CLEAN ENERGY SOLUTIONS CENTER
ASSISTING COUNTRIES WITH CLEAN ENERGY POLICY

INTERNATIONAL SOLAR ALLIANCE

International Solar Alliance Expert Training Course

New Business Models: Part 1

In partnership with the Clean Energy Solutions Center

Toby D. Couture

September 2018

Supporters of this Expert Training Series

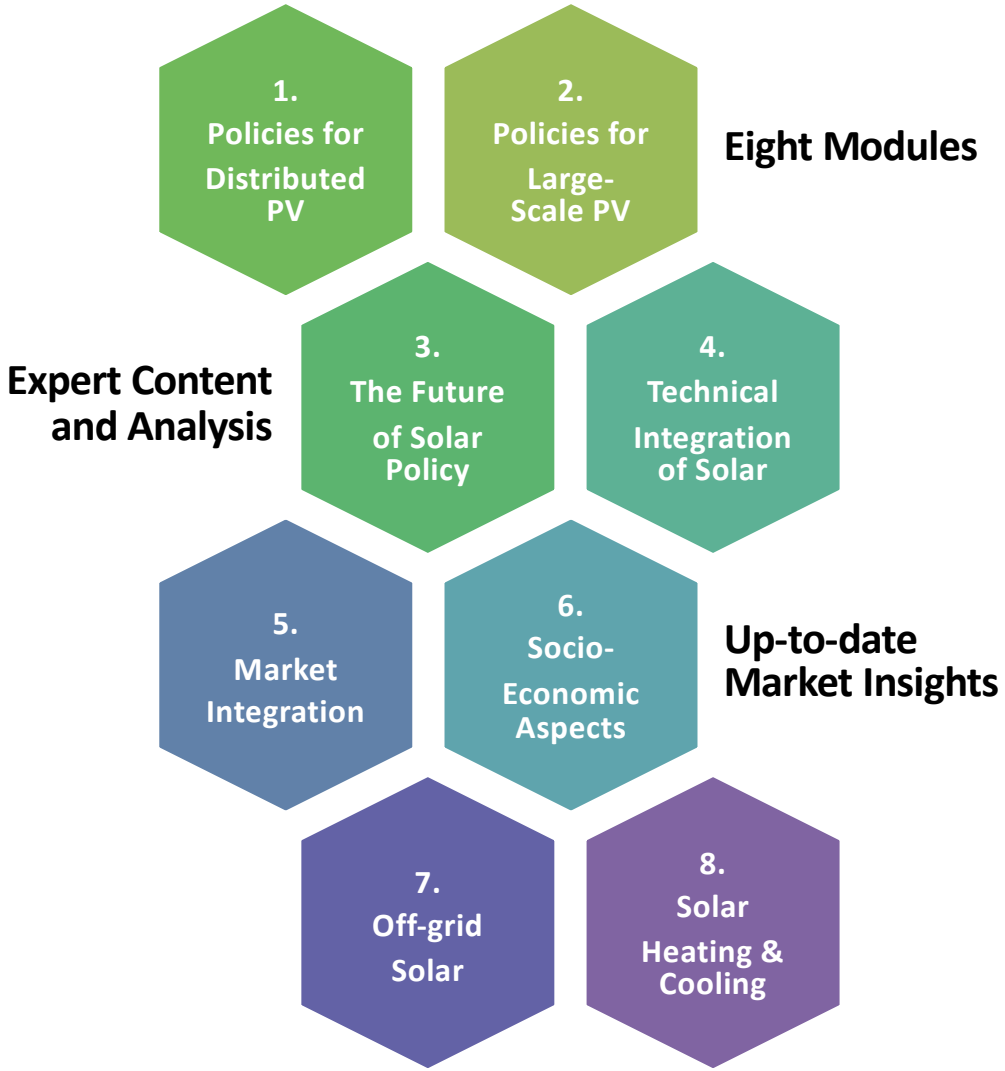
INTERNATIONAL SOLAR ALLIANCE

CLEAN ENERGY SOLUTIONS CENTER

ASSISTING COUNTRIES WITH CLEAN ENERGY POLICY

Overview of Training Course Modules

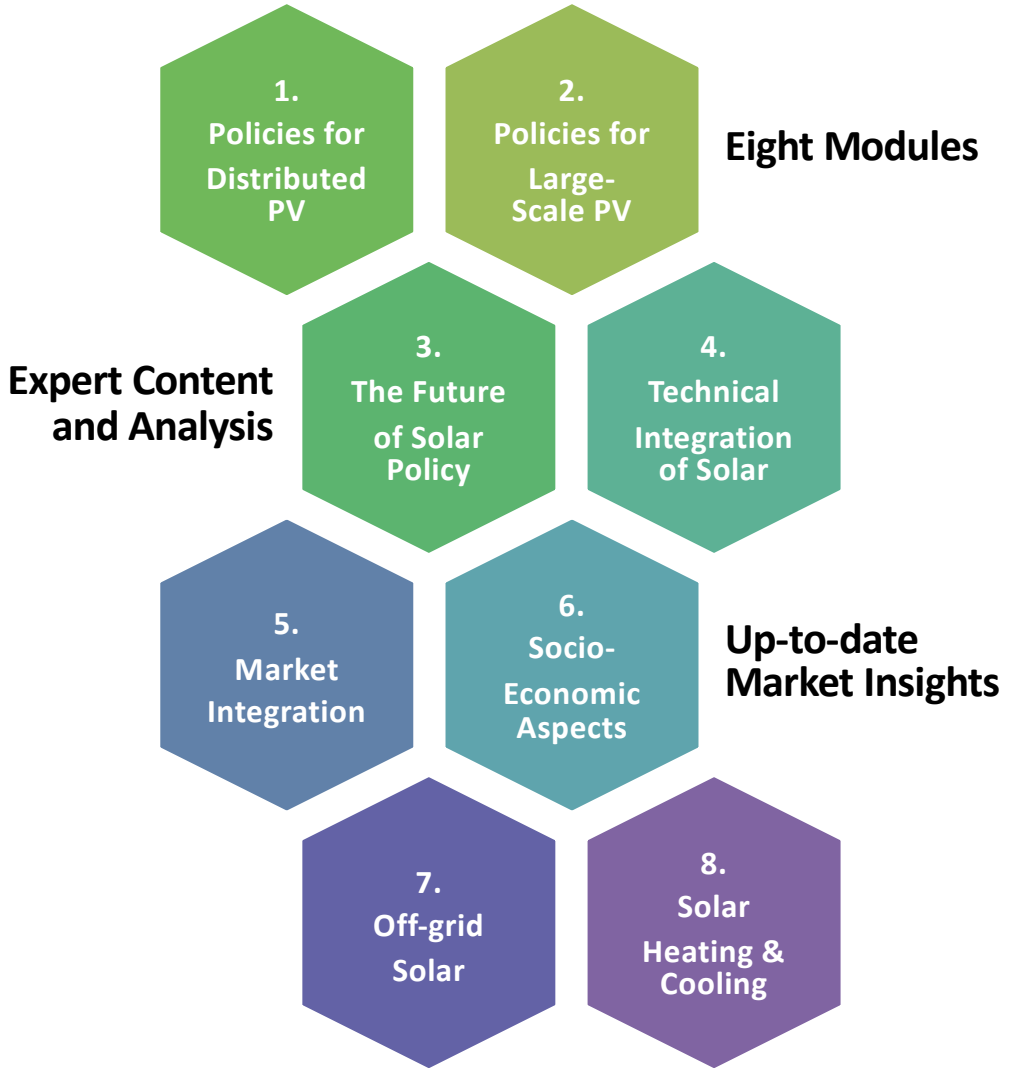
This Training is part of Module 1, and focuses on the issue of New Business Models in the Solar PV Sector



Two-Part Training

Part 1: Focuses on understanding these new solar business models

Part 2: Focuses on understanding how these new business models are impacting the traditional utility sector



Expert Trainer: Toby D. Couture

BRIEF PROFILE:

- Founder and **Director of E3 Analytics**, a renewable energy consultancy based in Berlin
- **12+ years of experience** in the renewable energy sector
- Worked with over **forty countries** around the world on the economic, financial, and policy aspects of solar deployment
- Lecturer in Berlin's University of Applied Sciences' **Renewables MBA** program

Overview of the Presentation

1. Introduction: Learning Objective
2. Understanding New Business Models
3. Overview of Four Main Business Models
4. Concluding Remarks
5. Further Reading
6. Knowledge Check: Multiple-Choice Questions

1. Introduction: Learning Objective

Learning Objectives

- Understand the historical context for the emergence of new business models in the power sector
- Understand the rise of new business models in the solar PV sector specifically
- Understand how the new business models are reducing the barriers to adopting solar
- Understand the advantages and challenges of these new business models

2. Understanding New Business Models

Historical Context

- The **traditional utility business model** is based on selling electricity from large, centralized power plants to end-users

- For most of the 20th Century, customers were connected to **one monopoly utility** with no option to switch providers, and little ability to engage in self-generation (except for industry, where self-generation remained widespread)

- Very **few independent power producers**: utilities owned the majority of generation, transmission, and distribution infrastructure

Historical Context

In the 1990s and 2000s, this started to change: **regulation enabled more actors to participate, compete, and invest**

The rise of new business models in the solar PV sector is a direct consequence of this prior period of liberalization and opening up

Photo credits: Hugo Lucas

What is a business model?

A business model defines how a business creates, delivers, and harnesses value for its customers

Why do new business models emerge?

There are two main drivers of the emergence of new business models in the power sector :

1. **Technological change**
2. **Changes in electricity market regulations**

New businesses emerge to capitalize on the new niches opened up by a rapidly changing technological and regulatory landscape

Photo credits: Toby D. Couture

Why do new business models emerge?

