A·S·E Applied Solar Expertise

Africa's ESG-Driven Trade: Paving the Path to Sustainable Success

„Sustainability bonds to allow investment in Africa into renewable energy in order to prevent energy injustice and reach the Paris climate goal“

ESG (Environment, Social, Governance) and its connected sustainability management are the core topics in our time

Dr. Winfried Hoffmann

20th December, 2023,
EU TECH online conference

CV Winfried Hoffmann

- Since 1979 active in photovoltaic and CEO of production companies (RWE Solar and RWE SCHOTT Solar GmbH: PV wafer, cells and modules, Applied Materials GmbH: Production equipment for deposition), president of associations (EPIA, today SolarPower Europe, BSW Solar), member/chairman of supervisory board (SMA Solar Technology AG/ Solar-Fabrik AG) and many institutes (FhG-ISE, ISFH, HZB, DLR, ZSW)

- **Today‘s activities in December 2023:**

❖ Independent consultant with Applied Solar Expertise - ASE

❖ Member advisory board from Solnet group (EPC)

❖ Member scientific board at ISFH (Hameln)

❖ lectures/Seminars at universities in Konstanz and Freiburg

Content

Africa – the continent with most people in the coming decades

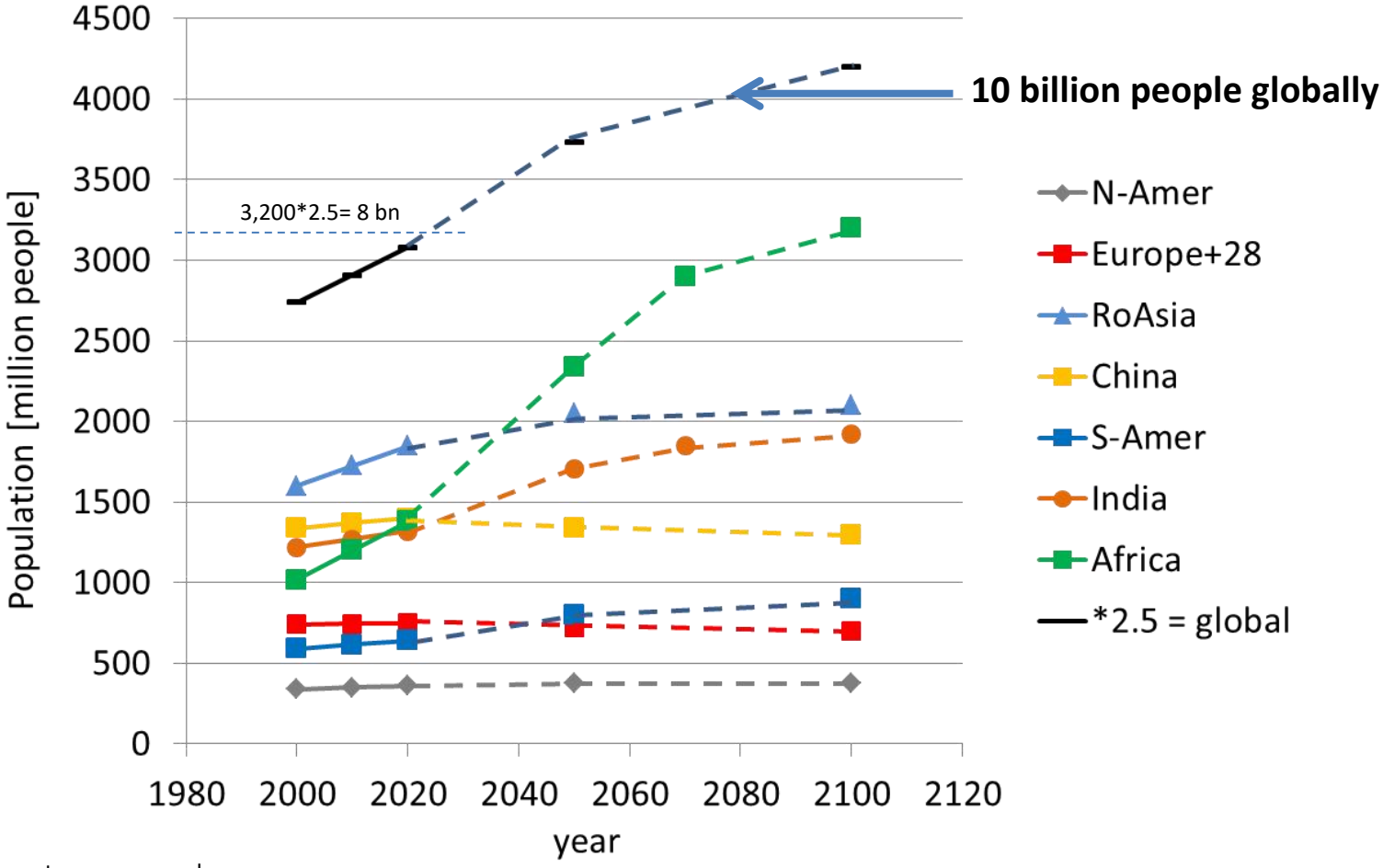
Energy justice – to prevent migration with unprecedented numbers

An ideal case would be the investment into electrification with renewables (PV, wind and storage) – and NOT in fossil technologies → loans needed!

