

Investing EU ETS auction revenues into energy savings

The interaction between the ETS and EE Directives

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Background

Background (1): Principal & Team



- **Principal:**
 - The Regulatory Assistance Project (RAP);
 - “A global, non-profit organisation focussing on long-term economic and environmental sustainability of the energy sector, providing technical and policy assistance to policy makers and regulators.”
 - Offices in the USA, China and the EU (Brussels);
 - Close affiliation with Climate Works and European Climate Foundation (ECF).
- **Project team:**
 - ECN Policy Studies (lead);
 - Cambridge Econometrics (CE).

Background (2): Policy context

- 2020 targets of EU Energy and Climate Policy Package (2008):
 - 20% GHG emissions reduction;
 - 20% renewable energy;
 - 20% primary energy savings.
- Main instrument:
 - (revised) EU ETS;
 - Auctioning of power sector allowances (2013).
- EU draft Energy Efficiency Directive (2011):
 - Only half of the EE target will be met by 2020.
- Idea: use EU ETS auction revenues to achieve EU EE target.

Background (3): Objective & research questions

- Overall project objective:
 - “to analyse the opportunities for and effects of using EU ETS auction revenues to stimulate investments in energy savings in three key target sectors, i.e. Households, Tertiary and Industry.
- Specific research questions:
 - What are the energy savings potentials in the target sectors up to 2020?
 - What are the investment needs and the required public funding to meet these potentials?
 - What are the socioeconomic and environmental effects of the investment in additional energy savings under different policy scenarios?
 - What are the interaction effects between the EU ETS and energy savings, and how can these effects be optimised?

Methodology

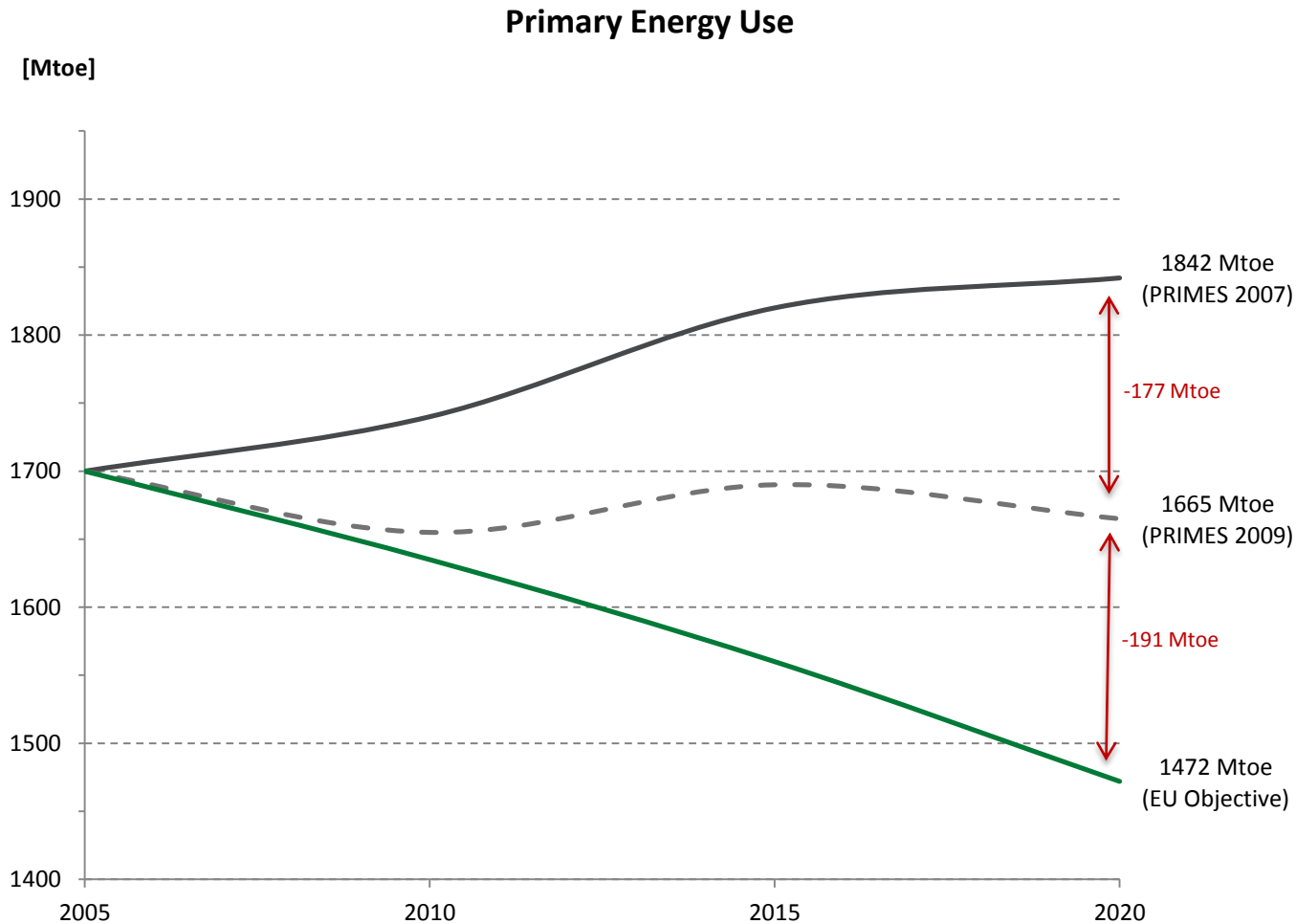
Methodology (1): Six steps

1. Defining the '*Intermediate (EE pre-investment) scenarios*';
2. Estimating scenario modelling inputs, i.e. energy savings potentials, investment needs and public funding support in target sectors;
3. Defining the '*Investment scenarios*';
4. Defining some '*Additional policy scenarios*';
5. Calculating the scenarios by running the E3ME model;
6. Analysing and interpreting the results.

