NEUJOBS

CREATING AND ADAPTING JOBS IN EUROPE IN THE CONTEXT OF A SOCIO-ECOLOGICAL TRANSITION

EUROPEAN COMMISSION
European Research Area

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Impact of the decarbonisation of the energy system on employment in Europe

NEUJOBS D11.1 & D11.2

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- Context
- Pathways for decarbonisation (D11.1)
- Employment implications (D11.2)
  - Objectives and methodology
  - Results
  - Discussion
- Conclusion

Context: NEUJOBS

- WP 11: Energy and green jobs
  - D11.1: The potential evolution of the European energy system until 2020 and 2050
  - D11.2: Impacts of the decarbonisation of the energy system on employment in Europe
  - D11.3: Policy brief

Context: The socio-ecological transition (SET)

- Transition from a socio-ecological regime to another
- Regime:
  - « specific fundamental pattern of interaction between (human) society and natural systems »
  - characterised by the dominant energy sources and conversion technologies

Context: Past and future SETs

- Hunther-gatherers → Agrarian societies
- Agrarian societies → Industrial societies

- In NEUJOBS: SET as transition « away from fossil fuels, towards solar and other low-carbon energy sources »
- Industrial societies → Long-term sustainability

Context : Cornerstones of EU energy policy

- Objective of limiting global warming to 2°C above pre-industrial levels
- Objective of 80-95% GHG emissions reduction by 2050 (cp. 1990)
  - D11.1 reviewed long-term scenarios
- 2020 targets (2007 Climate and Energy Package)
- 2030 framework in discussion – EC proposals:
  - 40% GHG emissions reduction
  - 27% share of RES in energy consumption

Context: Pathways to decarbonisation (D11.1)

- IEA
  - World Energy Outlook 2012 (450 Scenario)
  - Energy Technology Perspectives 2012 (2°C Scenario)
- European Commission
  - Roadmap for moving to a competitive low-carbon economy in 2050
  - 2011 White Paper on Transport
  - Energy Roadmap 2050
- EU research projects
  - AMPERE
  - SECURE (Europe Alone and Global Regime scenarios)

Context: Pathways to decarbonisation (D11.1)

- Greenpeace Energy [R]evolution 2012
- European Climate Foundation
  - Energy Roadmap 2050
  - Power Perspectives 2030
- IIASA Global Energy Assessment
- Eurelectric Power Choices Reloaded

Context: Pathways to decarbonisation (D11.1)

- Decarbonisation is possible using currently known technologies
- Decreasing energy demand: reduction by 2-6% until 2020 and by 20-30% by 2050 (cp. 2010)
- Changing energy mix towards RES
  - Share of RES: around 10% in 2010, around 20% in 2020 and more than 40% in 2050
  - Share of fossil fuels: around 75% in 2011, around 70% in 2020 and 40-50% in 2050

Context: Pathways to decarbonisation (D11.1)

- Increasing electricity demand: increase by 5-10% by 2020 and 30-50% by 2050 (cp. 2010)
- Power sector takes the lead
  - Less expensive to decarbonise than other sectors
  - Key strategies: RES and energy efficiency
- Share of RES in electricity: 20% in 2010, 35% in 2020 and 60-85% in 2050
  - Focus on wind, biomass, hydro and solar PV

Context: Pathways to decarbonisation (D11.1)

- Uncertainty about nuclear and CCS
- Variable RES require more generation capacity
  - Capacity/generation ratio: from 2.2:1 in 2010 to 2.5:1 in 2020 and up to 4:1 in 2050
- More flexibility in the electricity system
  - Generation
  - Transmission/Distribution
  - Demand-side response and management
  - Storage

Context: Pathways to decarbonisation (D11.1)

- Regional differences
  - Eastern Europe: higher rates of decarbonisation from 1990 to 2009
  - Western Europe: future decarbonisation rates need to be higher than in Eastern Europe
  - Projected RES deployment higher in West
  - CCS may play a larger role in countries with lower RES potentials

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D11.2: Objectives

Assessing employment effects of the decarbonisation of the energy sector

- Quantitative effects: number of jobs
- Qualitative effects: qualification levels

D11.2: Methodology

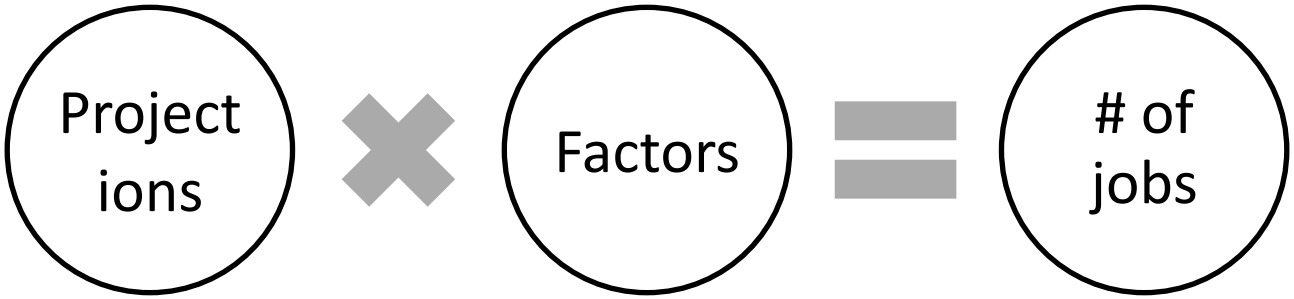
- Direct employment
- Results for 2020, 2030 and 2050
- Scenarios from EC *Energy Roadmap 2050*:
  - Reference
  - Diversified supply technologies
    - Neutral from a technology perspective
    - Decarbonisation achieved by carbon pricing applied to all sectors
  - High RES
    - Achieves a 97% share of RES in electricity consumption by 2050

