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# RENEWABLE ENERGY MARKET REVIEW

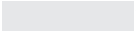
by act renewable





# Renewable Energy Market Review




## Market Overview – General

- The following renewable electricity technologies are applicable in this market: Onsite Solar Investment; Onsite Wind Investment; Unbundled EACs; Onsite Solar PPA/ Leasing;
- The following renewable heating technologies are applicable in this market: Solarthermal; 3rd Party Biomass; Biomass Investment;
- The countries installed renewable energy capacity by source (Hydro: 2 GW , Solar: 3 GW , Wind: 1.5 GW, ANY: n/a, Biomass: n/a)
-  targets to reduce its greenhouse gas emissions by 20% by 2030. Increase the proportion of renewable energy used to produce electricity to reach 50% in 2050, up from 20% in 2021
- Solar capacity addition will be substantially higher than the other renewable technologies.
- Average electricity costs for companies are 108.0 USD/MWh


 Available and recommended

 Available but further assessment needed

 Not available / not recommended




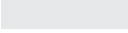
## Summary of Options

Feasible renewable energy options in the market are:

Renewable electricity option	Definition	Rationale
 Onsite Solar Investment	On-site solar solutions are located on the corporate's site and can either be rooftop solutions or smaller free field solutions next to the buildings. In case of an investment, the corporate pays for the installation of the power plant and owns it.	Possible, and excess electricity can be sold to the grid.



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	Renewable electricity option	Definition	Rationale
	Onsite Wind Investment	On-site wind solutions are located on the corporate's site or smaller free field solutions in the area. In case of an investment, the corporate pays for the installation of the power plant and owns it.	Possible, and excess electricity can be sold to the grid.
	Unbundled EACs	An EAC counts for 1 MWh produced electricity from a specific renewable energy system and can be used to claim renewable energy consumption. Certificates come unbundled from electricity and each certificate is unique (no double-counting). There are local and international certificate schemes, for calculation reasons we will refer to the local schemes if available in the country.	I-RECs are available in the country.
	Green Tariff	Green Tariff electricity means that the electricity you buy is from a non-identifiable renewable energy source and that your energy supplier is retiring certificates equal to the amount you consume. The evidence for the consumption of renewable energy will be on the electricity bill.	 does not have a green tariff scheme.




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	Renewable electricity option	Definition	Rationale
	Green Electricity Trading Wind	Green Electricity Trading allows corporates to procure RE from generators/utilities through an open market and is an OPEX model to acquiring renewable energy.	Not available
	Green Electricity Trading Solar	Green Electricity Trading allows corporates to procure RE from generators/utilities through an open market and is an OPEX model to acquiring renewable energy.	Not available
	Offsite Solar Investment	Direct investment in solar assets. The EACs generated can either be retired at asset level or passed on the off-taker of the electricity.	Possible under the condition that a PPA can be signed with EGAT.
	Offsite Wind Investment	Direct investment in wind assets. The EACs generated can either be retired at asset level or passed on the off-taker of the electricity.	Possible under the condition that a PPA can be signed with EGAT.
	Onsite Wind PPA	On-site solar solutions are located on the corporate's site and can either be rooftop solutions or smaller free field in the area. In case of a PPA, the developer installs, owns and operates the power plant and the corporate buys the electricity (PPA).	No record track of wind projects and highly likely that regulations for wind are not set yet.







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	Renewable electricity option	Definition	Rationale
	Offsite Wind PPA	A Offsite Wind PPA is a long-term electricity supply agreement between two parties, a generator (wind power plant owner) and an off-taker (electricity consumer). The power plant is not located at the off-taker's location. Only new build power plants are considered in this definition.	Only small Power Producers can sell additional capacity to other industrial customers under the PPA regime. Others need a PPA with EGAT, the public utility.
	Hydro PPA	A Hydro PPA is a long-term electricity supply agreement between two parties, a generator (hydro power plant owner) and an off-taker (electricity consumer). The power plant is not located at the off-taker's location. Only new build power plants are considered in this definition.	Only small Power Producers can sell additional capacity to other industrial customers under the PPA regime. Others need a PPA with EGAT, the public utility.
	Onsite Solar PPA/Leasing	On-site solar solutions are located on the corporate's site and can either be rooftop solutions or smaller free field solutions next to the buildings. In case of a PPA, the developer installs, owns and operates the power plant and the corporate buys the electricity (PPA) or rents the equipment (leasing).	On-site solar PPAs are allowed, and excess electricity can be sold to the grid.



