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AGRICULTURAL AND RURAL DEVELOPMENT BANK
ដើម្បីកសិករនិងអភិវឌ្ឍន៍សេដ្ឋកិច្ចសង្គម

UN WOMEN

UN environment programme

Green Finance and Carbon Credits Training

EmPower Programme: Women for Climate-Resilient Societies

Federal Ministry for Economic Cooperation and Development

NEW ZEALAND FOREIGN AFFAIRS & TRADE Manatū Aorere

Sweden Sverige

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

Agenda – Day 3

Time	Session	Lead Facilitator
08:00-08:30	Registration and networking	NCDDS Team
08.30-09.00	Opening Remarks	- Opening Remark by NCDDS; UNEP,; and, ARDB
09:00-09:20	Objectives, agenda, participant expectations	UNEP
09:20-10:05	Climate change basics: What it means for Cambodia, key terms, mitigation vs adaptation	UNEP
10:05-10:45	Practical examples: Climate Change mitigation in detail – Green Technology options	UNEP
10:45-11:00	Coffee break	
11:00-11:45	Green financing fundamentals: what makes finance green, how lenders define and track green lending	UNEP
11:45-12:30	Types of green loans (ARDB-relevant): categories, eligible investments, typical appraisal/verification approach – GUEST Speaker	ARDB
12:30-13:30	Lunch	
13:30-14:30	CO_2 calculations (practical): basic methods, assumptions, simple example calculations, limitations	UNEP
14:30-15:15	Carbon credits and carbon markets: what they are, how projects qualify, integrity basics, do's and don'ts	UNEP
15:15-15:30	Coffee break	
15:30-16:20	Group exercise: identify a green investment, match to loan type, outline expected climate benefit (mitigation/adaptation + indicative CO2)	Facilitator: UNEP & NCDDS
16:20-16:50	Plenary share-back and discussion: pipeline ideas, constraints, support needs	Facilitator: NCDDS & ARDB
16:50-17:00	Wrap-up, evaluation, and next steps	UNEP and ARDB
17:00-17:05	Closing Remark	NCDDS

Objectives, Agenda, Participant expectations

Pre- Training Assessment

https://forms.gle/FrLZ577ib31a5aHr8

Climate Change Basics

EmPower Programme II: Women for Climate-Resilient Societies

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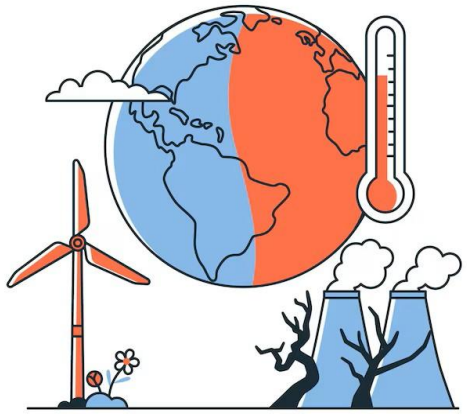
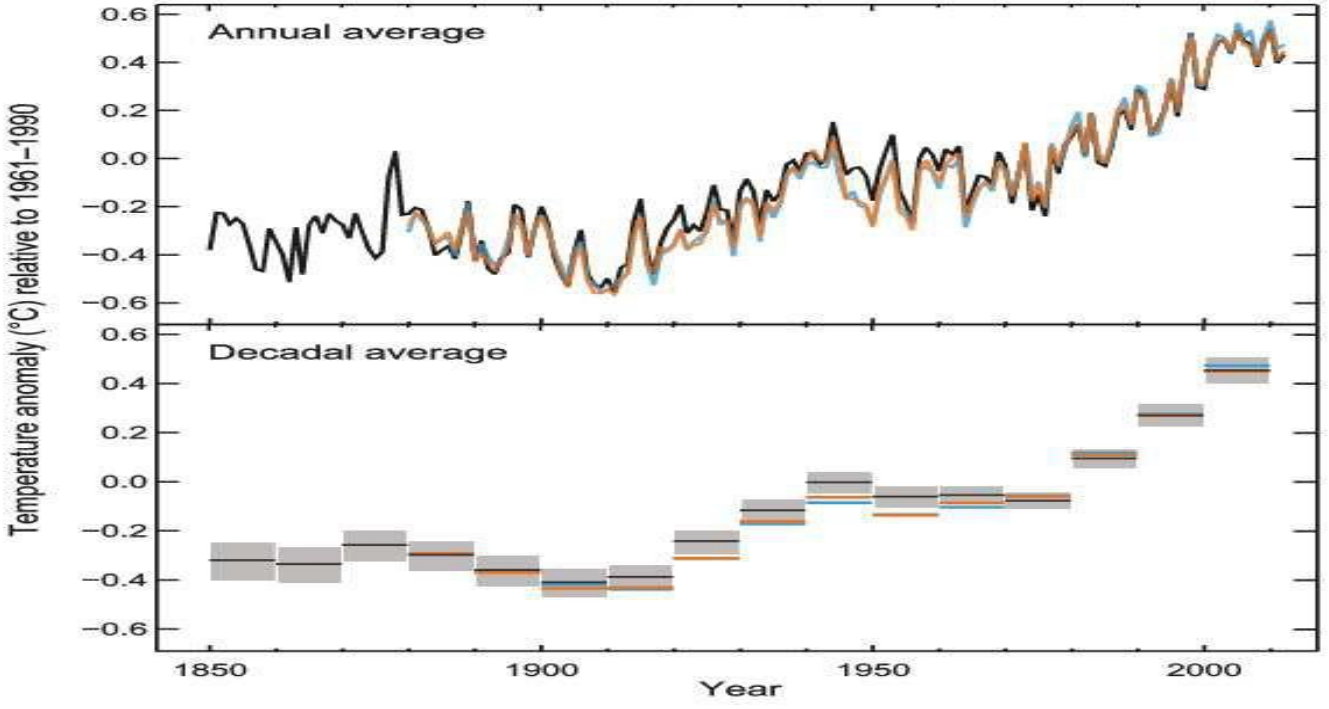
What is Climate Change?

Climate change is simply the change in **average climatic conditions** over a **long period of time**, usually more than a decade (10 years)

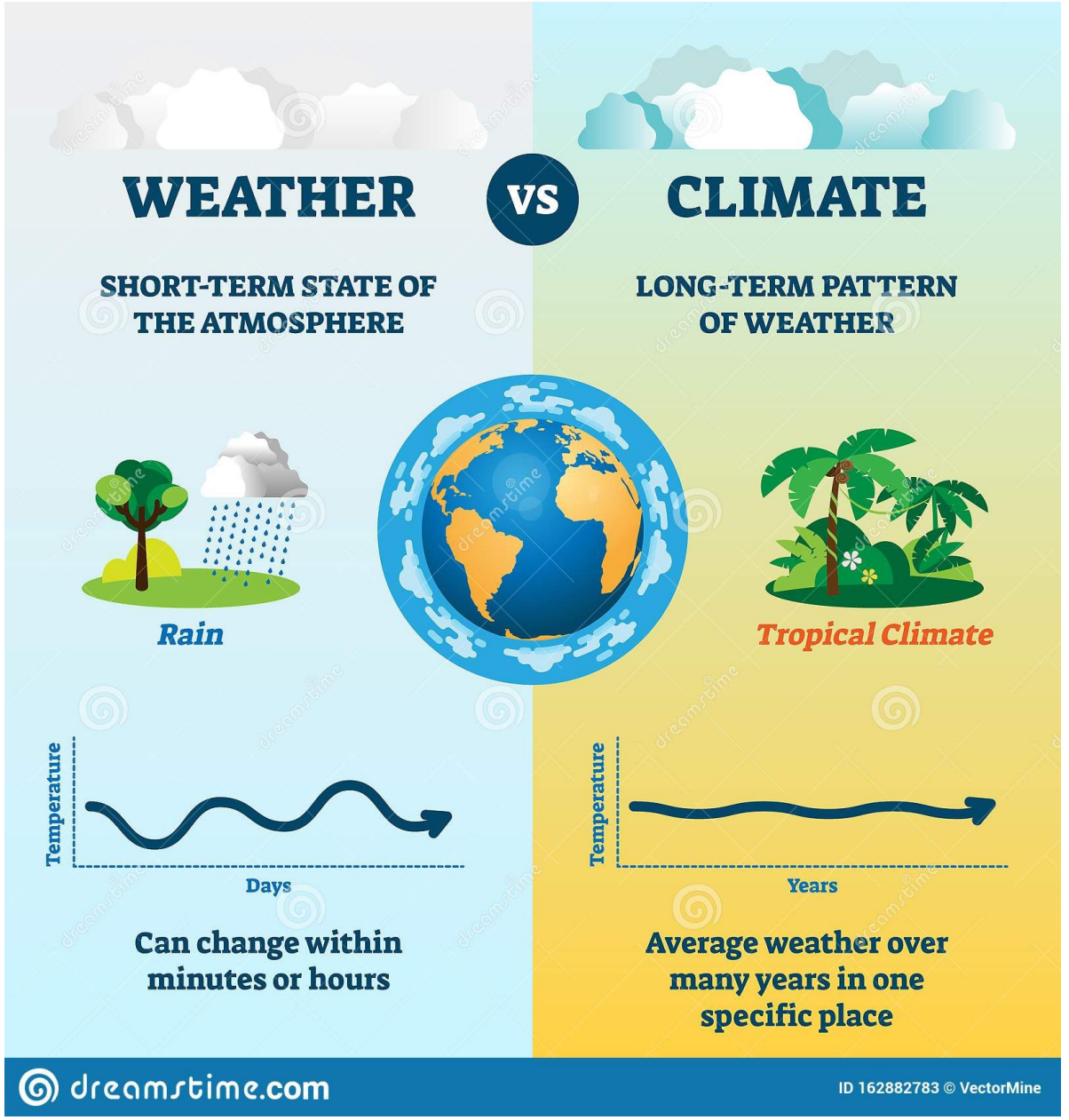


- Temperatur e
- Rainfall



Weather, Climate and climate change

- **Weather** is the day-to-day atmospheric condition of a place for a short period of time e.g.- today is a sunny day or snowfall is predicted in the next few days.
- **Climate** - Average weather over time and space
- **Climate Change in the average weather patterns**, such as temperature and rainfall, in a region over a long period of time (usually 30 years) due to Global Warming



Causes of climate change

CAUSES OF CLIMATE CHANGE

GENERATING POWER

MANUFACTURING GOODS

POWERING BUILDINGS

PRODUCING FOOD

USING TRANSPORTATION

CUTTING DOWN FORESTS

CONSUMING TOO MUCH

Why care about climate change?

CLIMATE CHANGE EFFECTS

HOTTER TEMPERATURES

MORE SEVERE STORMS

INCREASED DROUGHT

A WARMING, RISING OCEAN

LOSS OF SPECIES

NOT ENOUGH FOOD

MORE HEALTH RISKS

POVERTY AND DISPLACEMENT

Heavy rain caused **floods** in nine provinces, affecting over 33,000 families as of October 2025.

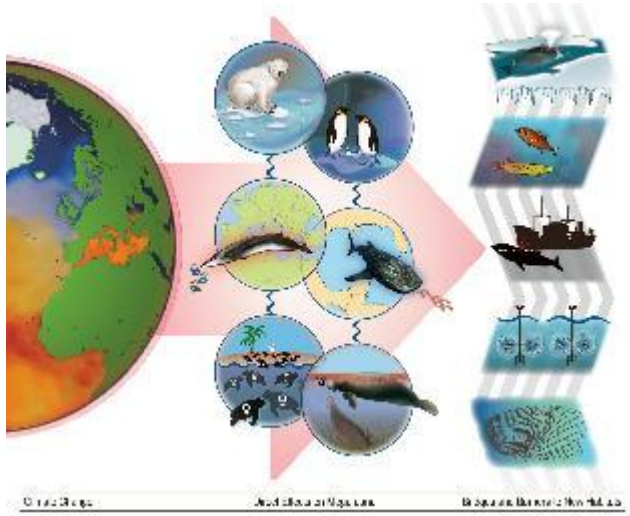
The **hottest temperature** recorded in 170 years,rose over 40 degrees in Phnom Penh and someprovinces in 2024.

Climate Change Impacts in Cambodia

Rising Temperature

Drought

Extreme weather



Changes to ecosystem

Sea Level Rise

Climate Change Impacts in Cambodia

Wildfires

Poor Air Quality

Health Risks

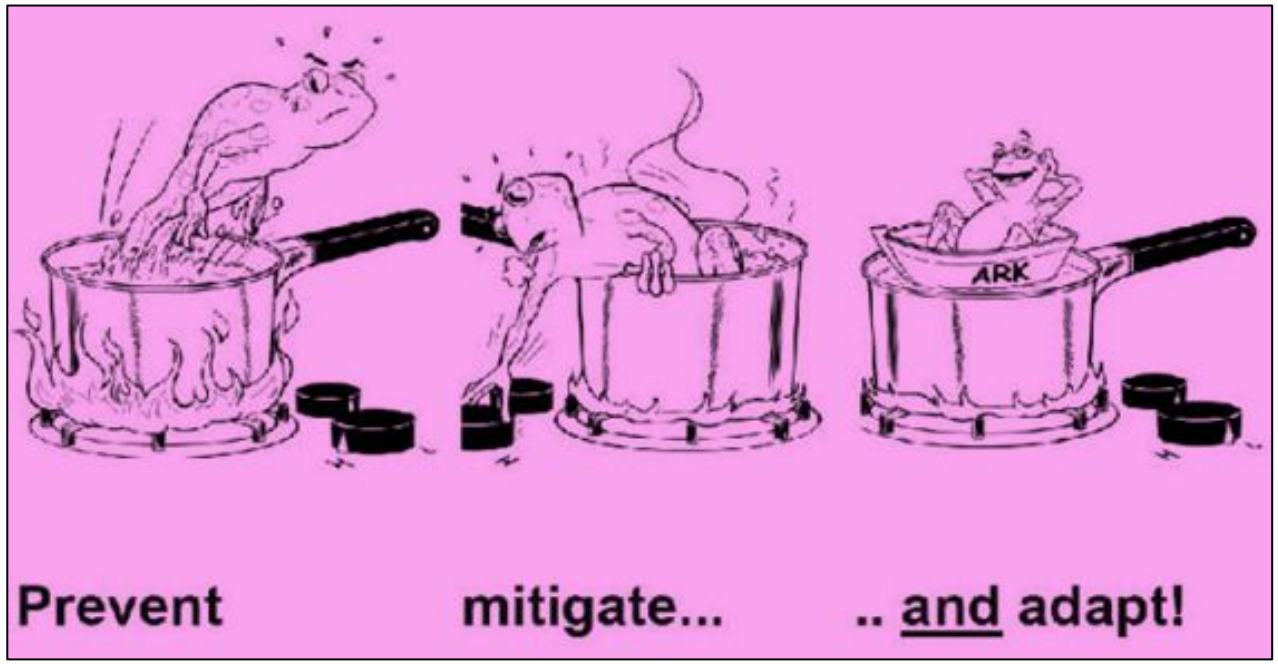
Economic Impacts

Climate Projections: Cambodia

Indicator	Projection by 2050
Temperature	+1 °C to +1.5 °C
Extreme heat	Significant increase
Rainfall	~5% increase but more irregular
Flood risk	Higher
Drought risk	Higher in dry season

Climate Change Mitigation and Adaptation

CLIMATE CHANGE MITIGATION VS ADAPTATION



Mitigation

- Making the impacts of climate change less severe by **preventing** or reducing the emission of greenhouse gases (GHG) into the atmosphere.

Adaptation

- Make ourselves adapt to the new environment/ climate
- Protect our families, our economies, and the environment in which we live from the impacts of climate change.

