COST OF MOVING TO A 30% GHG REDUCTION TARGET IN EUROPE

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NEW ENERGY FINANCE

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3. Targets

4. Why the cost of the 20% target is low

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INTRODUCTION

- This slide pack presents more details of the analysis underlying the publication of our report “The Cost of Meeting a 30% Emission Reduction Target in Europe” on 26 April 2012.
- The full report can be downloaded from: www.newenergyfinance.com/free-publications/white-papers/

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APPROACH & ASSUMPTIONS

Uses Bloomberg New Energy Finance model of EU energy and emissions system

- All sectors of economy - 50 sectors
- All GHGs (CO2, CH4, N2O, SF6, HFC, PFCs) + int'l aviation
- Over 300 energy consuming technologies
- Investment decisions using real world investment criteria
- Resource curves for renewable energy
- Local fuel prices
- Build lead times

- Work does not look at co-benefits

APPROACH & ASSUMPTIONS

- Burden sharing – as per the Commission's Effort Sharing Decision (2009).
- Analysis period: 2011 – 2020 inclusive. Figures presented are *averaged* over this period.
- Costs show total cash capital and operating costs over the period.
- Costs include (i) direct costs of reducing emissions – capital costs & operating costs, (ii) costs (and benefits) of trading emissions in NTS and EU ETS.
- Member State analysis does not take into account effect of auction revenue redistribution

APPROACH & ASSUMPTIONS

- No extra CERs imported into EU ETS under 30% target but 866Mt CERs imported into NTS 2013-2020 (108Mt/yr).
- CERs priced at a discount to marginal abatement cost in NTS
- EUA surplus accumulated in EU ETS by end of 2012 taken into account in all scenarios. No surplus carry over in NTS from pre to post 2012.
- 20% renewable energy target achieved in all scenarios, ie 20% and 30%.
- Scenarios run with different end dates for the EU ETS (2020, or 2028 - this affects the carbon price)
- GDP assumptions - PRIMES 2009 (same as Commission analysis). Fuel prices same as Commission analysis.

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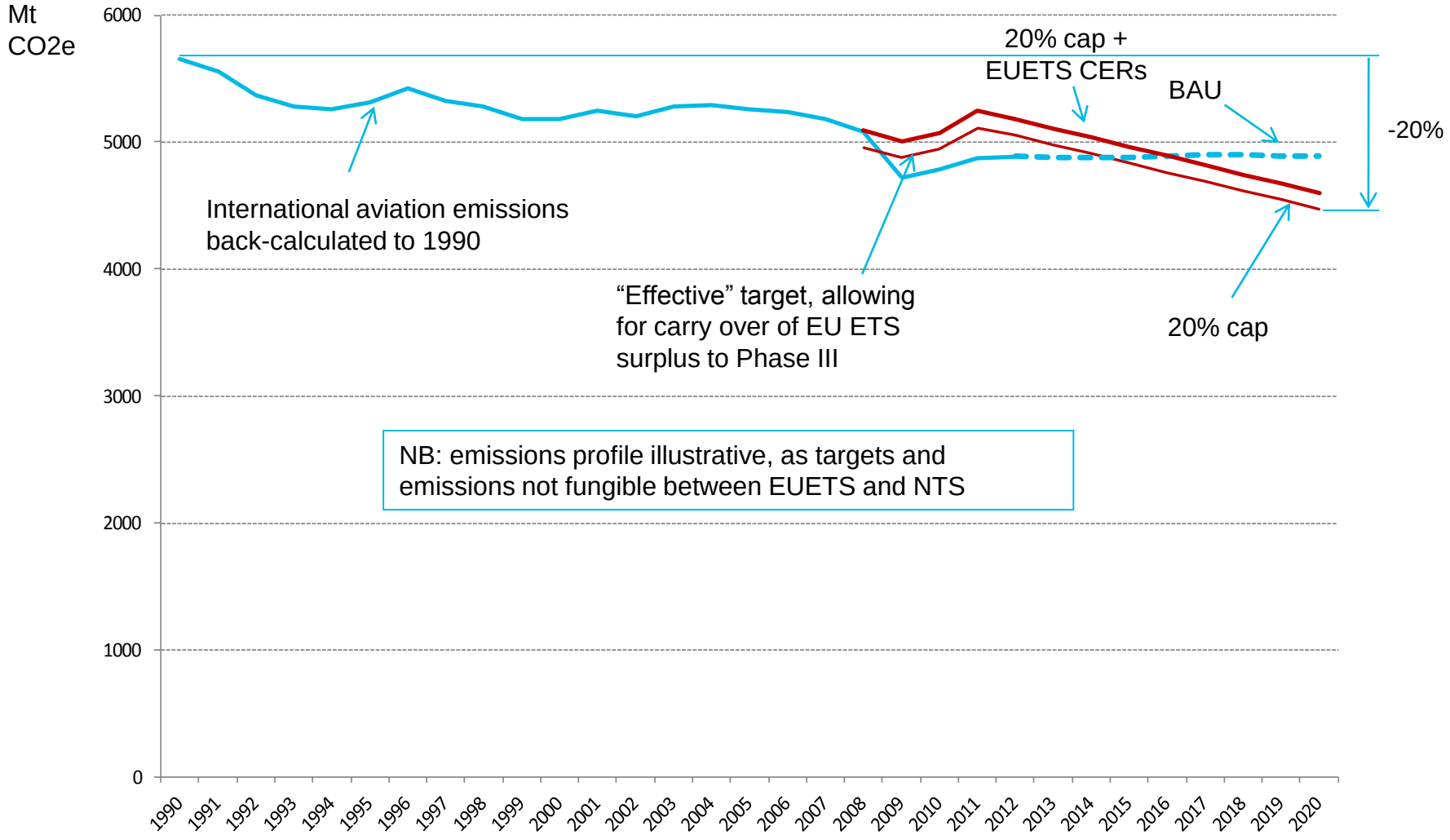
EU27 GHG EMISSIONS PROFILE – 20% TARGET



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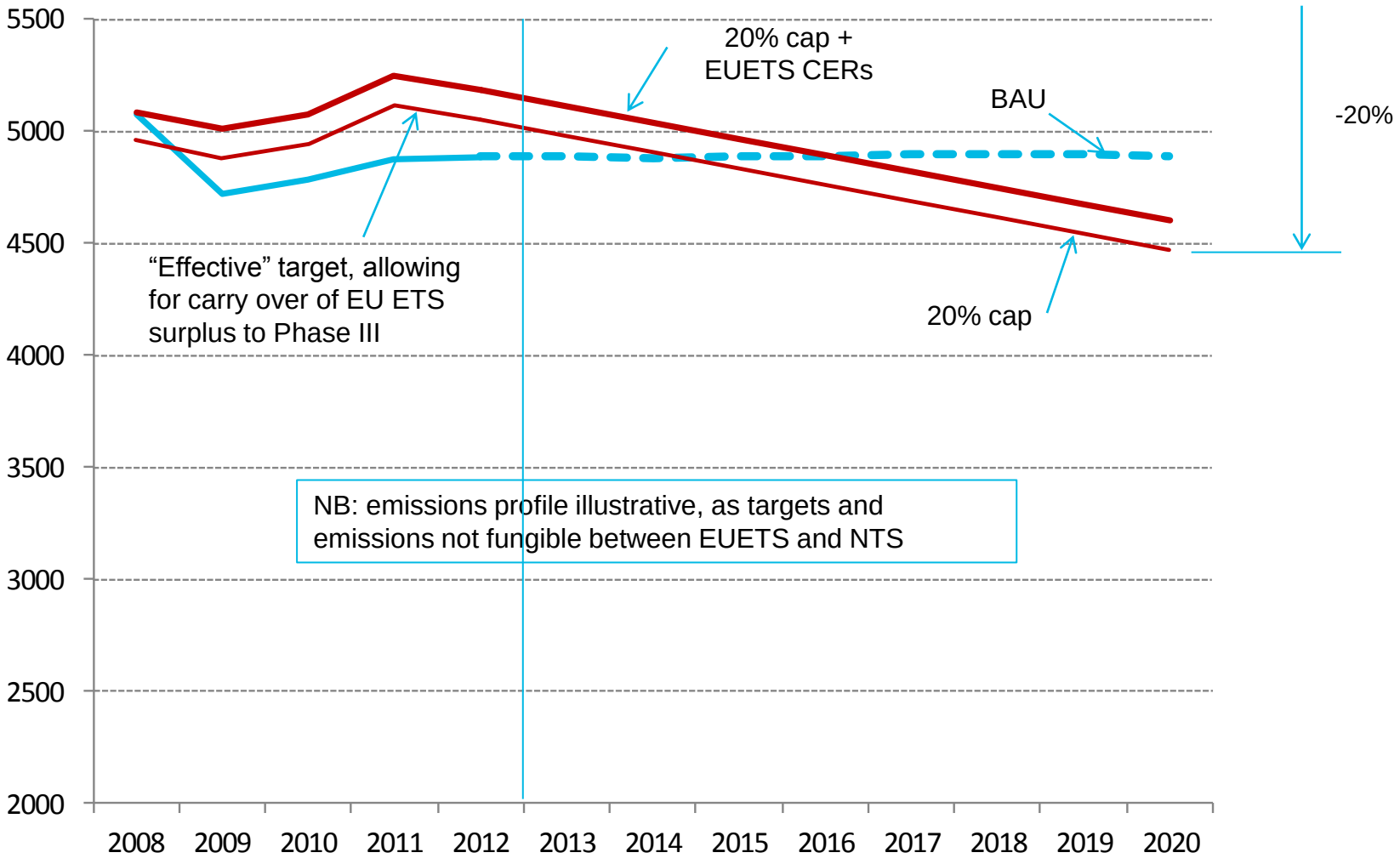

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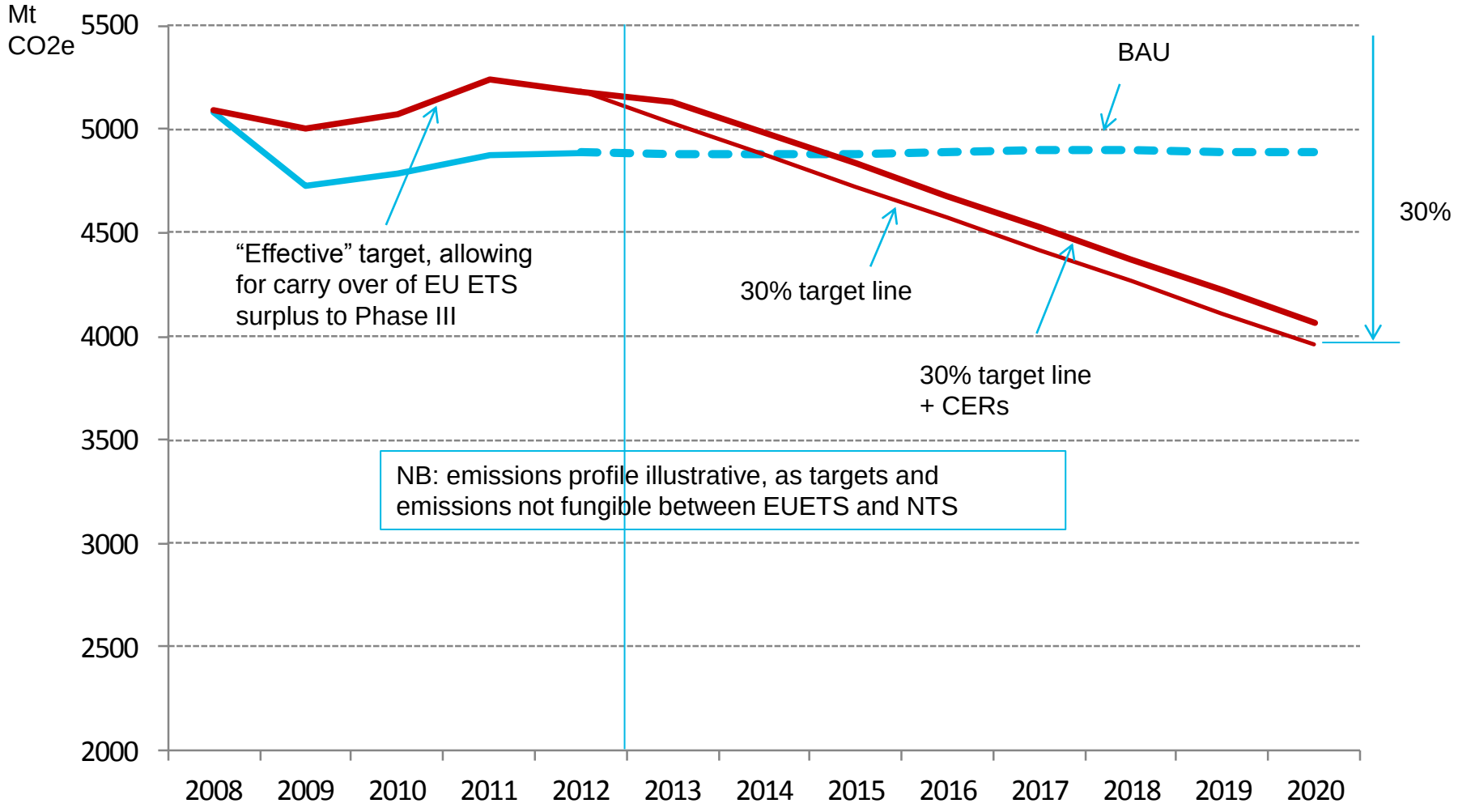

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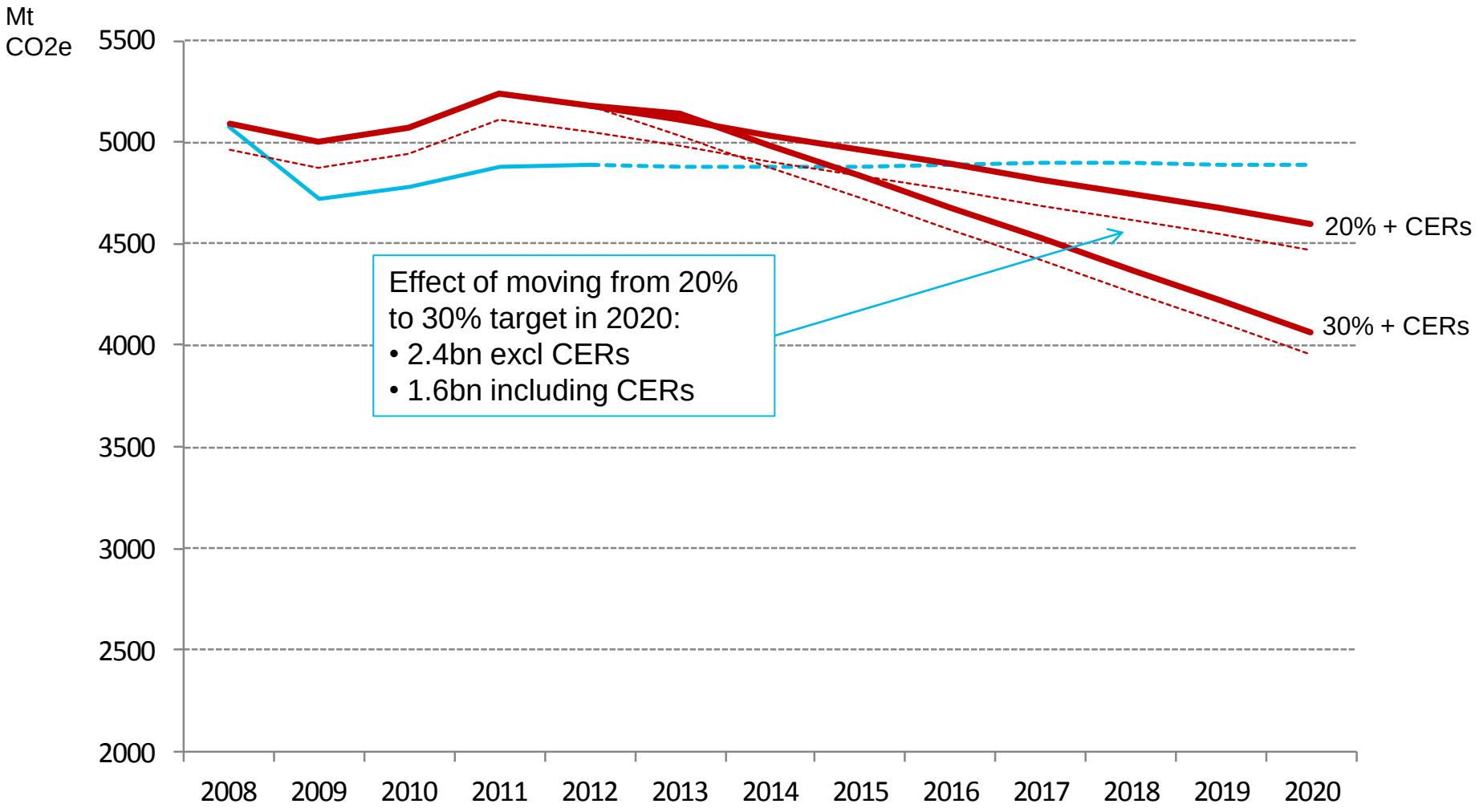

TARGETS

Overall Target (1990 Baseline)	Overall Reduction Target (2005 Baseline)	ETS Reduction Target (2005 Baseline)	NTS Reduction Target (2005 Baseline)
20%	-14%	-20%	-9%
30%	-25%	-34%	-16%

