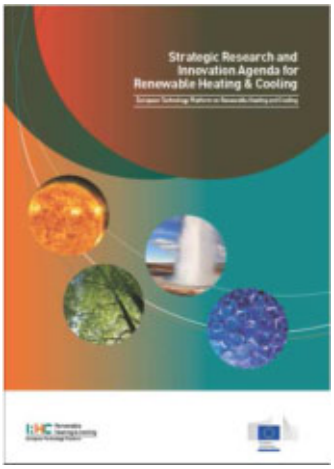
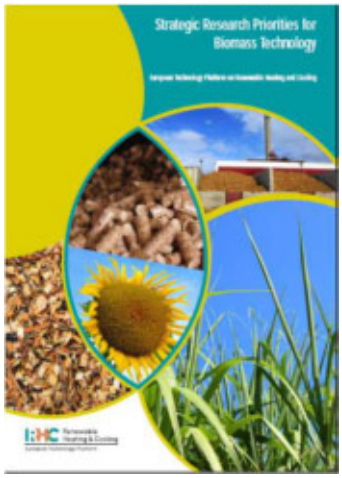
Biomasse – F&E Schwerpunkte und deren Implementierungsstrategie

Walter Haslinger & Lara Mertens
BIOENERGY 2020+ & AEBIOM
Wieselburg & Brüssel

Renewable Heating & Cooling
European Technology Platform
www.rhc-platform.org

ETP RHC Basisdokumente



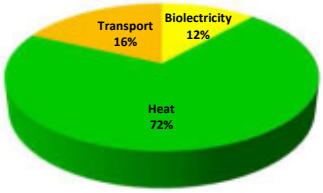


Renewable Heating & Cooling
European Technology Platform
www.rhc-platform.org

Vorstellung des Sektors / State of the art

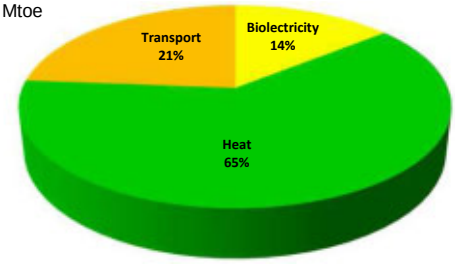
Bioenergieziele gemäß der nationalen EE Aktionspläne [national renewable energy action plans (nREAPs)]

Total contribution of bioenergy in 2010 in EU27: 85,3 Mtoe



2010

Total contribution of bioenergy in 2020 in EU27: 138,3 Mtoe



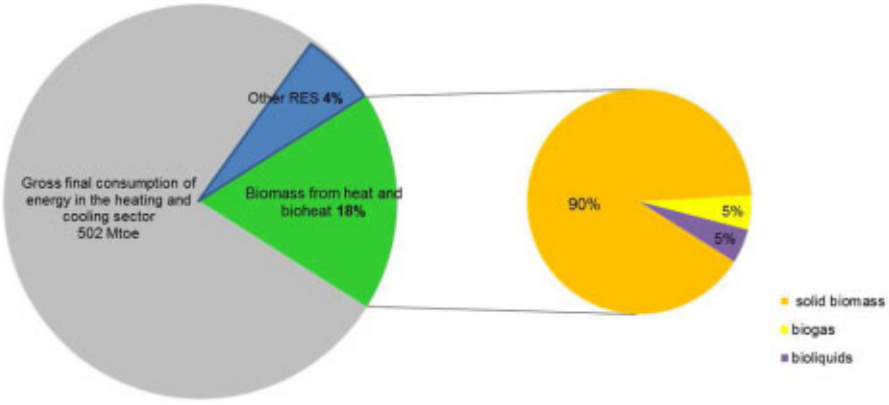
2020

Renewable Heating & Cooling
European Technology Platform
www.rhc-platform.org

Note: Bioenergy is considered as the gross final energy consumption, made up of the sum of bioelectricity, biomass for heat, bioheat (CHP, DH) and transport biofuels.

Vorstellung des Sektors / State of the art

- Energieverbrauch für Heizen und Kühlen in den EU27 im Jahr 2020 (gemäß nREAPs)

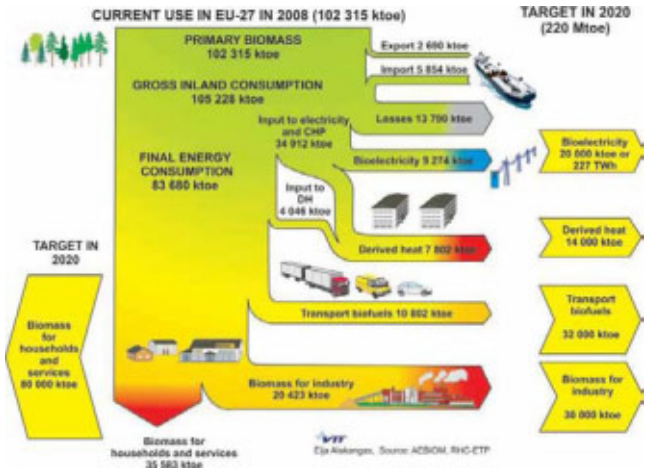


- Die 2020 Ziele können nur durch einen ganz wesentlichen Beitrag des RHC Sektors erreicht werden.