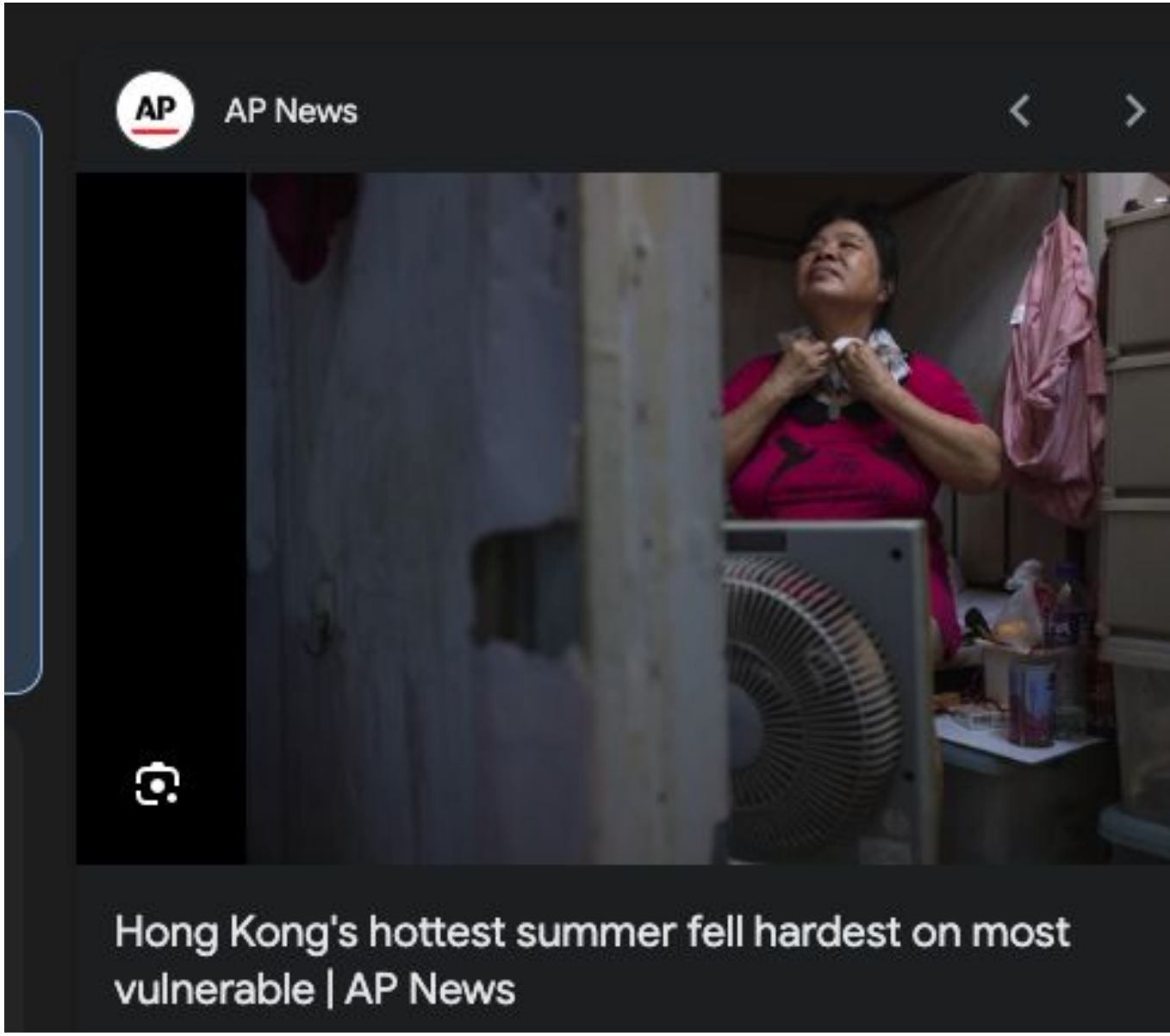
We live on the same Earth with Same Climate Conditions

Do you think climate change affects us differently?

YES - NO

- Same Flood- Different Impacts

- Same increase in Temperature- Experienced differently



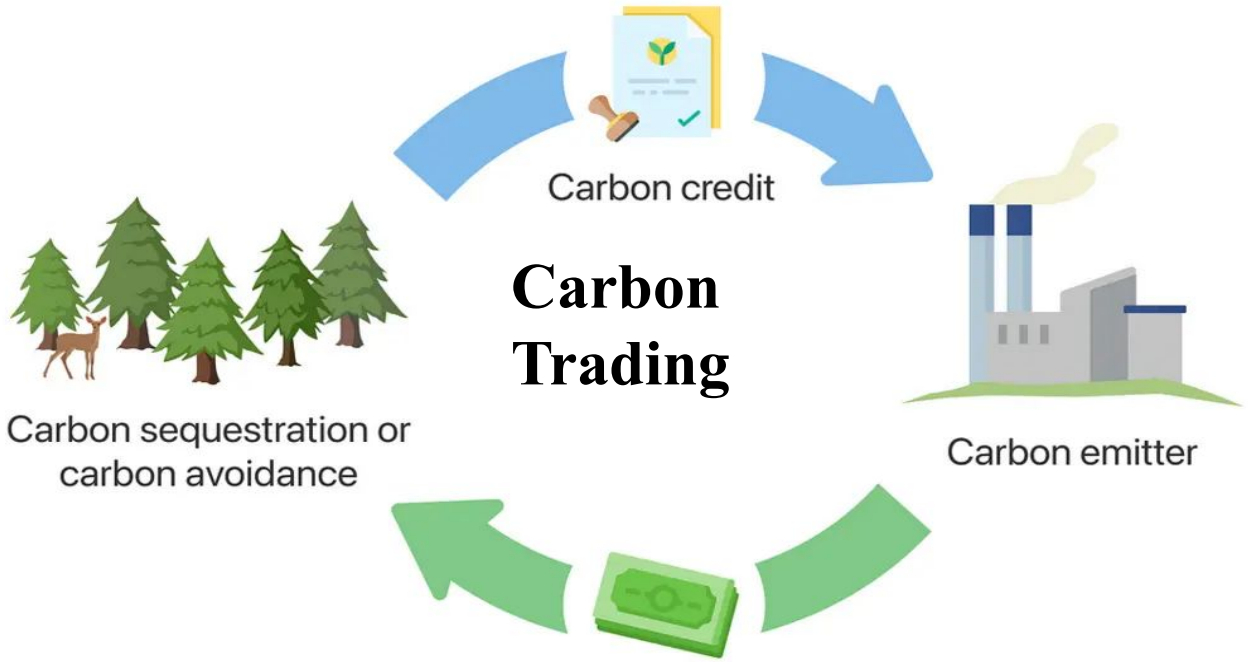
Impact of Climate Change

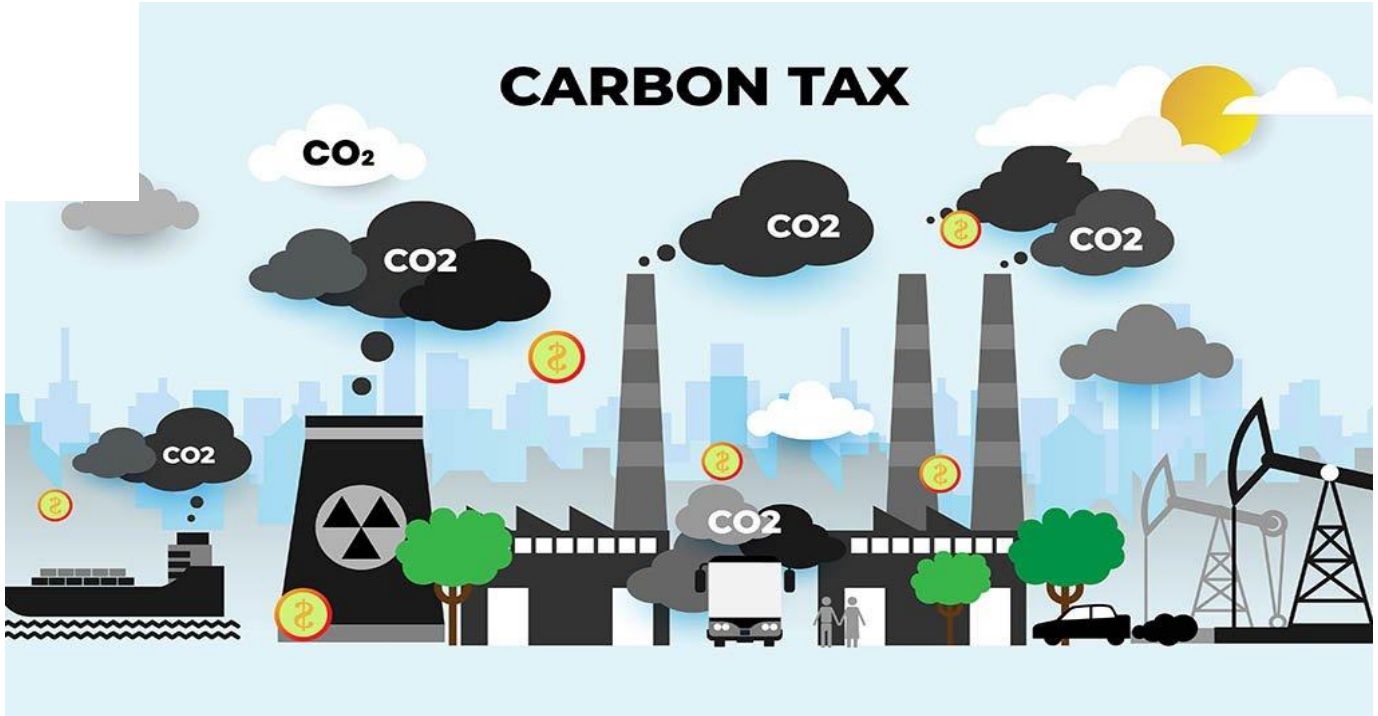
Do you think climate change affects everyone equally?

Simple answer: **NO!**

Vulnerability –people will be differently impacted by Climate change based on their Socio-Economic Conditions – NEEDS different support and planning!

Climate Policies for Mitigation





Q&A Session

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UN environment programme

Practical Examples: Clean and Climate Resilient Technologies

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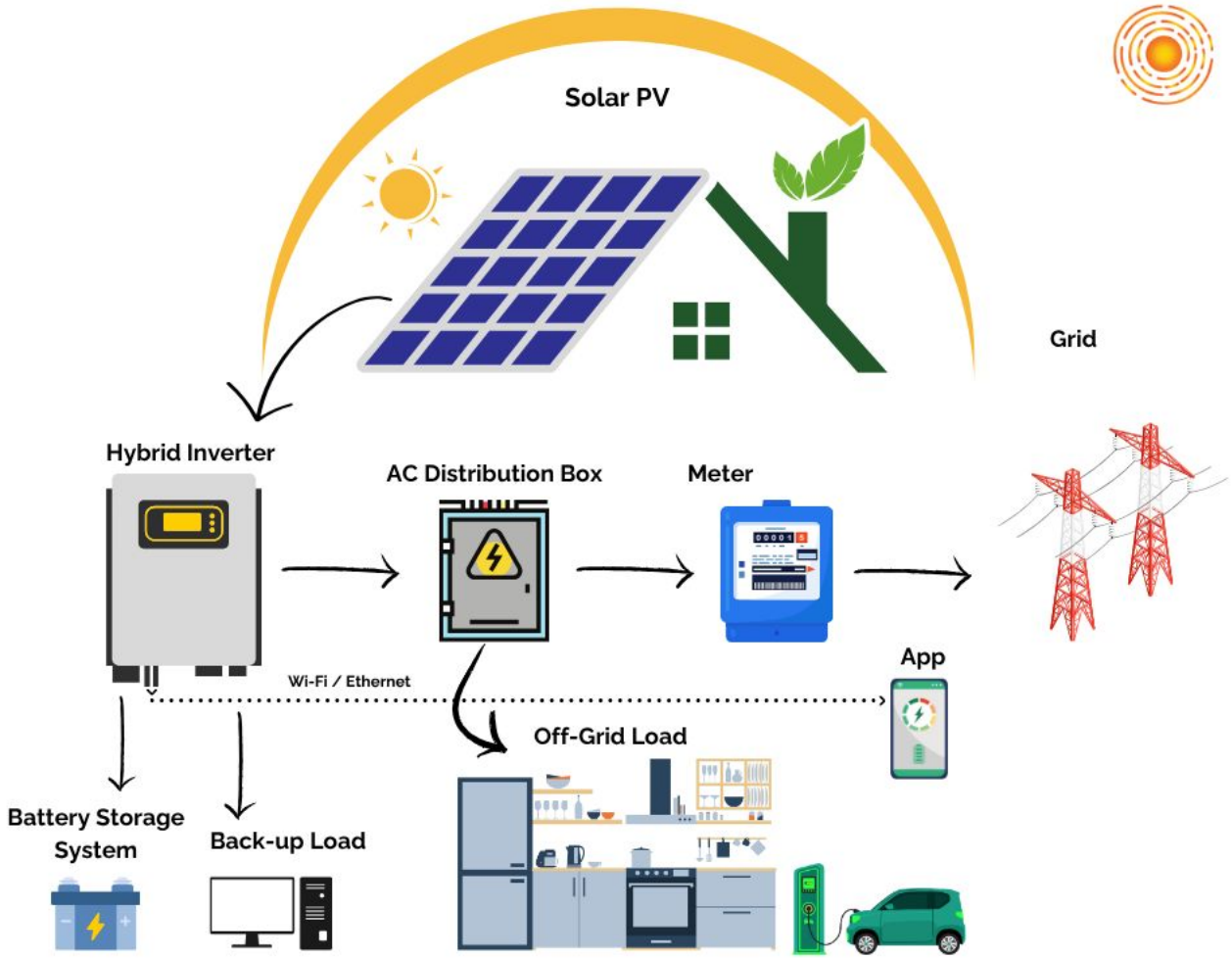
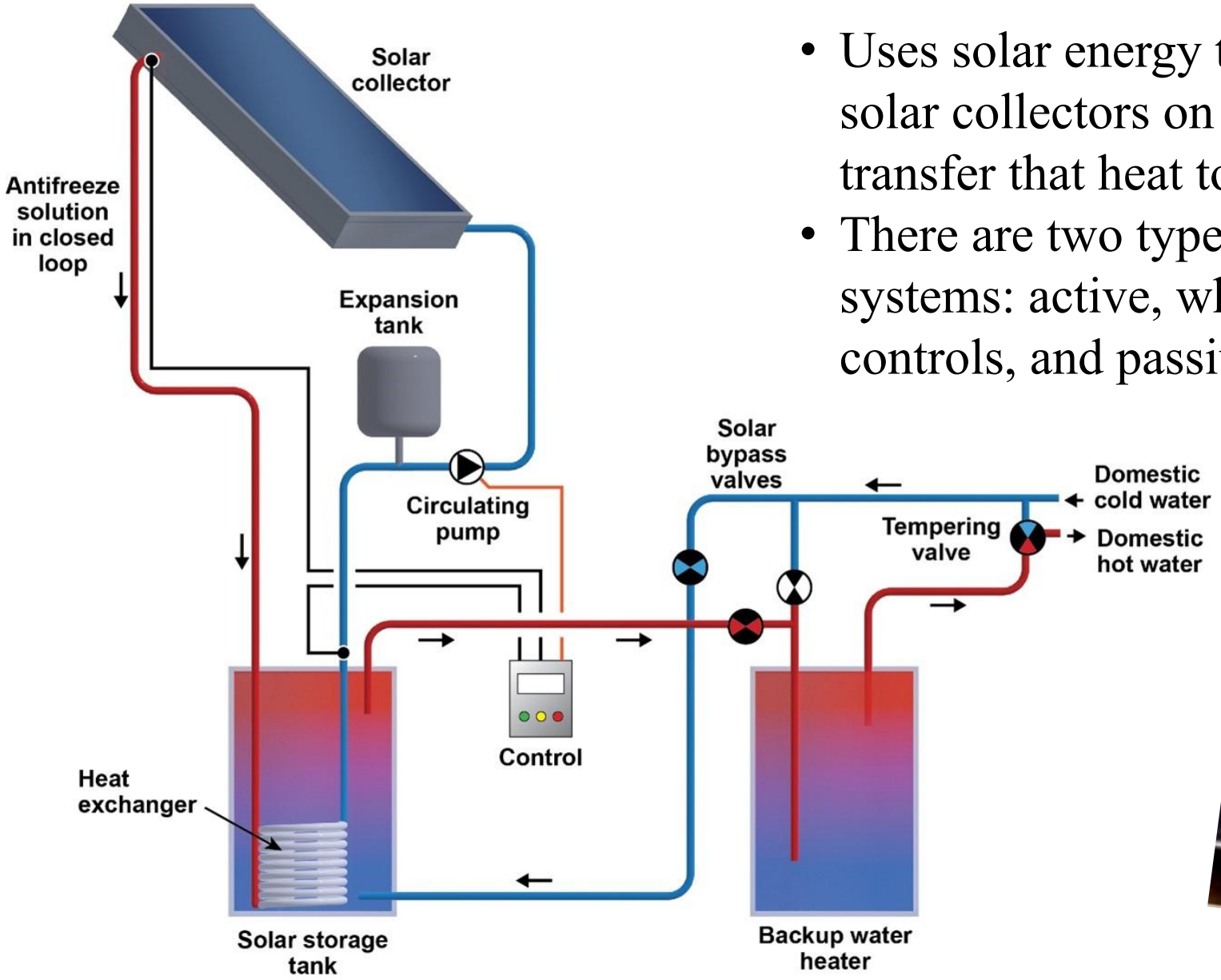
Solar PV (Photovoltaic) Technology