Necessaty for a joint undertaking between Europe and Africa: „PPP“ (Public money to secure the loans**),** Private money from various stakeholders for the loans, Partnership agreement between African states together with their utilities and European states together with their financing institutions (e.g. KfW, EIB, …)

Sustainability bonds as vehicle to execute the PPP

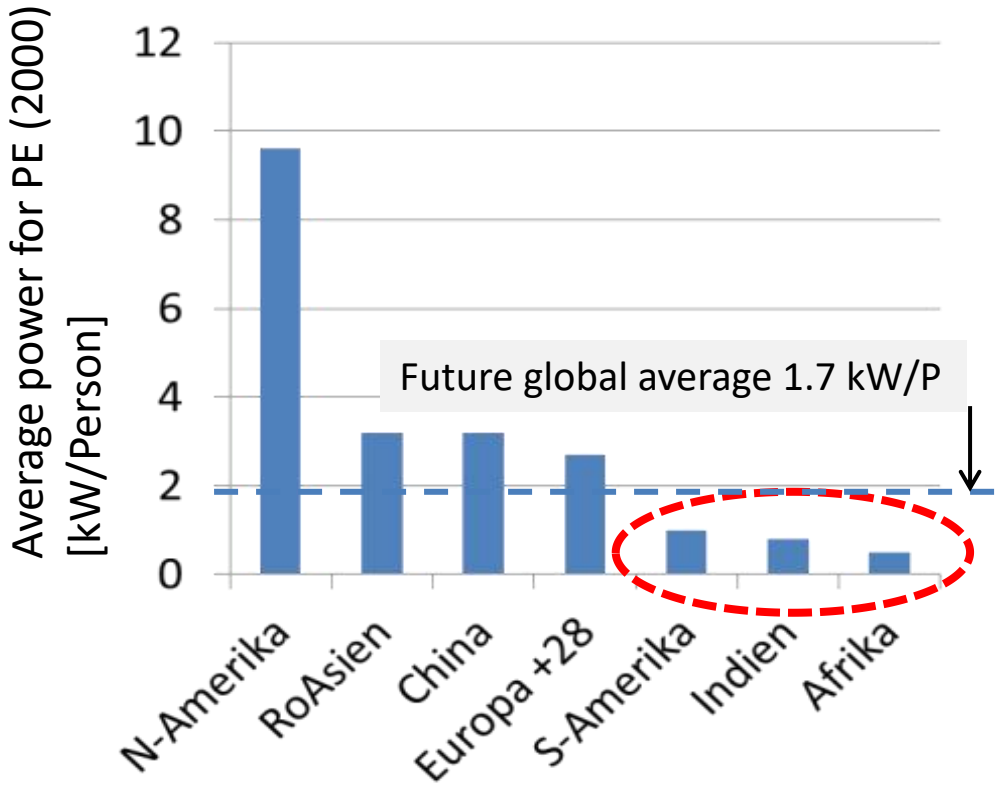
How much energy will be needed globally? Africa – the continent with most people in coming decades!



Source: UN reports, own research

Global energy justice today… ?

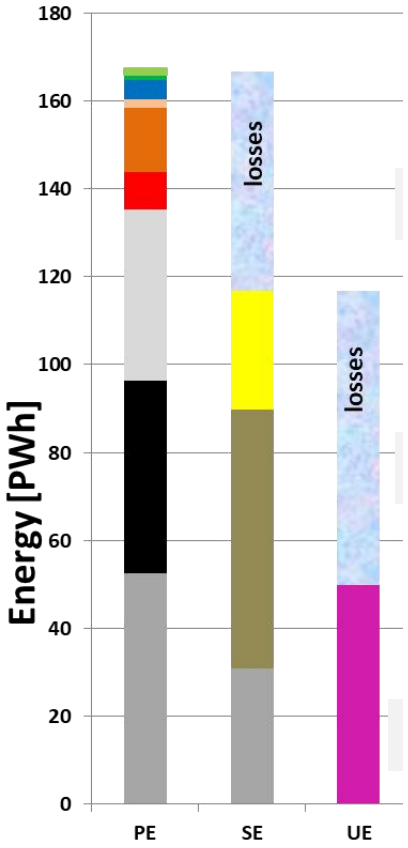
Inequity in global energy distribution



Consequences are increasing migration:

- Emigrants from Africa living 2020
  - # in Europe ~11m
  - # in middle East ~ 5m
  - # in US ~ 3m
  - World bank expects 86m until 2050 (…+67m in 25a!)

today (~2019)