D11.2: Methodology

- Estimate current employment in the energy supply sector
  - Employment levels
  - Qualification levels
- Estimate labour intensity ratios per technology (employment factors)
  - Number of jobs/energy units
- Apply employment factors to scenarios for future energy sector

D11.2: Methodology

- Multiply projections from scenarios by employment factors:



D11.2: Methodology

- Energy supply sector: Primary energy sector vs. power sector
- Primary energy sector (jobs/ktoe):
  - Primary fossil fuels: coal, oil and gas
  - Mining, refining, and manufacturing of fossil fuels
  - No RES
    - Wind and solar: no fuel → no activity in primary fuels
    - Biomass and biogas: lack of employment data for manufacturing of fuel → focus on power generation
  - No Nuclear: lack of employment data for fuel supply activities only

D11.2: Methodology

- Power sector (jobs/MW):
  - Both conventional and renewable sources
    - Construction, installation and manufacturing (CIM)
    - Operation & maintenance (O&M)

D11.2: Methodology

- Primary energy sector
  - Coal and lignite:
    - Domestic EU extraction
    - Processing of both domestic and imported volumes
    - Manufacture of coke oven products and briquettes
  - Oil and gas:
    - Domestic EU production
    - Exploration and drilling
    - Development and operation of production fields
    - Refining of both domestic and imported oil volumes/manufacture of gas
    - Distribtuion and trade of gas to final users

D11.2: Methodology

- Electricity (including RES):
  - Production in the EU
  - Transmission
  - Distribution and trade

D11.2: Methodology

- Current employment in the energy sector
  - Low range: DG Energy estimates
  - High range: Labour Force Survey (LFS) on Eurostat
- Current employment in RES
  - Data from EurObserv'ER for direct + indirect jobs
  - Multipliers of direct to indirect jobs

D11.2: Methodology

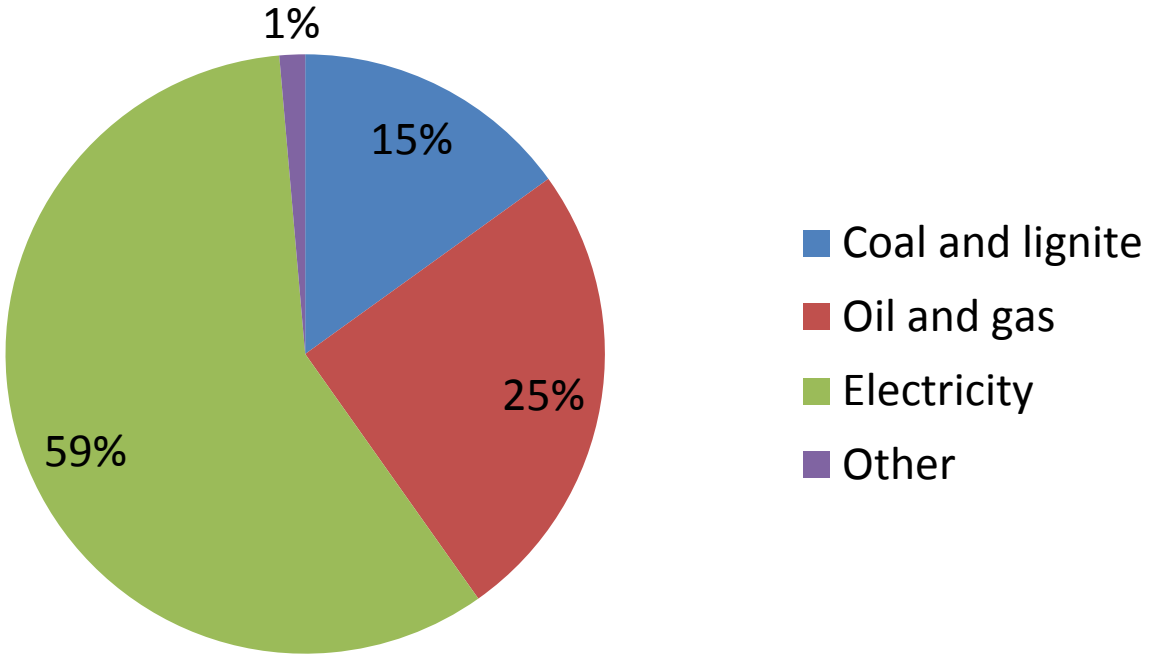
- Comparison of decarbonisation scenarios to Reference case
- EU results vs. regional results

D11.2 – Results: Current employment in the energy supply sector

2012:

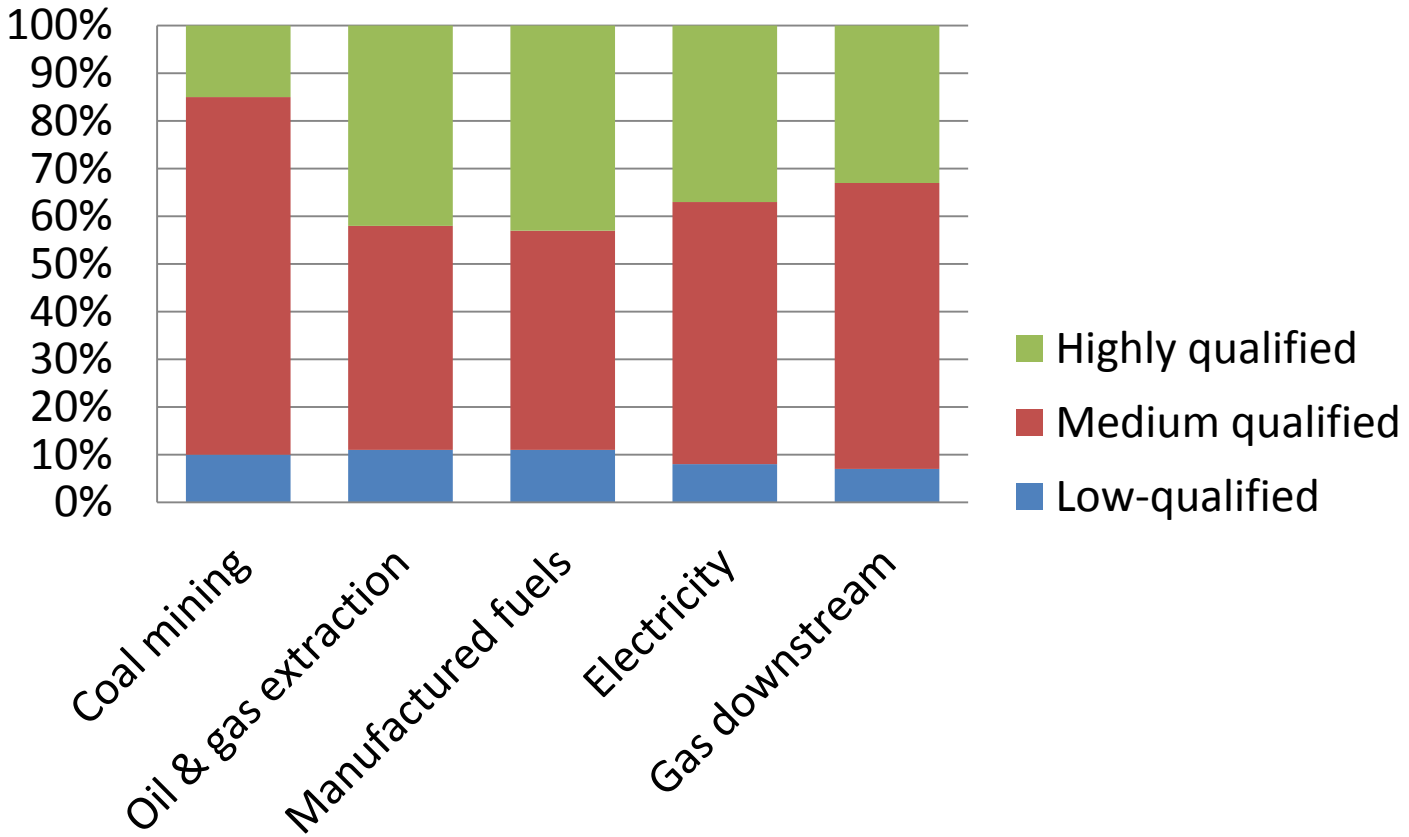
1.5 to 2.2 million direct jobs (incl. 600 000 jobs in RES)