- Converts sunlight directly into electricity using semiconductor materials, like silicon, in solar cells



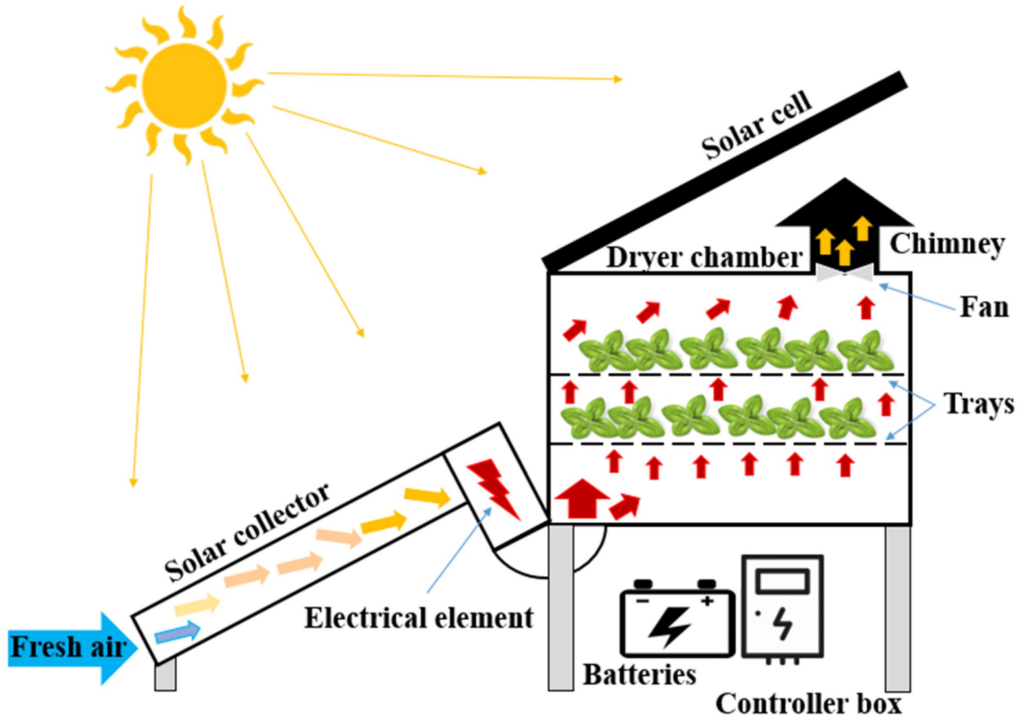
Solar Water Heating System

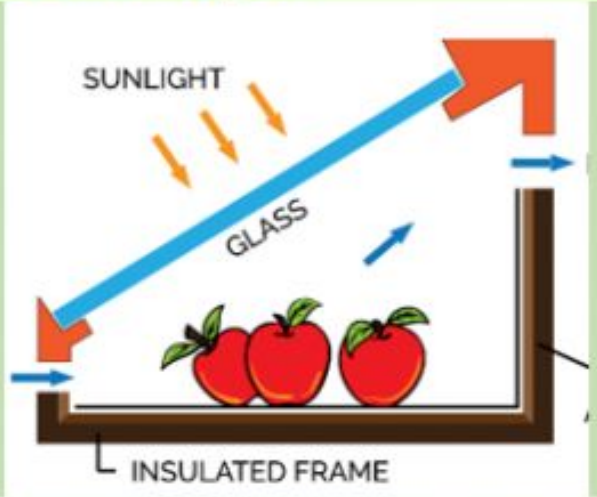
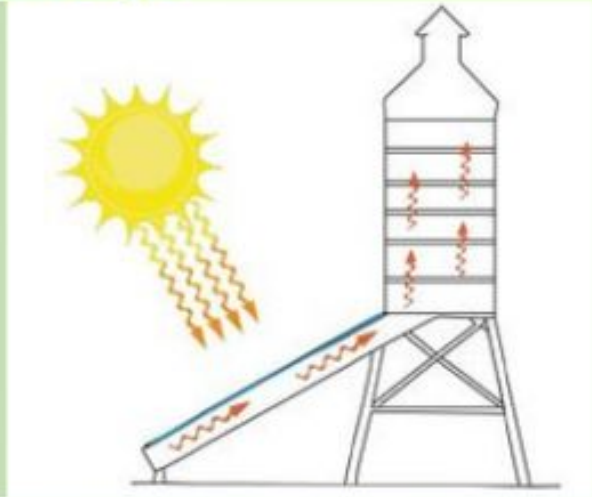


- Uses solar energy to heat water, typically by using solar collectors on a roof to capture sunlight and transfer that heat to a storage tank
- There are two types of solar water heating systems: active, which have circulating pumps and controls, and passive, which don't have pumps.

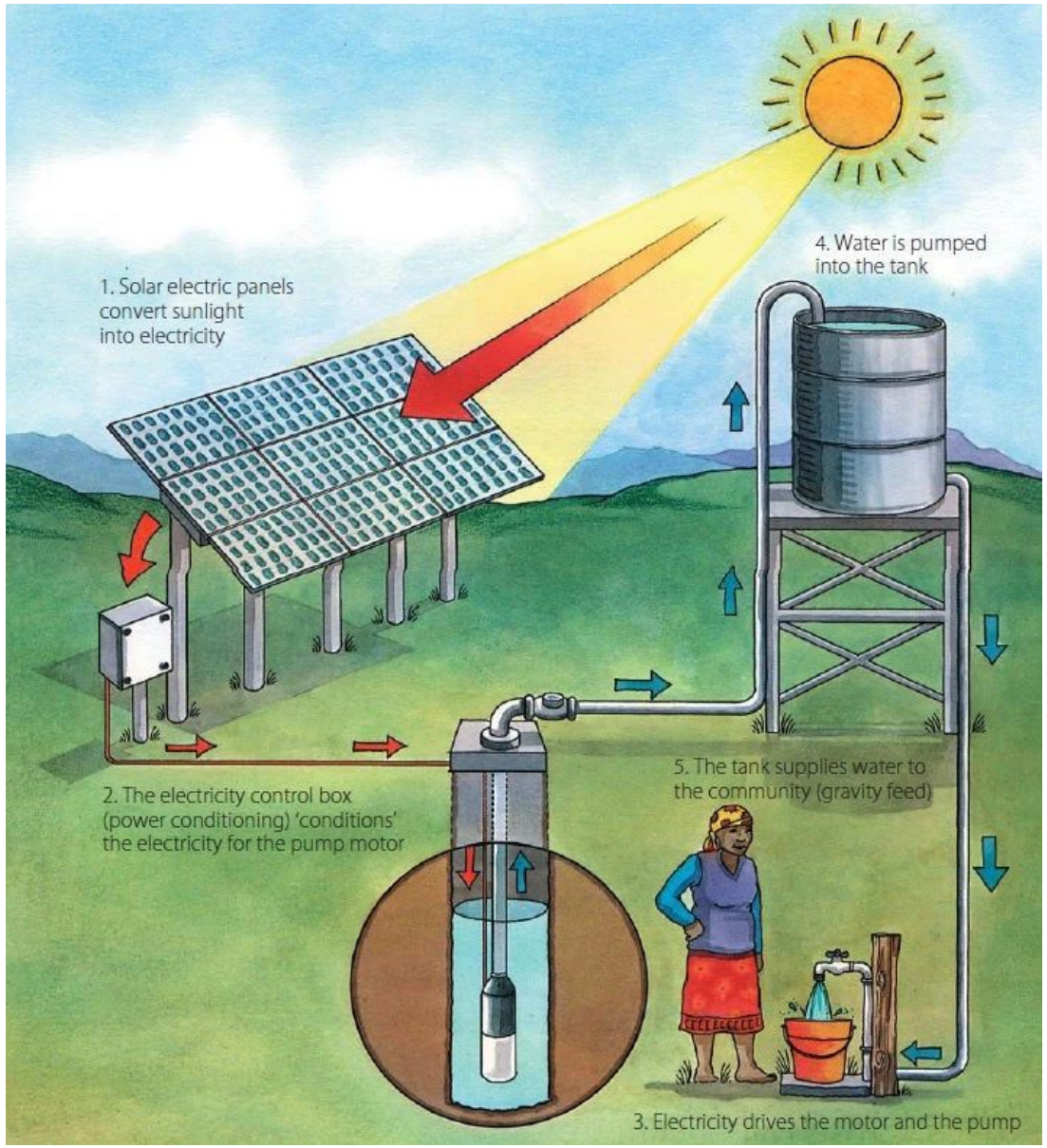
Solar Dryers

- Use the sun's energy to reduce the moisture content in food, crops, and other substances, extending their shelf life.
- Two common types:
  - Direct Solar Dryers
  - Indirect Solar Dryers

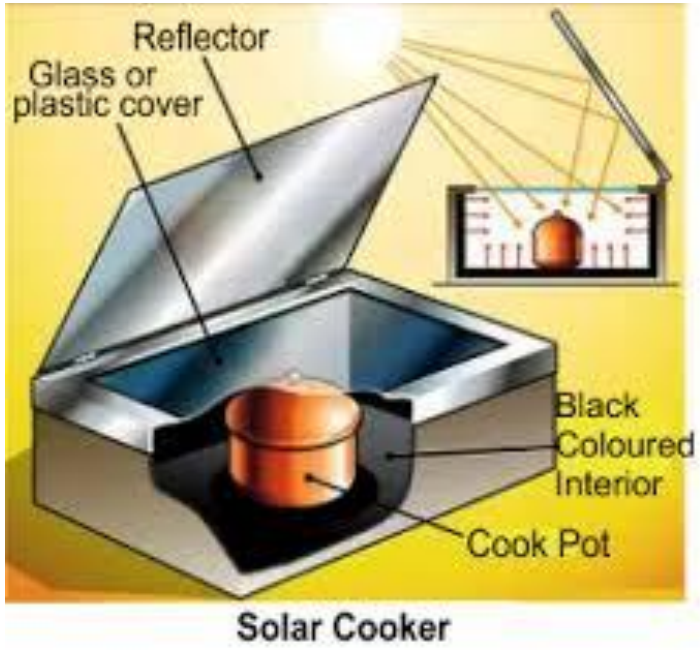


	Direct Solar Dryer	Indirect Dryer
		
Operating Temperature	Medium temp. usage (45-78°C)	Medium temp. (45-75°C)
Scale of operation	Applicable in small to Industrial Scale	Better in small scale usage
Need of solar collector	No solar collector	Solar collector must
Types of Commodity	Can also be used for products* where direct solar contact is mandatory	Can also be used for products* where direct solar contact is not mandatory
Performance in unfavorable weather	Operatable even in unfavorable weather	Poor performance in unfavorable weather

Solar Water Pumps



- Use energy from solar panels to power an electric pump, which can draw water from a source like a well or stream.
- Benefits: Lower operational costs, Environmentally friendly, Remote access & Low maintenance.



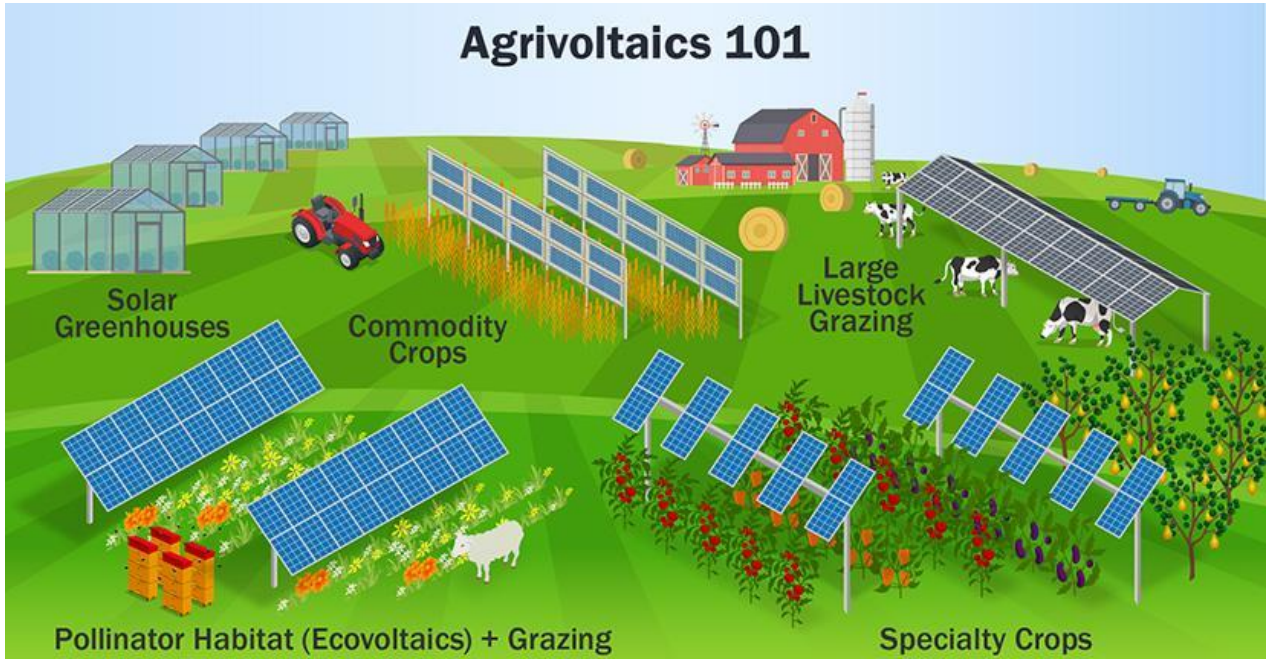
Solar Cooker

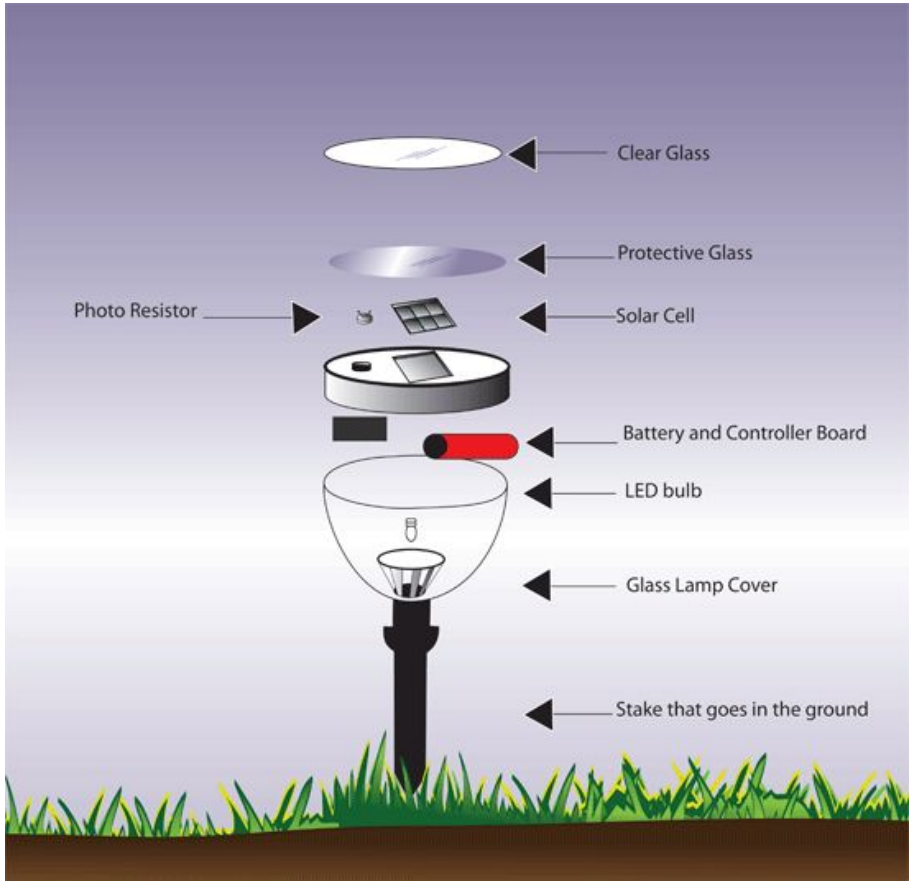
Solar Cooker

Uses sunlight to cook food, eliminating the need for electricity, gas, or firewood