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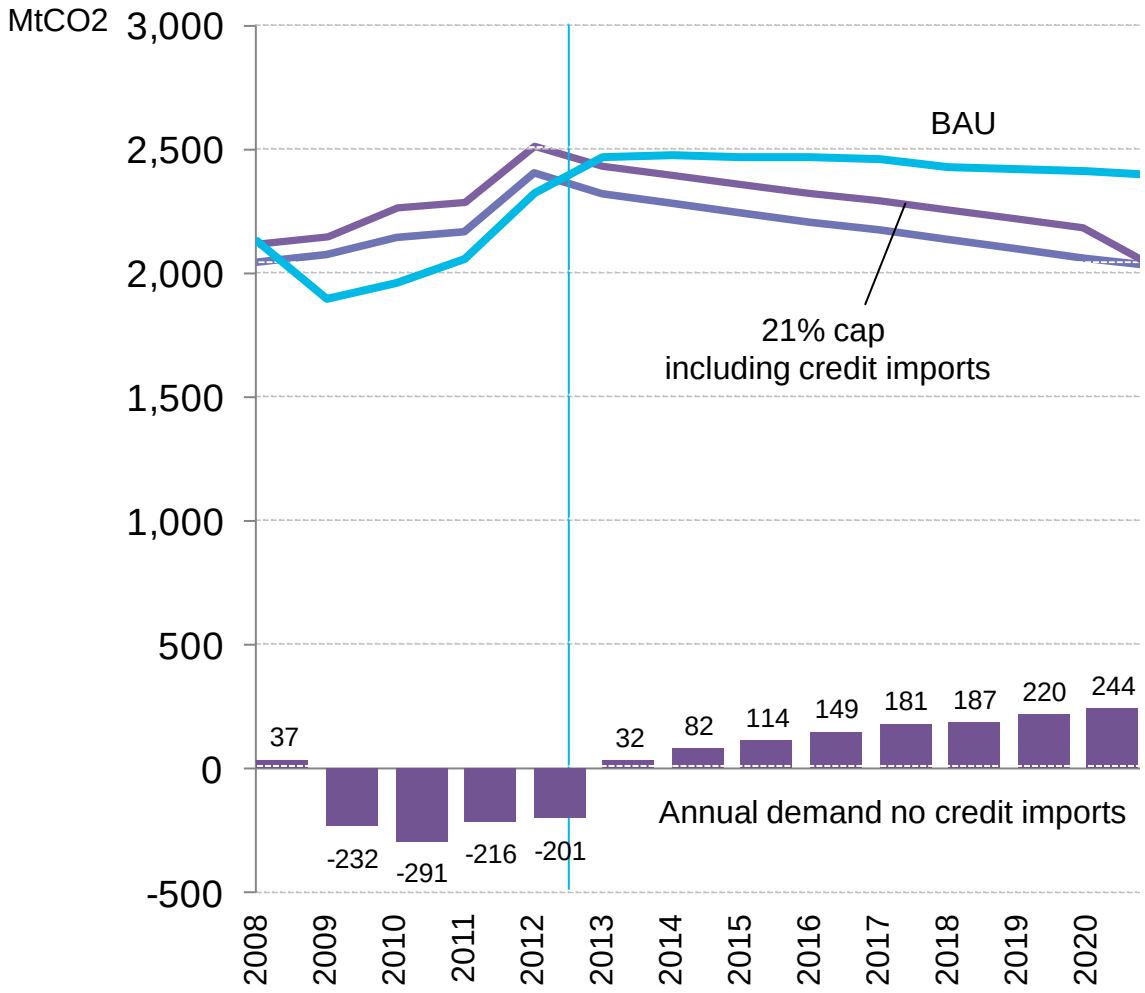
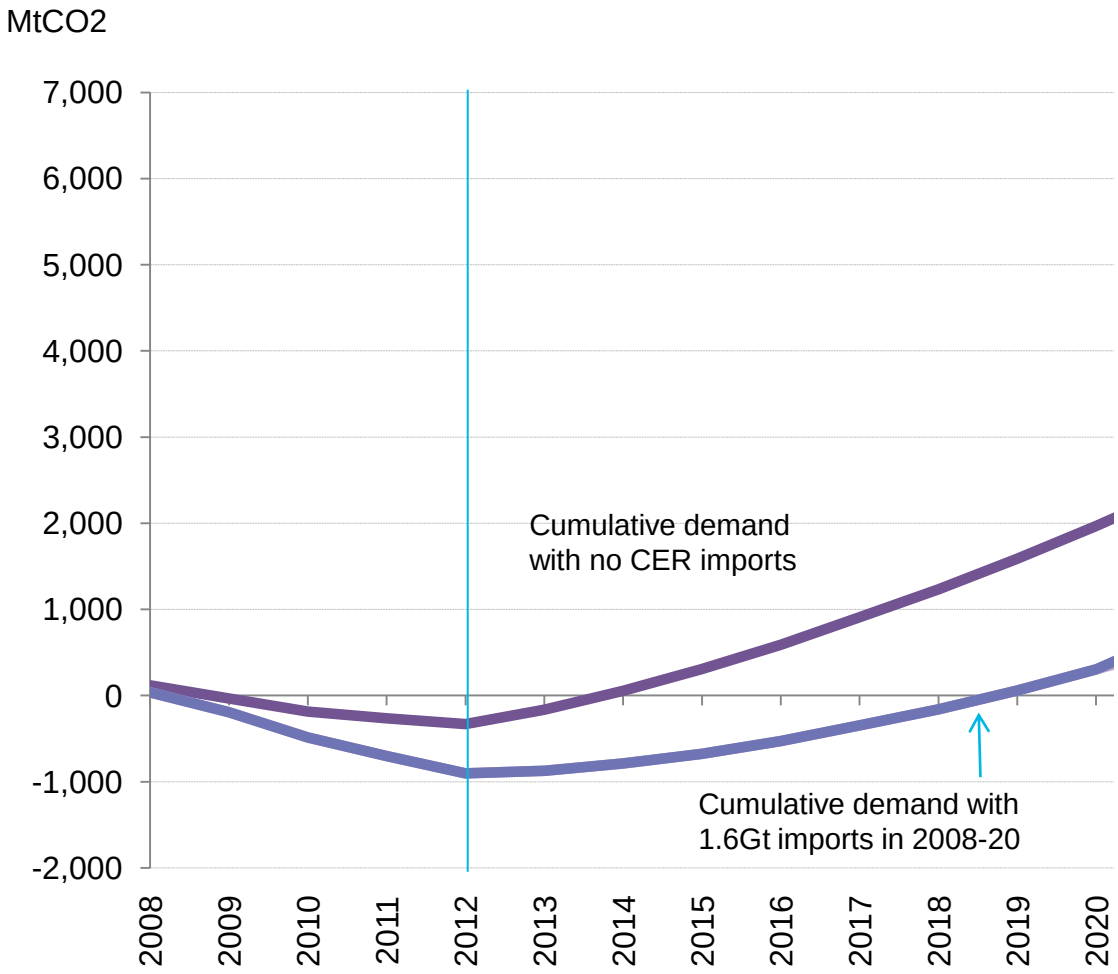
EUA SURPLUS AND CERS – 20% TARGET



- BAU includes Renewable Energy developments
- 2008 – 2012 will create c. 1bnt EUA surplus
- CER/ERU import limit into EUETS = 1.68bn
- These sources of supply will be used up after 2012 as tougher targets start to bite

Source: Bloomberg New Energy Finance

BASE CASE CUMULATIVE EU ETS DEMAND – 20% TARGET



- Combination of CER import allowance and low economic growth leads to small net demand in EU ETS up to 2020 under 20% target.
- The cost of achieving this is of the order €10/t.

Note : assumes 21% target in 2020

Source Bloomberg New Energy Finance

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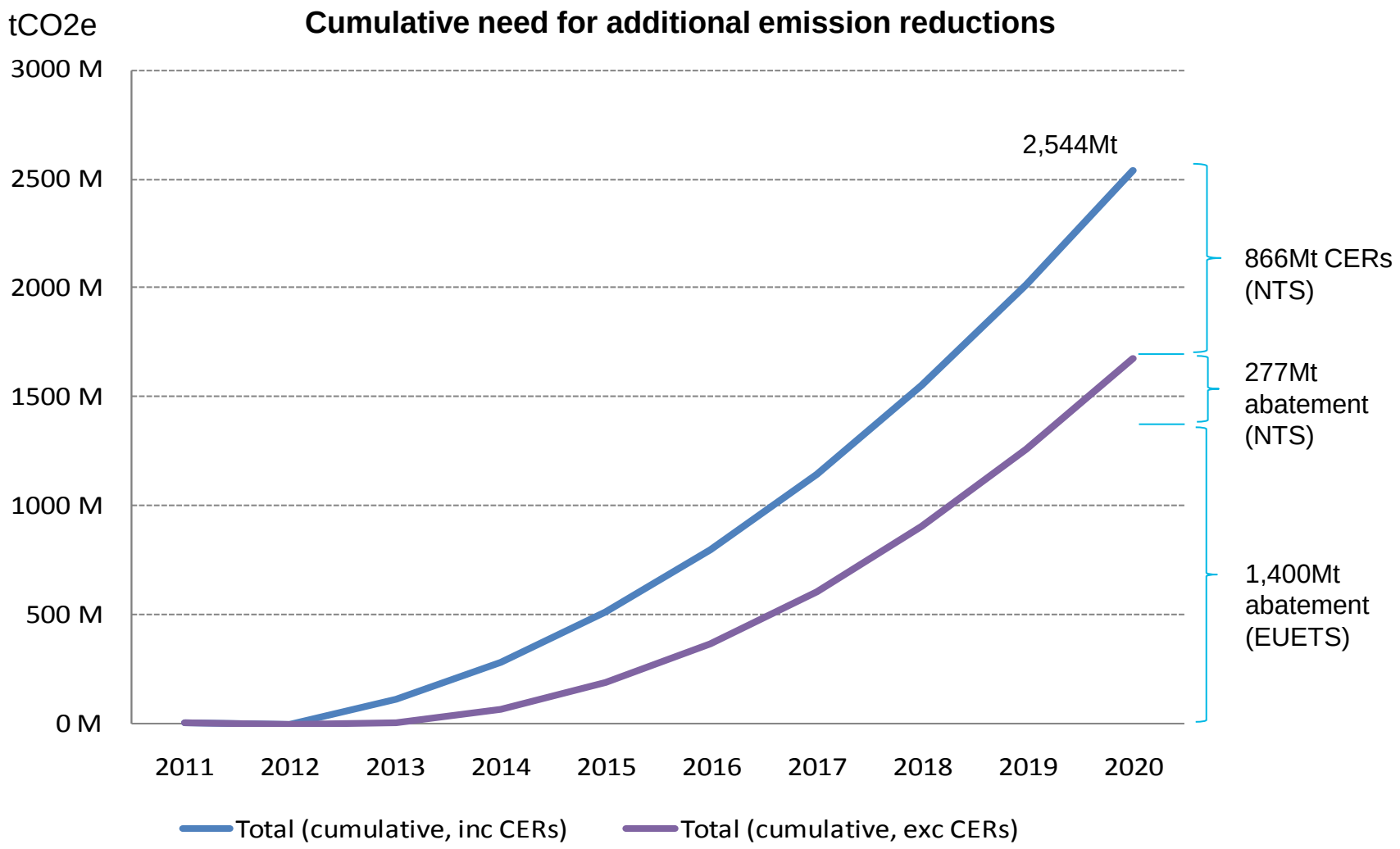
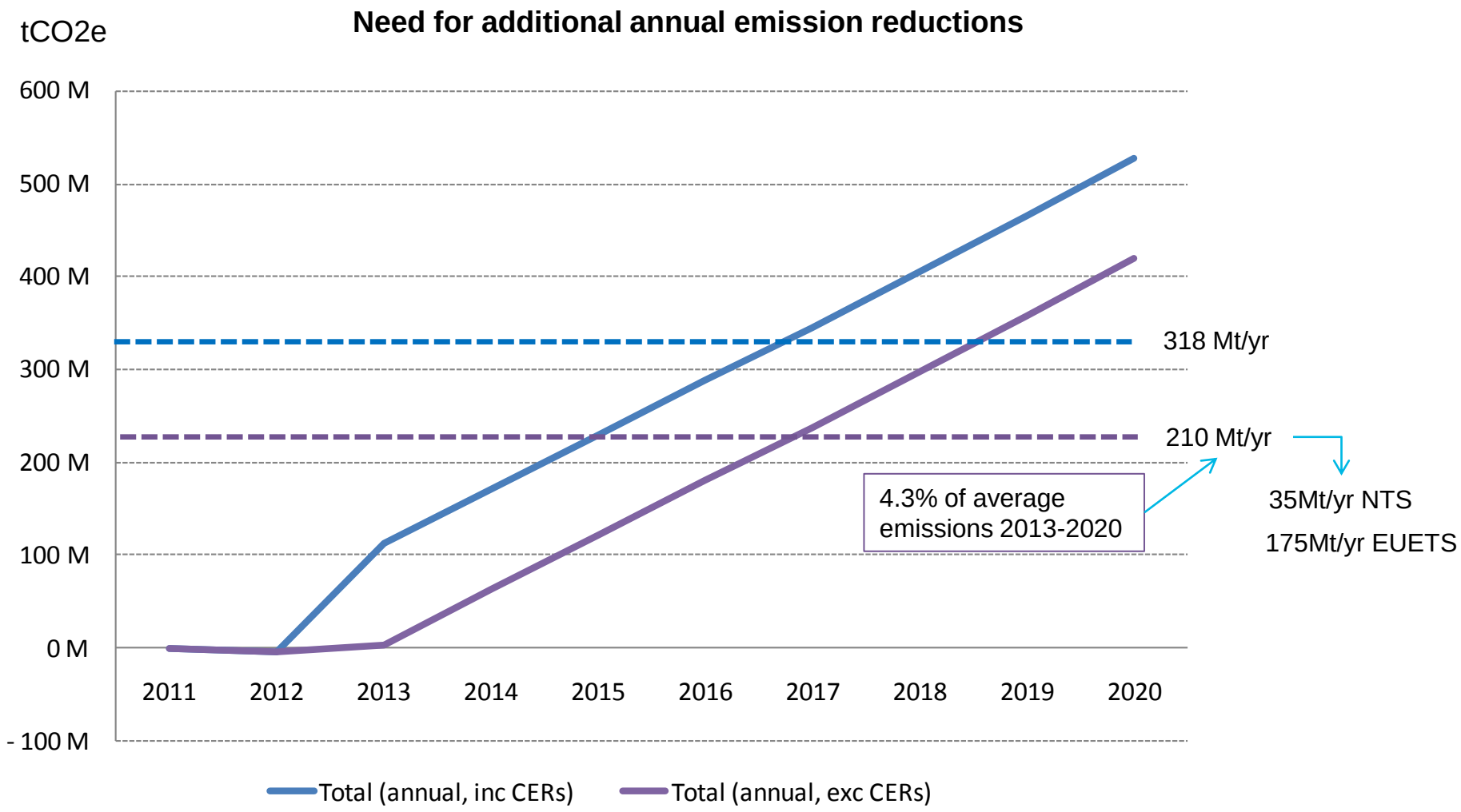
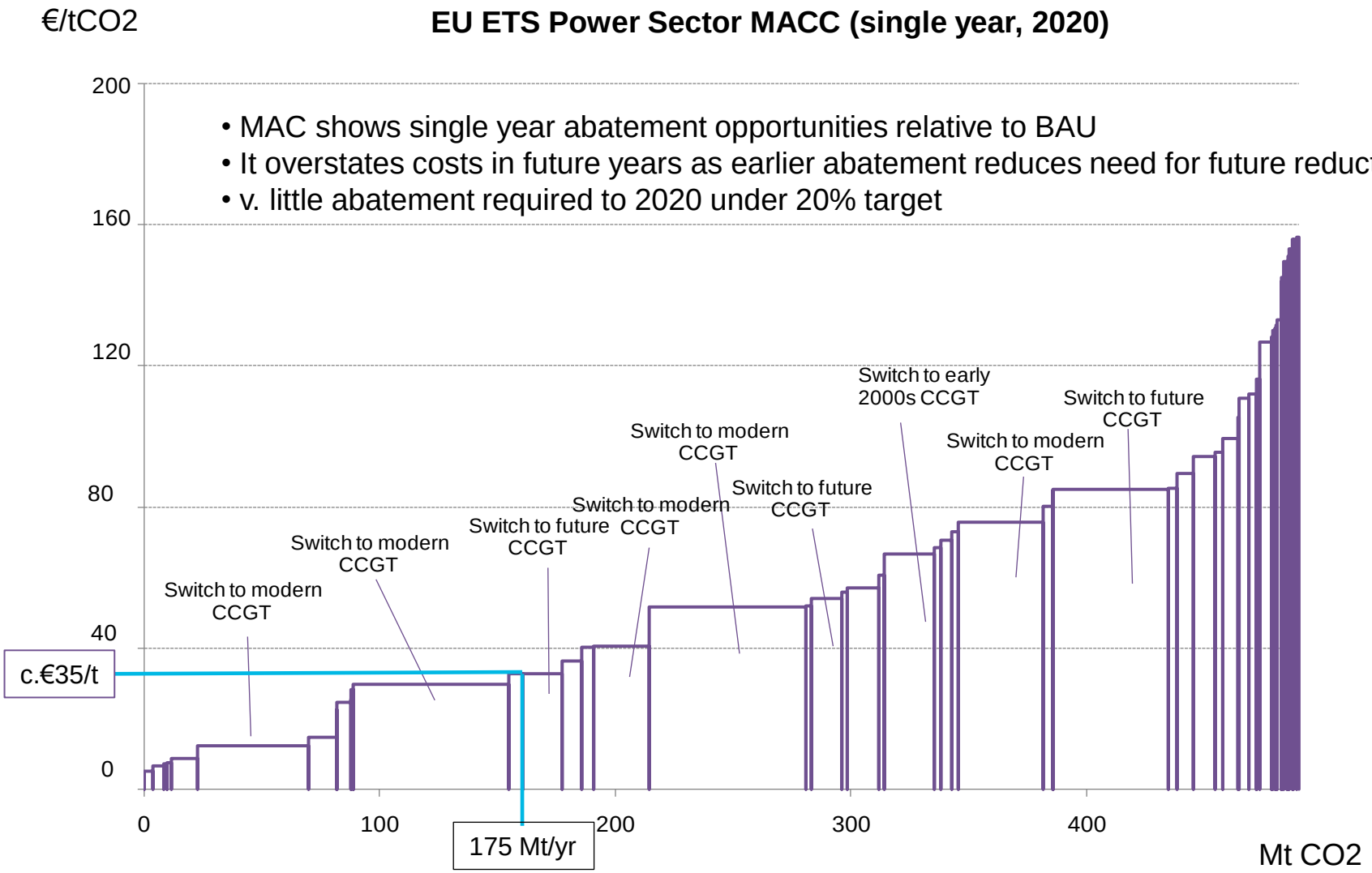
MOVING FROM 20% TO 30% TARGET



MOVING FROM A 20% TO 30% TARGET



COST OF REDUCING EMISSIONS IN EU ETS (APPROXIMATE)



SHARING THE BURDEN

- EU ETS targets currently applied evenly across the EU (irrespective of country) – but some redistribution of money from auctioning of allowances from more to less wealthier economies.
- Targets for NTS sectors set through Effort Sharing Decision (ESD).
- Current targets for NTS (20% target) set in line with GDP/ Capita – ie Germany, France, UK do proportionately more, less well off do less.
- Bloomberg and Commission analysis uses same principle of burden share under 20% and 30% targets. Other burden shares possible.
- Trading of emissions between Member States allowed.

