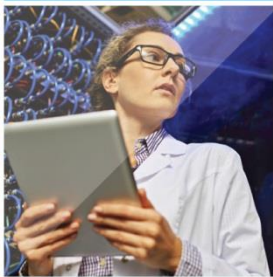




European
Commission



High performance, smart district heating & cooling 4DH Conference 12-13 September 2017, Copenhagen

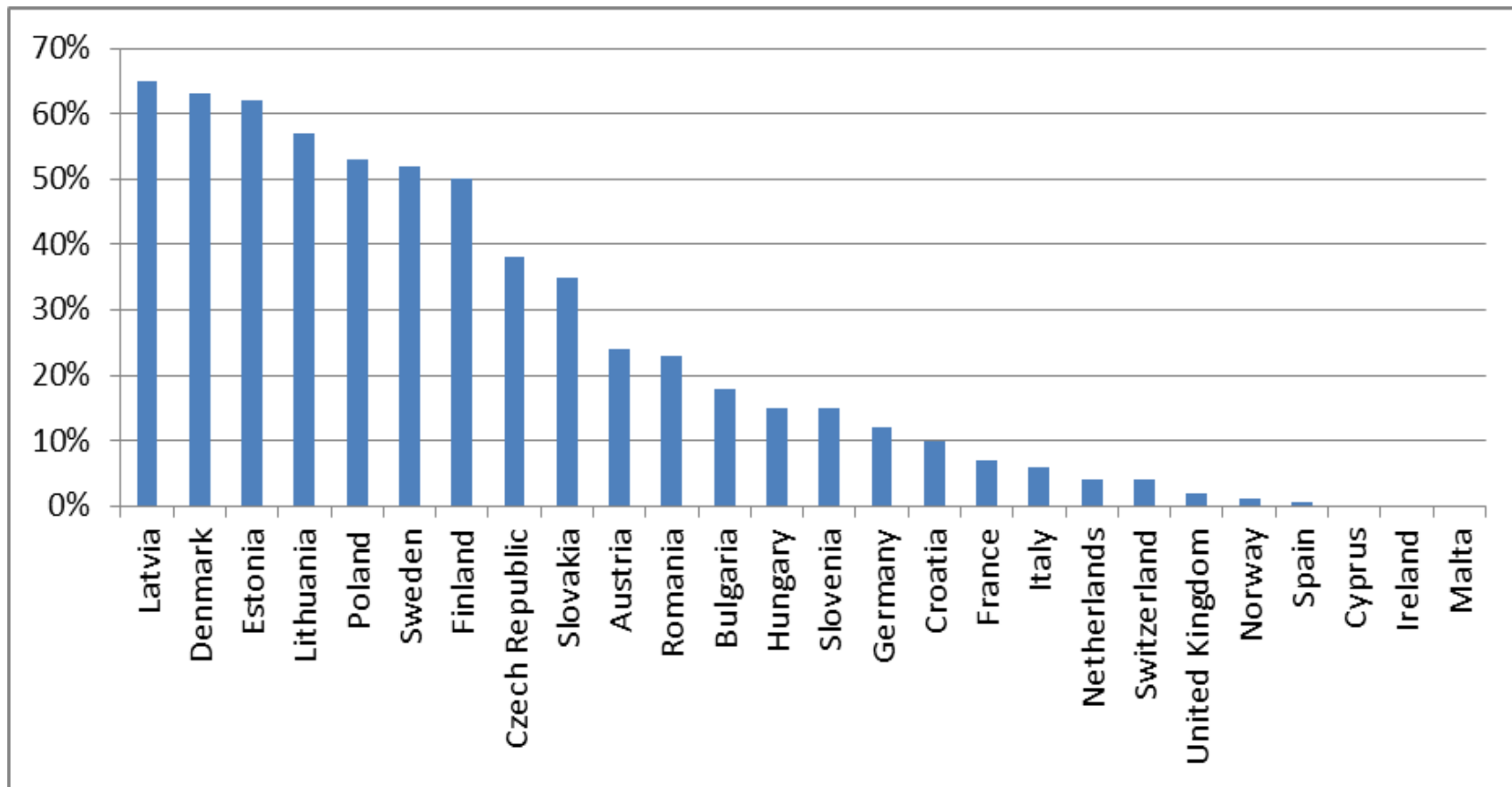
Eva Hoos
European Commission – DG ENERGY



District Heating & Cooling: Today

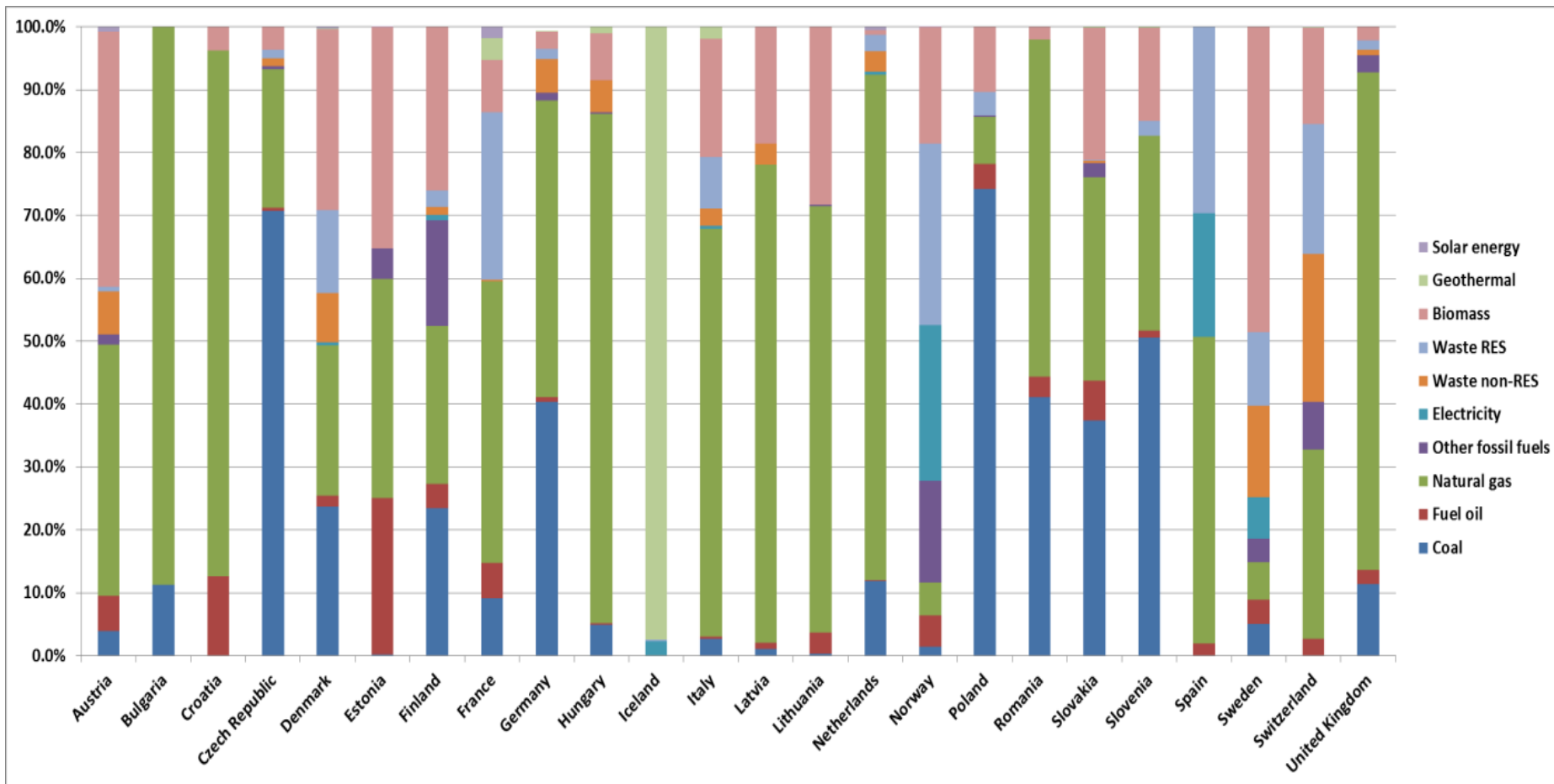
- ❑ Supplies around 10% of heat consumption at EU level
- ❑ Widely diverging situation in the European Union's Member States
 - market shares from 0% to close to 70%
- ❑ Widely different levels of development
 - from countries where heat networks are a natural and traditional part of the heating systems to countries where they are virtually unknown with no tradition
- ❑ Dominance of conventional systems with high temperature networks fitted to " high-temperature" buildings and building heating system
- ❑ Dominance of fossil fuels (only around 20% of renewables) but widely different supply sources
- ❑ Widely different regulations and governance
 - from fully regulated to semi- and not regulated systems (e.g., prices, organisation, management)
- ❑ District cooling
 - less than 1% overall and developed only in a handful of cities
- ❑ No European framework
- ❑ Regulation in most Member States is underdeveloped (regulatory gaps)
 - e.g. consumer protection, performance information (efficiency and renewables, planning, business models, relationship with building codes, etc.
- ❑ Expertise in design and technology is limited and concentrated in a few countries
- ❑ Consumer awareness of this heating solution is low in most EU countries

Percentage of the population served by district heating (2013)



