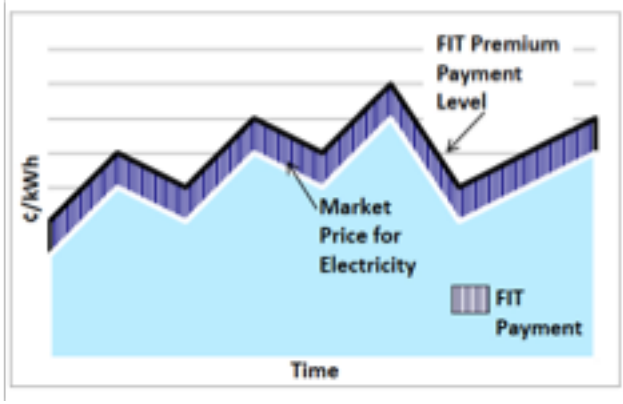
8. Feed-in Premiums

- Governments introduce a bonus or premium payment on top of the market price in order to ensure investments in solar power are economically viable

- This premium payment can either be fixed or variable and can involve caps and floors (see **Session 5** for more details on Feed-in Premium policies)

Examples:

- Germany, Czech Republic, Spain



9. Quota Obligations (Renewable Portfolio Standards, RPS)

- Governments frequently establish targets mandating a certain share of renewable energy in the power mix
- When they are legally binding, these targets are known as RPSs
- Frequently combined with renewable energy certificates (RECs), which can be traded between legally obligated entities (see next slide)

Examples:

Romania, U.S., Sweden

10. Renewable Energy Certificates

- In combination with Quota Obligations, many governments have introduced tradeable renewable energy certificates (often called RECs or TGCs for tradeable green certificates)
- RECs typically represent 1MWh of renewable electricity and can be sold separately from the electricity itself to meet the obligation
- In some U.S. states, solar technologies receive special RECs called “solar RECs” (SRECs) that typically trade at a higher value

Examples of SREC policies:

New Jersey (US), Massachusetts (US), Ohio (US)

11. Financial De-risking Mechanisms

- An additional category of solar subsidy takes the form of financial de-risking measures such as partial risk guarantees, currency protections, off-taker risk guarantees, sovereign risk guarantees, political risk guarantees and others.

- The aim of financial de-risking tools is to reduce the cost of capital and unlock financing

Examples:

Zambia, MIGA risk guarantees in Namibia, currency risk guarantees in India

Overview of Solar Subsidies

Subsidy Type	Description
1. Research and Development	Government supports R&D on solar power technologies
2. Investment Subsidies	Government offers a **cash subsidy** (often in $/kW) for the purchase of solar systems
3. Tax Incentives	Government provides special incentives, often in the form of **tax exemptions, or tax credits,** for the purchase of solar systems
4. Low interest loans	Financial institutions (often government-backed) provide concessional loans for investments in solar power

Overview of Solar Subsidies

Subsidy Type	Description
5. Government Mandates (Ordinances)	Governments set out a **mandate** requiring solar power on certain building types by a certain date
6. Direct Government Investment	Government **directly purchases solar systems** for public facilities or pilot projects, or covers land costs or grid connection costs for free
7. Feed-in Tariffs	Government sets **cost-covering rates** for the purchase of solar electricity
8. Feed-in Premiums	Government provides a **bonus or premium on top of the market price** for electricity generated by solar power

Overview of Solar Subsidies

Subsidy Type	Description
9. Quota Obligations (aka Renewable Portfolio Standards)	The Government sets out a minimum target for the share of renewable energy in the electricity mix. Electricity suppliers must meet this percentage share
10. Renewable Energy Certificates (RECs)	The Government creates a separate market for the "environmental attributes" of solar power via special certificates, allowing producers to earn a second revenue stream
11. Financial De-Risking Mechanisms	Governments or multilateral agencies provide a range of financial de-risking tools and guarantees to reduce the cost of capital and help unlock investment

4. Concluding Remarks

Concluding Remarks

- The debate around solar subsidies remains critical to the future of solar power worldwide
- The increasingly low cost of solar power **eliminates the need for traditional subsidies** like grants and rebates
- Major governments like China have recently phased out Feed-in Tariffs, moving instead to auctions in an attempt to lock-in even lower prices
- When the market sets the price (e.g. via an auction), most agree that the resulting price is not a subsidy

Concluding Remarks

- However, **many auctions around the world include other forms of subsidies**: free grid connection, subsidized land costs, preferential tax treatment, etc.
- Some argue all projects should sell directly on the spot market
- Phasing out the use of contracts altogether significantly increases the cost of capital, which pushes up the cost of solar
- There is a **trade-off between the desire to remove all kinds of policy intervention, and "policy-induced" cost increases**

Concluding Remarks

- Regardless of what type of support is offered to solar power, **the role of framework conditions is likely to remain important:** clear grid access rules, streamlined permitting, long-term targets, etc.

- **Even USD $2 cents/kWh solar needs a clear regulatory and permitting environment**

5. Further Reading

Further Reading

- Jacobs, D., Couture, T.D., Zinaman, O., Cochran, J., (2016). “RE-TRANSITION: Transitioning to Policy Frameworks for Cost-Competitive Renewables,” IEA-RETD, Paris. Available at: http://iea-retd.org/wp-content/uploads/2016/03/IEA-RETD_RE-TRANSITION.pdf
- IRENA, REN21, IEA (2018). Renewable Energy Policies in a Time of Transition, Available at: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Apr/IRENA_IEA_REN21_Policies_2018.pdf
- Analysis of the Scope of Energy Subsidies and Suggestions for the G-20 Initiative (2010)., IEA, OPEC, OECD, World Bank Joint Report. Available at: https://www.iea.org/media/weowebsite/energysubsidies/G20_Subsidy_Joint_Report.pdf
- Can the Solar Industry Survive Without Subsidies (June 2018). The Economist. Available at: https://www.economist.com/business/2018/06/14/can-the-solar-industry-survive-without-subsidies

Thank you for your time!

6. Knowledge Checkpoint: Multiple Choice Questions