Global development of the bioenergy sector – data and markets

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World Bioenergy Association

- Global industry association based in Stockholm
- Established in 2008
- **Mission**: Promoting the sustainable development of bioenergy
  - International advocacy
  - Platform for engagement
- Members – Pellet producers, utilities, research institutions, boilers/gasifier manufacturers, pellet mills, briquette manufacturers, heating companies etc.
- Coverage: Solid, liquid and gaseous fuels

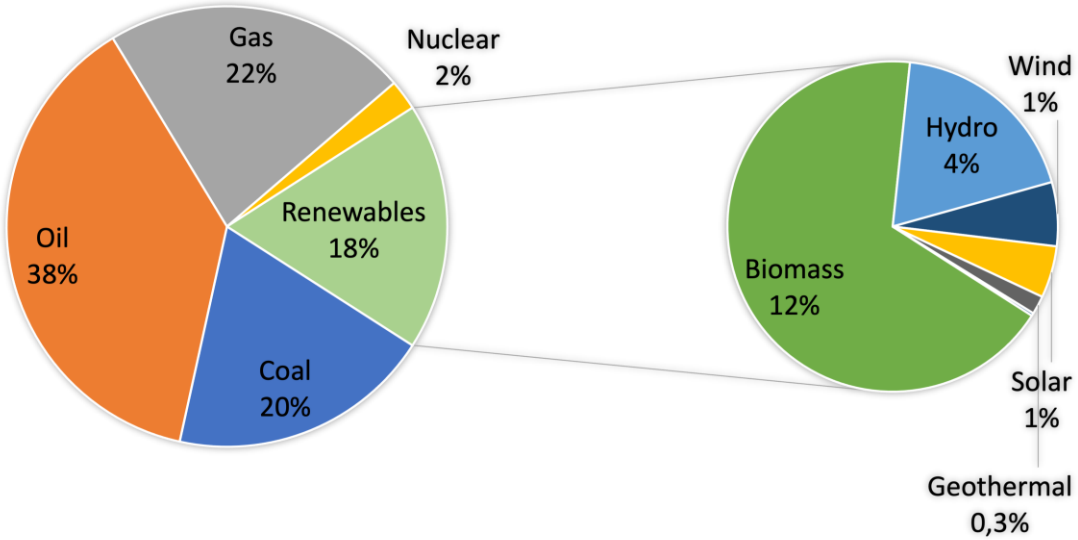
Membership

Associations

Companies

Energy Supply

- The reality is that our energy mix is dominated by fossil fuels – coal, oil and gas
- In terms of energy consumption (approx. 380 EJ), fossil fuels account for 80%
- Renewable share is constant (18%) since the start of the century – increased re deployment matched by increasing consumption
- **Bioenergy** is the largest renewable energy source globally
  - 50% traditional and 50% modern



Renewable energy in sectors

- Heating (Derived heat + final consumption) accounts for 50% of all energy consumption
- Penetration of RE varies among end use sectors
  - Decent share in **electricity** (25 – 30%) due to diverse options available
  - Long way to go in **heating** (8 – 10%) due to lack of policies and options
  - Woefully low in transport (3 – 5%)
- Bioenergy has major impact and potential in all end use sectors – with heating and transport more prominent