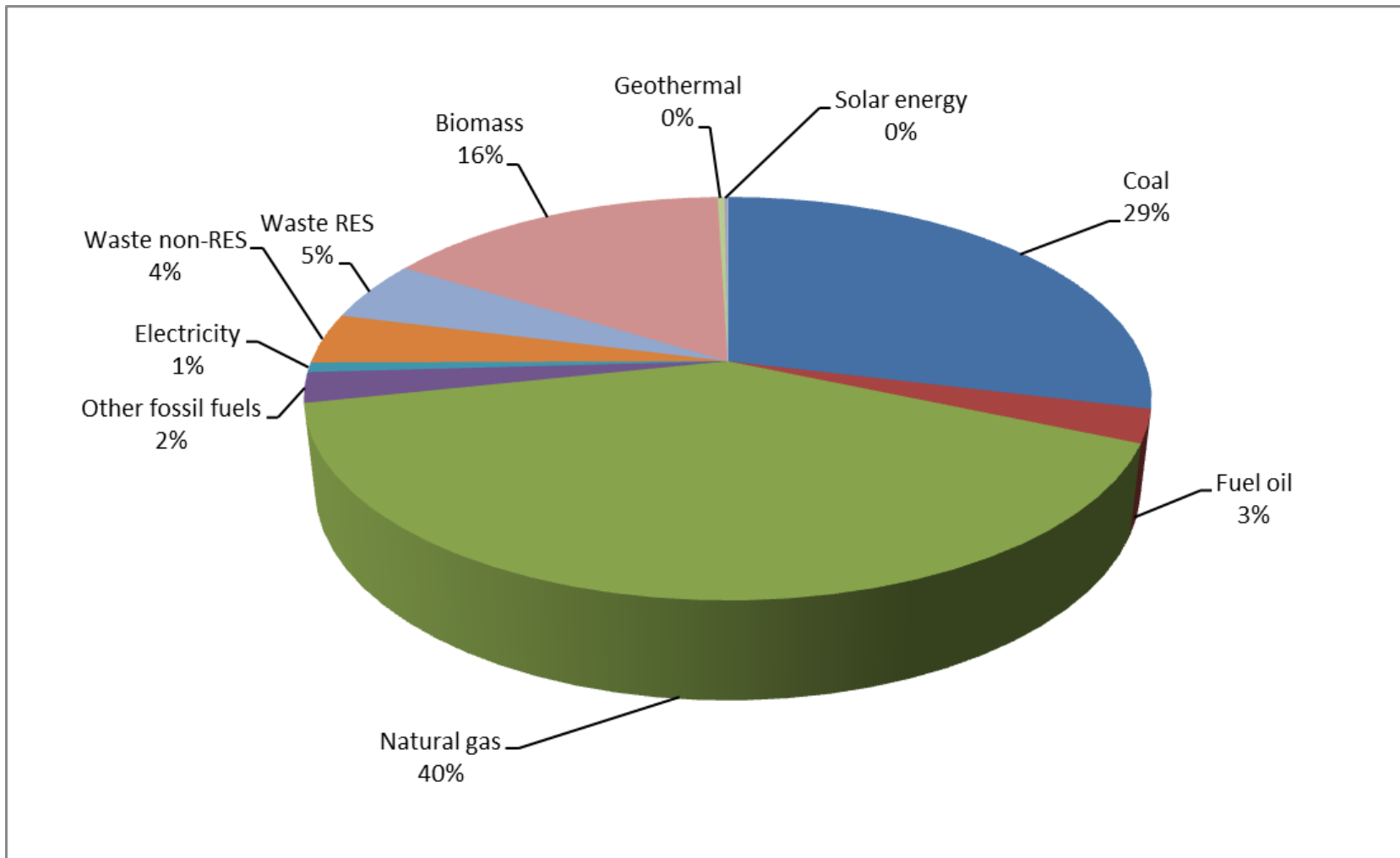
Source: Commission services using data supplied by Euroheat and Power

Share of energy carrier in DHS in 2012



Source: Commission services using Fraunhofer and alia, Heating and cooling data mapping ... ENER/C2/2014/641

District Heat Primary Supply Sources in EU28 2012 (606 TWh)



Source: Commission services using Fraunhofer and alia, Heating and cooling data mapping ... ENER/C2/2014/641

Towards the future

The start: EU Heating and Cooling Strategy

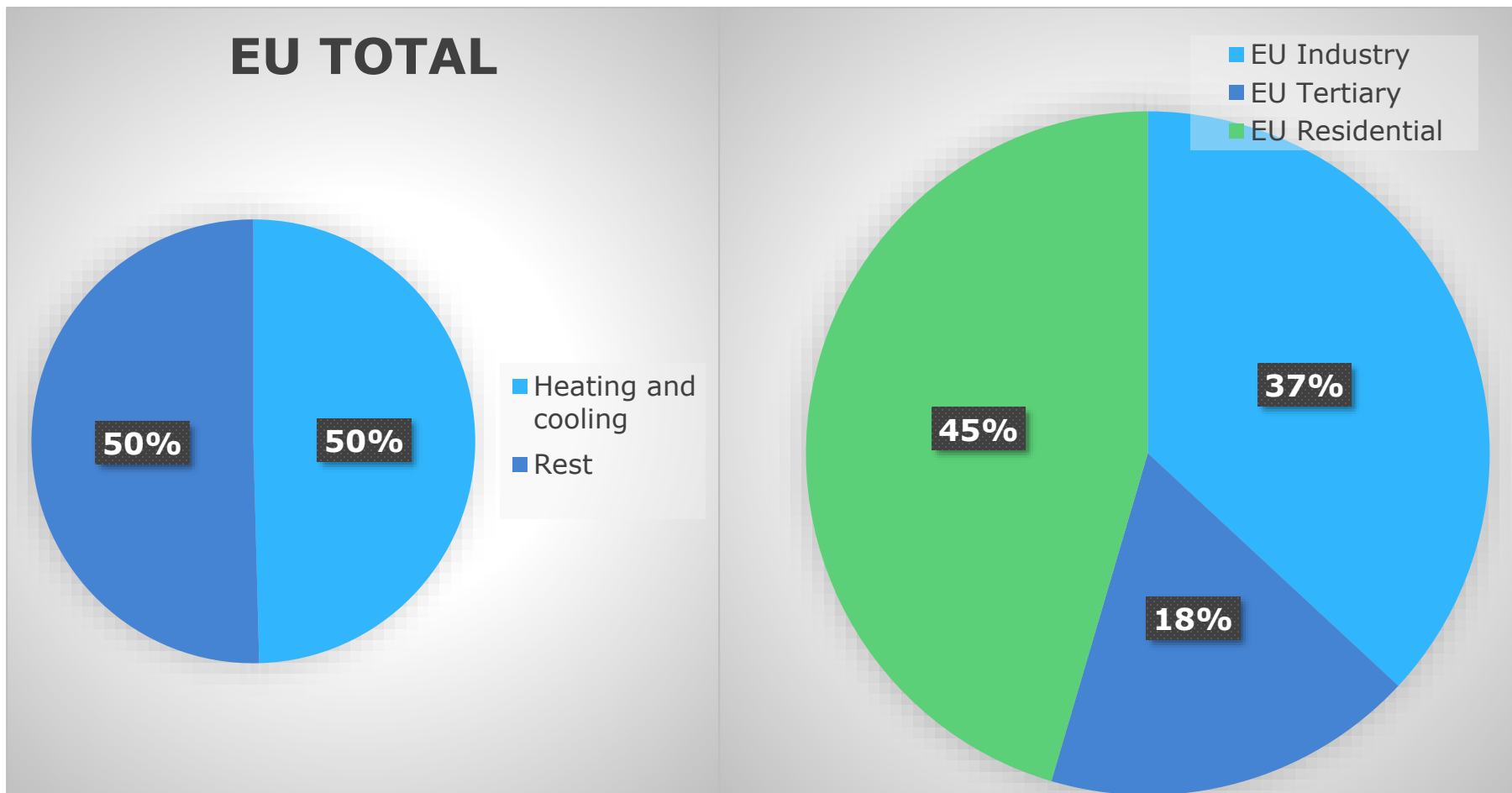
- ❑ Recognised that heating and cooling was a distinct policy area that needed to be integrated into the EU the energy policy framework on its own.
- ❑ It established that
 - heating and cooling was a big (the biggest) part of the EU energy consumption $\geq 50\%$
 - was based largely on fossil fuels and
 - largely inefficient both in terms of production (supply) and in terms of consumption (demand)
- ❑ This allowed for the first time to look at the EU thermal energy production and consumption together in a holistic way and identify synergies within the sector and with other energy sectors (electricity, waste heat & cold, buildings)
- ❑ It called for making heating and cooling both more renewable based and energy efficient in production (supply) and consumption (demand e.g. in building)
- ❑ It set the goal to decarbonise buildings in the EU by 2050

The start (cont)

EU Heating and cooling strategy proposed tools & solutions:

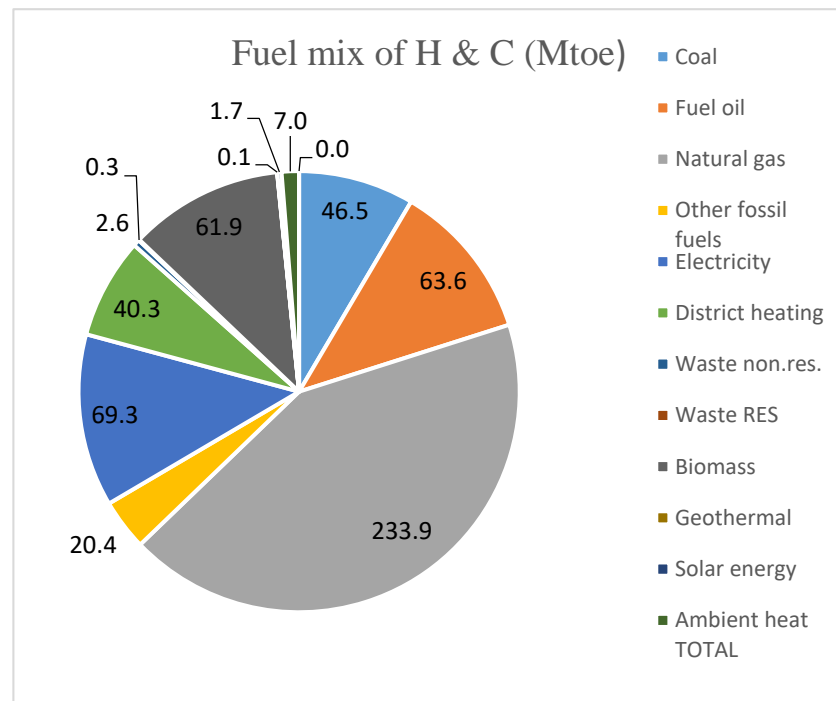
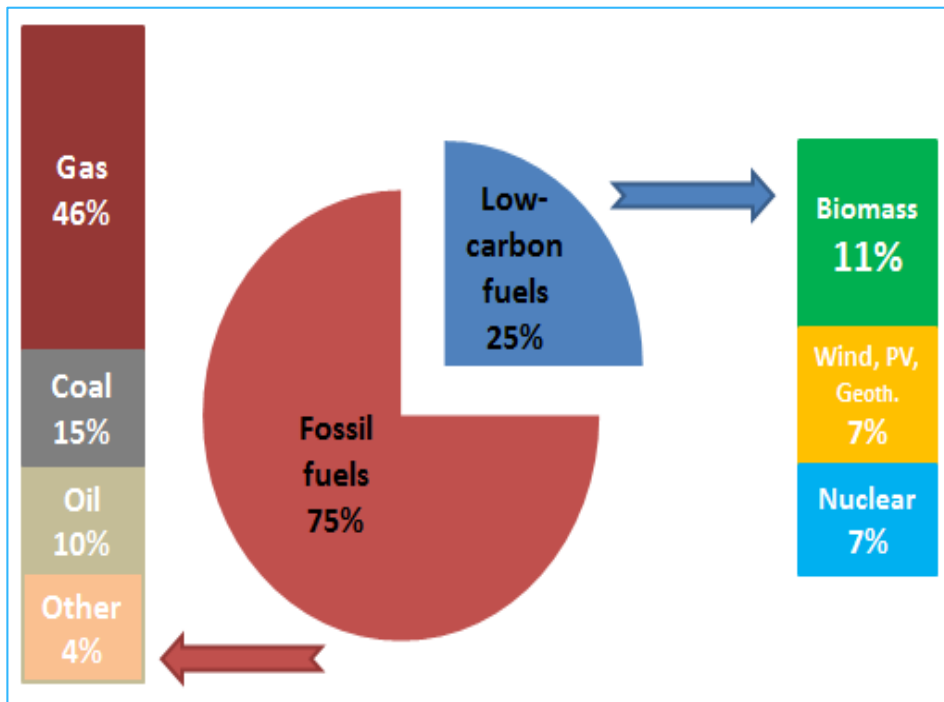
- ❑ a) district heating & cooling (efficient, renewable based, high performance and smart) and cogeneration
- ❑ b) smart energy systems (digitalisation) able to benefit from demand response, energy storage, smart meters and heating systems/appliances
- ❑ c) linking heating & cooling with electricity to allow a greater integration of variable renewable electricity (e.g. wind and solar that are already on par in cost with new fossil fuel generation) by offering balancing and optimisation for both renewable electricity and heat
- ❑ d) linking industrial waste heat sources with buildings through heat networks to save primary energy
- ❑ e) refurbishment of existing building stocks to make demand more efficient
- ❑ f) deploy renewable and efficient heat and cold supply in buildings to replace old and inefficient, fossil based systems
- ❑ g) help industry to do the same as for buildings
- ❑ g) unleash innovation, research and development
- ❑ h) step up education, training, best practice exchange and information to educate consumers, companies and public authorities and ensure sufficient skilled professionals
- ❑ i) reflect these objectives in the Clean Energy Package that overhauls the EU electricity, energy efficiency, building and renewable frameworks

Heating and cooling is 50% of EU's final energy consumption



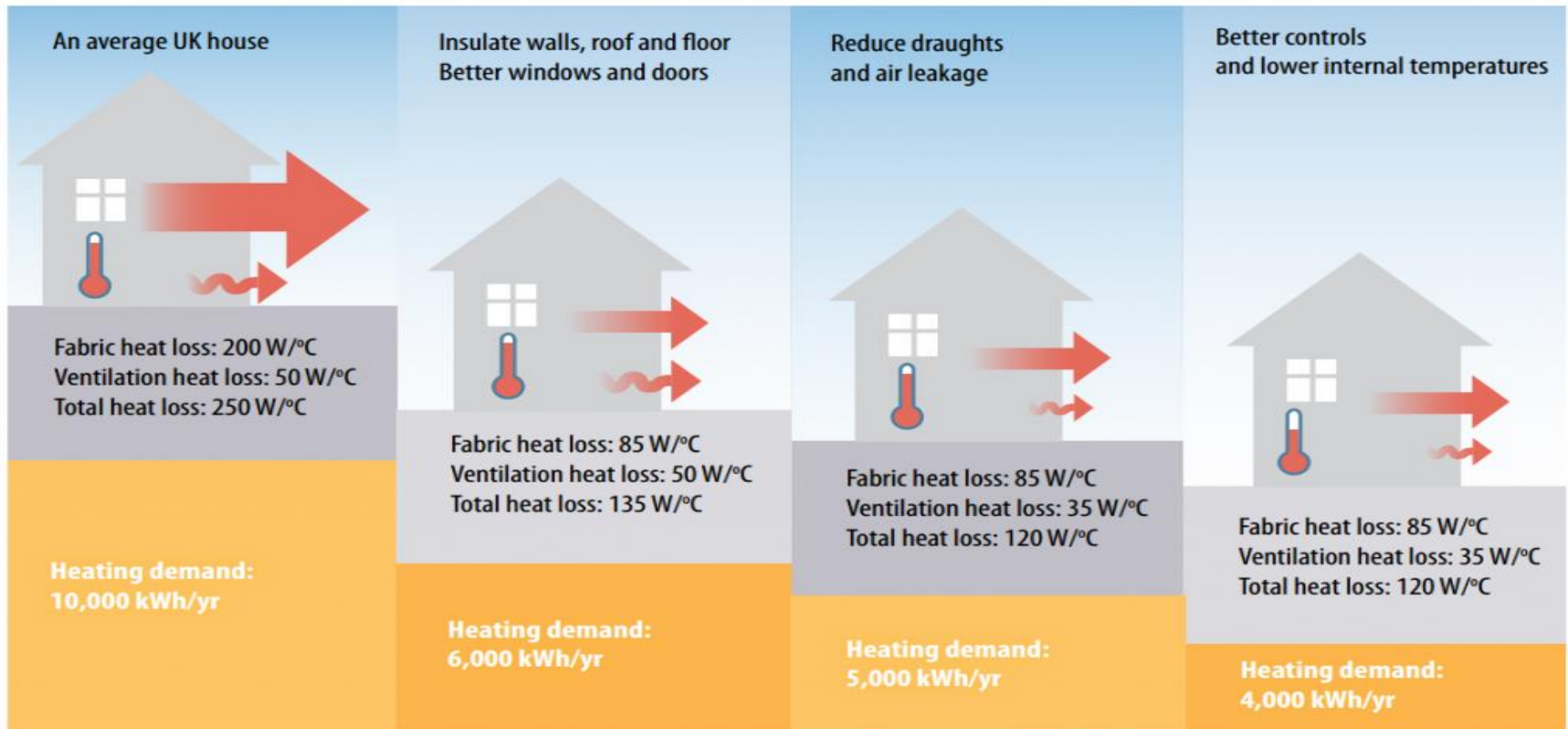
Buildings consumes \approx 60% of heating and cooling, industry consumes most of the rest

EU heating and cooling sector: Most of it is fossil fuel

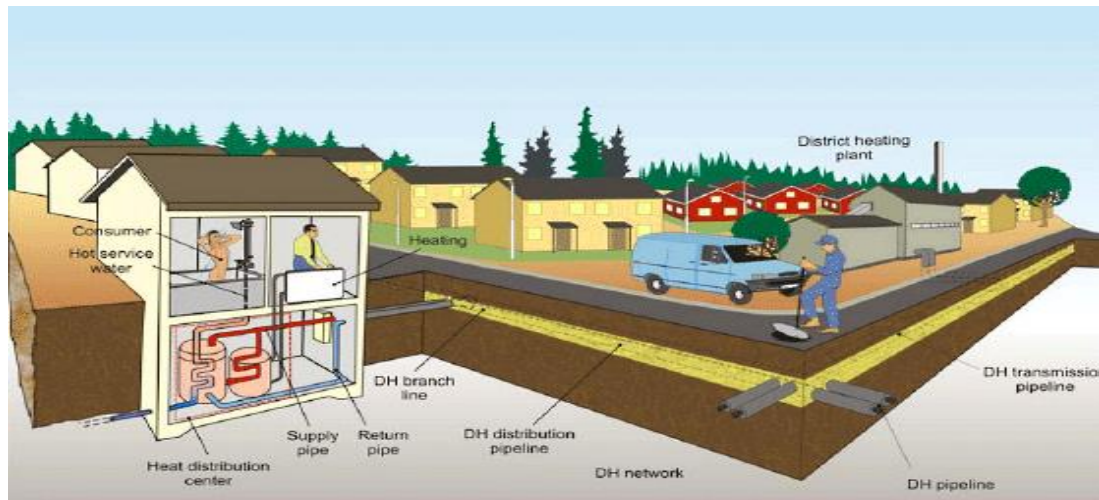


Natural gas is the dominant fuel

Used inefficiently in buildings ... also in industry



Produced in heating appliances ($\approx 90\%$) and in district systems ($\approx 10\%$)
... many of which are old and inefficient ...



