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Actual Challenges of Czech Energy Transformation

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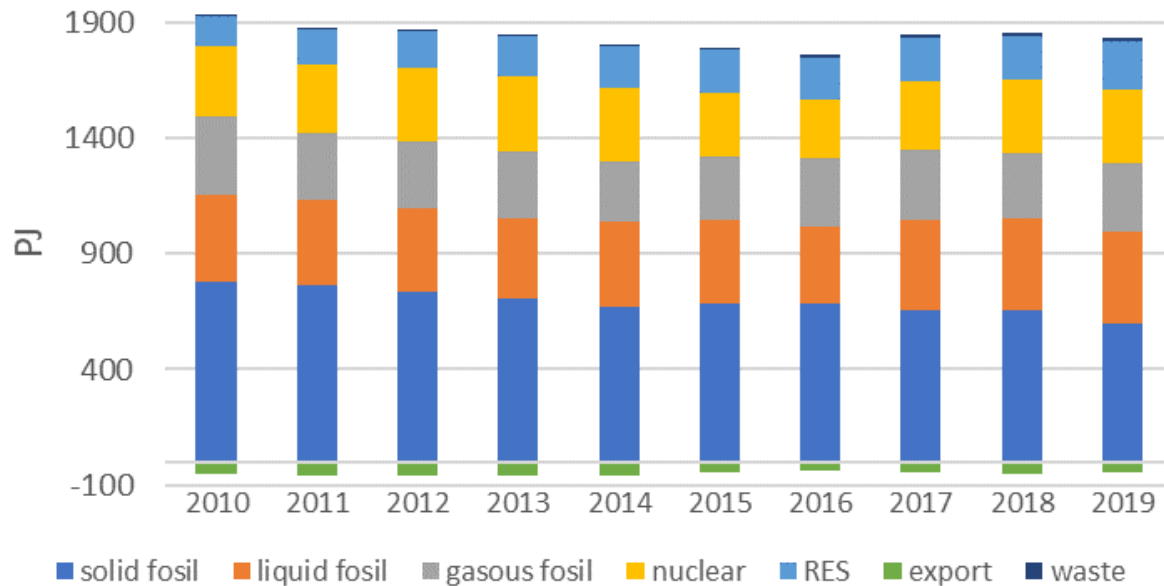
Czech Technical University in Prague, Faculty of Electrical Engineering

Opportunities and Challenges for Energy Transformation in Central Europe
22.1.2021, Prague



CZ energy branch development

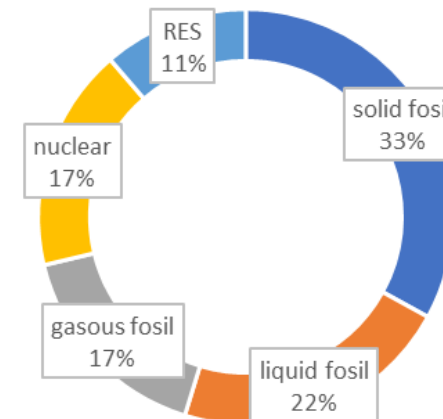
Primary energy sources - Czech Republic



Stagnating consumption of PES (year 2013=year 2019)

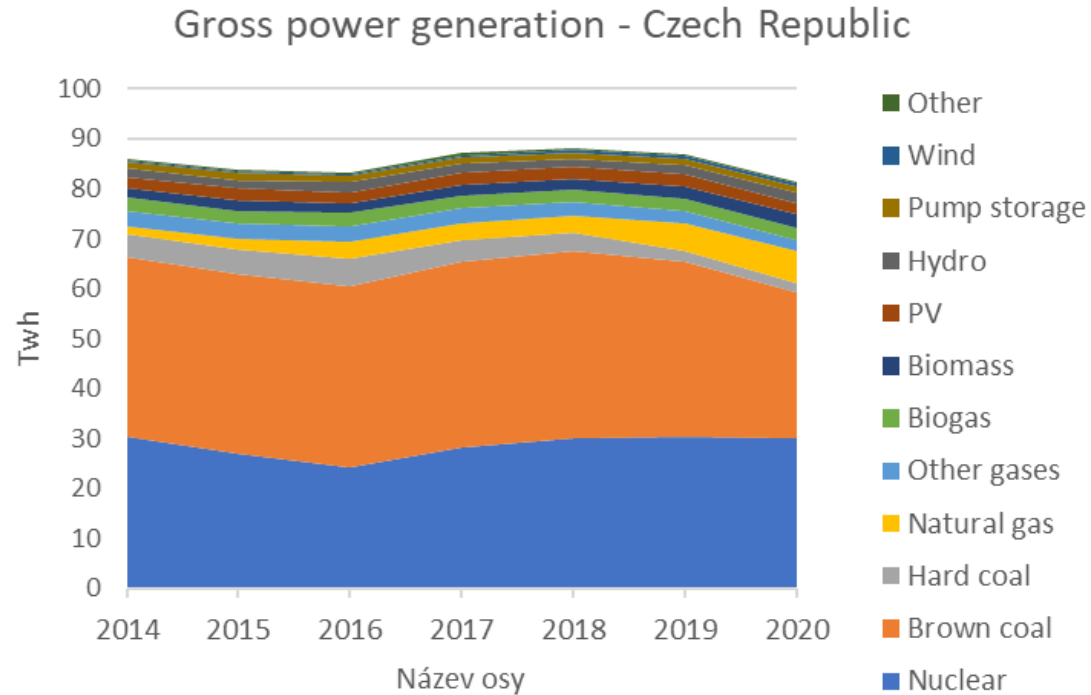
- High share of coal (2019/2010): -23% absolute decrease
- Slow growth of RES