Other factors that can help accelerate the emergence of new business models include:

- **Changes in tax policy**
- **Changes in consumer behavior**
- **Financial innovation** (e.g. new financial products and services that make it easier for customers to invest, or borrow)

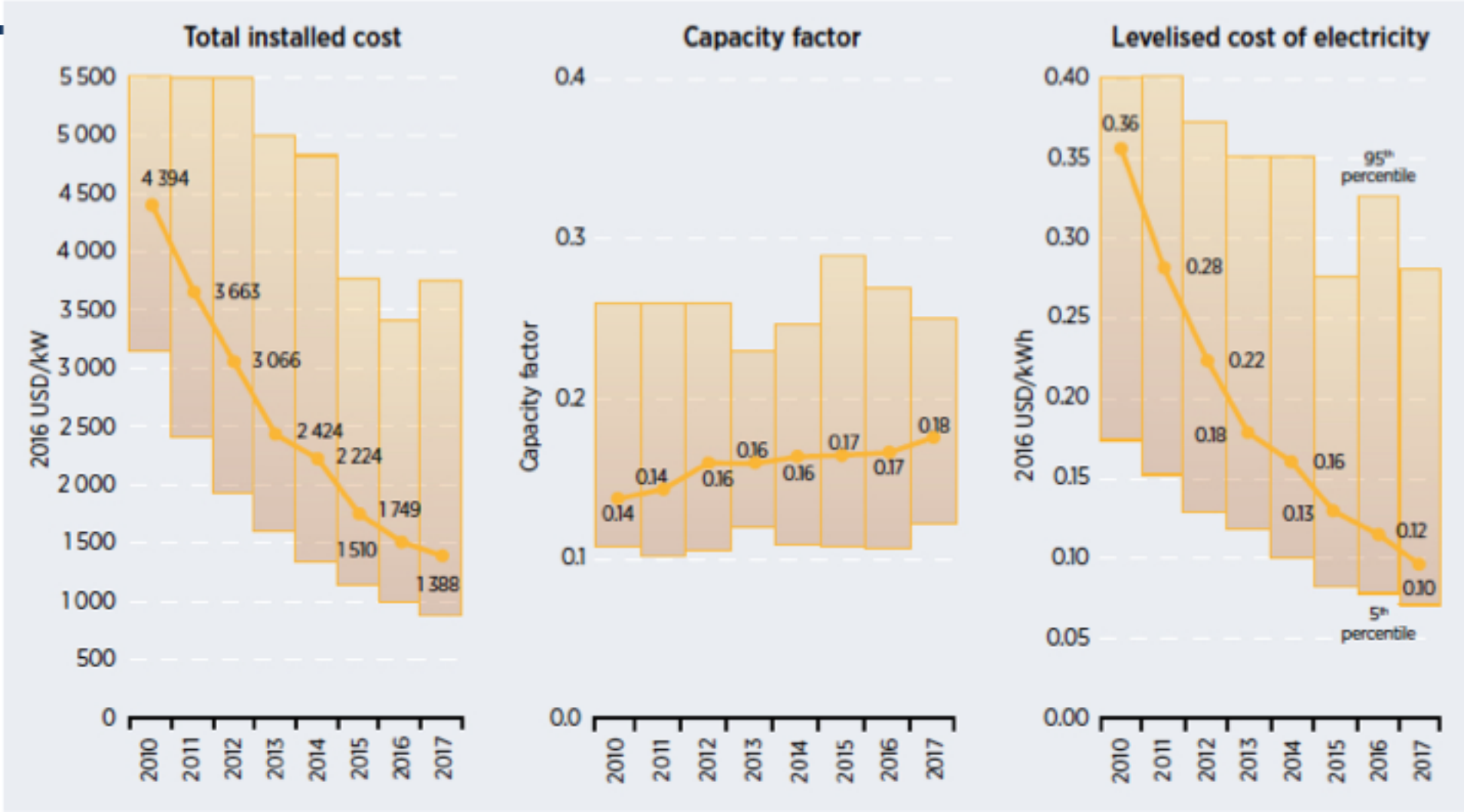
Rapid changes underway in solar market

The solar PV market is growing exponentially

Much of this growth is driven by large-scale solar PV projects (e.g. >50MW)

However, there is significant growth happening at the customer end as well, driven in part by new business models that are making it easier than ever before to invest in solar

