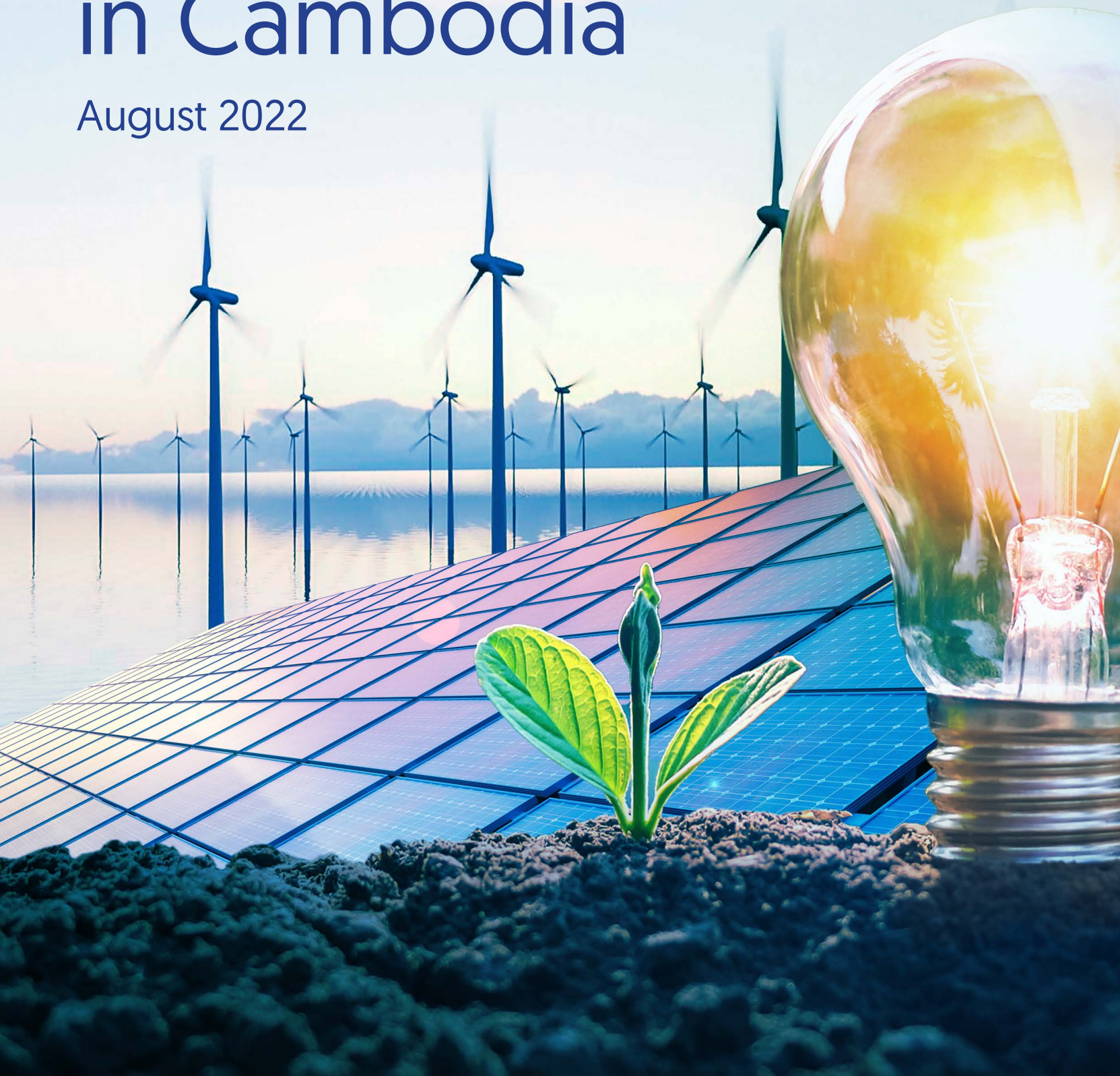


# Position Paper on Renewable Energy in Cambodia

August 2022



# *The Partner Organizations Supporting this Paper*

**adidas**

**DECATHLON**

**H&M Group**

 **GGGI**

  
**MEKONG**  
strategic partners

“Rooftop solar is essential for us in order to attract new, more modern suppliers and to grow production in Cambodia. This is a competitive issue, and my job is to make Cambodia more competitive as a production hub for different products. At some point, if we cannot compete with other manufacturing hubs, we will have to leave.

***In every other country, it is easier than here”***

*EuroCham Garment Committee member*

Under current conditions, investment in rooftop solar in Cambodia does not yield any returns - ever.

***In other markets, where governments support rooftop solar, the ROI is often within three years.”***

*Representative of international brand sourcing in Cambodia*

# Acknowledgments:

The completion of this undertaking would not have been possible without the support of the many members who shared their valuable insights for our study. Their contributions are sincerely appreciated and gratefully acknowledged.

In particular, EuroCham would like to express our appreciation to the following:

- **Mrs. Bridget McIntosh**, Energy Lab;
- **Ms. Cecile Dahome**, Sevea Consulting;
- **Mr. Rogier van Mansvelt**, GGGI;
- Mekong Strategic Partners Specialist;
- **Dr. Susanne Bodach**, BEE Green Building Consulting, previous EuroCham Green Business Committee Chairwoman;

Any remaining errors are our own and should not tarnish the reputations of these people. The generosity and expertise offered by these individuals improved this paper in innumerable ways and saved us from many errors; any that may remain are entirely EuroCham's own responsibility.

## Acronyms

ACGF	= ASEAN Catalytic Green Finance Facility
ADB	= Asian Development Bank
ASEAN	= Association of Southeast Asian Nations
CAPEX	= Capital Expenditure
CDC	= Council for Development of Cambodia
CHDHK	= China Huadian Hong Kong Company Limited
CIIDG	= Huadian Sihanoukville Coal Power Plant
COP	= Conference of the Parties
CSP	= Concentrating Solar Power
EAC	= Electricity Authority of Cambodia
EdC	= Electricité du Cambodge
Euro Cham	= European Chamber of Commerce in Cambodia
FOB	= Free On Board
GCF	= Green Climate Fund
GDP	= Gross Domestic Product
GFT	= Garment, Footwear, and Travel Goods
GHG	= Greenhouse Gas
GMAC	= Garment Manufacturers Association in Cambodia
GMS	= Greater Mekong Subregion
GWh	= Gigawatt hours
GWp	= Gigawatt pea
I-REC	= Interstate Renewable Energy Council
KfW	= Kreditanstalt Für Wiederaufbau (German Development Bank)

KWh	= Kilowatt hours
LCOE	= Levelized Cost of Energy
LED	= Light Emitting Diode
LNG	= Liquefied Natural Gas
LOI	= Law on Investment
LSS4	= Large Scale Solar 4
MEF	= Ministry of Economy and Finance
MME	= Ministry of Mines and Energy
MoE	= Ministry of Environment
MW	= Megawatt
OLTC	= on-load tap changer
OPEX	= Operational Expenditure
PDP	= Power Development Plan
PPA	= Power Purchase Agreement
PV	= Photovoltaic
RE	= Renewable Energy
RE100	= Renewable 100 percent
REC	= Renewable Energy Certificate
RGC	= Royal Government of Cambodia
ROI	= Return On Investment
SBTi	= Science Based Targets initiative
SCADA	= Supervisory Control and Data Acquisition
SEZ	= Special Economic Zones
TNB	= Tenaga Nasional Berhad of Malaysia
UNDP	= United Nations Development Programme
ACGF	= ASEAN Catalytic Green Finance Facility

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# 1. Fully enabling renewable energy investments is a must for the sustainable growth of Cambodia's economy

## a. Foreword

Cambodia is at a crossroads. Neighboring Vietnam continues to attract investment by promoting itself as a wind and solar powerhouse, making renewable energy a priority investment and positioning itself as an ideal manufacturing destination for international investors. Cambodia seems to be taking a different path and risks staying behind the development in the regional markets. Thailand too positions itself as a greening manufacturing hub in the region.

