Access to energy: Opportunities, challenges and policy actions

Rachid Amui,
Economic Affairs Officer
Division of International Trade and Commodities
UNCTAD

Outline

- Energy access
- Primary and secondary energy sources
- Strategies for improving energy access
- Challenges in energy access
- Policy actions
- Case study
- Conclusion

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Energy access

What it means?

- Reliable and affordable access to both cooking facilities and electricity that can be scaled up over time
- Over 733 million people lack access to electricity (600 million in SSA)
- 2.4 billion cook with open fires or inefficient stoves fueled by kerosene, biomass (wood, animal dung or crop waste) and coal

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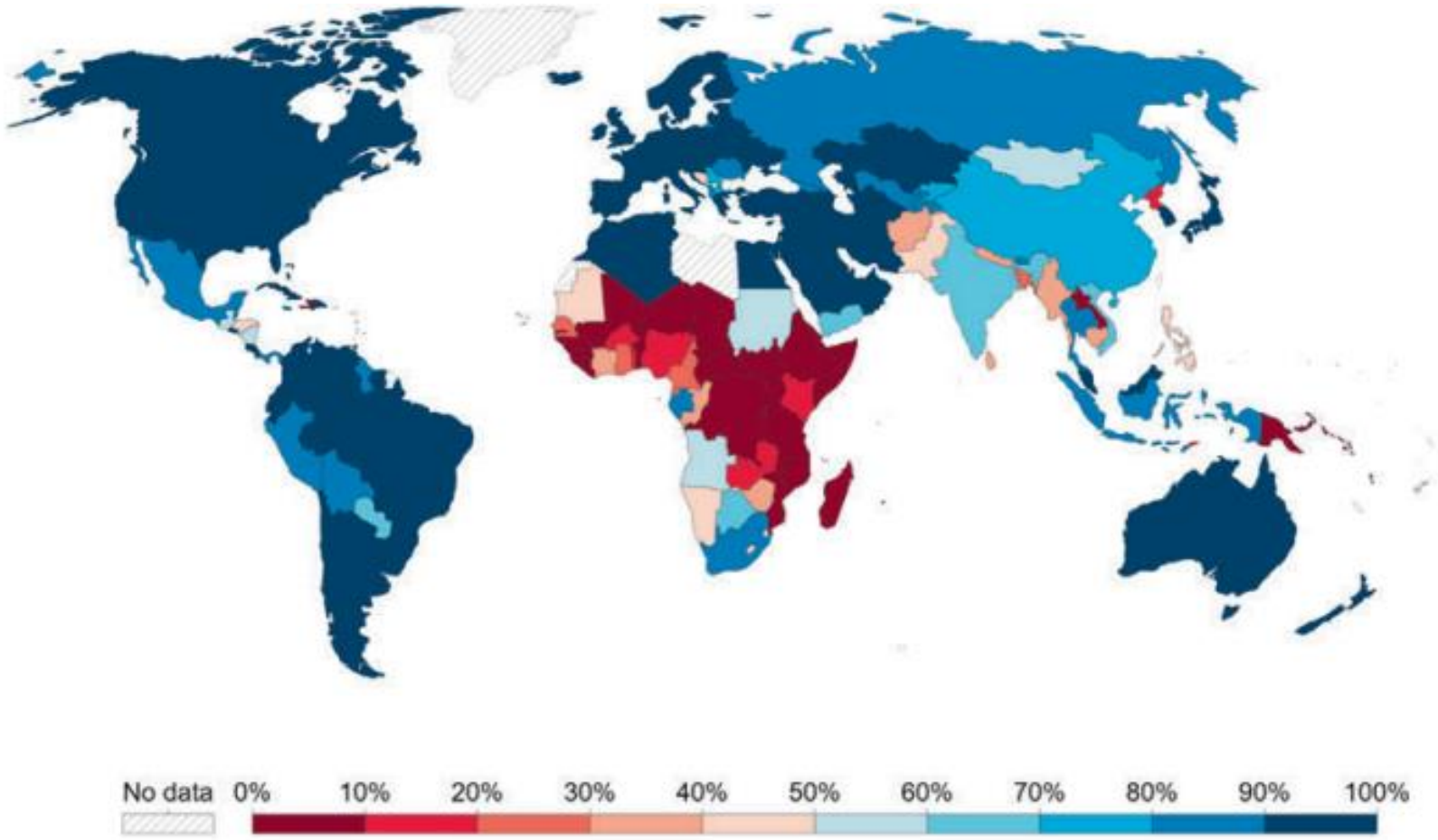
Share of population with access to clean fuels for cooking



Source: World Bank Our World in Data

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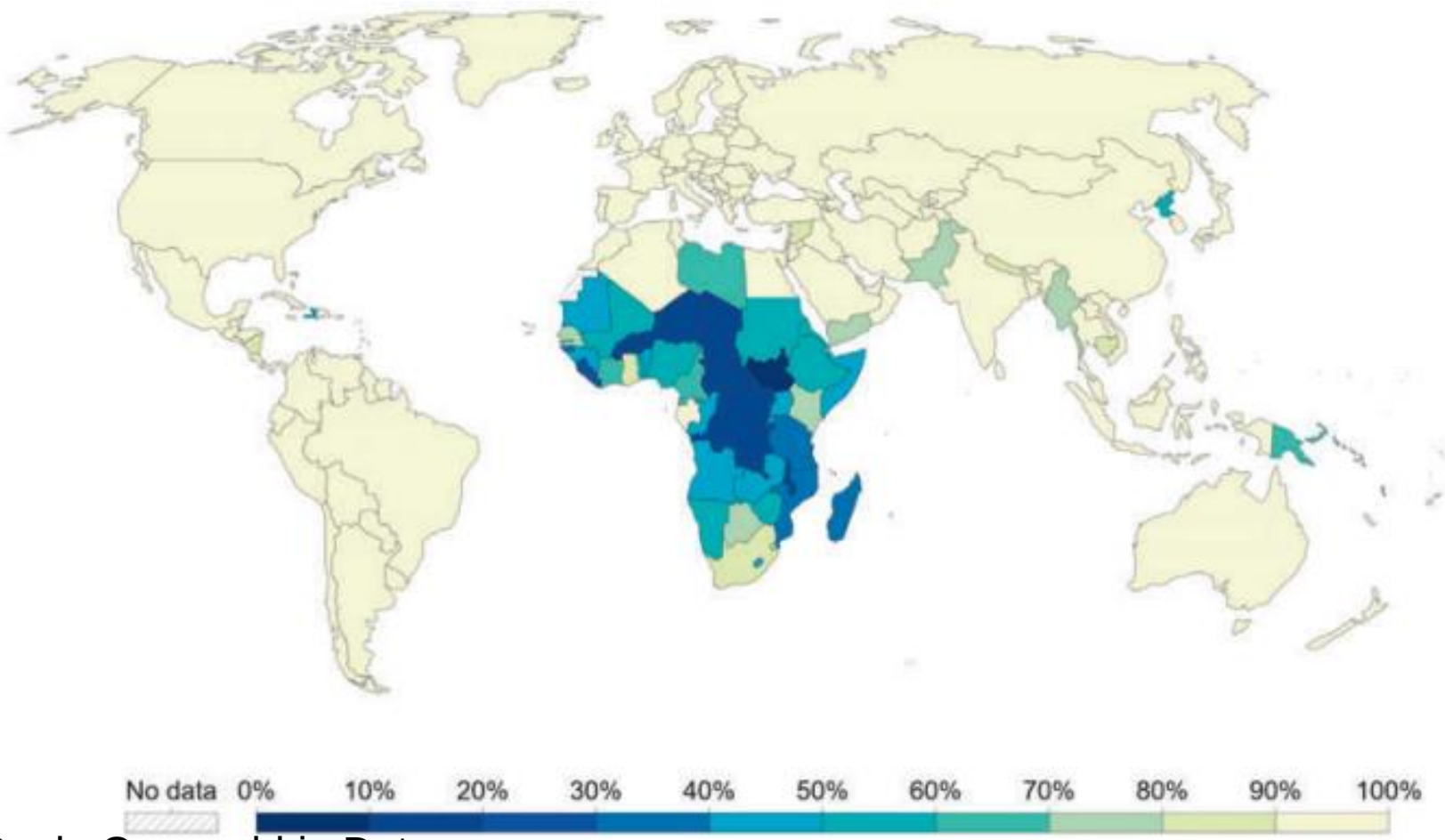
Share of population with access to electricity