Follow-up actions

- The legislative reviews of the EU Energy Efficiency framework (Energy Efficiency Directive, Energy Performance of Buildings Directive, Eco-design and energy labelling framework), of the Renewable Energy Directive and new electricity market design in 2016.
- Intensified implementation of the current legislation (e.g. Article 19 of the EED on split incentives).
- New non-legislative actions (e.g. industrial round tables for energy industries).
- Intensification of current non-legislative actions (e.g. Skills, SET plan, Covenant of Mayors, etc.).

The Clean Energy Package

Why do we need it?

THE ENERGY SYSTEM OF TOMORROW WILL LOOK DIFFERENTLY

2030

50% of electricity to come from renewables



2050

Electricity completely carbon free



Thanks to the EU - ambitious **energy and climate commitments**



With leadership comes responsibility

Unique opportunity to modernise our economy and to

boost competitiveness

create the growth and jobs we need

THE CLEAN ENERGY PACKAGE: KEY OBJECTIVES

LEADING THE ENERGY TRANSITION - CREATING VALUE FOR CITIZENS AND BUSINESS



Putting energy efficiency first



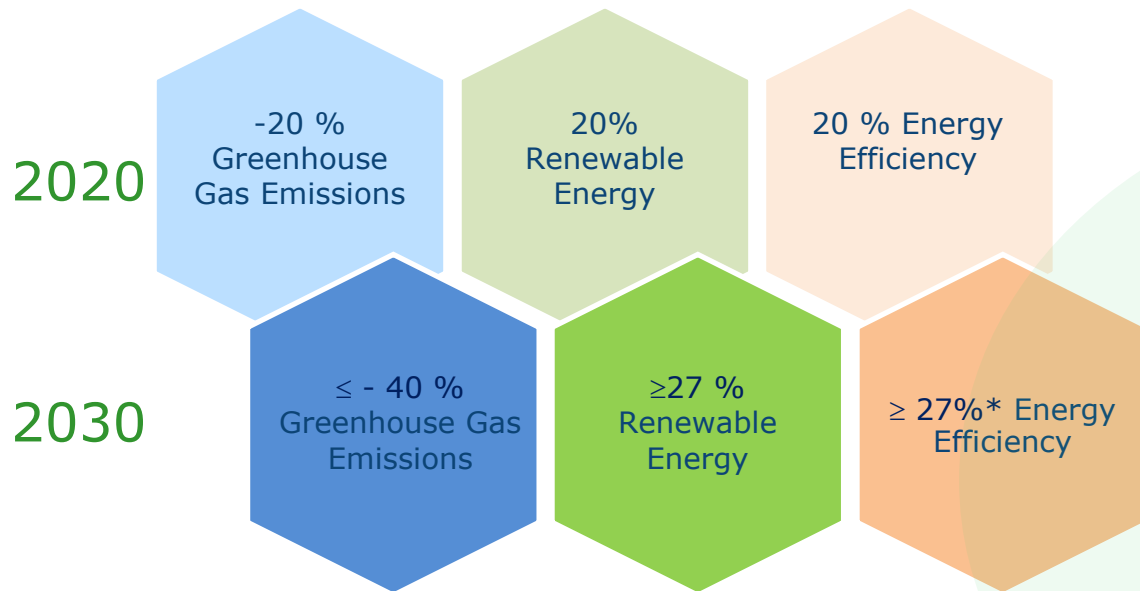
Demonstrating global leadership in renewables



Delivering a fair deal for consumers

THE CLEAN ENERGY PACKAGE: KEY OBJECTIVES

October 2014: European Council Agreement on Climate and Energy objectives 2030



Global Leadership

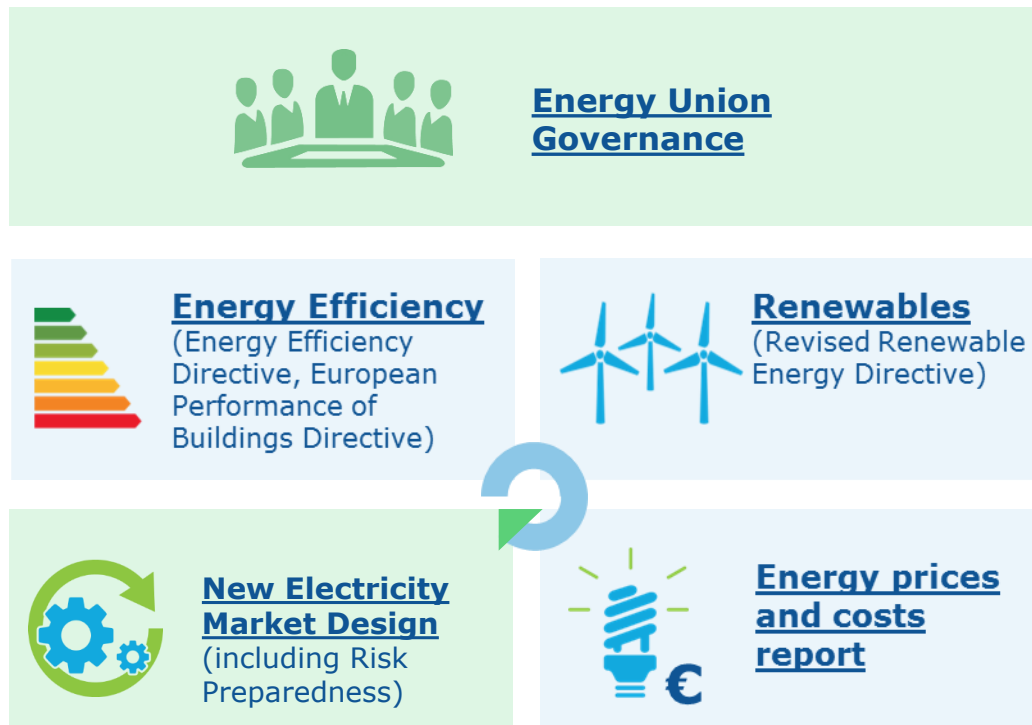
Commission's 10 Priorities – Ambition to Become Global Leader in Renewables

KEY ELEMENTS OF THE PACKAGE

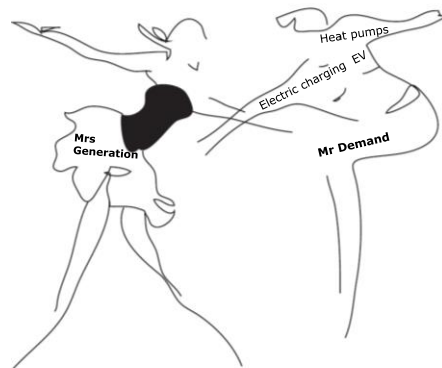
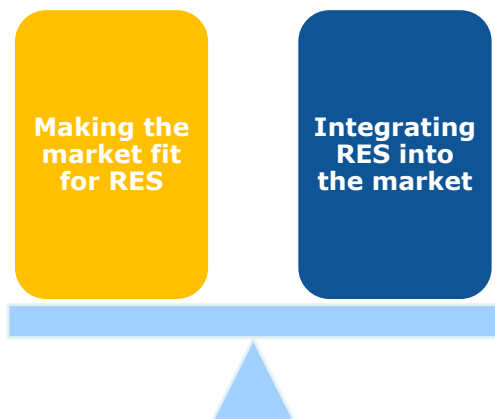
A SET OF COHERENT MEASURES

" In essence the new package is about tapping our green growth potential across the board"

Commissioner Miguel Arias Cañete (2016)



ENSURING A HOLISTIC APPROACH ACROSS POLICY AREAS



The **new market design** will be the foundation of the 2030 framework (short term markets, flexibility) and ensure RES generators can earn a high fraction of their revenues via the market

With the **governance initiative** underpinning the process across the 5 Energy Union dimensions

But also Energy Efficiency, Energy Performance of Buildings, Risk preparedness, the ETS and non-ETS proposals...

GOVERNANCE OF THE PACKAGE

Energy Union Governance Regulation

Energy Efficiency Directive / Energy Performance of Buildings Directive Renewable Directive Electricity Regulation & Directive Risk Preparedness Regulation

Integrated PLANNING

2030 TARGETS

2030 TARGETS

Integrated REPORTING

Progress reports on implementation of the integrated national energy and climate plans

EC MONITORING of collective progress

State of the Energy Union

EC RECOMMENDATIONS & MEASURES for delivery

Target achievement

Regional cooperation

Development and implementation of the integrated national energy and climate plans

20

The Clean Energy Package: an enabling framework for 2030 and beyond

Recast Renewable Energy Directive – key highlights

- Framework for renewable heating and cooling
- Market framework for district heating and cooling
- District heating/cooling potential to provide balancing, demand response and storage services
- Waste heat and cold as supply source
- Bio-sustainability criteria for biomass and biomass fuels used in heating & cooling
- Renewable self-consumption (prosumers) and renewable energy communities

Energy Performance of Buildings Directive – key highlights

- Long-term (2050) renovation strategies for highly efficient and decarbonised buildings to guide investment decisions
- Energy performance of buildings to take into account renewable energy in/on buildings and supplied through energy carriers (e.g. district heating and electricity networks)