In our opinion, Cambodia has an opportunity to go **beyond** its renewable energy strategies to benefit from its unique location between the two leading Greater Mekong Subregion (GMS) economies and to position itself as a leader in green business.

We suggest that Cambodia:

- Allow for the full implementation of solar infrastructure in industrial compounds and/or factories
- Attract investments and maintain business competitiveness with other countries, especially Vietnam and Thailand
- Enable Cambodian industry to better integrate into fast, modern, and sustainable regional supply chains

Enabling rooftop solar does not only support the direct beneficiaries (manufacturers, garment sector, export companies) but also contributes to:

1. The creation of a new, future-proof industrial sector in sustainable energy, starting with solar technology.
2. The development of high-skilled jobs and know-how in the industry.
3. The avoided power infrastructure costs, grid costs, and other related costs. This can translate into a cumulative GDP gain.
4. Support for new companies and service providers to launch in the sector and contribute to state revenues.
5. The attractiveness of solar panels and peripheral production investment to Cambodia for both the local market and exports.
6. The enhancement of Cambodia's reputation as a modern, progressive investment destination and subsequently, a premier tourism destination.

Ensuring reliable, affordable and improved energy security is a priority for the Royal Government of Cambodia (RGC), as stated in the Power Development Plan (PDP) 2040.

However, for international manufacturers and investors in higher quality production, those with high carbon neutrality targets, and those who consider investing into sustainable production in attractive markets, **renewable energy IS the most important factor for the continued, renewed, or initial investment into a market**, followed by affordability and reliability.

Thus, the priorities of the RGC and international investors concerning renewable energies may not be fully aligned.

## b. Executive Summary

**Cambodia's current energy mix sets a commendable rate (by all international standards) of 51.17% of RE. This represents, without any doubt, a source of pride for the RGC and at the same time a challenge on how to maintain such high yield of RE into the energy mix in the years to come.**

The current situation of fossil fuels commodity market might push Cambodia towards a series of energy security risks, not to mention a difficult financial trade balance. Moreover, energy demand will likely rapidly increase until 2040. Cambodia stands at a crossroads and must choose a path for how to supply and cater reliably to this demand. The Levelized Cost of Electricity benchmarks suggests that renewable energy provided by solar panels, solar farms, and onshore and offshore wind projects represents the future. Therefore the country could invest more with the help of international institutions as well as private investors. International brands and garment purchase agencies have established their targets for green and sustainable sourcing. They have already expressed many times their needs for a cleaner energy mix. Even local manufacturers have expressed a clear need for more progressive legislation toward rooftop solar panels that will allow the industry to remain competitive and compliant.

*Therefore, this position paper advocates in favour of a cancellation of the capacity charges for the manufacturing and industrial sectors, as well as Special Economic Zones (SEZ). It also advocates for a more favorable framework for Localized Private Purchase Agreements. Needless to say that the manufacturing sector, particularly the garment sector, constitutes the heart of the Cambodian source of employment.*

## 2. The Current Situation in Cambodia

### a. The energy mix in Cambodia

**The current energy mix is strong, and provides Cambodia a leading position in the region, but its outlook is jeopardized by already approved coal and fossil fuel investments.**

The current electricity generation mix sets Renewable Energy (RE) at 51.17%<sup>1</sup>. The proposed Power Development Plan (PDP), recently presented as a base for discussion by the Ministry of Mines and Energy (MME), envisions a drastic reduction in the domestic renewable energy share to 35% in 2030. This will increase only to a meager 43.1% a decade later, by 2040. **This effectively reduces the RE generation mix by almost 8.1% in 20 years.**

The situation gets even more challenging for the RE mix when accounting for coal power imports from Lao PDR (dedicated plants for Cambodia). In this case, the share of renewable energy drops to approximately one quarter (25%).<sup>3</sup>

Most of this fossil fuel energy will be imported. Therefore, we would like to highlight the outlooks and consequences of this.

#### I. Outlook

The future balance of the overall energy mix in terms of RE share leans heavily on towards approved coal (CIIDG/CHDHK and Royal Group) or gas (LNG).<sup>4</sup>

In the immediate future, the total Import Power Source will jump 5.24 points, rising from 26.55% in 2021 to 31.79% in 2022. At the same time, Total Domestic Generation will decrease from 73.45% to 68.21% only<sup>5</sup>. On another note, as of 2021,

**62% of the electricity mix was dependent on imports** (whereas 26.55% is direct electricity imported from neighbors and 35.45% from imported fuel like coal or oil burned in a domestic power plant). By 2040, 69% of the energy mix will be dependent on imports (the share of power imports will remain the same but the electricity produced with imported fuel will rise, according to the Cambodia Power Development Plan 2021-2040.<sup>6</sup>)

#### II. Consequences

The consequences of less progressive policies towards renewable energies are:

- 1. Energy security risk:** In 2040, 75% of electricity will be dependent on imports (either primary as coal or gas or a secondary source) from neighbours. This will impact trade balances. According to the World Bank in fact, Cambodia already has one of the highest import dependencies of fuel and electricity in East Asia, when measured as a percentage of GDP.
- 2. Price volatility risk:** Fossil fuel projects are tied by purchase agreements to global fuel prices (such as the existing Sihanoukville coal plants), and face exposure to global volatility. Increasing the coal mix means that the utility supplier Electricité du Cambodge (EDC) has to pay more when global coal prices are high. Oil has reached a price peak in the last 14 years, coal is at its highest price in the last 10-15 years (\$402 per tonne. In Sept. 2020 it was \$46 per tonne), and gas prices are four times higher than they were two years ago. A focus on solar and other RE will result in better energy security and reduced exposure to global fuel price fluctuations.

3. **Finance risk:** China, Korea, and Japan have all stated they will not finance coal projects. The proposed power plan for 2040 includes 3,100MW of unfinanced coal projects. This includes the 2,400MW coal projects in Lao PDR, with a fixed price of 7.7c/kWh. With current coal prices, these projects may struggle to be financially viable and therefore, will struggle to find investors. The power shortages that Vietnam experienced in 2019 were exactly due to financing difficulties in coal projects.
  
4. **New & existing investment risk:** International investors increasingly need a higher share (not a decreasing share) of renewable energy in their energy supply mix if they are to continue to invest in Cambodia.
  
5. **Electricity cost risk:** Solar and wind power are the cheapest sources of new electricity supply. Cambodia's solar auction for the 40MW solar park was announced last month at **2.67 cents/kWh cost for the operator. In 2019 it was 3.9 cents/kWh and, in 2016 it was 9.1 cents/kWh.** Although these prices have to be adjusted for land cost and HV infrastructure, they undoubtedly represent a much lower price than the purchase price offered by the 2,400 MW Laman and Xekong thermal coal-fired power plants - which have an electricity price of 7.7 cents/kWh. Cambodia and the RGC will lose a competitive advantage if they do not benefit from the lower prices of renewables.