Transformation in Solar Technology

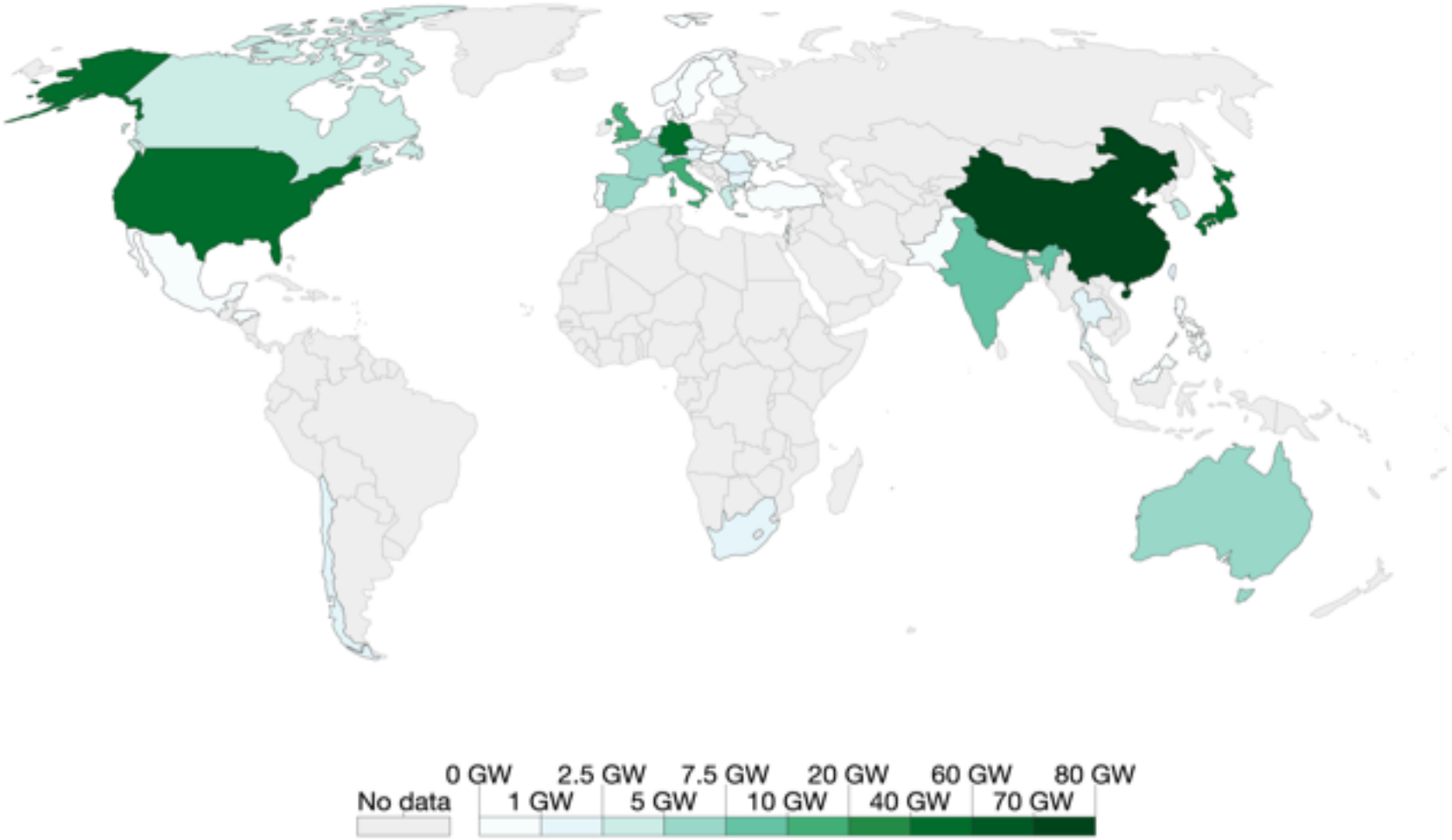


https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Jan/IRENA_2017_Power_Costs_2018.pdf

Installed solar photovoltaic (PV) capacity, gigawatts, 2016

Cumulative installed solar photovoltaic (PV) capacity, measured in gigawatts (GW).