Agrivoltaics

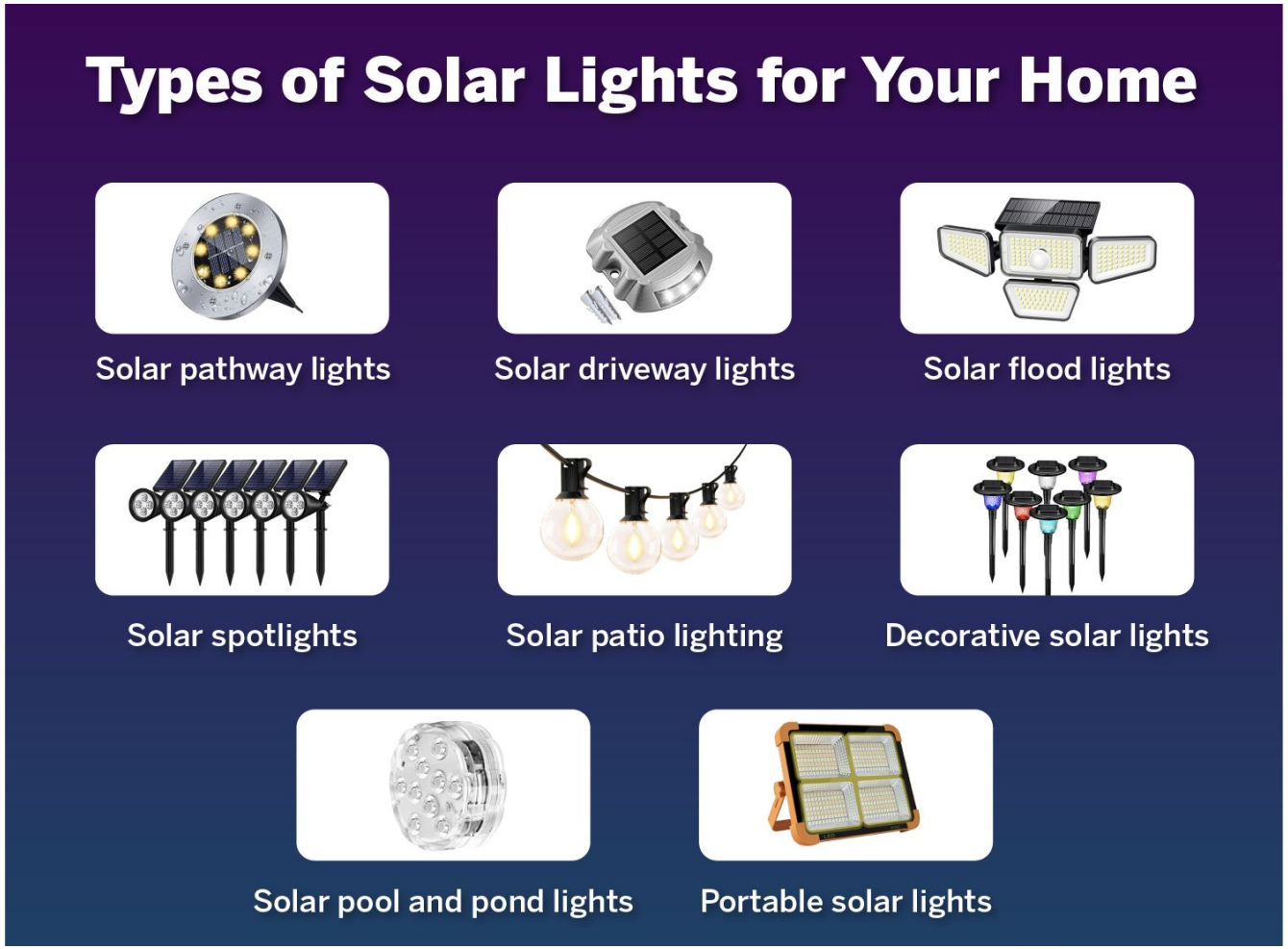
- The dual use of land for both agricultural production and solar energy generation
- Benefits include:
  - Dual land use
  - Improved crop yields and resilience
  - Economic benefits for farmers





Solar Lamps

A lighting system composed of an LED lamp, solar panels, battery, charge controller and there may also be an inverter.



Energy Efficient Solar Refrigerator with Box Versatile Solar Cooling Mobile Solar Chiller for Camping & Travel

Brand: No Brand | More Home Appliances Parts & Accessories from No Brand

₱4,184.10 ~~₱6,623.00~~ -37%

Delivery Options : Metro Manila-Quezon City, Quezon City, Project 6 CHANGE

Get by 26 Nov-1 Dec >

Standard,with shipping fee ₱42.50

Return & Warranty : Change of Mind · 7 Days Free Return · Warranty not available >

Color Family: Not Specified

Not Specified

Quantity: — 1 +

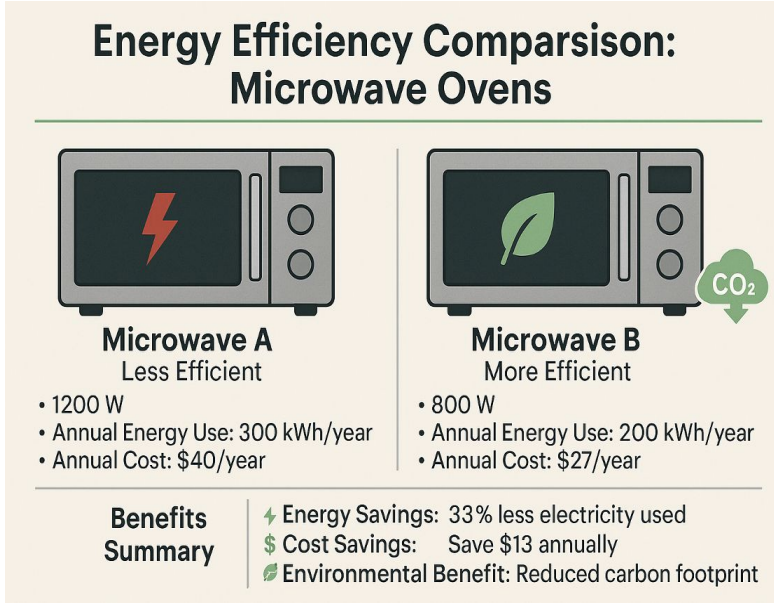
What are the Advantages of Solar Technologies?

- Reduces carbon emission
- Can offset electricity bills – less Expense
- May gain profit through solar renewable energy credits
- Clean Homes
- Low maintenance costs
- Helps gain electricity in any climate/ No impacted by disasters
- May improve home values

Clean Cook Stoves

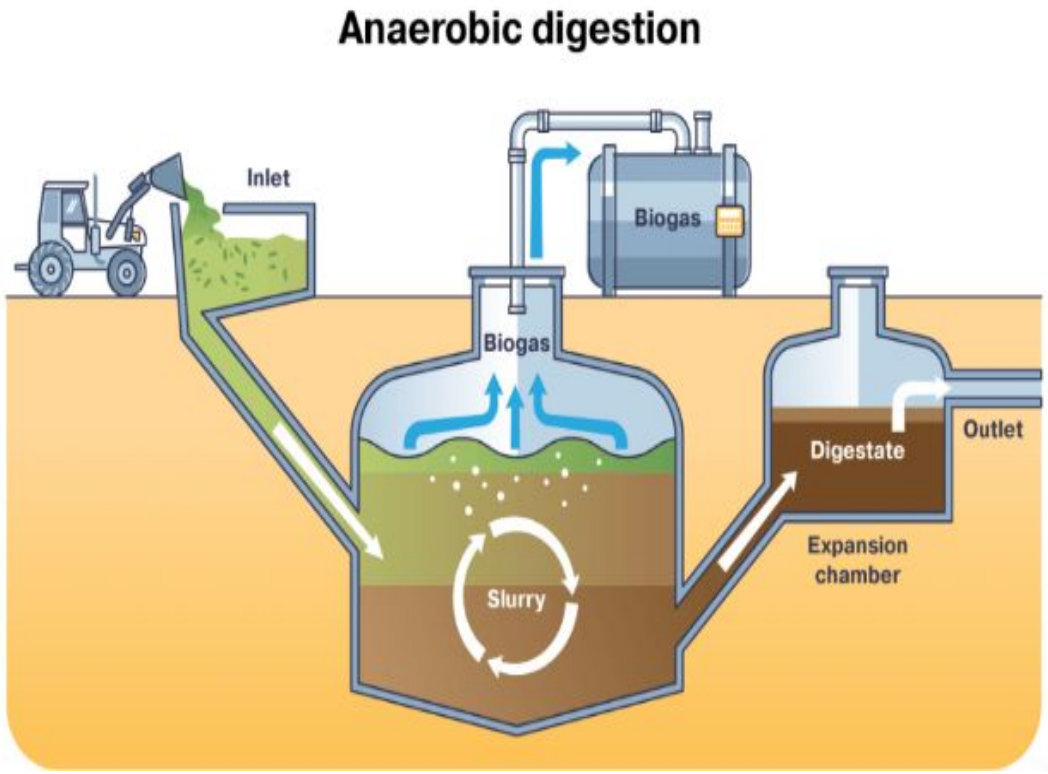
Electric Vehicle

Bio Digester



Energy Efficient Appliances

Bio Digester



Advantages	Disadvantages
Produces clean biogas for cooking	High initial installation cost
Reduces household and farm waste	Needs continuous supply of organic waste
Produces nutrient rich organic fertilizer	Gas production decrease in cold climate
Saves money on fuel and chemical fertilizer	Needs adequate space for installation
Suitable for rural and urban households, farm and institutions	Not suitable for all waste types
Helps reduce deforestation by replacing firewood	Poor management may cause odor problems

TWO SITUATIONS: WHAT HAPPENS TO WET WASTE

SITUATION 1: WE COMPOST

A natural, aerobic (oxygen-rich) process of decomposition

BIOLOGICAL RECYCLING

Microorganisms like bacteria & fungi breaking down food scraps.

Humus production

HEAT GENERATION

Kills weed seeds & pathogens

CLIMATE MITIGATION

Avoids landfill methane.
Carbon Sequestration

IMPROVED SOIL HEALTH

AEROBIC DECOMPOSITION

No methane production.
Healthier soil life

NUTRIENT RETENTION

Stable form ready for plants

IMPROVED SOIL HEALTH

Lower waste fees.
More local jobs

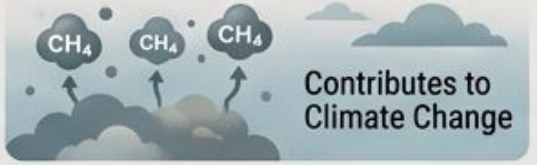
SITUATION 2: WE LANDFILL (The Traditional Path)

A waste disposal problem with environmental consequences

WASTE ACCUMULATION

Buried in vast cells

GREENHOUSE EMISSIONS



Contributes to Climate Change

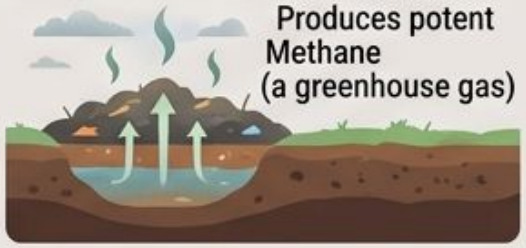
GROUNDWATER RISK

Toxic leachate formation

POOR SOIL QUALITY

Contributes to soil degradation

ANAEROBIC DECOMPOSITION



Produces potent Methane (a greenhouse gas)

RESOURCE LOSS

Valuable organic matter lost

POOR SOIL QUALITY

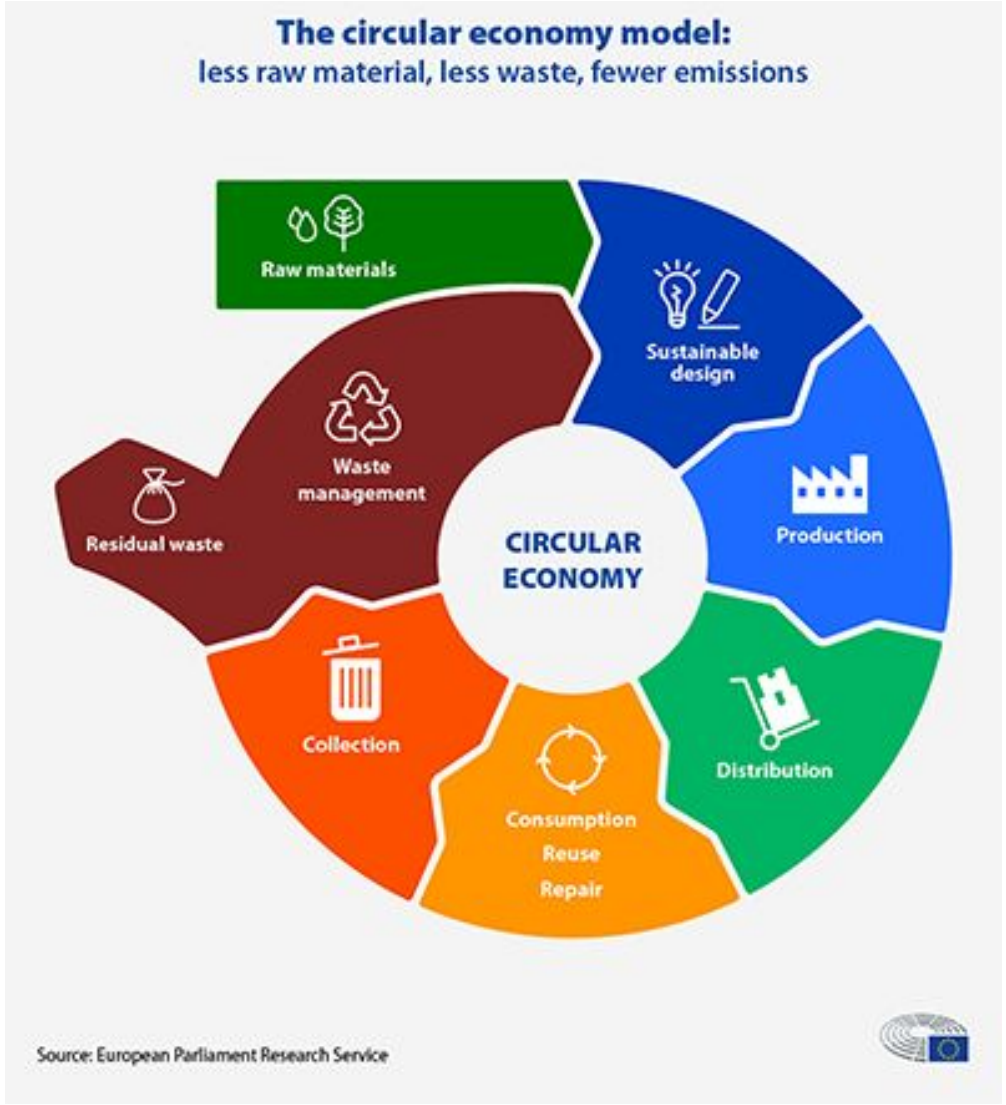
Contributes to soil degradation

HIGH COSTS & POLLUTION

Tipping fees & transportation pollution

GLOBAL SUSTAINABILITY INITIATIVE

Circular Economy Practices



Sustainable Packaging

Method of using materials and processes that reduce the environmental impact of packaging throughout its life cycle.