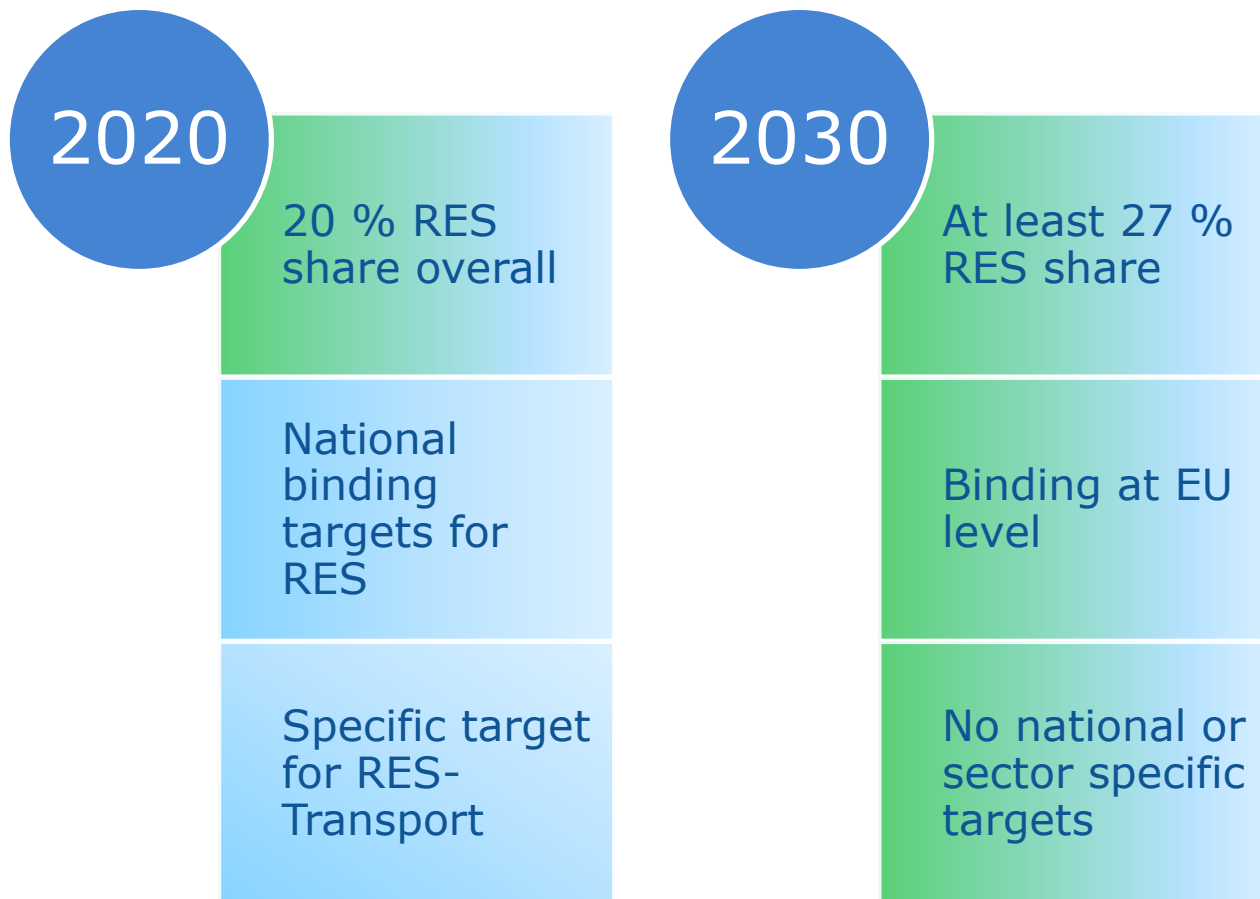
Energy Efficiency Directive – key highlights

- Renewable energy in/on buildings and primary energy saving through district heating/cooling can count towards the national end-use energy saving requirements

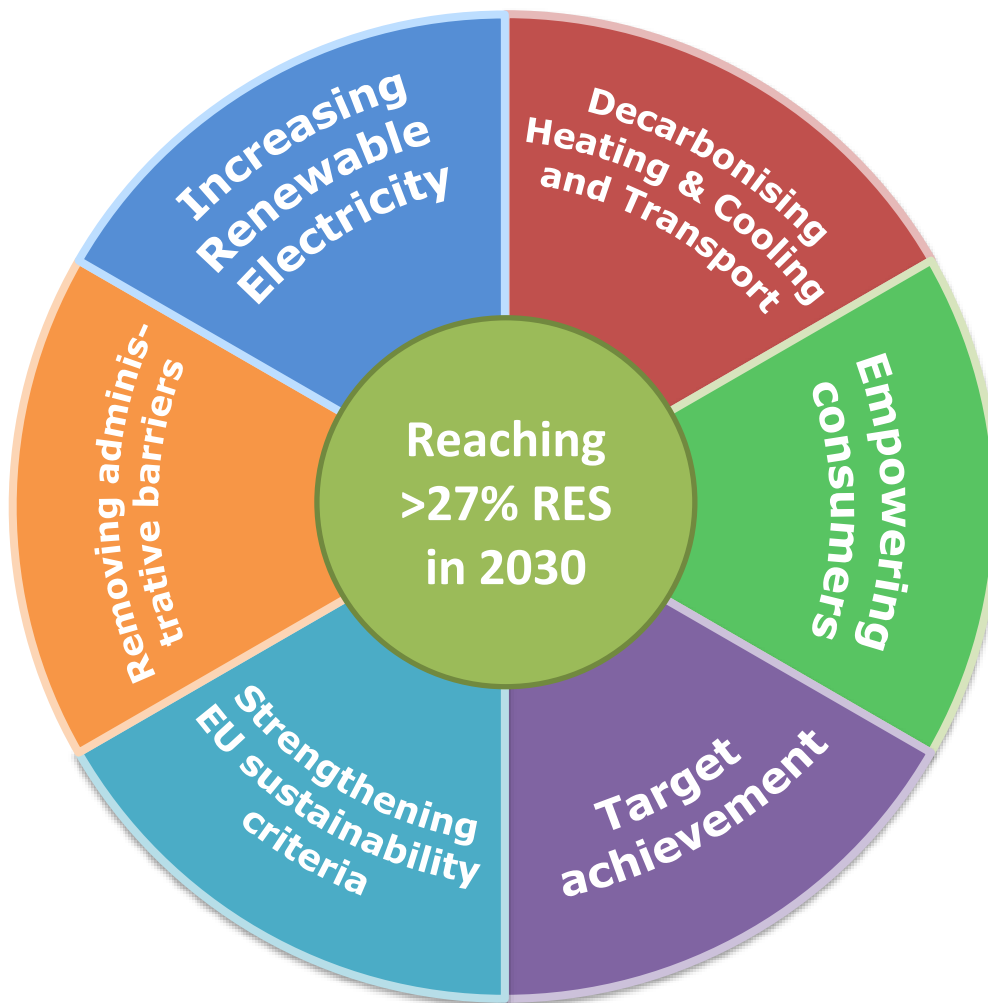
Electricity market design to make market fit for renewable energy – key highlights

- Flexibility: balancing, demand response, storage and other system (ancillary) services integrated
- Active consumers and energy communities

