

Emerging technologies from abroad:

A report from World Sustainable Energy Days 2022

R. Trojanowski

Workshop 3: Adoption of new wood heater technology and integration with other renewables

April 27th, 2022



@BrookhavenLab

World Sustainable Energy Days



- Organized by OÖ Energiesparverband
- Hybrid event: over 650 experts from 55 countries participated in the conference, over 60 % of them on-site in Wels.
- European Pellet Conference, European Energy Efficiency Conference, Energy Efficiency Policy Conference, Industrial Energy Efficiency Conference, Smart E-Mobility Conference and Innovation Workshops
- Pellet Conference: presented latest trends in markets, policies, technologies and innovations – helping the participants stay on top of developments in the pellet and bioenergy world.

<https://www.wsed.at/>

<https://www.energiesparverband.at/en>

World
Sustainable
Energy Days
2022

5 - 8 April 2022
Wels, Austria

HYBRID EVENT

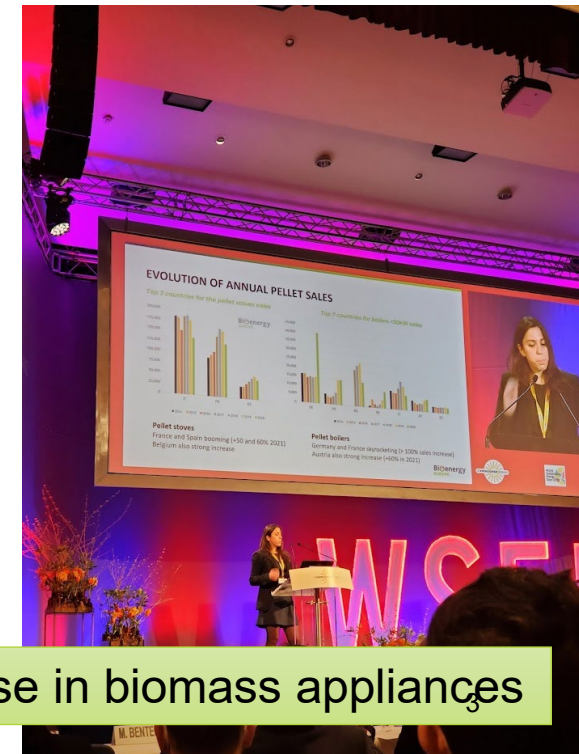
2022:

Energy
transition -
full speed ahead!



Overall Trends

- “Re-powering” Europe
 - Overall: biomethane or biofuels, wind, solar, electrification, clean biomass, full synchronization of grids– investments and financing assistance
 - Buildings: solar rooftops, heat pumps, better insulation
 - Industry: hydrogen, deep electrification, CHP, “blue” ammonia, synthetic kerosene
- Biomass for energy is main source of renewable energy in EU
 - Heating/cooling largest end user; threefold increase in DH since 2000
 - France and Spain pellet stove sales grew 50 and 60% since 2021
 - Germany and France saw 100% sales increase for pellet boilers; Austria 60%
- Sustainability issues
 - Biodiversity, carbon sinks in forests, air pollution
- To meet 1.5 °C scenario by 2030 or 2050, we need our primary source of biomass to transition from traditional use to modern use
- Solid biomass is important for decarbonization of buildings and industry
 - By 2050 ten-fold growth in use of bioheat for district heating
 - In Austria alone, 61% of space heating is from solid biomass
- Zero emissions!