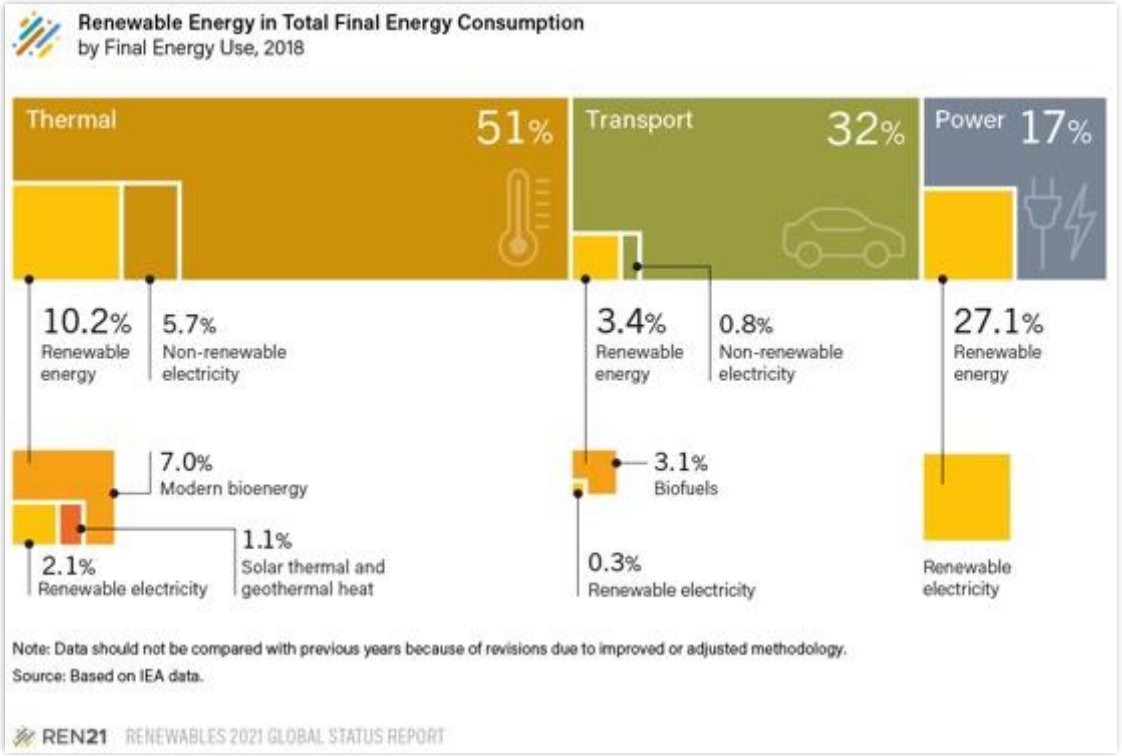


Figure: Renewable energy in TFEC (Source: REN21)

Where does feedstock come from?

- Biomass accounts for about 10% of the energy supply
- Currently, forestry sector (traditional and modern) accounts for about 85% of the biomass supply
- Agriculture/Animal sector accounts for approx. 10% of the supply – expected to grow further
- Minor share from MSW/Landfill gas

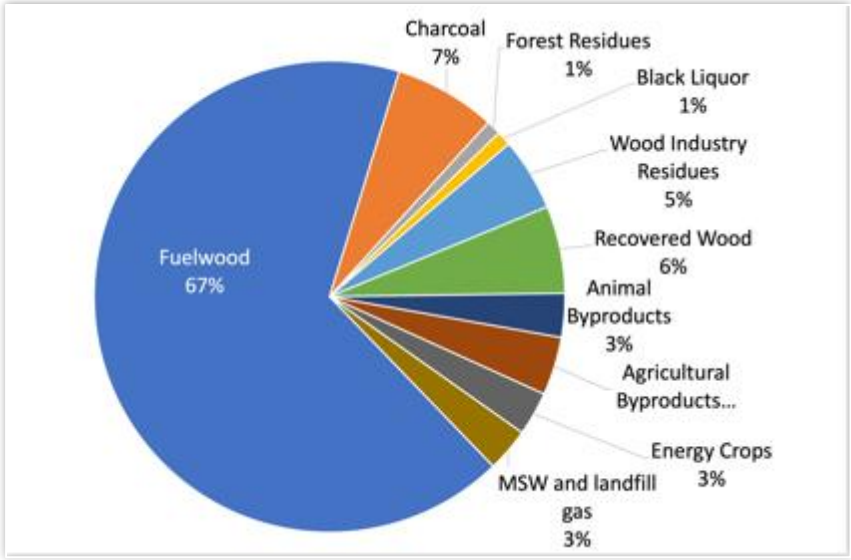
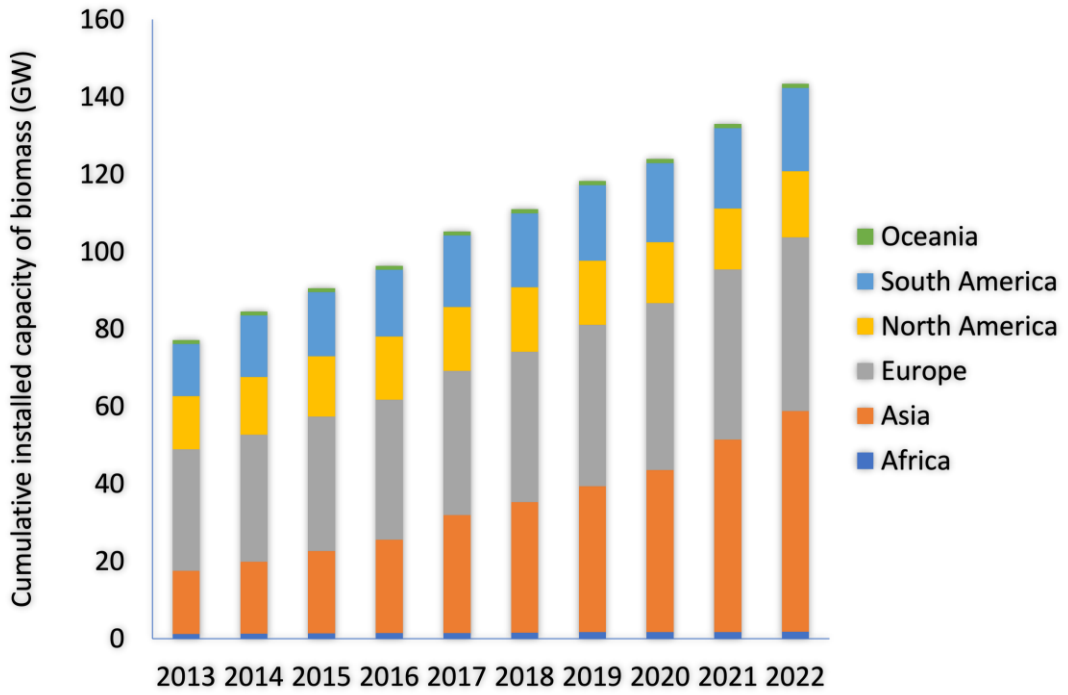