PES structure in 2019 - Czech Rep.

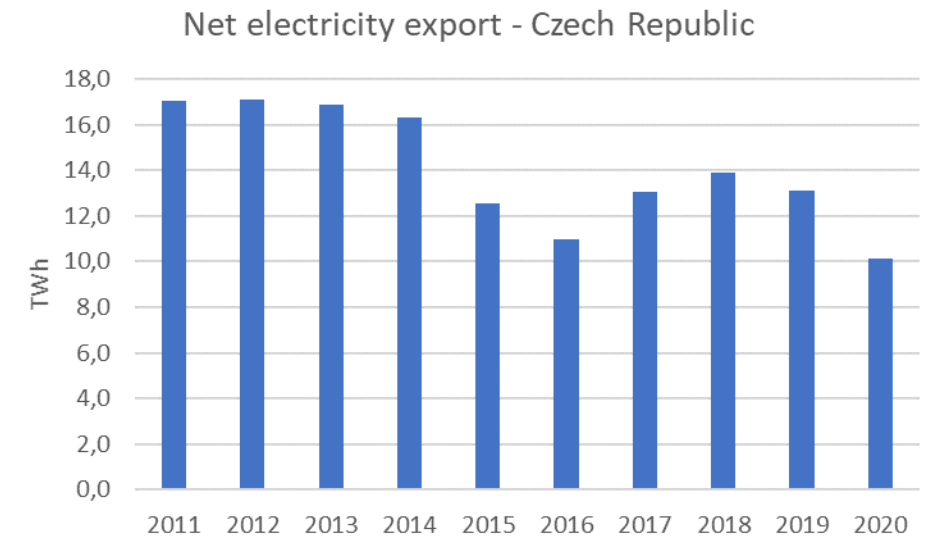




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- Decrease of power generation from coal (2020/2014): -24% decrease in absolute production from coal
- Slow growth of RES power
- Electricity exports are gradually declining

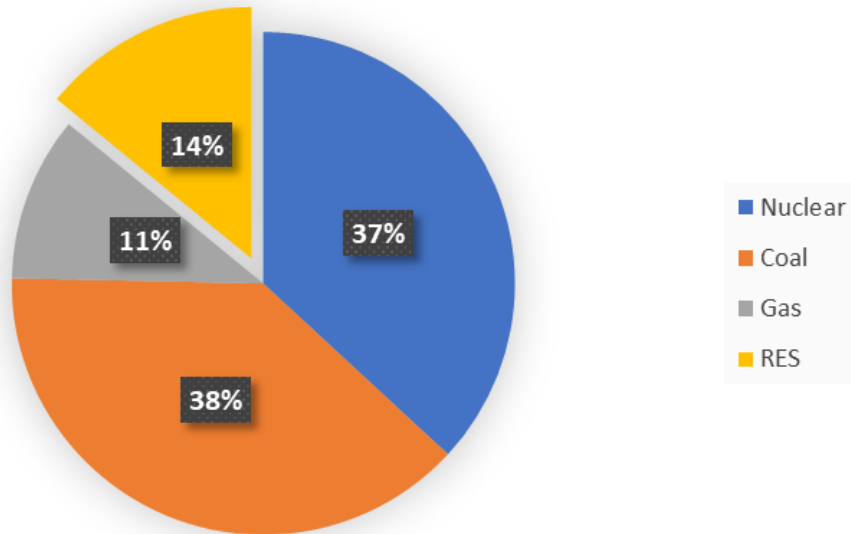


Source: ERÚ



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Gross power generation structure - CZ 2020



The share of coal in electricity generation is still high

2020: Total gross power generation from coal is 31 TWh, of which:

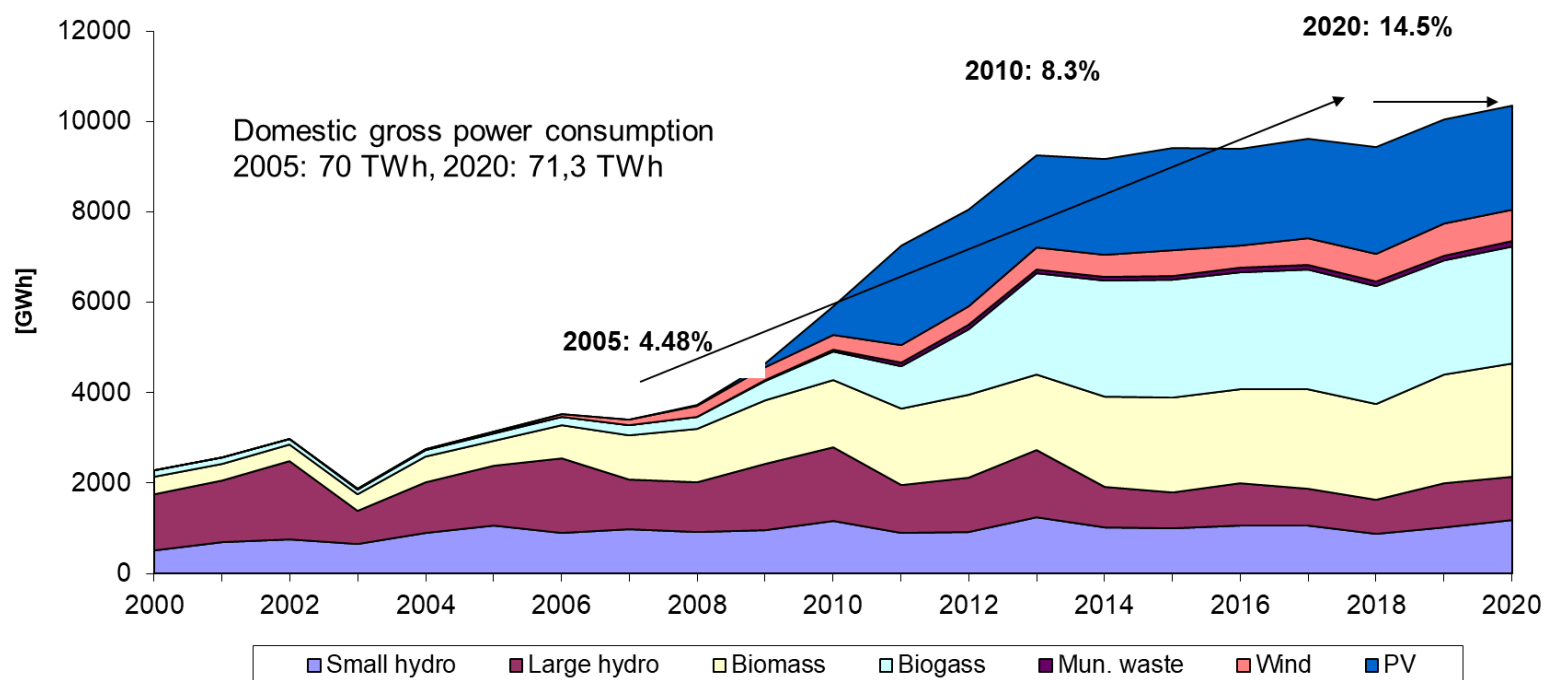
- Cogeneration: 4,6 TWh

The phasing out of coal-fired power plants will require new resources to cover both base load and to provide sufficient flexibility



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RES power development



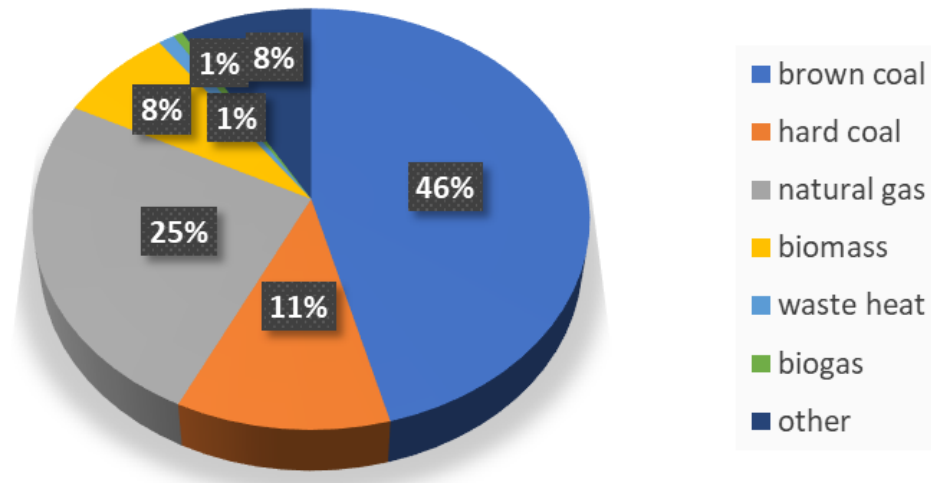
Stagnation of electricity production from RES from 2013-2014 in all categories except solid biomass (2014=2 TWh, 2020=2.5TWh)