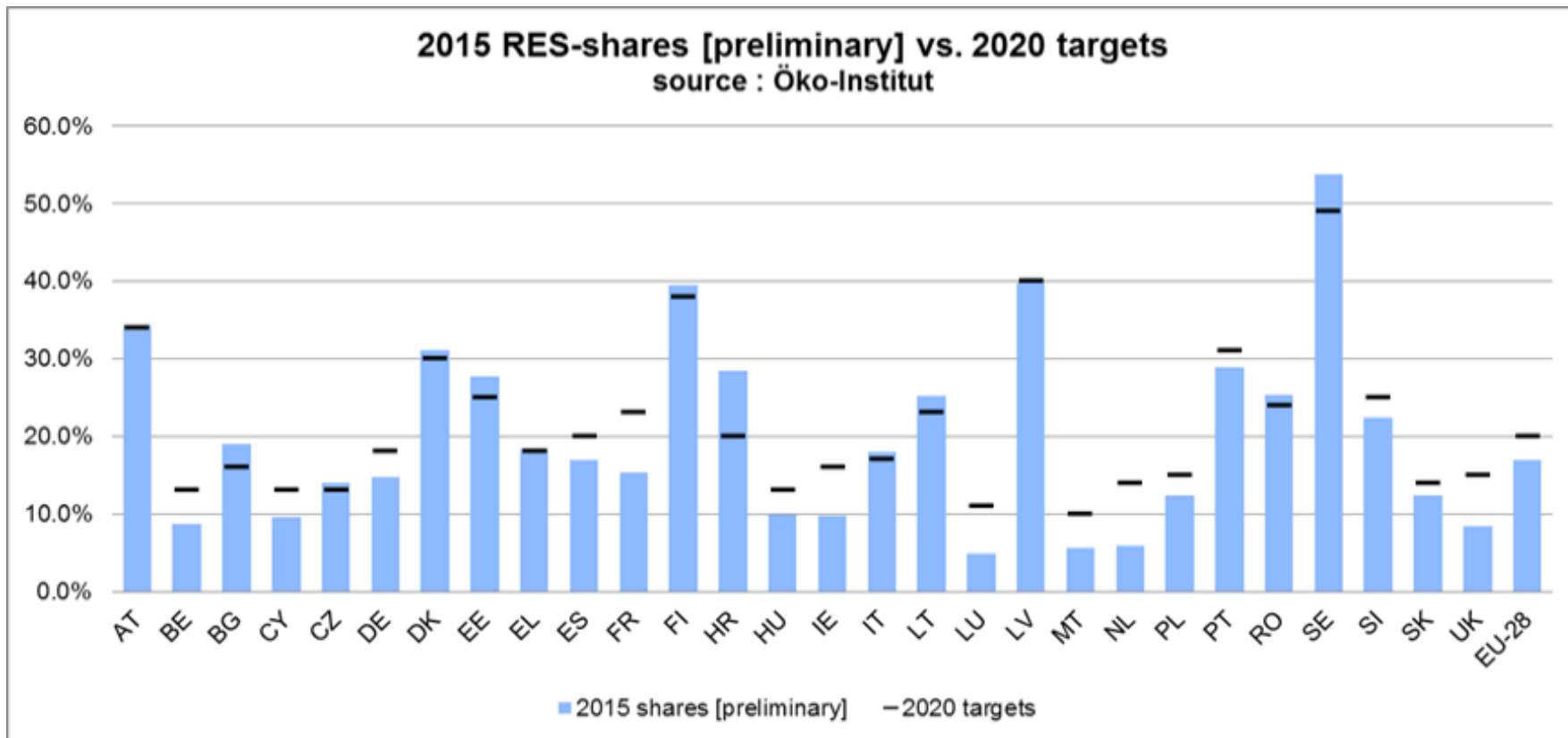
RENEWABLE ENERGY



NEW RENEWABLE ENERGY DIRECTIVE

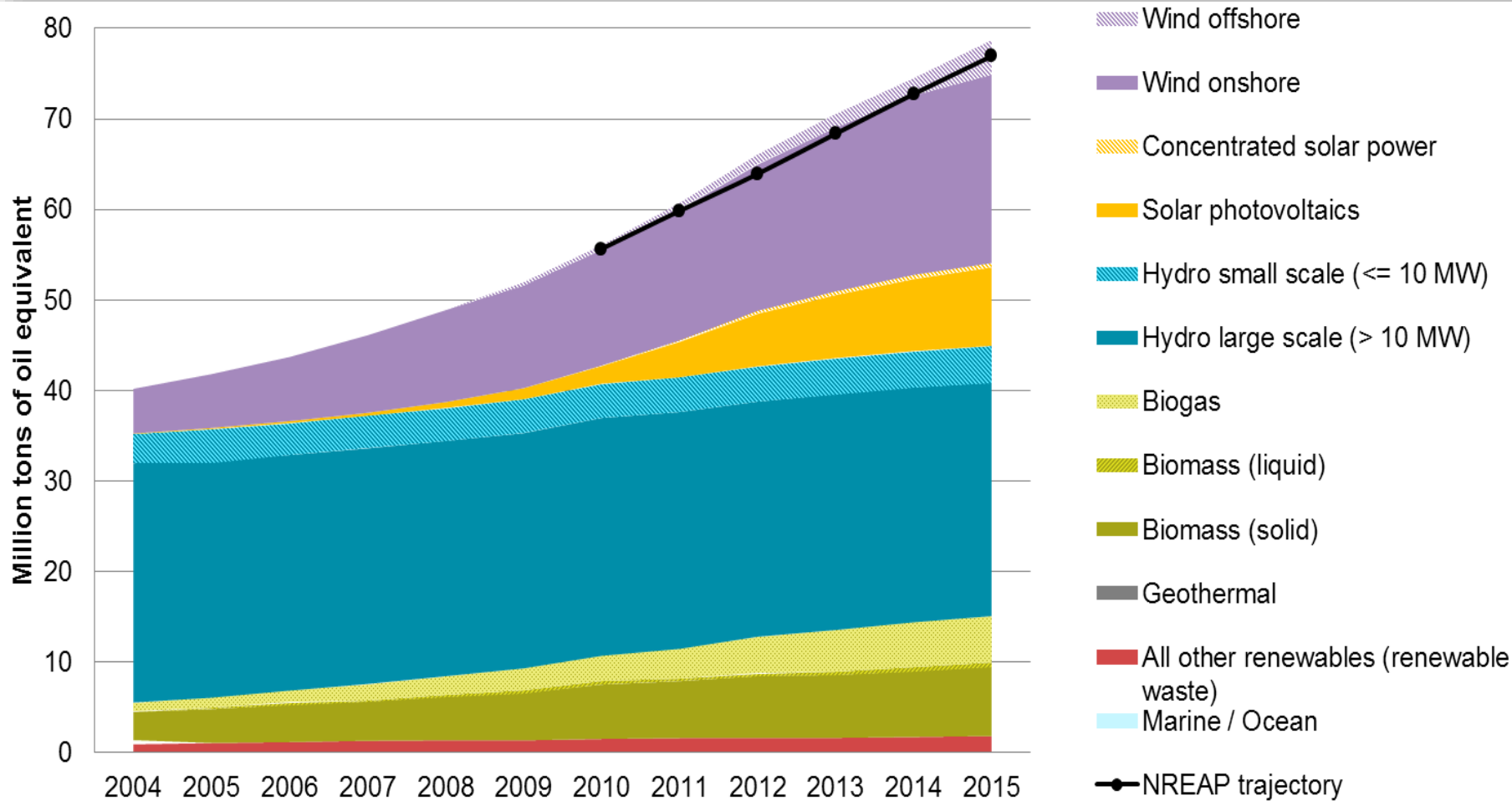


STATE OF PLAY - PROGRESS TOWARDS NATIONAL 2020 TARGETS

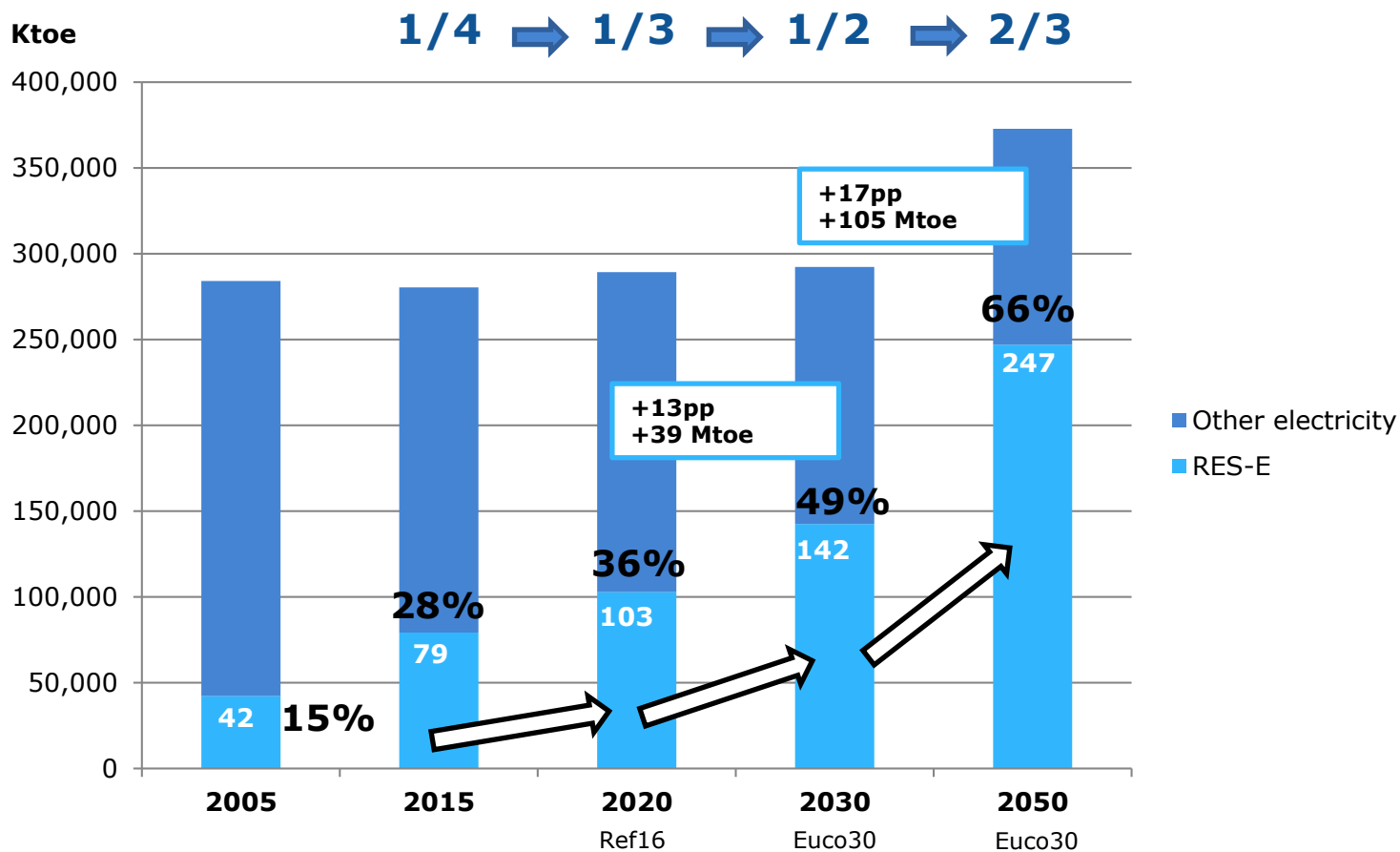


Based on 2016 Interim Progress Report - Oeko-Institute

Progress on renewable electricity – EU level

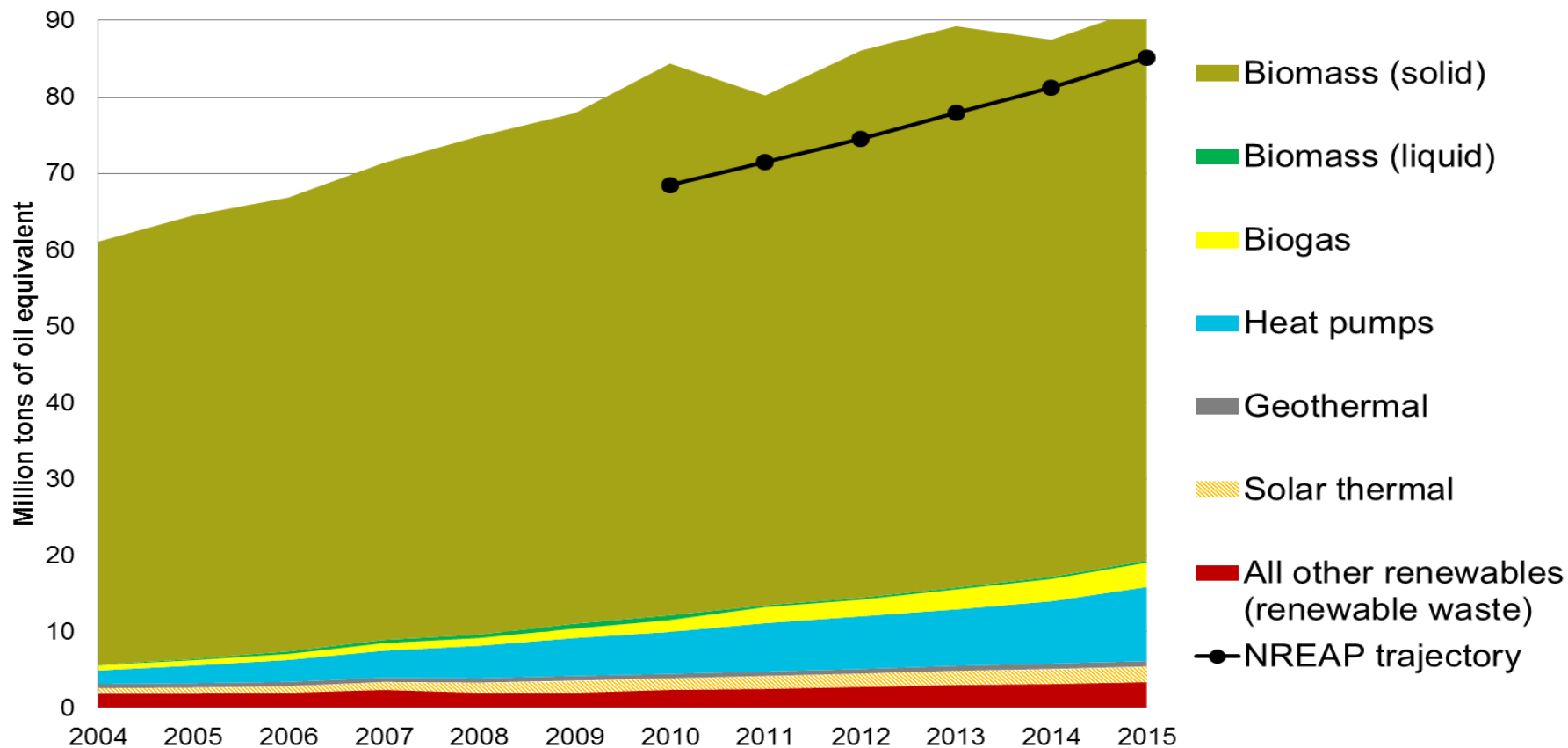


RES-E: Where are we and where do we need to go?



RES-E share of total electricity

Progress on RES-H&C – EU level

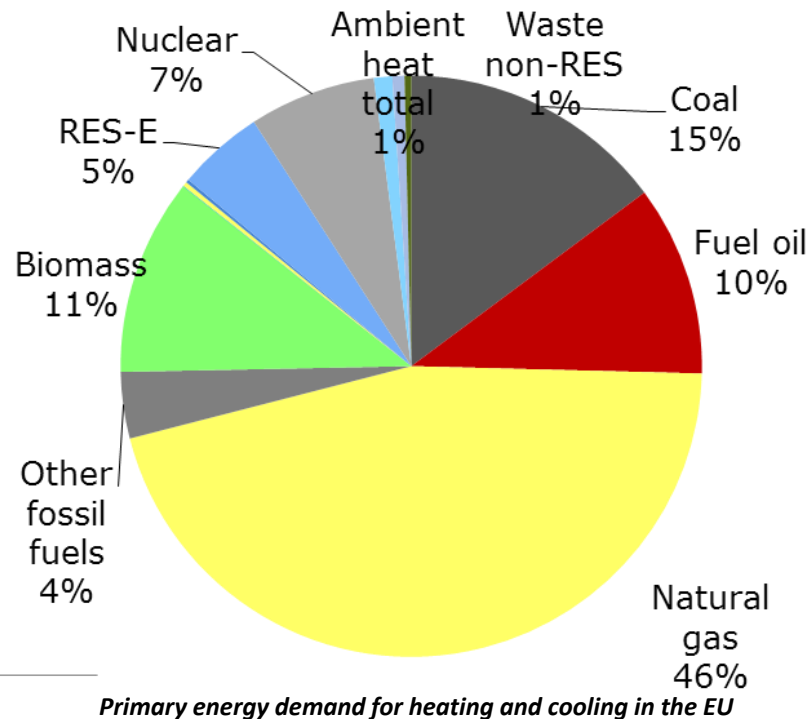


EU-28 renewable heating and cooling production by source
 source: EUROSTAT, Öko-Institut

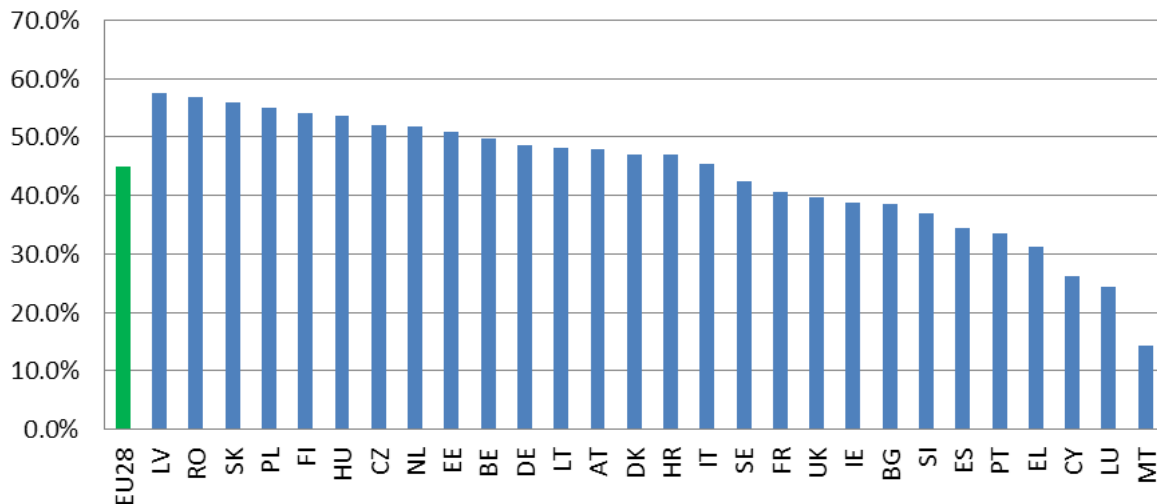
RES-H&C – What Is At Stake?

Why act at EU-level ?

- ≈ 50% energy consumption
- 18% RES today => 27% in 2030
- 68% of the EU's gas imports
- Risk of missing target if no action



Share of heating and cooling in Gross Final Energy Consumption



Essential yet fragmented sector

ADDRESSING THE UNTAPPED POTENTIAL OF HEATING & COOLING

WHAT

Endeavour by Member States to increase the share of renewable energy in heating and cooling supply, by 1 percentage point per year until 2030.

Consumer information on district systems' energy performance and renewable shares

Access rights to local district heating and cooling systems for producers of renewables heating and cooling and waste energy from industry