Figure: Biomass energy supply (Source: IPCC, IEA and WBA calculations)

Growth of biopower capacities

- Renewable energy sources account for 40% of total installed capacities
- Cumulative installed capacity of bioenergy – approx. 143 GW (5% of overall RE capacity)
- During 2021 – 2022, 10 GW of additional capacity was added: 4% of overall RE power addition
  - Asia accounted for largest increase y-o-y (+15%)
    - China + 5 GW
    - Indonesia, Japan + 1 GW
  - Europe experienced slowest y-o-y growth (2%)
- One of the slowest y-o-y growth in past decade



Biopower and Bioheat

Bio power

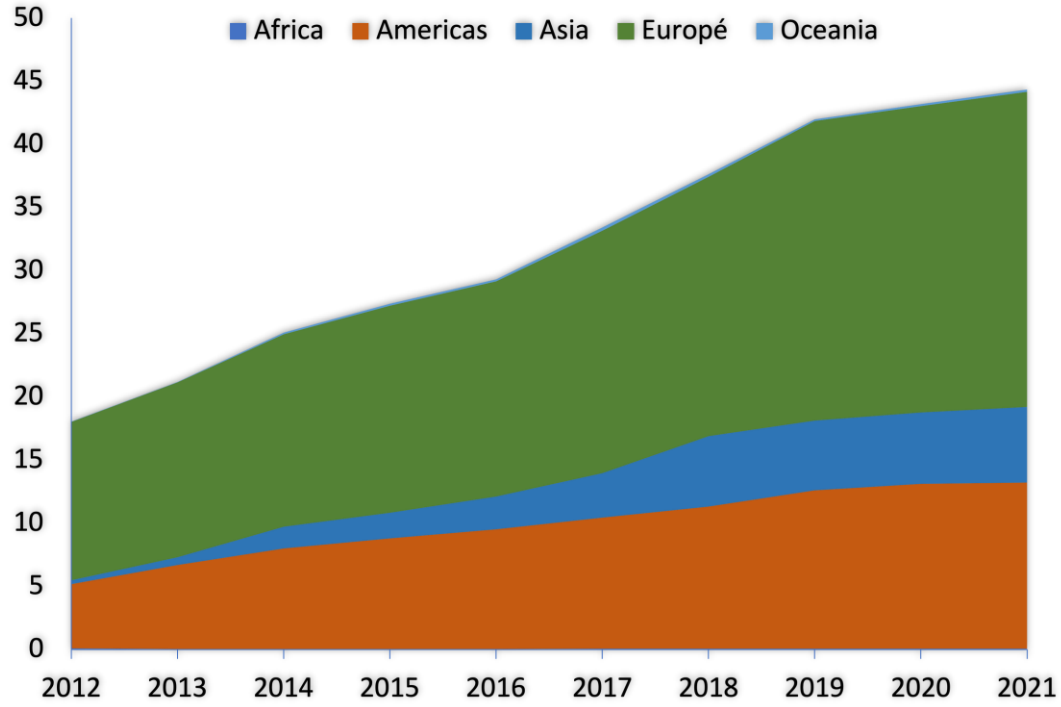
- 680 TWh of electricity was generated from biomass based sources – 9% of overall renewable power
- Installed capacity in 2022: 150 GW in 2022 (5.3%)
  - Bagasse co generation in Brazil, India
  - CHP facilities in Europe (DE, SW, UK)
  - Waste to energy in China, rest of Asia
  - Biopower generation in USA