Our World in Data

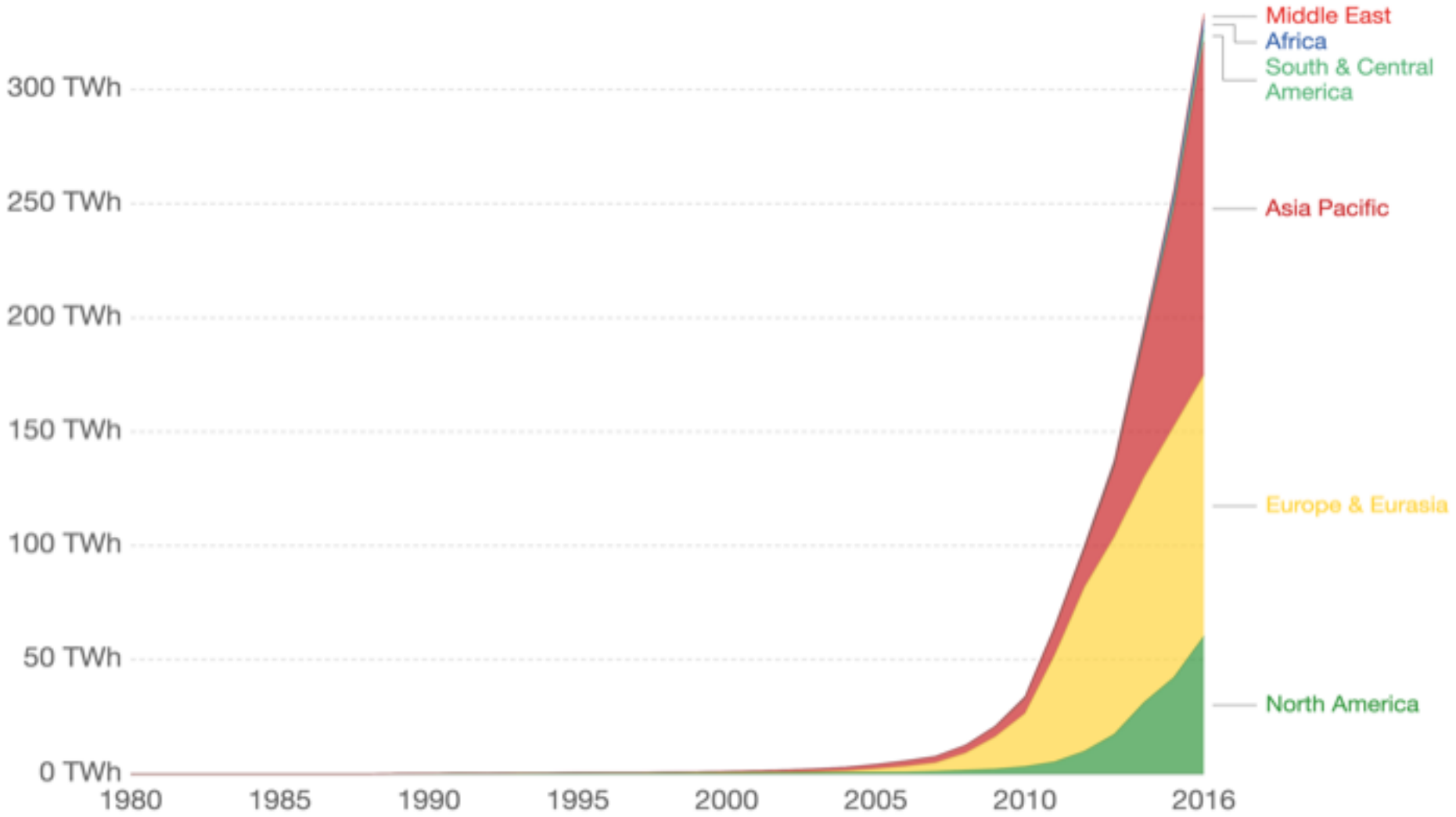


Source: BP Statistical Review of Global Energy

https://ourworldindata.org/renewables

Solar PV energy consumption by region, terawatt-hours

Solar photovoltaic (PV) energy consumption by region, measured in terawatt-hours (TWh) per year.



Source: BP Statistical Review of Global Energy

https://ourworldindata.org/renewables

3. New Solar Business Models

New Solar Business Models

- New business models almost always evolve in lock-step with a shifting regulatory landscape

- New models often emerge either where little or no regulation exists (e.g. Pay-as-you-go solar in Africa) or after regulations opening up the market are implemented (e.g. U.S., Australia)

- **Enabling regulations** (and supportive tax policy) **are often key for the market to take root**

New Solar Business Models

New business models take a range of forms. Most can be captured under the following four categories:

1. **Leasing Models**
2. **Third-party PPA Models**
3. **Pre-paid Models:** Cash sales
4. **Community Solar**

New Solar Business Models

- While a few companies dominate the headlines in the solar sector, there is a wide range of actors and businesses that are developing ”new business models” in the utility sector

- These include those listed previously, as well as **aggregators**, **merchant models**, **virtual utility models**, providers of **“smart” platforms** (e.g. peer-to-peer trading platforms), etc. (for more info, see **Part 2**)

- The four options discussed here focus specifically on **solar business models**

New Solar Business Models

- Many of the leading companies in this space (SolarCity, Sunrun, Vivint, Sungevity, Trina, etc.) offer customers more than one financing option

- Customers can choose which option they prefer based on the individual context, preferences, and financing capacity (e.g. with or without down payment, short or long-term lease, owners vs. renters, with or without storage, etc.)

- There is no one definition that captures all solar business models: **the landscape is evolving rapidly**

Overview of Key Roles and Responsibilities

- A key function of emerging solar business models is to provide a **bridge between utilities and customers**, as well as a **bridge between the *theory* of "going solar" and the actual *practice*** of doing so

KEY ACTIVITIES	TODAY		
	UTILITY	SOLAR COMPANY	CUSTOMER
PROJECT DEVELOPMENT			
Identify DPV sites		■	
Solicit & enroll DPV program participants		■	
Vet technologies & service providers		■	■
Engineer & design DPV projects		■	
Finance projects (or procure financing)		■	■
Procure hardware & materials		■	
Install DPV projects		■	
Permitting, inspection, & interconnection	■		
Own DPV projects		■	■
OPERATIONS			
Metering & billing	■	■	
Provide DPV customer support services	■	■	
Perform DPV maintenance		■	■
Manage DPV operations		■	■
GRID INTEGRATION			
Manage market transactions	■		
Forecasting, scheduling, dispatch, & system control	■		
Outage restoration & resiliency	■		
System planning & long-range forecasting	■		
Perform grid maintenance	■		

Source: RMI 2014; note: DPV = distributed solar photovoltaics

3.1. Leasing Models

3.1. Leasing Models

- Under this model, a third party developer installs and maintains a solar PV system on, or near, the customer's premises, often at zero-cost to the customer (i.e. no down payment)

- The customer signs a **rental agreement** and agrees to pay a **fixed monthly "rent"** or lease payment in exchange for the ability to consume the power generated by the system

3.1. Leasing Models

- The lease payment is often structured to be **cheaper than the customer's utility payment**

- The arrangement is often designed to make use of existing policy frameworks such as **net metering**

- Customer can choose a range of financing options (zero down payment, or with down payment)