Meeting the original NECP targets (22% share of RES in final consumption) would require significant RES development



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Structure of fuel for heat delivery

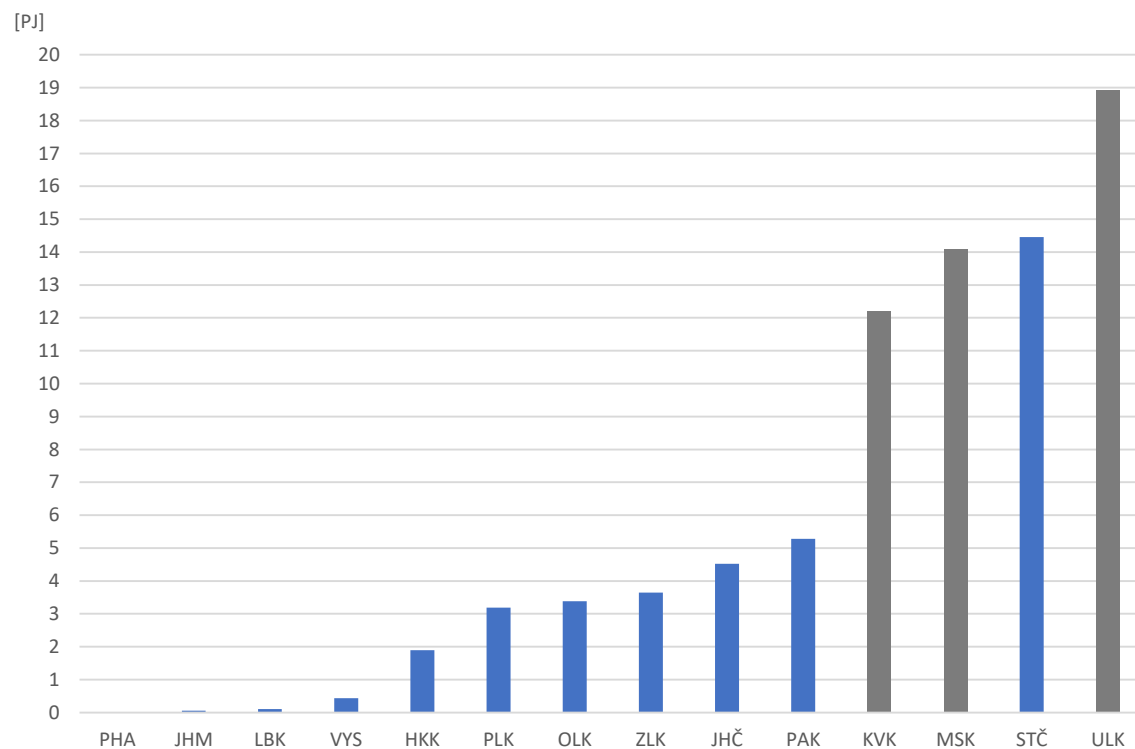


District heating systems play significant role in heating:

- Approximately 40% of households are supplied with heat from the DHS
- App. 57% of delivered heat is produced from coal