Biopower

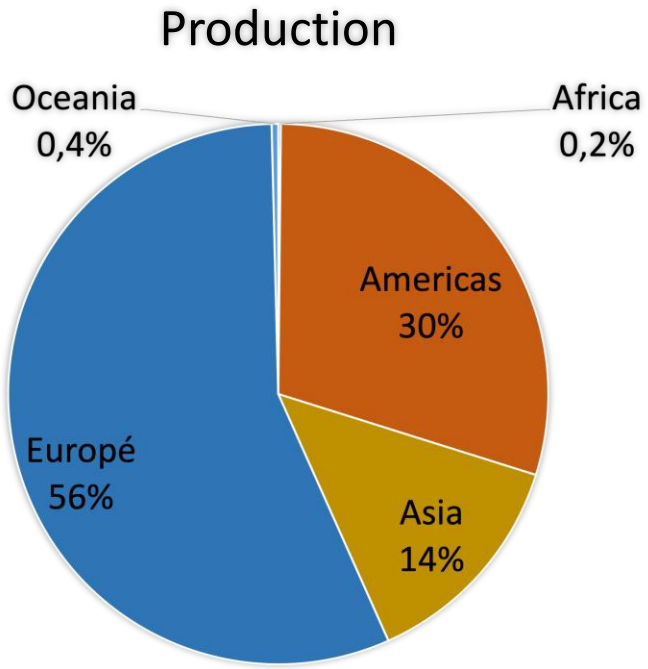
- 1.26 EJ of biomass heat was generated – 96% of all renewable heat in buildings, industry, commercial, forestry etc.
- Europe accounts for more than 90% of all bioheat produced globally
  - Possible due to large scale CHP facilities with District heating networks
  - Residential heating with pellets/chips boilers and stoves
  - Not much growth in Asia – Pacific due to lack of need for residential heating, but focus on industry

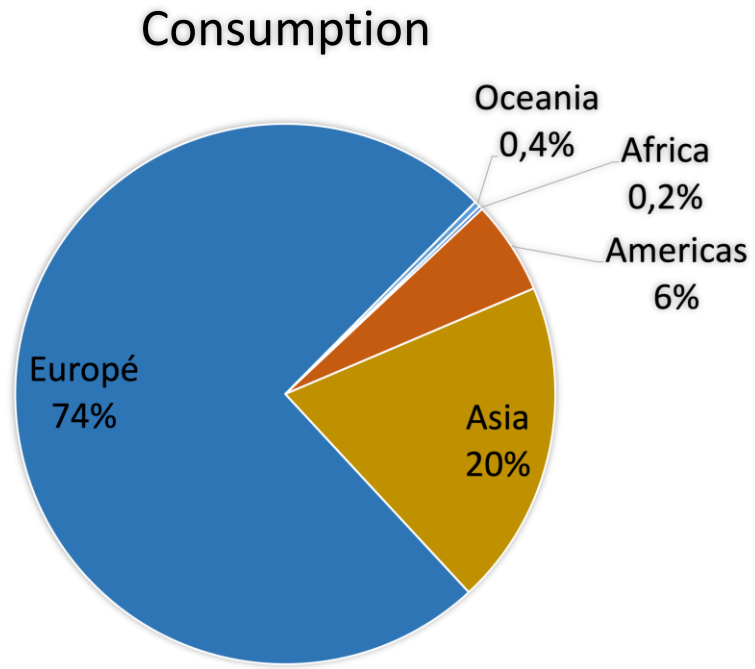
Pellets globally

- Pellets are one of the fastest growing commodities worldwide
- Global production of wood pellets has risen to 44 million tonnes
- Asia is a major player in consumption of wood pellets (e.g. Japan)
- Increasing focus on agriculture pellets for large power plants (e.g. India)
- Feedstock mobilization and densification technology critical