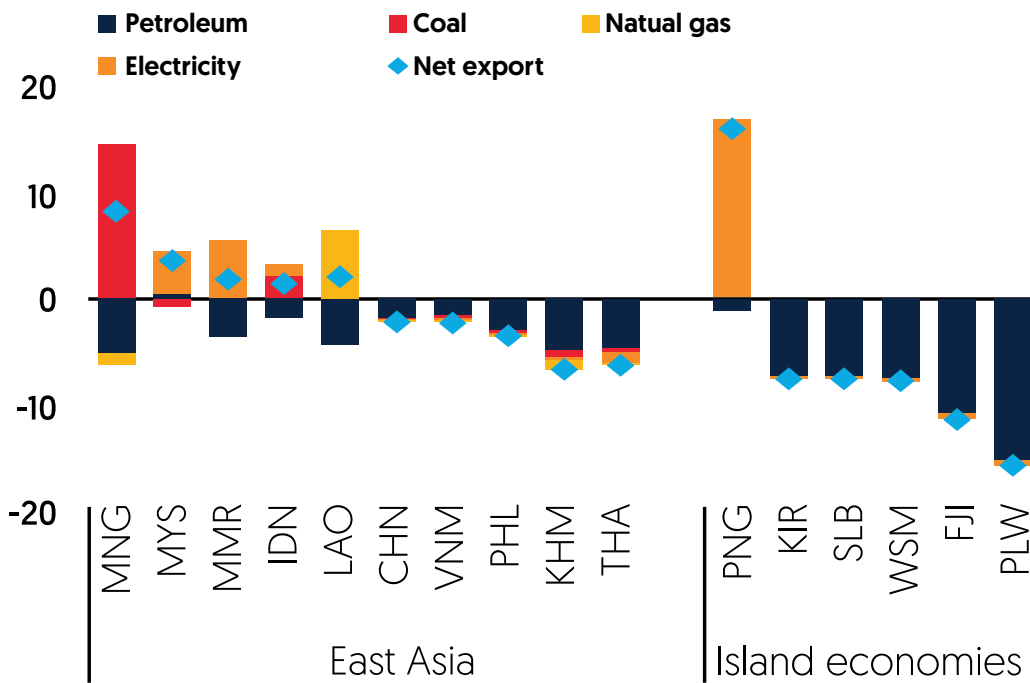
**Coal prices last 10 years**



Source: <https://tradingeconomics.com/commodity/coal>



Percent of GDP



KHM= Cambodia

Source: <https://www.worldbank.org/en/publication/global-economic-prospects>

### III. Conclusion

In conclusion, we respectfully suggest that the government **prioritise RE sources (solar and wind in particular) and to set even more ambitious, higher targets** when finalising the Power Development Plan 2021-2040. The total energy mix should at least reflect the current situation of RE share that sits above 51% of the total generation mix. Missing this opportunity will undoubtedly have a higher cost for the entire country and its population.

#### b. Energy Demand in Perspective

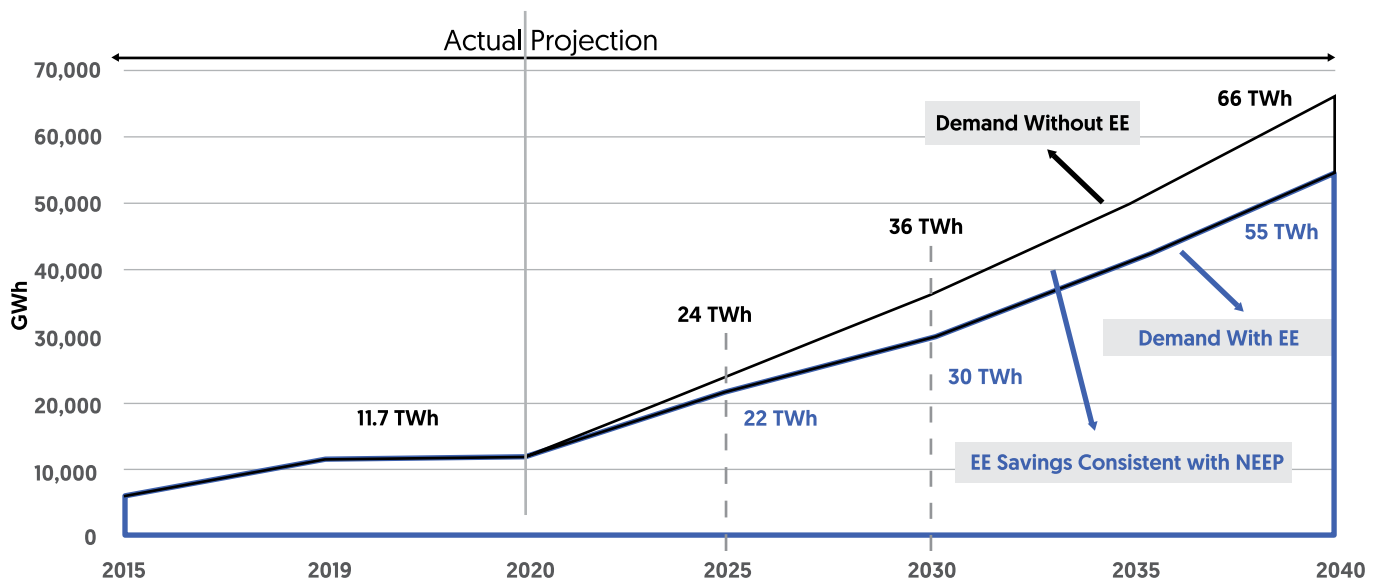
**Energy demand will increase due to economic growth**

During the past 15 years, the capacity of power sources has increased 9.58 times and the power supplied has increased 8.31 times.

Even during the Covid-19 crisis, power demand increased in Cambodia. The total energy delivered in 2021 was 12,601 Gigawatts hours (GWh), 1.61% higher than the previous year, according to an Electricity Authority of Cambodia (EAC) report released in February 2022.<sup>7</sup>

## I. Outlook

There is almost no doubt that energy demand in Cambodia will increase at a steady pace for the next few decades, as the recently presented Cambodia Power Development Plan (PDP) highlights<sup>8</sup>:



**Energy demand will more than triple by 2040, with or without an energy efficiency (EE) plan in place.**

## II. Consequences

Ensuring reliable, affordable, and improved energy security is a priority for the RGC (as stated in the PDP 2040). This can be met with a plan that has a diversified mix of supply: coal, gas, hydro, solar, and wind. New technologies, imports, and improved energy efficiency can help this issue. The PDP 2040 scenarios clearly show that a scenario that relies less on imported coal is less expensive in the long run.

The estimated additional cost to the RGC of purchasing energy from a foreign country is relevant and significant given the RGC's limited budget. On the other hand, renewable resources require a higher level of local investment in the country initially. However, this is followed by the reduction and subsequent end of fuel import costs.

## III. Conclusion

Appropriate incentives for RE and **more favourable legislation/tariffs for industrial solar photovoltaic (PV) could easily meet the growing demand for electricity in the country.** A growth in RE share will significantly reduce power generation costs for the operator of Cambodia (EdC), and reduce the cost burden of consumers (residential and industrial).

## c. Solar and wind energy plans and regulations

Progress has been made on solar farms, although future plans remain limited and rooftop solar regulations continue to penalize investors.

### I. Current Situation and Outlook

Solar farms currently account for less than 5% of total generation sources for Cambodia, imported and domestic. Solar only generates 4-5 effective hours per day compared to 24 hours for coal/gas, so although the domestic installed capacity might look high (above 12%), the actual replacement of fossil fuel generation is very little, only 6.4% of the domestic generation<sup>9</sup>. Under the PDP 2040, this share will be reduced significantly by domestic and imported coal power. The share of solar it seems will only increase to around 9% by 2040, with an additional 2,700MW added<sup>10</sup>. There are no proposed wind projects in the PDP 2040. Given global trends<sup>11</sup>, and the lower electricity cost benefit, this share is considered quite low.