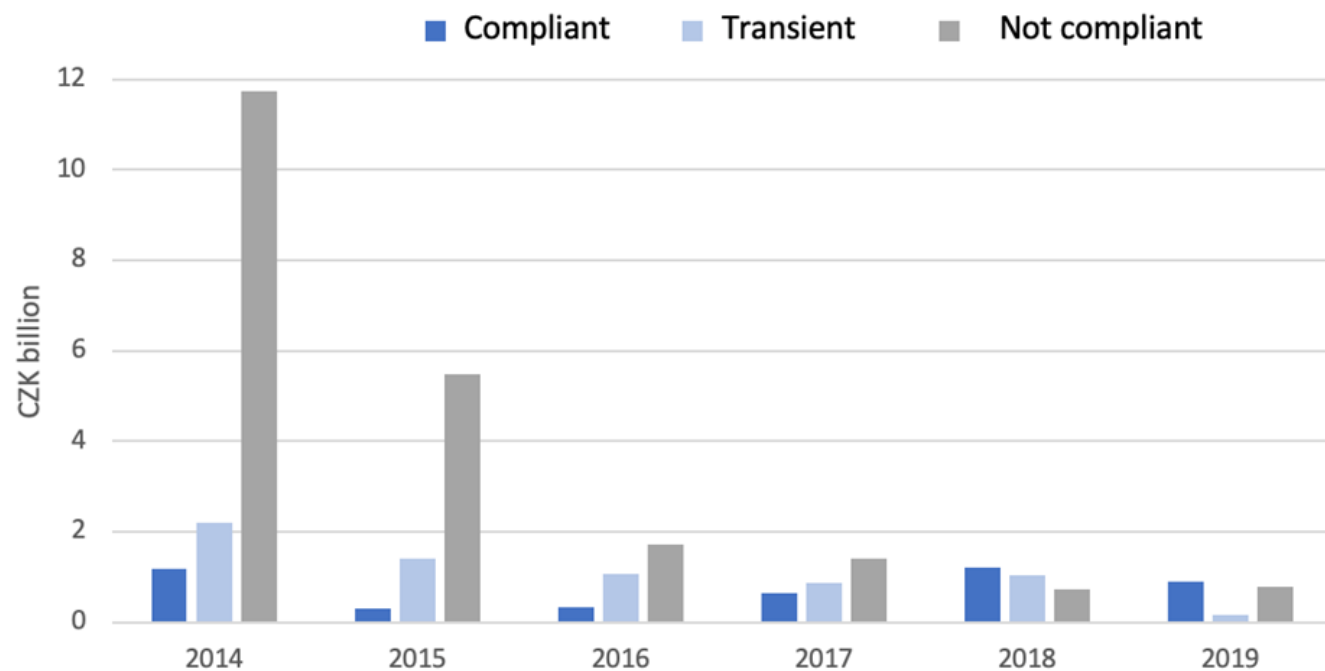
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District heating systems using coal are concentrated in several regions including the three coal regions that are/will be affected by coal mining closures:
- Asymmetric regional impacts



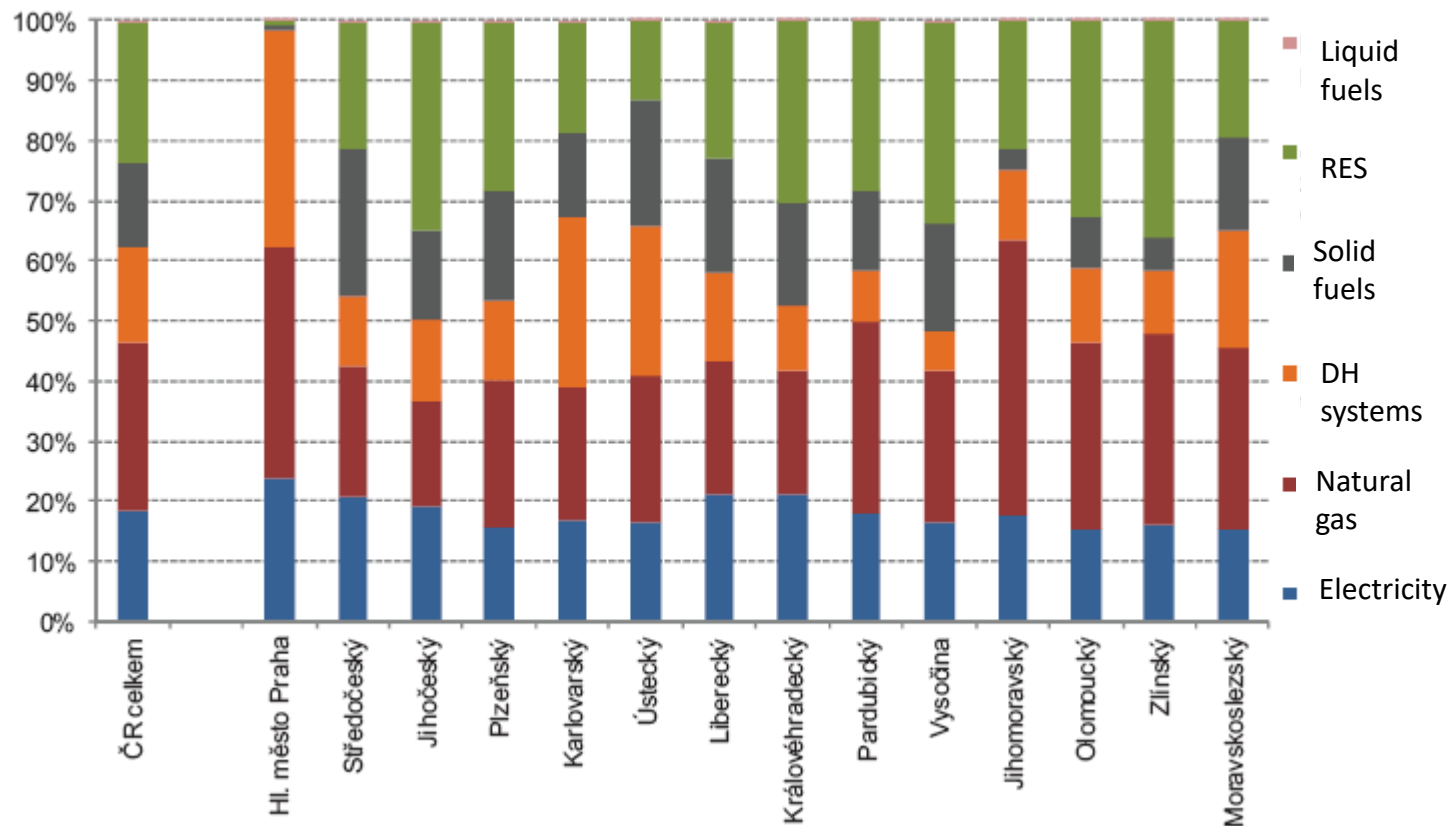
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In the past decade, the heating industry has invested heavily in retrofitting sources to meet emission limits for conventional pollutants - the current transformation brings the problem of undepreciated investments.