Methodology (2): the intermediate scenarios

- The baseline scenario (1Ai):
 - Based on & calibrated to the PRIMES 2009 scenario trends in energy use up to 2020;
- The EU GHG stretch scenario (1Bi):
 - EU GHG target: -30% in 2020, compared to 1990;
 - EU ETS cap: - 34% in 2020, compared to 2005 ETS emissions.
- The Energy Savings Obligation scenario (2Ai):
 - Introduction of an ESO for energy suppliers to realise energy savings of 1.5% per annum of their deliveries to end-users in Households and Tertiary sectors.
- The EU GHG stretch and ESO scenario (2Bi):
 - Mix of scenarios 1Bi and 2Ai.

Methodology (3): Energy use projections



Methodology (4): Estimating scenario inputs

- For each intermediate scenario and for each target sector we have estimated:
 - Updated ‘cost-effective’ energy savings potentials up to 2020;
 - (Private) investment needs;
 - Public funding/support needs.
- These inputs have been included in the four intermediate scenarios in order to obtain the four investment scenarios.

Methodology (5): The additional policy scenarios

- Focus on non-ETS related fuel savings (1An):
 - € 10 billion per annum (2013-2020) of public support to stimulate investments in fuel savings in non-ETS sectors only;
- Focus on ETS related fuel savings (1Ae):
 - Id., in ETS sectors only;
- EUA ‘set aside’ scenario (1As):
 - Scenario 1Ae + set aside of EU ETS allowances (EUAs) to neutralise the impact of additional EE investments on the ETS carbon price;
- EUA ‘set aside’ scenario (2At):
 - Scenario 2Ai + set aside of EUAs to neutralise the impact of the ESO on the ETS carbon price.

Methodology (6): The E3ME model

- The '*Energy-Environmental-Economy Model for Europe*' (E3ME);
- Developed by Cambridge Econometrics (CE);
- Main dimensions and features:
 - Close integration of EU economy, environment and energy systems;
 - 29 countries: EU27 + Norway and Switzerland;
 - 42 economic sectors, including disaggregated energy sectors;
 - 19 different users of 12 different fuels;
 - 14 types of air-borne emissions;
 - 23 types of households;
 - Database covers period 1970-2009;
 - Projections up to 2050.

Results (EU27, 2020)

Results (1): Estimated scenario inputs

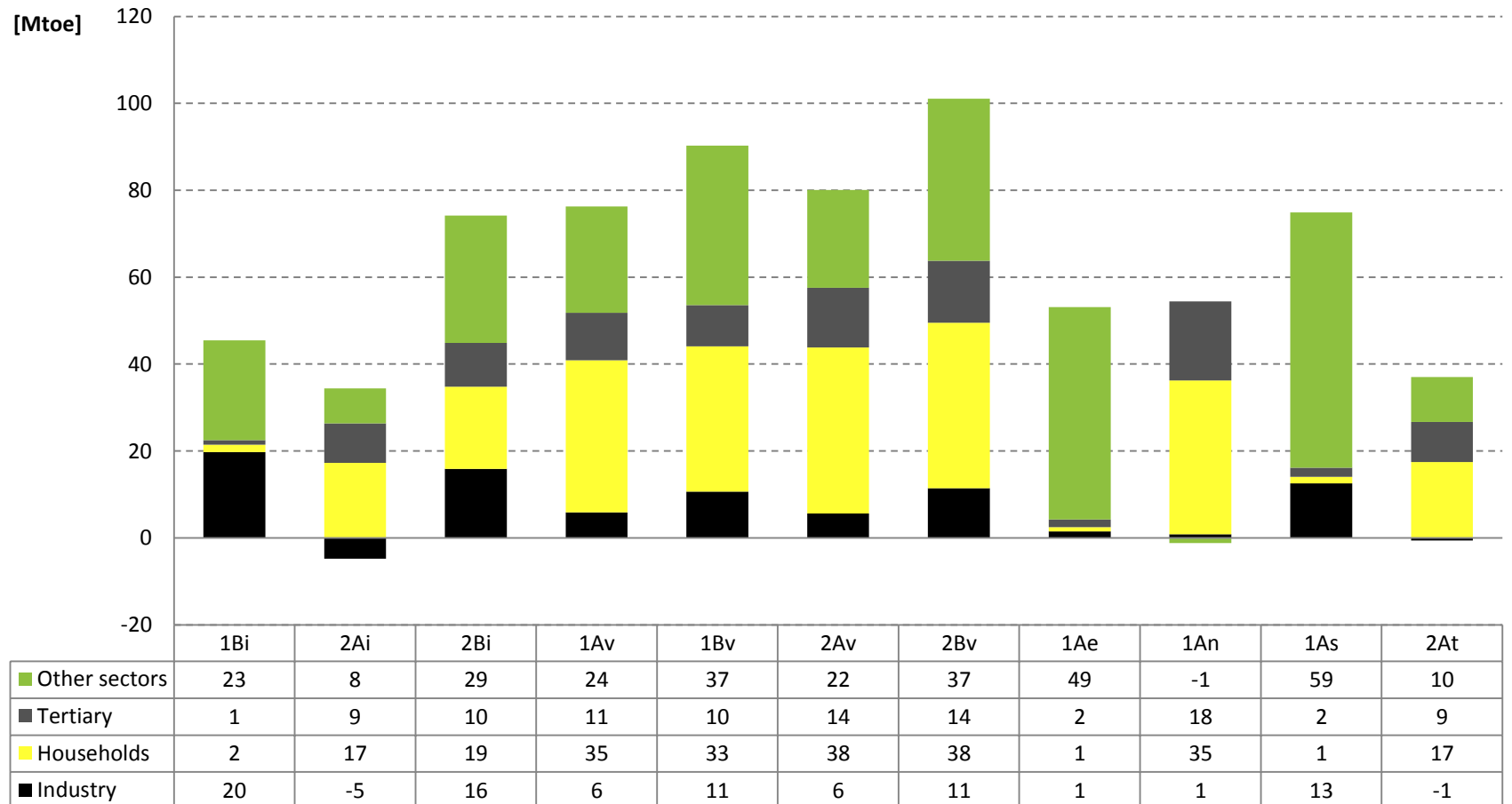
	1Av	1Bv	2Av	2Bv
Energy savings potentials in target sectors (in Mtoe)	74	52	50	33
Investment needs (2013-2020; billion € p.a.)	37	30	24	19
Public support (2013-2020; billion € p.a.)	6	5	4	3