### II. Tariffs and Regulations

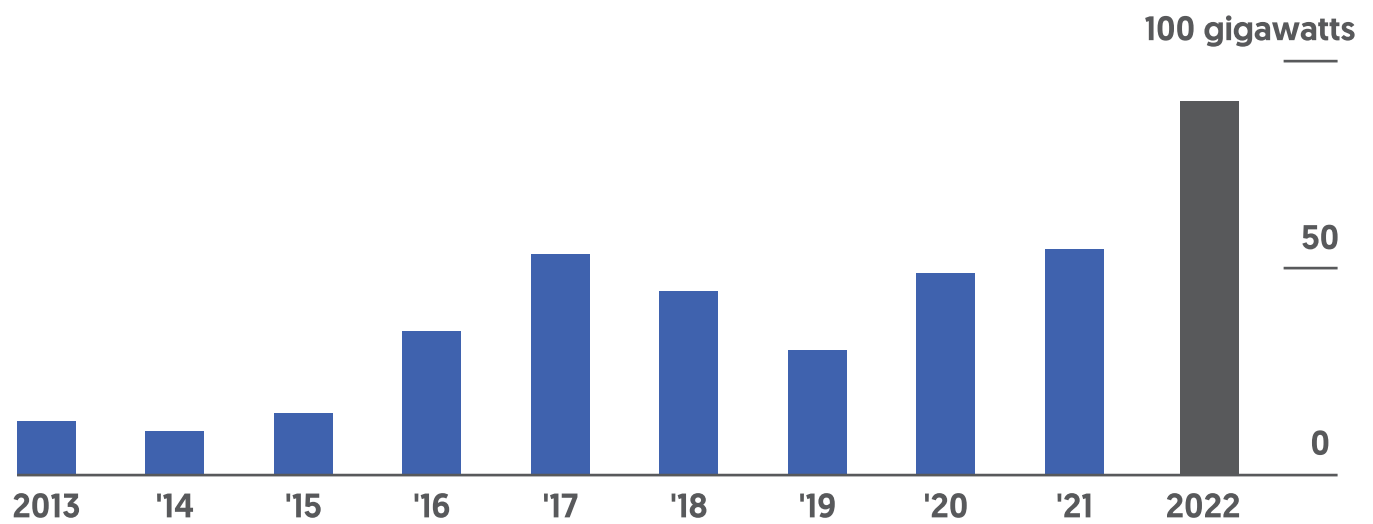
The EdC follows EAC regulations and the MME sets the regulations for EAC. Thus, the EdC simply implements policies and regulations. The state utility company EdC is the only authorized entity to sign power purchase agreements for solar power (except for a few licensees), thus prohibiting REE licensees and SEZs from installing solar power to supply to customers. The EdC does not promote customers installing solar panels on their rooftops for the following reasons:

- 1. Limited solar on the grid** – the EdC states that the amount of solar power on Cambodia's grid should be limited to 15% of the electricity generation mix<sup>12</sup>;
- 2. Sharing benefits** – EdC argues that all customers should benefit from low cost solar power (via EdC buying it on their behalf), not just customers who install it on their roof. This assumes the first point above applies and there is a limited amount of total solar that can be included on the grid;
- 3. Economies of scale** – A solar farm can produce electricity cheaper than a rooftop solar system;
- 4. Grid stability** – Small customers exporting power to the grid can be a safety risk and also make the grid unstable with variable output. (While we understand the limitations in Cambodia, this technical issue has been successfully managed in every other country).

## Having said that, our considerations on the above points are:

- **Point 1** - Indeed, an unpublished 2017 EdC report on solar energy in the grid states that peak capacity could be 15% with no changes required to the grid. However, that same report states that up to 40% could be included with some investment, but no major problems (see also point 4 below);
- **Point 2** - While agreeing on this EdC logic (benefits assured for the entire population) in principle, we would like to highlight the fact that a more liberal approach to solar PV in terms of charges (cancellation of capacity charges) for the manufacturing industry/SEZ (see request below) will actually benefit the entire industry, safekeeping competitiveness and creating hundreds of thousands of jobs for Cambodians. Therefore, benefits will be “spread” to the population;
- **Point 3** - That is certainly true in absolute numbers, and we support solar farms. However, when comparing costs to private solar PV installations, we need to take into account that solar farms require huge investment costs for distribution and cables, without taking into account the land value that the RGC often provides. Instead, privately installed Solar PV systems have a distinct advantage: they are located at the point of consumption, therefore delivering big savings for the EdC on infrastructure and efficiency. Energy is generated where it is needed, whether it's in the city or industrial areas. This aspect should not be underestimated considering the fact that private PVs come at zero investment for the utility provider (EdC), and even reduces the need for extra investment to upgrade cables and transformers;
- **Point 4** - Regarding this point, energy storage and technical devices are sufficiently advanced to avoid a grid collapse even in the worst situation. All solar inverters can be connected to a Supervisory Control and Data Acquisition (SCADA) system making it possible to fully control the amount of solar. There is no safety risk. Inverters shut down immediately when the grid is down. Even options to install some percentage of batteries for grid stability could be included. Other measures include having substations and a transformer network with an on-load tap changer (OLTC), or the refinement of the grid code for connecting solar PV systems to Low Voltage (LV) networks. In a nutshell, there are technical solutions to address the problem of overvoltage over the transformer network. Every developed country has faced similar problems that have been overcome with the help of technology, or a political decision to waive the investment costs incurred by the State Agency. Cambodia could learn from and obtain technical assistance from China, the world leader in solar installation<sup>13</sup> and grid management. Moreover, international institutions are ready to support the modernization of the grid (as demonstrated by the recent KfW financing<sup>14</sup>).

China is forecast to add record solar energy in 2022 (see graph below), despite ongoing high material expenses as the country pushes forward with a huge sustainable build-out to reach its ambitious climate targets. About “75 to 90 gigawatts of solar power capacity will certainly be installed this year”, Wang Bohua, chairman of the China Photovoltaic Industry Association, said on 23rd February 2022.<sup>15</sup>



Source: National Energy Administration, China Photovoltaic Industry Association

Note: 2022 is the high-case scenario of CPIA forecast

### III. Conclusion

As a result of the above, **Cambodia is one of few countries in the world to penalise customers for installing Rooftop Solar PV.** Customers wishing to invest in solar at their property face the following issues:

1. They are charged an additional fixed monthly fee (capacity charge);
2. They are unable to access cheaper off-peak nighttime rates;
3. Solar is capped at 50% of the contracted load;
4. They are prohibited to export excess solar electricity to the grid;
5. Systems built prior to the introduction of regulation are blocked.

It is evident that this tariff and regulation policy is not only discouraging investments in private solar panels but effectively blocking any possibility for the industry to reduce the cost of electricity and achieve sustainability goals.

**We thus urge the RGC to actively seek revision of these restrictive policies with less stringent regulations, particularly regarding the capacity charges, which is seen in the industry as a major barrier.**

### 3. What is at Stake?

#### a. The Problem for investors and Cambodia's reputation

**The push from consumers for a more sustainable supply chain is shifting buying patterns across the globe: repercussions on sourcing from Cambodia are already a reality.**

The private sector has sustainability goals. **Investment decisions at new locations will therefore depend on green policies, enabling companies to fulfill greenhouse gas (GHG) commitments and targets.** Competition from large regional players to attract significant investment will be strong. Cambodia has taken the first step with its excellent new Law on Investment (LOI), but it is imperative that the LOI is complemented with an open renewable energy policy.

As the RGC recently observed: “the responsibility for environmental protection or environmental sustainability in the garment industry is on the rise, especially among major brands and buyers, who have begun implementing energy reduction programs by encouraging the factories or manufacturers within the industry to use the renewable energy”<sup>16</sup>. Moreover, the Government will “**encourage and promote the use of renewable energy as an efficient option** and continue to monitor electricity prices in a timely manner”<sup>17</sup>.

#### I. Brand Targets & Garment Sourcing

**The biggest brands in the world currently sourcing from Cambodia have clear targets to meet as early as 2025.**

Major garment brands are committing to reducing their GHG emissions within five to 10 years. These are firm commitments requiring global supply chains to decarbonize quickly. Through global programs such as RE100<sup>18</sup>, SBTi, Race to Zero, or COP26, many international companies operating in Cambodia have committed to reducing climate impacts by sourcing 100% renewable electricity. These commitments will obviously have an impact on sourcing decisions.

Indeed, key players in this industry will make their decision about maintaining and expanding to Cambodia as a sourcing country

by 2025. These decisions are going to be made based on the progress made and the tangible strategy put in place to achieve the 2030 goals.