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	Renewable electricity option	Definition	Rationale
	Offsite Solar PPA	A Offsite Solar PPA is a long-term electricity supply agreement between two parties, a generator (solar power plant owner) and an off-taker (electricity consumer). The power plant is not located at the off-taker's location. Only new build power plants are considered in this definition.	Only small Power Producers can sell additional capacity to other industrial customers under the PPA regime. Others need a PPA with EGAT, the public utility.

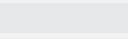
	Renewable thermal options	Definition	Rationale
	Biogas	Gas (methane) produced from the fermentation of biomass (organic waste), which can substitute fossil gas	Not really available
	Solarthermal	Heating of water using solar radiation via a system of heat collectors. In this case evacuated tube systems are the main reference.	Good potential option
	Liquid Biofuels	Liquid fuel (type of alcohol) produced from fermenting sugar contained in biomass (e.g. corn, sugar cane)	Not really available



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	Renewable thermal options	Definition	Rationale
<input checked="" type="checkbox"/>	3rd Party Biomass	Burning of solid biomass such as wood pellets or wood chips from sustainable forests or agricultural byproducts to generate heat. The boiler developer will install, own and operate the boiler. The corporate will purchase hot steam or hot oil directly. The boiler is usually located on site.	Possible solution, biomass is a focus technology
<input checked="" type="checkbox"/>	Biomass Investment	Burning of solid biomass such as wood pellets or wood chips from sustainable forests or agricultural byproducts to generate heat. The boiler developer will install the boiler and the corporate will own and operate the boiler. Fuel purchase, operation and maintenance will be with the corporate	Possible solution, biomass is a focus technology
<input checked="" type="checkbox"/>	Heat Pumps	Heat pump system generating heat from the different temperatures between two mediums, such as groundwater and outside air	Uncertain, not a solution at the moment


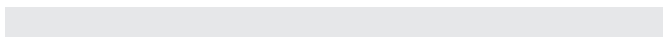

Market Overview - Electricity\*

Category	Detail	Onsite Solar Investment
General	Regulation & Policies	Possible in  Renewable projects will generally be eligible for investment incentives such as tax exemption.
	Outlook	Additional capacity for solar planned.
	Implementation complexity	Low complexity. Solar is a plug and play solution and can be implemented quite fast.



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Category	Detail	Onsite Solar Investment
		Key elements are the load reserves of the roof and potential shading.
Financials	Capital Investment per kW(p)	700.0 USD/kW(p)
	Annual Operation & Maintenance costs	8.0 USD/kW(p)
	Cost Savings	After the investment is paid off, there will be no costs for the electricity consumed from the power plant.
	LCOE	100.0 USD/MWh
Emissions savings	GHG Emission savings per MWh	351.0 kgCO <sub>2</sub> e/MWh
Production	Coverage of electricity consumption	0.1
	Specific yield solar	1500.0 kWh/kWp

Category	Detail	Onsite Wind Investment
General	Regulation & Policies	
	Outlook	
	Implementation complexity	





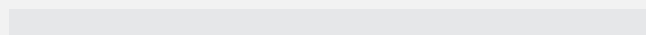
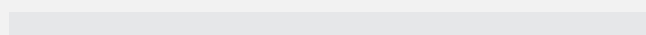
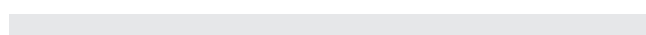
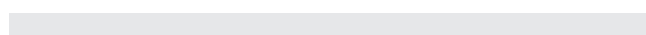
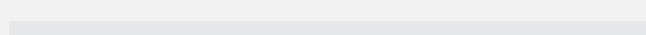
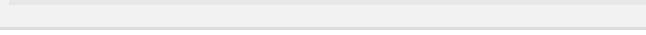
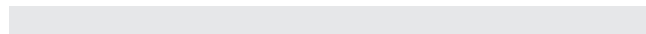
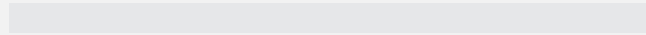
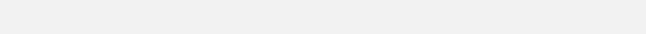
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Category	Detail	Onsite Wind Investment
Financials	Capital Investment per kW(p)	_____ _____
	Annual Operation & Maintenance costs	_____
	Cost Savings	_____ _____ _____
	LCOE	_____
Emissions savings	GHG Emission savings per MWh	_____ _____
Production	Coverage of electricity consumption	_____
	Capacity factor wind	_____