3.1. Leasing Models

- The solar company (or installer, if the two are different entities) typically **monitors, maintains and insures the system** over the course of the contract

- In exchange, the solar company receives up to 20 years of predictable **monthly cash flows**

- The company often qualifies for a range of **tax benefits**

- Often, both individuals and companies signing solar leases also benefit, as lease payments are frequently tax deductible

3.1. Leasing Models

Leasing companies differ in a range of ways:

- Whether the installations are subcontracted or done in-house
- Whether financing is subcontracted or provided directly by the company
- Whether additional services are offered (e.g. energy optimisation software, storage, etc.)
- Whether energy cost savings (or PV system performance) are guaranteed or not
- End-of-term issues: who owns the system after the lease? What is the buy-out price? What are the fees for breaking the lease agreement?

3.1. Leasing Models

Advantages	Challenges & Criticisms
• Customers are provided with customized financing for the solar system, often with little or no upfront cost • Customers lock-in stable electricity prices, and are protected against utility price increases • Significantly reduces the barriers to adopting solar, especially for households and businesses • Company takes care of much of the paperwork, resource analysis, permitting, etc. • Company often provides installation, maintenance and insurance	• Critics argue that solar leasing leaves the customer with too little of the profits associated with “going solar” • Certain companies have developed a bad reputation in some markets for providing poor quality service, and sub-standard installations[1] • The business model is highly exposed to regulatory changes, and shifting government policy • Profitability frequently depends on the availability of tax incentives

1 https://reneweconomy.com.au/solar-leasing-horizon-opens-up-in-australia-29484/

3.2. Third-party PPA Models

3.2. Third-party PPA Models

- Similar to Solar Leasing (see above)

- Under this model, a third party developer installs a solar PV system on, or near, the customer's premises

- Like solar leasing, **the end-user does not own the system**

- The company that owns the system **sells power directly to the customer** under a PPA-style arrangement (a fixed rate per kWh)

3.2. Third-party PPA Models

- Main difference between a solar lease and third-party PPA is that **instead of a fixed monthly fee (rental payment) the customer receives a bill from the solar company based on the kWh they consumed from the solar array**

- This consumption may represent all, or only a portion, of their consumption

- PPA is often structured to be cheaper than utility power ('retail rate – x%')

3.2. Third-party PPA Models

- Customer can retain their grid connection (via Net Metering), or can fully disconnect by adding storage

- Like a solar leasing arrangement, **the company often monitors, maintains and insures the system**

- **PPA rate is often indexed** (i.e. it goes up over time, based on the expectation of future retail price increases)

- Both the company and individuals may **qualify for a range of tax benefits**

3.2. Third-party PPA Models

- Since the sale of electricity is a regulated activity in many jurisdictions, **both solar leases and third-party PPAs often require legislation, or a change in regulation**, to allow them to sell power to end-users

- Such regulations often protect these new business models from all of the requirements of being a public utility

3.2. Third-party PPA Models

Advantages	Challenges & Criticisms
• Customers are provided with customized financing for the solar system, often with little or no upfront cost • Customers lock-in stable electricity prices, and are protected against utility price increases • Significantly reduces the barriers to adopting solar, especially for households and businesses • Third party takes care of much of the paperwork, resource analysis, permitting, etc. • Third party often provides installation, maintenance and insurance	• PPA rate often increases over time • Critics argue that solar PPAs leave the customer with too little of the profits associated with “going solar” • Third-party companies have developed a bad reputation in some markets[1] • Like leasing, the business model is highly exposed to regulatory changes, and shifting government policy • Profitability also frequently depends on the availability of tax incentives

1 https://reneweconomy.com.au/solar-leasing-horizon-opens-up-in-australia-29484/

3.3. Pre-paid Systems: Cash Sales

3.3. Pre-paid Systems

- Under this approach, the customer uses their own disposable income (cash) or an individually secured bank loan to purchase their own solar PV system

- Customer selects their own installer

- Owner is typically responsible for maintaining the system and for working through all the paperwork, permits, and regulatory documents required

- Often connected either to a Net Metering, Feed-in Tariff, or NET-FIT policy

3.3. Pre-paid Systems

- Under Net Metering, customers consume their own self-generated electricity and can export their net excess generation to the grid: receive a credit on their bill

- Under FITs, customers receive a fixed payment for every kWh produced ($/kWh, 100% grid-export): no self-consumption

- Under a NET-FIT, customers can consume their own electricity produced from their solar system, and receive a fixed payment for their net excess generation exported to the grid ($/kWh)

3.3. Pre-paid Systems

- A cash sales approach enables the customer to derive the maximum benefit from going solar, as all cost savings and environmental attributes (e.g. renewable energy certificates) typically belong to the system owner

- Limited to customers with the financial capacity to invest in their own solar system