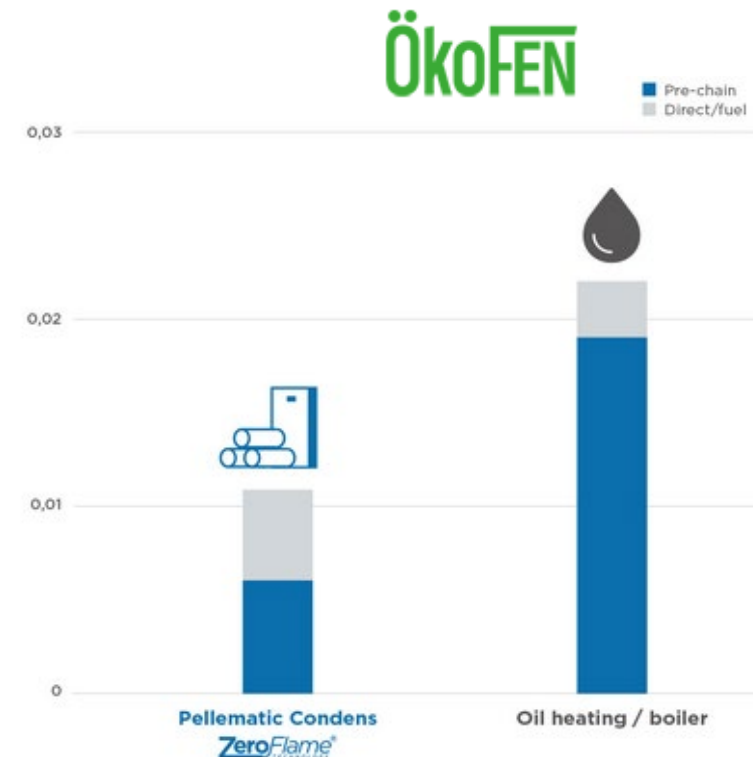
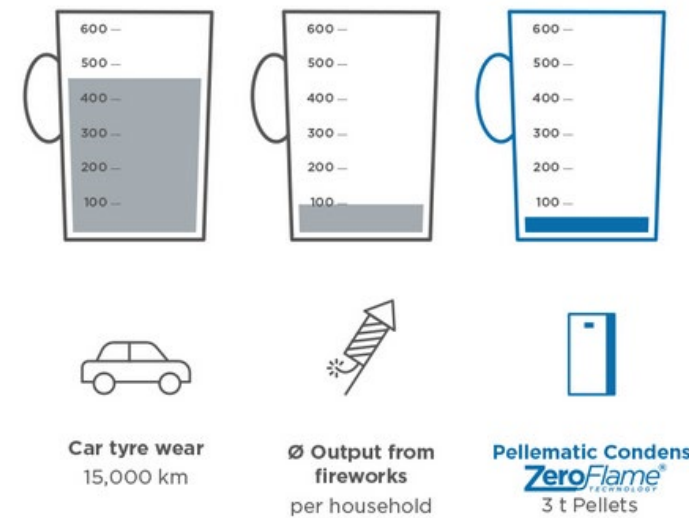


Increase in biomass appliances

Biomass heaters in Austria

More than 25% of all small-scale biomass boilers in Europe are manufactured in Upper Austria

- Ökofen– “pushing the limits on technology”
 - Highest efficiency possible
 - Electricity producing boiler connected to PV
 - “ZeroFlame” – cleaner than air heat pump, oil boiler, and coal combustion (when considering all upstream emissions)
- “Air quality: being the solution instead of the problem–innovation”
- Combinable with solar and tailored to a home



Biomass heaters in Austria



- Hargassner– “innovative solutions”
 - Refractory: best material available in terms of heat storage, function and durability
 - Lambda sensor to detect the relevant calorific value
 - Particle separation technology
 - Electrostatic precipitator

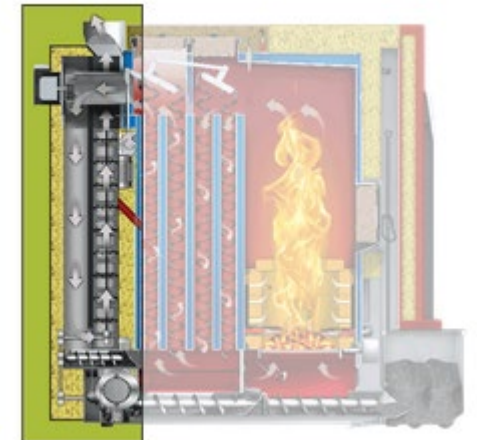


<https://www.hargassner.at/en/>

Oekotube-Inside



eCleaner



<https://oekosolve.com/en/products/stack-filters-automatic-wood-combustion/oekotube-inside/>