Results (2):

Scenario model output variables

- Primary energy use and savings by sectors;
- GHG emissions and ETS carbon price;
- Power sector:
 - Power use, electricity prices and power bills;
 - GHG emissions;
- Other, socioeconomic variables:
 - GDP, investments and consumption;
 - Imports & exports;
 - Employment;
 - Consumer prices & real household income.

Results (3): Energy savings in 2020



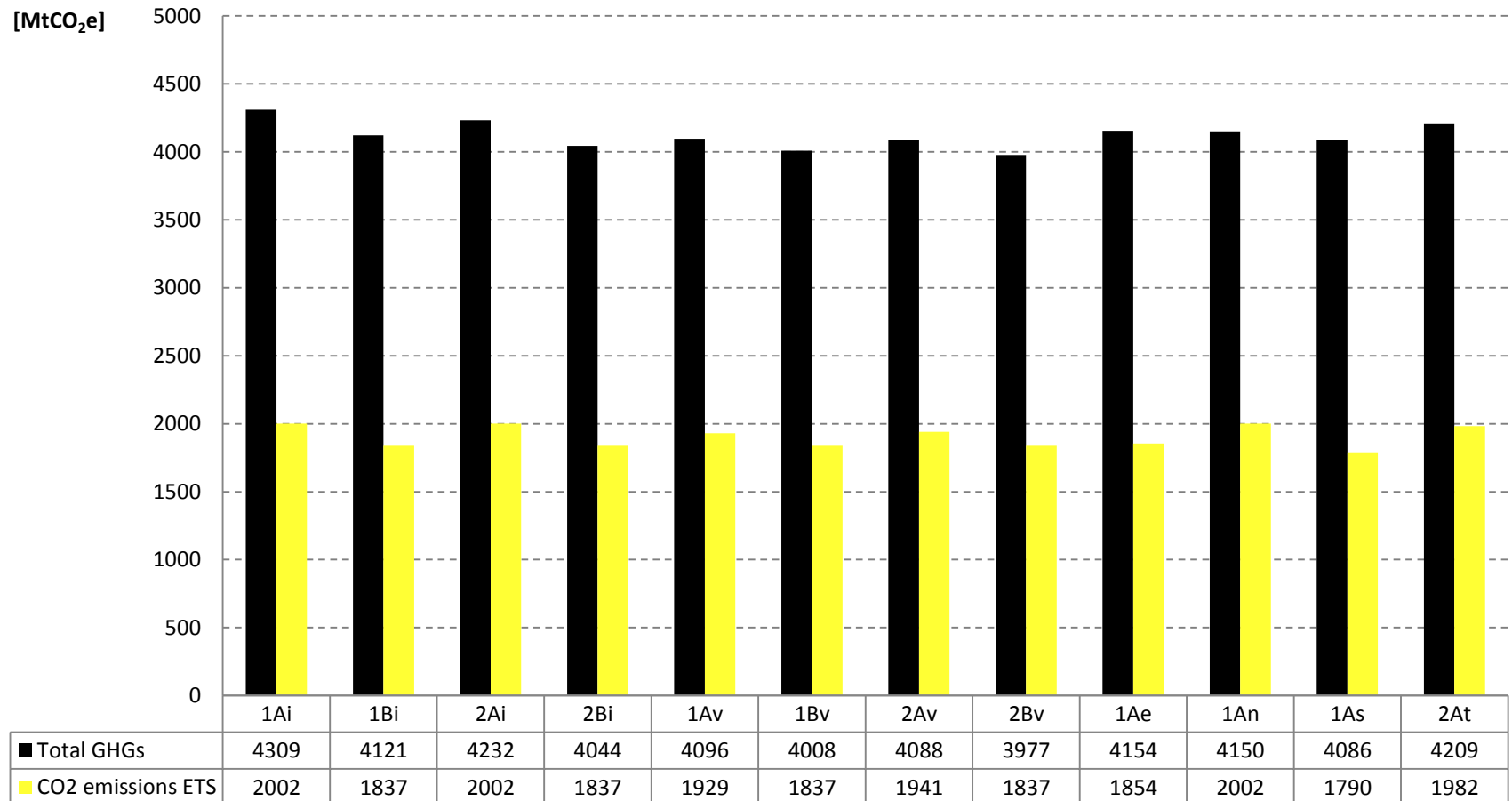
Results (4):