0.7 to 1% of the total employed workforce



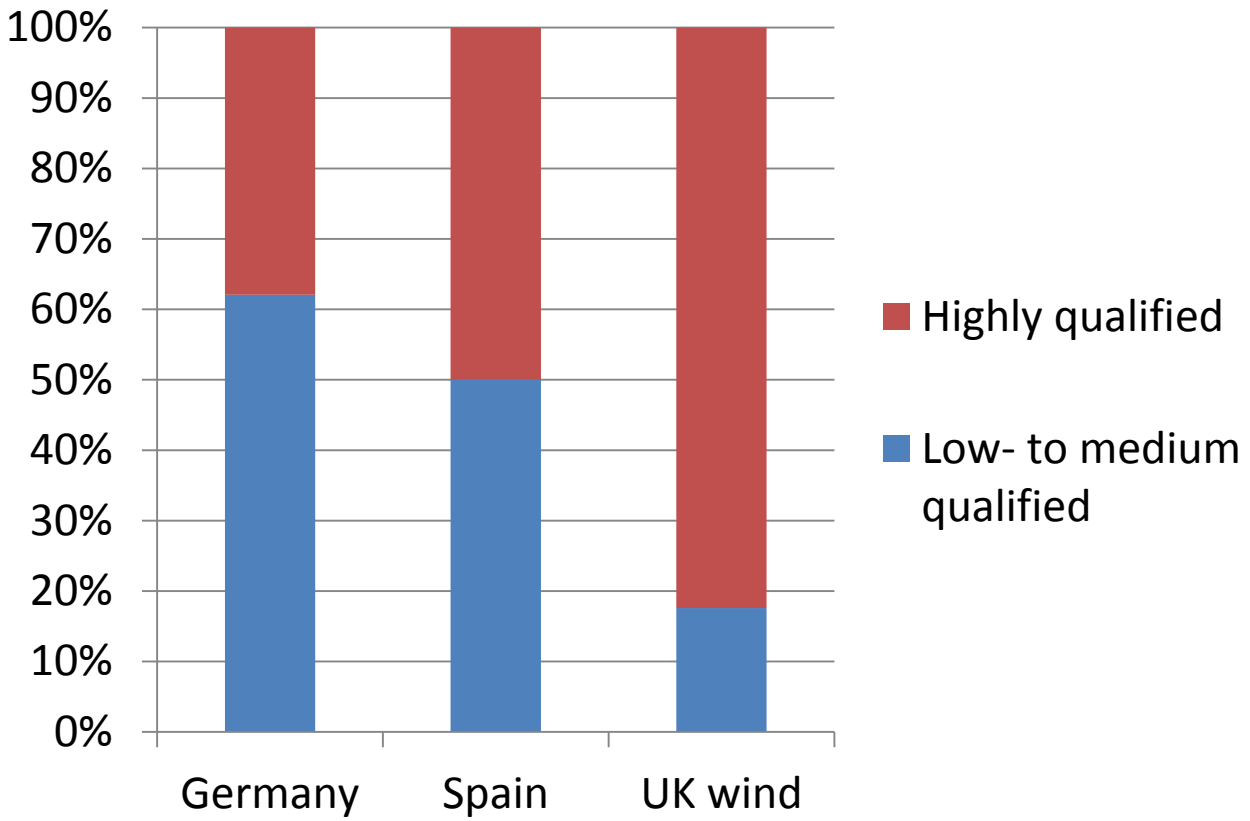
D11.2 – Results: Current energy sector

Employment structure in 2012

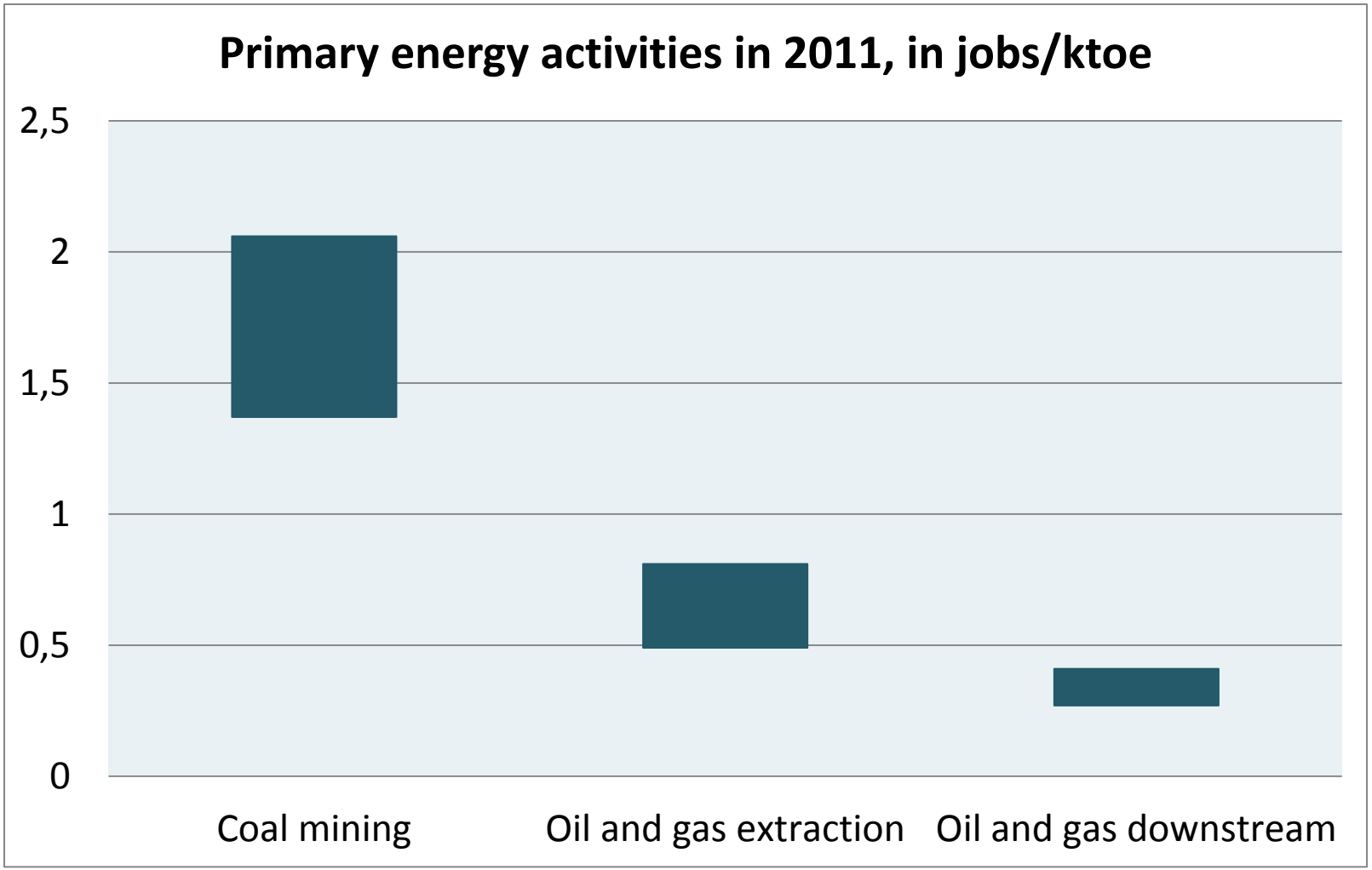


D11.2 – Results: Current energy sector

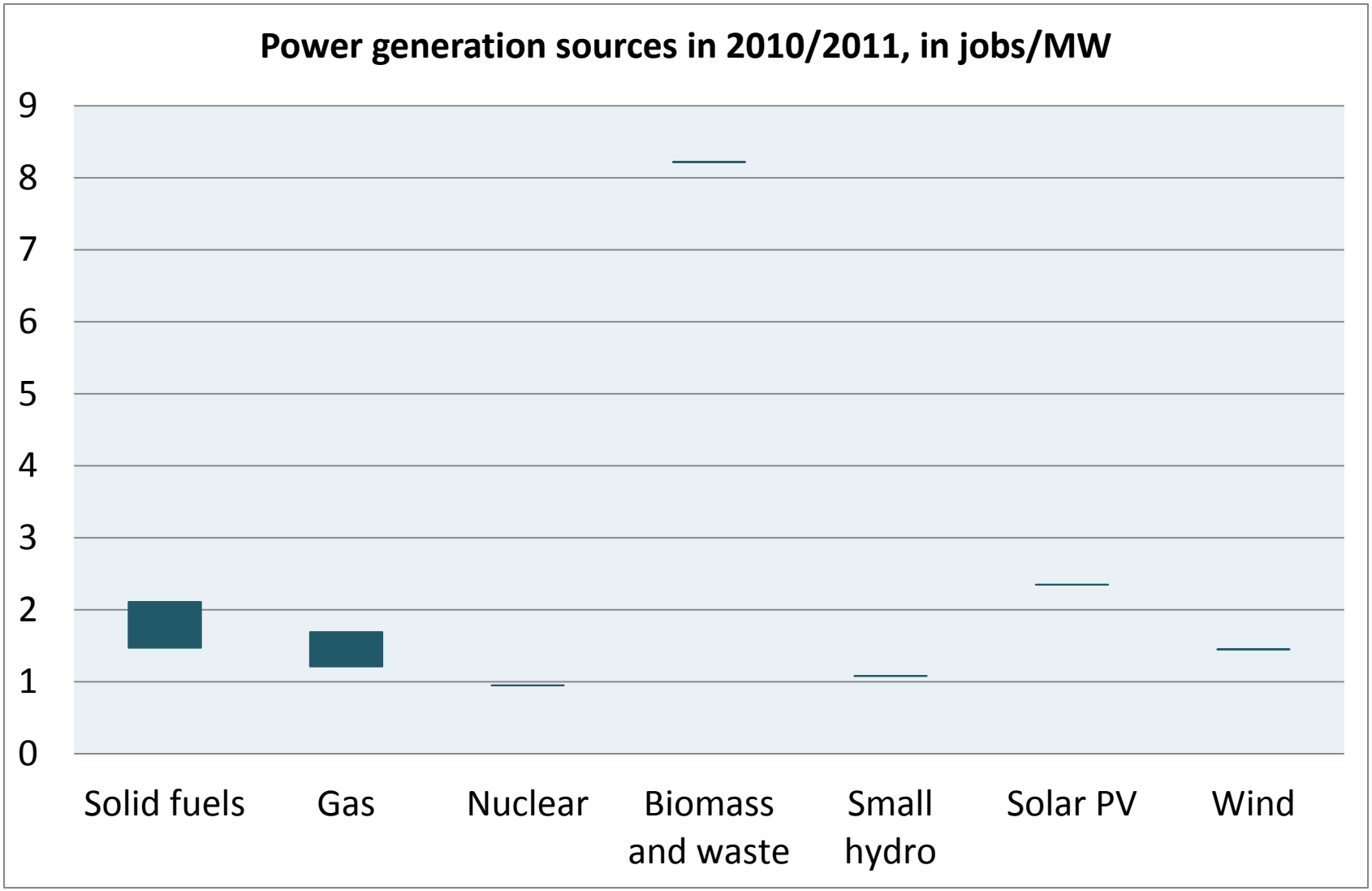
Employment structure of RES



D11.2 – Results: Labour intensity

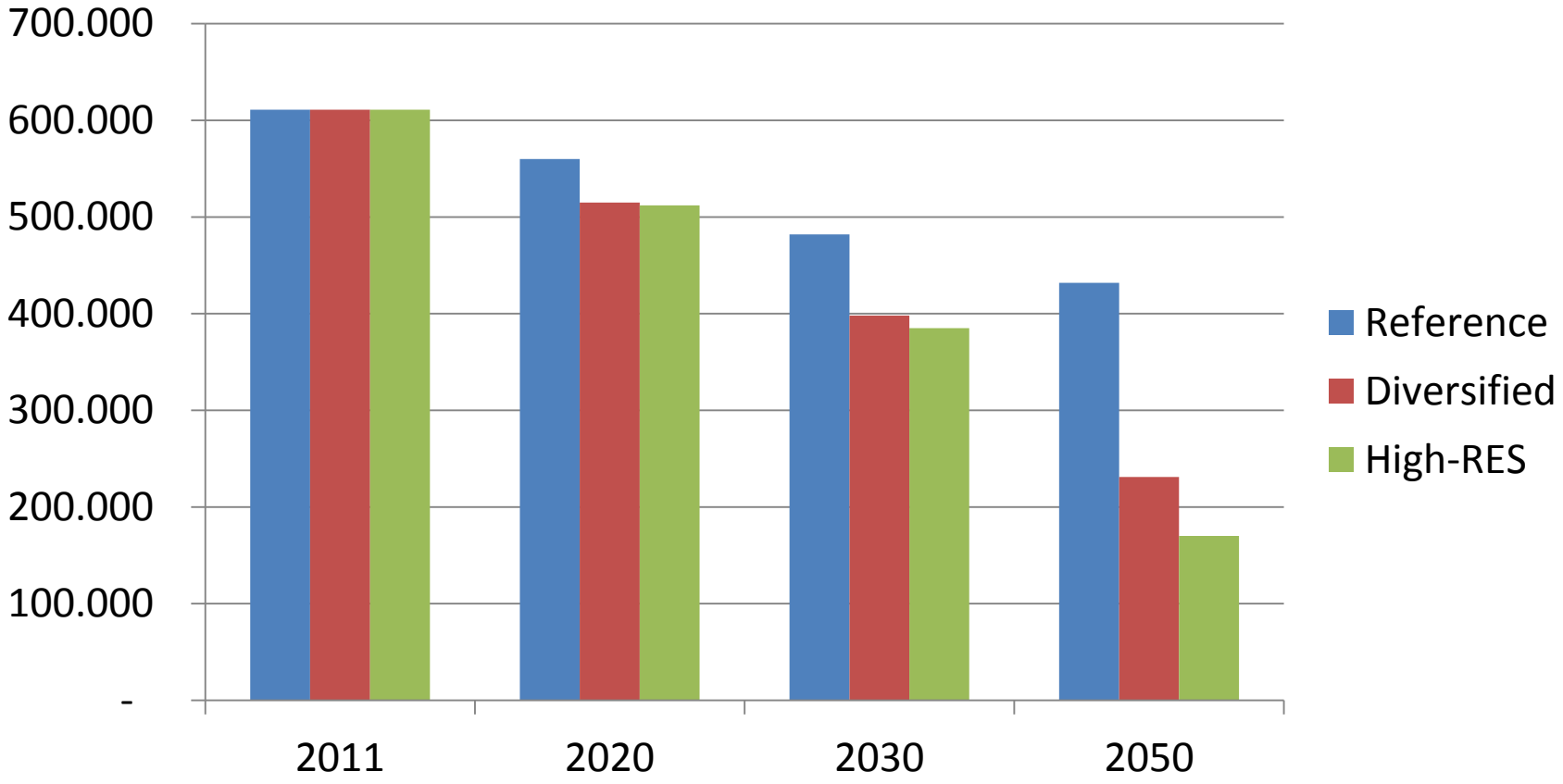


D11.2 – Results: Labour intensity

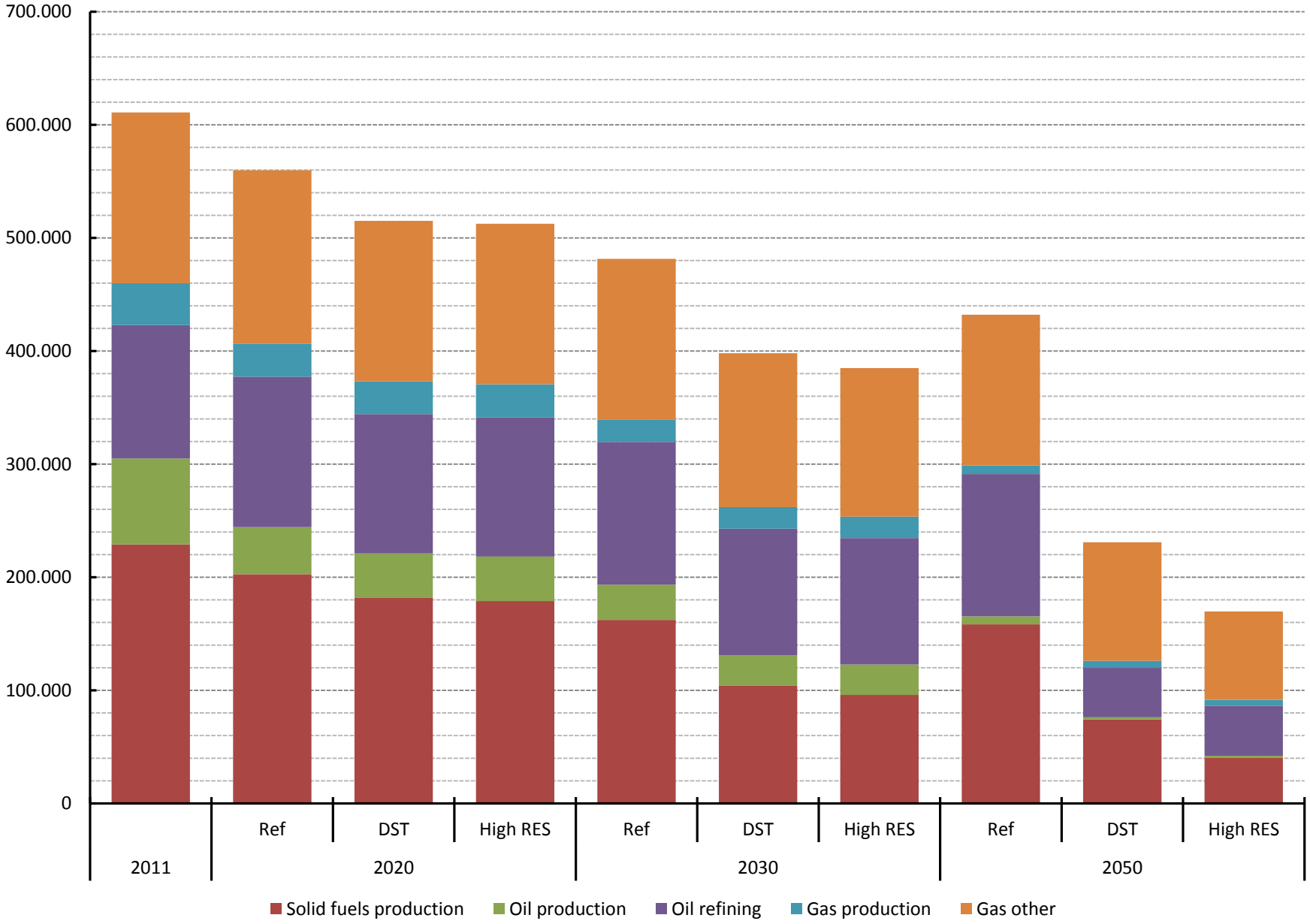


D11.2 – Results: future energy sector

Future employment levels: primary fossil fuels

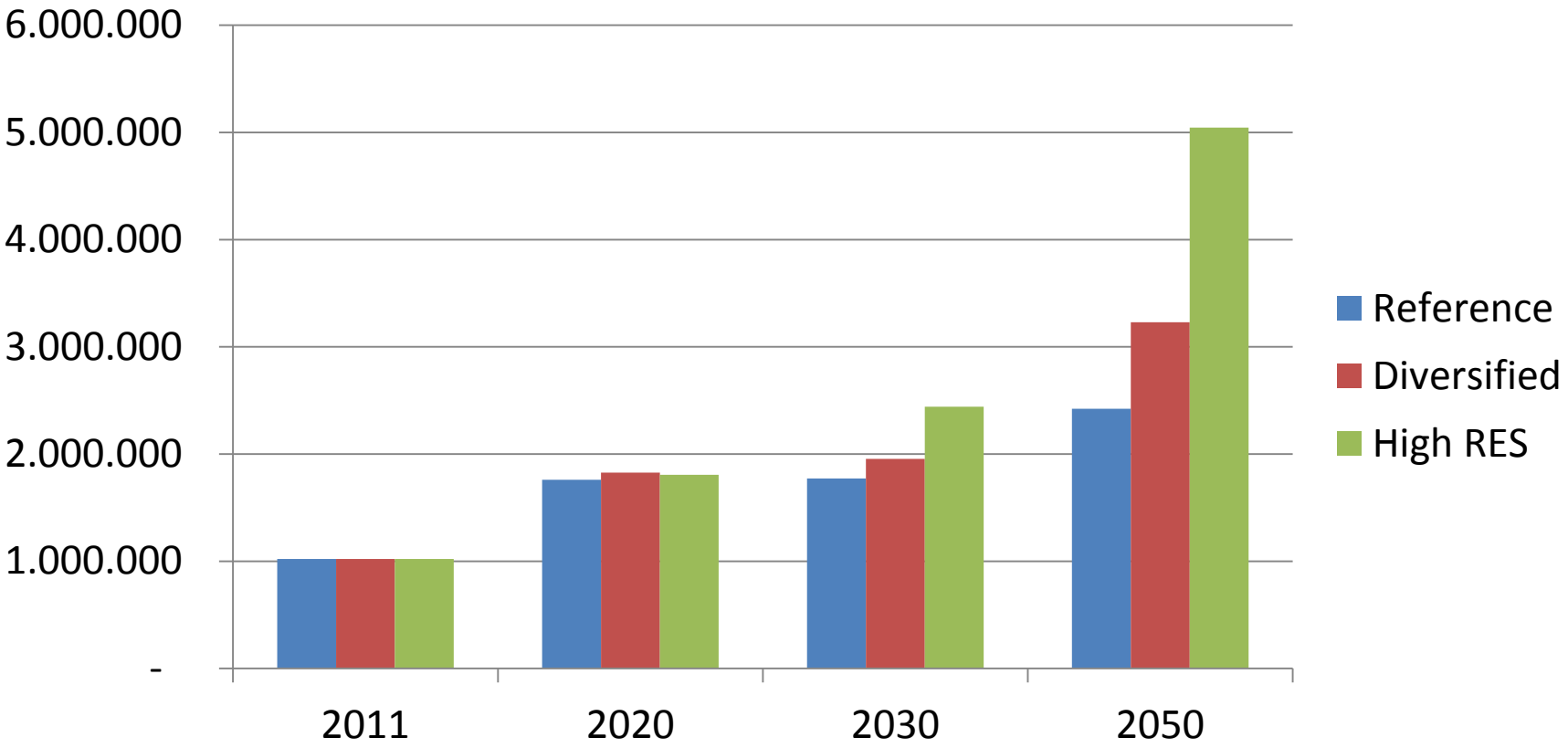


Future employment levels: primary fuels detailed

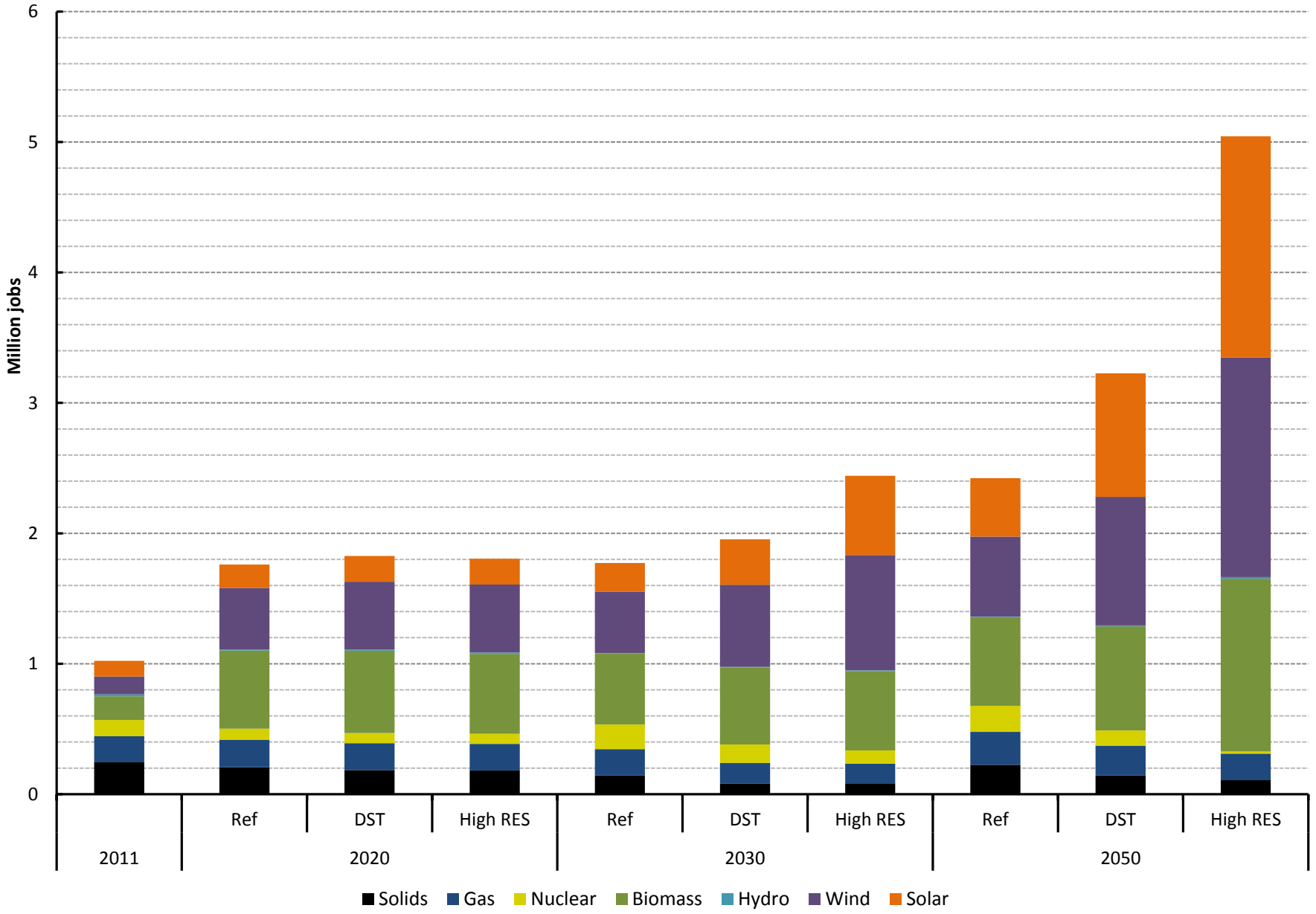