Category	Detail	Unbundled EACs
General	Regulation & Policies	_____ _____ _____
	Outlook	_____
	Implementation complexity	_____ _____ _____
Financials	Capital Investment per kW(p)	_____
		_____



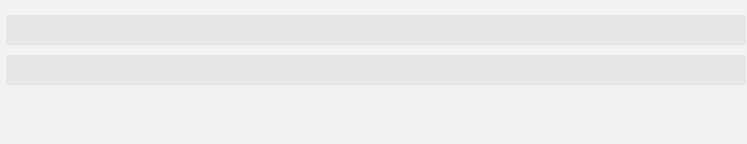

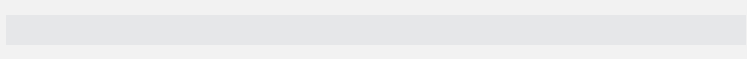
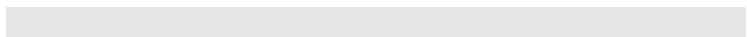
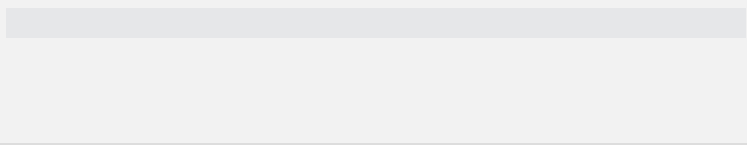
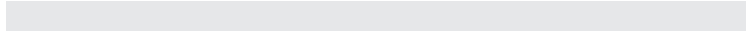
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Category	Detail	Unbundled EACs
	Annual Operation & Maintenance costs	 
	Cost Savings	 
	LCOE	 
Emissions savings	GHG Emission savings per MWh	
Production	Coverage of electricity consumption	 

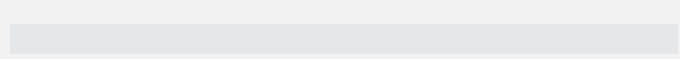
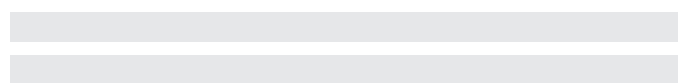
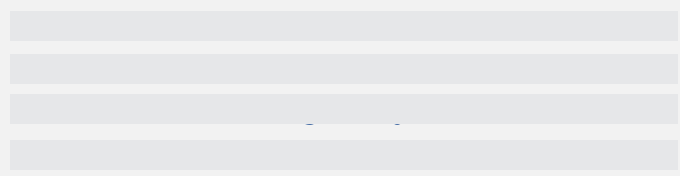
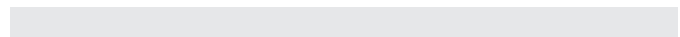
Category	Detail	Onsite Solar PPA/Leasing
General	Regulation & Policies	    
	Outlook	
	Implementation complexity	       
Financials	Capital Investment per kW(p)	 
		