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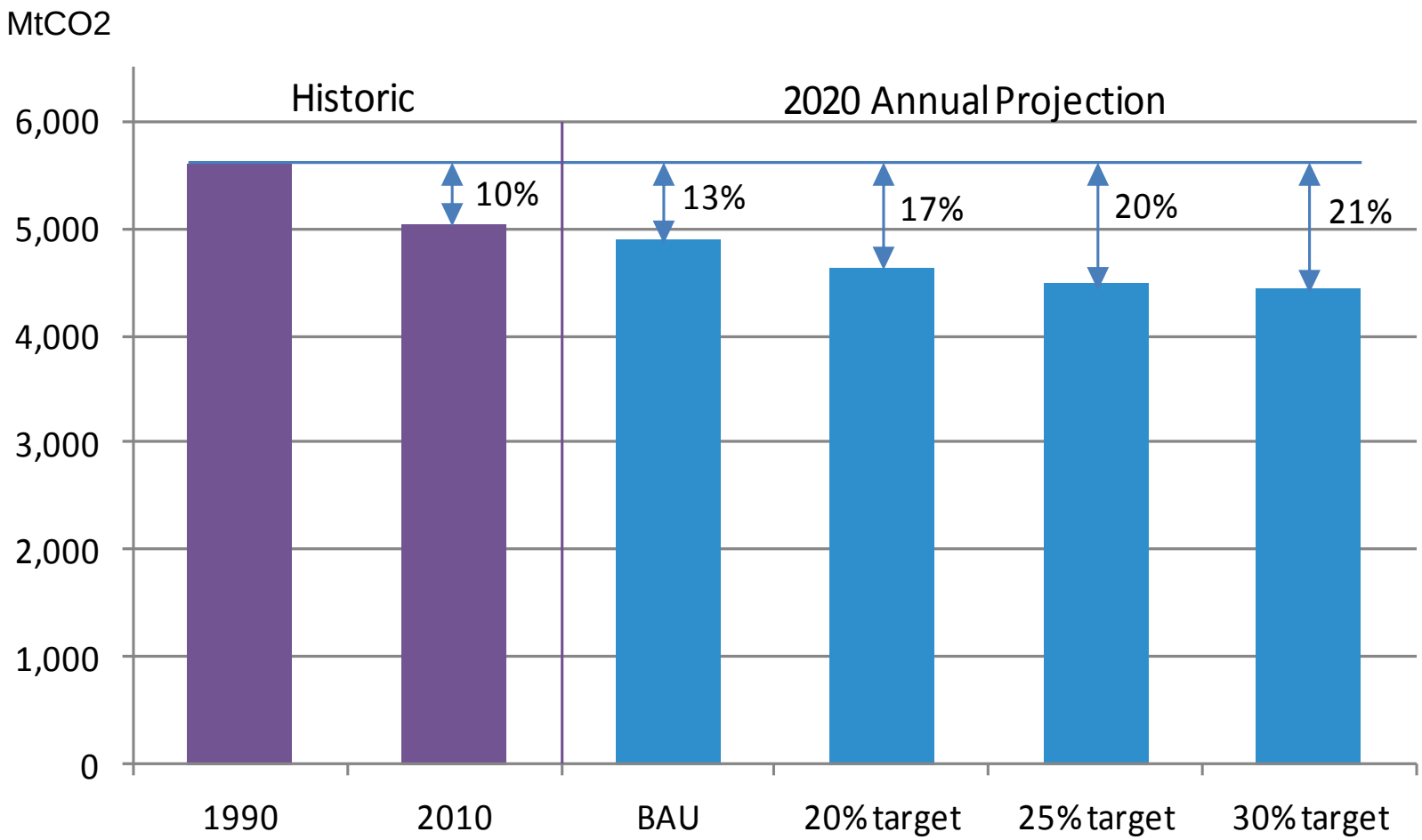
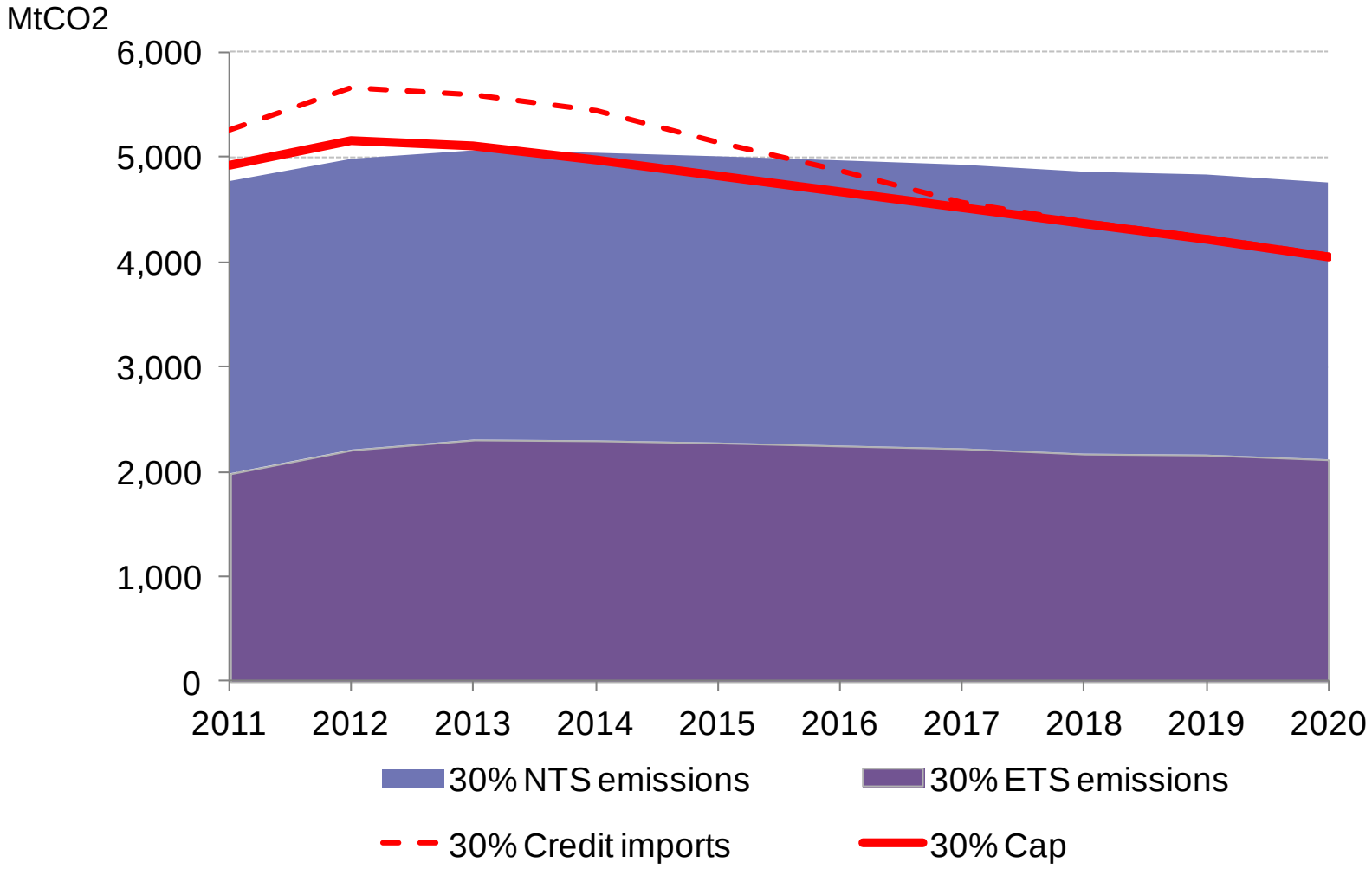
EMISSION REDUCTIONS IN 2020



EMISSIONS PROFILE UNDER 30% TARGET



RESULTS

EU27 annual average costs over 2011-2020 (2011 € billion)
(central fuel prices, 2020 clearing)

Emissions Reduction Target	Total annual cost of 20% target (including renewable energy)		Cost of 30% target relative to 20% target		Carbon Price (€ / tCO2e)	
	(€bn)	(% GDP)	(€bn)	(% GDP)	ETS	NTS
20%	23.2	0.21%	N/A		11	8
30%	26.7	0.24%	3.5	0.03%	33	8

Source: Bloomberg New Energy Finance

RESULTS

Annual average cost for the H-15 higher income and L-12 lower income Member States over 2011-2020 (central fuel prices, 2020 clearing) (%GDP)

Emissions Reduction Target	H-15		L-12	
	Total cost (incl. Renewable Energy Target)	Cost relative to 20% target	Total cost (incl. Renewable Energy Target	Cost relative to 20% target
20%	0.21%	N/A	0.06%	N/A
30%	0.24%	0.03%	-0.02%	-0.08%

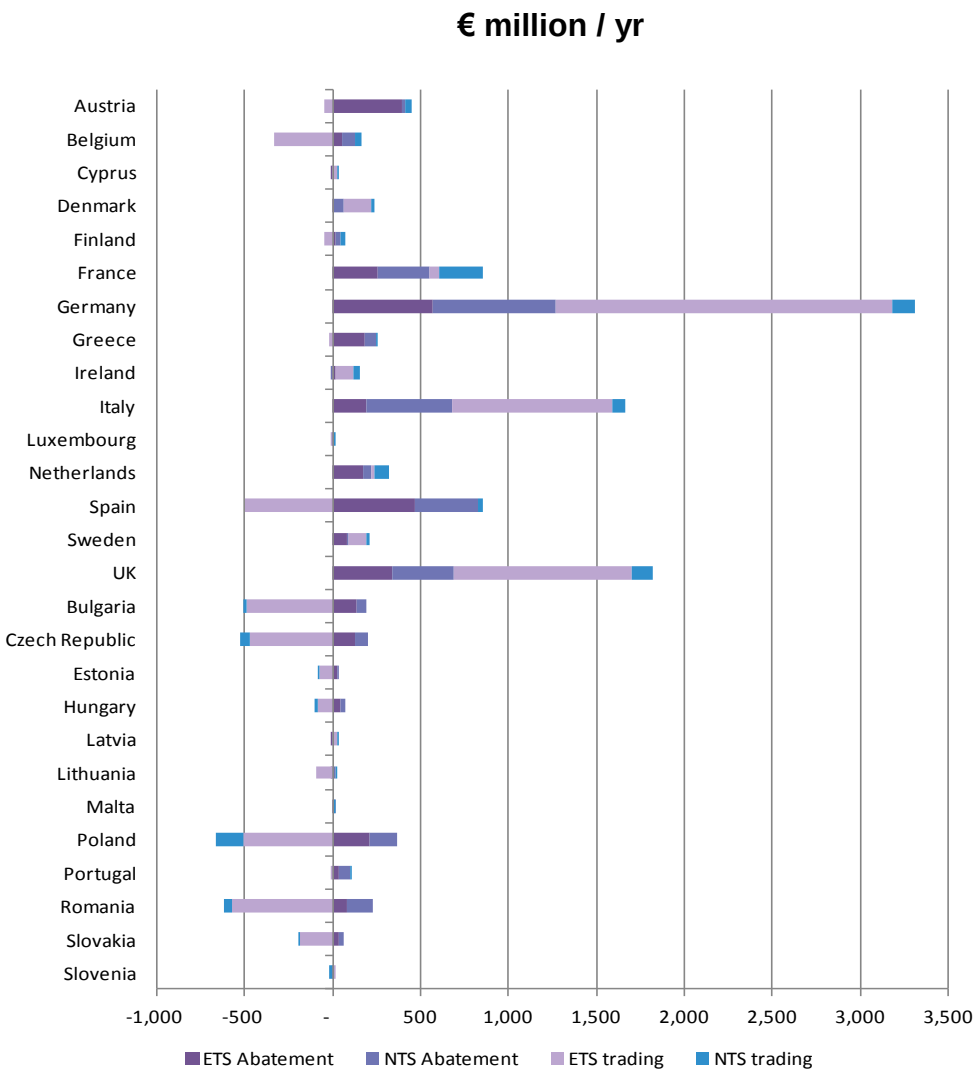
Source: Bloomberg New Energy Finance

RESULTS

Country	Annual average abatement relative to BAU (Mt CO2e)	Additional costs relative to BAU - (% GDP) *	Additional costs relative to 20% target (% GDP)
Austria	5.9	0.16%	0.05%
Belgium	4.7	-0.06%	-0.02%
Cyprus	0.1	0.12%	0.12%
Denmark	1.3	0.12%	0.02%
Finland	4.6	0.01%	-0.01%
France	6.9	0.05%	0.01%
Germany	49.1	0.15%	0.08%
Greece	11.7	0.10%	0.02%
Ireland	1.4	0.09%	0.07%
Italy	14.2	0.12%	0.07%
Luxembourg	0.1	0.01%	0.00%
Netherlands	7.1	0.06%	0.00%
Spain	22.3	0.04%	0.01%
Sweden	4.6	0.07%	0.03%
UK	38.3	0.10%	0.03%
H-15 Sub-total	**172.3**	**0.09%**	**0.04%**
Bulgaria	7.2	-1.18%	-0.46%
Czech Rep.	8.7	-0.27%	-0.17%
Estonia	0.9	-0.39%	-0.29%
Hungary	2.7	-0.04%	0.02%
Latvia	0.3	0.20%	0.04%
Lithuania	0.8	-0.34%	-0.24%
Malta	0.0	0.20%	-0.13%
Poland	26.4	-0.10%	-0.06%
Portugal	1.0	0.07%	0.10%
Romania	9.9	-0.39%	-0.12%
Slovakia	1.4	-0.24%	-0.13%
Slovenia	0.9	-0.00%	0.00%
L-12 Sub-total	**60.2**	**-0.19%**	**-0.08%**
EU-27 Total	**232.5**	**0.07%**	**0.03%**

* Including

RESULTS



- Costs show:
  - ETS abatement
  - NTS abatement
  - ETS trading
  - NTS trading
- Germany Italy, UK have highest costs
- More than half of costs of these countries made up of buying carbon allowances from other countries or purchase of offsets
- Belgium, Spain, Bulgaria, Czech Republic, Poland, Romania, Slovakia -all gain from selling carbon allowances.

Source: Bloomberg New Energy Finance

SENSITIVITIES

- Using current methodology:
  - Higher fossil (gas prices) €4bn/yr
  - Longer market horizon (2028) €4bn/yr
- Results show average costs over 2013-2020 period.
- If presented as single year in 2020 total cost = c. €9bn/yr (€23/t average cost x 400Mt in 2020)

COMMISSION COMPARISON

- Commission Staff Working Paper:

Cost of moving from 20% to 30% target	=	€25bn/yr in 2020 (2008 prices)
ETS carbon price	=	€30/tCO2 (€16.5 in ref sc.)
Average annual investment (2016-2020)	=	€18bn/yr

- Commission numbers include welfare effects – ie loss in consumer utility.
- Excluding welfare effects, actual costs < €12bn/yr (400Mt/yr reduction in 2020 x €30/t marginal cost = €12bn/yr. This is a max figure as €30/t is marginal price).

Source: Bloomberg New Energy Finance

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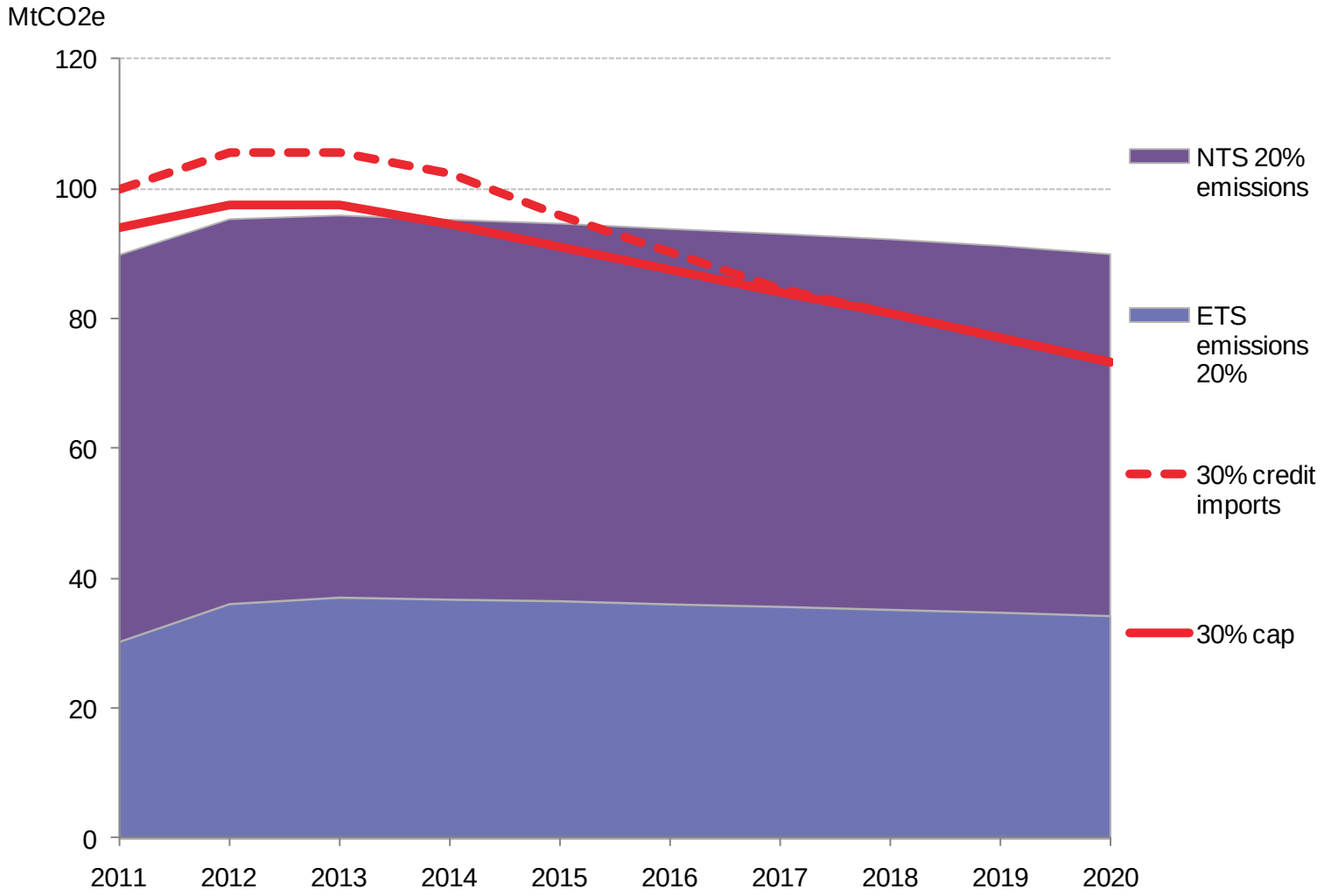
AUSTRIA



Source: Bloomberg New Energy Finance

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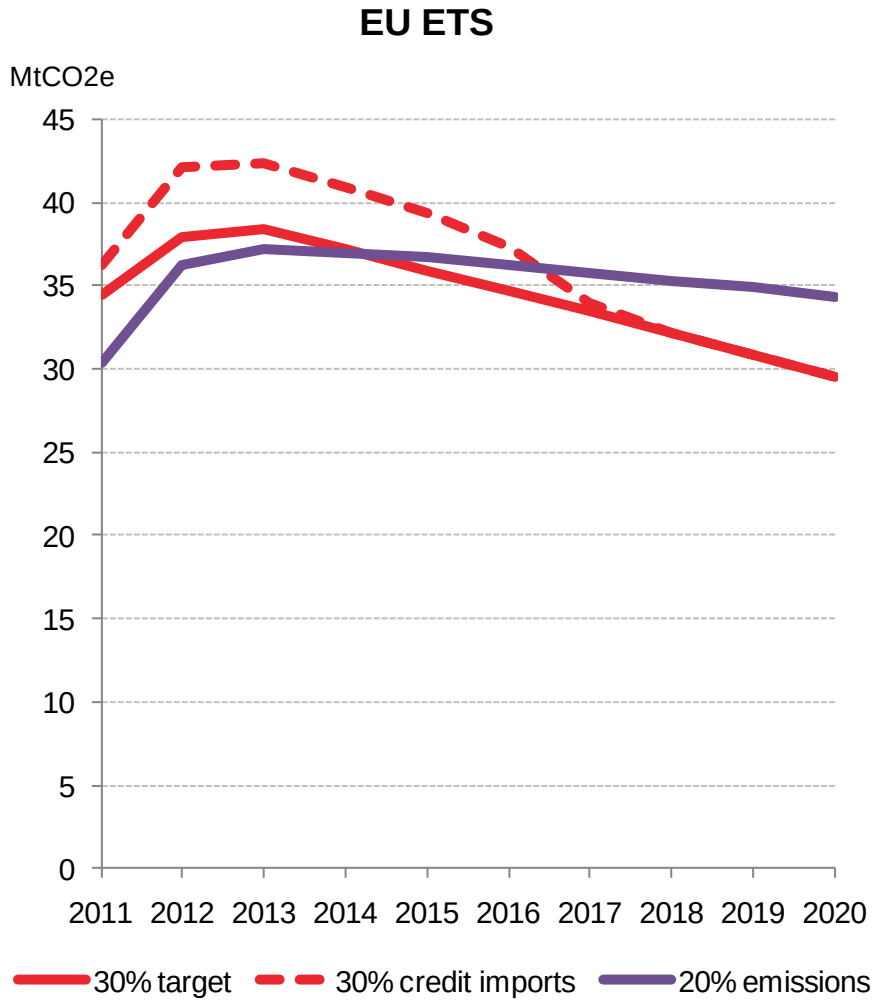