Together, European brands and retailers represent a substantial portion of Cambodia's garment exports (estimated at 30-35% of Cambodia's total apparel export). The importance of this bulk buying and the real possibility that these orders will shift swiftly to other countries should not be underestimated. American, Canadian, and Japanese<sup>19</sup> brands are also increasingly under pressure to use green energy in their supply chain.

## II. Garment Factories & GMAC

**The Garment Manufacturing Association of Cambodia has a clear stance on the issue: “we want to be able to use more solar energy to reduce electricity costs”.**

Garment factories have high power consumption and consistent load profiles. Nevertheless, garment factories typically operate on short two to five-year lease agreements with site owners, making long-term investments difficult to prioritise. Current regulations push the Return on Investment (ROI) of solar PV investments up to eight to 10 years, effectively more than doubling a regular ROI for a big factory (typically about four years for the optimum-sized systems). Companies that want to install smaller systems have even negative payback times. It is not a coincidence that a letter from GMAC dated 15.02.2020 to the honorable Minister of MME highlighted Prakas No. 40 [issued one day before] with the following comments:

- a. “This **regulation does not encourage the use of solar energy** to consumers in the industrial sector”;
- b. “This tariff policy does not seem to encourage the use of solar energy. Currently, buyers in the **garment and footwear industry are urging factories to increase their use of renewable energy in order to reduce electricity demand from the national grid and reduce electricity costs**. Well, in case we cannot meet the Requests and Requirements of Buyers, these factories may be affected by the lack of orders or the cancellation of orders. In addition, under the new electricity tariff, we may also have to pay more for solar energy use”;
- c. “The Garment Manufacturers Association of Cambodia (GMAC), which represents members in the garment and footwear industry, is **calling for more leverage reductions and pricing reviews for companies that have installed solar energy**”.

## III. Conclusion

The current solar tariff situation is not sustainable for factories, the private sector in general, or major brands sourcing from Cambodia. In addition, advances in automation and robotics will make it crucial to reduce cost and energy consumption, particularly to:

1. Stay **competitive** (as envisaged by the GFT sector strategy);
2. Attract **quality buyers** (as envisaged by the GFT sector strategy)
3. **Diversify garment exports** with a higher FOB (as envisaged by the GFT sector strategy)

A more favourable policy toward Solar PV could open the door for more orders as well as more competitiveness for the garment sector and the manufacturing sector in general. The industry requests full implementation of solar infrastructure inside SEZ industrial compounds and factories. This would create a favourable environment to attract said investments and keep companies competitive with other garment-producing countries. The bills of industrial consumers would become lighter and, in addition, Cambodia could improve its reputation by becoming a “green manufacturing” destination.

## 4. Impact on National Economy

### a. Unleash the opportunities

#### I. Commitments & Savings

Cambodia's electricity decisions are making the country less economically competitive and they go against global trends. Cambodia's PDP 2040 documentation shows electricity costs will be higher under the selected scenario (presumably scenario 4). The scenario with more renewable energy and less coal results in significantly lower electricity costs in 2030.

Understandably, the RGC is reluctant to cancel power agreements signed in 2019, yet it is these agreements that will lock Cambodia into an oversupply of electricity until 2035. This means higher prices will affect Cambodia's trade balance. Cambodia could save up to \$16.4 billion by not choosing to import this share of coal generated power.<sup>20</sup>

#### II. UNDP Study - A \$900 Million Investment Opportunity

In terms of investments, just to give an idea of the potentiality of RE, 10 GW of solar energy and 1.5 GW of wind power could generate a potential aggregate of \$6.8 billion in investments for Cambodia<sup>21</sup>. More specifically, a recent UNDP study on attracting new FDI concluded that there is "over a \$900 million investment opportunity in solar PV: Cambodia has the potential to attract significant private sector investment in solar PV, estimated at USD \$903 million across the four solar PV sub-sectors to achieve the report's targets"<sup>22</sup> ;

#### III. Skilled Jobs Developments Opportunities

A considerable number of new jobs will be created by introducing more favourable tariffs towards solar panels and renewable energy in general. New jobs and market opportunities as importers, wholesalers, retailers, shops, mechanics, technicians, installers, and maintenance personnel will bring significant benefits to the whole economy. In fact, up to 51,400 jobs could be created from investing in 11.5 GW of solar and wind<sup>23</sup>. Skills development, technologically-advanced training, and innovations in this sector will ensure a "future-proof" industry.

#### IV. Tax Exemption Is Viable

A comprehensive study done by UNDP<sup>24</sup> showed that a **tax exemption on the import of solar PV equipment is economically viable**. Essentially, there is a net benefit indicating that the reduction in electricity generation costs is higher than the potential revenue from import taxes. This implies that the import tax exemption on solar PV equipment is an economically viable instrument which should be used by the government. There is currently a 0% tax on solar panels, but there is a 5% duty on inverters (if purchased from China, otherwise 7%) Often these systems are purchased together and arrive in the same shipment. These different duties treatments involve different procedures at customs and different documents, delays, etc. Therefore, a more homogeneous tax exemption policy could be considered.



## 5. Neighboring Countries

### a. Ideas and lesson learned

**What are Cambodia's competitors or partners doing now and in the near future to attract FDI and innovate their economies?**

All eyes are on Cambodia right now, watching how the country's leadership will drive the transition to cleaner energy use. Renewable energy efforts and energy efficiency measures will remain the region's top priority. Setting clear targets is seen as beneficial and can serve as a benchmark for potential energy

investors. In addition, clear targets are imperative to implement a regulatory environment where investors can easily collaborate with Asian member states. Therefore, the year 2022 is expected to be a turning point for the ASEAN region in terms of its energy transition.

#### I. Malaysia and Indonesia: Current and Outlook

Malaysia has rolled out phase four of its large-scale solar action program (LSS4), a 1GW tender and a MYR 13 billion (\$ 2.9 billion) program to install LED street lighting, rooftop solar panels and transmission lines as a part of its Covid-19 stimulus package<sup>25</sup>. The Indonesian government is developing the Surya Nusantara (or Solar Archipelago) plan, which aims to install thousands of rooftop solar panels with a combined capacity of 1GW per year for millions of the country's poorest households over the

next five years.

Malaysia's state-owned utility TNB has established a green tariff<sup>26</sup> for customers who value green electricity to pay more (this premium is netted out by a tax on fossil fuels so the net price paid by customers is the same). The mechanism uses the I-REC Standard Foundation, which has also recently been established in Cambodia.

#### II. Vietnam: Current and Outlook

Over the past five years, Vietnam has shifted away from coal power investments to renewable energy. The main drivers were the inability to secure financing for new coal projects and the increased competitiveness of renewables. Since the country has set ambitious RE targets, funding has been flowing in to make these investments. After an initial phase where the solar PV policy was overly supportive (it created a new "rooftop leasing" business model that led to grid instability), the country has recently shifted to an offshore wind power model<sup>27</sup>. This experience shows that clear national targets coupled with fair regulation and a standardized, transparent implementation process, could send a clear signal to international investors across all sectors that Cambodia could be a place for green investment.

