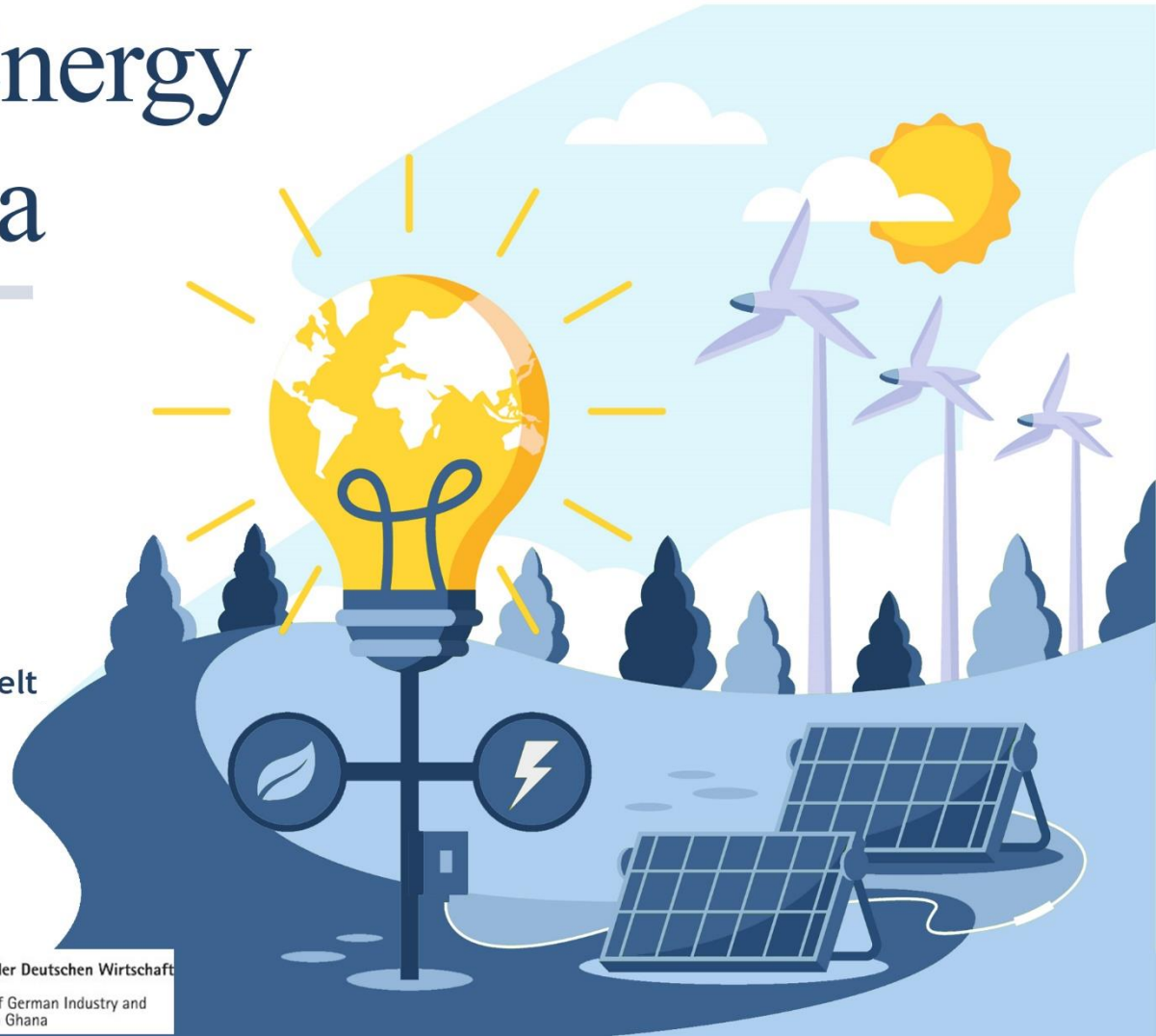


Delegation of German Industry and Commerce in Ghana (AHK Ghana)

Renewable Energy in West Africa

Katharina Felgenhauer
Kompetenzzentrum Energie und Umwelt

10 September 2019





Outline

- AHK in West Africa
- Renewable Energy in West Africa
 - Ghana
 - Côte d'Ivoire
 - Senegal

AHK in West Africa



-  = Delegation of German Industry and Commerce
-  = Regional Coordination

German companies in Ghana



C. WOERMANN
GHANA LIMITED

Allianz



ecoligo.
get solar. get it financed.

REDAVIA
RENTAL SOLAR POWER

SIEMENS



Das Auto.

FRANKI
A KELLER COMPANY

Continental
The Future in Motion



EVONIK
INDUSTRIES

Bayer HealthCare
Science For A Better Life



SCHULTE MARITIME
SERVICES GHANA LTD.