D11.2 – Results: future energy sector

Future employment levels: power sector

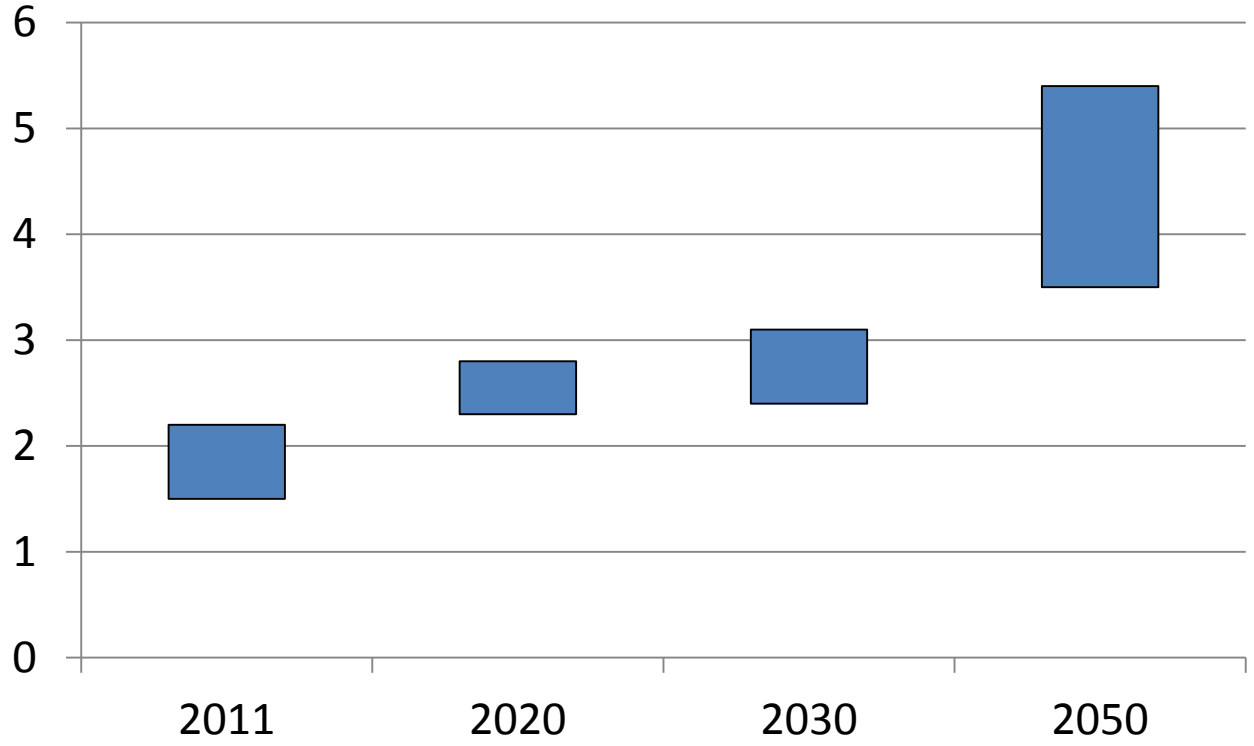


Future employment levels: power sector detailed



D11.2 – Results: future energy sector

- Potential increase of employment in the energy sector



D11.2 – Results: future energy sector

- Decarbonisation can lead to job creation, especially in the long-term
  - Job creation in RES-E outweighs job destruction in primary fuels
- Possible shift to a higher qualified workforce
  - Skill shortages?
  - Provide measures to match changing employment demand and supply patterns

D11.2 – Discussing results