WHY

High untapped potential: a major contribution of the sector is crucial for a cost-optimal target achievement

Strategic sector for energy security: 75 % European homes are heated (or cooled) with fossil fuels & 68% of the EU's gas import

Risk of **missing the target** in the absence of action

Need to provide **visibility and certainty to investors**

HOW

Proportionality and flexibility for Member States when implementing the options
Limited administrative burden (particularly when combined with Energy Efficiency measures)

New framework for renewable heating & cooling

Renewables in the HC sector (**new Article 23**)

- A yearly 1ppt increase in renewables shall be endeavoured and respective measures and policies to be put in place

The heating and cooling sector should contribute to the EU renewable energy target in proportion to its size

District heating & cooling (**new Article 24**)

- Access of renewable (and waste energy) suppliers to the system
- Consumers right to switch to renewable suppliers
- Consumer rights to disconnect for their own renewable supply
- Information on energy performance and renewable heat to consumers

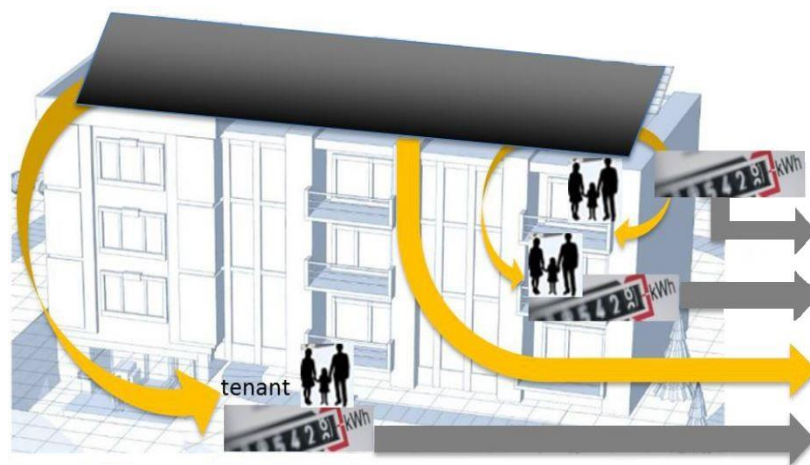
Administrative procedures (**revised Article 15**)