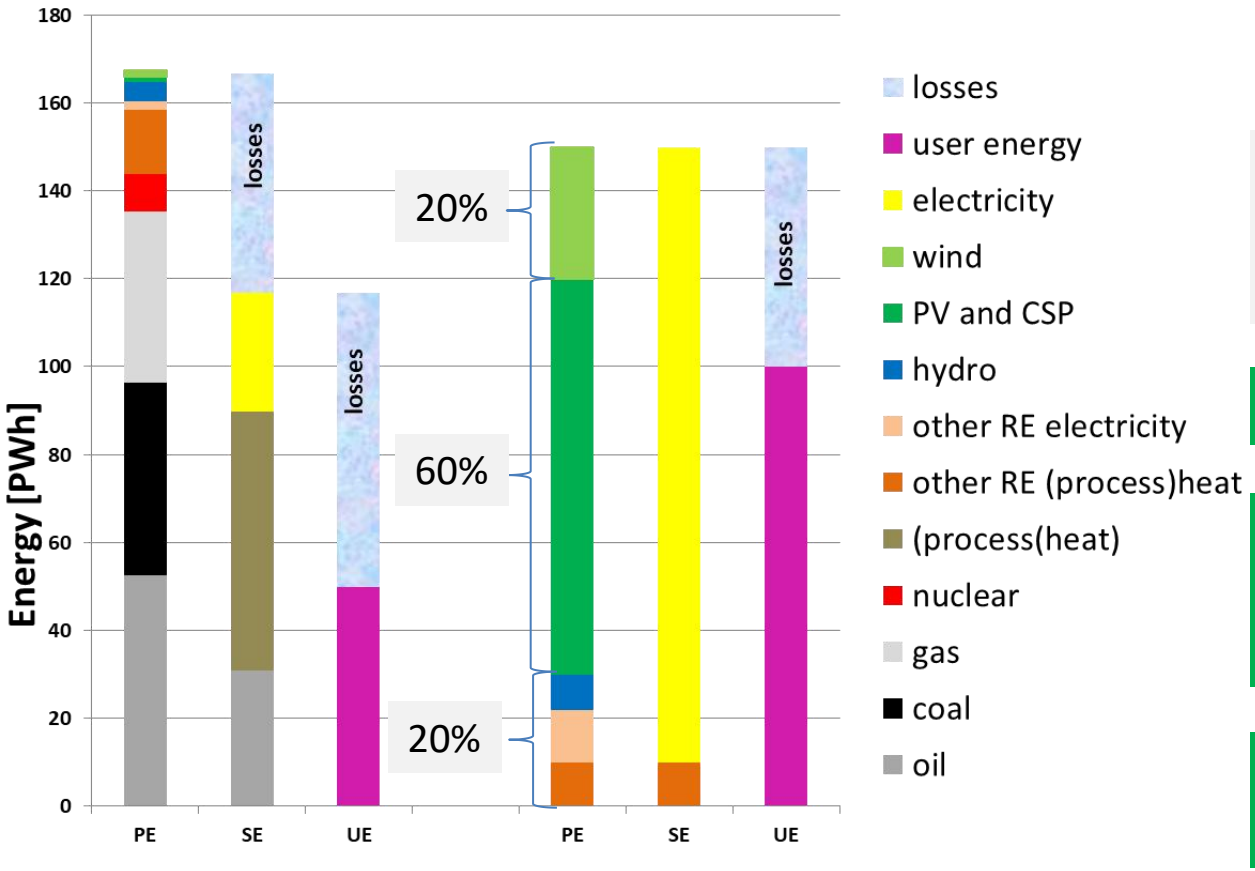


PE Primary energy (eg coal, crude oil)
SE Secondary energy (eg electricity)
UE User energy (input of SE minus losses)

PWh = 10^^15 Wh

Source: 2019 data IEA WEO (2020)

today (~2019) → future (~2050+)



electricity in 2050 includes P2G(&X)