LIEBHERR



BRAUN
SHARING EXPERTISE

LAPP

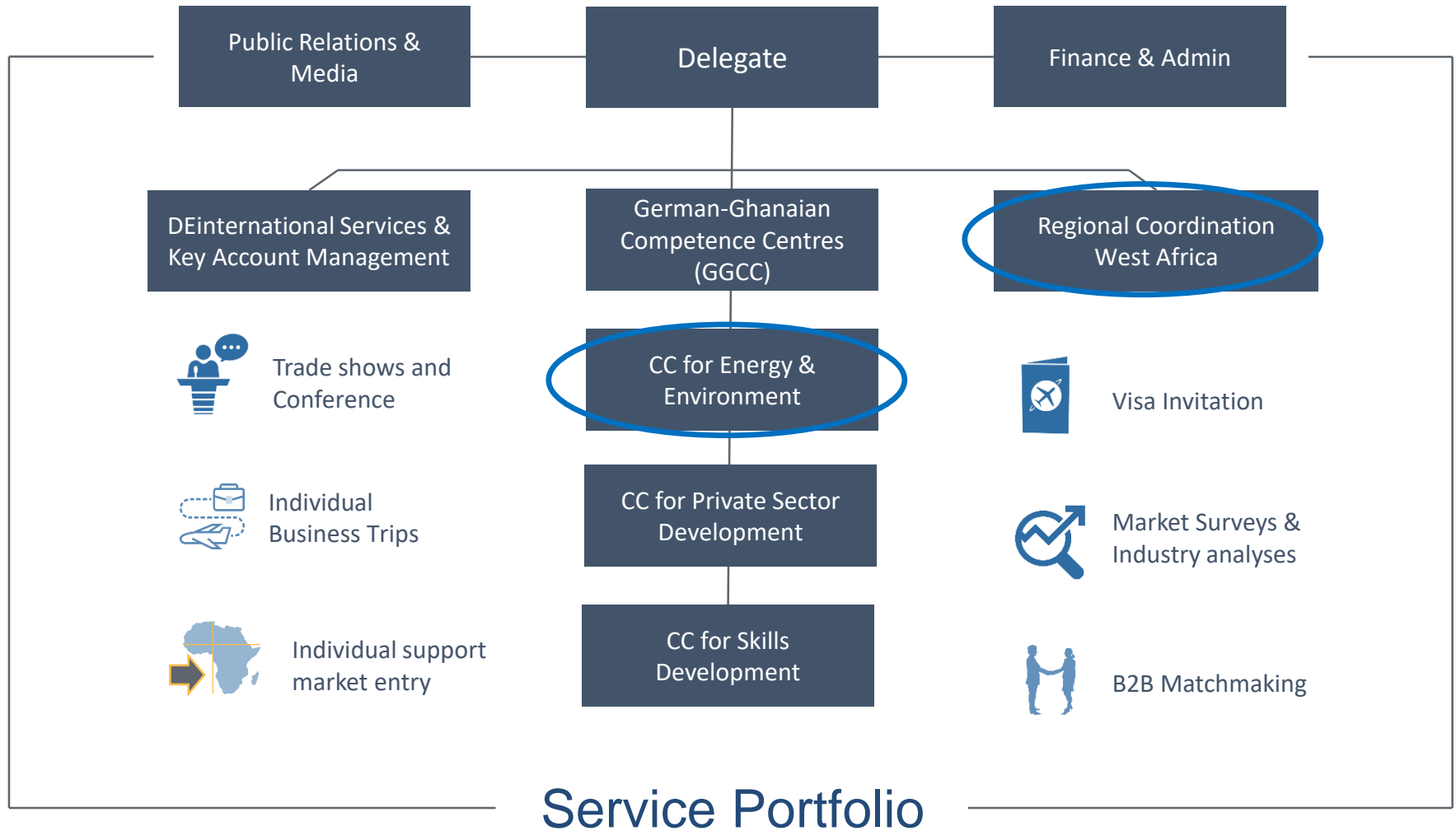
KNAUF



ExperTS
Economy. Transfer. Sustainability.

Partner For Energy

AHK Ghana





Competence Centre for Energy & Environment

Scaling of sustainable energy solutions and innovative environmental technologies in Ghana and West Africa

Our portfolio:

- Market studies, trade information and industry analyses
- Consultation with public and private stakeholders
- Information and delegation trips
- Business partner search and address selection
- Conferences, seminars, trainings, trade shows

7th West African Clean Energy & Environment Trade Fair & Conference



WACEE'19 Goes Greener!