Energy savings as % of potentials

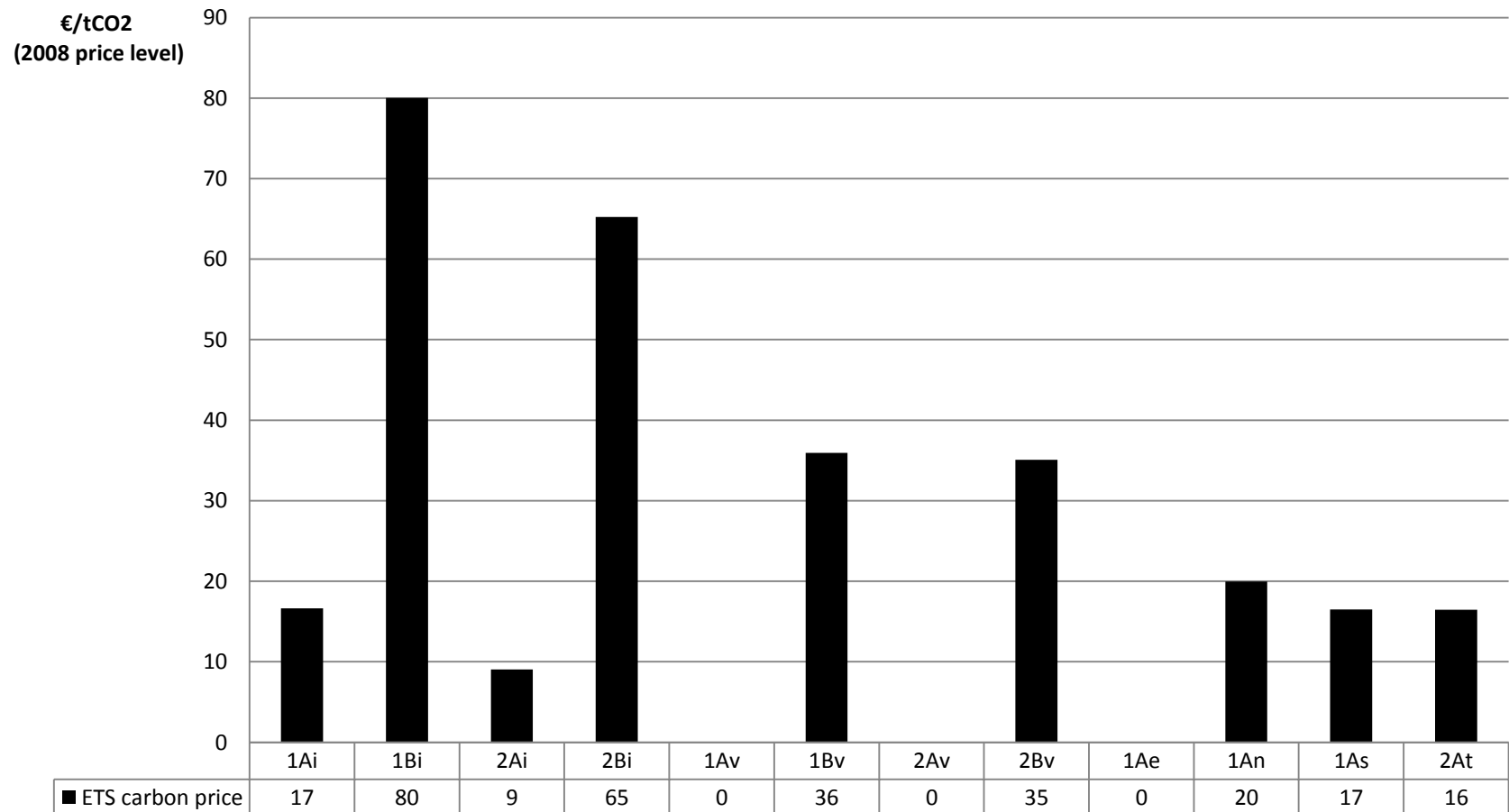
Comparison of energy savings potentials and realised energy savings by additional EE investments in target sectors

	1Av	1Bv	2Av	2Bv
Potentials (Mtoe)	74	52	50	33
Savings (Mtoe)	51	30	36	19
Balance (Mtoe)	22	21	14	15
Share (%)	70	59	72	56
<i>ETS carbon price (in €/tCO₂)</i>				
Before investments	17	80	9	65
After investments	0	36	0	35