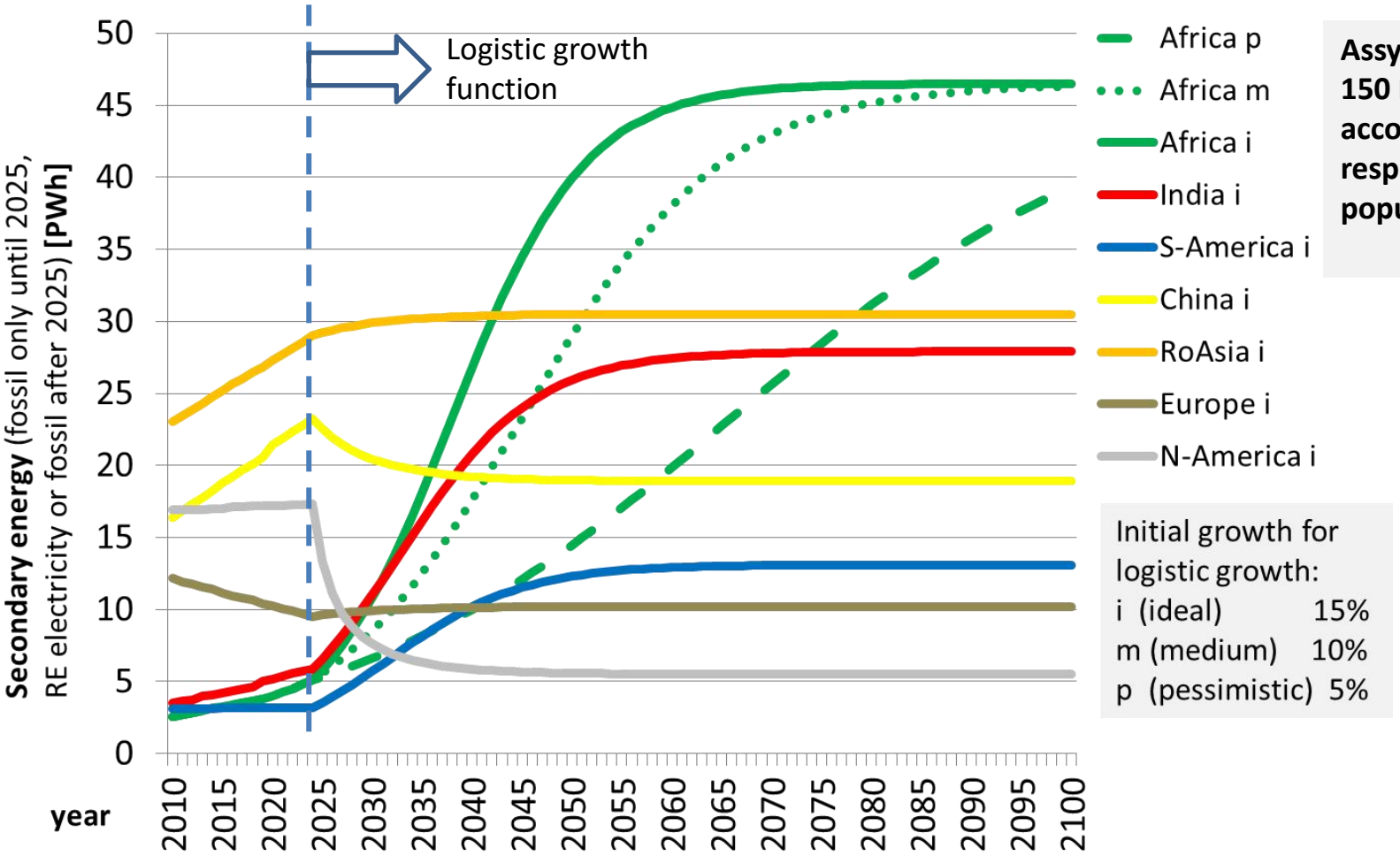
Zero Carbon

Equal energy for all 10 billion people

Efficiency & only RE

Source: 2019 data IEA WEO (2020), 2050 data Winfried Hoffmann (2021)

Consequences for the future regional energy needs

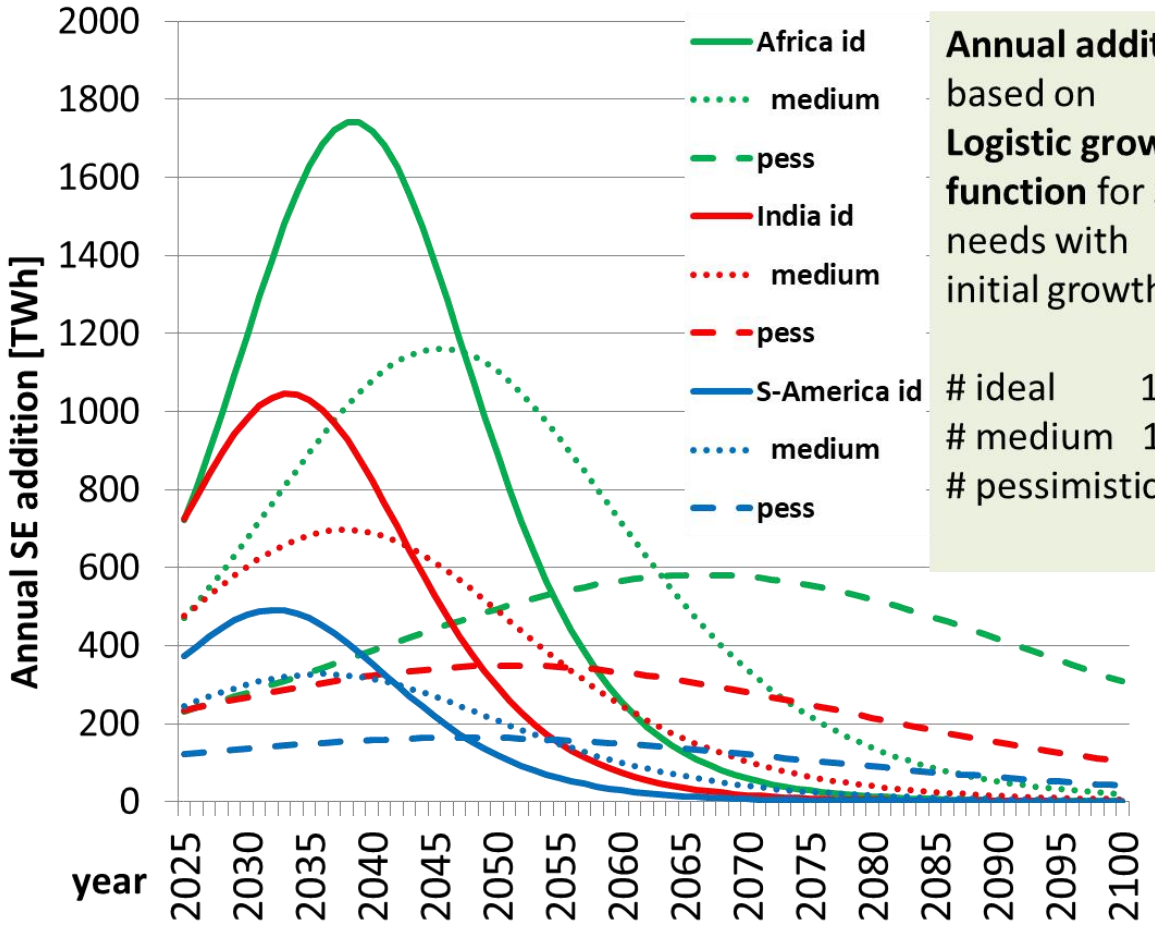


Assymptotic value = 150 PWh split according to the respective population

Initial growth for logistic growth:

i (ideal)	15%
m (medium)	10%
p (pessimistic)	5%

Annual energy additions in Africa, India and South America



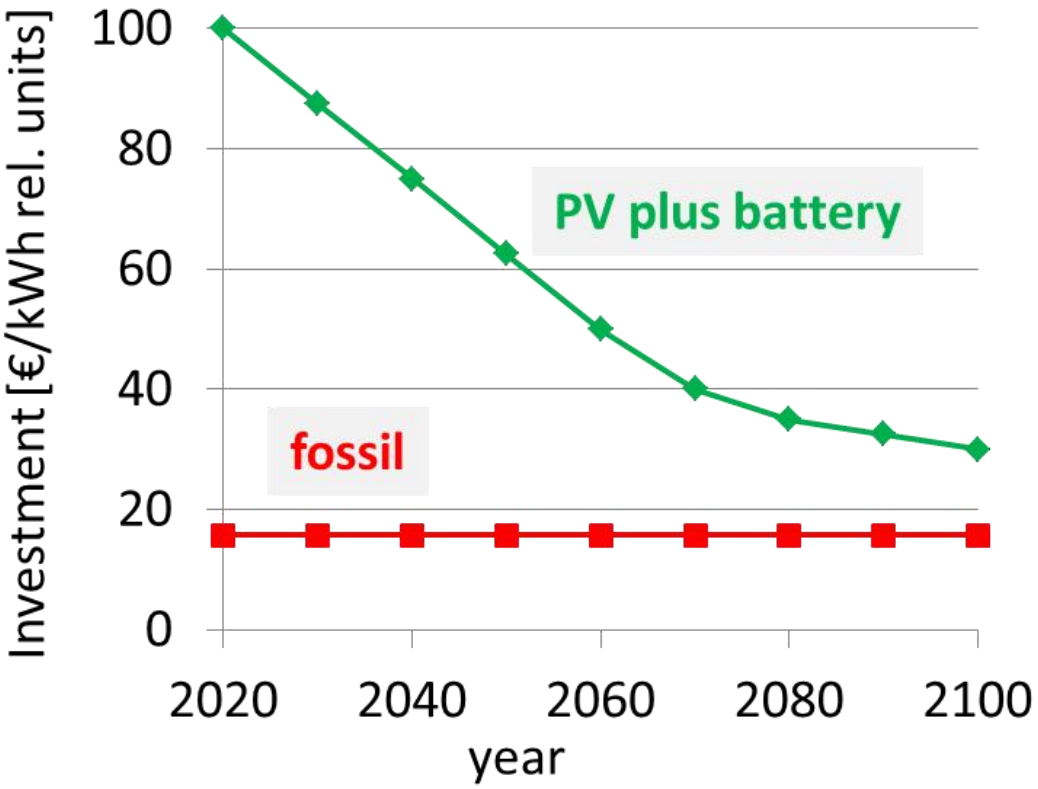
Annual addition based on **Logistic growth function** for SE needs with initial growth

ideal 15%
medium 10%
pessimistic 5%

Africa alone accounts for about 60% of the total

Source: EUPVSEC 2022, MIlano

Comparison investments fossil versus (PV plus battery)

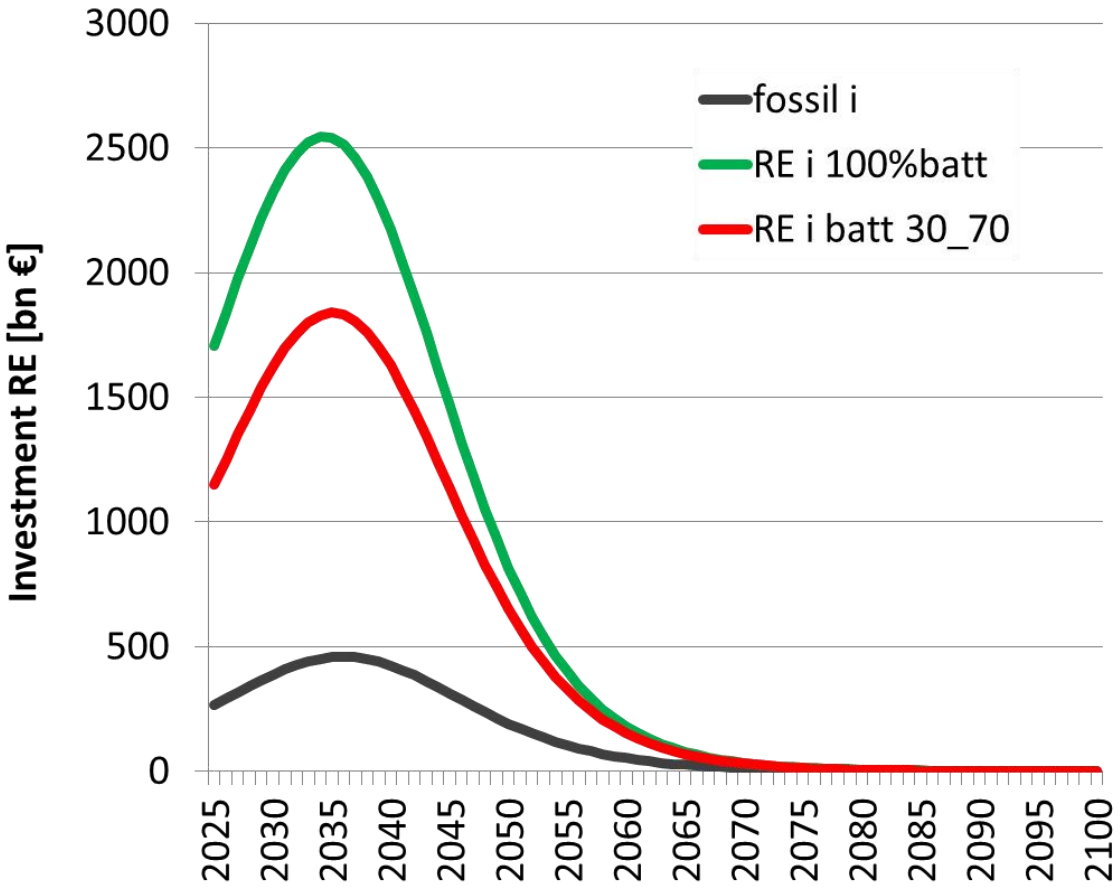


Africa	PV+b	fossil
kWh/W_{inst}	2	7

Whenever cash money is scarce
→ Lowest investment will be taken for the needed energy
→ which is fossil!
→ … although the LCOE is higher relative to PV
→ … and adding to the CO_2 budget!