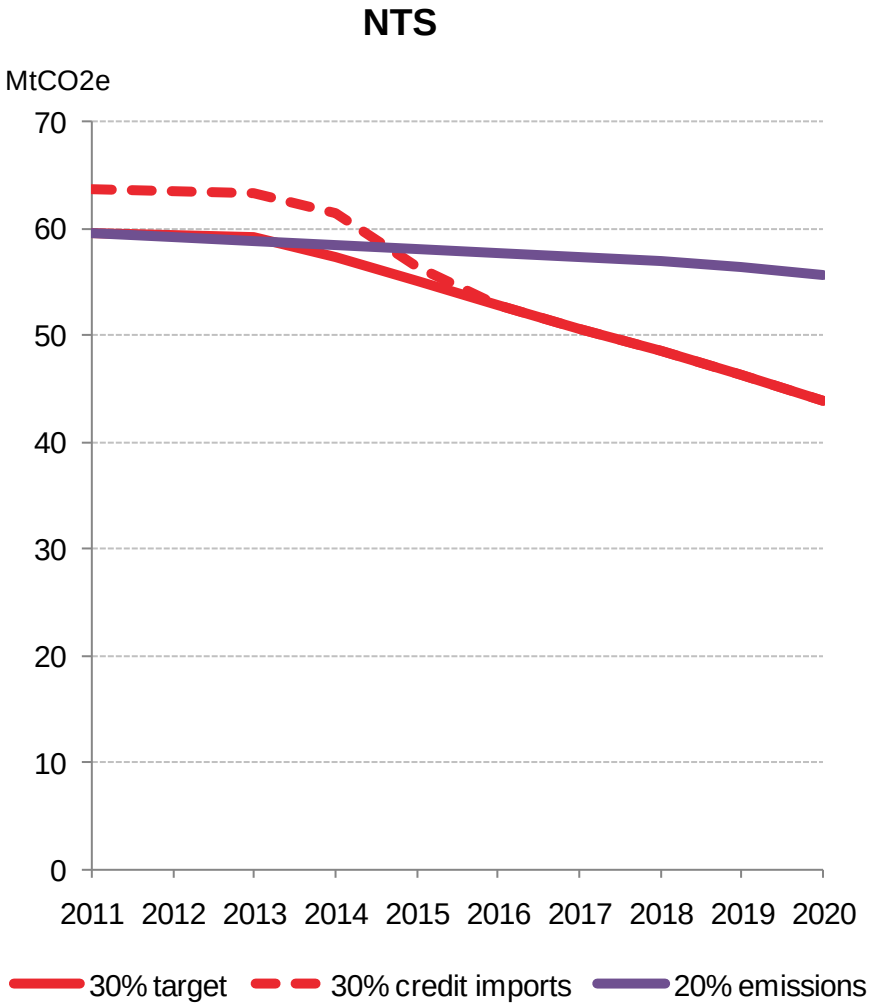

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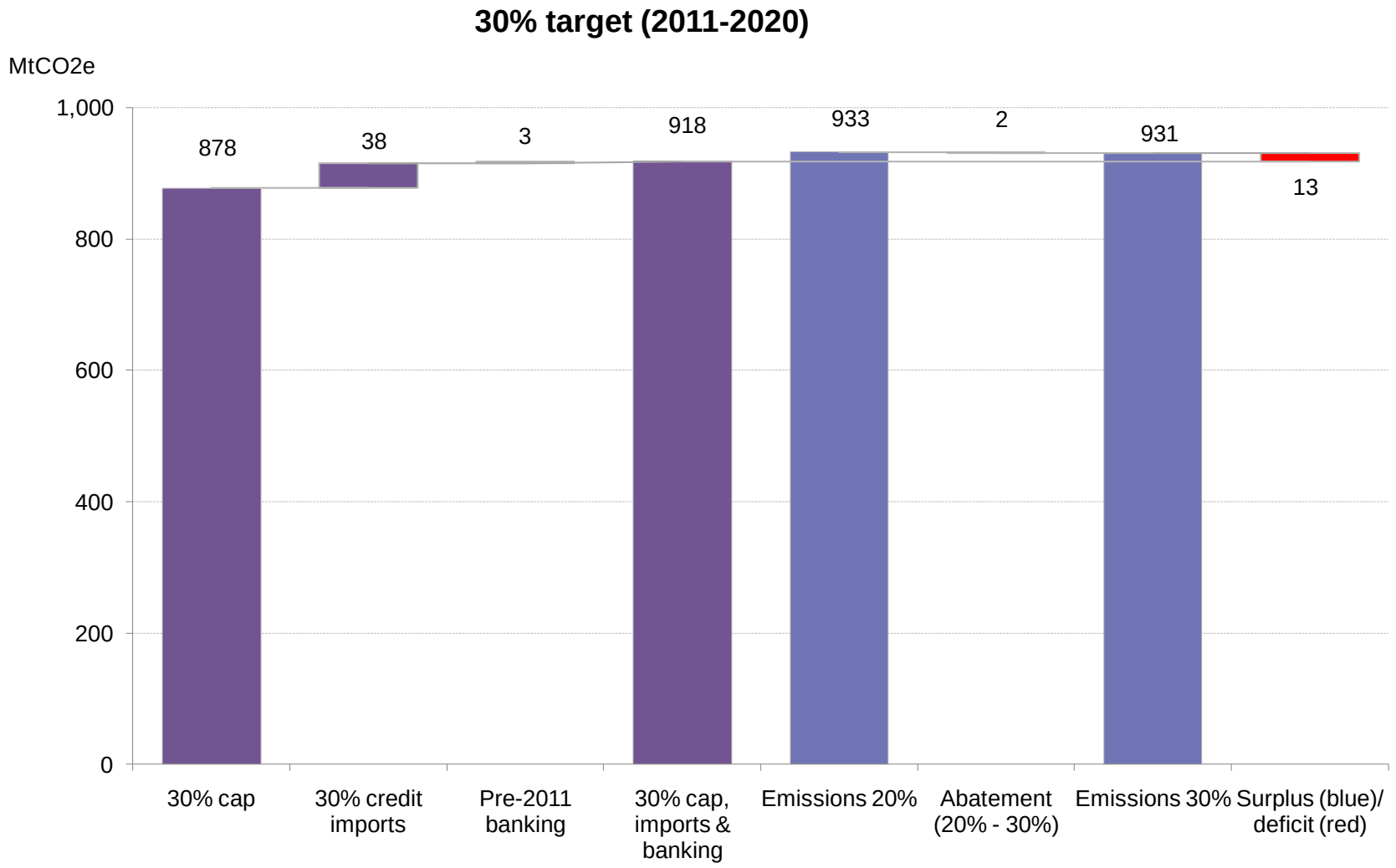
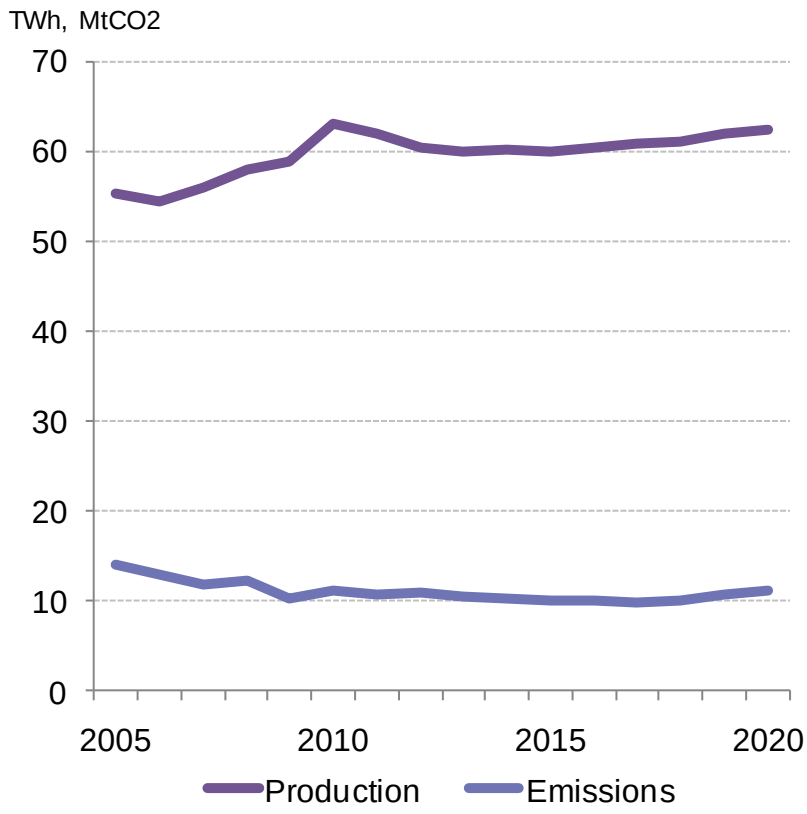
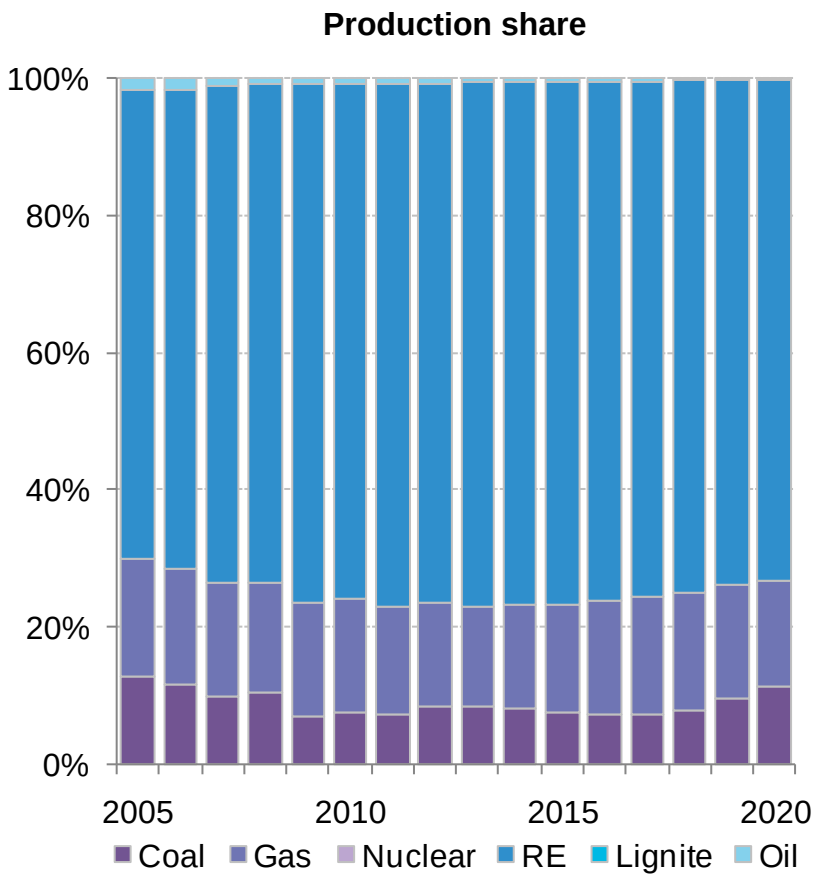


Source: Bloomberg New Energy Finance

AUSTRIA POWER SECTOR (20% SCENARIO)





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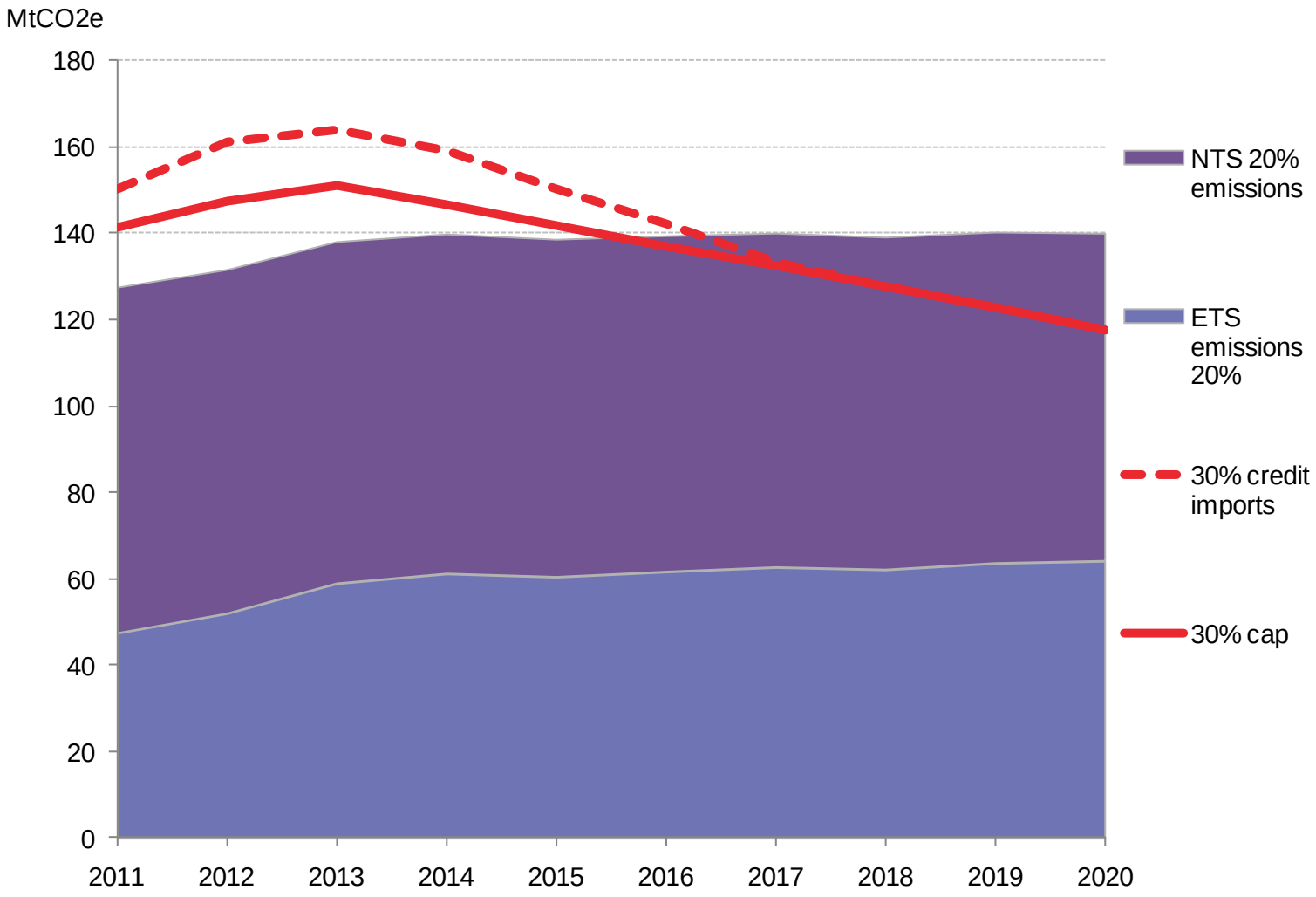
BELGIUM



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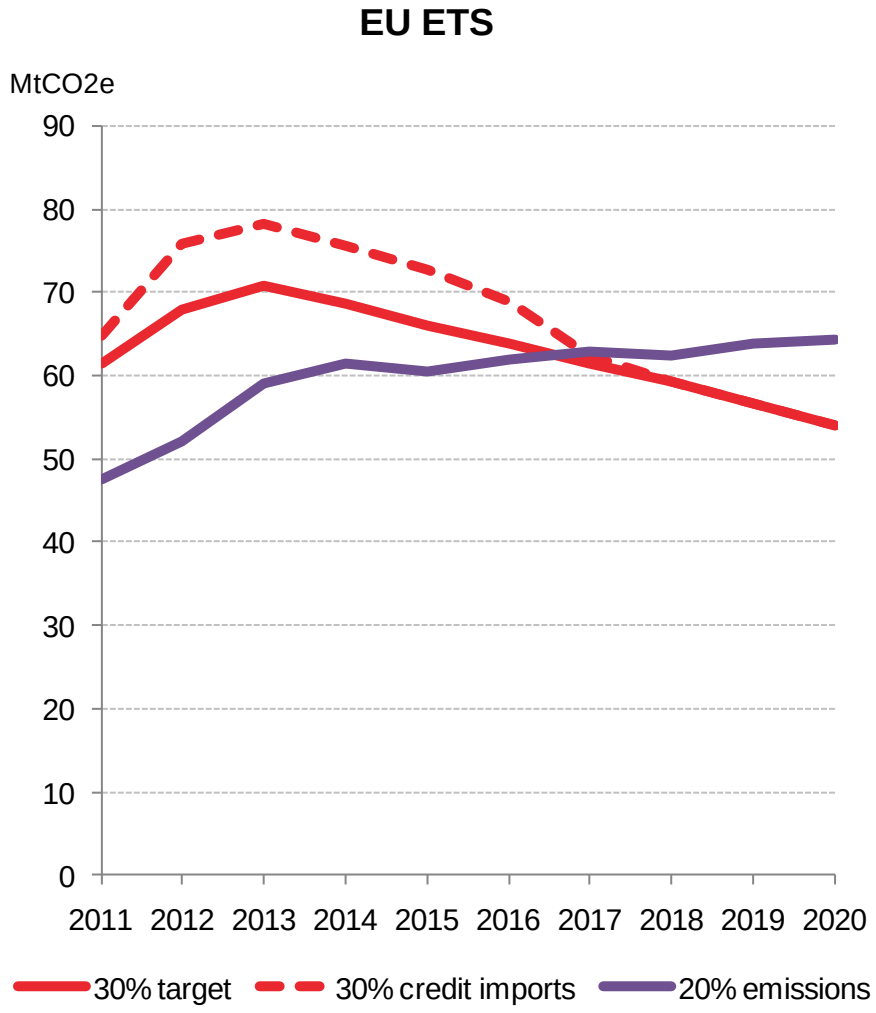