Venue: **Accra International Conference Centre**

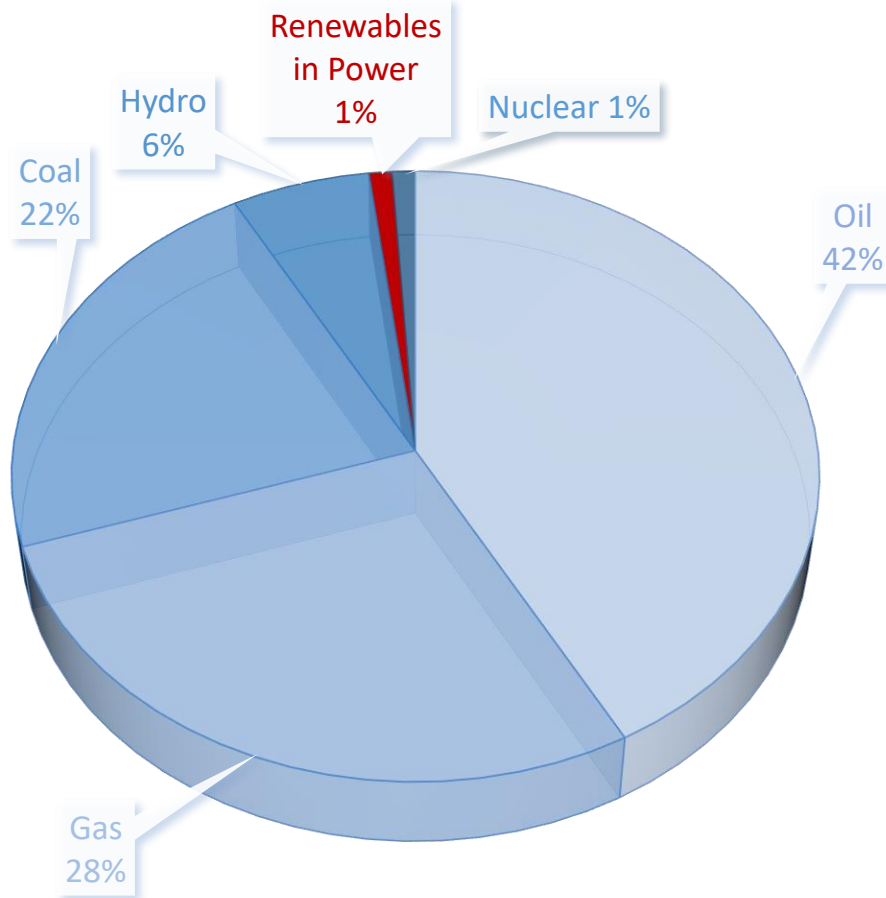
Date: **6th - 8th November 2019**

Time : **9am - 5pm Each Day**

Connect with us: **+233-(0)-54 012 6604 || +233-(0)-24 243 8760**
for details on how to get on board.

Read more: www.wacee.net

Renewable Energy in West Africa



Renewable energies still only represent 1% of the energy sources in Africa.

Source: GIZ



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Photo Credit: © iStock.com/Drazen_

OBJECTIVE

To present German technologies in the renewable energy sector, including solar, wind, biomass and storage solutions and to develop business partnerships between German and Ghanaian companies

ACTIVITIES

2019

Target market
analysis with
profiles of the
market players

2019

Accra: expert
symposium
and business
conference

2019

Business trip
from Germany
to Ghana



Renewable
Energy Supply &
Energy Efficiency



Mining



Health
Sector



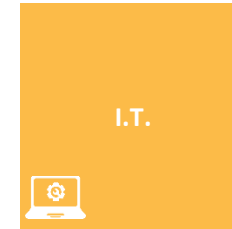
Oil & Gas



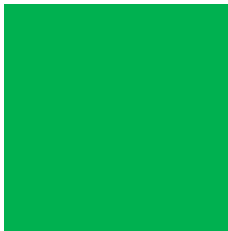
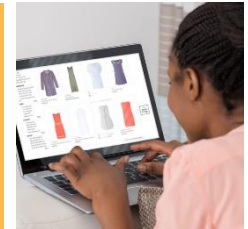
Drinking &
wastewater
sector



MARKET OPPORTUNITIES IN GHANA



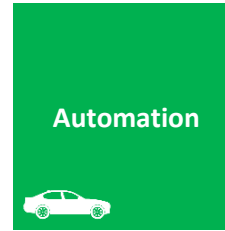
I.T.



Environmental
Technology



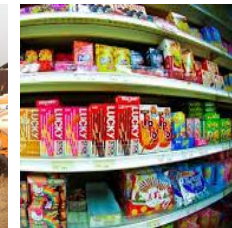
construction
sector



Automation



Agriculture



Food



Electricity & Energy Market

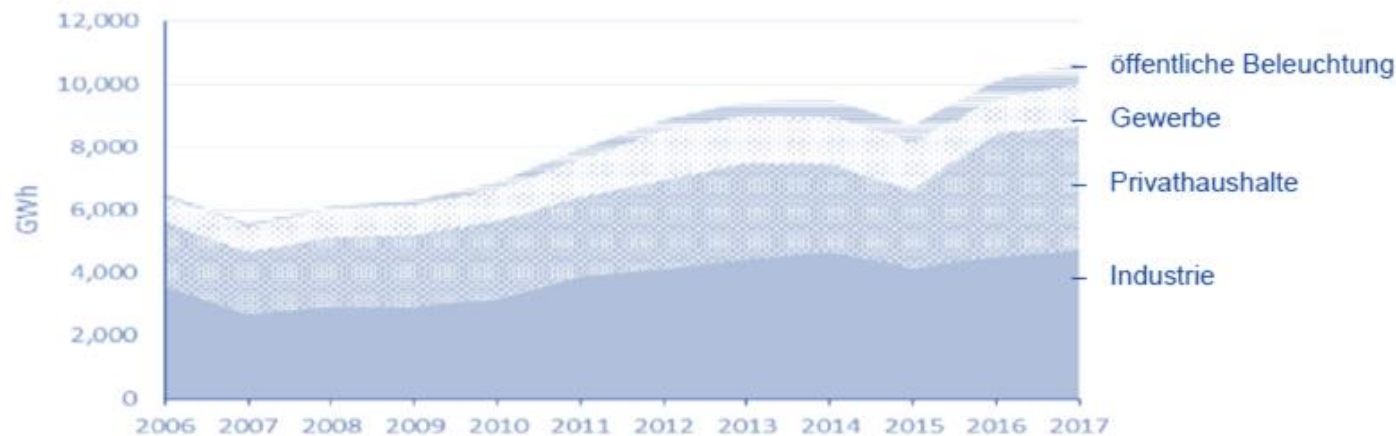
Kraftwerk	Kraftstoff	KAPAZITÄT (MW)				GESAMTERZEUGUNG		
		Installiert	Anteil in %	Durchschnittlich in Betrieb	Durchschnittlich verfügbar	GWh	Anteil in % (inkl. integriert)	Anteil in % (exkl. integriert)
Wasserkraftwerke	Akosombo	1.020		900	505	4.282	30,5	30,6
	Bui	400		340	205	582	4,1	4,2
	Kpong	160		140	115	752	5,3	5,4
	Zwischensumme	1.580	35,9⁹ 36,7	1.380	825	5.616	39,9	40,2
Thermalkraftwerke								
Takoradi Power Company (TAPCO)	Öl/Gas	330		300	200	686	4,9	4,9
Takoradi Inter. Company (TICO)	Öl/Gas	340		320	260	1.880	13,4	13,4
Sunon-Asogli Power (SAPP)	Gas	560		520	180	1.417	10,1	10,1
Kpone Thermal Power Plant (KTPP)	Öl/Diesel	220		200	20	124	0,9	0,9
Tema Thermal Plant1 (TT1P)	Öl/Gas	110		100	70	365	2,6	2,6
Tema Thermal Plant2 (TT2P)	Öl/Gas	80		70	1	0,5	0,0	0
CENIT Energy Ltd (CEL)	Öl/Gas	110		100	30	59	0,4	0,4
AMERI	Gas	250		230	200	1.229	8,7	8,8
Karpower	Schweröl	470		450	225	1.814	12,9	13,0
AKSA	Schweröl	260		220	100	799	5,7	5,7
Zwischensumme		2.730	63,3	2.510	1.286	8.373,5		
Trojan	Diesel/Gas	44		40	30	52	0,4	-
Genser	Kohle/LPG	22		18	0	0	0	-
Zwischensumme (inkl. integrierte Stromerzeugung)		2.796	63,6	2.568	1.316	8.425,5	59,9	
Erneuerbare Energien*	VRA	2,5		1,5	1,5	3,0	0,02	
	Solar							
	BXC	20		16	10	25	0,18	
Zwischensumme		22,5	0,5	11,5	11,5	28,0	0,2	
Summe (inkl. integrierte Stromerzeugung + Solar)		4.398,5		3.966	2.198	14.069		
Summe (exkl. integrierte Stromerzeugung + Solar)		4.310		3.890	2.156	13.989		