Production and consumption of pellets





IEA NZE Pathway

- Sustainable bioenergy delivers emissions reductions across a wide range of area:
  - Low emission fuels for aviation, shipping and other forms of transport
  - Replacing natural gas with biomethane and other fuels
  - Replacing coal with solid biomass fuels in large CHP facilities
  - Clean cooking solutions
- In NZE scenario, bioenergy will be the 2nd largest fuel in 2050!!

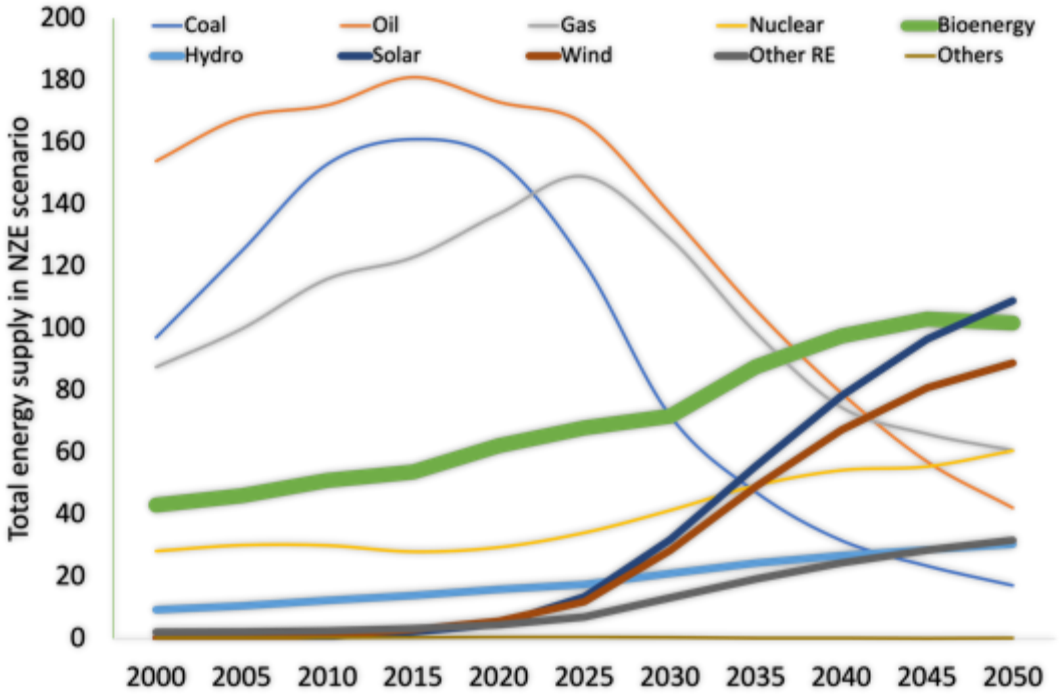
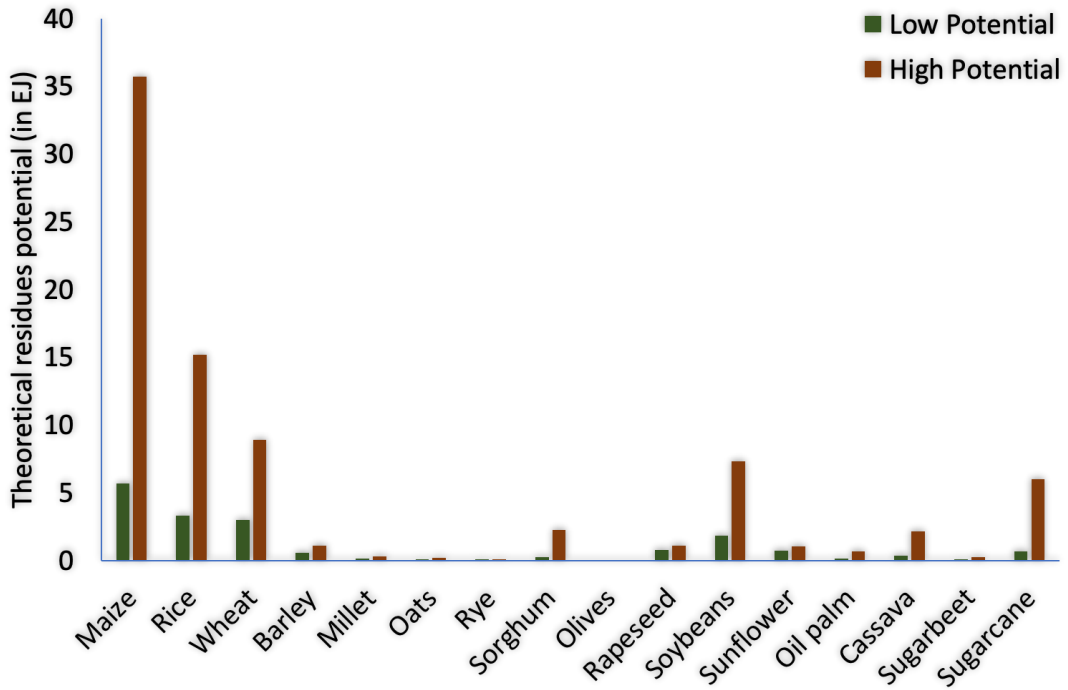


