Bioenergy – Importance and development from a global perspective

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Ökad nytta av bioenergi

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World Bioenergy Association

- International association with mission to promote sustainable development of all bioenergy technologies
- Key priorities
  - International advocacy
  - Platform for promotion and engagement
  - Knowledge hub
- WBA covers all sectors of bioenergy including solid biomass, liquid biofuels and biogas

WBA Membership

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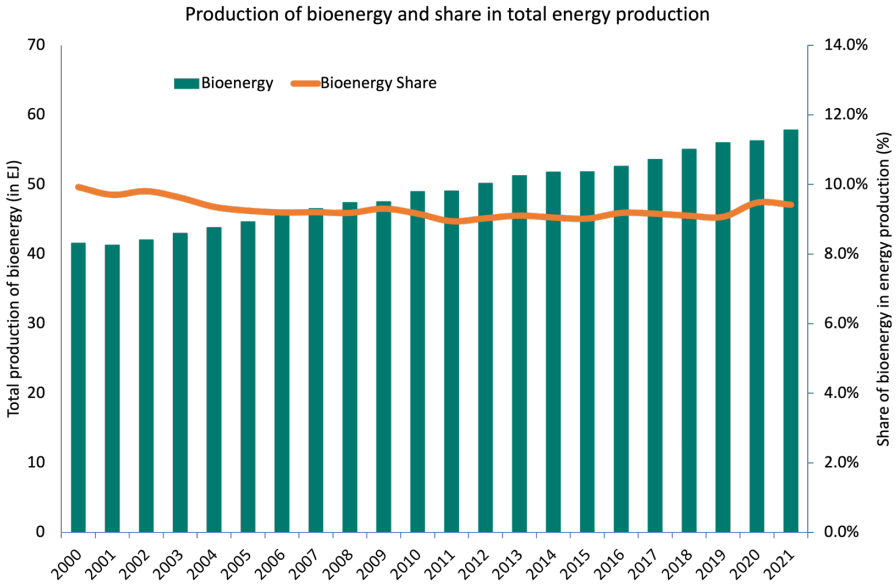
Bioenergy role in energy mix

Bioenergy in global energy mix

- Bioenergy (traditional + modern) accounts for **largest RE** share in the global energy mix
- Current **supply** at about 60 EJ – almost half of it is traditional
- Efforts underway to replace **traditional** with modern forms of bioenergy/energy
- **NZE** scenarios require 3* modern bioenergy by 2050



Source: IEA Data, WBA calculations

Bioenergy in sectors

- In terms of consumption, **heating** accounts for 50% of all energy use
- **Renewable** share is highest in power, followed by heat and renewables
- **Bioenergy** plays a major role in heat and transport globally (80 – 95%)