Biomass heaters in Austria

- Fröling– “better heating; innovative & convenient”
 - Condensing pellet boilers
 - Emission mitigation:
 - Optional particle separator
 - Electrostatic precipitator
 - “hot” combustion zones for easy “re-start”
 - Flue gas recirculation
 - Lambda probe for fuel adjustment
 - Solar panel integration
 - Storage tanks with multiple sensors for optimal operation
 - New CHP device– commercial size
- Windhager– “revolution in wood chip heating”
 - “PuroWIN” high efficiency
 - Zero emission through gasification technology with ember retention
 - Ember bed
 - Active carbon filter to filter fine dust
 - Combust wood gas
 - Solar panel integration + external thermal storage



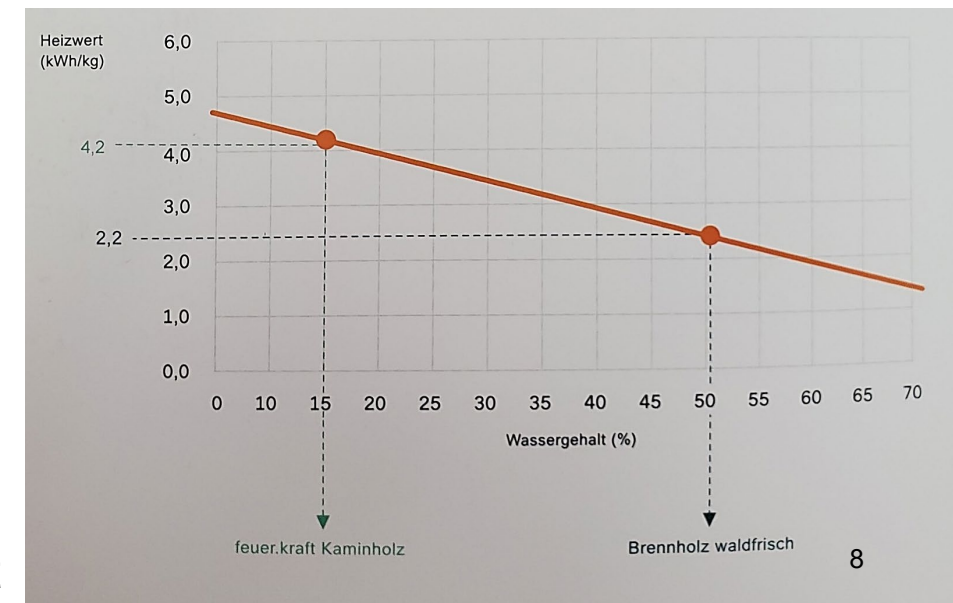
Biomass heaters in Austria

- Guntamatic– “modern in design, traditional in values and innovative in energy concept”
- Pellet (or logwood) hybrid heat pump
 - “no flame” pellet combustion chamber
 - high heat demand → pellet heat
 - low heat demand → heat pump
 - Can prioritize ecology or economy
- Combi-systems
 - Low heat demands = pellets
 - Uses pellets to heat up the log module–gasification technology for log
- No catalyst or ESP used in their systems to achieve low emissions
 - Use of high-quality materials (well insulated combustion chambers)



Fuel is important too...

- General shift from companies logs → pellets (automatic fed fuels)
 - Unless large scale (commercial applications)
- Emissions “too high” with log wood, ways to mitigate but more difficult
- Recommendations do exist:
 - To secure a good combustion and high efficiency, the wood logs should be **dried at least 2 years** in a sunny place
 - You can even purchase pre-dried wood!
 - Sustainable forest practices, “cleaned”, maximum energy yield



Final thoughts

- “Air quality: being the solution instead of the problem– innovation”
- Competitive through the energy transition
- Energy management
 - Baseload and system optimization
- Local district heating networks are huge!
 - Cascading boilers to minimize over-sizing issues
- Apps to make energy efficiency “easy”
- System integration is key
 - Using renewable sources when they make sense
- Focus on GHG emissions– cradle to grave



<https://www.cio.com/article/230332/where-does-innovation-belong-in-the-it-department.html>

Where do you see the strongest need for innovation in the wood heater sector?

- Enlarging the raw material basis
- Cost reductions of raw material
- Improved combustion technologies
- New services (delivery, install, maintenance contracts)
- Emission testing protocols / regulatory policies
- Something else





Thank you!

rtrojanowski@bnl.gov

631·344·5149