European Technology Platform

Source: nREAP, AEBIOM calculation

Vorstellung des Sektors / State of the art

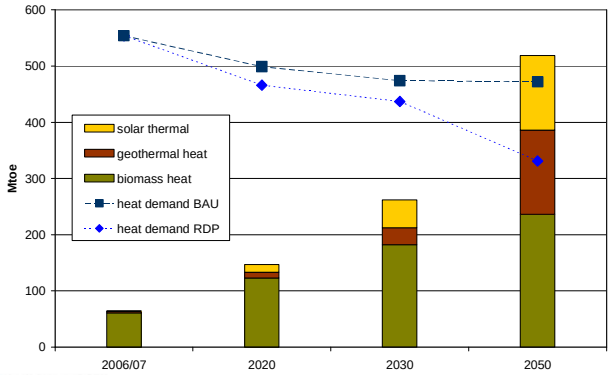


Renewable Heating & Cooling
European Technology Platform
www.rhc-platform.org

5

Vision

- Der thermischen Biomassenutzung wird auch langfristig eine wesentliche Rolle zur Decarbonisierung des europäischen Sektors Heizen & Kühlen zukommen



Renewable Heating & Cooling
European Technology Platform
www.rhc-platform.org

Vision

- Anteil der Biomasse am europäischen Wärmemarkt
  - 11% in 2007
  - ~25% in 2020
- Lösungen in 2020 sind
  - technisch zuverlässig
  - umweltfreundlich
  - wirtschaftlich
  - für (fast) alle in Frage kommenden Anwendunge
- **Bis 2020 Verdoppelung** des Anteil der Bioenergie für Heizen und Kühlen
- In 2050
  - erhöhter Strombedarf und reduzierter Wärmebedarf
  - Bioenergie hat Schlüsselrolle in allen Märkten
  - nachhaltige Landnutzung und nachhaltiges Ressourcen-management entscheidend für Versorgungssicherheit
  - effiziente Nutzung
- **Bis 2050 Verdreifachung** des Bioenergieeinsatzes für Heizen und Kühlen

Renewable Heating & Cooling
European Technology Platform
www.rhc-platform.org

Forschungsschwerpunkte – kleine bis mittelgroße Anlagen

1. Improve system design of residential biomass heating systems
2. Demonstrate the potential of efficient biomass boilers and stoves to improve air quality and reduce energy consumption
3. Cost-effective micro-CHP systems
4. Development of next generation of firewood stoves
5. Fuel flexible residential scale boilers
6. Cost effective solutions to reduce dust emissions
7. Cogeneration technologies and small scale biomass gasification technologies

Renewable Heating & Cooling
European Technology Platform
www.rhc-platform.org

Forschungsschwerpunkte – industrielle Anlagen

8. Development of advanced cost-efficient high quality solid and liquid biomass fuels from agro-biomass, bio-degradable waste, forestry and aquatic biomass
9. Cost efficient CHP plants using biomass and biogas
10. Development of CO2-negative bioenergy systems
11. Development of highly efficient large-scale or industrial CHP with enhanced availability and high temperature heat potential
12. Development of high efficient biomass conversion systems for tri-generation

Renewable Heating & Cooling
European Technology Platform
www.rhc-platform.org

Forschungsschwerpunkte

Einzelprojekte zu thematischen Schwerpunkten zusammengefasst:

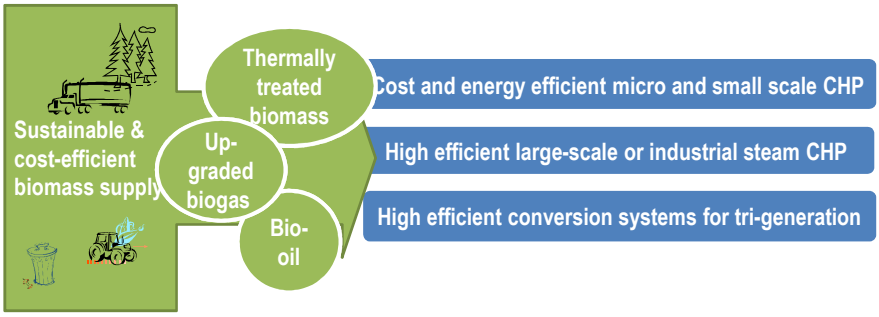
- Versorgungssicherheit
- Brennstoff- und Lastflexibilität
- Effizienz und Emissionen
- Integrierte Konzepte und prädiktives Management
- Nachhaltigkeit

→ Wärme- und Kühldienstleistungen zu **wettbewerbsfähigen** Bedingungen für KundInnen!