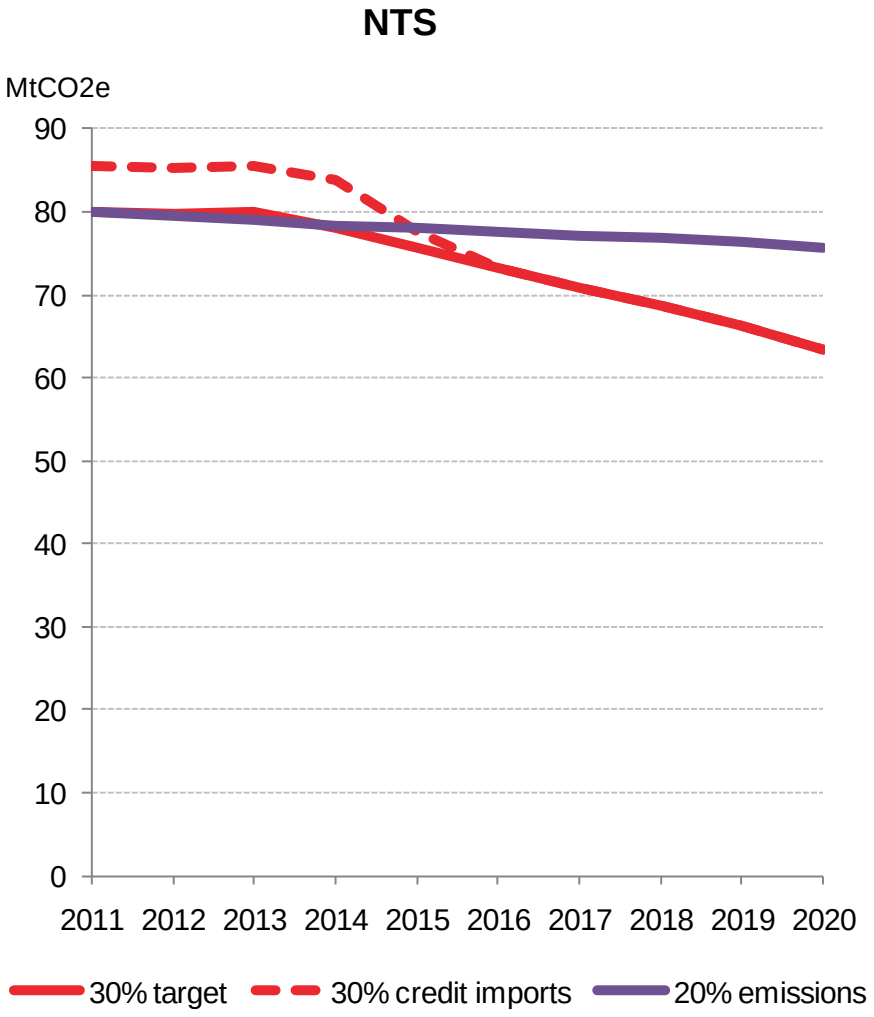

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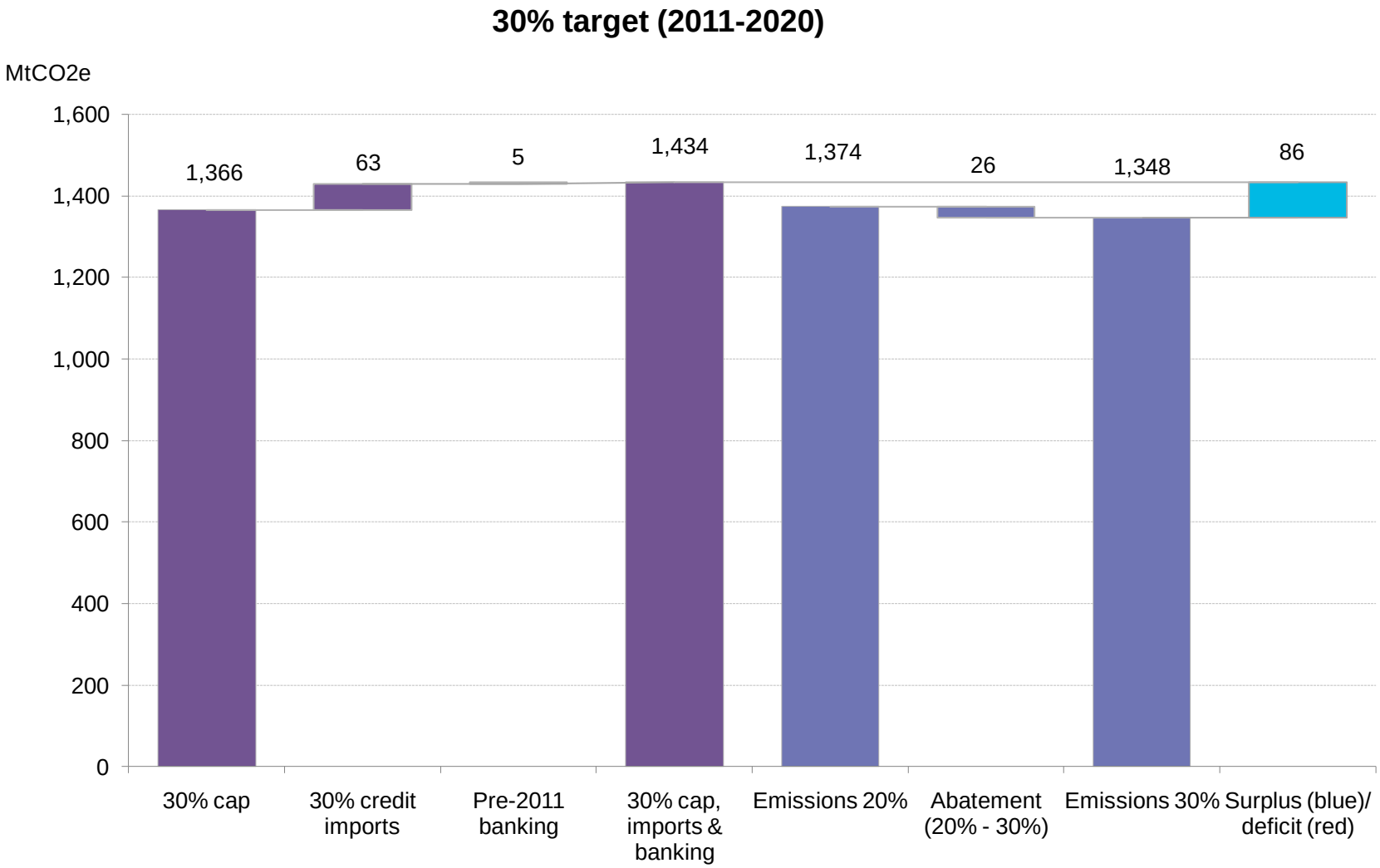

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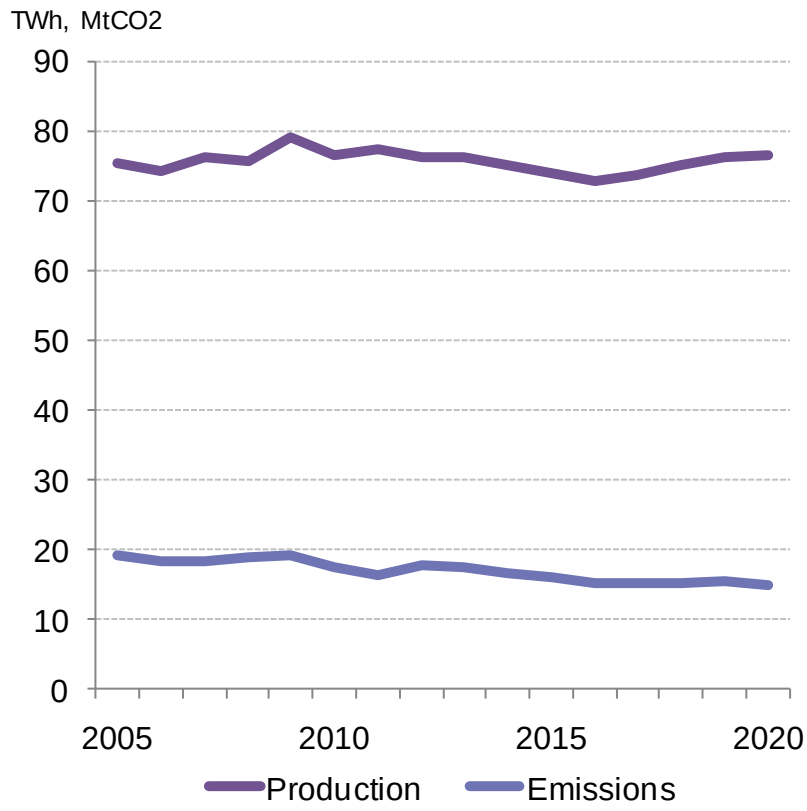

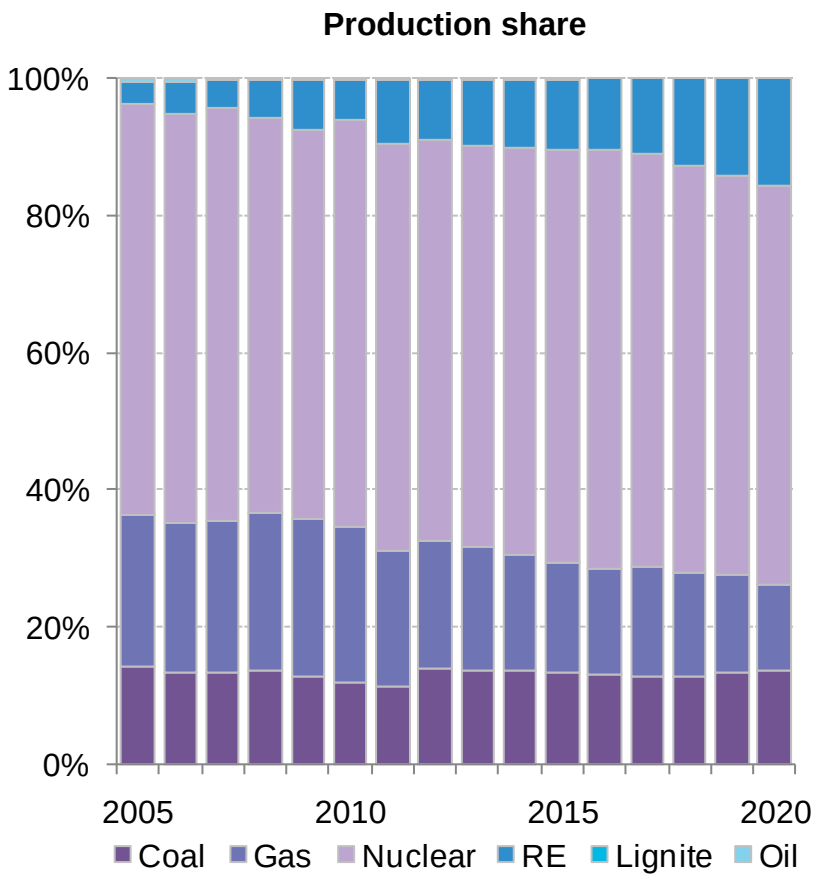

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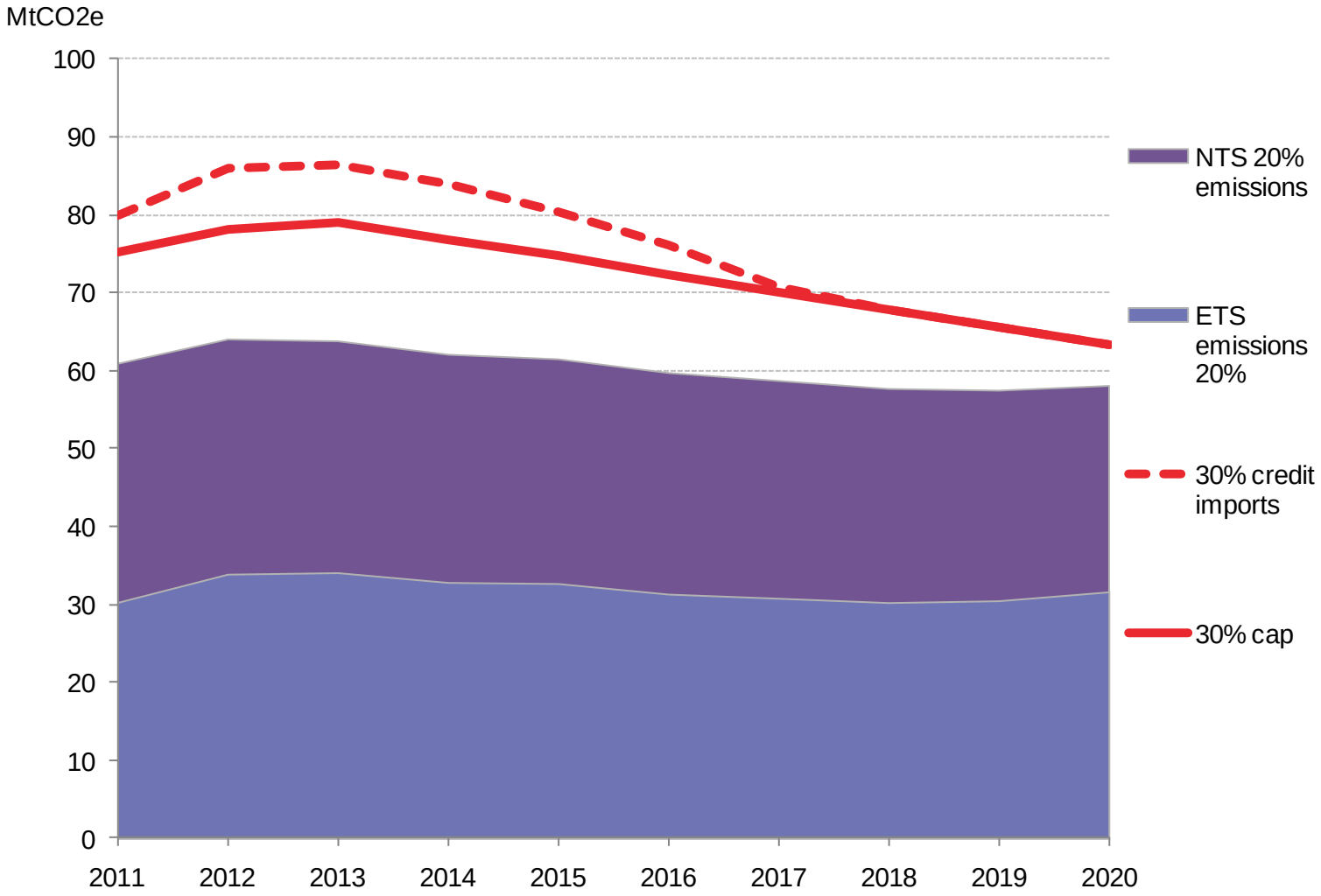
BULGARIA



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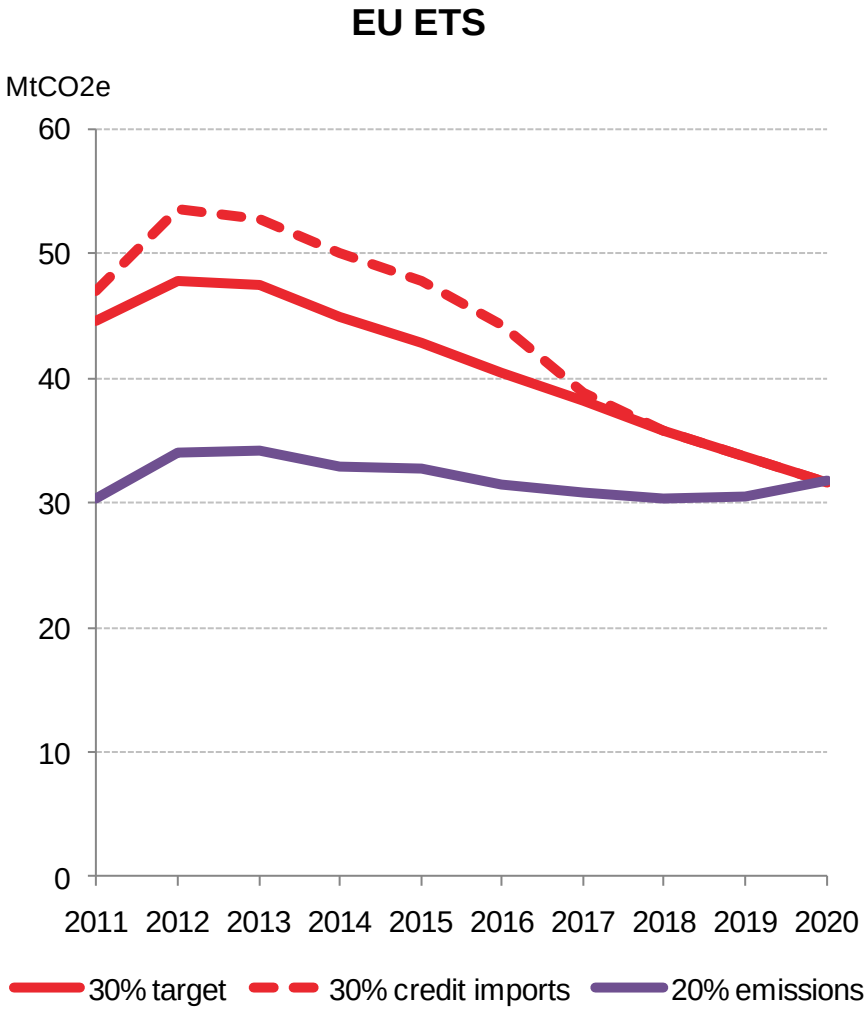