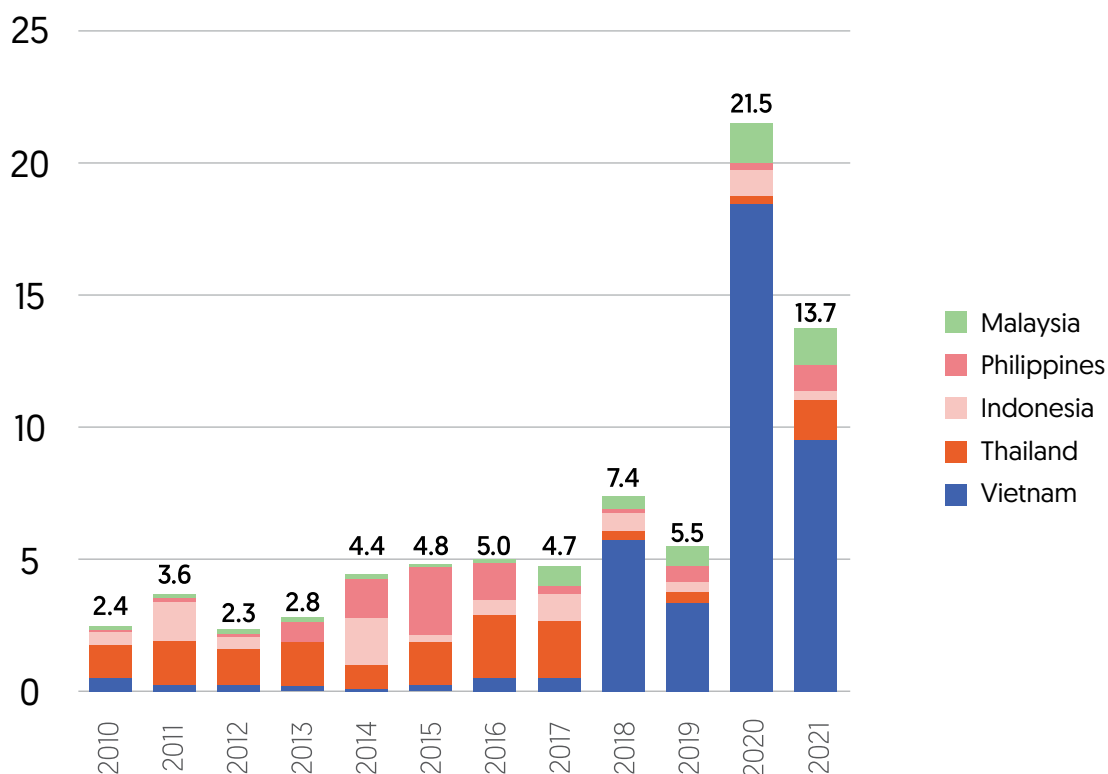
### III. Singapore: Current and Outlook

The Singaporean government has adopted many projects to promote renewable energy. Given the geography of the country and the density of the population, the government has focused on the development of solar energy. In 2020, solar energy reached 350MWp which represents 5% of the peak electricity of the year. The government has therefore set more ambitious targets for 2030 [solar target of at least 2 gigawatt-peak [GWp] by 2030, and energy storage deployment target of 200MW beyond 2025].

In addition, the Solar Nova program launched in 2014 will allow private companies to sell electricity generated from their solar panels to government agencies in 2022. It will use a solar leasing business model in which a private sector company will install, own and operate the solar systems and sell electricity to government agencies through a long-term power purchase agreement.<sup>28</sup>

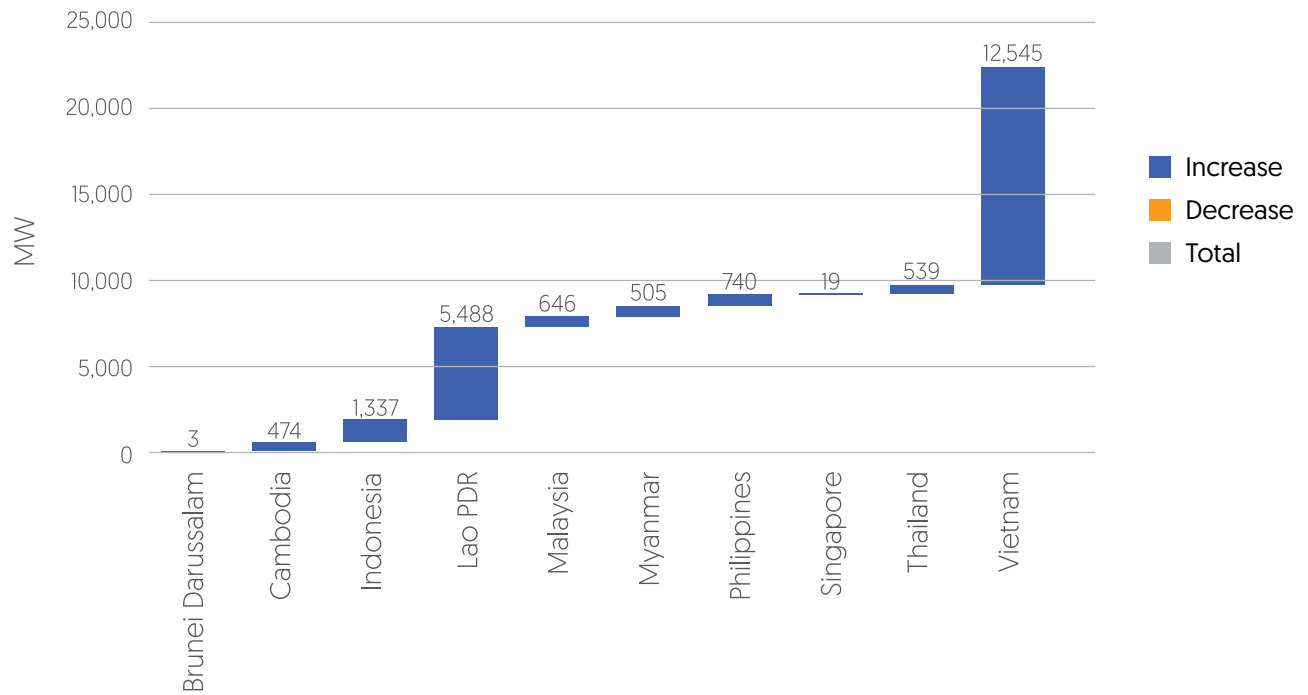
**Southeast Asia energy transition investment by country**