Quelle: Energy Commission, Energy Outlook 2018, April 2017

Opportunities: Solar / Bioenergy

- Power for self-consumption
- Mini-grid connections for the industry
- Off-grid island connections
- Risk investment management
- Energy efficiency solutions

Abbildung 8: Netzstromverbrauch nach Nutzerklassen



Quelle: Energy Commission, Energy Statistics 2018, April 2018

Policy highlights

Ghana RE ACT 832

- Feed-in-tariffs
- Net-Metering

Draft Mini Grid Regulations Policy

- Develop mini grid systems in off-grid communities incl. lakeside and island communities

RE Masterplan

- Increase RE in national energy generation mix
- Reduce the dependence on fossil fuels
- Provide RE based decentralized electrification in 1000 off grid communities
- Promote local content and local participation

Challenges

- Excess capacity of 1,700MW($\pm 3\%$) reported - hence power purchase agreements are limited
- Restructuring and partial privatization of electricity distribution
- Ineffective implementation of tax and customs incentives on renewable energy technologies
- Local Content & Local Participation Requirements



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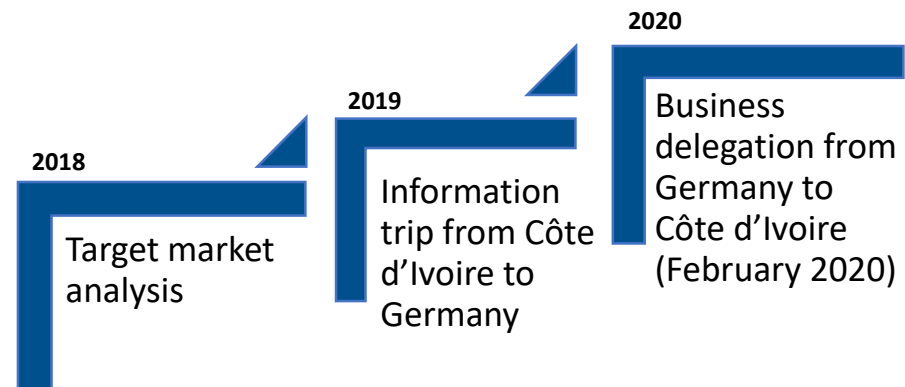