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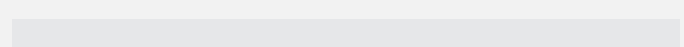
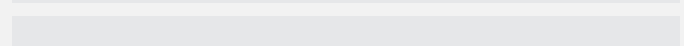
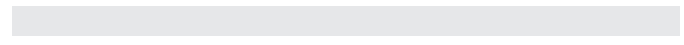
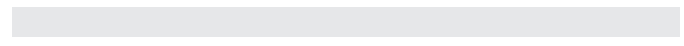
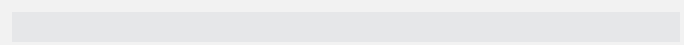
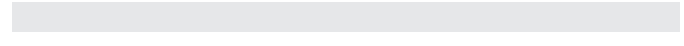
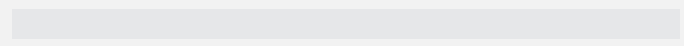
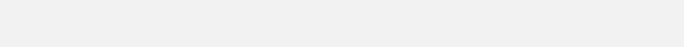
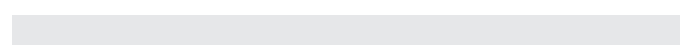
Category	Detail	Onsite Solar PPA/Leasing
	Annual Operation & Maintenance costs	
	Cost Savings	
	LCOE	
Emissions savings	GHG Emission savings per MWh	
Production	Coverage of electricity consumption	
	Specific yield solar	

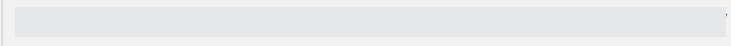
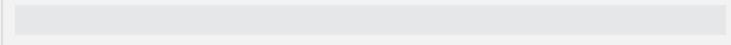
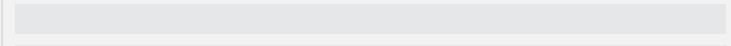
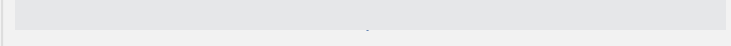
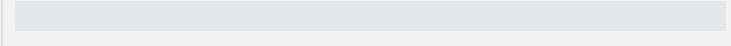
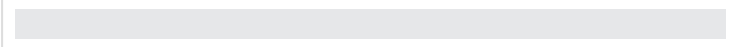
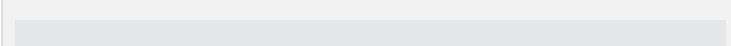
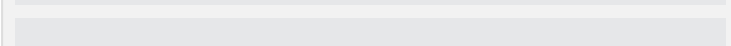
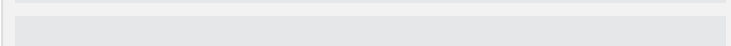
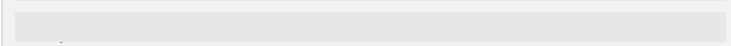
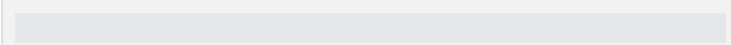
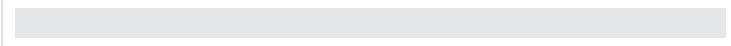

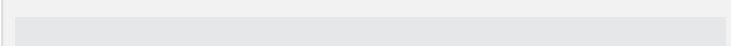
**Market Overview - Heat\***

Category	Detail	Solarthermal
General	Regulation & Policies	
	Outlook	
	Implementation complexity	
Financials	Capital Investment per kW(p)	



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Category	Detail	Solarthermal
	Annual Operation & Maintenance costs	 
	Cost Savings	 
	LCOE	
Emissions savings	GHG Emission savings per MWh	
Production	Coverage of electricity consumption	 
	Specific yield solar	

Category	Detail	3rd Party Biomass
General	Regulation & Policies	    
	Outlook	
	Implementation complexity	    
Financials	Capital Investment per kW(p)	 
		




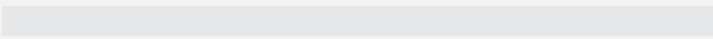
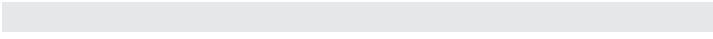
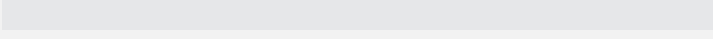
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Category	Detail	3rd Party Biomass
	Annual Operation & Maintenance costs	
	Cost Savings	
	LCOE	
Emissions savings	GHG Emission savings per MWh	
Production	Coverage of electricity consumption	

Category	Detail	Biomass Investment
General	Regulation & Policies	
	Outlook	
	Implementation complexity	
Financials	Capital Investment per kW(p)	
	Annual Operation & Maintenance costs	



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Category	Detail	Biomass Investment
	Cost Savings	
	LCOE	
Emissions savings	GHG Emission savings per MWh	
Production	Coverage of electricity consumption	

\*as of May 2022

**Sources**