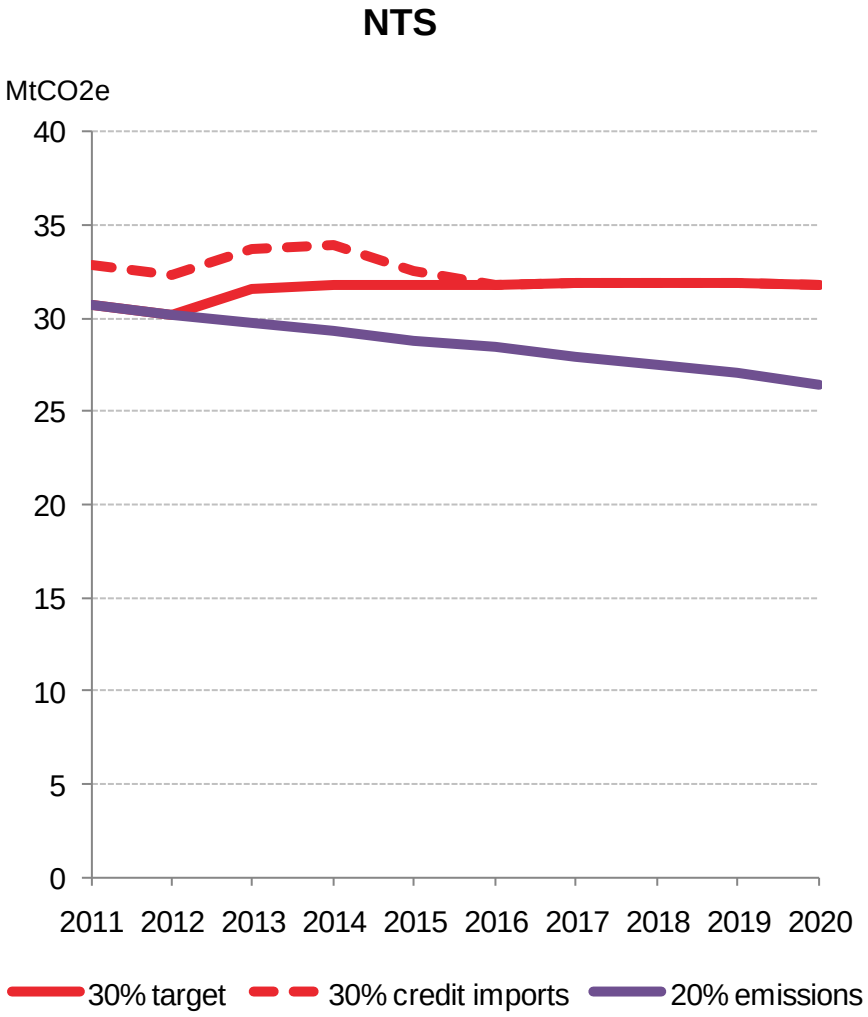

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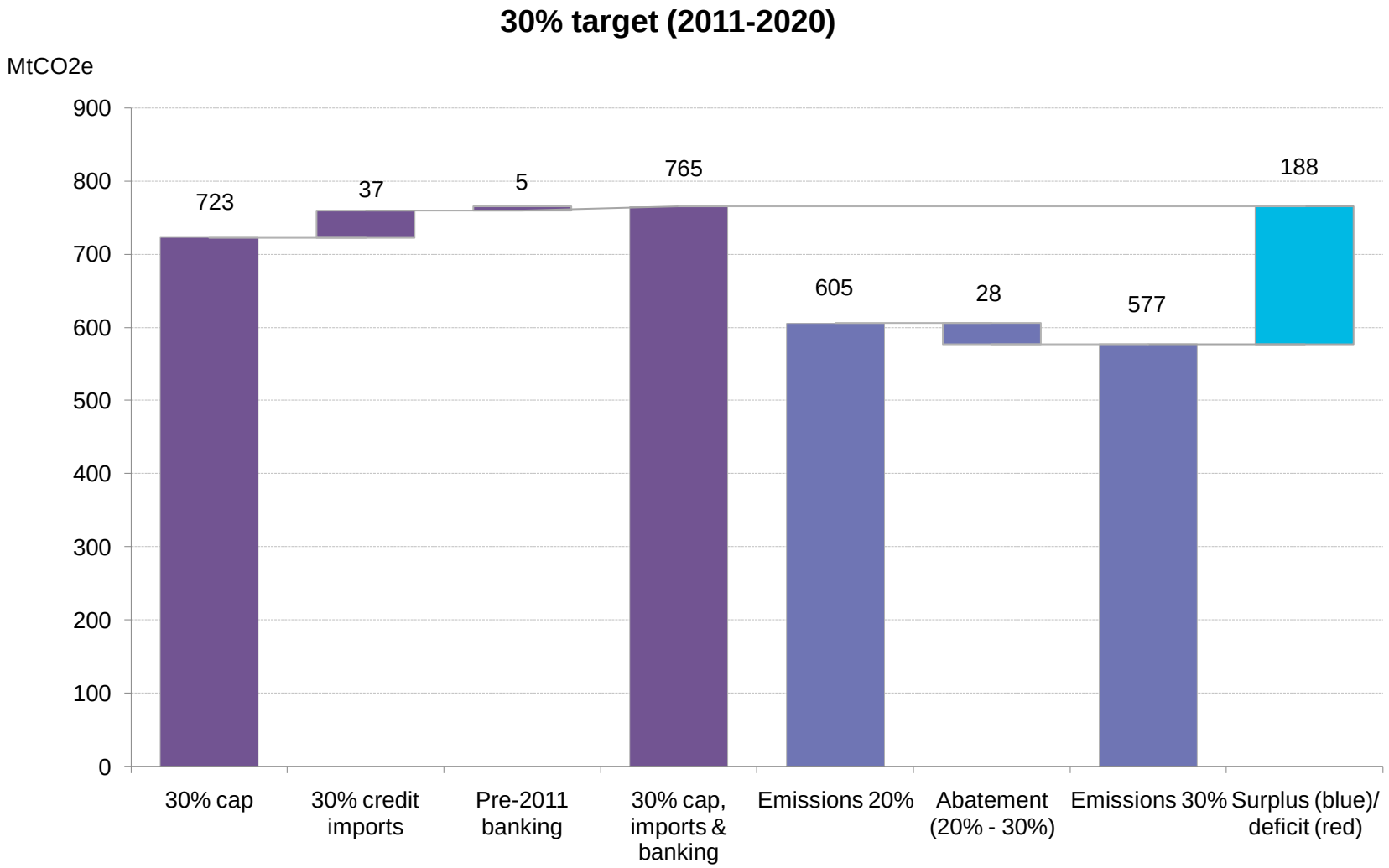

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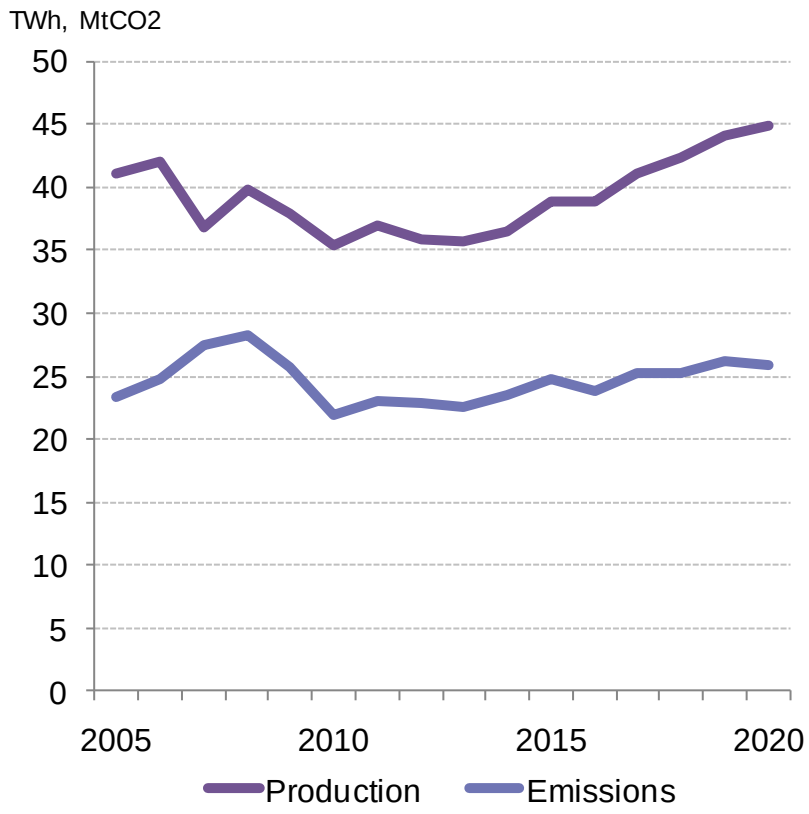

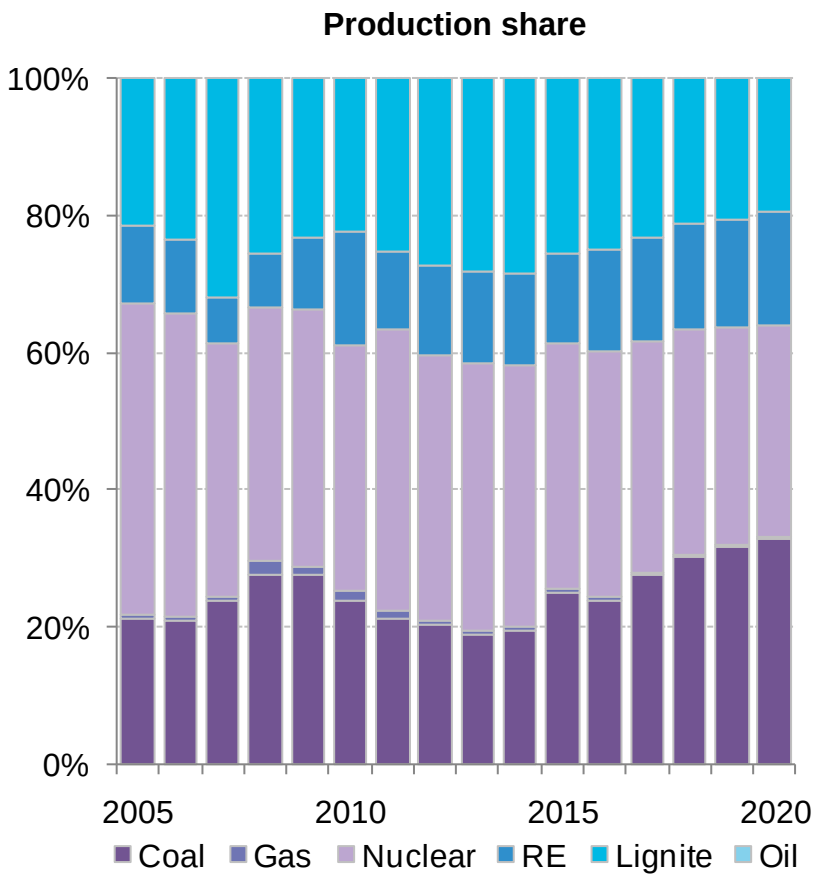

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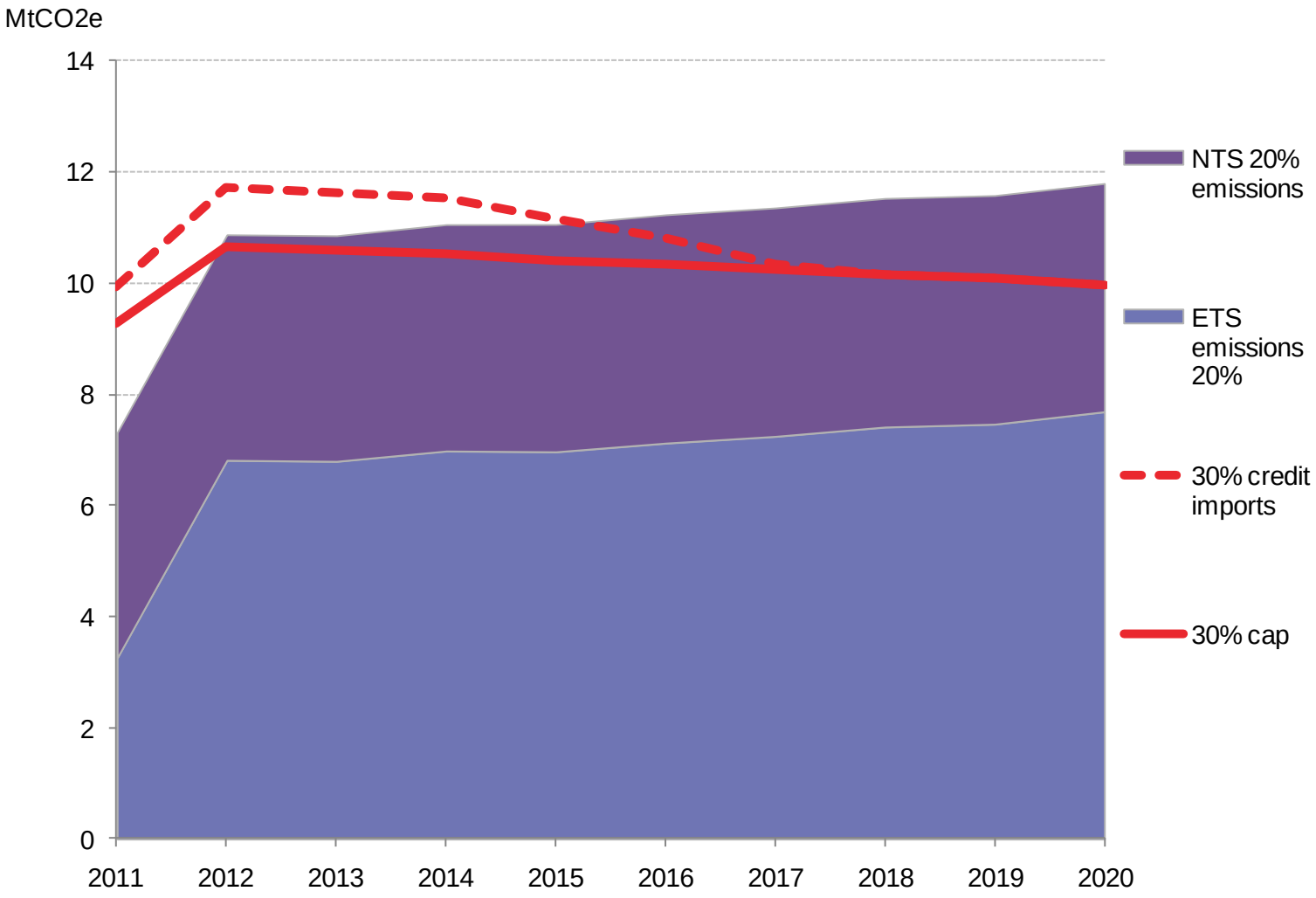
CYPRUS



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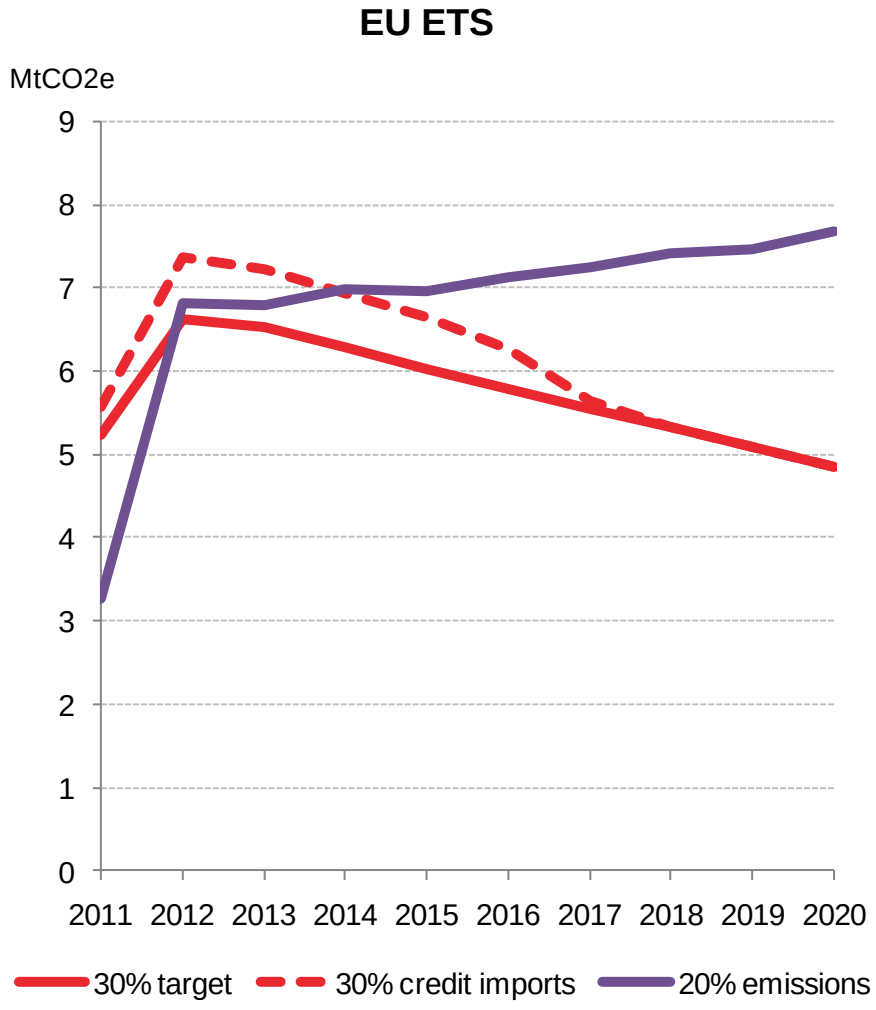

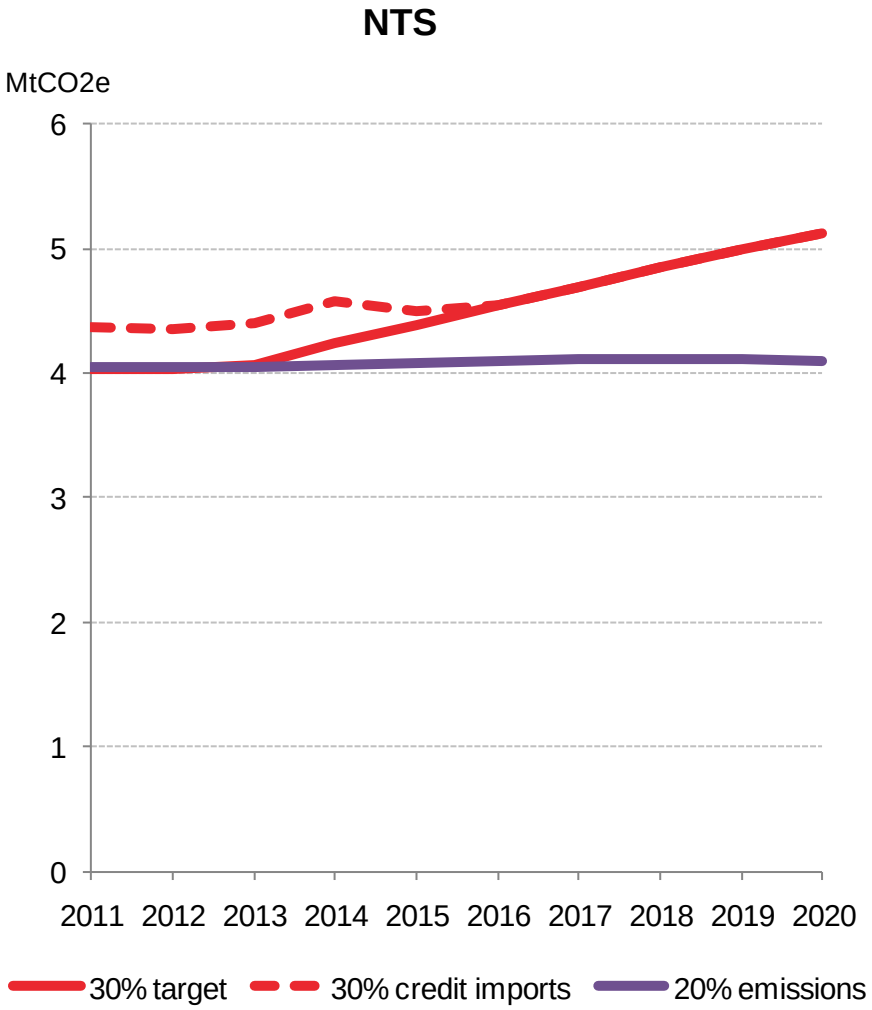

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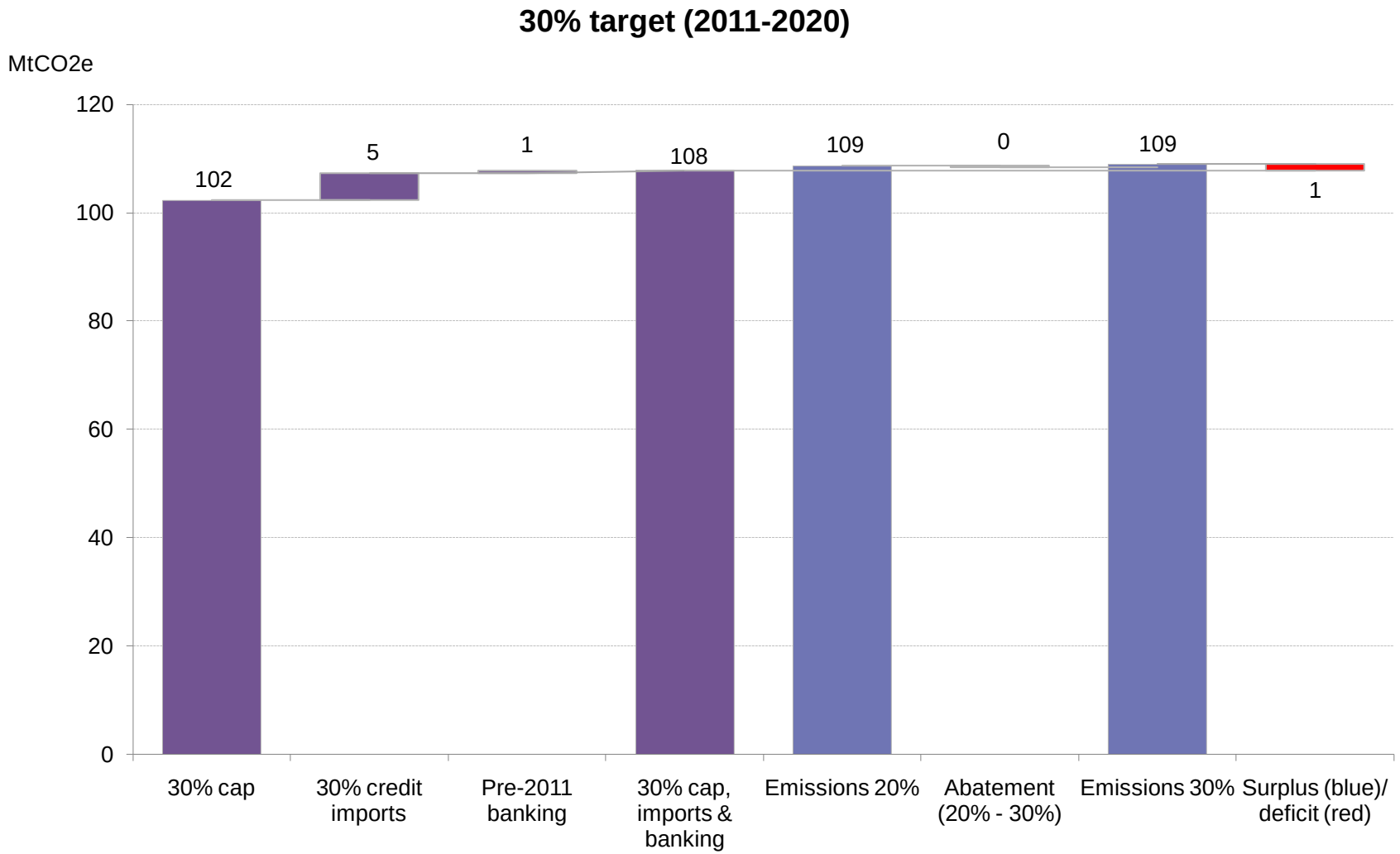