Source:

Annual investment needs for fossil and PV plus storage (only ideal case)

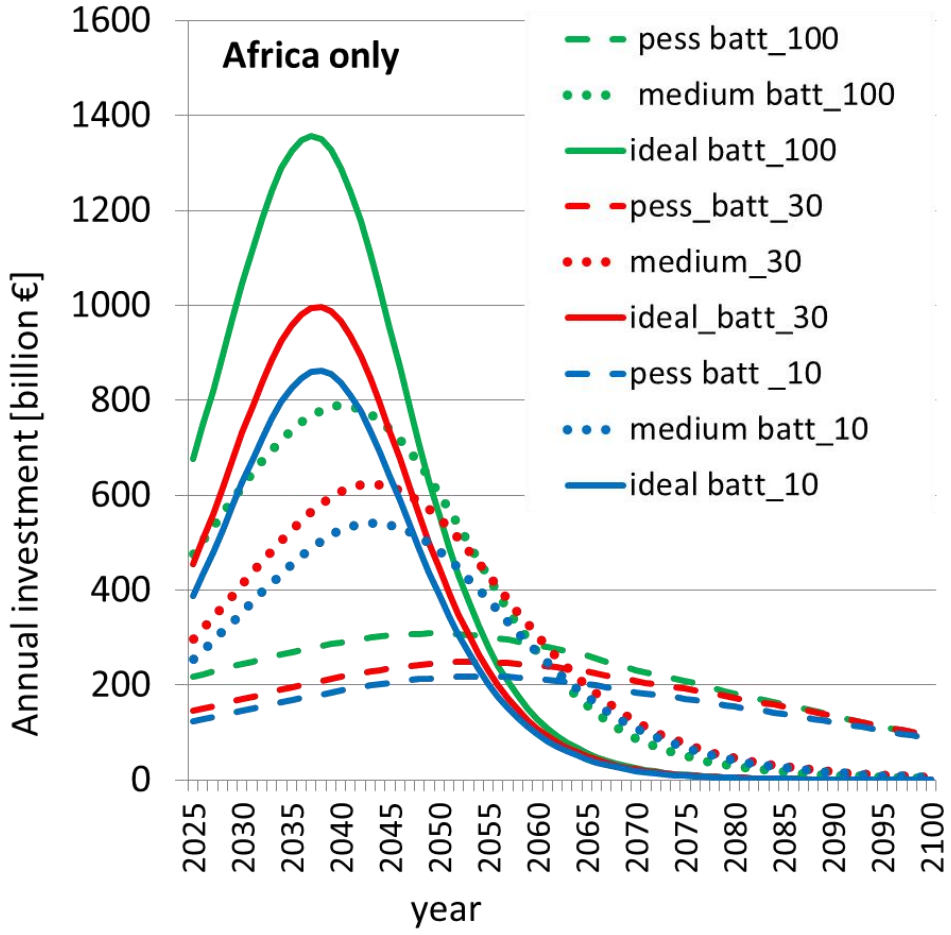


Africa, India and South America

Africa alone accounts for about 60% of the total

Source: EUPVSEC 2022, Milano

Annual investment needs for PV plus storage (Africa only)