Renewable Heating & Cooling
European Technology Platform
www.rhc-platform.org

Priorisierung und Wertschöpfungsketten

- Fokus: Kurzfristige Umsetzung marktfähiger (kommerzielle Verfügbarkeit bis 2020) Lösungen für verschiedene Nutzungen
- Integration der Forschungsschwerpunkte in Wertschöpfungsketten



Renewable Heating & Cooling European Technology Platform www.rhc-platform.org

Nachhaltige und wirtschaftliche Versorgung

Sustainable, innovative and cost-efficient advanced fuel feedstock supply

New biomass fuel commodities

- 30% lower production costs
- Intelligent machinery
- Sustainable production
- 30% reduction of CO_2 in supply chain
- Improved feedstock quality, lower material losses

Cost-efficient, full-scale demonstrations of bio-oil technologies

Cost-efficient, full-scale demonstrations of different technologies for thermally treated biomass

Upgrading of biogas to biomethane

- Full demonstration of different pathways (e.g. bio-oil, torrefied biomass, steam explosion, hydrothermal carbonised fuels)
- Market implementation of fully commercial plants, which includes: Flexibility in raw material and standardised product quality

Renewable Heating & Cooling European Technology Platform www.rhc-platform.org

Klein- und Mikro-KWKs

- Feedstock: High quality biomass feedstock; biogas, solid or liquid biomass
- Technologies: combustion, gasification, fuel cells (Different state of development)
- Technological challenges: Reliability, efficiency, cost reduction, material development, efficient storage system development
- Required research activities:
- Basic research (TRL 1) (10 %): material research (thermoelectric materials, working fluids, working machine materials, heat exchanger materials)
- Applied research (TRL 2-4) (45 %): Component and system development, cost reduction, testing procedures (standardization)
- Demonstration (TRL 7-8) (45 %): long-term performance, cost reduction (overcoming valley of death)

Renewable Heating & Cooling
European Technology Platform

www.rhc-plat

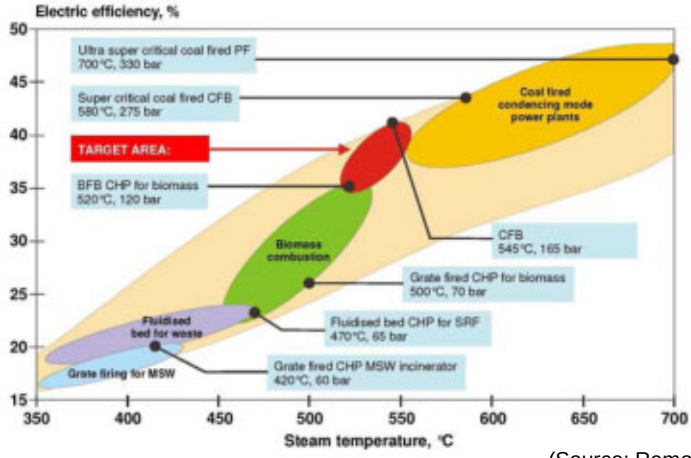
www.okofen-e.com www.buttonenergy.at

Hoch-effiziente industrielle Dampfkraftwerke (Dampftemperaturen bis zu 600º C)

- Feedstock: Biogas and solid biomass
- Technologies: Combustion and gasification
- Technological challenges: increase fuel flexibility, high operational electrical efficiency, increase steam parameters and/or heat medium temperature, increased plant availability, reduce emissions, new ash utilization options
- Required research activities:
- Applied research: material science, corrosion control, improved knowledge on correspondence with fuel properties, flue gas components, lab and pilot testing of co-firing matrices and new materials, optimization of boiler design / placement of heat exchange surfaces / cleaning techniques, ash utilization routes
- Demonstration at existing or new units: boiler retrofitting, long-term testing of fuel mixtures / new materials with increased agrobiomass share, monitoring of plant efficiency and emissions behavior, development of control concepts and strategies for optimal efficiency under variable loads