Water Conservation

Water conservation means the careful and efficient use of water to reduce wastage and ensure sufficient water for present and future generations

Green financing fundamentals: what makes finance green, how lenders define and track green lending

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Sustainable development
is development that meets present needs without compromising the ability of future generations to meet their own needs

Green Financing Fundamentals

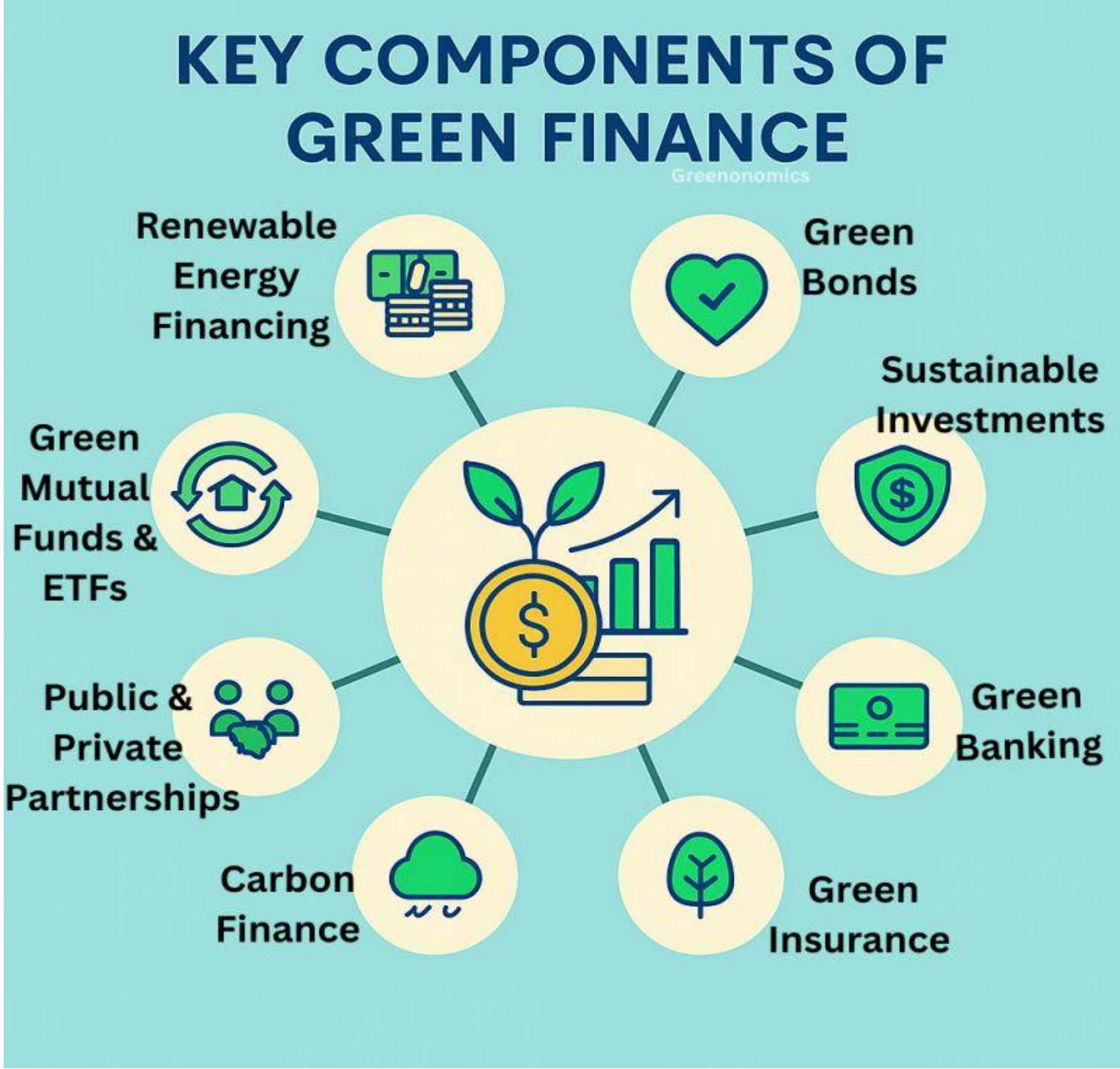
What is Green Finance?

Investment that flow into sustainable development projects and initiatives, environmental products, and policies that encourage the development of a more sustainable economy

Why Green Finance?

To increase the level of financial flows (from banking, micro-credit, insurance and investment) from the public, private and not-for-profit sectors to sustainable development priorities

To better manage environmental and social risks, take up opportunities that bring both a decent rate of return and environmental benefit and deliver greater accountability



What Makes Finance “Green”?

Renewable Energy

Solar, Wind, Hydro

Energy Efficiency

Buildings & Industry

Green Buildings

Sustainable Design

Green Buildings

Sustainable Design

Waste Management

Recycling & Recovery

Climate Agriculture

Resilient Farming

Key Principles of Green Financing

Environmental Impact

Projects must demonstrate measurable environmental benefits — reduced carbon emissions, improved energy efficiency, or reduced pollution.

Transparency

Lenders and borrowers must clearly disclose how funds are being used and what environmental outcomes are expected.

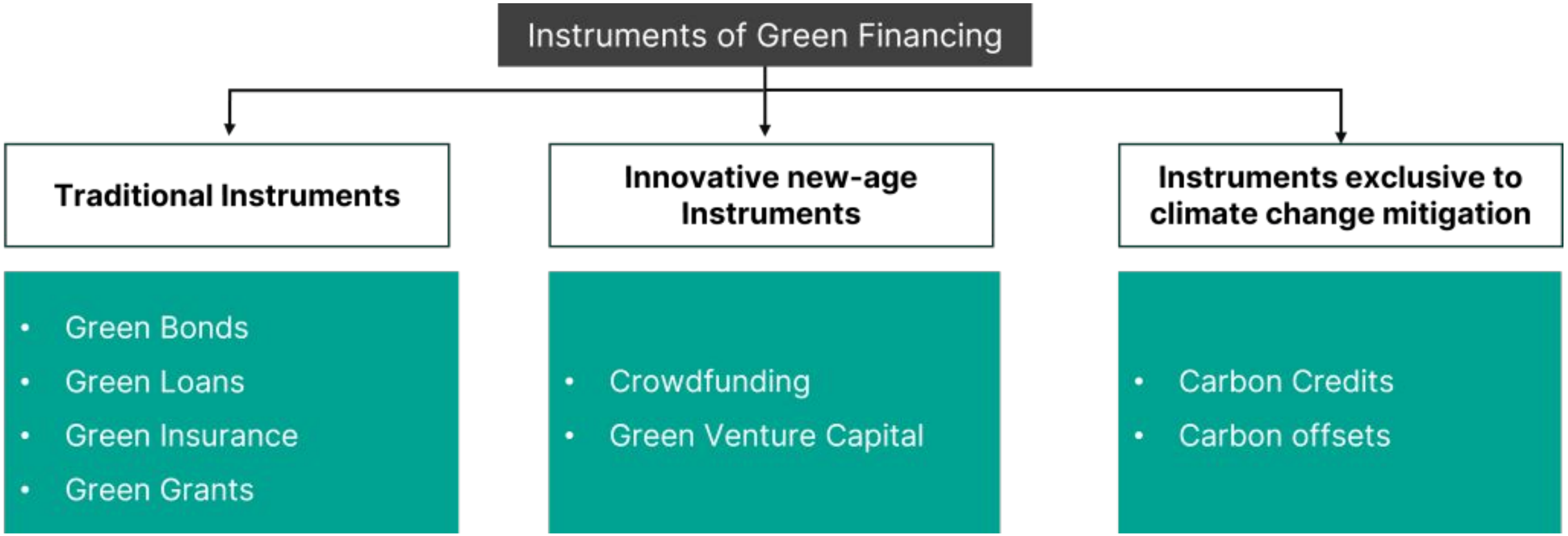
Accountability

Projects often require independent verification or certification to ensure they truly deliver environmental benefits.

Green Financial Products

Green Bond	A green bond is a type of fixed-income instrument that is specifically earmarked to raise money for climate and environmental projects. These bonds are typically asset-linked and backed by the issuing entity's balance sheet, so they usually carry the same credit rating as their issuers' other debt obligations
Green Loan	Loan provided to projects which promotes environment sustainability.
Green Car Loan	Loans to encourage customers to purchase cars with high fuel efficiency by offering low interest rates
Credit Guarantee Schemes (CGSs)	A credit guarantee scheme provides third-party credit risk mitigation to lenders through the absorption of a portion of the lender's losses on the loans made to SMEs in case of default, typically in return for a fee.
Hometown Investment Trust (HIT)	The Hometown Investment Trust (HIT) funds is a new source of community-based trust funds created to connect local investors with projects in their own locality, where they have personal knowledge and interests.

Types of Green Financial Instruments



Objectives of Green Finance

- The main objectives of Green Finance is to promote Global Green Growth through the harmony between Economy and the Environment
- To achieve the goal of a low-carbon economy
- To promote green industry
- Environmental pollution prevention projects
- Renewable energy development projects

Advantages of Green Finance

Green Industry

- Sustainable Environment and valued natural resources

Green Investment

- Competitive Knowledge of Economy

Green Life

- Social Development and quality of life

Green Technologies

- Sustainable use of Resources

Green Energy

- Clean Energy and Climate Action

Disadvantages of Green Finance

Risk is too high

Lack of leadership/ examples

Payback period is long

Cases are unclear - smaller and numerous types of projects

Profitable projects are lacking

Lack of Knowledge and Data

Barriers for Green Finance

Asian Countries, including Cambodia, is a bank dominated financial system

- Banks are the main source of funding
- The financial realities of the market economy is set by its banks, not the government

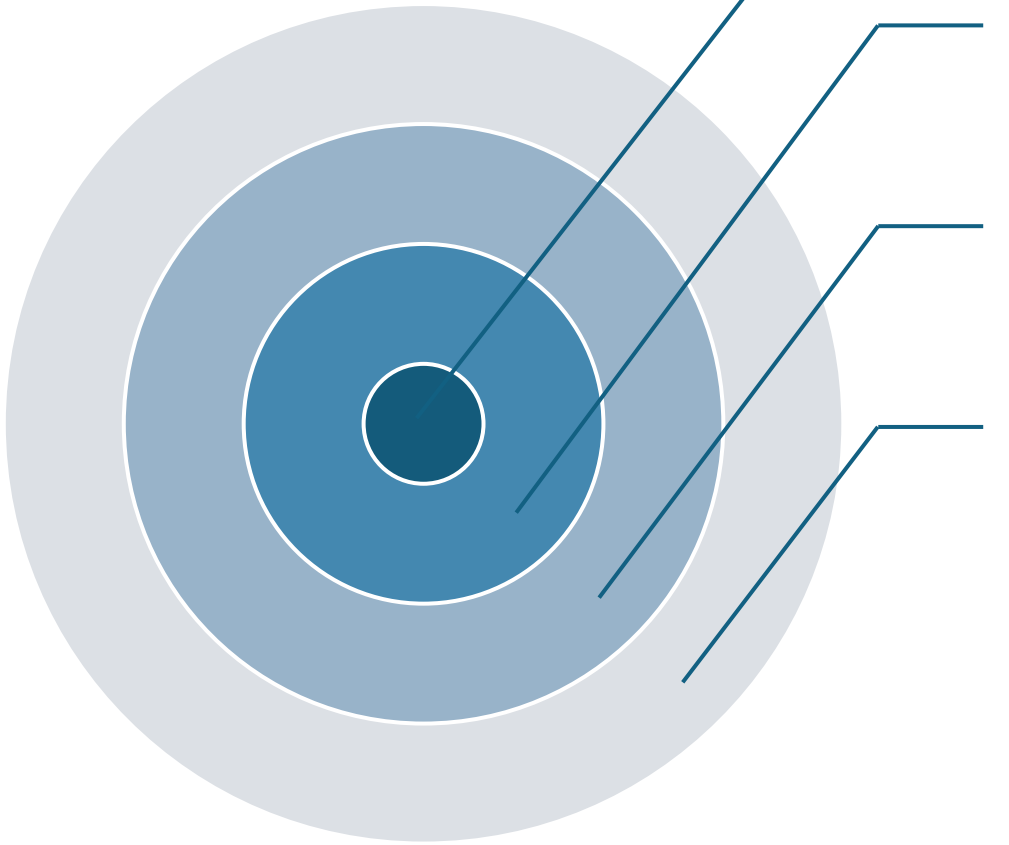
Low Rate of Return

Example- higher prices of generated electricity from green renewable projects than the fossil-fueled ones reduces their competitiveness and return on interest. This is due to additional cost of realizing green renewable energy projects and the much smaller amount of available governmental subsidies for these projects compared to those of fossil energy.

Perceived Risk

Risk of green technologies despite the existence of a large number of successful projects of such technologies in many parts of the world

Impacts of Green Finance



Long-term Sustainability

Attract potential investors

Long term benefits

Environmentally friendly

How Lenders Define & Track Green Lending

DEFINING GREEN LENDING

Banks use frameworks and taxonomies to classify qualifying projects:

- Environmental impact thresholds
- Eligible sectors
- Climate mitigation or adaptation benefits

Example: Climate Bonds Initiative provides standards for identifying climate-aligned investments.

TRACKING GREEN FUNDS

Use-of-Proceeds: Funds tracked in dedicated accounts for eligible activities.

Impact indicators measured:

- ✓ CO_2 emissions reduced
- ✓ Renewable energy generated (MWh)
- ✓ Energy saved (kWh)
- ✓ Waste recycled or diverted
- ✓ Water conserved

Periodic reports + third-party verification required.

Green Finance

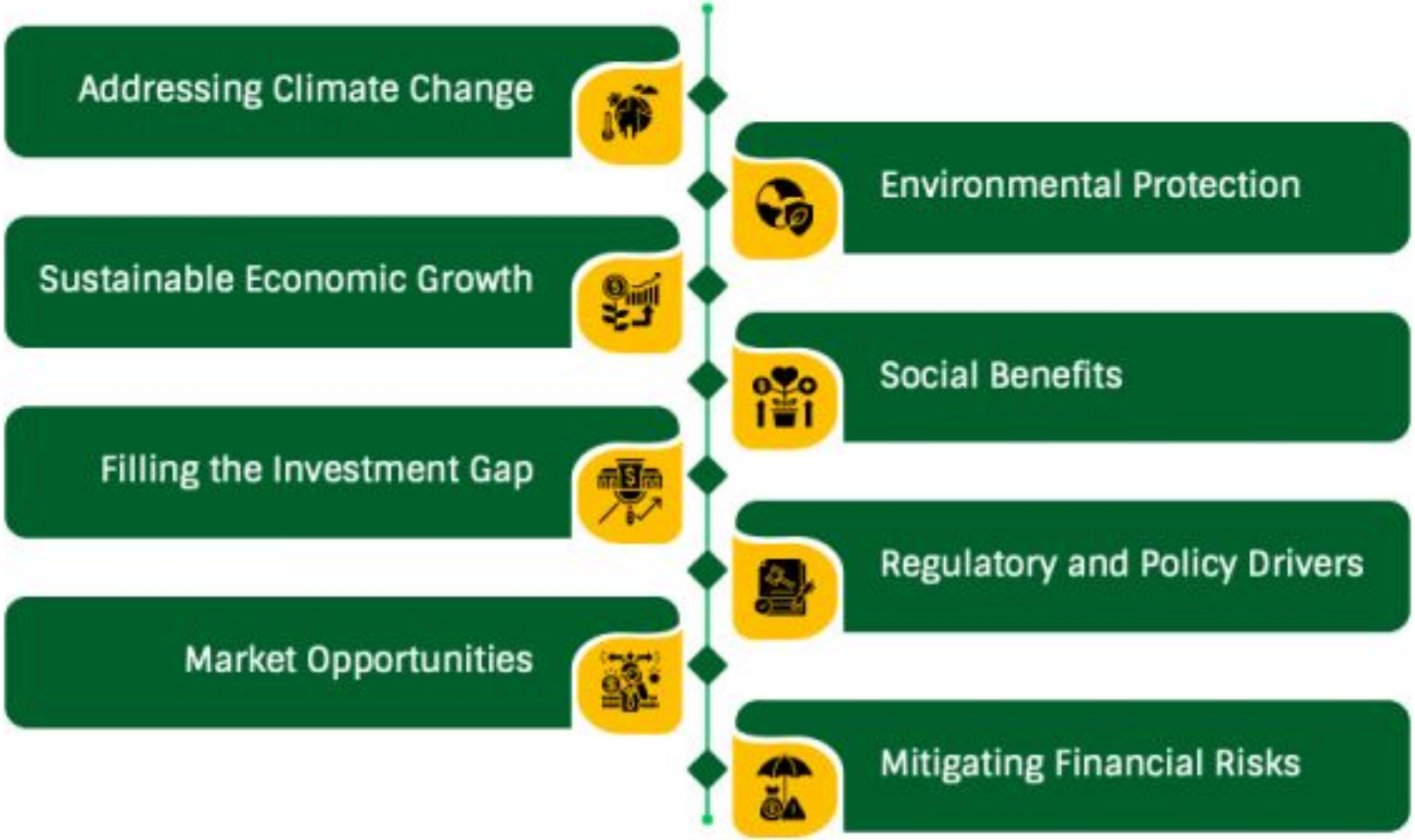
Alliance for Financial Inclusion (AFI) have been at the forefront of advocating global financial institutions to respond to climate change by focusing on green finance

World Bank and Asian Development Bank also have within their mandate to work in major area of development in the developing world

afi Alliance for Financial Inclusion
Bringing smart policies to life

ADB
Asian Development Bank

THE NEED FOR GREEN FINANCE



Risks & Challenges

- **Greenwashing:** The practice of making misleading claims about the environmental benefits of a product or investment.
  - E.g?
  - **Transition Risk:** Risks arising from the structural shift toward a low-carbon economy.
  - **Physical Risk:** Financial risks resulting from climate change-induced events
  - E.g
  - **Bankable Projects:** Projects that are financially viable enough to attract investment.
- E.g.