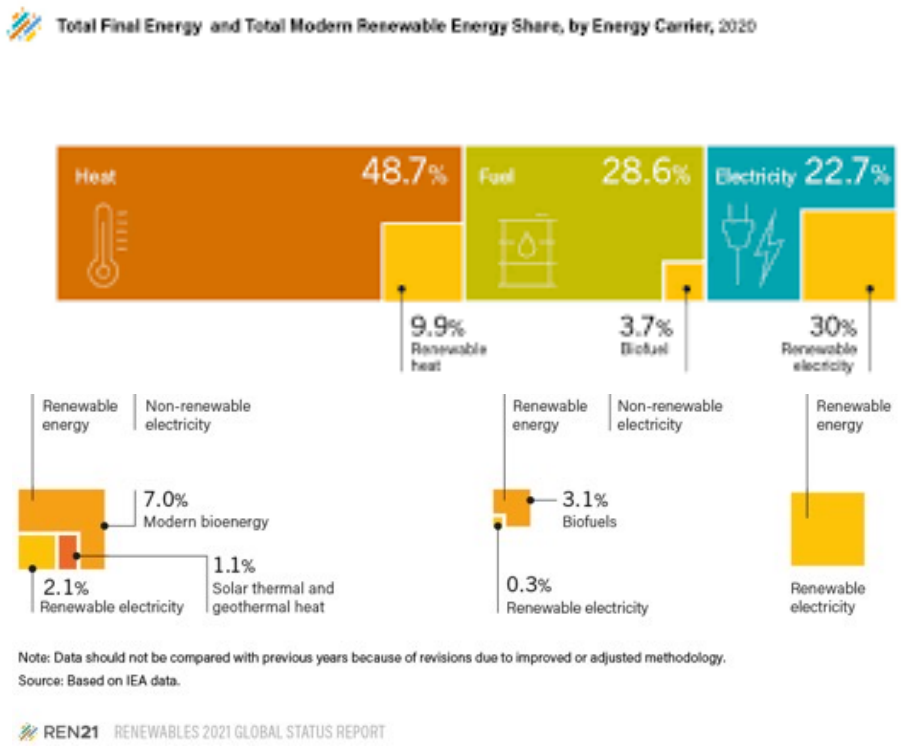
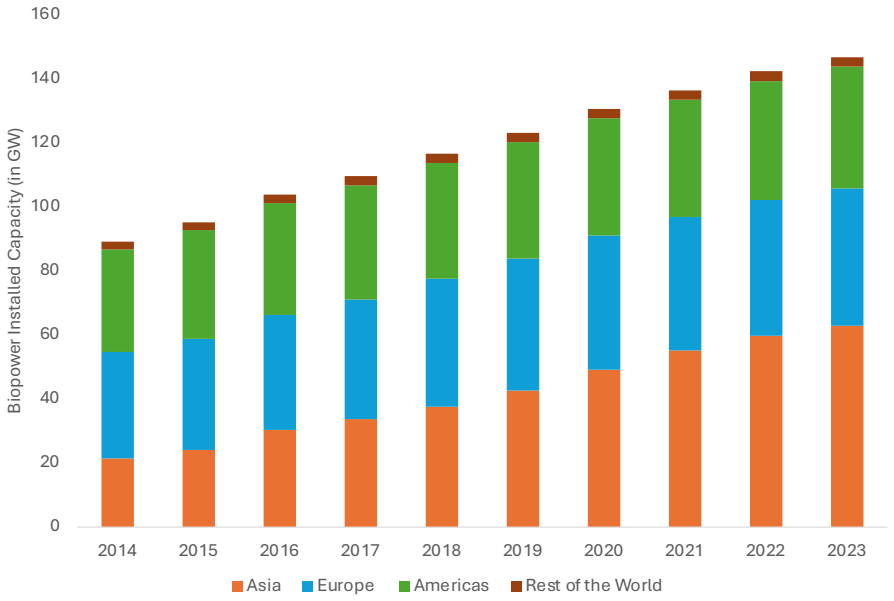


Figure: Renewable energy in TFEC (Source: REN21)

Biopower installed capacity

- Installed **biopower capacity** in 2023 – 150 GW
- Sector experienced **slowest growth** in a decade
- **Asia** (e.g. China, Japan, Korea, India, Indonesia) as key growth – dedicated biomass power units and co firing!



Biomass for heat

- Biomass for heating (1.26 EJ) is an excellent renewable option – cooking, heating, hot water etc.
- 96% of all renewable heat used in end uses sectors is from biomass sources
- Clean cooking and industrial decarbonization are promising sectors for bioheat growth

Liquid biofuels for transport

- Liquid biofuels production in 2023 was 180 billion litres – highest ever
- Bioethanol accounts for 65% of the global biofuel production, FAME + HVO account for rest
- Top biodiesel producers:
  - USA/EU (25%)
  - Indonesia (19%)
  - Brazil (12%)