Figure: IEA Net Zero Emissions scenario (IEA NZE report)

Agricultural residues

- WBA study on theoretical potential of agricultural residues to energy
  - 50% left on the fields for soil etc.
- Estimated 60 – 100 EJ only from agro biomass
- Challenges remain
  - Aggregation (e.g. paddy straw vs. bagasse) – Focus on sugar and rice mills
  - Cost of collection, transport and storage
  - Technical limitations with agro biomass



Case of China

- Climate neutral pledge by 2060
- According to the recent 5 year plan,
  - Need to replace : 650 000 industrial boilers (3.5 TW – 85% coal)
- Rate of transformation is impressive
  - E.g. 500 MW coal fired power plant replaced with straw pellets in Northern China
  - 6 – 8 months for conversion
- COVID restrictions a major hindrance, signs of easing up

Fig: Coal to pellets fired power plant. Heat to a automotive company.

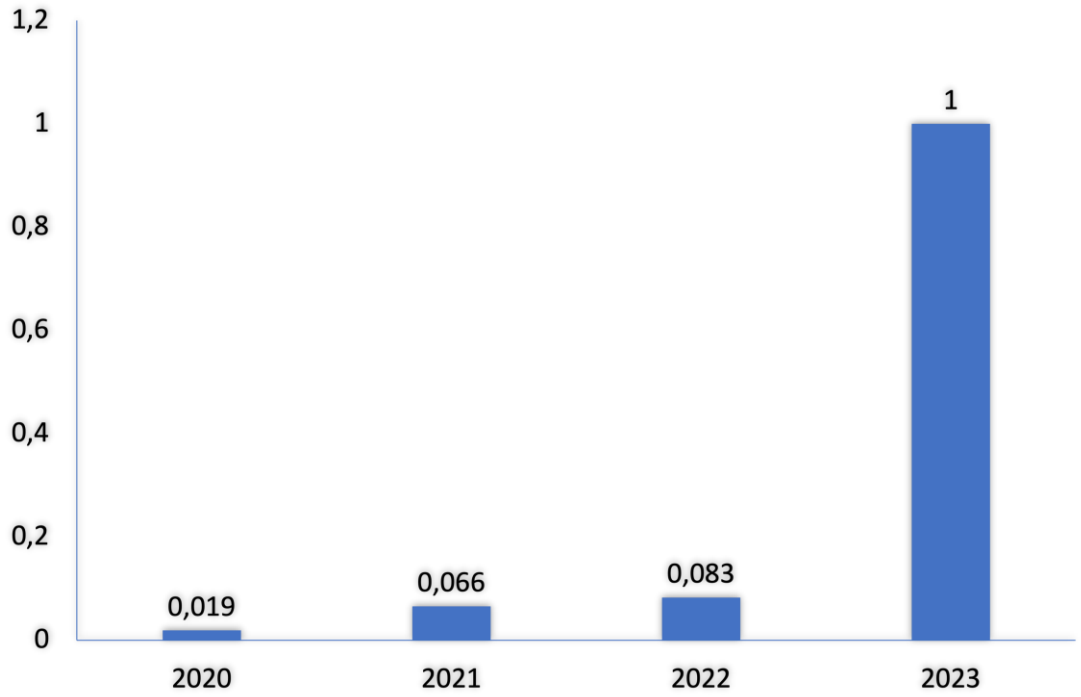
Case of India

- Aim to co fire 5% of biomass in thermal power plants