\$ billion

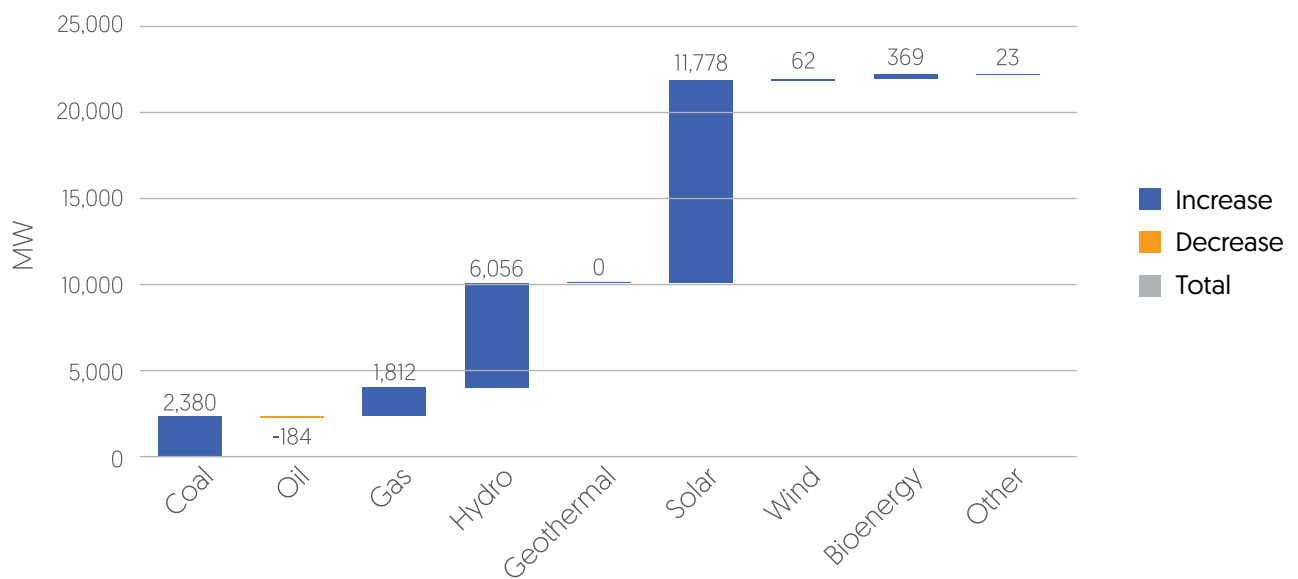


Source: BloombergNEF

### Additional ASEAN Installed Power Capacity in 2020, compared to 2019, by country



### Additional ASEAN Installed Power Capacity in 2020, compared to 2019, by source



Source: ASEAN Power Updates | September 2021 | ACE . All rights

# 6. Solar Costs & International Financing

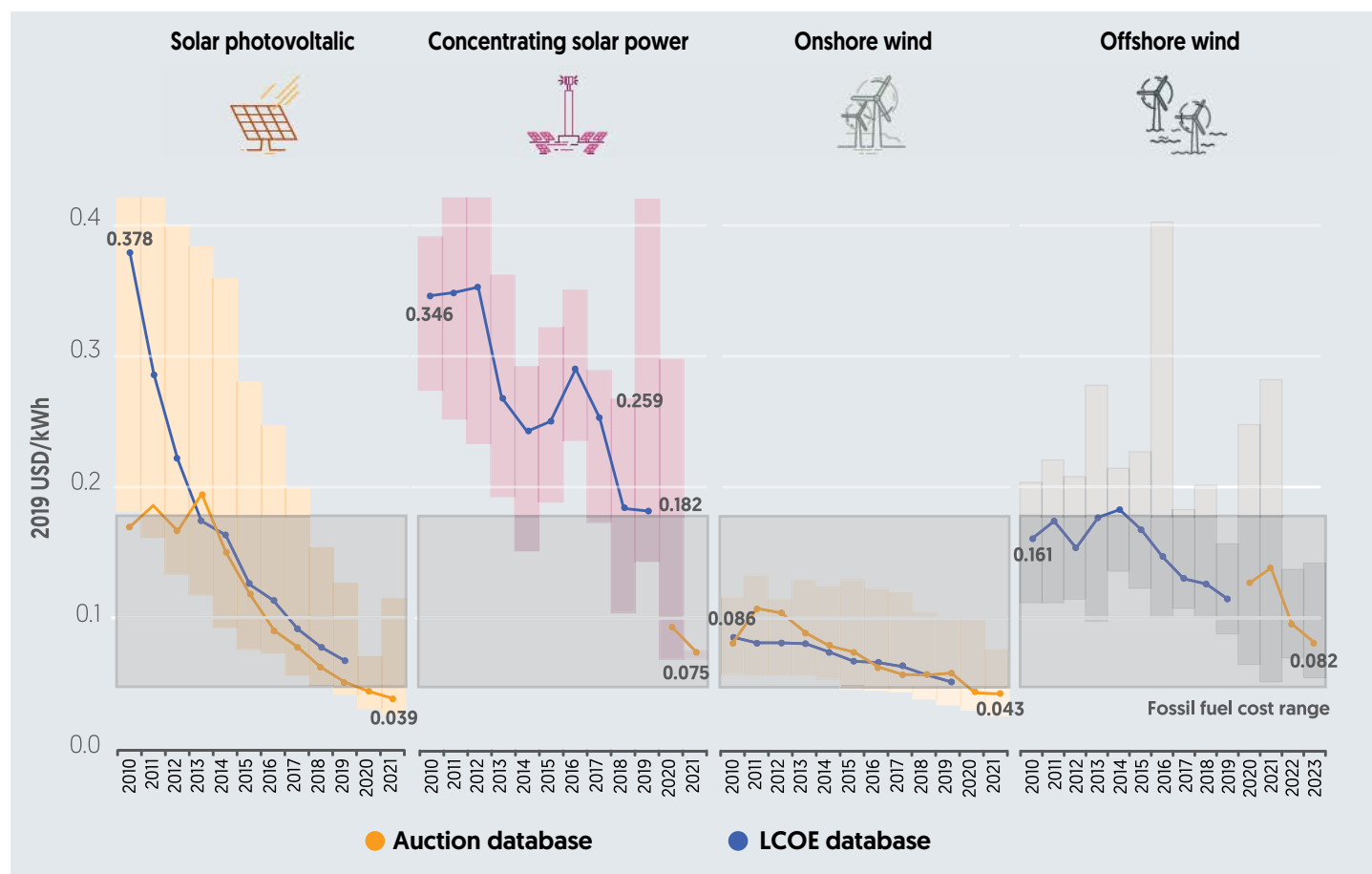
## a. Solar Farms Costs and Floating Farms

Existing solar farms are cheap (as demonstrated by the recent auctions and other studies<sup>29</sup>) and can be financed by the private sector.

Cambodia could consider more floating solar farms. Floating solar farms allow for renewable energy generation without taking up space that might be needed for agriculture or other purposes. The

cooling effect of water allows floating solar cells to operate more efficiently than solar installed on land with an approximate efficiency gain of 5.3%. Floating solar PV farms could avoid land conflicts, leaving open resources for agriculture/food production and could even contribute to fisheries revenues by creating an undisturbed environment for fish reproduction.

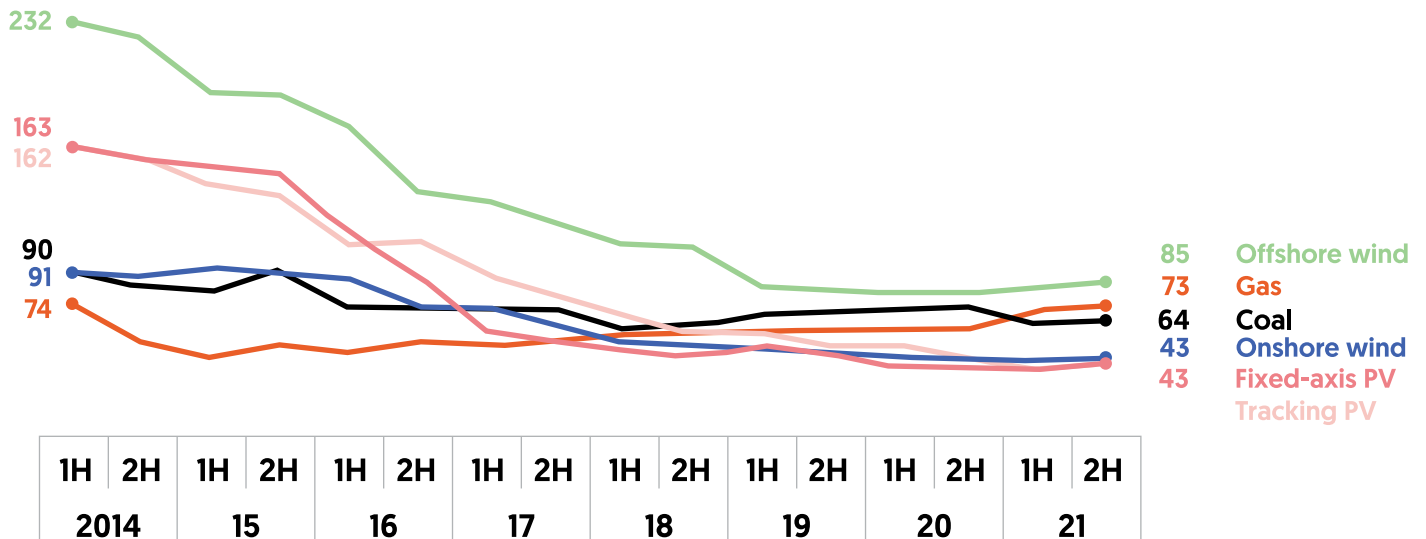
**Global weighted average LCOE and Auction/PPA prices for CSP, onshore and offshore wind, and solar PV, 2010 to 2023**



**Note:** For CSP, the dashed blue bar in 2019 shows the weighted average value including projects in Israel.

## Global LCOE benchmarks for bulk power. 2014-2021

S/MWh (2020 real)



Source: Bloomberg NEF

### b. Financing the Transition

A clean energy and solar energy transition will be supported and funded by the international community. China (which is the leading manufacturer of solar PV) will surely be interested to invest in Cambodia's solar energy. Development partners from the US, EU, UK, Australia, Japan, and South Korea, including development banks such as ADB, KfW, and UN partners, will support the increased technical integration of clean energy throughout the Kingdom. Many development partners have sent clear signals to the RGC regarding their willingness to provide additional support to respond to clear local market demand.