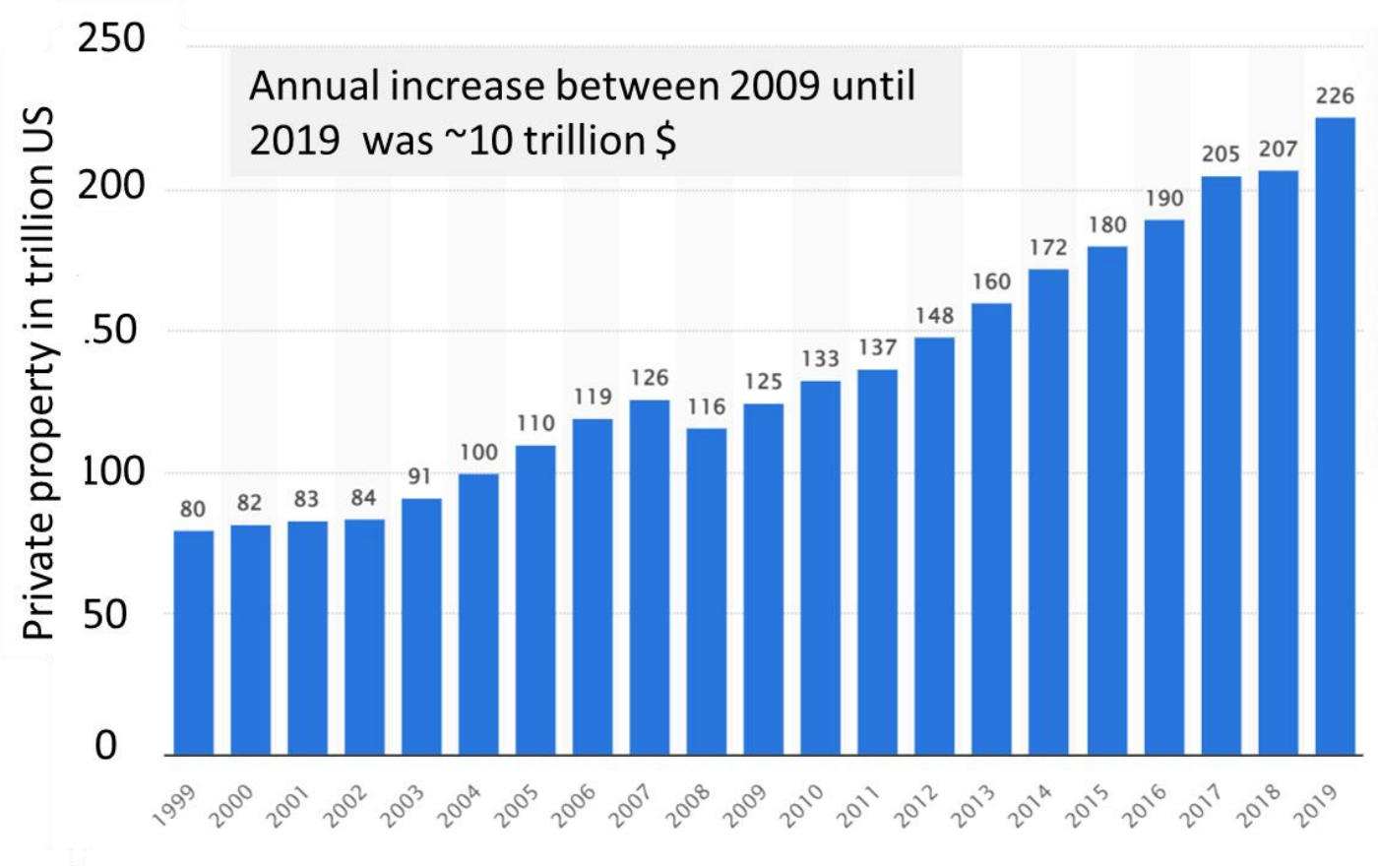
Source: EUPVSEC 2022, Milano

Between 2025 and 2055 there is an average investment need for ~400 – 1.000 bn€ each year!

If all the PWh's from Fig. 8 (ideal case)would come from fossil power plants, an average of 22 PWh p.a. would need just for fossil fuel cost ~440 bn€ p.a. (@2€ct/kWh fuel cost from IEA)

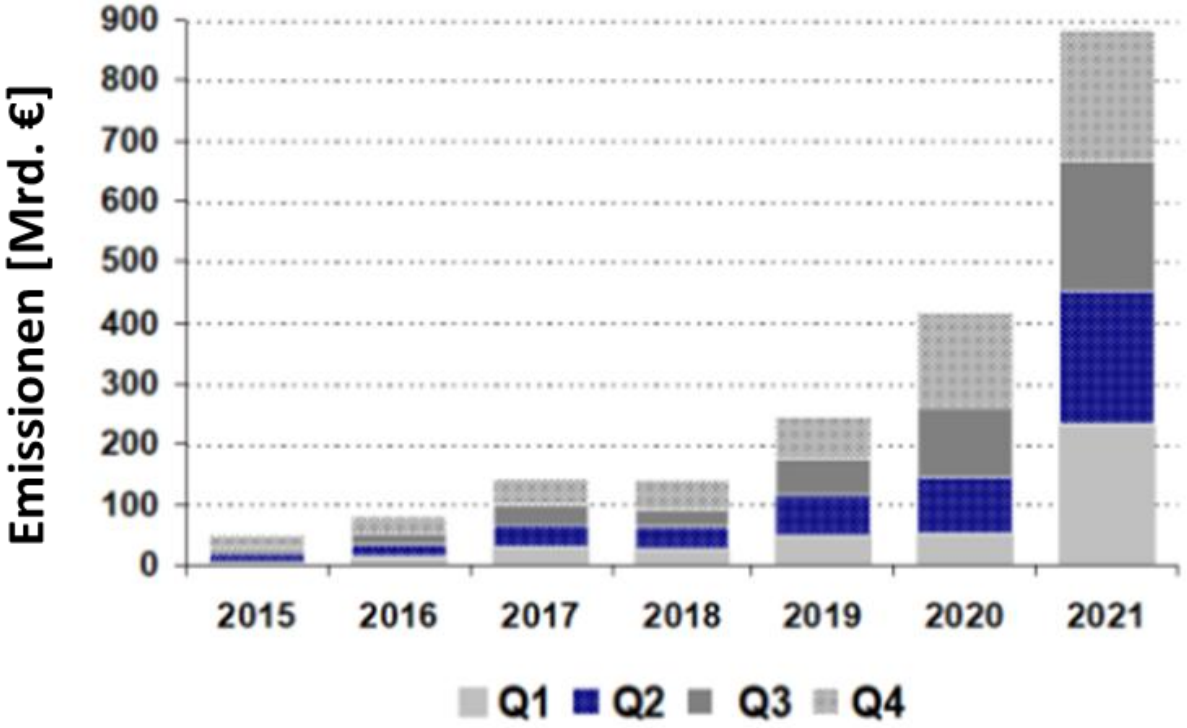
A brandnew study from McKinsey (12/2023) concluded an investment for Africa of only 3 trillion $ cumulative from 2025 to 2025 (~120 bn $/year average)

Global private property development



Source: Statista (de/statista.com/113 4213)

Globally placed issues for sustained financing [billion €]



Source:

Decentralized PV plus storage electrification project in Africa

Mali project

- In total 20 villages with 90,000 people
- ~4,000 households electrified (32,000 people served)
- 185 km electricity network

Characterictic numbers for a typical **Solar Power Center (SPC)** and mini grid:

- 1 Solartainer (40' container) plus greenfield installation
  150-300 kWp PV, 300-600 kWh battery storage
- ~10 km power lines from SPC to households (average from 20 villages)

Serves on average 1000 households (8 people each) per village and corresponds to ~30% people electrified from total population in a village

Source: AGT Asset GmbH, Heinz-Werner Binzel (private communication)

- **State banks do not treat RE investments as infrastructure projects!**
- **Financial resource from governmental institutions should be offered as subordinated loans and with decent interest rates.**
- **Only well developed technology should be used**

Boundary conditiones for large scale electrification in Africa (et al.)