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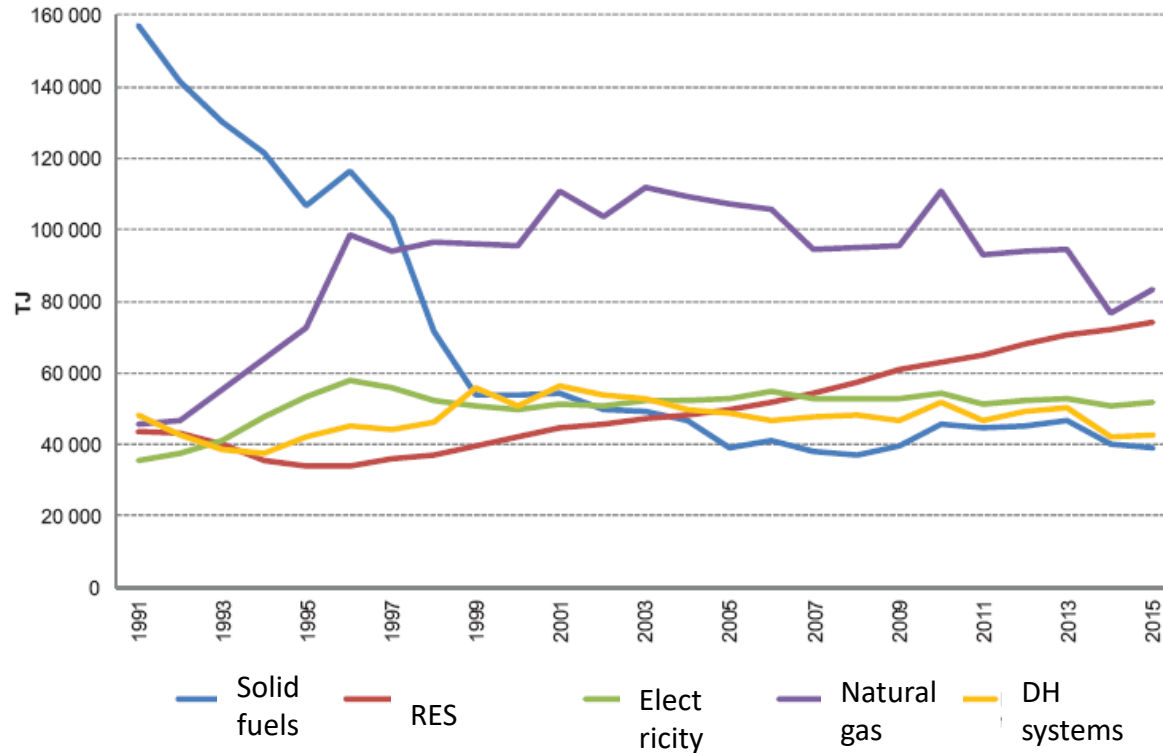


Zdroj: ČSÚ, šetření Energo 2015

Coal is still used by more than 300,000 households for local heating



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Coal phase-out affects not only the "big" energy sector but also a large number of local and individual heating sources - potentially a major socio-economic problem



The main challenges of the energy transition

The transformation of the energy sector must be seen in the context of other sectors of the national economy