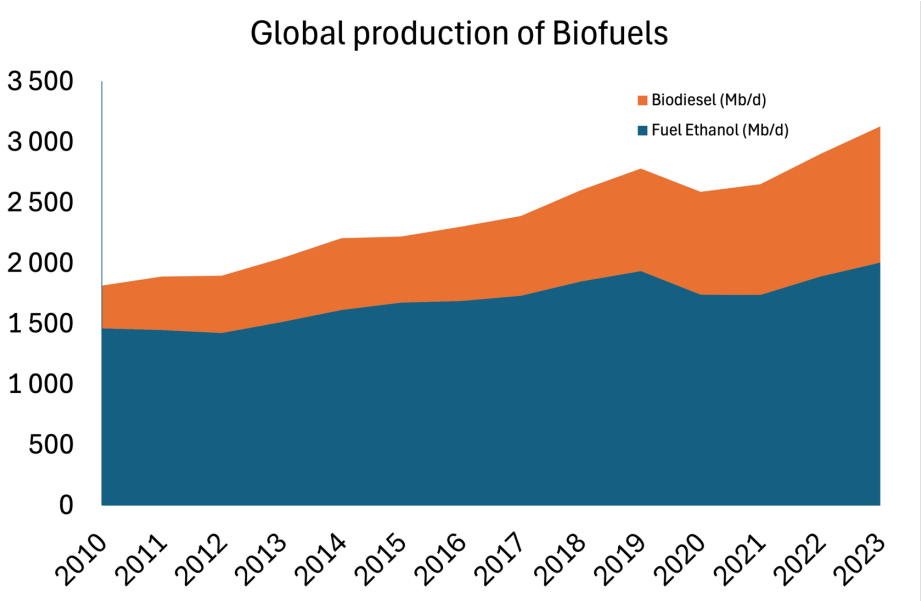


***Image**: WBA. Original data from various data sources – REN21, IEA, EIA*

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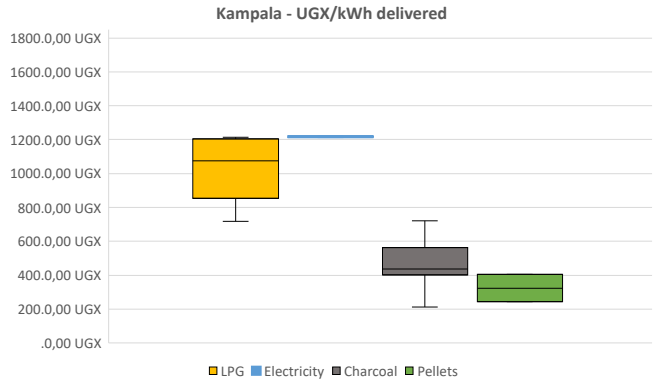
Key emerging markets

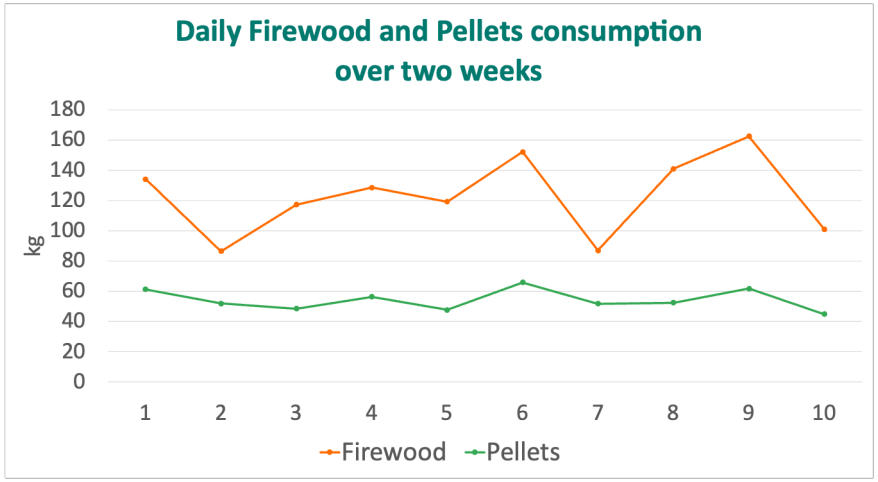
Emerging sectors (1) – Clean Cooking

- Significant challenge of replacing traditional and inefficient cookstoves with modern forms of energy/bioenergy
- Recent estimates suggest millions of tonnes of pellets needed for clean cooking transition
- Focus of WBA towards gasification cookstoves: No smoke, affordable, local fuel, protecting environment
- **Research**: Simulations, new models, feedstock assessments, feedstock quality, business models!



WBA pilot project

- Joint project of WBA and Biomassters
- 2 pellet burners attached to existing cookstoves of the school
- Various kitchen performance tests performed including fuel use, emissions, efficiency etc.



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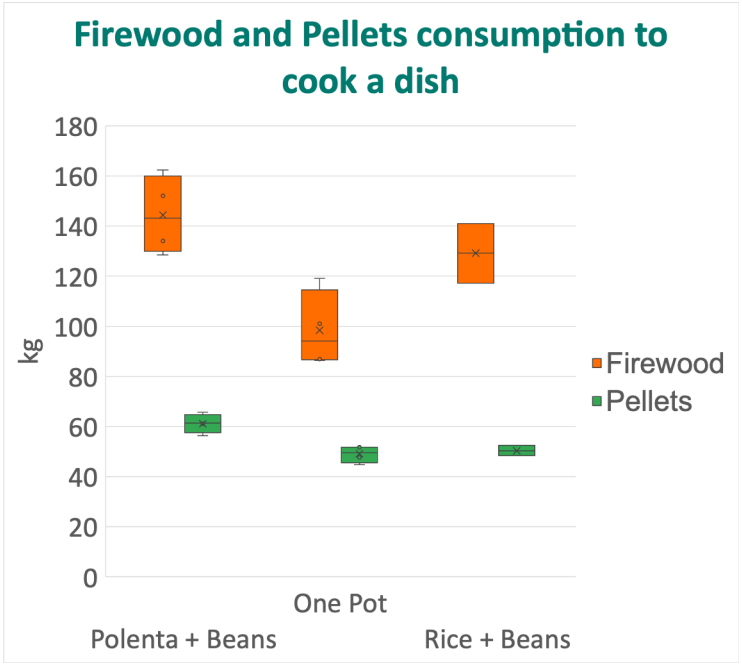
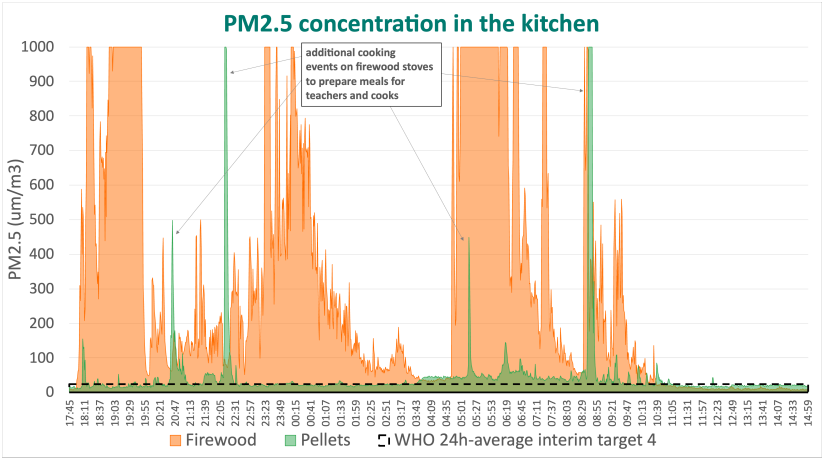