- Simple methodology to assess employment effects of decarbonisation
- Results show job creation, but much uncertainty
  - Inherent to scenario analysis
  - Development of energy system (decentralisation)?
  - Development of employment factors?
  - Convergence of employment factors over MS?
  - Development of RES capacity factors?

D11.2 – Discussing results

- Data issues
  - Difficulty to find reliable data on current employment
    - Skill levels
    - Focus on direct jobs only
    - Lack of data on the level of individual technologies
    - Robust direct to indirect jobs multipliers for RES, shares of CIM and O&M in total jobs for power sector, etc.
  - Difficulty to compare available data, due to different methodologies

Conclusion

- Share of jobs in energy supply small compared to overall economy
- Decarbonisation might lead of overall increase in jobs
- Qualification levels likely to increase as well
- Systems cost might explode if linearity prevails
- Many uncertainties and data issues
- Purpose of RES policy: role of job creation?

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Thank you for your attention!

Key methodological issues

- Power sector: CIM and O&M ratios
  - Reason to distinguish: jobs in CIM do not last for the full lifetime of a power plant >< jobs in O&M
  - How to derive separate factors for CIM and O&M from the factor of total jobs/MW?
    - Factors for CIM and O&M jobs per technology taken from existing study
    - The share of each of those factors in the total factor in the other study is used to break down our total factor into CIM and O&M factors

Key methodological issues

- Calculation of employment factors
  - Technology-specific
  - Based on data for current energy sector
    - Jobs:
      - Fossil fuels: DG Energy estimates and Labour Force Survey on Eurostat
      - Nuclear: estimation by Foratom
      - RES: derived from EurObserv'ER (see previous slide)
    - Volumes for fossil fuels: Eurostat
    - Installed capacity for power sector: Eurostat, EurObserv'ER, Eurelectric