- RES-HC/DHC in planning & buildings
- Minimum levels of RES in buildings

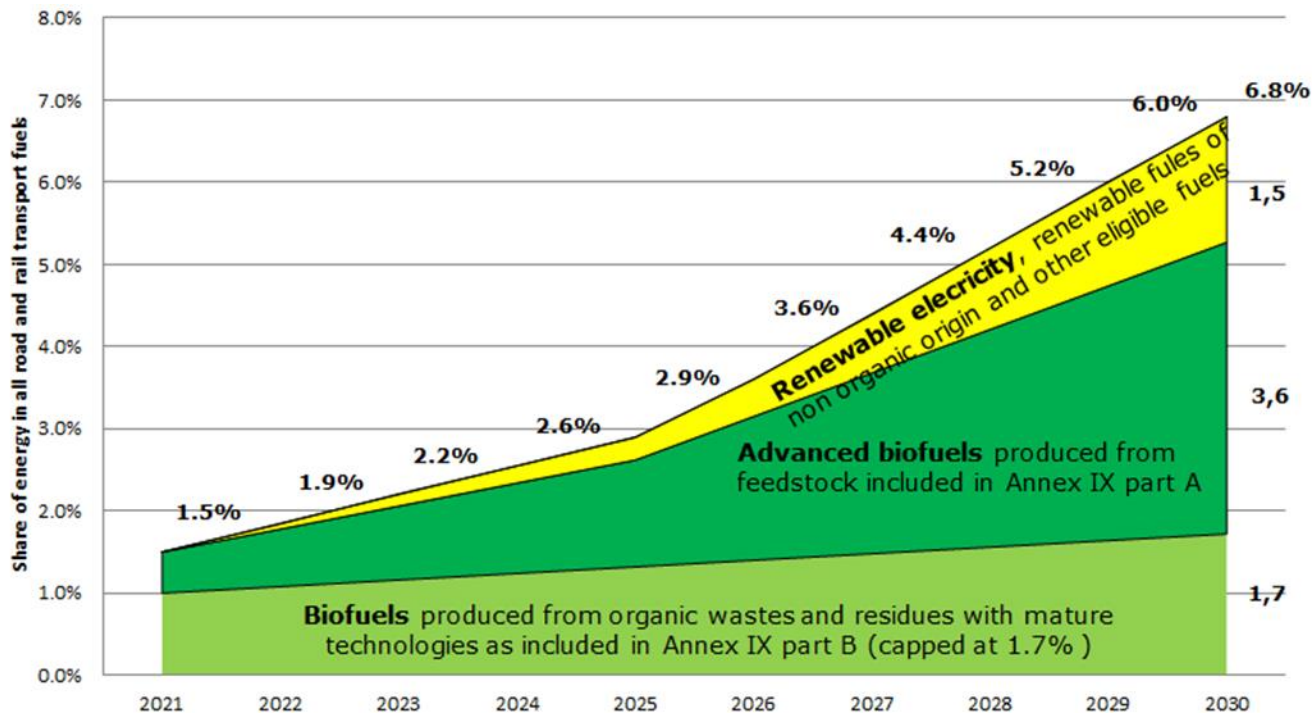
EMPOWERING CITIZENS AND COMMUNITIES

A EU-level framework for renewable self-consumption in which citizens are at the core

- ✓ Renewable self-consumers to be allowed to generate, store, sell and consume their own electricity
- ✓ Renewable self-consumers in multifamily houses to be allowed to generate, store, sell and consume their electricity jointly
- ✓ Specific provisions for energy communities



PROPOSAL: Promoting Innovation in Transport



Increasing the share of low carbon and renewable fuels in transport through an EU blending mandate for transport fuel suppliers

NEW ELECTRICIT MARKET DESIGN

THE ENERGY SYSTEM OF TOMORROW WILL LOOK DIFFERENTLY



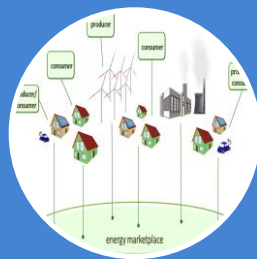
2030

50% of electricity to come from renewables



2050

Electricity completely carbon free



Today

Increasingly decentralized power generation



2021-2030

Investment needs 47 bn/Year (47 % network)

Technological and political developments require an overhaul of the market rules

PURPOSES OF THE NEW ELECTRICITY MARKET DESIGN



Boost wholesale market **flexibility** and provide **clear price signals** to facilitate the continuing penetration of renewable energies and ensure investments



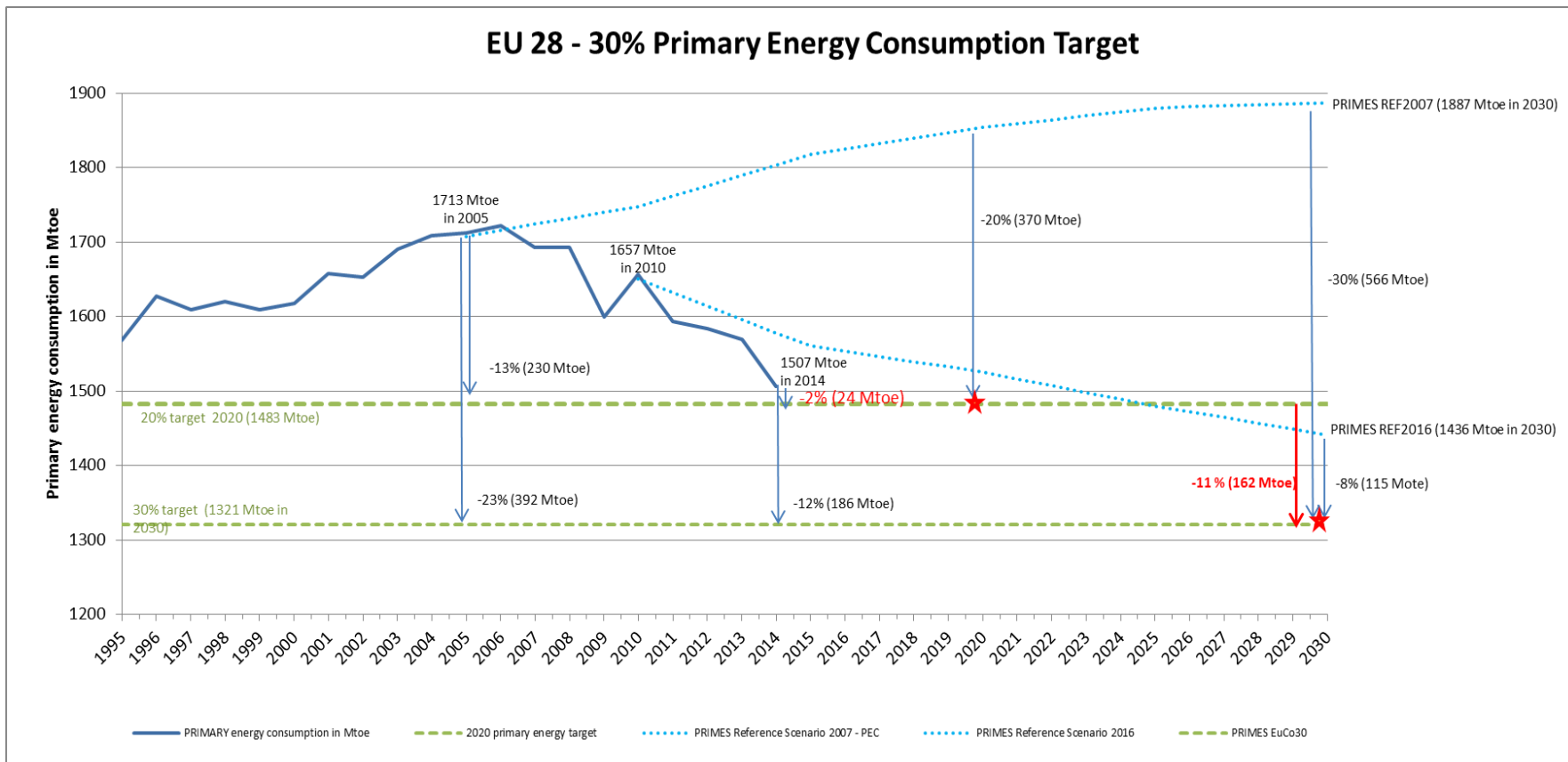
Enable **active consumer participation** and ensure that **consumers are protected and benefit** from progress in energy technologies



Promote **regional cooperation** and provide a true **European dimension to security of supply**

ENERGY EFFICIENCY

EU 28 - 30% Primary Energy Consumption Target



How heat networks are fitting in all of this?

District heating & cooling in the future energy system

HEAT NETWORKS: POTENTIAL TO BECOME ENABLERS OF THE ENERGY TRANSITION AND A KEY ELEMENT OF THE FUTURE LOW-CARBON, SMART, SUSTAINABLE ENERGY SYSTEM

High-performance, smart district heating and cooling is an evolutive backbone of a balanced energy transition that can be supplied with a very broad range of renewable and recycled energies and are the perfect match with energy efficient buildings. They allow high level optimisation of the use of resources and good individualised quality; they thus contribute to security and resilience of supply, emissions reduction and effectively address affordability and energy poverty.

Heat networks are many things:

- They can use many different supply sources; an endless mix of combinations (solar thermal, geothermal, bioenergy, renewable electricity, excess heat and cold, ambient heat through heat pumps and direct uses) – They are adaptable!
- They can integrate smart technologies for optimisation, primary energy saving, consumer control/comfort; they can be linked to and interact with the electric grids
- They can store energy, including variable renewable electricity; they can use stored energy
- They can participate in electricity grid balancing, demand response and system/ancillary services
- They can be adapted to low energy buildings and various settlement types (high building/heat density and low building/heat density)
- They are scalable from large systems serving entire cities and districts or just a few buildings and small villages (small and micro-systems)

CHALLENGES

A radical transformation of the EU energy system is under way.

- **District networks can offer already a lot of innovative and new solutions and can become an important element of the new emerging smart energy system.**
- **The innovative solutions for renewables, energy efficiency, flexibility, storage, the integration and tailored made combination of various supply sources, technologies and smartness should become mainstream in district energy.**
- **Integration with high-efficiency, low-energy buildings and low-carbon sustainable communities is essential.**

Further challenges:

- **Continue R&D&I**
- **Keep cost-effectiveness and consumer satisfaction in focus**
- **Diffuse technologies, solutions and know-how in all stages of heat network development (e.g. planning, project development, operation)**
- **Innovative and effective financing solutions (map investment needs)**
- **Keep develop linkages with other elements of the energy system (electricity, storage, fuels)**
- **Address regulatory gaps and develop tailored business models**

The Clean Energy Package with its various elements and as a coherent framework enables addressing the challenges and tasks and provides the opportunity for district heating and cooling to become an important building block of the EU future energy system.



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