Photo: unsplash.com/zburival

Objectives

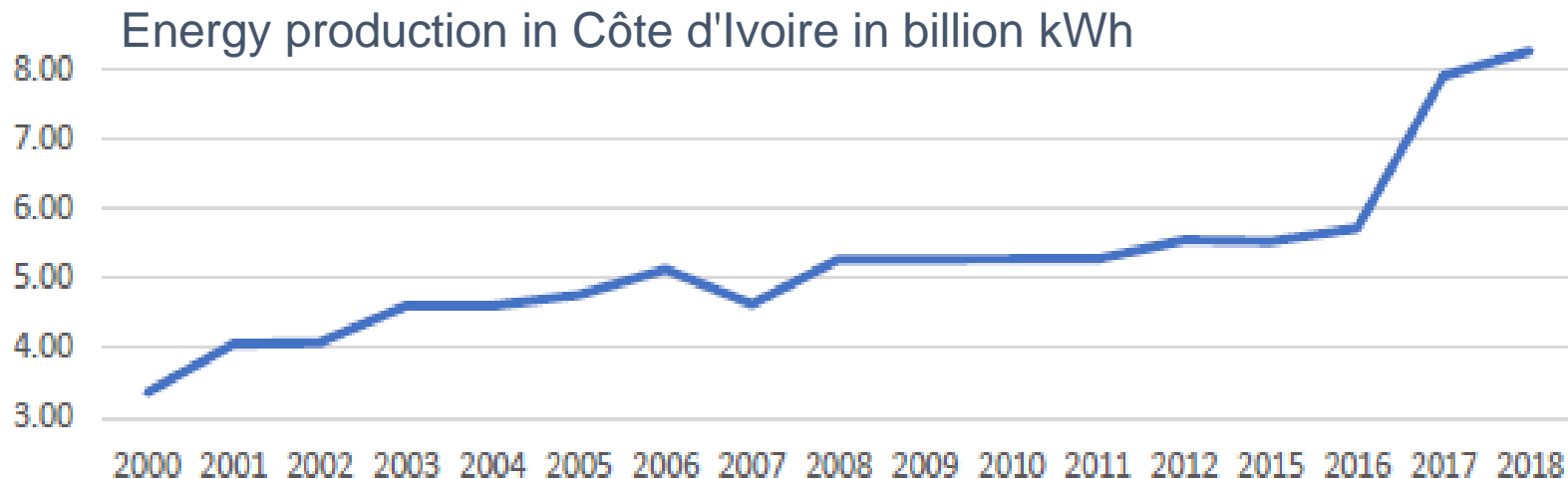
Establishing business relationships between German and Ivorian business partners in the fields of Renewable Energy and Energy Efficiency

Activities



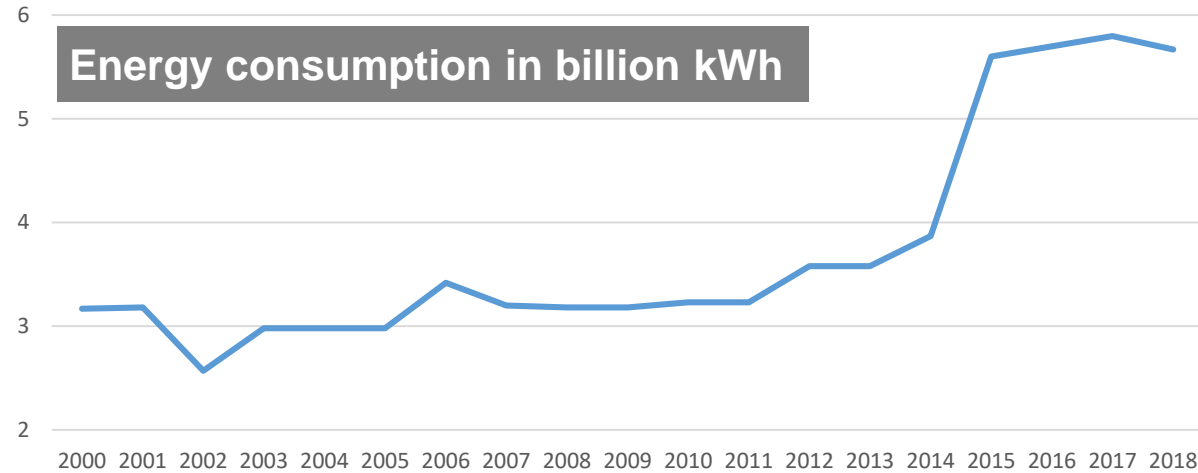
Energy Production

- Production capacity to reach 6000MW by 2030 (2016: 1886 MW; 2020: 4000MW)
- Strategy plan „Development of the Energy Sector by 2030“:
 - Promotion of Renewables (Biomass, Hydro, Solar)
 - Rural electrification, decentral power plants, mini-grids
 - Public-private partnerships for increased capacity

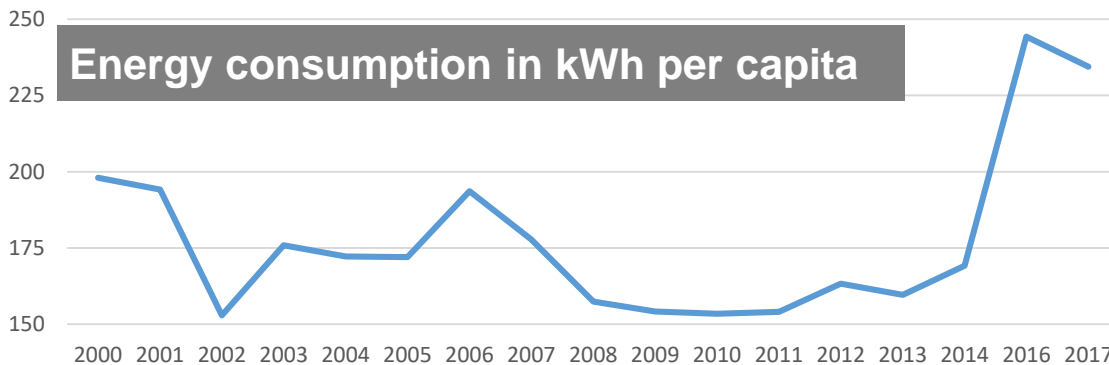


Source: Centre for International Development at Harvard University, The Atlas of Economic Complexity