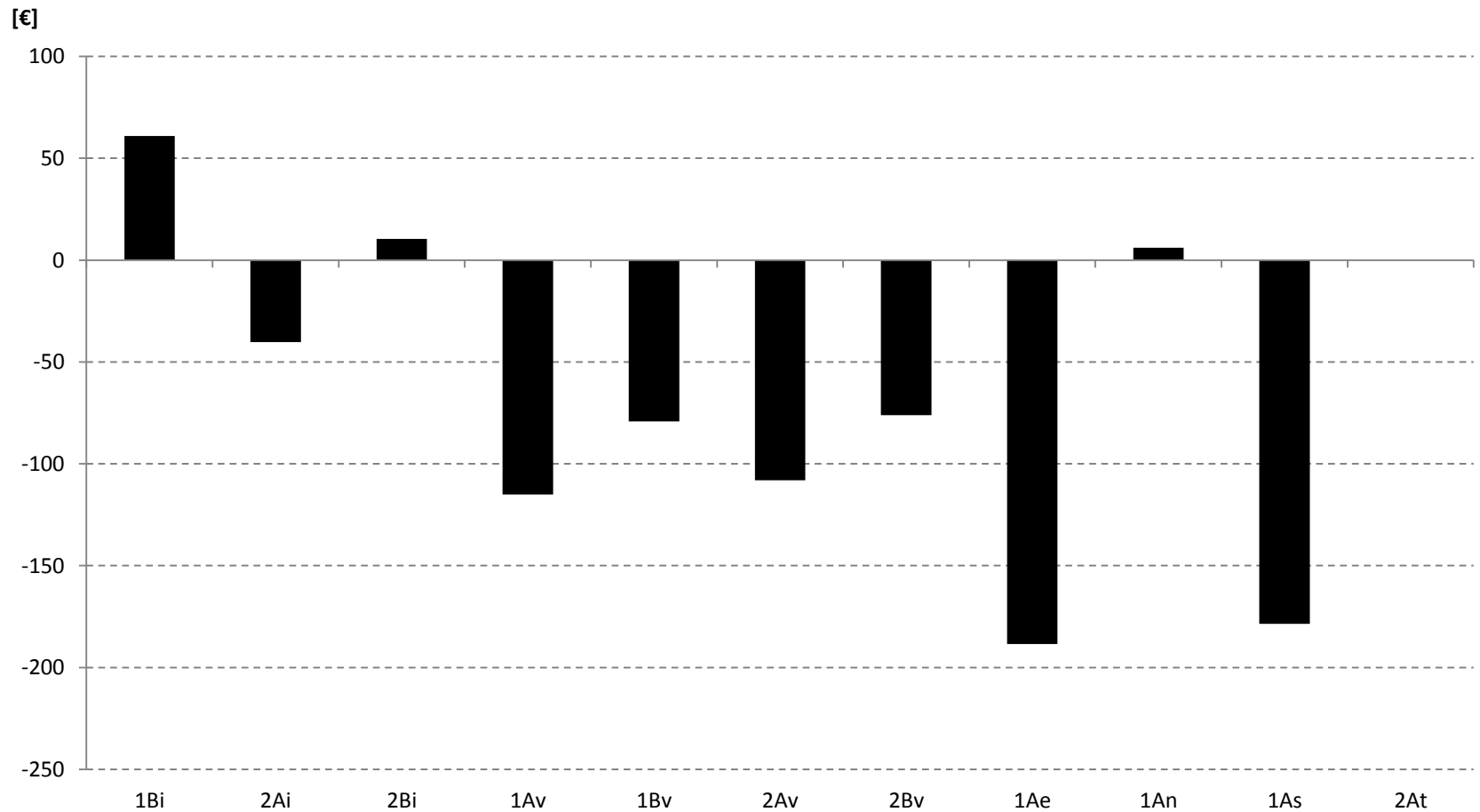
Results (5): GHG emissions



Results (6): ETS carbon price in 2020

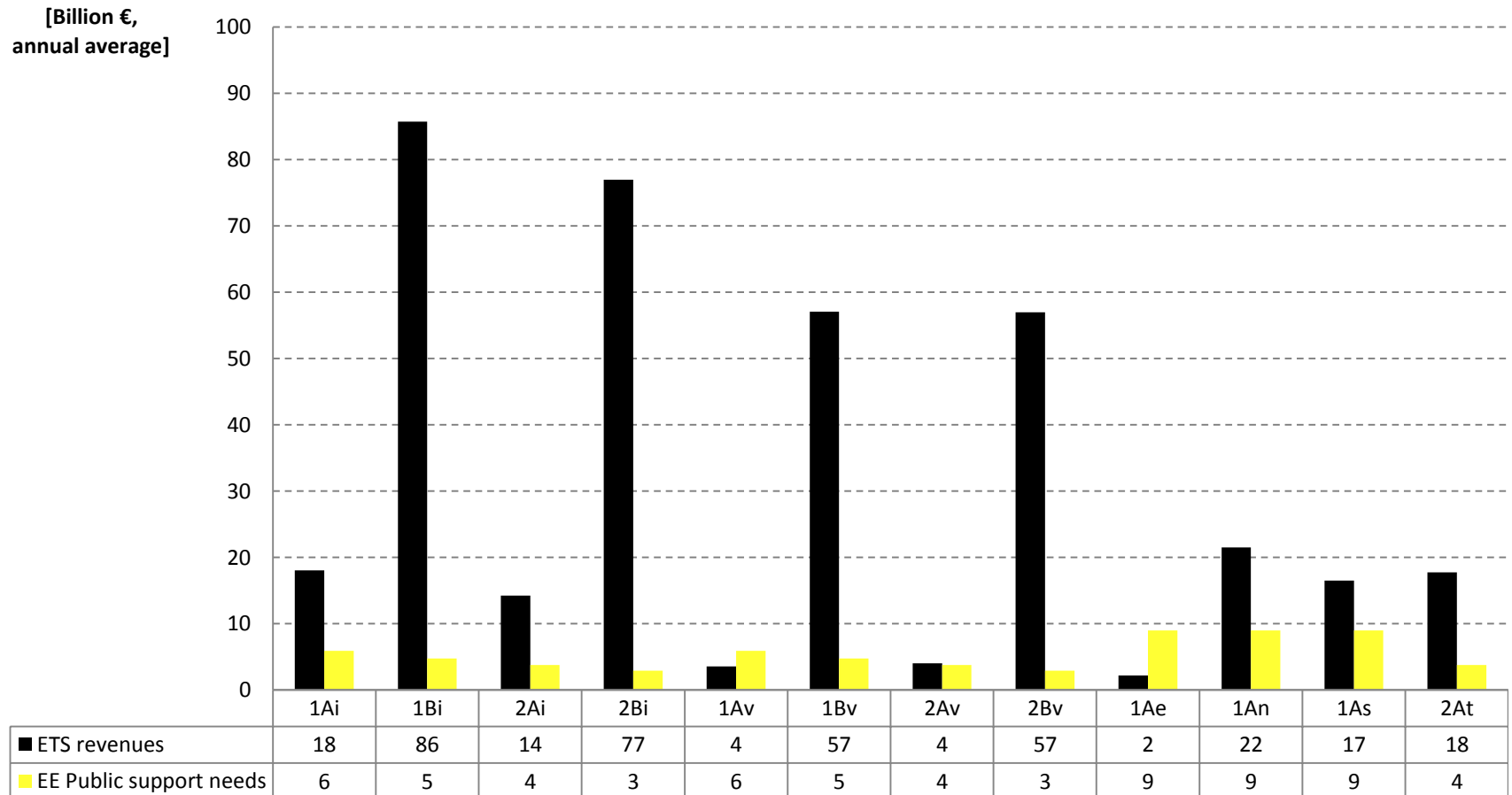


Results (7): Change in household power bill



Results (8):