Source: World Bank, Our world in Data

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Primary and secondary energy resources

Primary energy resources

- Oil
- Gas
- Coal
- Nuclear
- Renewables (hydro, wind, solar, biomass, biofuels, geothermal etc)

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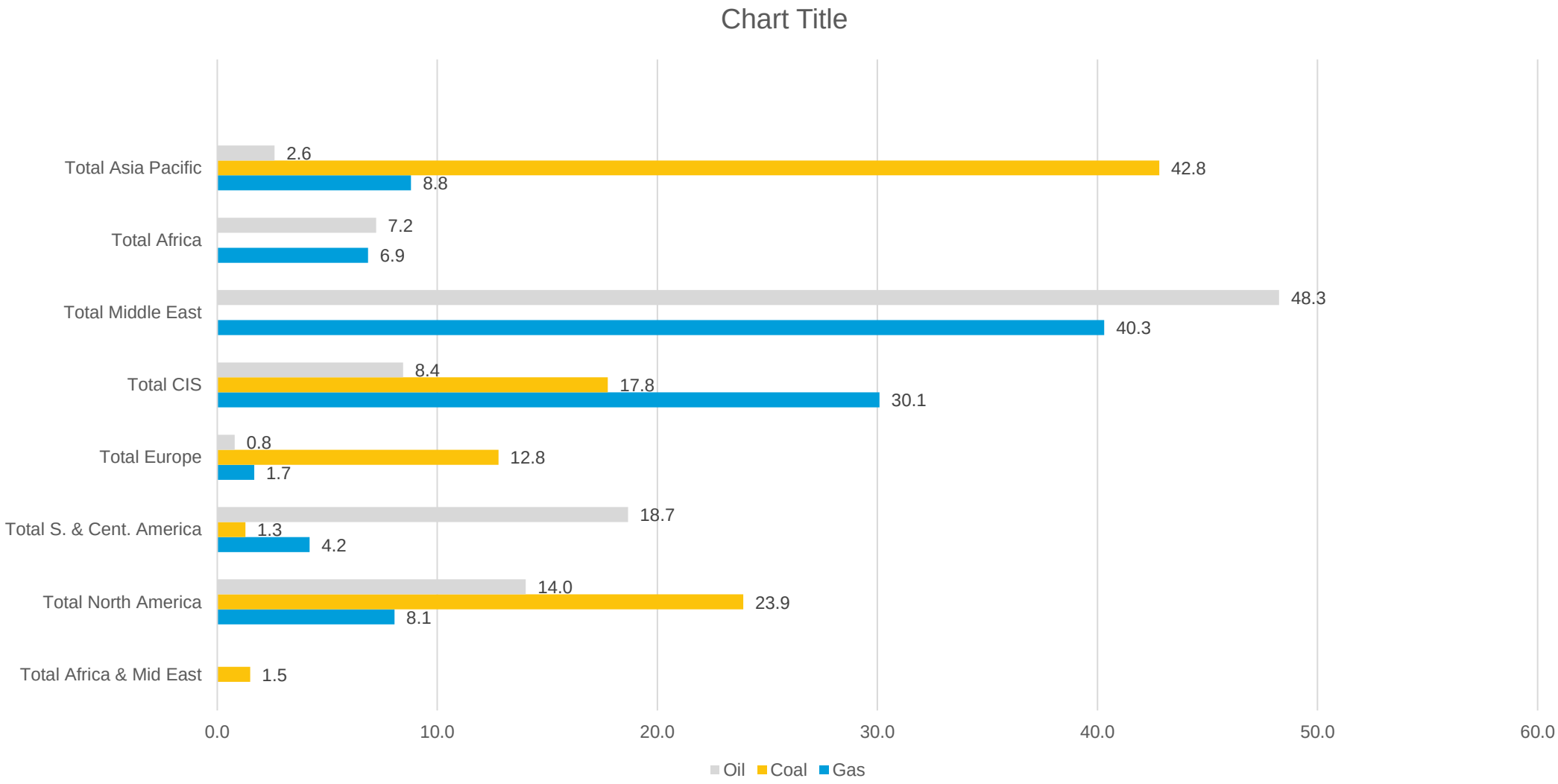
Shares of world coal, oil, gas reserves, 2020 (per cent)



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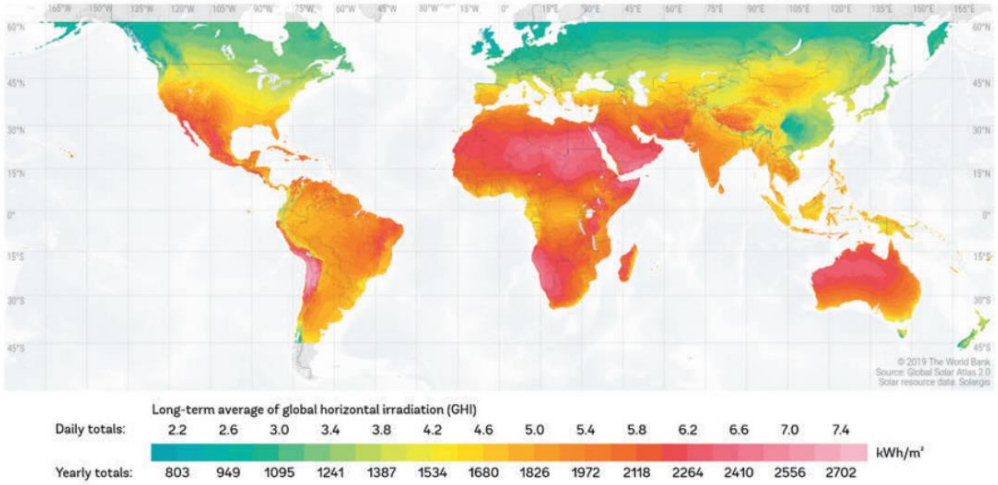
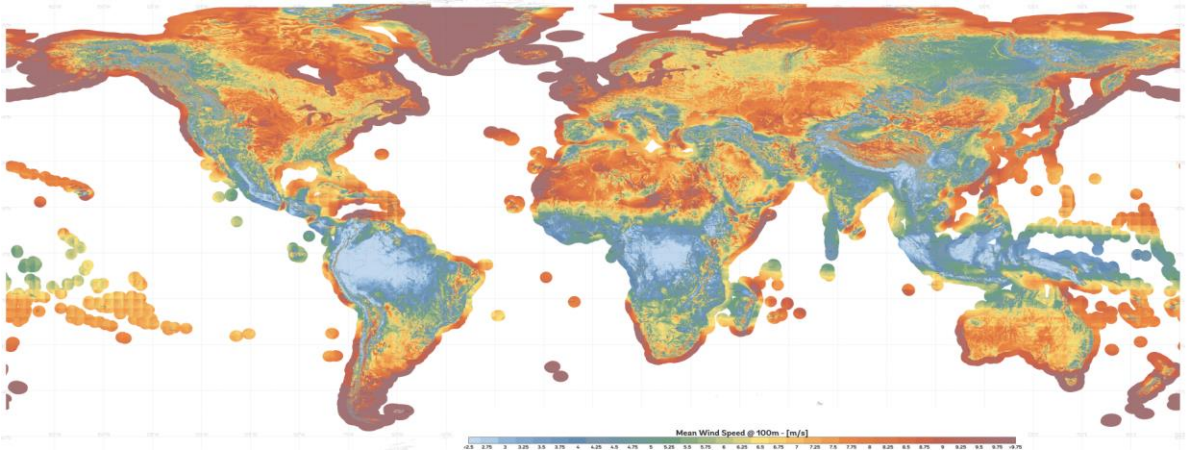
Renewable energy resources