Energy Consumption



Trend ↗



- Economic growth
- Population growth
- Infrastructure development
- Grid expansion
- Development policy
- Large-scale projects

Source: Delegation of German Industry and Commerce in Ghana (AHK Ghana) based on Index Mundi, www.indexmundi.com

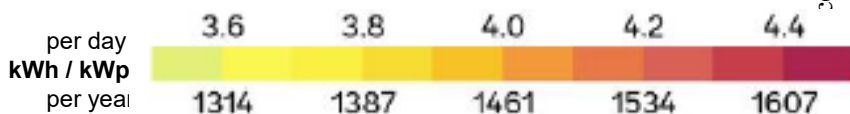
Solar Energy

Moderate solar potential

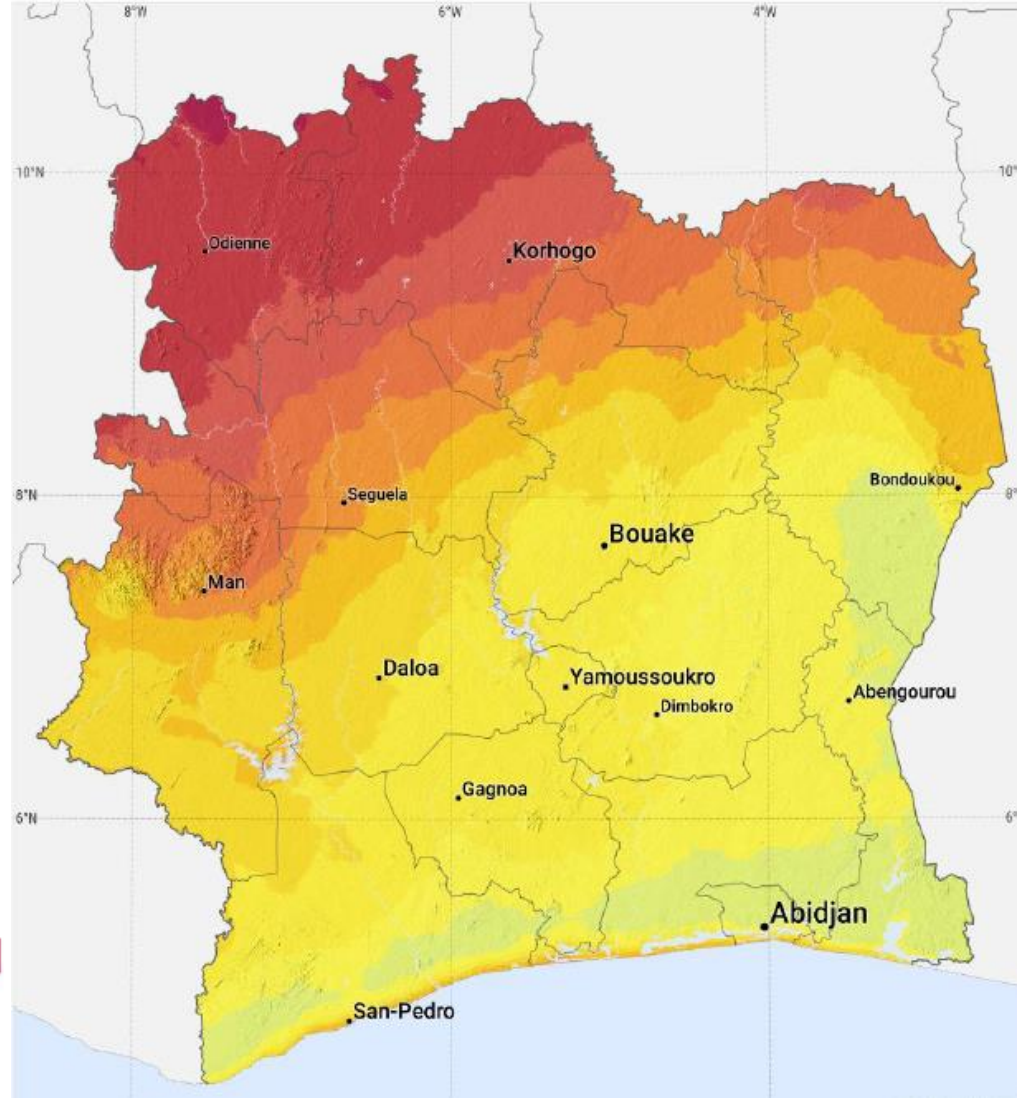
- 4-5 kWh/m²
- 6 sunshine hours / day
- 10.325 TW p.a.

Exploitation below potential

Government supports expansion (solar power installations, solar lanterns)



Source: Worldbank ESMAP, Solargis, <http://globalsolaratlas.info>, 2017



Strengths of German suppliers

- German technologies highly recognized
- Integrated solutions for renewable energy, energy efficiency and energy storage
- Competitive advantage for building local skills and capacities
- Political support through German-Ivorian reform partnership

Weaknesses of German suppliers

- German quality has its price
- On-site networks are not strong
- Cultural and linguistic differences make entry into the market more difficult

Market opportunities

- Economic and population growth
- Government encourages expansion of renewable energy, clear legal framework
- No currency risk CFA <> EUR
- Access to the West African market
- Local network partners, e.g. AHK Ghana and Global Business Network

Market risks

- Limited market information available
- Awareness of renewable energy still underdeveloped
- Strict, powerful legal framework
- Currently increased interest of various private and state players in the energy market, increased competition