Green Financing in Cambodia

CO2 Calculations

EmPower Programme II: Women for Climate-Resilient Societies

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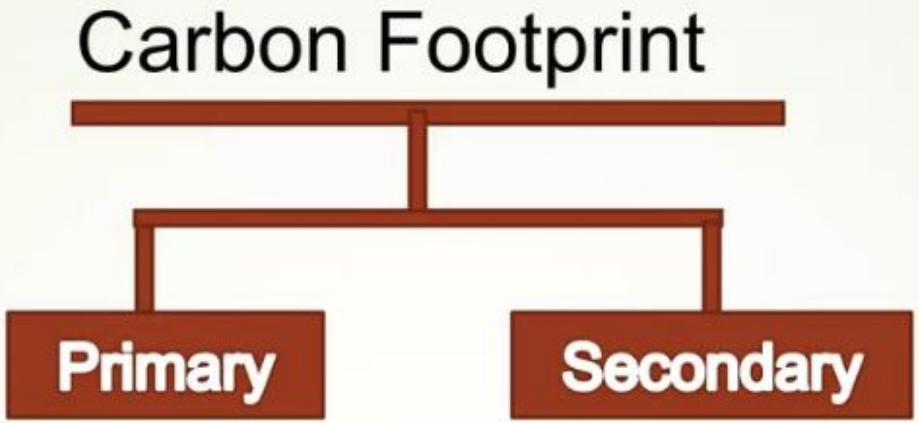
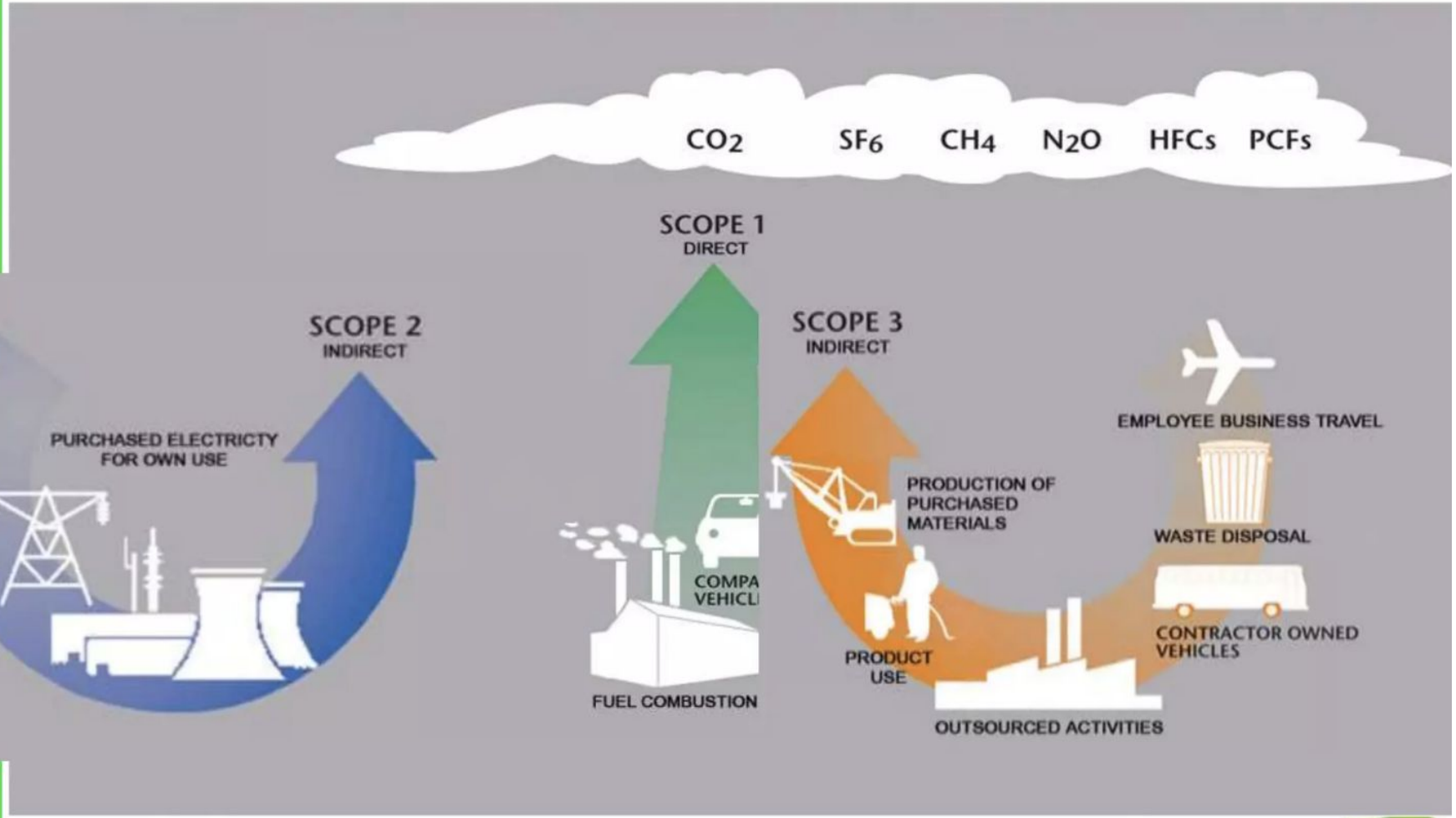


- The **primary footprint** is a degree of our direct emissions of CO2 from the burning of fossil fuels including internal energy consumption and transportation (e.g. car and plane).

- The **secondary footprint** is a degree of the indirect CO2 emissions from the entire lifecycle of products we use - those associated with their manufacture and eventual breakdown.

Simplifying the Types of GHG Emissions
All Expressed as Metric Tons of Carbon Dioxide (MTeCO2)



Scope 2: Emissions from utility production not at the institution

Scope 1: Emissions from the direct activities of the campus

Scope 3: Indirect emissions including transportation, waste disposal, etc.

It's not just CO_2, it's Greenhouse Gases

GHG	GWP		tonnes		tCO_2e
CO_2	1	x	100	=	100
CH_4	21	x	100	=	2,100
N_2O	310	x	100	=	31,000
HFCs	140	x	…	=	…
PFCs	to				
SF_6	23,900				

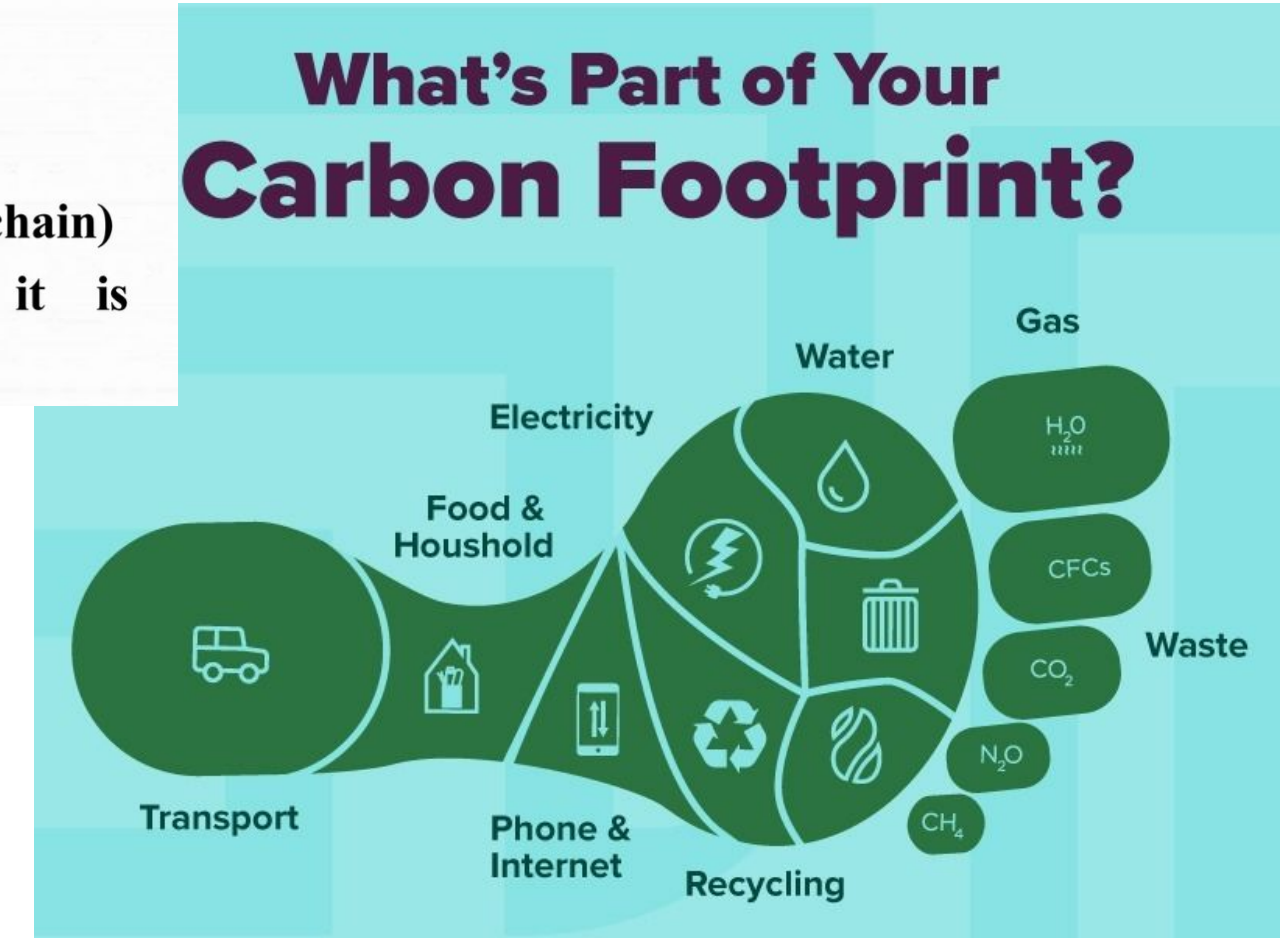
+

SUM of tCO_2e

Kyoto Protocol GHGs (through 2012)

CARBON FOOTPRINT

- The total amount of CO_2 and other greenhouse gas (GHG) emissions for which an individual or organization is responsible.
- Usually expressed in equivalent tons of carbon dioxide (CO_2).
- Calculated for events or products also.
- An organization's footprint includes
  - a. Direct emissions sources (e.g. direct use of fuels)
  - b. Indirect impacts (e.g. from the extended supply chain)
- When calculating an organization's footprint it is important to include the full range of emissions.



By using EMISSION FACTORS

Use scientific estimates per level of activity

Activity Data x **Emission Factor** = **GHG Emissions**

Liters of Gasoline

Tonnes of Cement Production

km of road driven

$kgCO_2$ per liter of Gasoline

tCO_2 per tonne of Cement Production

$kgCO_2$ per km using small car

Source: API Compendium 2009 **Table 3-8. Densities, Higher Heating Values, and Carbon Contents for Various Fuels**

Fuel	Typical Density		Higher Heating Value		Lower Heating Value		Carbon, % by wt.
Acetylene	0.0686 lb/ft^3 [a]	1.10 kg/m^3	1.47×10^3 Btu/ft^3 [a]	5.49×10^7 J/m^3	1.33×10^3 Btu/ft^3	4.97×10^7 J/m^3	92.3
Asphalt and Road Oil	8.61 lb/gal [b]	1032.09 kg/m^3	6.64×10^6 Btu/bbl [b]	4.40×10^{10} J/m^3	6.30×10^6 Btu/bbl	4.18×10^{10} J/m^3	83.47 [b]
Aviation Gas	5.89 lb/gal [b]	705.74 kg/m^3	5.05×10^6 Btu/bbl [b]	3.35×10^{10} J/m^3	4.80×10^6 Btu/bbl	3.18×10^{10} J/m^3	85.00 [b]
Butane (liquid)	4.86 lb/gal	582.93 kg/m^3	4.33×10^6 Btu/bbl [b]	2.87×10^{10} J/m^3	4.11×10^6 Btu/bbl	2.73×10^{10} J/m^3	82.8 [b]
Coal, anthracite	No data [c]	No data	1.13×10^4 Btu/lb [c]	2.63×10^7 J/kg	1.07×10^4 Btu/lb	2.49×10^7 J/kg	No data [c]
Coal, bituminous	No data [c]	No data	1.19×10^4 Btu/lb [c]	2.78×10^7 J/kg	1.13×10^4 Btu/lb	2.64×10^7 J/kg	No data [c]
Crude Oil	7.29 lb/gal [b]	873.46 kg/m^3	5.80×10^6 Btu/bbl [b]	3.85×10^{10} J/m^3	5.51×10^6 Btu/bbl	3.66×10^{10} J/m^3	84.8 [b]
Distillate Oil (Diesel)	7.07 lb/gal [b]	847.31 kg/m^3	5.83×10^6 Btu/bbl [b]	3.87×10^{10} J/m^3	5.53×10^6 Btu/bbl	3.67×10^{10} J/m^3	86.34 [b]
Ethane (liquid)	3.11 lb/gal	372.62 kg/m^3	2.92×10^6 Btu/bbl [b]	1.94×10^{10} J/m^3	2.77×10^6 Btu/bbl	1.84×10^{10} J/m^3	80.0 [b]
Fuel Oil #4	7.59 lb/gal [d]	909.48 kg/m^3	6.01×10^6 Btu/bbl [d]	3.99×10^{10} J/m^3	5.71×10^6 Btu/bbl	3.79×10^{10} J/m^3	86.4 [d]
Isobutane	4.69 lb/gal	561.59 kg/m^3	4.16×10^6 Btu/bbl [b]	2.76×10^{10} J/m^3	3.95×10^6 Btu/bbl	2.62×10^{10} J/m^3	82.8 [b]
Jet Fuel	6.81 lb/gal [b]	815.56 kg/m^3	5.67×10^6 Btu/bbl [b]	3.76×10^{10} J/m^3	5.39×10^6 Btu/bbl	3.57×10^{10} J/m^3	86.30 [b]
Kerosene	6.83 lb/gal [b]	818.39 kg/m^3	5.67×10^6 Btu/bbl [b]	3.76×10^{10} J/m^3	5.39×10^6 Btu/bbl	3.57×10^{10} J/m^3	86.01 [b]
Lignite	No data [c]	No data	6.43×10^3 Btu/lb [c]	1.50×10^7 J/kg	6.11×10^3 Btu/lb	1.42×10^7 J/kg	No data [c]
LPG [e]	See footnote e						
Lubricants	7.52 lb/gal [b]	900.70 kg/m^3	6.07×10^6 Btu/bbl [b]	4.02×10^{10} J/m^3	5.76×10^6 Btu/bbl	3.82×10^{10} J/m^3	85.80 [b]
Miscellaneous Product [f]	7.29 lb/gal [b]	873.46 kg/m^3	5.80×10^6 Btu/bbl [b]	3.85×10^{10} J/m^3	5.51×10^6 Btu/bbl	3.65×10^{10} J/m^3	85.49 [b]
Motor Gasoline [g]	6.20 lb/gal [b]	742.39 kg/m^3	5.25×10^6 Btu/bbl [b]	3.49×10^{10} J/m^3	4.99×10^6 Btu/bbl	3.31×10^{10} J/m^3	86.60 [b]
Natural Gas (processed)	0.042 lb/ft^3 [h]	0.6728 kg/m^3 [h]	1,020 Btu/ft^3 [h] 1,004 Btu/ft^3 [h] 1,027 Btu/ft^3 [e]	3.80×10^7 J/m^3 [h] 3.74×10^7 J/m^3 [h] 3.83×10^7 J/m^3	918 Btu/ft^3 [h] 903 Btu/ft^3 [h] 924 Btu/ft^3 [e]	3.42×10^7 J/m^3 [h] 3.37×10^7 J/m^3 [h] 3.44×10^7 J/m^3	76 wt% C [h]
Natural Gas (raw / unprocessed)			1,235 Btu/ft^3	4.60×10^7 J/m^3 [h]	1,111 Btu/ft^3	4.14×10^7 J/m^3	
Natural Gas Liquids (NGL) [e]	See footnote e						
Natural Gasoline [f]	5.54 lb/gal [b]	663.70 kg/m^3	4.62×10^6 Btu/bbl [b]	3.07×10^{10} J/m^3	4.39×10^6 Btu/bbl	2.91×10^{10} J/m^3	83.70 [b]
Pentanes Plus	5.54 lb/gal [b]	663.70 kg/m^3	4.62×10^6 Btu/bbl [b]	3.07×10^{10} J/m^3	4.39×10^6 Btu/bbl	2.91×10^{10} J/m^3	83.70 [b]
Petrochemical Feedstocks	5.95 lb/gal [b]	712.49 kg/m^3	5.25×10^6 Btu/bbl [b, j]	3.48×10^{10} J/m^3	4.99×10^6 Btu/bbl	3.31×10^{10} J/m^3	84.11 [b]
Petroleum Coke [f]	No data [b]	No data	6.02×10^6 Btu/bbl [b]	4.00×10^{10} J/m^3	5.72×10^6 Btu/bbl	3.80×10^{10} J/m^3	92.28 [b]

GWP

33.1 MJ/Liter

x 67,500 $kgCO_2$ per TJ (10^{12} J) = 2.234 $kgCO_2$/Liter x 1

x 3 $kgCH_4$ per TJ (10^{12} J) = 0.0000993 $kgCH_4$/Liter x 21

x 0.6 kgN_2O per TJ (10^{12} J) = 0.0000198 $kgCO_2$/Liter x 310

= 2.242 $kgCO_2e$/Liter

Travelling

- To calculate your travel footprint you need to work out how much travel you have done in the last year using various forms of transport.