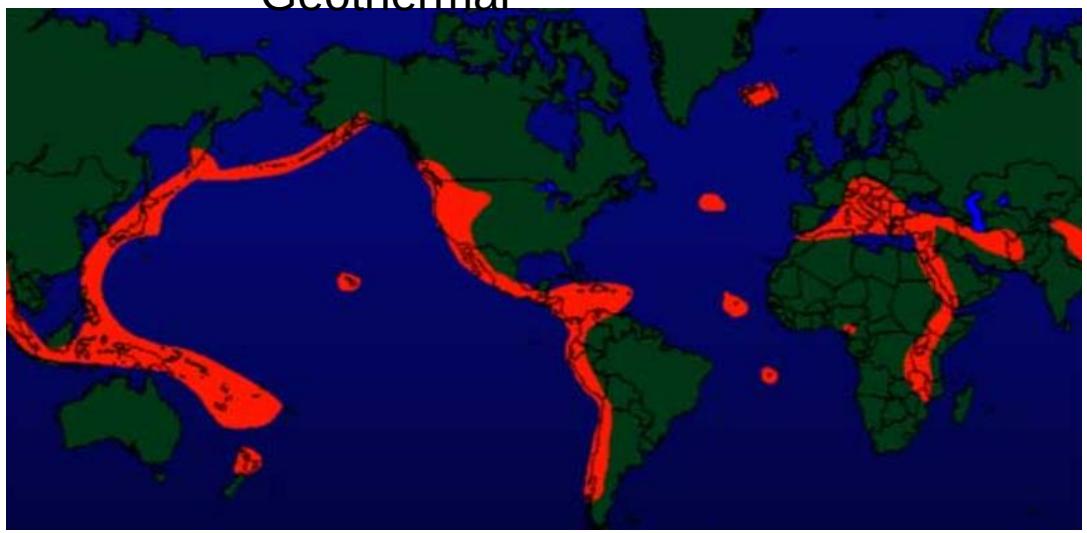
Solar



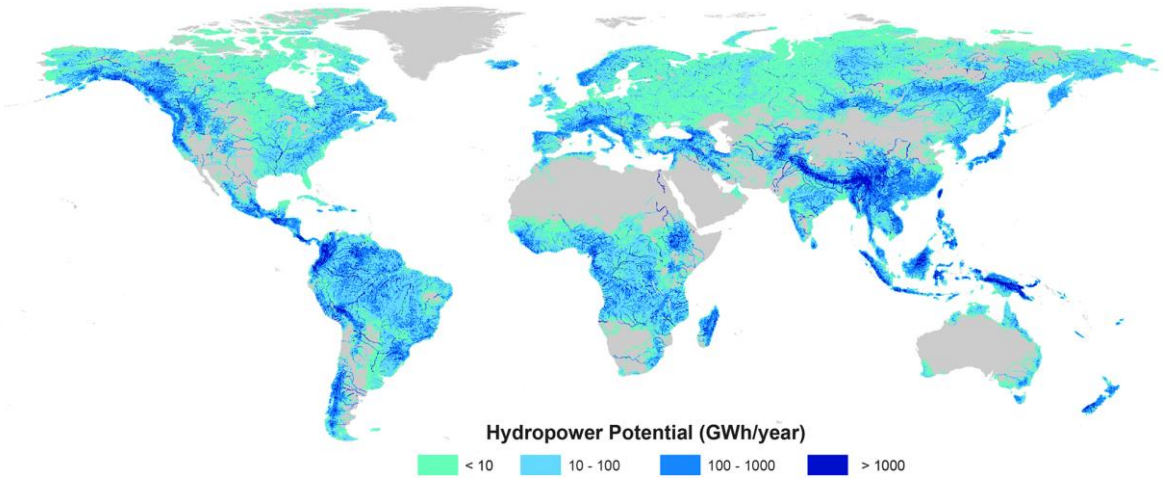
Wind



Geothermal



Hydro



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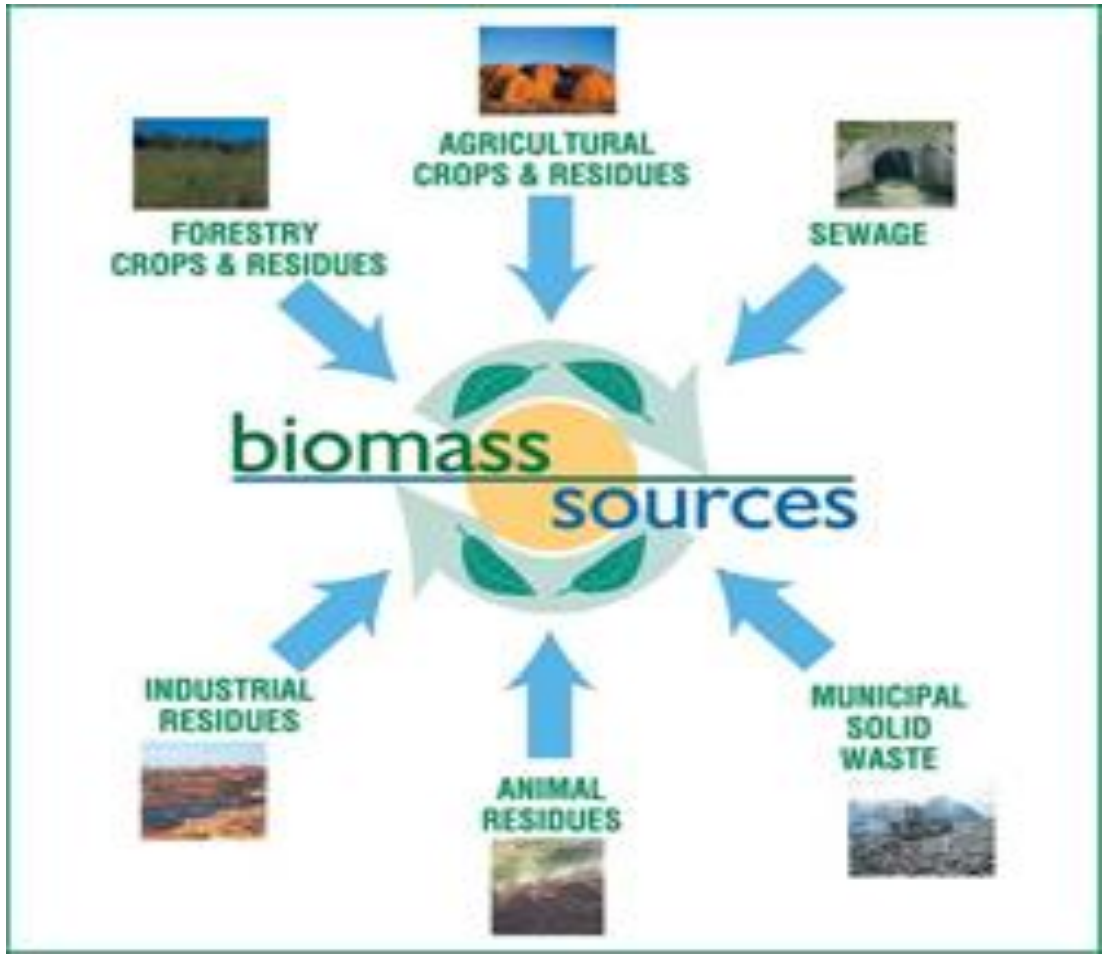
Biomass resources