Recommendations

- Good time for a market entry (market potential, outlook, business environment, commitment of German politics)
- Strategic cooperation with German and local (competence) partners and authorities is essential
- Specific business models must react flexibly to changing conditions



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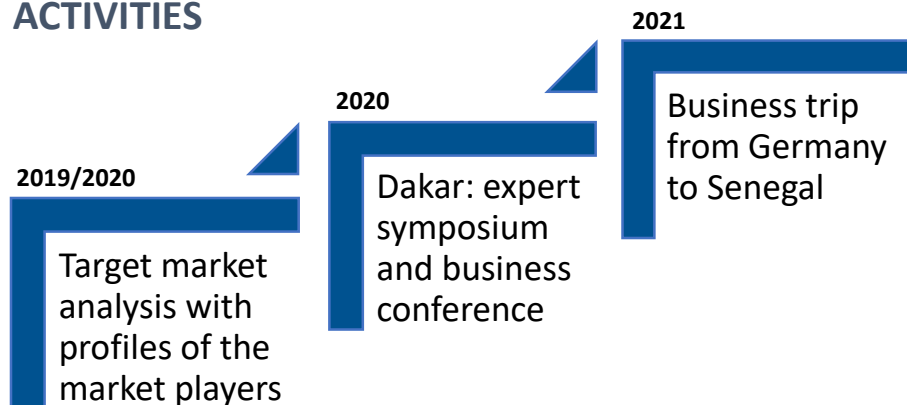


Photo Credit: iStock.com/i-Stockr

OBJECTIVE

To present German technologies in the renewable energy sector, including solar, wind, biomass and storage solutions and to develop business partnerships between German and Senegalese companies in these areas.

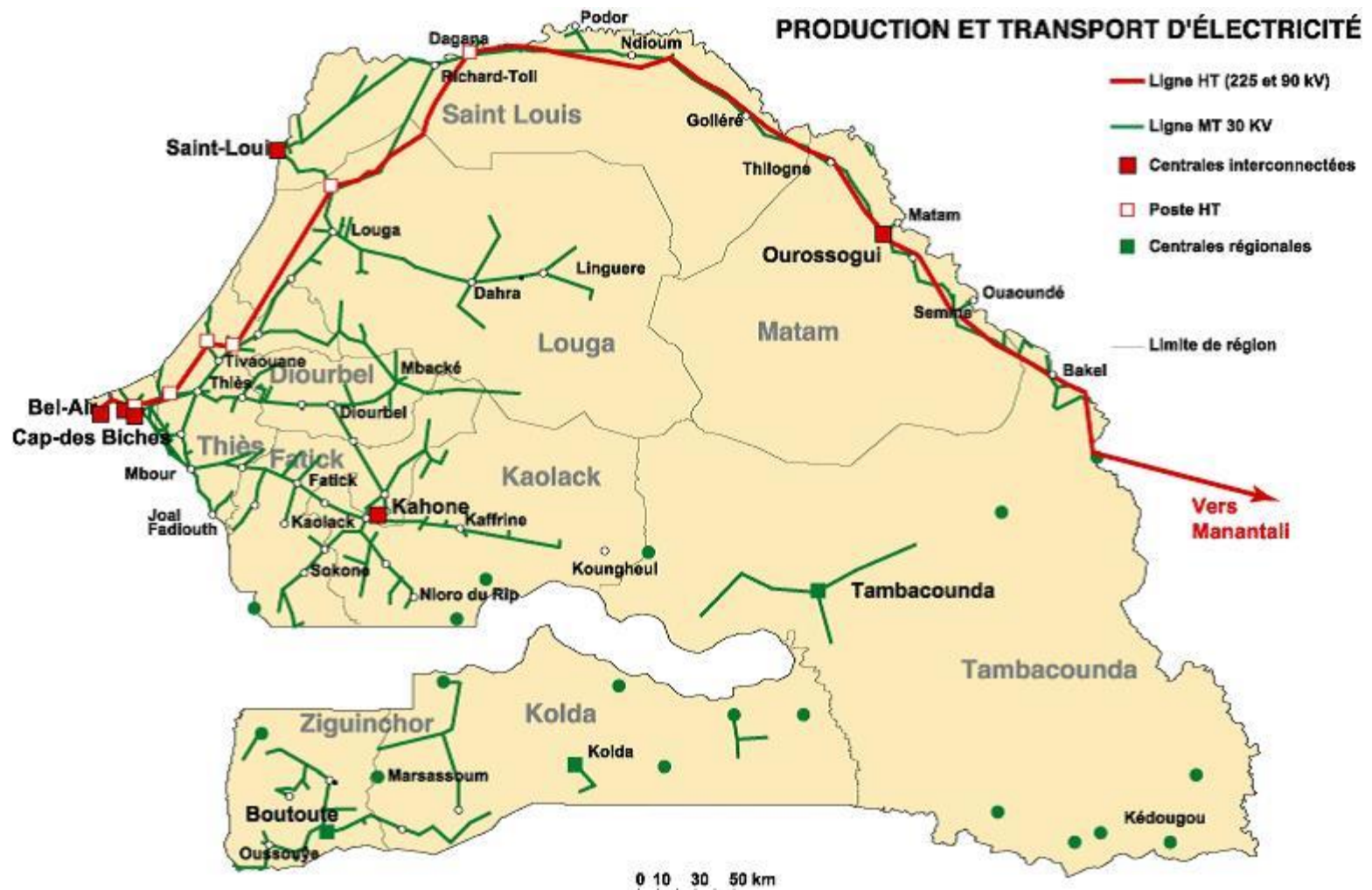
ACTIVITIES



Electricity sector Senegal

- Political will for 15% of generation capacity from renewables by 2020
- Electricity generation mainly from imported diesel and gas
- Growing power demand; installation of new coal and diesel plants
- Exploitation of newly discovered offshore gas reserves
- Electricity access rate of 55% (90% in urban, <30% in rural areas)
- Government targets universal access in 2025