Renewable Heating & Cooling
European Technology Platform

Hoch-effiziente industrielle Dampfkraftwerke (Dampftemperaturen bis zu 600º C)



(Source: Remondis)

Renewable Heating & Cooling
European Technology Platform
www.rhc-platform.org

15

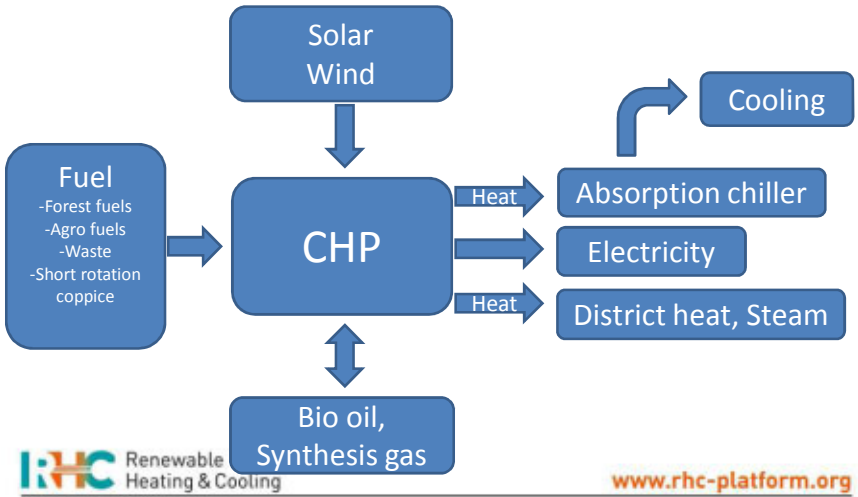
Polygeneration – Kombinierte Technologien für die Bereitstellung von Wärme, Kälte und Strom

- Feedstock: High quality biomass feedstock; biogas, solid or liquid biomass for combustion and gasification
- Technologies: Combustion, gasification, fuel cells – combined with adsorption and absorption chillers
- Technological challenges: Interaction of components, system design and system integration, heat or cold store
- Required research activities:

- Applied research: Energy storage
- Development: Concepts development for operation hybrid electric/heating/cooling grid, comparative study on cooling grid techniques/concepts
- Demonstration of cost-competitive polygeneration production plants

Renewable Heating & Cooling
European Technology Platform
www.rhc-platform.org

Trigeneration (Polygeneration):
Vereinfachtes Schema



Renewable Heating & Cooling
European Technology Platform
www.rhc-platform.org

Implementationsroadmap

Nachhaltige Versorgung

	2014-2016	2017-2020
Commercial plants for thermally treated biomass	BR	Demo
	AR	
Sustainable and cost efficient feedstock	AR	Demo
Full use of the energy content of biogas	AR	M
	Demo	M
Commercial plants for bio-oil	BR	Demo
	AR	

BR … basic research
AR … applied research & experimental development
Demo … demonstration
M … market-ready

Renewable Heating & Cooling
European Technology Platform

18

Implementationsroadmap

Mikro- und Klein-KWKs

	-> 2015	2015-2017	2017-2019	2020
Thermoelectrics	BR		AR	
Stirling engine	AR		Demo	M
Steam Cycle	AR		Demo	
ORC	Demo			M
Fuel cell	Demo			M
Micro gas turbine	AR		Demo	
Gasification +IC	AR		Demo	

BR … basic research
AR … applied research & experimental development
Demo … demonstration
M … market-ready

Renewable Heating & Cooling
European Technology Platform

19

Implementationsroadmap

Hoch-effiziente industrielle Dampfkraftwerke (Dampftemperaturen bis zu 600º C)

	2014-2017	2017-2020
High efficient large-scale or industrial steam CHP with enhanced availability and increased high temperature heat potential	AR *New materials (e.g. for superheat tubes, catalysts, etc)*	Demo *Demonstrate fuel flexibility and optimal efficiency under variable load at 3-4 CHP units*
	AR *Optimization of boiler design / placement of heat exchange surfaces / leaning techniques*	
	AR *Development and testing of suitable co-firing matrices for problematic biofuels*	
	AR *Corrosion control (additives)*	

European Technology Platform

Implementationsroadmap

Trigeneration (Polygeneration)

	2014-2016	2017-2020
Energy storage	BR	Demo
	AR	
Concept developments	AR	M
3 Demonstrations in different scales	AR	Demo

Renewable Heating & Cooling
European Technology Platform
www.rhc-platform.org

Vielen Dank!

Kontakt

Walter Haslinger
walter.haslinger@bioenergy2020.eu
07416/52238-20

Renewable Heating & Cooling
European Technology Platform
www.rhc-platform.org