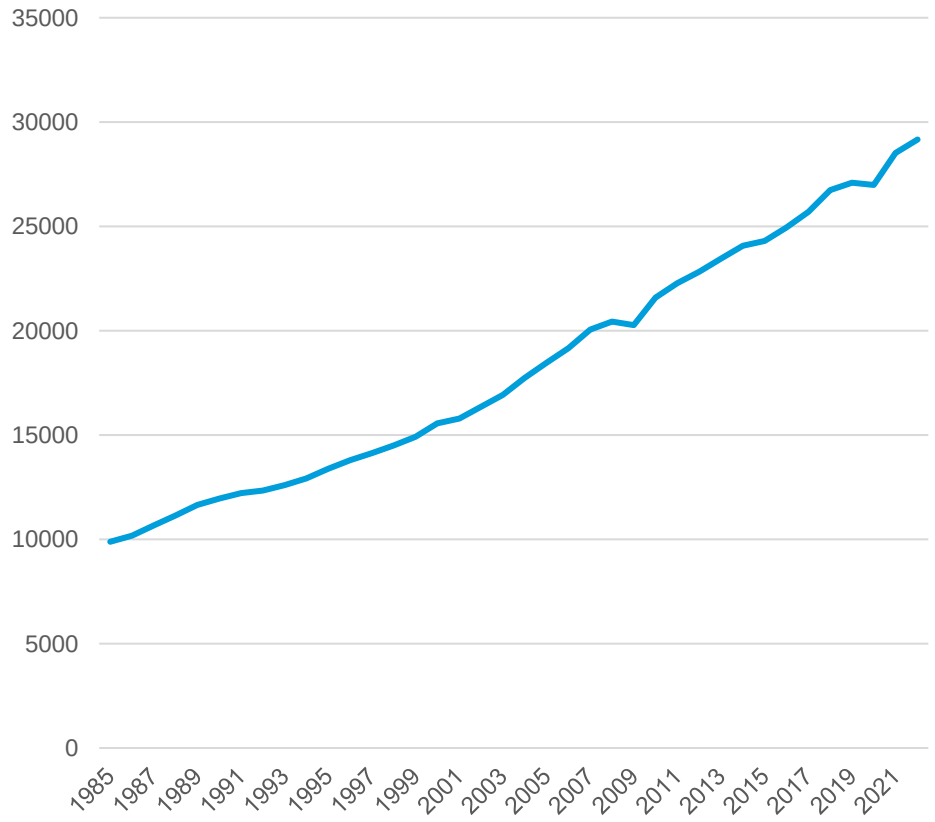


Source: Natural Resources Canada

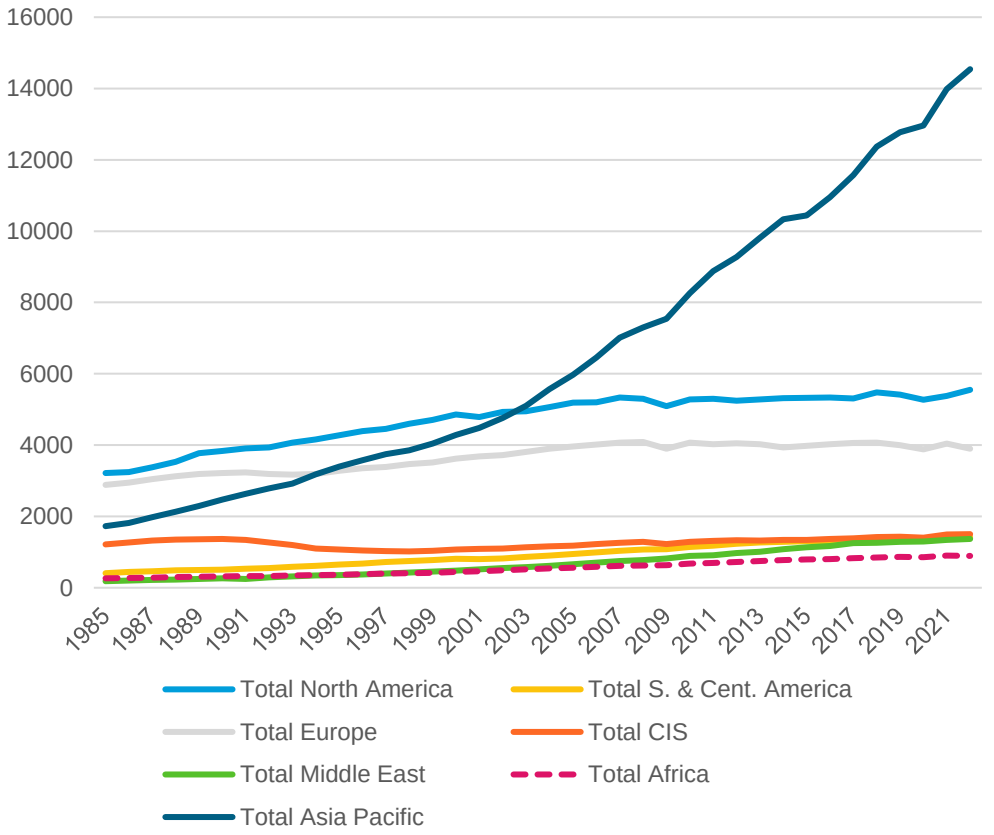
Secondary energy: Electricity generation

(terawatt hours)

Total World



World regions



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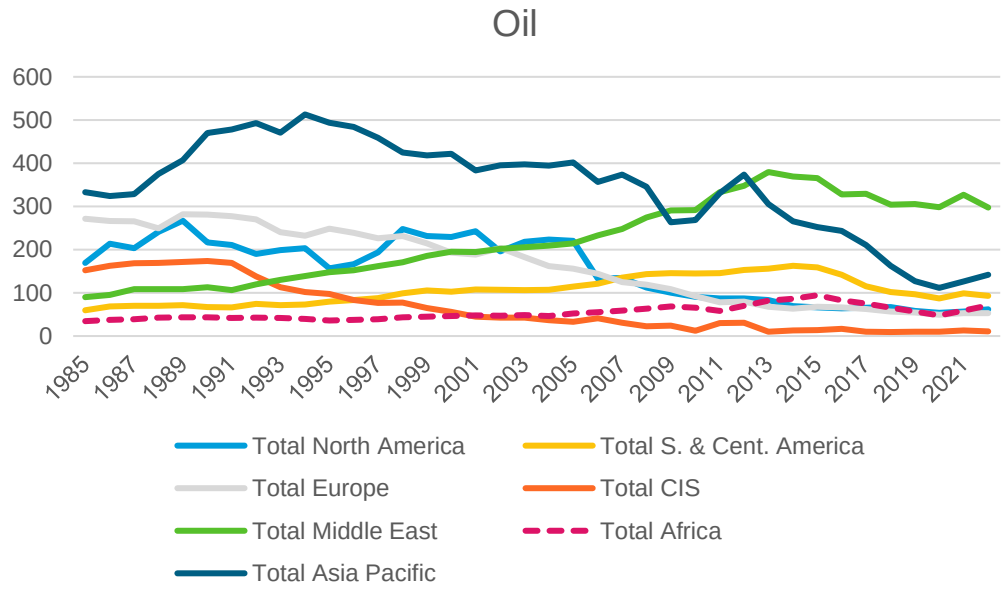
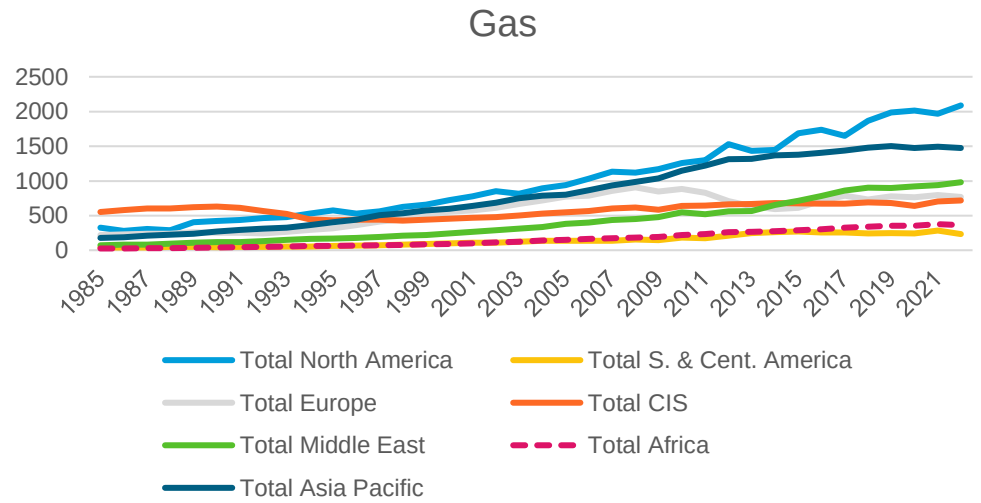
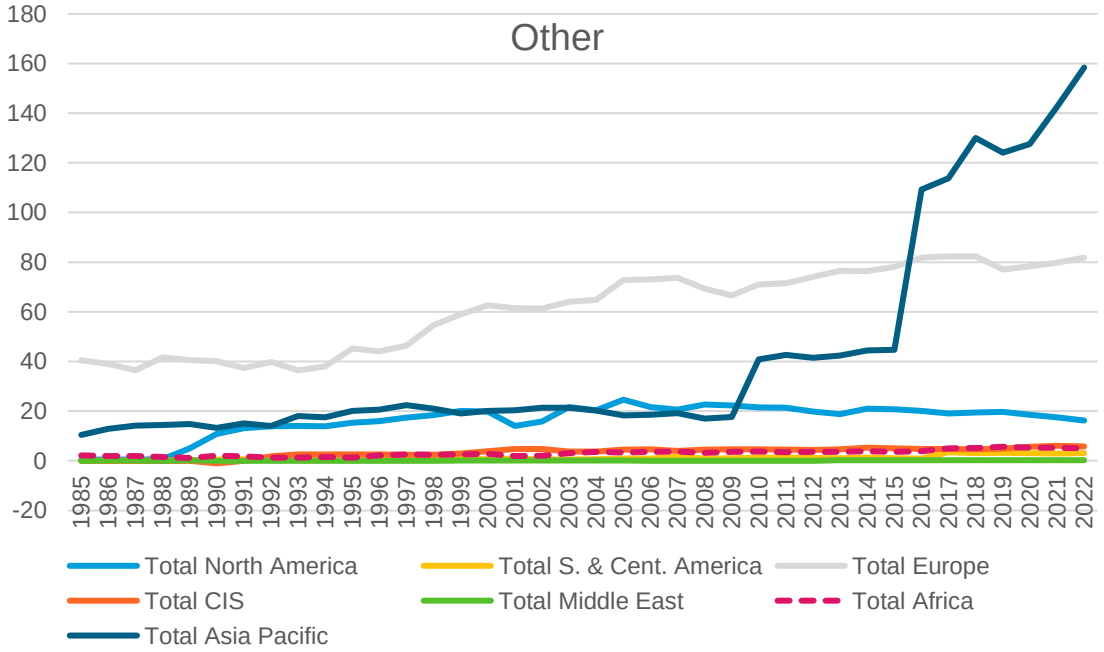
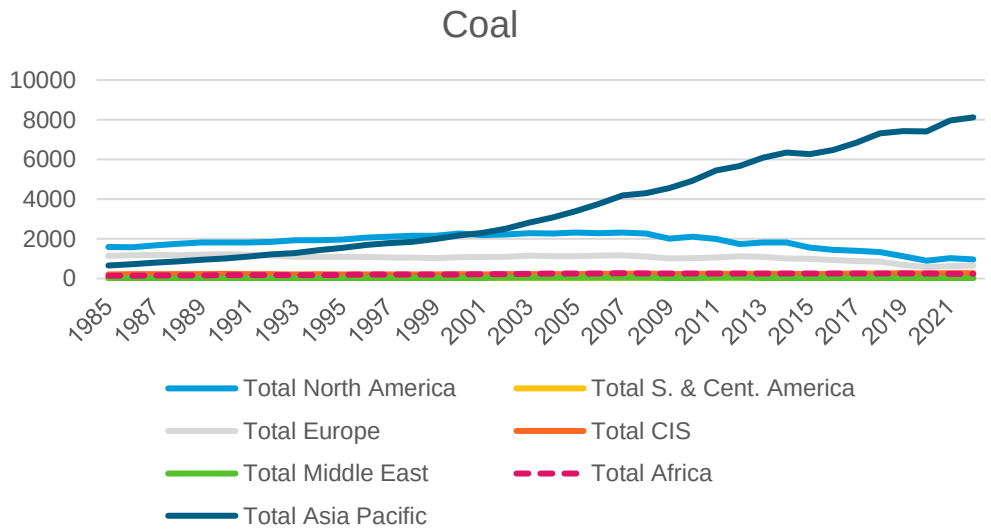
Electricity generation from oil, gas, coal, other