- Pellets are targeted as key feedstock: both torrefied and non torrefied pellets are promoted
- Primary feedstock: paddy straw
- Current status:
  - 39 power plants
  - 85 477 MT of pellets (0,6%)
- Increased to 7% from 2024 onwards

Fig: Paddy straw torrefaction unit in Haryana, India

Case of India

- 5% of co firing with coal translates to roughly 8 million tonnes annual consumption
- Order already placed for 4.3 million MT by 35 power plants
- Focus on local production and use of local equipment
- Financial incentives available:
  - One time grant on capital investment: 16 000 Euros per t/hr (non torrefied) and 38 000 Euros per t/hr (torrefied)



Opportunity – Industrial decarbonization

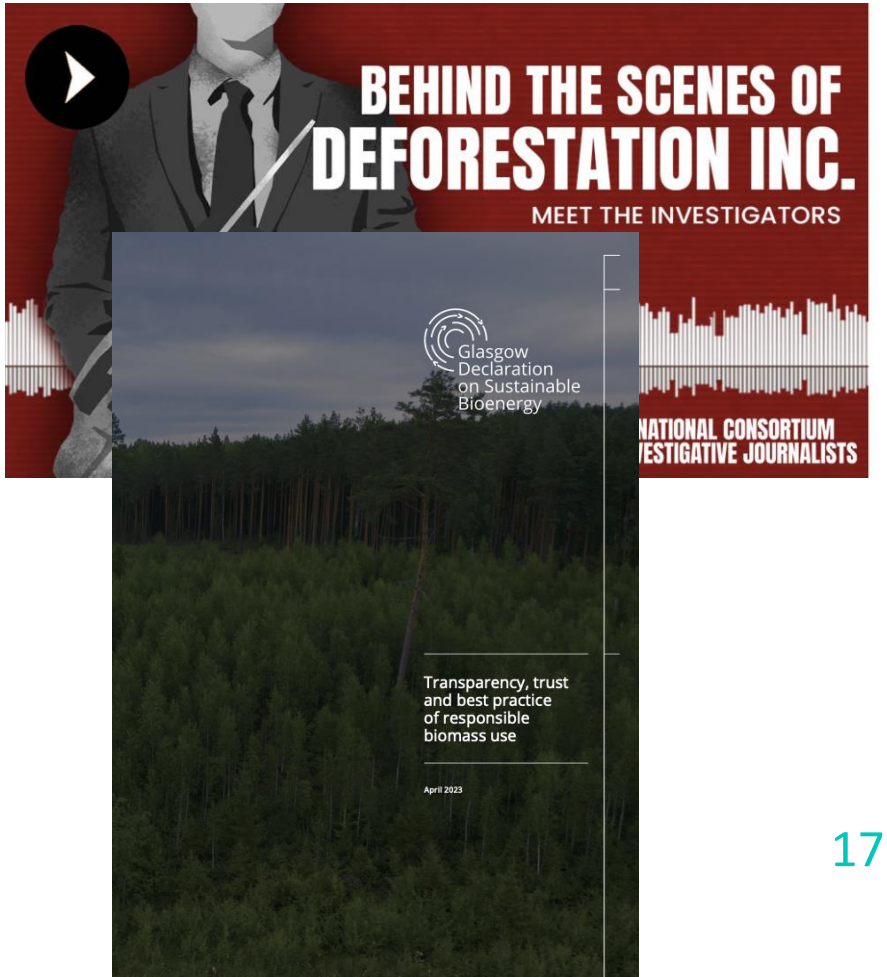
- 1) Heineken / BE-CIS, Indonesia
  - 7 MW facility for producing steam
  - Replaced natural gas fired boiler – an cost saving example of gas to biomass in industry
  - Feedstock: rice husk and wood chips
- 2) Serum Institute / Thermax, India
  - Largest vaccine manufacturer
  - Shifted from gas to biomass for cost savings