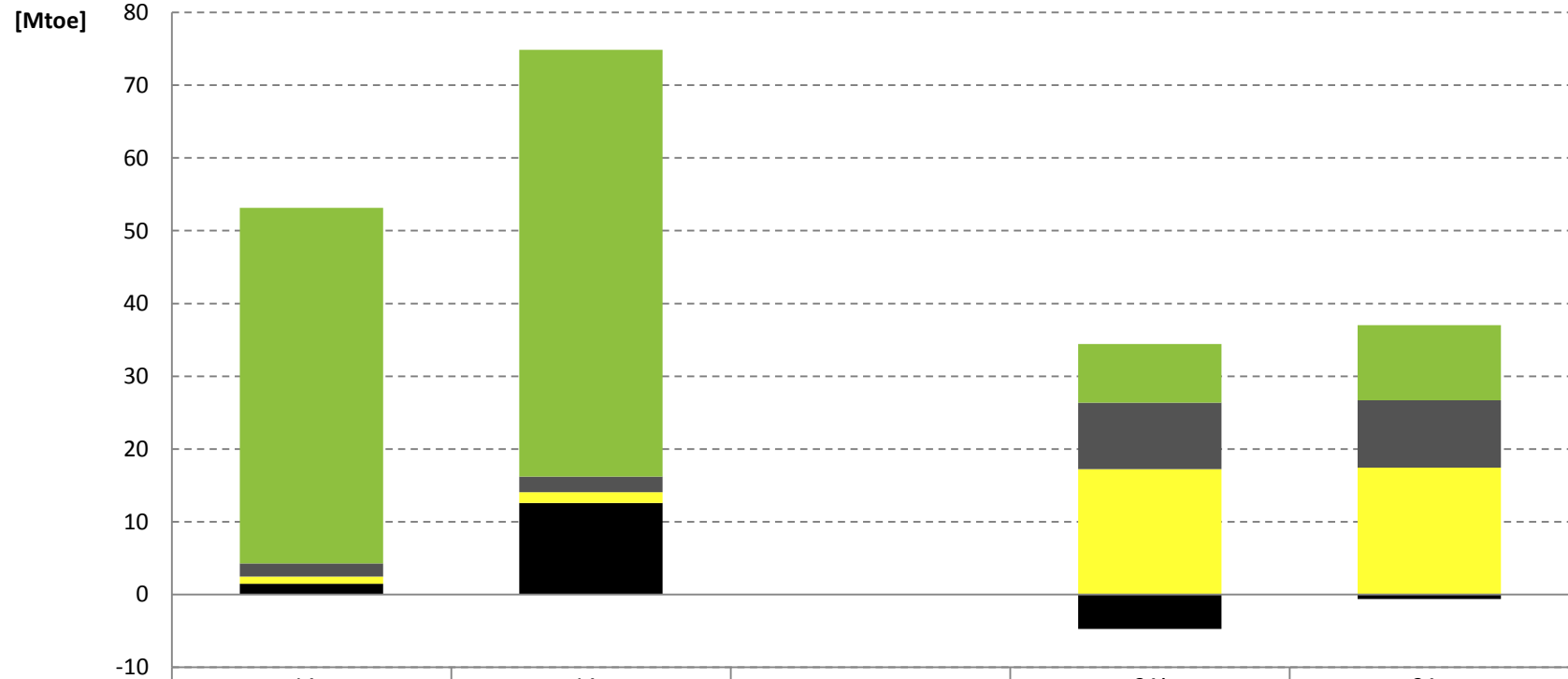
ETS revenues - EE public support



Results (9): Estimate of EUA set asides

Estimate of EUA set asides			
	Total 2013-2020 (MtCO ₂)	Annual Average (MtCO ₂)	As % of EU ETS cap
1As	1074	134	6.3
2At	328	41	1.9