(terawatt-hours)









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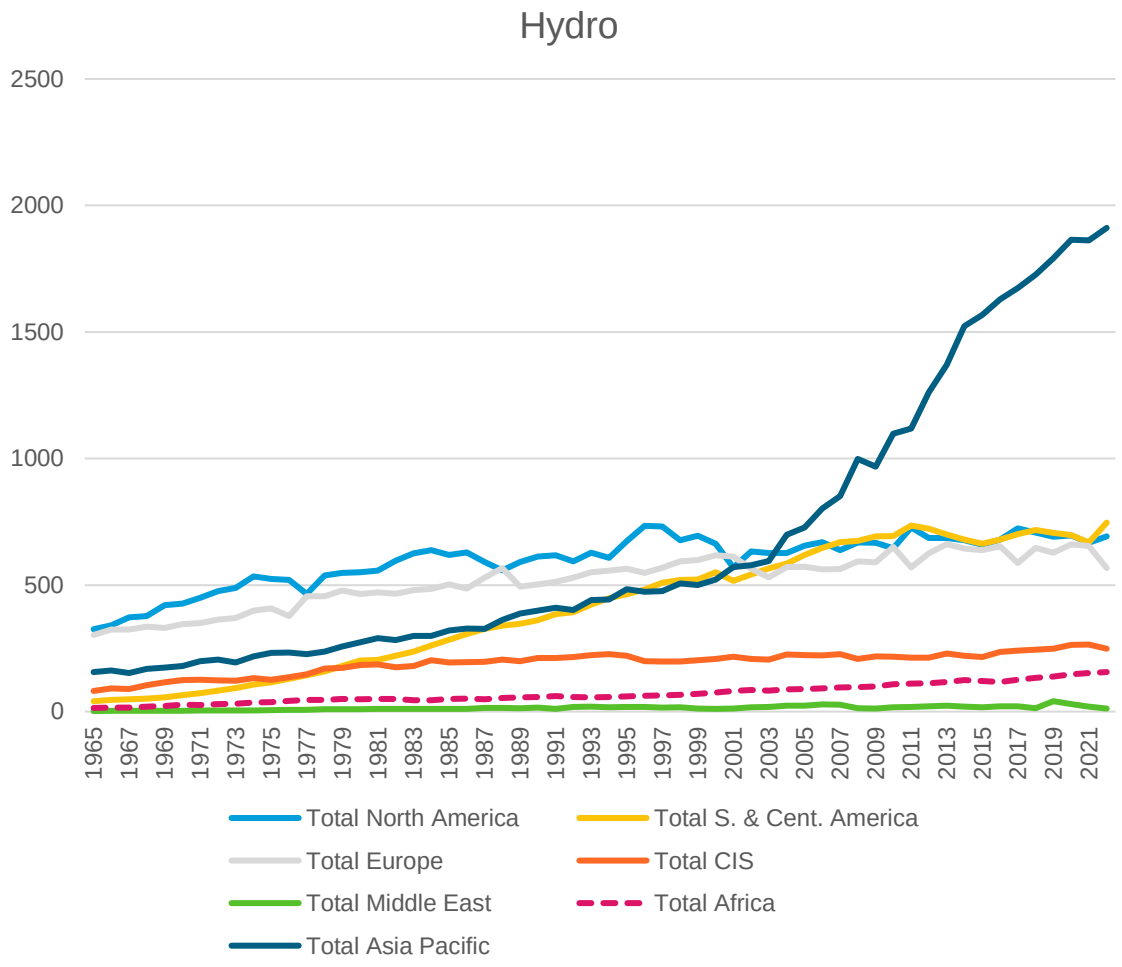
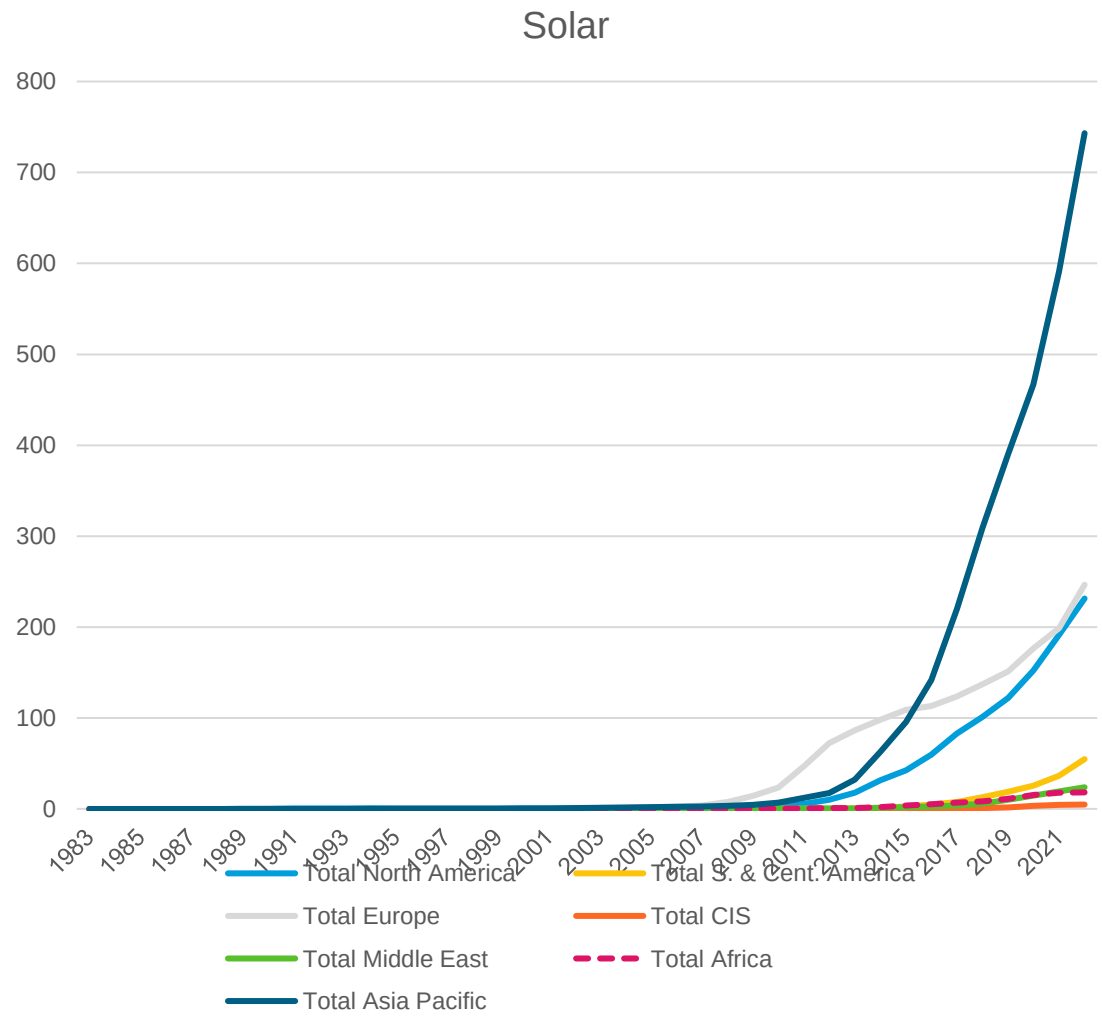
Electricity generation from hydro, solar