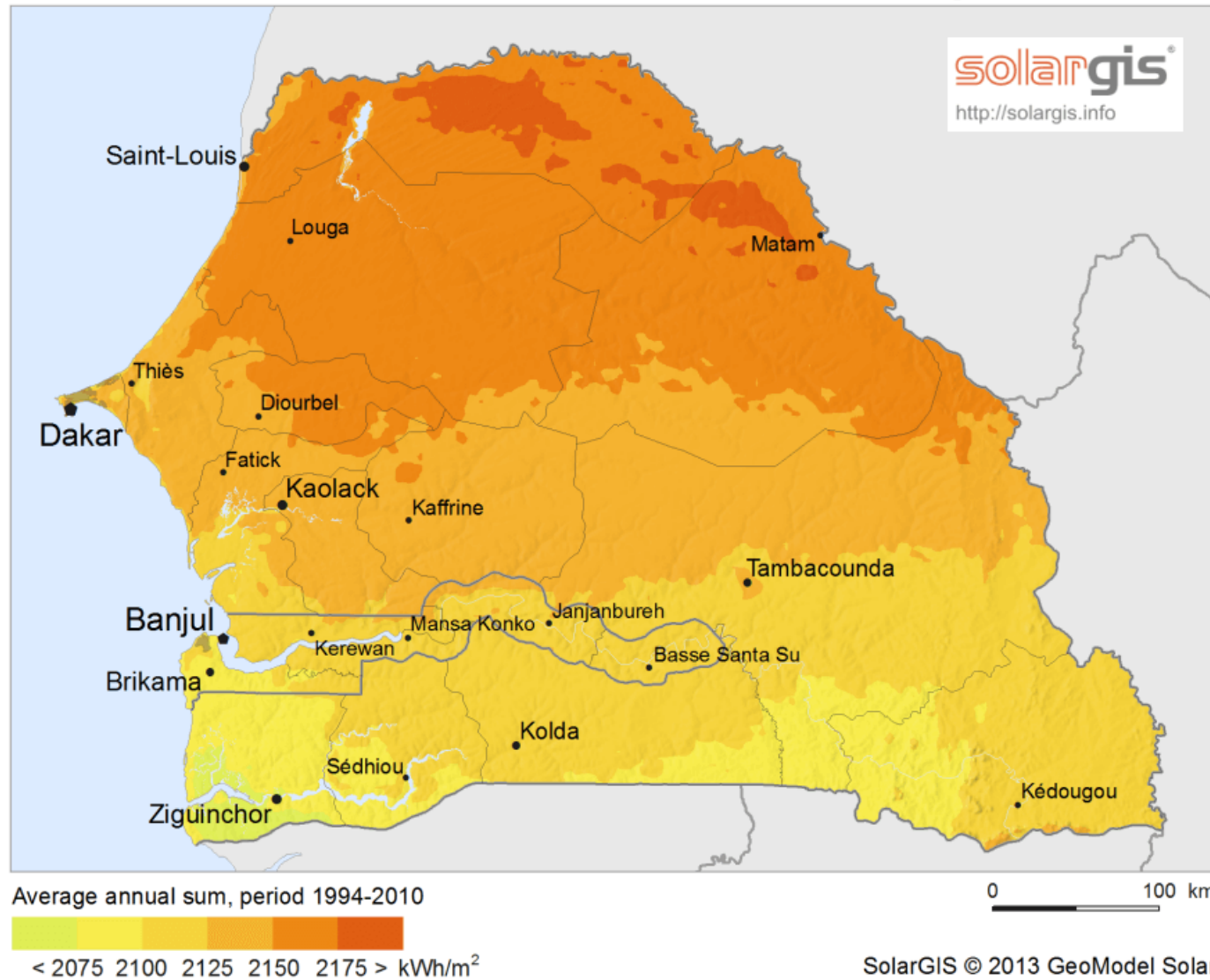
Distribution network



Source: CRSE via https://www.get-invest.eu/wp-content/uploads/2015/11/Senegal_transmission-and-distribution-network.jpg

Global Horizontal Irradiation

Senegal and Gambia



Hydro

- Senegal River with significant hydroelectric potential (est. 1,200 MW)
- Total potential for large hydro on the Senegal and Gambia rivers around 1,400 MW
- Currently only 260MW exploited with Manantali plant (incl. export)

Wind

- Good wind energy potential along Northern coastline between Dakar and Saint Louis (wind velocities of 5.7-6.1m/s)
- Resource has not been exploited; more detailed data needed
- Potential to account for up to 70% of renewable energy generation capacity

Solar

- Significant solar energy resources (irradiation above 2,000 kWh/m²/year)
- Market opportunities enhanced by national and international promotion programmes

Biomass

- Agricultural by-products and liquid biofuels with good potential
- Est. generating potential is 2,900 Gwh

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**Delegation der Deutschen Wirtschaft
in Ghana**
Delegation of German Industry and
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