Industrial decarbonization is a major sector for rapid deployment of biomass solutions

Numerous examples in industries – food, beverage, pharmaceutical, FMCG, breweries

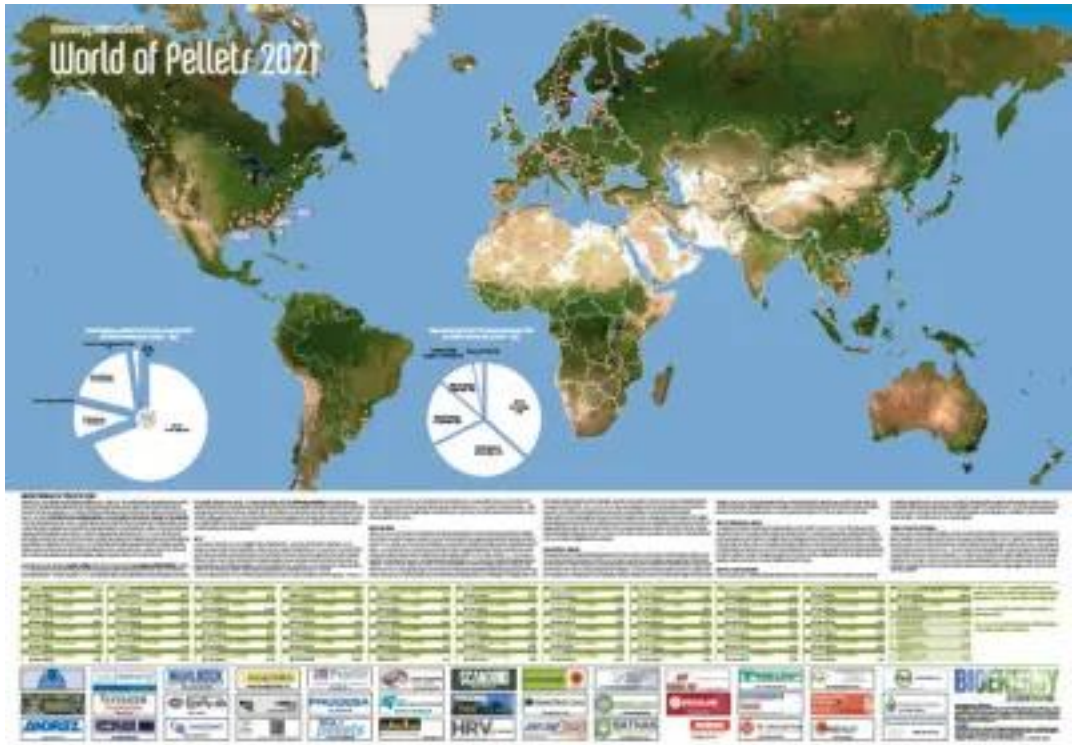
Major campaigns against bioenergy

- Increased opposition against the use of biomass for energy purposes
- Opposition has various advantages – massive resources and simple narrative
- Some sectors are impacted more than others:
  - Biofuels: e vehicles, food vs. fuel
  - Pellets: Deforestation, carbon debt
- **Important for the community to gather together, utilize the science and present good success stories**
- WBA initiative – Glasgow Declaration on sustainable Bioenergy (Join Us)



Bioenergy International

- Bioenergy International is the leading English language trade publication covering all bioenergy sectors
- Bio Int is the official magazine of WBA
- Recently launched the World Of Pellets Map – details list of major pellet production from around the world
- Homepage: https://bioenergyinternational.com/



BIOENERGY INTERNATIONAL

Thank you!

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23/05: Biomass pellets and briquettes (CPM, Kahl, Andritz, C F Nielsen..)

22/06: Conversion technologies (Polytechnik, Justsen, ..)

19/10 – …: WBA General Assembly (Hanoi, Vietnam + Beijing, China)