(terawatt-hours)





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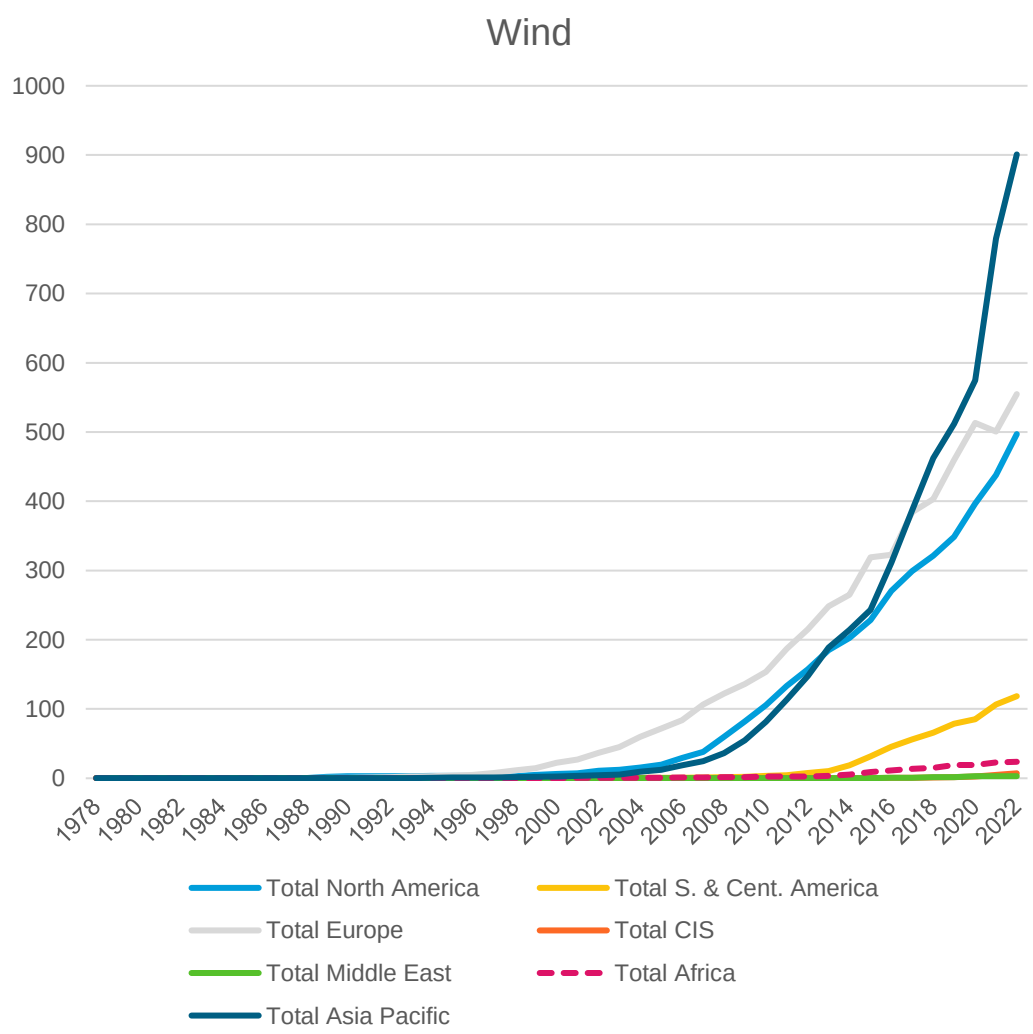
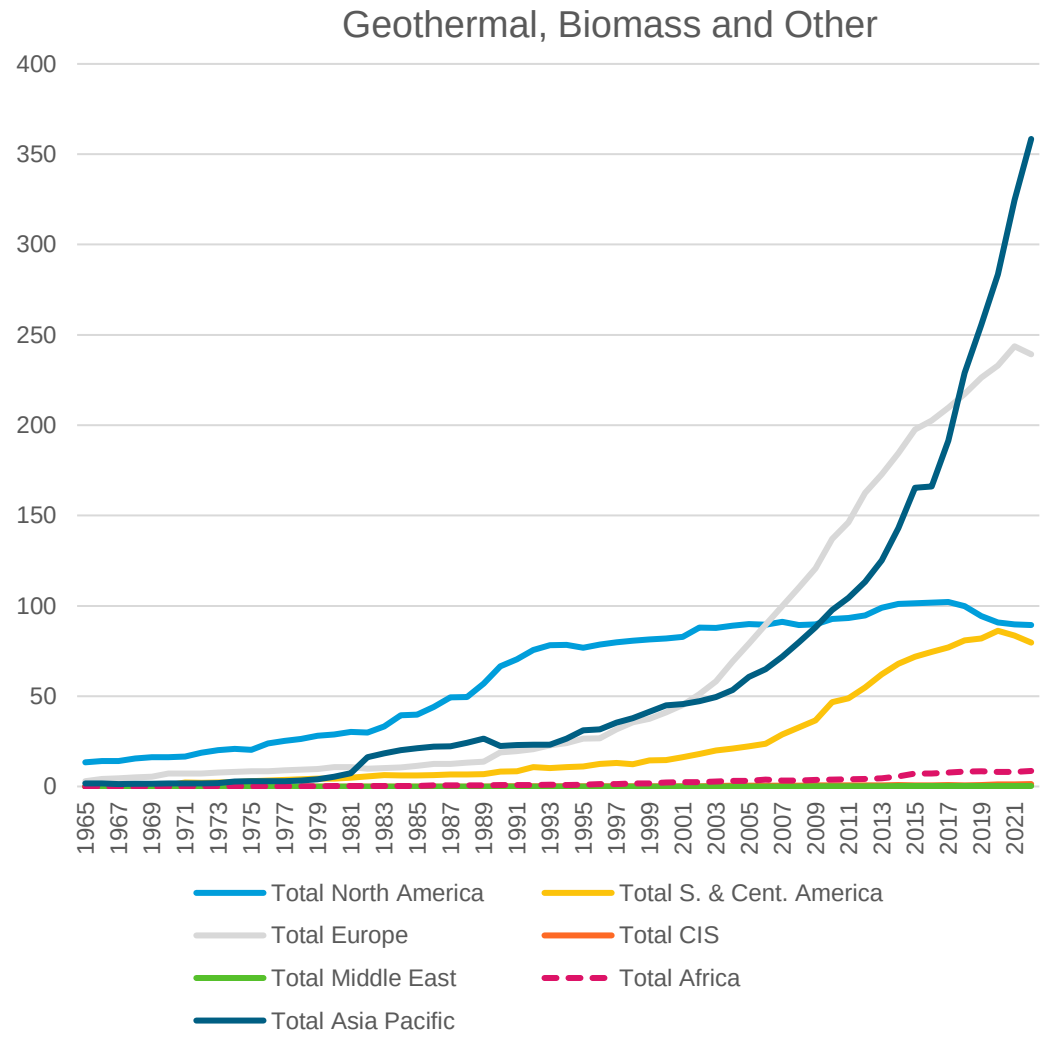
Electricity generation from wind, geothermal, biomass, other