- Vehicle: distance (km/yr) /*EF (kg CO2e/km) = emissions (kg CO2e/yr)

If you can drive 640 Km with 64 Lit tank.
How much CO2e will be emitted for each Km?

- 0.224 KgCO2e Per km

Toyota Camry 3.5L

Tank Size: 17.0 Gallons or 64 Liters

IF you drive 10,000km every year? What is the Emission in 1 year

64 Liters x 2.242 $kgCO_2e$/Liter = 143.5 $kgCO_2e$ per tank

- 2240 kg/year

A World Bank report on Cambodia's e-mobility roadmap uses a **2022 grid emission factor of 0.53 kgCO2e/kWh** for electric vehicles.

IF you drive the BYD EV 10,000km every year? What is the Emission in 1 year

Emissions = 10,000 × electricity use per km × 0.53 kgCO2e/kWh
Efficient EV (0.20 kWh/km):

10,000 × 0.20 × 0.53 = **1,060 kgCO2e/year**

Housing

• To calculate housing footprint we need to work out our personal share of home energy use, water use and waste dumping. This means collecting figures for your home's annual energy, water and waste use and dividing it by the number of people in your home, to get your individual share.

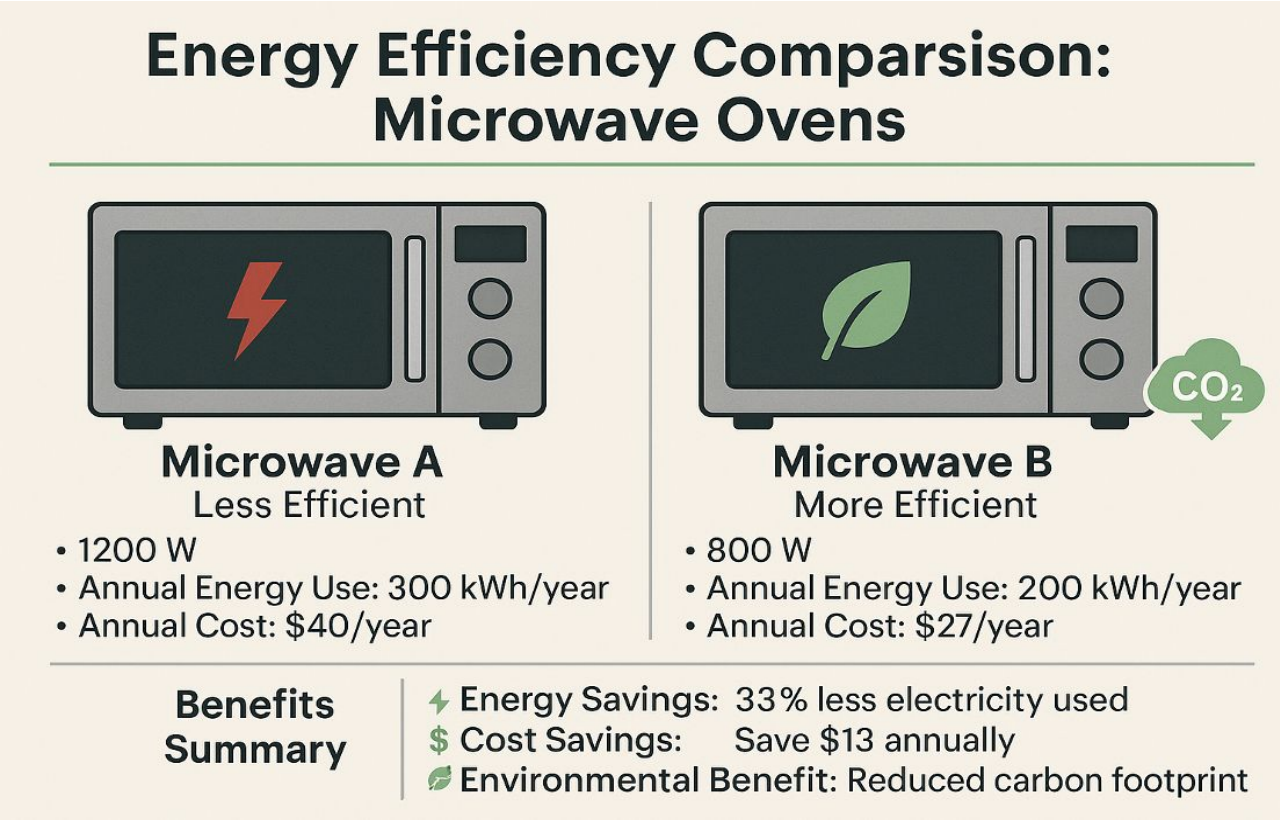
• The calculations look like this:

Electricity: use (kWh/yr) * EF (kg CO2e/kWh) = emissions (kg CO2e/yr)

Energy Consumption at Home

Emission Factor for Cambodia - 0.53 $kgCO_2e/kWh$

- **What is the emission from Microwave A?**
- **300 kWhx0.53 $kgCO_2e/kWh$ =159 $kgCO_2e$**



- **What is the emission from Microwave B?**

200 kWhx0.53 $kgCO_2e/kWh$ =106 $kgCO_2e$

Food

- To calculate your food footprint you need to estimate the amount of food you consume and the emissions that result from the supply of that food.

- The calculations look like this:

Red meat: consumption (kCal/day)*365*EF (kg CO2e/kCal) = emissions (kg CO2e/yr)

Carbon Credits and Carbon Markets

EmPower Programme II: Women for Climate-Resilient Societies

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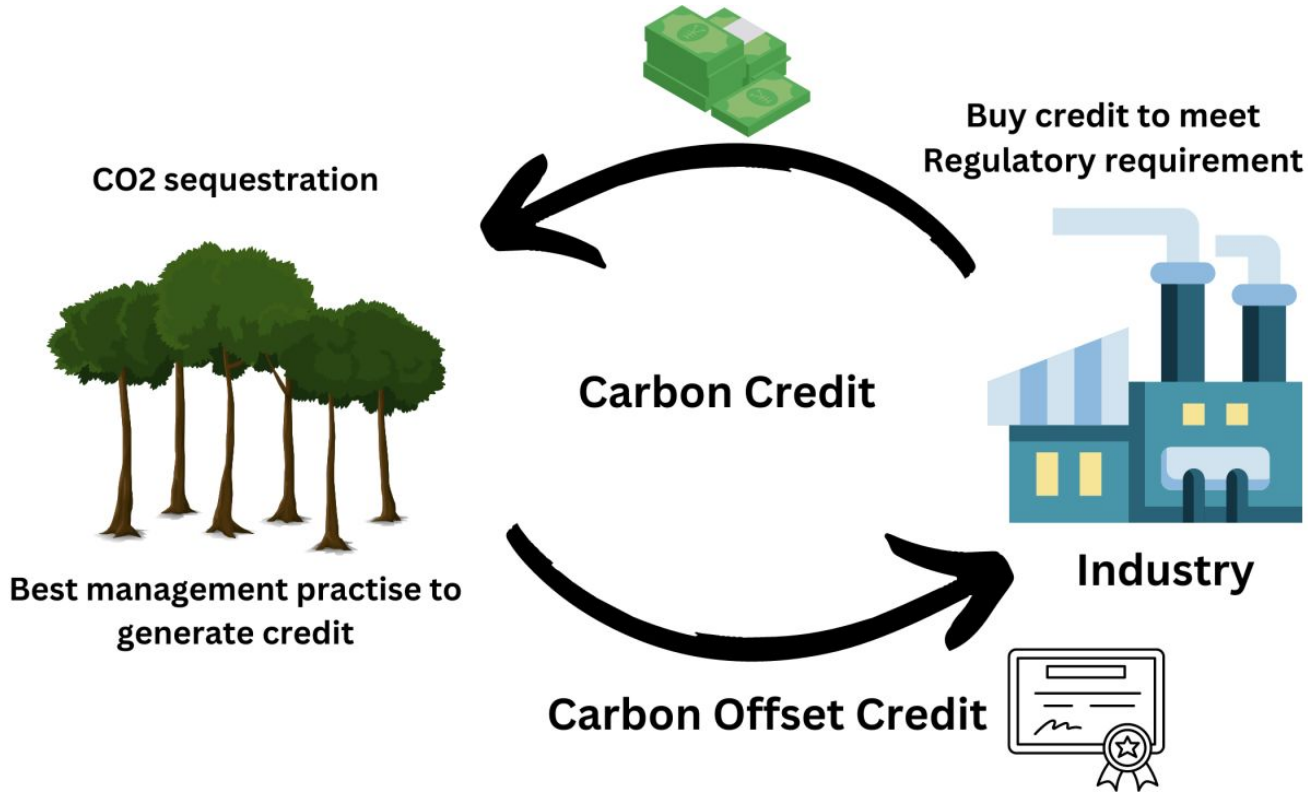
What is Carbon Credit?

A carbon credit is a tradable instrument (typically a virtual certificate) that conveys a claim to avoided GHG emissions or to the enhanced removal of GHG from the atmosphere.



What is Carbon Markets?

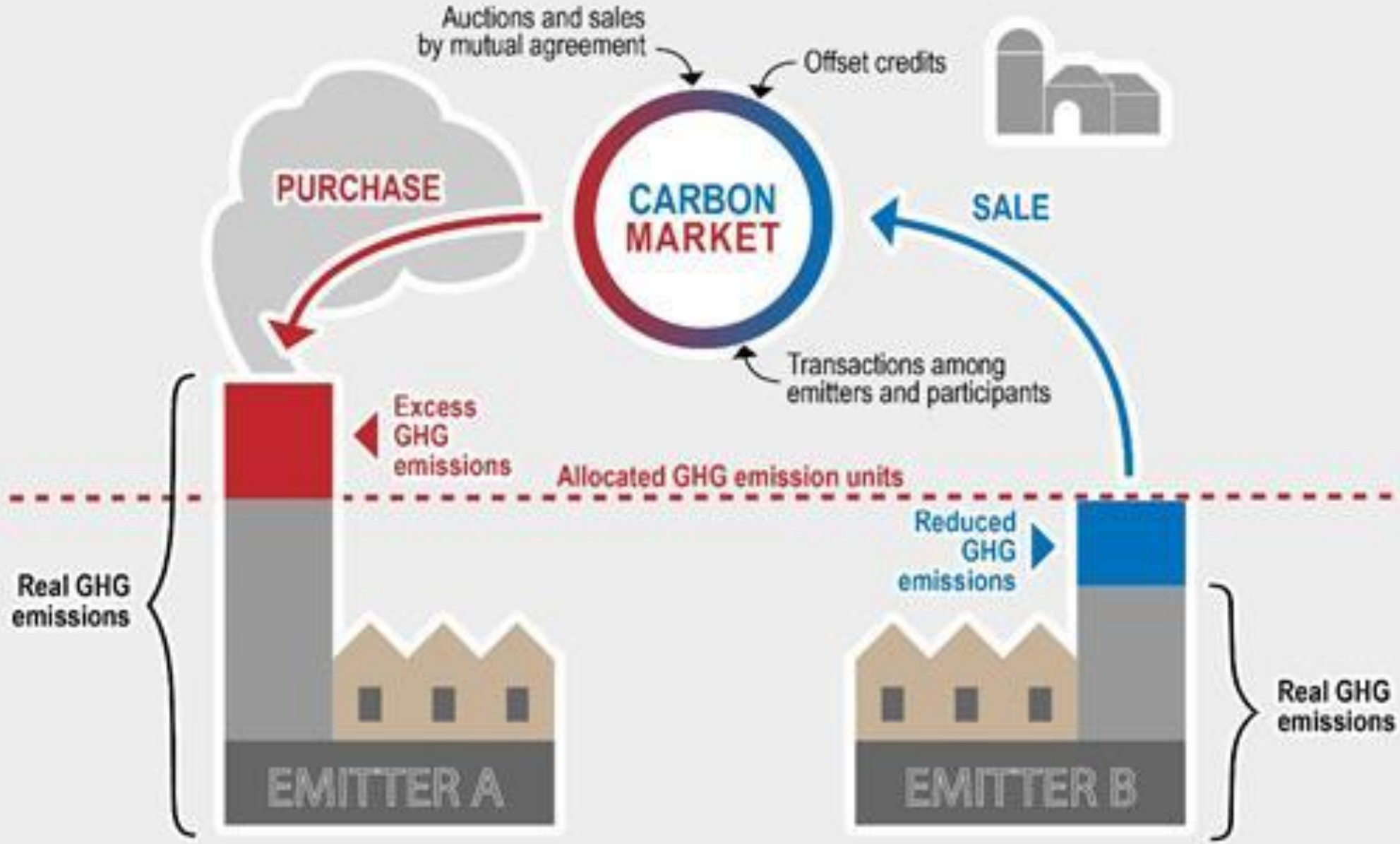
Carbon markets are trading systems that put a price on greenhouse gas emissions, allowing entities to buy or sell carbon credits or allowances (usually 1 ton of CO2e) to meet climate targets cost-effectively.

⚖️ Compliance Markets

- Regulated by governments
- Companies must meet legally required emission limits
- Examples: National & regional Emission Trading Systems (ETS)

🤝 Voluntary Carbon Markets

- Companies, orgs, or individuals participate voluntarily
- Used to offset emissions and meet sustainability goals
- Many projects in developing countries generate these credits


Auctions and sales by mutual agreement
Offset credits
PURCHASE
CARBON MARKET
SALE
Transactions among emitters and participants
Excess GHG emissions
Allocated GHG emission units
Reduced GHG emissions
Real GHG emissions
Real GHG emissions
EMITTER A
EMITTER B

Types of Carbon Credit Projects

Renewable Energy

Solar, Wind, Hydropower

Energy Efficiency

Industrial & building upgrades

Forest Conservation

REDD+ & Reforestation

Waste Management

Methane capture

Sustainable Agri.

Low-emission farming

Clean Cooking

Efficient stove tech

How Carbon Projects Qualify?

Additionality

Emission reductions must not have happened without carbon finance.

Measurable Impact

Reductions must be quantifiable and scientifically measured.