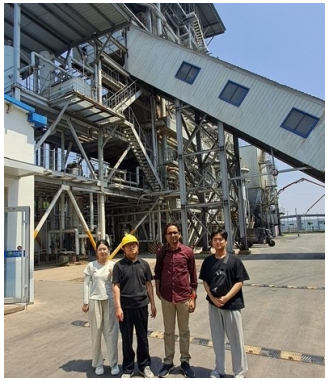


Emerging sectors (2) - Industrial decarbonization

- India
  - World's largest vaccine manufacturer
  - Cost savings as key motivation
  - Key: Feedstock Flexibility
- Indonesia
  - MNC's announcements for net zero
  - Utilization of local residues from rice fields
- China
  - Export oriented company looking for green credentials and security of supply
  - Use of wood waste as primary fuel

Research: Boiler technologies, resource assessments, emission control, circularity

Vaccine manufacturer – India



Food processing – China

Successful solutions are being scaled and replicated in nearby regions

Brewery in Indonesia

Emerging sectors (3) – Transport

- **Road Transport**
  - Significant unmet demand from mandates
  - Challenges include feedstock access, incentives, public perception etc.
- **Aviation**
  - Current production approx. 130 million l
  - Projected demand (2050) could be 15 billion litres
- **Shipping**
  - Policies include targets set by IMO (NZF) and national/regional legislations
  - Estimating demand in EU leads to demand of millions of tonnes of HVO etc.

Research – Novel feedstock, Improving Life cycle emissions etc.

***Image**: Blending mandates. Source: IEA Bioenergy*

Bioenergy in India – status

- Important, yet neglected sector for a long time
- Key opportunities recently
  - Co firing mandates (7%)
  - Biofuel blending mandates (E20)
  - Focus on SAF (1 – 5%)
  - Biogas and biomethane

Research: Densification technologies, novel feedstock and pathways, pricing mechanisms, gasification etc.

Year	Small Hydro Power	Wind Power	Bio-Power		Solar Power	Total RES Capacity
			BM Power/ Cogeneration	Waste to Energy		
2014-15	4.06	23.44	8.31	0.24	3.99	40.04
2015-16	4.27	26.78	8.67	0.25	7.12	47.09
2016-17	4.38	32.28	8.84	0.28	12.78	58.56
2017-18	4.49	34.15	9.36	0.31	22.35	70.65
2018-19	4.59	35.63	9.78	0.32	29.10	79.41
2019-20	4.68	37.74	9.88	0.35	35.60	88.26
2020-21	4.79	39.25	10.15	0.39	41.24	95.80
2021-22	4.85	40.36	10.21	0.48	54.00	109.89
2022-23	4.94	42.63	10.25	0.55	66.78	125.16
2023-24	5.00	45.89	10.36	0.59	81.81	143.64
Gr (2014-15 to 2023-24)	**23.15%**	**95.78%**	**24.67%**	**145.83%**	**1950.38%**	**258.74%**
CAGR (2014-15 to 2023-24)	**2.34%**	**7.75%**	**2.48%**	**10.51%**	**39.88%**	**15.25%**

Source: MNRE, India

Thank you!

- Bioenergy is an **underutilized** renewable energy source with significant potential
- Favourable **policies**, energy challenge and environmental concerns driving growth
- **Challenges** related to feedstock mobilization, financing, public perception etc.
- **Innovation** in feedstock supply, pathways, financing and community engagement critical for growth