(terawatt-hours)





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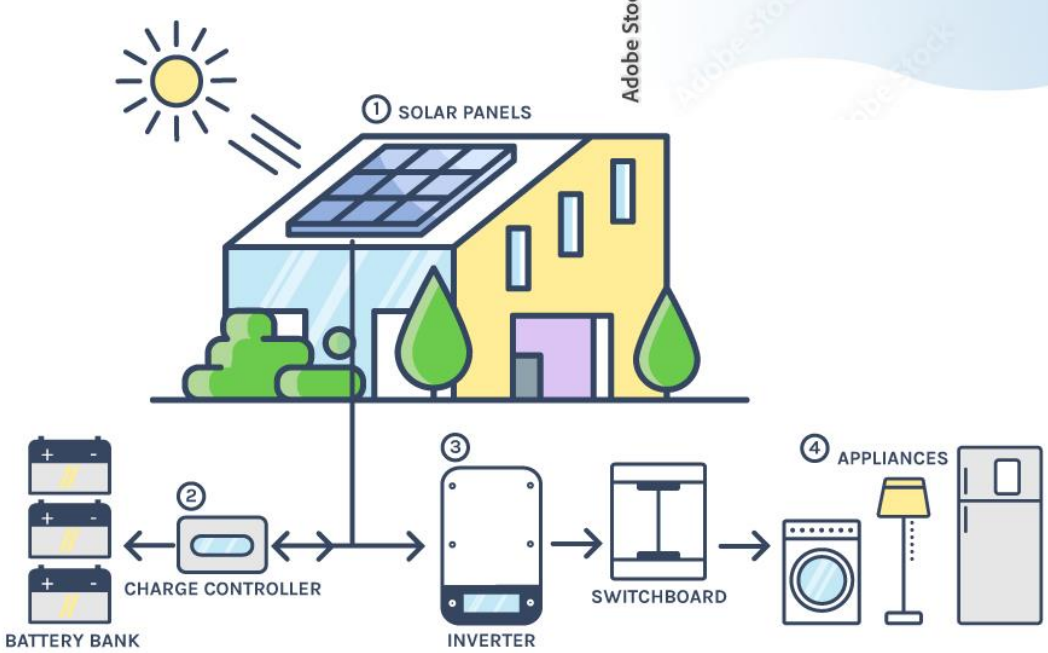
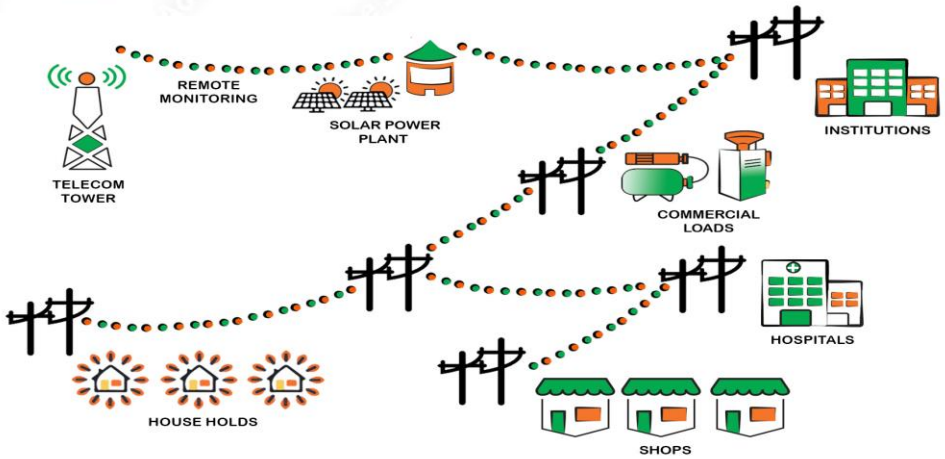
Strategies for improving energy access

Expand grids, off grid and mini grids



Source: anerngroup.com



Source: tarauja.com

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Promote renewable energy development

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Natural gas

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Leverage technology and innovation

- Deploy appropriate technologies for energy storage, e.g. batteries
- Deploy improved cookstoves

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Challenges

Challenges: access to electricity

Supply side

- Poor state of supply caused by lack of sufficient generation capacity, coupled with poor transmission and distribution infrastructure; expensive storage costs
- High initial cost of investments - updating infrastructure or investing in expansion is an integral part of the energy transition and an enabler of modern technologies.
- Low funding of utilities to maintain infrastructure; electricity tariffs are sometimes set without reflecting true costs
- Vulnerability to price fluctuations
- High costs of supply to remote areas

Demand side

- High connection and connection charges to grids; SSA is among the highest in the world e.g. 2x consumers in other regions of the world

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Challenges: access to clean cooking fuels

Supply side

- High upfront costs for improved cooking stoves make its difficult to switch from traditional fuels
- Availability of alternative fuels
- Inconsistent availability of clean cooking fuels or unreliable fuel delivery services

Demand side

- Preservation of cultural norms with respect to cooking traditional meals
- Resistance to new technology due to lack of knowledge about alternative technologies
- Lack of awareness and information about the health and environmental benefits of clean cooking fuels and technologies

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Policy actions

Policy actions to facilitate energy access (1)

- Foster a more diverse and resilient energy mix
- Design policies and regulatory frameworks that incentivize investment in energy access projects, facilitate private sector participation
- Allow consumers to feed in excess renewable energy generated from rooftop solar panels or other distributed sources into the grid at preferential rates
- Balance affordability of energy services and the financial viability of developing individual projects
- Promote energy efficiency measures in households and businesses to optimize energy use, make energy access more affordable, reduce waste

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Policy actions to facilitate energy access (2)

- Scalable projects, allowing for incremental expansion as demand grows
- Offer affordable and reliable electricity access to communities not connected to the main grid.
- Long-term planning and regulatory frameworks that provide certainty and stability for investment in energy infrastructure and technologies.
- Foster energy access projects targeting underserved populations, such as off-grid solar installations, mini-grids, or clean cooking solutions
- Foster collaboration between governments, utilities, and private sector entities (PPPs) to jointly finance, develop, and operate grid extension projects.
- Foster regional and international cooperation

Case study

Lake Turkuna wind project (LTWP), Kenya

- LTWP is the largest wind farm in Africa, 310 MW (cost of €625 million); Provide reliable and low-cost energy to the Kenyan population
- Increased Kenya's electricity generation capacity by approx. 13% and reduces the need for expensive and polluting thermal (fossil fuel) plants.
- Contributes to stabilization of electricity access and reduction of power outage
- Potential of scaling up and exporting to other countries when electricity generation is curtailed as Kenya gets connected to regional power pools
- Access to electricity has established initiatives to improve the local population's access to drinking-water, health services and education