- High share of industry on gross value added (GVA), 3rd highest in EU, year 2018:
 - CZ 29,7%
 - Ireland 36,5%
 - Slovenia 26,7%
 - EU27 20,1%
- It is not just about the transformation of the energy sector, but about the transformation of the whole economy and society
- Meeting climate targets (Green Deal, COP26) will require progressive fundamental changes in final energy consumption



The main challenges of the energy transition

Power generation/electricity market:

- The Coal Commission did make a recommendation to end the use of coal by 2038, but:
 - There is no officially adopted strategy (yet)
 - Even the incoming government has not published a clear plan to move away from coal
 - But market pressures combined with other external factors (see e.g. the declaration on coal phase-out adopted at COP26, Glasgow 2021) are likely to accelerate coal phase-out
- Uncertainty associated with the construction of new nuclear units (timing, tender announcement, etc.) despite the prevailing political consensus
 - But the new nuclear unit/blocks will only replace part of the lost generation capacity in coal-fired power plants
- Expected rapid development of electricity generation from RES, e.g. CEZ announced in 2021 a plan to build 6,000 MW of RES-based generation (mostly PV) by 2030
- Problem of generation adequacy



Power generation/electricity market:

- Delays in introducing new market elements into the legislative environment:
 - Aggregators
 - Energy communities
 - Electricity storage
 - Motivation for active customers
- Changes in the electricity market (massive development of electricity production from RES, local electricity production, electromobility, heat pumps, etc.) must be responded to with new tariff schemes
 - the threat of asymmetric impacts on different consumer groups
- Rapidly rising prices of electricity and other energy commodities create a real risk of energy poverty
 - the need to prevent serious socio-economic impacts of the transition
 - maintaining the competitiveness of the industry/national economy



The main challenges of the energy transition

RES energies:

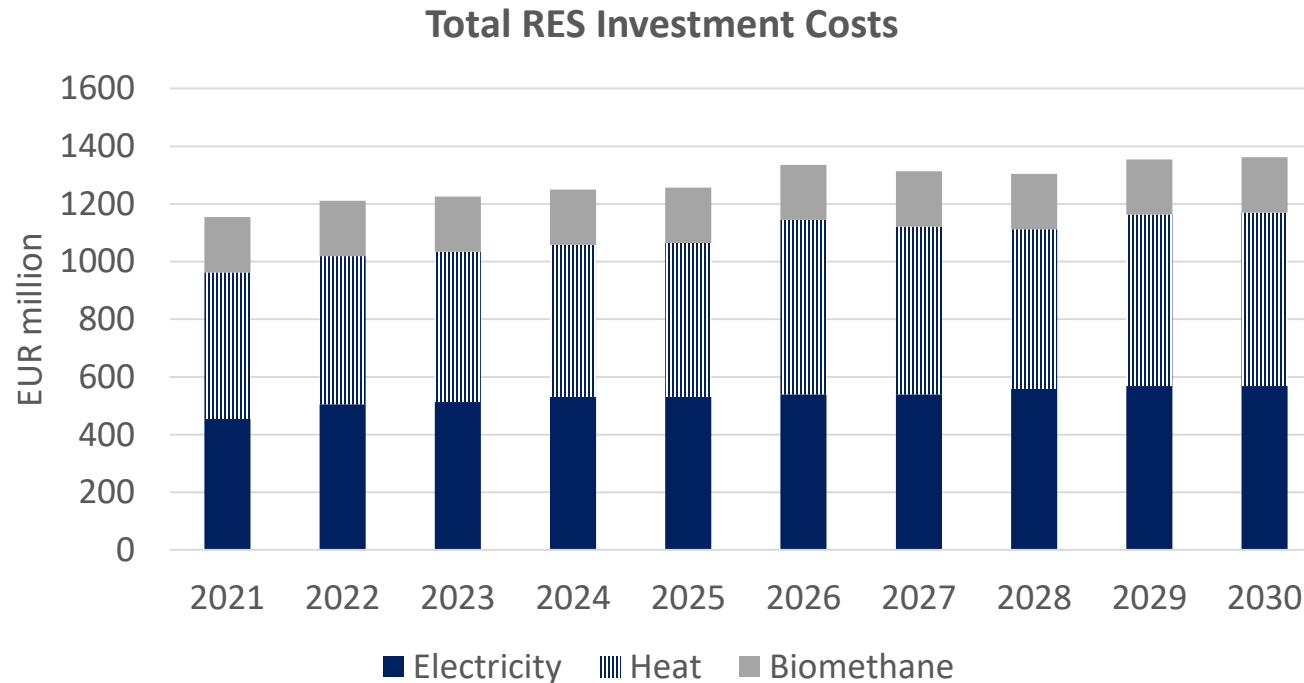
- Lack of a systemic strategy for achieving (strengthened) RES targets by 2030 and in the longer term
- Delay in adopting legislation to support RES in the post-2020 period (amendment to the RES Act adopted only in 9/2021, but still lacking significant implementing regulations).
- Biomass is seen as an important resource for the future, but the current estimates of its use do not reflect the increasing demands for sustainability
- The need for a systematic strategy in the use of financial resources from the Modernisation Fund and other sources of funding