Following global climate finance pledges, Cambodia would be able to access billions of dollars in green investment, climate investment, and carbon finance if renewable energy projects

are prioritised and promoted. The Green Climate Fund (GCF) and ADB have set up the ASEAN Catalytic Green Finance Facility (ACGF) to support over \$4 billion worth of green infrastructure projects across the Southeast Asian region. Mekong Strategic Partners, together with the RGC and the GCF, are developing a dedicated national \$100 million Climate Financing Facility for Cambodia. This national climate finance institution will de-risk local RE projects, with a specific mandate to enable the local financial sector by incentivizing local banks to increase their credit risk appetite and grow their lending to RE projects in Cambodia.

Cambodia should also be able to generate sustainable financing for energy transition through its ASEAN chairmanship in 2022 and the ASEAN Energy Ministers' Meeting (in September).

## 7. A Final Conclusion and a Request

### a. The Ask

*Most importantly:*

- > No capacity charges levied for solar users for the manufacturing / industry sector and SEZs ;
- > A more favourable tariff environment towards specific and localized PPAs

I.

**The key goal for the industry is the cancellation of capacity charges for the manufacturing/ industry Sector and SEZs that have installed Solar PV or wish to install them.** Capacity charges are too high. The penalty for solar electricity is about \$0.07/kWh for larger solar systems and \$0.84/kWh for smaller systems. This cannot be the intent of the solar regulation and makes the investment economically

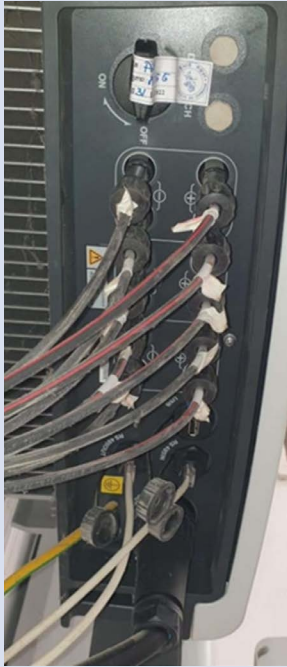
unattractive and unviable. The implementation of solar rooftops could push Cambodia towards an energy transition and also help to meet the growing demand.

At the very least, capacity charges should be based on the size of the solar system. The tariff should otherwise remain the same for a customer with or without a solar system.

II.

**A more favourable tariff environment towards specific and localized PPA** (Power Purchase Agreements) with local SEZ and/or large-scale private investments should be made possible;

## An Unsolved Problem for Solar PV Pioneers



Many enterprises, building owners, and factories have already installed solar panels on their rooftop prior to the pandemic. Since the beginning of 2021, EdC has been penalising only solar panel users by charging them an unfairly high capacity charge. This has made the operation of most rooftop solar systems economically unfeasible and has led to the disconnection of most systems. Current solar regulations (and implementation) need to be revisited to make rooftop solar investments feasible and to provide a clear standardised process.

Pictured below is a solar PV system installed before the 2021 regulations were published. In the picture we can clearly see the EdC official seal set on the OFF position for the main inverter, effectively switching off the entire system and making the full investment useless.<sup>30</sup>

Some of the most reputed schools in the country had the inverters switched off.

# Endnote

1. Consolidated Report 2021 – Electricity Authority of Cambodia, page 1
2. MME ADB - Cambodia Power Development Plan - April 2022 Scenario 4, page 31
3. MME ADB - Cambodia Power Development Plan - April 2022 Scenario 4, page 27
4. On this topic also see a very informed article recently published on the Phnom Penh Post: <https://www.phnompenhpost.com/special-reports/powering-coal-what-cost>
5. Consolidated Report 2021 – Electricity Authority of Cambodia
6. MME ADB - Cambodia Power Development Plan - April 2022 - Calculated based on graph page 26, scenario 4, with 3GWh Lao PDR Hydro imports, the rest (17GWh coal or Thai/VN)
7. <http://www.xinhuanet.com/english/asiapacific/20220223/afa0b99f2a514d75a32a7fec970a462a/c.html>
8. MME ADB - Cambodia Power Development Plan - April 2022 Scenario 4, page 11
9. Consolidated Report 2021 – Electricity Authority of Cambodia
10. MME ADB - Cambodia Power Development Plan - April 2022 Scenario 4, page 23 List of Solar Projects to be Developed. 9% share calculated: 3.1GW solar (2,700+400MW existing) producing 4.89TWh of power in 2040 as a share of total demand of 66TWh in 2040.
11. <https://asianews.network/vietnam-to-cut-solar-power-capacity-pivot-to-offshore-wind-power-in-draft-plan/>
12. Dr Chulasa Praing, Deputy Director of EDC who stated this during the MME ADB PDP Presentation on 6th April 2022 as well as <https://www.khmertimeskh.com/631779/solar-to-make-up-15-pct-of-local-energy-production-by-2020/>
13. Renewable Capacity Statistics. IRENA. 2021. - <https://www.irena.org/publications/2021/March/Renewable-Capacity-Statistics-2021>
14. <https://www.khmertimeskh.com/501086961/germany-pledges-over-30m-to-build-power-grids-in-cambodia/>
15. <https://list.solar/news/chinas-solar-5/>
16. Cambodia Garment, Footwear and Travel Goods (GFT) Sector Development Strategy 2022 – 2027, page 16. Government authorities named for the implementation are: MME, MoE, MEF, CDC.
17. Ibidem, page 25.
18. <https://www.there100.org/re100-members>
19. UNIQLO – Fast Retailing signed the Fashion Industry Charter for Climate Action in January 2020. The Charter supports the goals of the Paris Agreement in “limiting global temperature rise to well below two degrees Celsius above pre-industrial levels.” It also calls for a commitment to “30% aggregate GHG emission reductions in scope 1, 2 and 3 of the Greenhouse Gas Protocol Corporate accounting and Reporting Standard, by 2030 against a baseline of no earlier than 2015.”
20. Calculated based on 2,400MW of coal power operating at 75% capacity factor sold to Cambodia at 7.7c/kWh. First unit operational by 2024 and final unit by 2031 per Council of Ministers 11 September 2021.
21. Calculated at solar investment cost average over the period as \$0.5m/MW and wind \$1.24m/MW.
22. UNDP 2019 - CAMBODIA: De-risking Renewable Energy Investment: Selecting Public Instruments to Support Solar Photovoltaic Energy Investment in Cambodia – Page 19
23. Calculated based on, 7.49 jobs per \$m invested in renewable energy, from Garrett-Peltier 2017
24. UNDP 2019 - CAMBODIA: De-risking Renewable Energy Investment: Selecting Public Instruments to Support Solar Photovoltaic Energy Investment in Cambodia – Page 19
25. Ernst and Young, Green recovery opportunities in Southeast Asia , Japan , South Korea and Taiwan. Ernst and Young, 2021.
26. <https://www.pinsentmasons.com/out-law/news/malaysia-launches-green-electricity-tariff>
27. <https://asianews.network/vietnam-to-cut-solar-power-capacity-pivot-to-offshore-wind-power-in-draft-plan/>
28. Source: Thomson Reuters Practical Law – Electricity regulation in Singapore – overview and Power Technology, SolarNova 4 Solar PV Park, Singapore
29. IRENA [2020], Renewable Power Generation Costs in 2019, International Renewable Energy Agency, Abu Dhabi.
30. An inverter is one of the most important pieces of equipment in a solar energy system. It's a device that converts direct current (DC) electricity, which is what a solar panel generates, to alternating current (AC) electricity, which the electrical grid uses.