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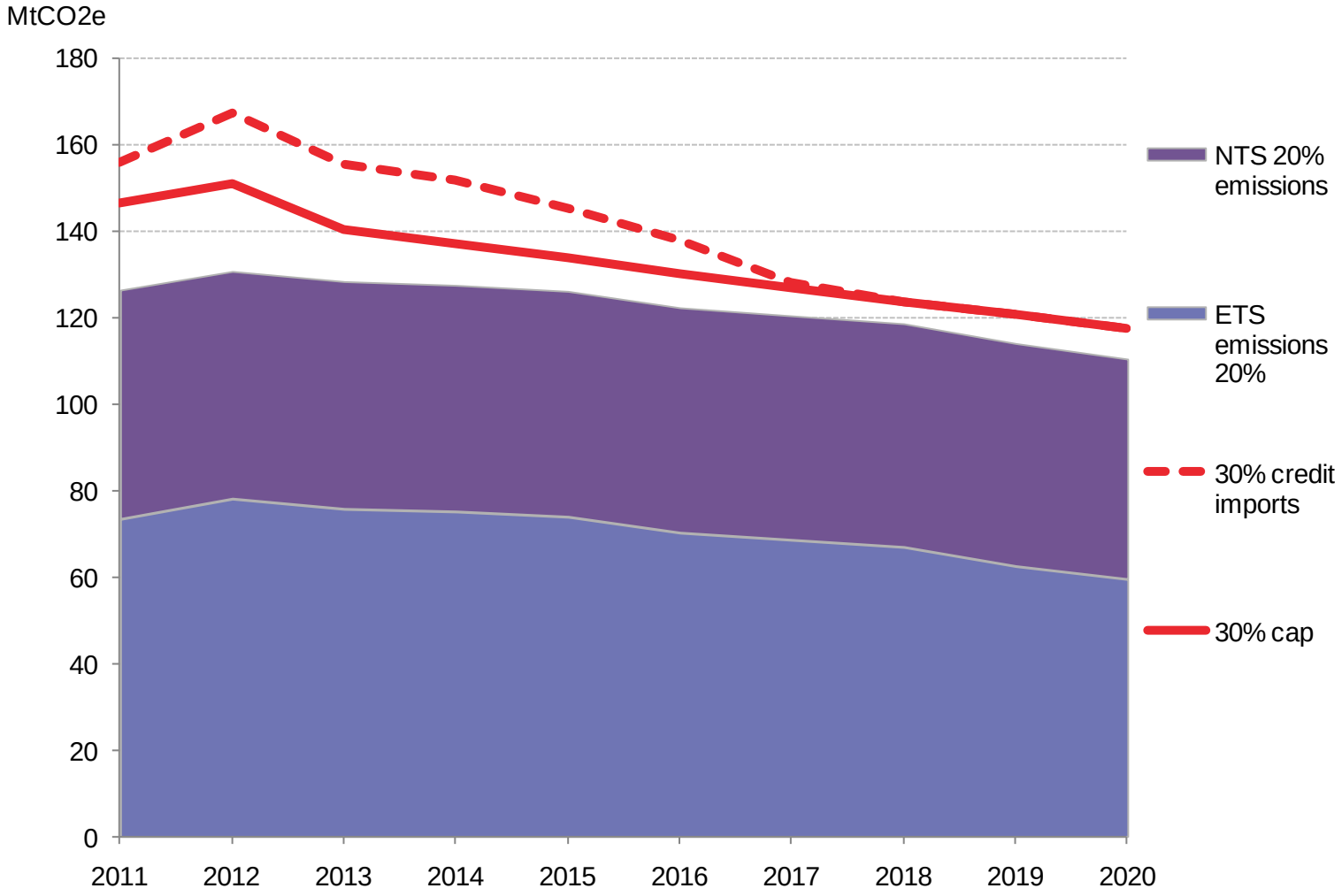
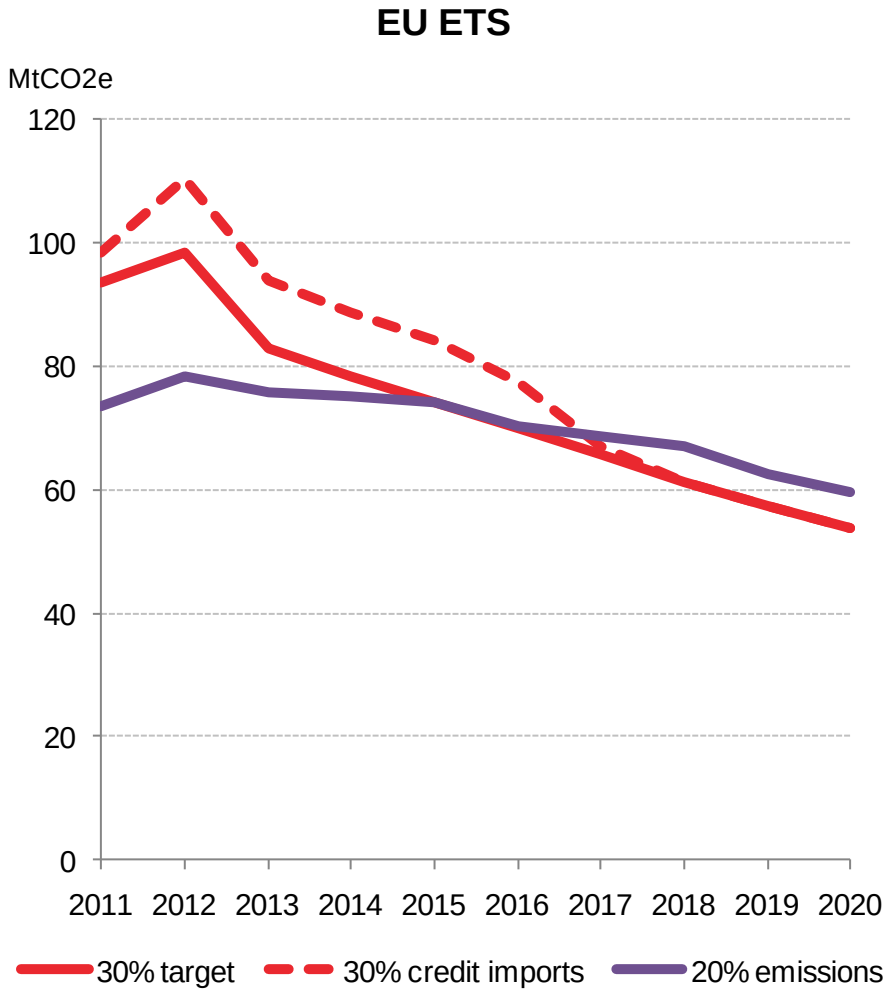
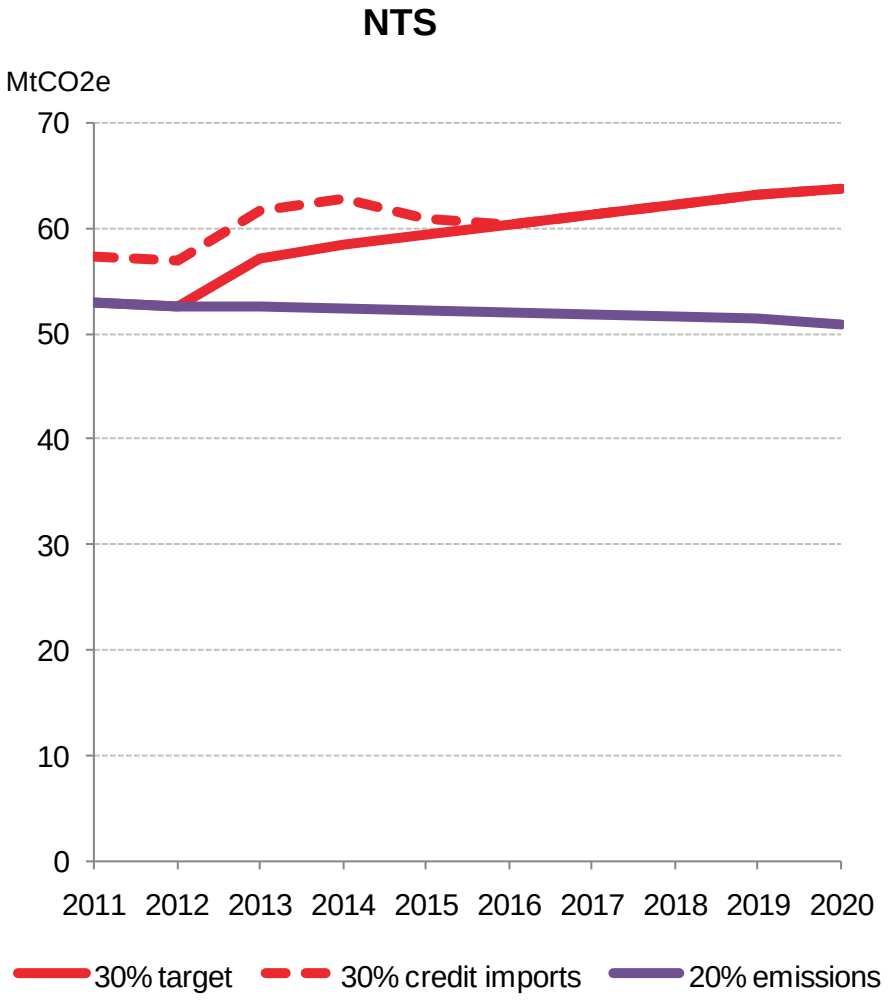
CZECH REPUBLIC