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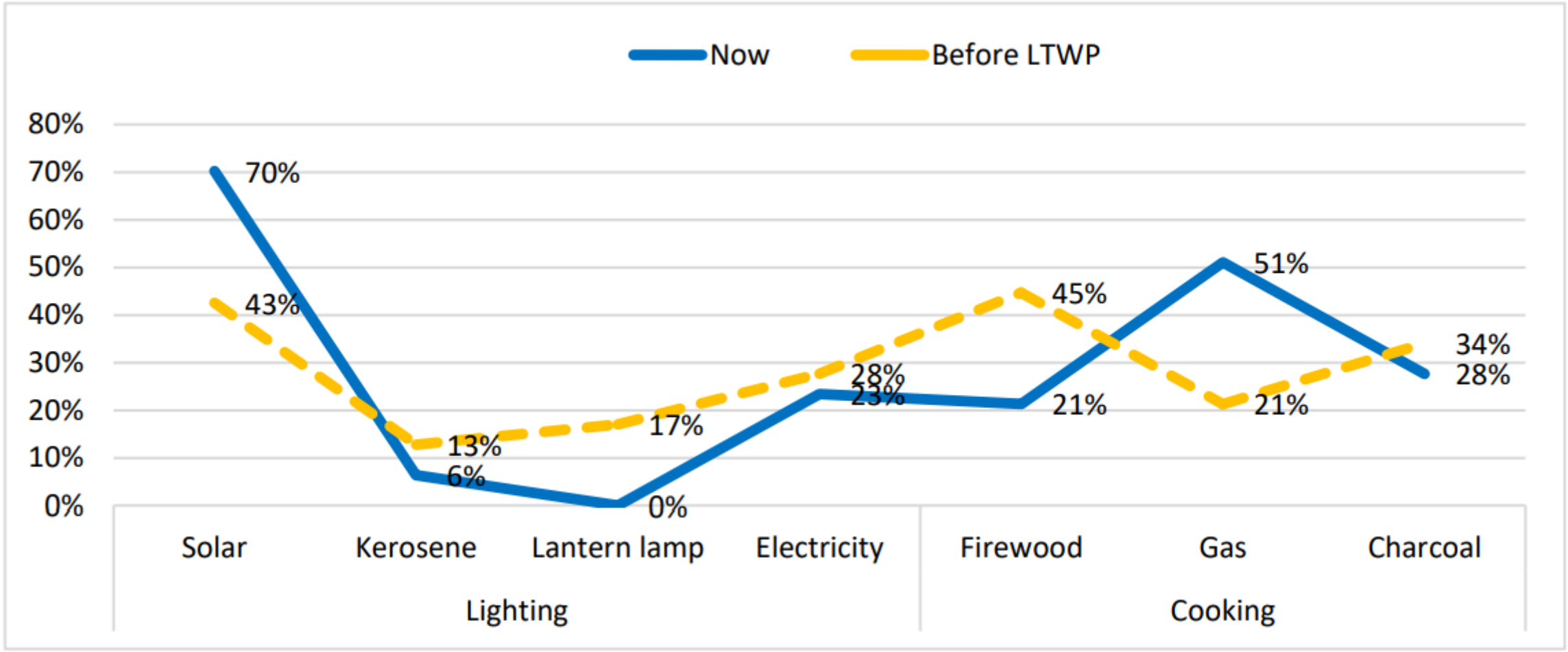
Sources of lighting and cooking energy, LTWP



Source: Finnfund; https://www.finnfund.fi/wp-content/uploads/2020/05/Socio-economic-impact-of-Lake-Turkana-Wind-Power-in-Marsabit.pdf

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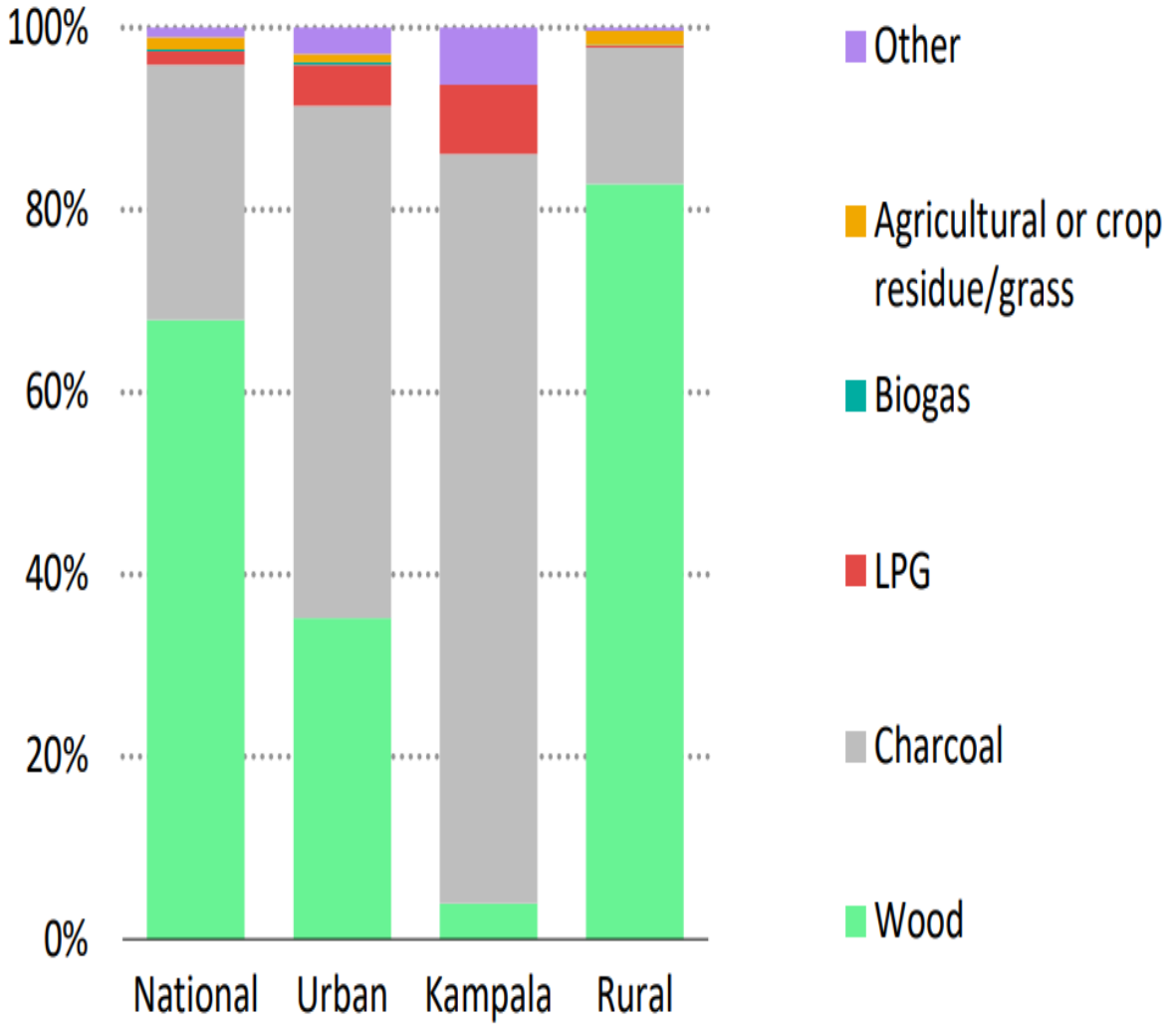
Uganda - Distribution of households by primary cooking fuel, 2021

- Approx 68% of Ugandan households use firewood as their main source of cooking fuel;
- Low access has implications on health, environment, economic livelihoods, and gender issues



Source: IEA

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Clean cooking fuel project, Uganda

- LPG is a safe and clean cooking fuel
- The main challenge is the high initial cost of buying an LPG stove and gas cylinder
- In 2022, Government launches a national LPG programme to disseminate 1 million 13-kg LPG cylinders burners and other accessories over the next five years
- Program targets vulnerable communities that normally would be unable to pay the upfront cost of an LPG kit
- Over 24,000 benefitted from the scheme in 2023
- Gas usage increased from 25,000LPG tonnes in 2021 to 32000 tonnes in 2022

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Conclusion

Conclusion

- Lack of energy access exacerbates socio-economic inequalities and hinders progress in key sectors such as education, health, and agriculture.
- To overcome high upfront costs and affordability barriers, attracting investments from diverse sources, including private and foreign investors, is essential.
- Access to affordable, reliable, and sustainable energy is achievable with multi-stakeholder collaboration.
- Improving energy access through a low carbon pathway paves the way for a sustainable large-scale industrialization
- Improving energy access is fundamental for economic development and poverty reduction - vital for achieving Sustainable Development Goals (SDGs)

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Thank you!

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