- Typically limited to customers with their own land or rooftop

3.3. Pre-paid Systems

Advantages	Challenges & Criticisms
• Customers can select their own installer based on the best price available in the market at the time • Customers own their own system, and can directly access any associated tax benefits or renewable energy certificates • Ownership of the system means that all of the benefits of going solar (lower cost electricity, tax benefits, etc.) belong to the customer	• Financing a solar PV system with cash or an individual bank loan may not be possible for many households, esp. low-income HH • The actual payback of investing in a solar PV system depends on future retail prices, as well as changes to Net Metering/FIT/NET-FIT policies: customers face more regulatory and price risk than under a solar lease or PPA arrangement • Customer typically responsible for paperwork and securing permits • Profitability also frequently depends on the availability of tax incentives

3.4. Community Solar

3.4. Community Solar

Community solar or ”shared solar” has emerged in recent years to enable customers to group themselves together to own solar on a community basis

Customers collectively invest in one larger solar PV array, often located off-site on a separate parcel of land

https://www.nrel.gov/docs/fy11osti/49930.pdf

3.4. Community Solar

Customers typically have two options:

1. They can **own a "share"** of the production and use that share to offset their utility bill

2. They can subscribe to, or "**lease**", a portion of the project's output for a set price

Note: there is a wide range of community solar models, not all of which can be covered here.

3.4. Community Solar

There are four broad types of community solar:

1. **Utility-led model**: utility owns and develops a project into which its ratepayers can invest on a voluntary basis
2. **Special-Purpose Vehicle (SPV) model**: a legal entity is established to finance the system, drawing on contributions from community members
3. **"On-bill Credit" Model:** participants get a credit on their monthly bill based on their share in the community solar project
4. **Non-profit model**: donors contribute to finance a community installation for a charitable organisation

https://www.solarreviews.com/blog/what-is-community-solar-and-is-it-better-than-installing-solar-panels-on-your-home

Why Community Solar?

- It is estimated that only 22% to 27% of residential rooftops in the U.S. (for instance) are suitable for developing a solar PV system (due to issues related to shading, building structure, ownership, and the orientation of the roof)

- Community solar allows all ratepayers to participate in solar, including citizens who do not own their own roof (renters)

https://www.nrel.gov/docs/fy11osti/49930.pdf

3.4. Community Solar

Advantages	Challenges & Criticisms
- Customers can co-finance a solar system, and lock-in stable electricity prices - Benefit from economies of scale (larger solar systems = lower costs) - Customers without land or access to their own rooftop (e.g. renters) can still invest in and benefit from solar - Paperwork, permitting, installation, maintenance and insurance is typically covered by the community or by the project developer	- The business model remains exposed to regulatory changes, and shifting government policy - Logistical and community engagement challenges can make it difficult to mobilize financing - Tax and regulatory issues may make it difficult for all investors to participate on equal terms - Large projects may face higher environmental barriers than individual rooftop systems - Profitability also frequently depends on the availability of tax incentives

4. Concluding Remarks

4. Concluding Remarks

- **Business models, regulatory frameworks, and financial instruments are inextricably linked: all must evolve together**

- **New business models are making it easier than ever before for customers to "go solar":** zero down payment, streamlined procedures, etc.

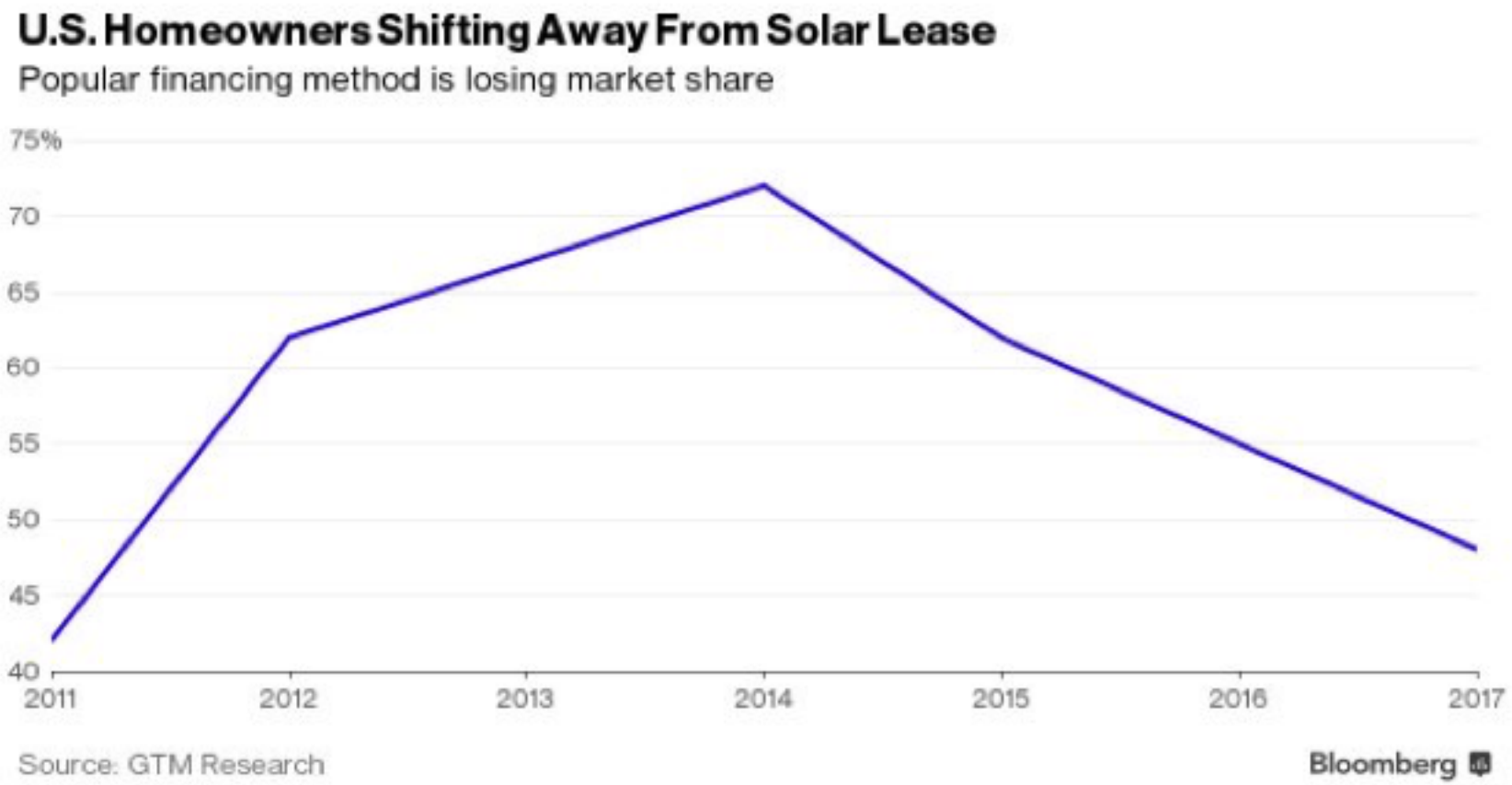
- New options like community solar can help **bring the benefits of solar to individuals without their own home**, or a suitable roof