The main challenges of the energy transition

RES energies:

- Estimated total investment costs for achieving the original (low) NECP targets by 2030 are approximately CZK 327.5 billion for the period 2020-2030

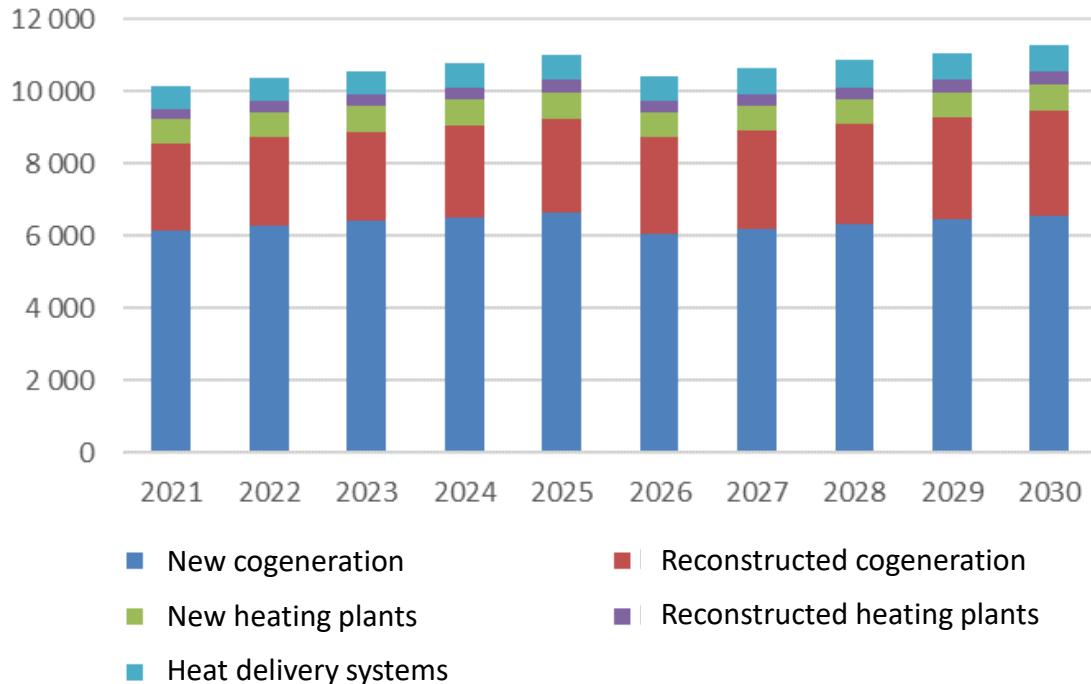




The main challenges of the energy transition

DH systems

- The cost of transformation of current coal-fired heat sources is estimated at CZK 97-107 billion, including the cost of pipeline reconstruction



Conservative scenario	do 2025	2026-2030
New cogeneration	32 060	31 653
Reconstructed cogeneration	12 442	13 861
New heating plants	3 487	3 462
Reconstructed heating plants	1 611	1 697
Heat delivery systems	3 302	3 645
TOTAL	52 901	54 318

Coal substituted by 2/3 by natural gas, app. 20% biomass, alternative fuels app. 12%



The main challenges of the energy transition

DH systems

- High pressure of emission allowance prices on the price of heat
- By 2021, pressure due to efforts by heat consumers to disconnect from systems
- DH systems to play a significant role in the future - DH systems 4 generation
 - DH systems enable energy storage, progressive electrification (heat pumps, large-scale electric boilers), integration of decentralised RES and use of low-potential waste heat
- The need for a systemic transformation strategy in relation to the transformation of energy, industry and other sectors of the economy
- The problem of limited capacity in supply companies and limited speed of reconstruction of heat distribution pipelines



Conclusions

Energy transformation needs to be understood in the context of changes in the whole national economy and society

Changes in the energy sector driven by the decarbonisation strategy are rapid and have complex impacts on society as a whole

Changes in the energy sector trigger both extreme transformation costs and fundamental changes in the way energy markets operate and the need for an adequate response from the legislative environment

Risk of asymmetric impacts on different types of consumers including households, need for continuous monitoring and timely interventions to prevent increase in energy poverty

Effective ways of transforming the energy sector must be actively pursued; fast-moving time is the "main enemy"



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