Results (10): impact of EUA set asides on energy savings



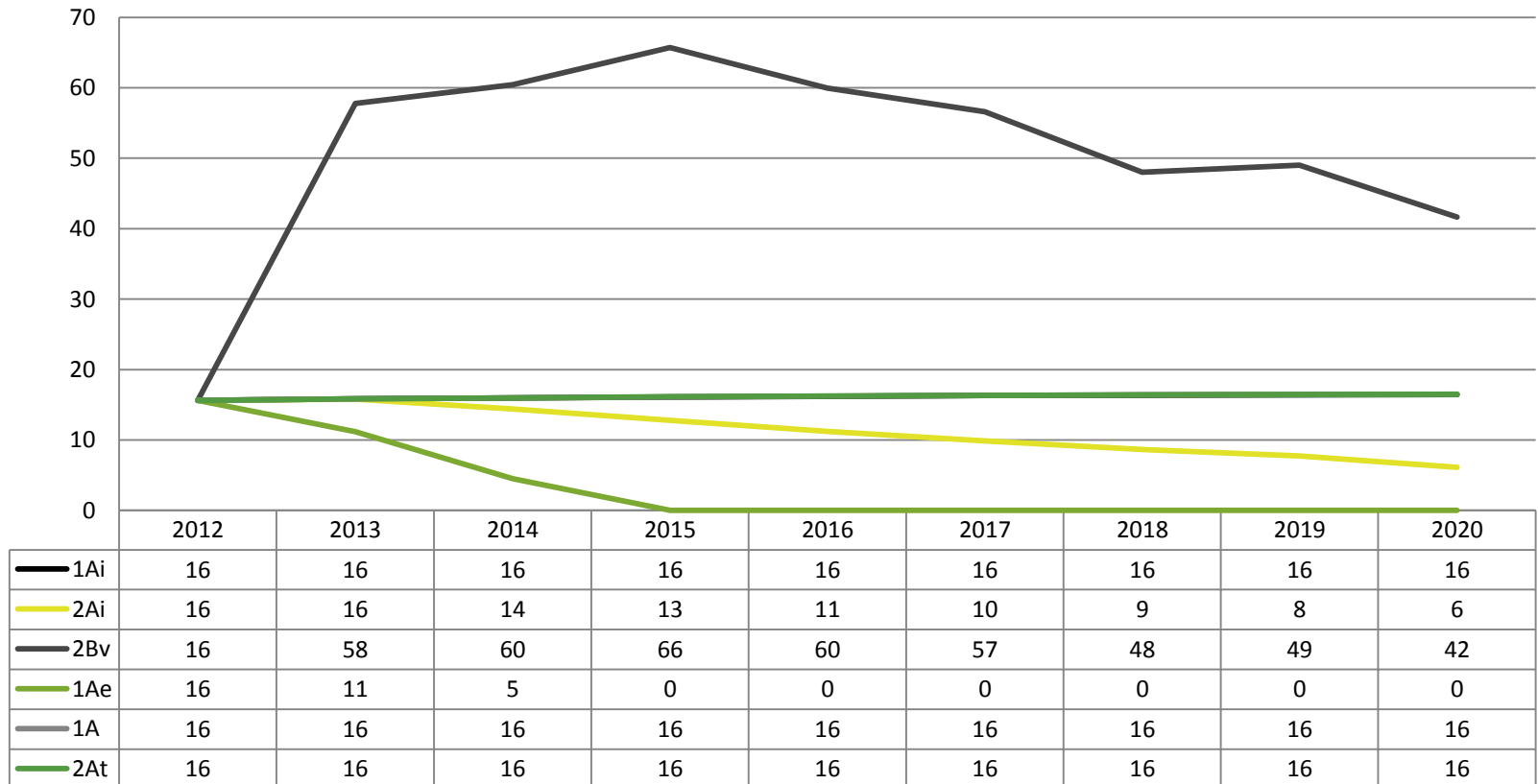
	1Ae	1As	2Ai	2At
Other sectors	49	59	8	10
Tertiary	2	2	9	9
Households	1	1	17	17
Industry	1	13	-5	-1