4. Concluding Remarks

However, **growth in certain business models**, particularly solar leases and third-party PPA models, **has slowed** in many key markets due to a few key factors:

1. Solar panels are becoming **more affordable**, reducing the barrier to people purchasing their own;
2. With a PPA or lease, the solar company and its investors get most of the **tax benefits and incentives**, not the end-user
3. Awareness is growing that customers can **save more money** by buying their systems with cash or with a loan
4. Difficulties can arise when owners want to **sell their house:** the new owner may not want the solar lease

4. Concluding Remarks



https://www.solar-estimate.org/solar-financing/ppa-solar

4. Concluding Remarks

However, there is still tremendous potential for new business models, particularly **in emerging economies**:

- **Less disposable income** to invest in solar
- Often **difficult for small players** (e.g. households) to obtain bank loans on their own
- **Cost reductions** in solar now make it possible to undercut utility rates in many emerging markets
- **Fewer tax incentives** for individuals to access
- **Low level of awareness** points to significant potential for growth

4. Concluding Remarks

The main risks for these new customer-focused business models remain:

- Introduction of **fixed charges** and other levies on solar customers
- Changes in **Net Metering or other self-consumption regulations**
- Changes in **tax laws**
- Changes in **electricity market design**/regulation

4. Concluding Remarks

Governments keen to support the emergence of new solar business models need to create a supportive enabling environment

→ Includes power market regulations, policies enabling self-consumption, tax rules, etc.

Thank you for your time!

5. Further Reading

Further Reading

New Business Models (PwC 2016): https://www.pwc.com/gx/en/utilities/publications/assets/pwc-future-utility-business-models.pdf

New Business Models (RMI 2014): https://rmi.org/insight/bridges-new-solar-business-models/

Future of Utilities - Utilities of the Future (2016). Ed. Fereidoon Sioshansi, Elsevier. https://www.elsevier.com/books/future-of-utilities-utilities-of-the-future/sioshansi/978-0-12-804249-6

Community Solar (NREL 2010): https://www.nrel.gov/docs/fy11osti/49930.pdf

Further Reading

Residential Guide to Community Solar (2016):
https://www.seia.org/sites/default/files/Residential%20Consumer%20Guide%20to%20Community%20Solar%20-%20FINAL.pdf

Community Solar (2018):
https://www.solar-estimate.org/news/2018-05-12-community-solar-alternative-to-owning-or-leasing-solar

Rooftop vs. Community Solar (2018):
https://www.solarreviews.com/blog/what-is-community-solar-and-is-it-better-than-installing-solar-panels-on-your-home

Common terms in both solar leasing and solar PPA models:

- **Term length:** Residential solar leases are usually for 20 to 25 years. Commercial solar leases can be shorter (generally from 7 to 20 years).
- **Performance & maintenance:** The leasing company will monitor the system's performance to ensure that it is operating correctly for the duration of the lease. They are also responsible for maintaining and repairing it
- **Monitoring:** Most solar leasing companies offer free online, smartphone, or tablet programs to track your solar panel system's performance.
- **Buying the system:** You can typically buy the solar panel system at any time during the lease term.
- **Selling your home:** If you sell your property, you can transfer the remainder of your lease to the homebuyer or buy the system yourself.
- **At the end of the term:** When your agreement ends, you can either buy the system outright, have the leasing company remove it, or leave the system in place and renew the agreement with the owner/developer.

6. Knowledge Checkpoint: Multiple Choice Questions