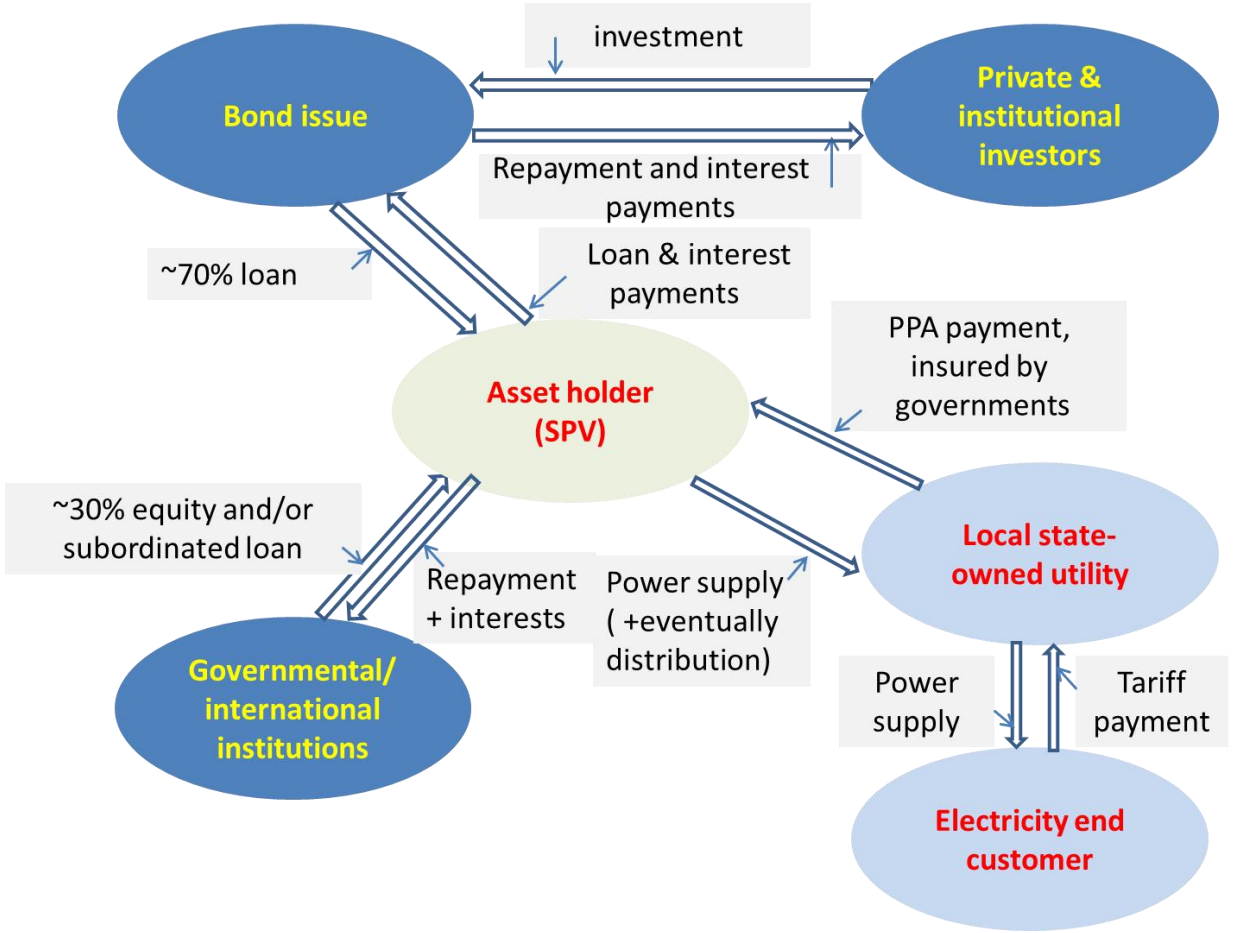
The majority of the **loans** must come from **private** and **institutional investors.** However, this will only happen if the **risk** for these huge infrastructure investments are **taken by governmental institutions and governments**.

Politics must influence their **state banks** to recognize **renewable energy** as important **infrastructure investment**, similar to the construction of large hydropower or nuclear power stations. **Financing duration** needs to be **~20 years**.

- **Risk money from governmental institutions such as KfW, EIB, Worldbank ,** e.g. equity participation and/or subordinated loan totalling to ~30% of the investment volume
- The **100 billion $ p.a.,** often discussed in the climate talks , could be a start
- **Take over/participation** in various risks (exchange rate, political and credit risks; example is insurance provided by the German government for taking over credit risks associated with **P**ower **P**urchase **A**greement payments)
- Model best suited for **large renewable infrastructure projects**

Source: EUPVSEC 2022, Milano

Potential financing model as vehicle for PPP



Source: EUPVSEC 2022 (Milano)

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Thank you for listening!

And please keep in mind:

only when today's rich regions – like ours – will provide the loans for investments in renewable technologies (PV, wind and storage) in continents like Africa,

then we have the chance to limit the global temperature increase hopefully below 2° C! . . . if not?!!

20th December, 2023