Comparative assessment of future power generation technologies based on carbon price development

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Abstract. The long-term assessment of new electricity generation was performed for various long-run policy scenarios taking into account 2 main criteria: private costs and external GHG emission costs. Such policy oriented power generation technologies assessment based on carbon price and private costs of technologies can provide information on the most attractive future electricity generation technologies taking into account climate change mitigation targets and GHG emission reduction commitments for world regions.

Analysis of life cycle GHG emissions and private costs of the main future electricity generation technologies performed in this paper indicated that biomass technologies except large scale straw combustion technologies followed by nuclear have the lowest life cycle GHG emission. Biomass IGCC with CO_2 capture has even negative life cycle GHG emissions. The cheapest future electricity generation technologies in terms of private costs in long-term perspective are: nuclear and hard coal technologies followed by large scale biomass combustion and biomass CHPs. The most expensive technologies in terms of private costs are: oil and natural gas technologies. As the electricity generation technologies having the lowest life cycle GHG emissions are not the cheapest one in terms of private costs the ranking of technologies in terms of competitiveness highly depend on the carbon price implied by various policy scenarios integrating specific GHG emission reduction commitments taken by countries and climate change mitigation targets.

Keywords. Energy technologies assessment, carbon price.