Permanence

Carbon storage or reductions must be long-lasting.

No Double Counting

Same reduction cannot be counted by more than one entity.

Standards: Verra (Verified Carbon Standard) · Gold Standard Foundation

Do’s and Don’ts in Carbon Projects

✅ DO's

- Follow approved carbon standards & methodologies
- Report activities and reductions transparently
- Conduct regular emissions monitoring
- Use independent third-party verification
- Align with Sustainable Development Goals

❌ DON'Ts

- Claim environmental benefits without evidence (greenwashing)
- Double-count the same credits across entities
- Use weak or inaccurate baseline assumptions
- Exaggerate calculated emission reductions
- Harm local communities or biodiversity

Importance for Climate Action

Mobilizes Funding

Directs capital toward climate solutions, especially in developing nations

Incentivizes Cuts

Creates market pressure for businesses & governments to lower emissions

Paris Agreement

Supports national emission reduction targets under the global climate accord

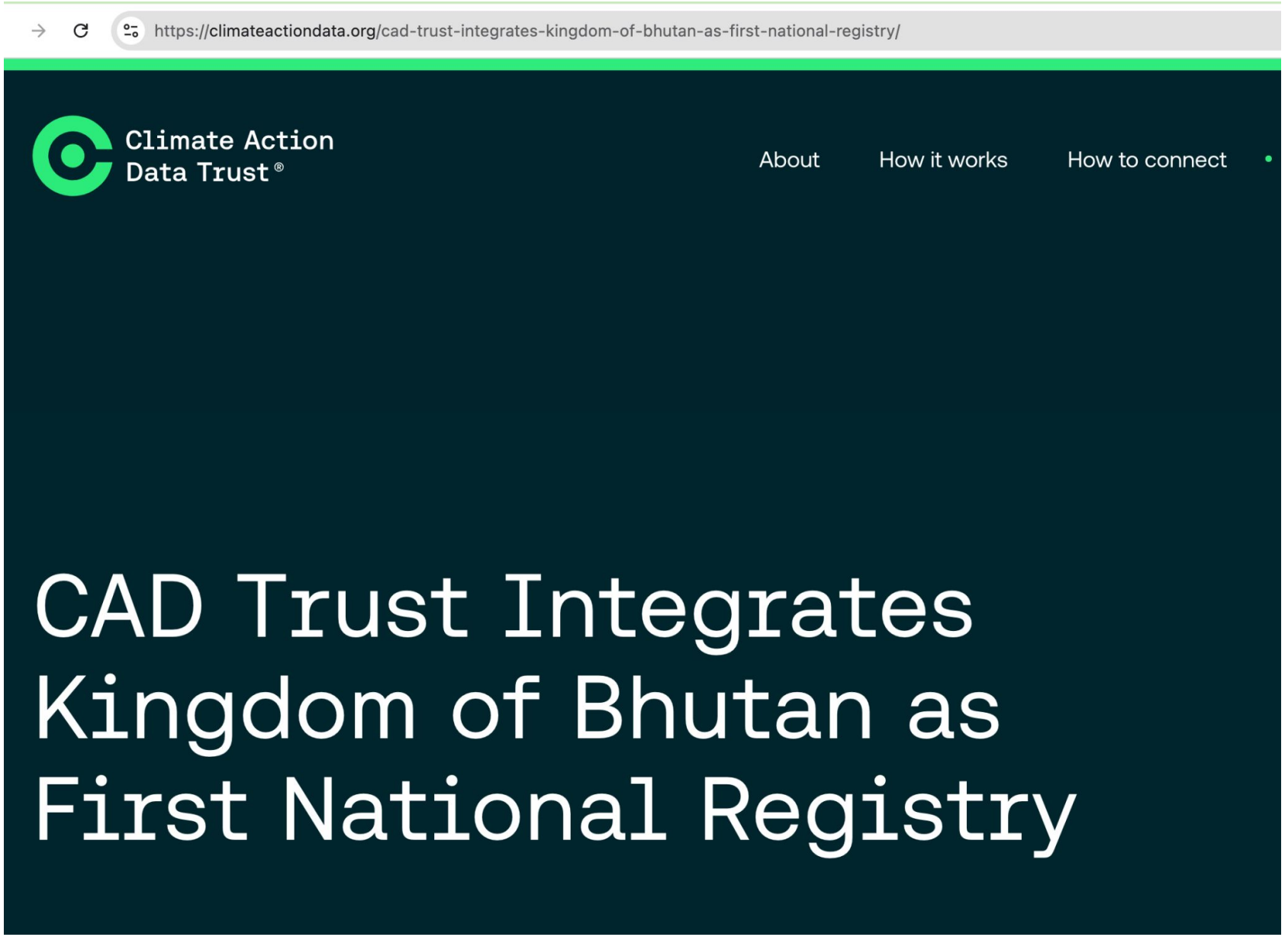
Sustainable Dev.

Promotes long-term sustainability and green technology investment

Integrity in Carbon Markets

Integrity ensures carbon credits represent real and credible emission reductions.

REAL	Emission reductions must actually occur — not just on paper.
ADDITIONAL	The project must depend on carbon finance to be implemented.
VERIFIABLE	Independent third-party auditors must confirm all reductions.
TRANSPARENT	Project data and monitoring reports must be publicly available.
PERMANENT	Carbon storage and reductions must last over a long period.


https://climateactiondata.org/cad-trust-integrates-kingdom-of-bhutan-as-first-national-registry/
Climate Action Data Trust®
About
How it works
How to connect
CAD Trust Integrates Kingdom of Bhutan as First National Registry

LIFE OF A CARBON CREDIT

This graphic illustrates the process of developing and bringing carbon credits to market, highlighting a non-exhaustive set of barriers to ensuring a trusted and efficient voluntary carbon market.

PROJECT DESIGN

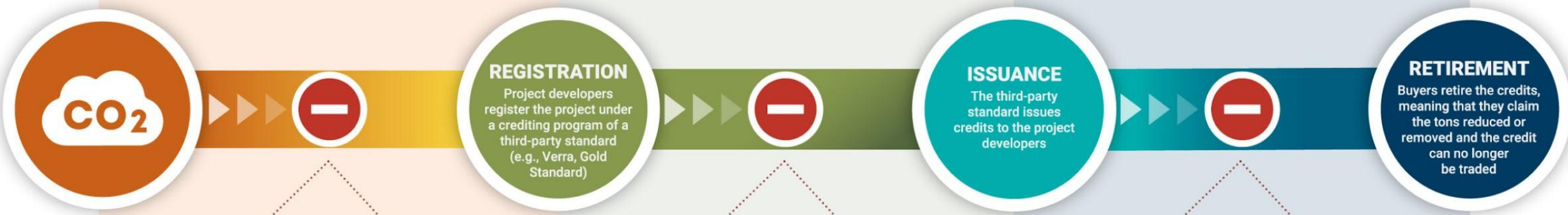
Project developers conduct feasibility studies, acquire assets, and identify potential methodologies for quantifying emissions reductions and removals.

MRV
(MONITORING, REPORTING, AND VERIFICATION)

Validation and verification bodies monitor the project and verify that emissions reductions or removals have occurred.

TRANSACTION

Project developer sells credits either through brokerages, exchanges, or directly to buyer.



Limited market access, including access to upfront capital.

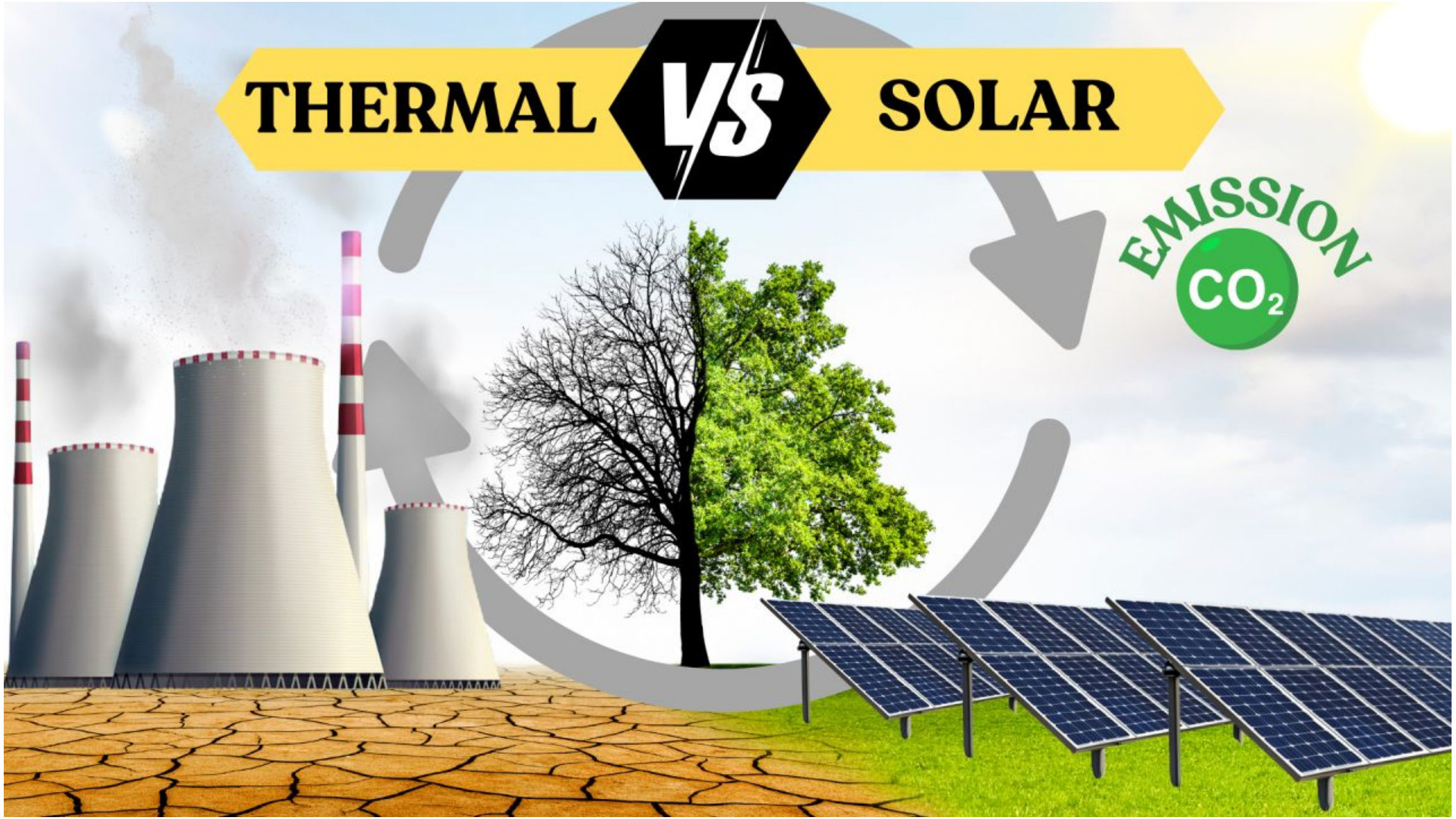
Lengthy process for developing new methodologies.

Limited transparency around verification.

Limited integration of technology in MRV processes.

Mistrust of credit quality.

Lack of efficient price discovery.



Scenario 1_ tThermal Power Electricity. Scenario 2: Solar PV – What are the benefits?

CER vs VER vs ERU vs ITMO

Very simple carbon-market comparison

Term	Full form	Main market	Who issues / governs it	What it means
CER	**Certified Emission Reduction**	Kyoto compliance	UNFCCC CDM	1 tCO_2e reduced from a Clean Development Mechanism project
VER	**Verified Emission Reduction**	Voluntary market	Private standards (for example Verra / Gold Standard)	1 tCO_2e reduced or removed and used voluntarily
ERU	**Emission Reduction Unit**	Kyoto compliance	UNFCCC Joint Implementation	1 tCO_2e reduced from a Joint Implementation project
ITMO	**Internationally Transferred Mitigation Outcome**	Paris Agreement Article 6	Participating countries under Article 6 rules	A mitigation outcome transferred between countries for NDC use or other authorized purposes

Quick takeaway: CER and ERU belong mainly to the Kyoto era, VER belongs to the voluntary market, and ITMO is the key unit/concept for international transfers under the Paris Agreement.

Source summary: UNFCCC pages on CDM, Joint Implementation and Article 6, plus Verra pages on voluntary carbon units.

Group Discussions

EmPower Programme II: Women for Climate-Resilient Societies

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GROUP EXERCISE

Purpose: Work in groups to assess whether a proposed investment qualifies as green finance, match it to ar appropriate loan product, outline the expected climate benefit, and identify the practical constraints and support needed to make it bankable.

Each group should present:

- The proposed green investment – you can make assumptions of numbers and locations.
- Expected climate benefit: mitigation, adaptation, or both
- Indicative climate impact, including CO2 reduction where possible (which aspects only- no exact figures required)
- The most suitable loan type
- Main financing constraints
- How to roll it out

Think as an investor:

- Is the investment clearly green and eligible?
- What loan structure best fits the borrower and repayment profile?
- What are the likely risks and how can they be managed?
- What assumptions can be used for indicative climate benefits?
- What technical or institutional support is need to finance it?

Time

- Group discussion: 30 minutes
- Plenary share-back: 5 minutes per group
- Facilitated discussion: pipeline ideas, constraints, and support needs

Note

You do not need to perform exact technical calculations. Reasonable assumptions and practical banking judgment are sufficient. The main aim is to build confidence in identifying viable green lending opportunities and understanding what it takes to turn them into a financeable pipeline.

Group	Topic	Case Description
Group 1	**Rooftop Solar for a Medium Hotel**	A medium-sized hotel wants financing for rooftop solar equipment and installation to reduce electricity costs and improve energy reliability.
Group 2	**Energy-Efficient Machinery for an SME**	A small manufacturing enterprise plans to replace old motors and machinery with more energy-efficient equipment to lower operating costs and improve productivity.
Group 3	**Electric Vehicle Fleet for an Urban Transport Company**	A transport company wants to finance electric vehicles for taxi or shuttle operations and may also require charging infrastructure.
Group 4	**Electric Cooking Promotion Program**	A company wants to invest in promotion of electric pressure cookers, induction stoves, or rice cookers in areas with reliable electricity.
Group 5	**Waste Recycling Enterprise**	An SME wants to establish or expand a business in plastic recycling, waste sorting, or composting, with revenues linked to recovered materials and service fees.
Group 6	**Green Building Retrofit**	A commercial building owner wants to install insulation, efficient lighting, efficient cooling systems, and water-saving fixtures to reduce resource use.
Group 7	**Climate-Resilient Cold Chain for Fisheries or Food Supply**	A business wants to invest in energy-efficient cold rooms, insulated storage, and solar backup to reduce spoilage and protect products during heat and power disruptions.
Group 8	**Sustainable Forestry / Agroforestry Enterprise**	A farmer cooperative wants financing for agroforestry, tree crop planting, nursery development, and soil conservation measures that improve income while restoring land.
Group 9	**Biogas for Rural Households Program**	An NGO wants to establish a biogas plant network across the country with farmers/ livestock owners

Group Presentations

Reflections- Discussions

Post- Training Assessment

https://forms.gle/HTr73nAFuNWSRMDa6

Questions and Discussions?
Thank you

GCF in Cambodia

Major current and recent Green Climate Fund projects and support windows

GCF ID	Project / programme	Focus	Lead entity	Year	Type
FP076	**Climate-Friendly Agribusiness Value Chains**	Climate-resilient agriculture and value chains	ADB	2019	Project
FP199	**Northern Tonle Sap Basin agricultural resilience**	Climate-resilient agricultural production	FAO	2023*	Project
FP228	**Cambodian Climate Financing Facility (CCFF)**	Concessional climate finance facility; crowds in private investment	Korea Development Bank	2024	Facility
FP270	**CAISAR in Cambodia**	Irrigation, climate-smart agriculture and rural resilience	IFAD	2025	Project
FP274	**BRACE**	Education-sector and community resilience	Save the Children Australia	2025	Project
SAP058	**Local Governments and Climate Change III**	Local adaptation planning and finance	NCDD-S	2025	SAP

Takeaway: Cambodia's GCF portfolio now spans agriculture, local adaptation, education resilience and a dedicated climate finance facility (CCFF), with the Ministry of Environment serving as the NDA / country focal point.

** FP199 note: the cited source refers to 2023 funding and subsidiary agreements that accelerated implementation.*