Results (11): impact of EUA set asides on ETS carbon price

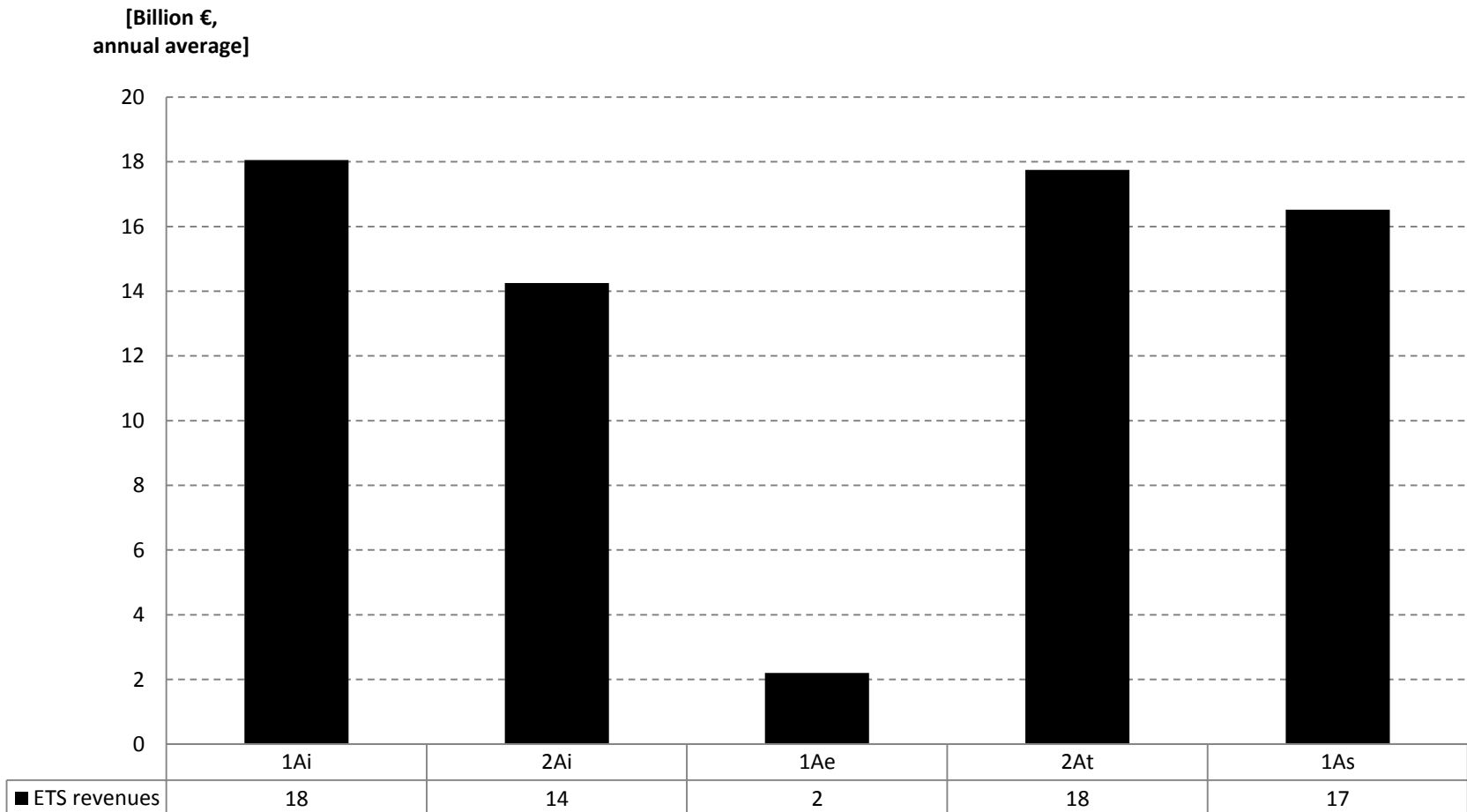


Euro/tCO2

ETS carbon price in selected scenarios, 2012-2013

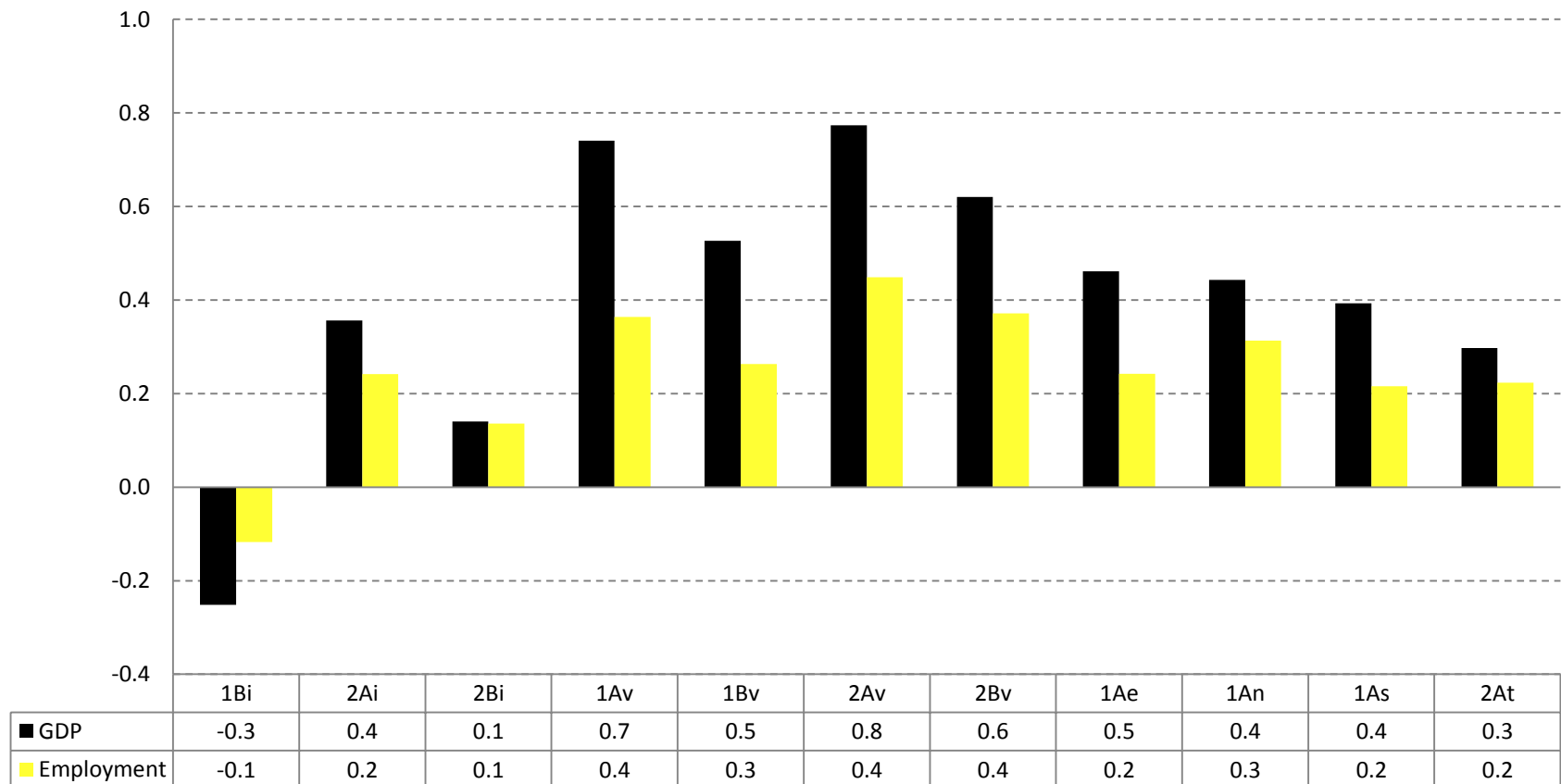


Results (12): impact of EUA set asides on auction revenues



Results (13): impact on macroeconomic variables

[% change compared to baseline]



Policy implications & conclusions

Policy implications & conclusions (1)

- There are still large ‘cost-effective’ potentials of energy savings in both the target and other sectors to achieve the EU EE target by 2020;
- These potentials can or may be achieved by supporting additional EE investments; in most scenarios, ETS auction revenues over 2013-2020 are sufficient to cover these support needs;
- Energy savings has some positive effects:
 - Reducing energy bills;
 - Reducing GHG (and other) emissions cost-effectively;
 - Small, but generally positive effects on GDP, investments, employment, etc.

Policy implications & conclusions (2)

- However, stimulating ETS related fuel savings – through an ESO and/or supporting additional EE investments – has some adverse, interaction effects on the ETS sectors:
 - Decreasing the ETS carbon price;
 - Reducing the effectiveness of ETS related fuel savings;
 - Enhancing the average carbon intensity of power generation;
 - Lowering incentives for long-term investments in low-carbon technologies and the decarbonisation of the economy in the long run.
- Policy options to avoid these adverse effects:
 - Focus on non-ETS related fuel savings;
 - Reduce ETS cap;
 - Set aside EUAs to neutralise adverse ETS carbon price effect.

Thanks for your attention!

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