Source: Bloomberg New Energy Finance

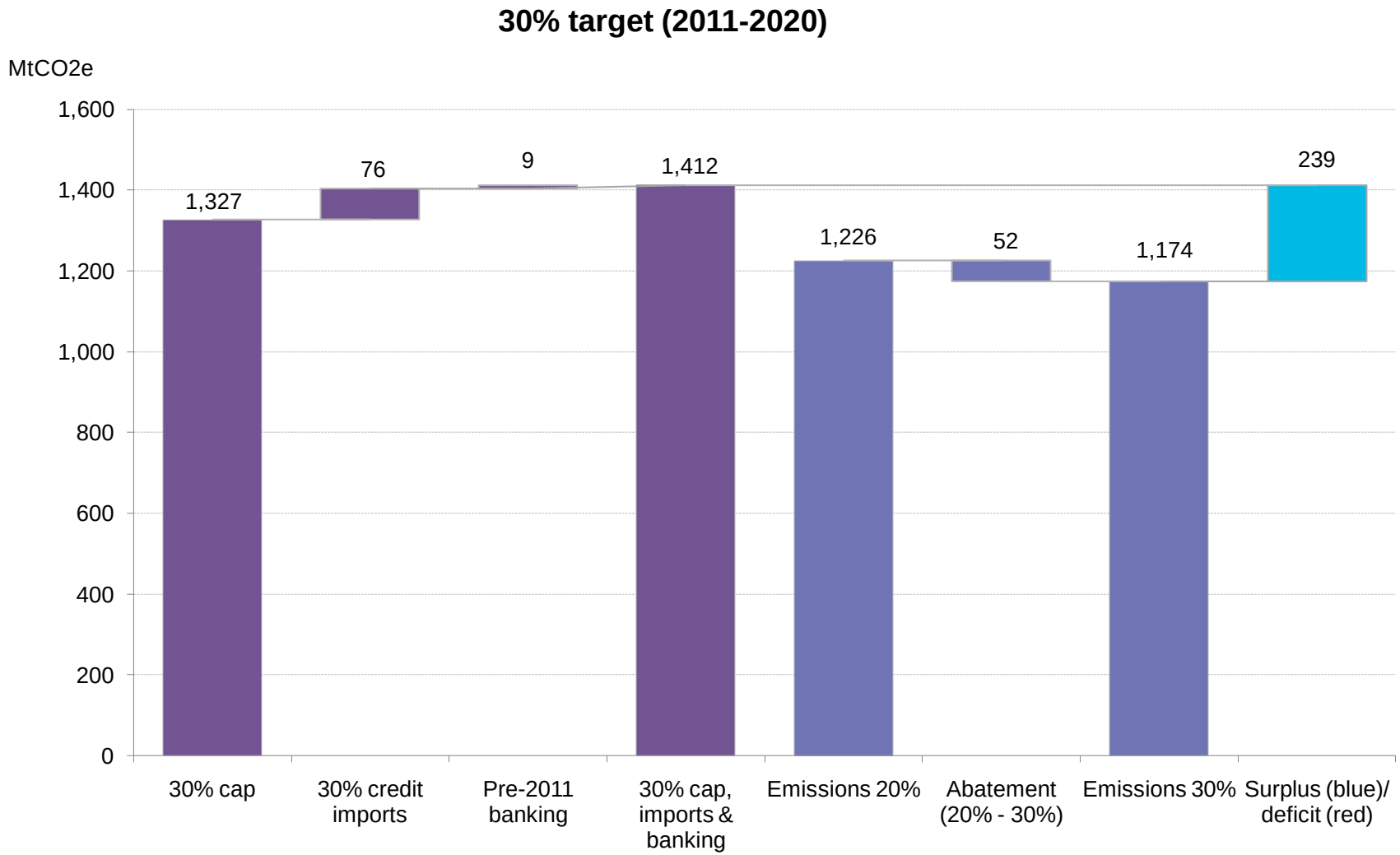
CZECH REPUBLIC





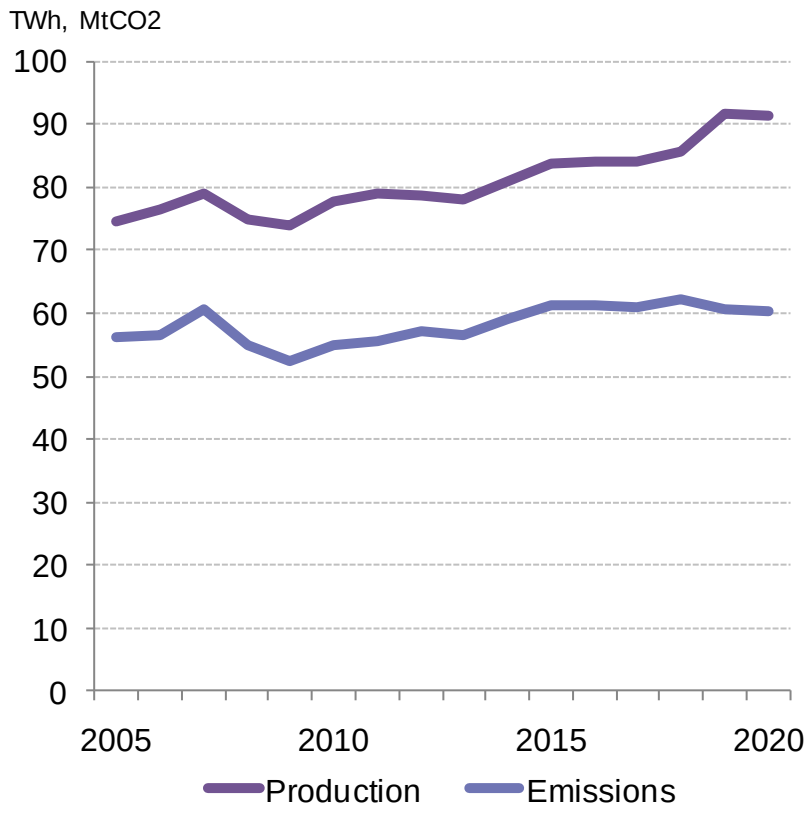
Source: Bloomberg New Energy Finance

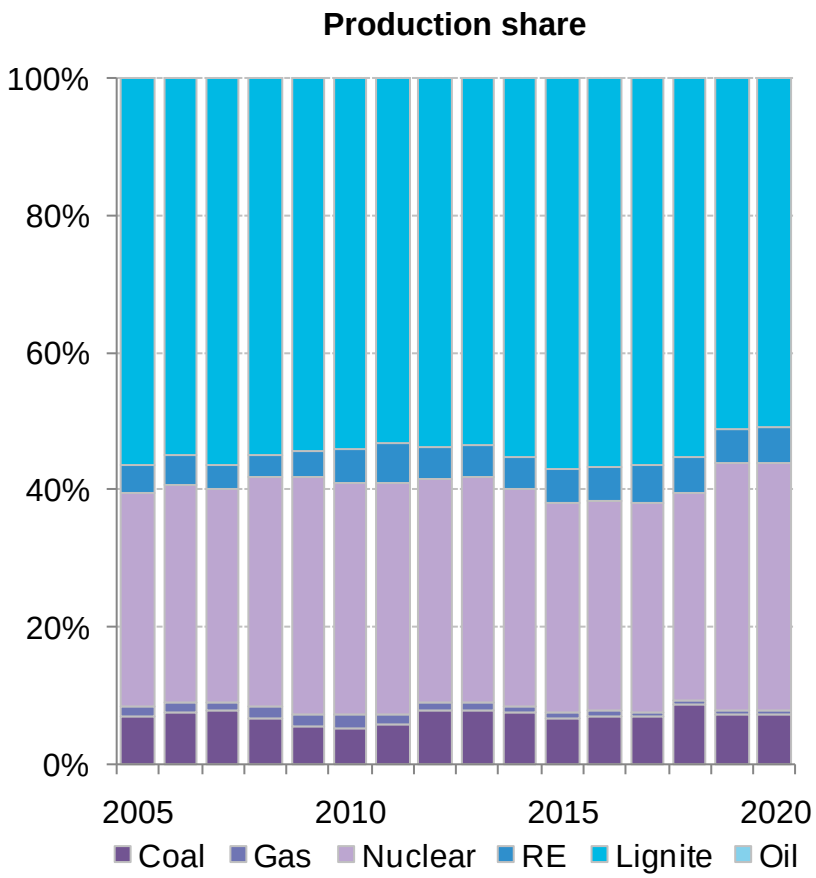
CZECH REPUBLIC



Source: Bloomberg New Energy Finance

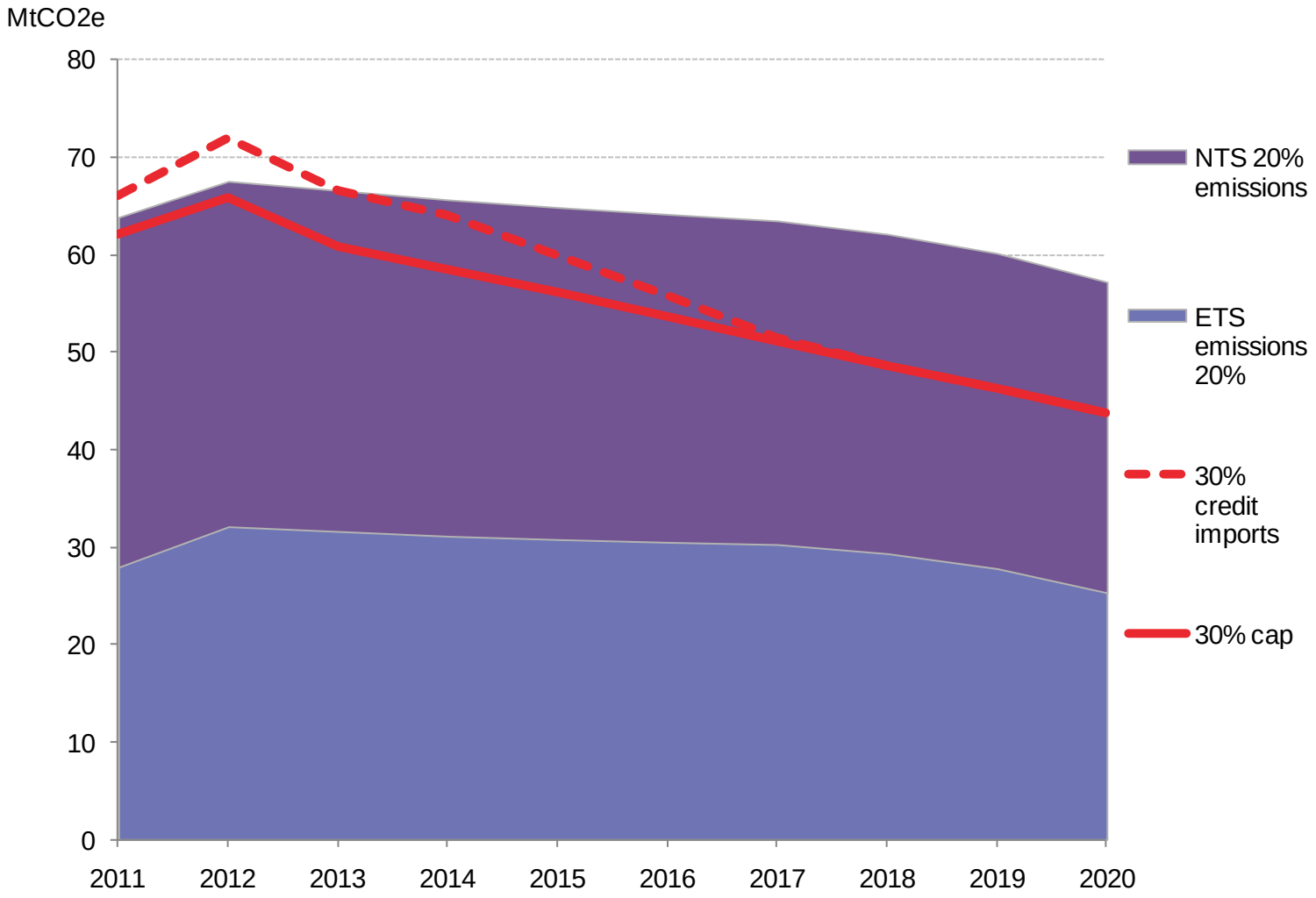
CZECH REPUBLIC POWER SECTOR (20% SCENARIO)





Source: Bloomberg New Energy Finance

DENMARK



Source: Bloomberg New Energy Finance

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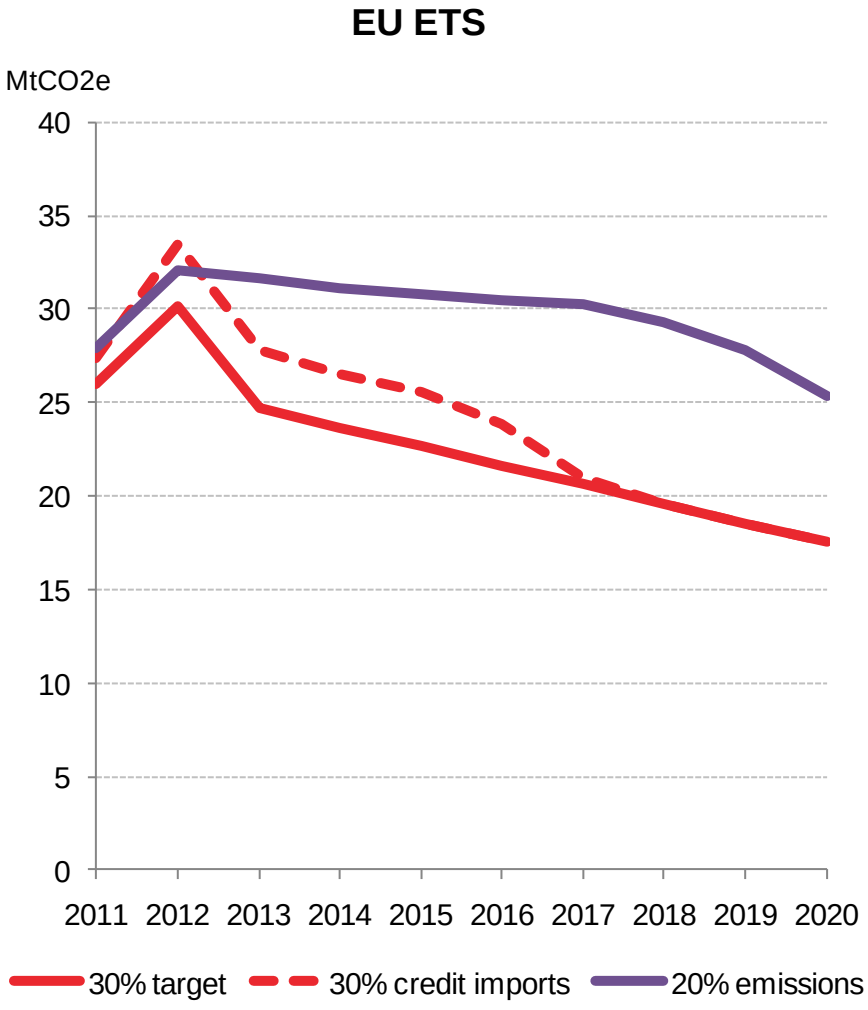
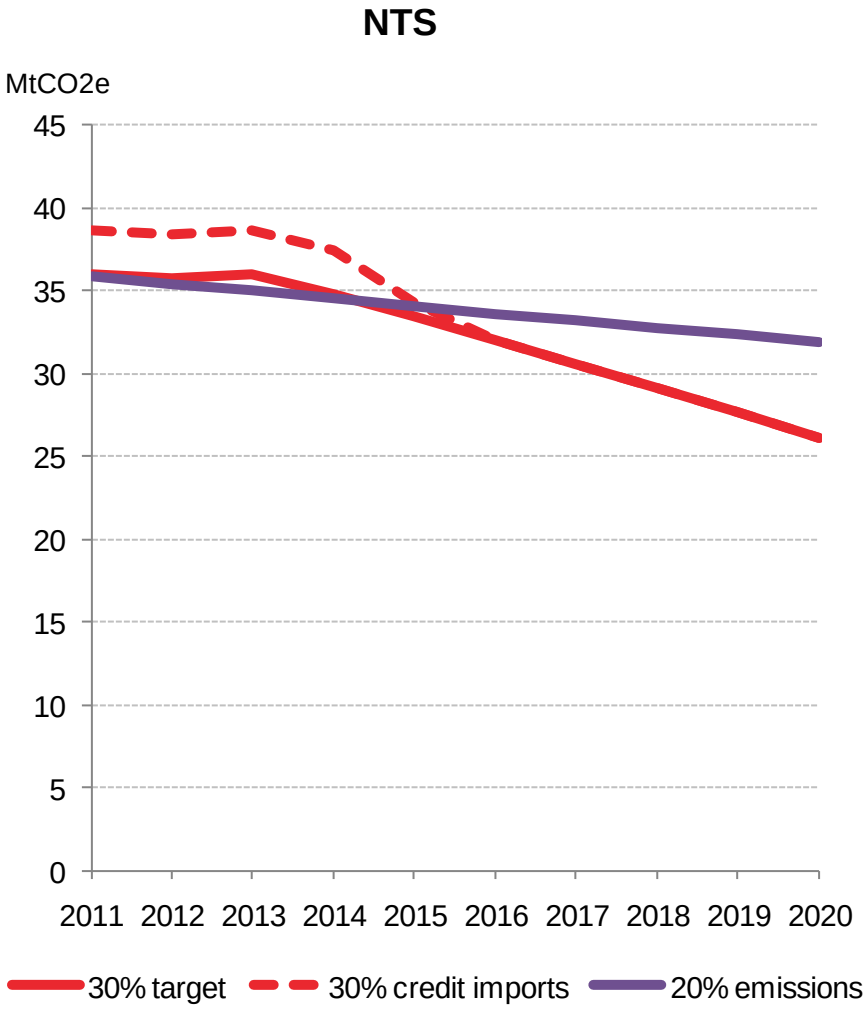
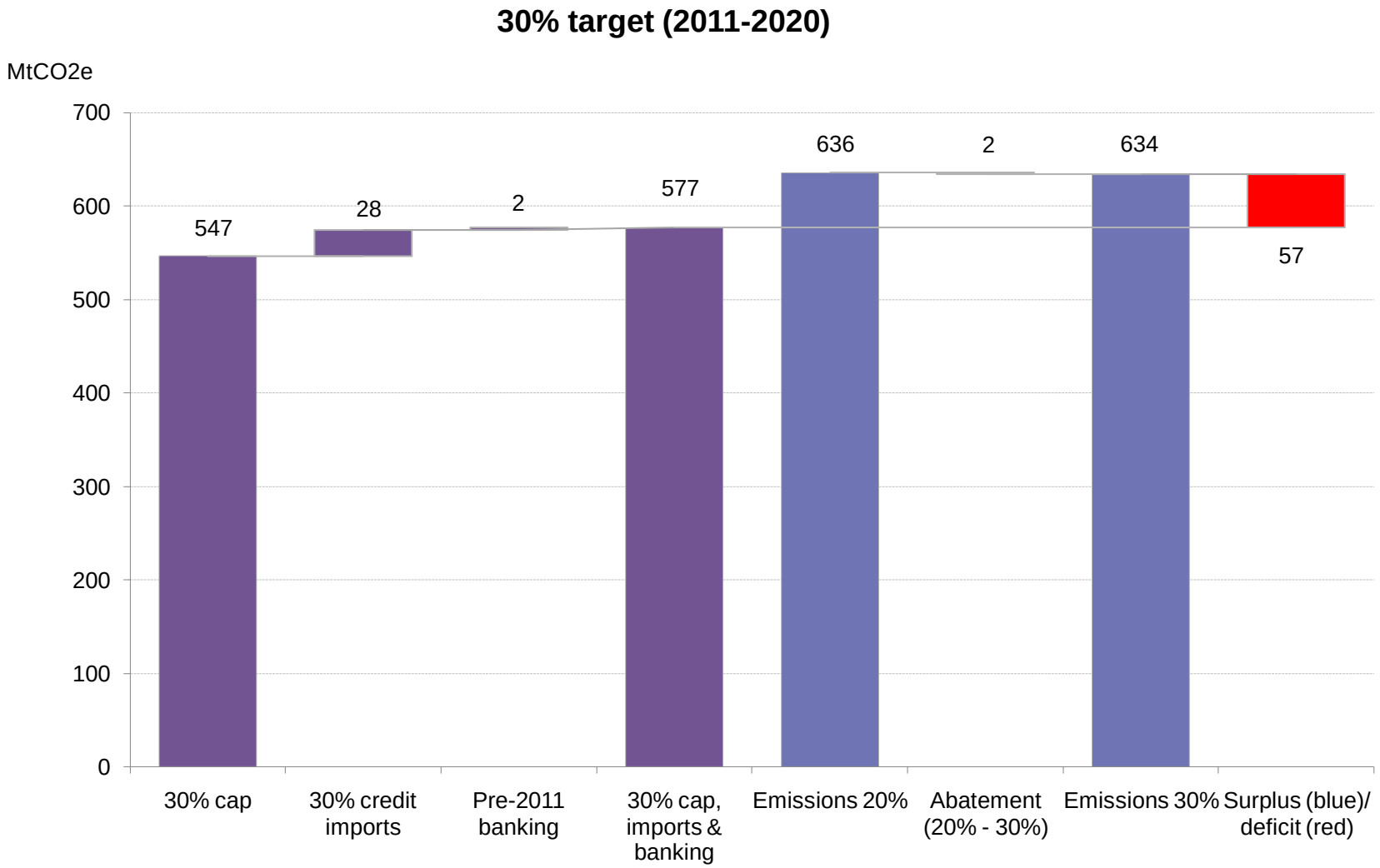




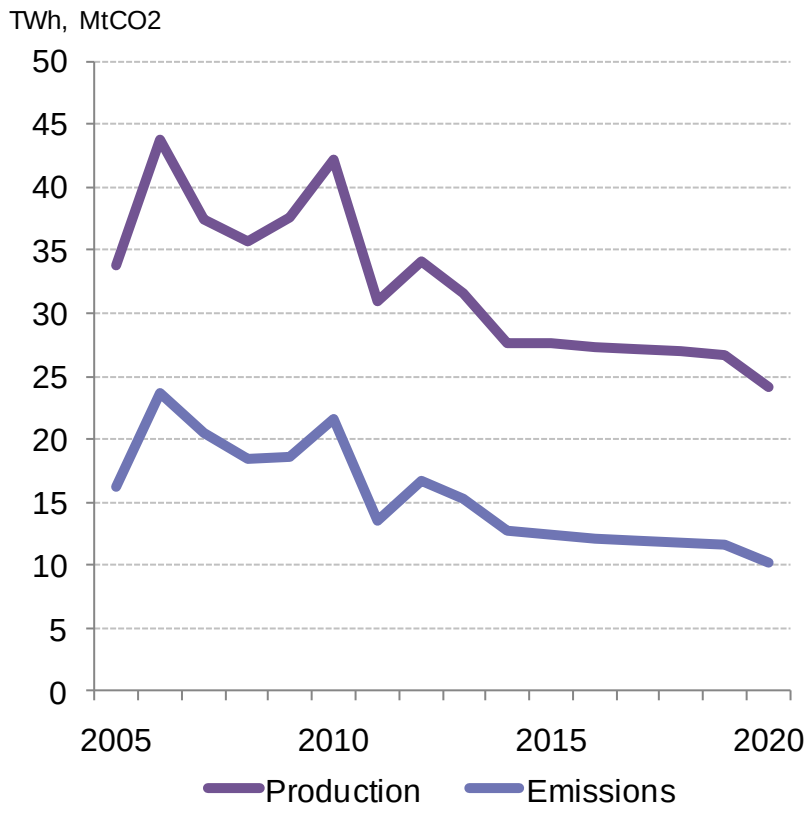
Source: Bloomberg New Energy Finance

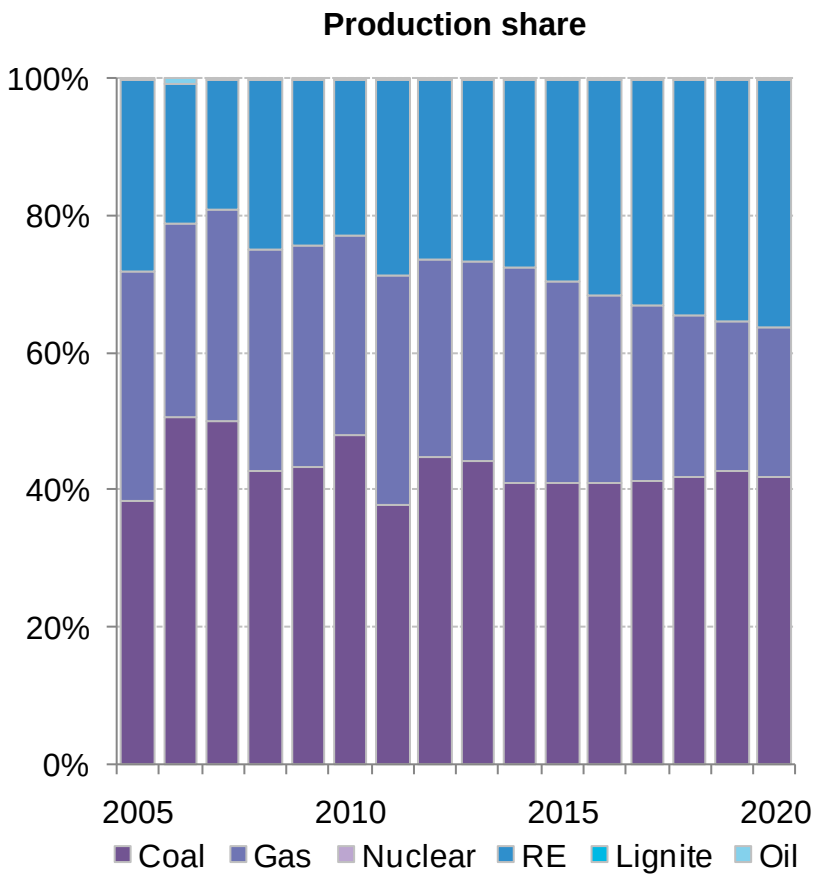
DENMARK



Source: Bloomberg New Energy Finance

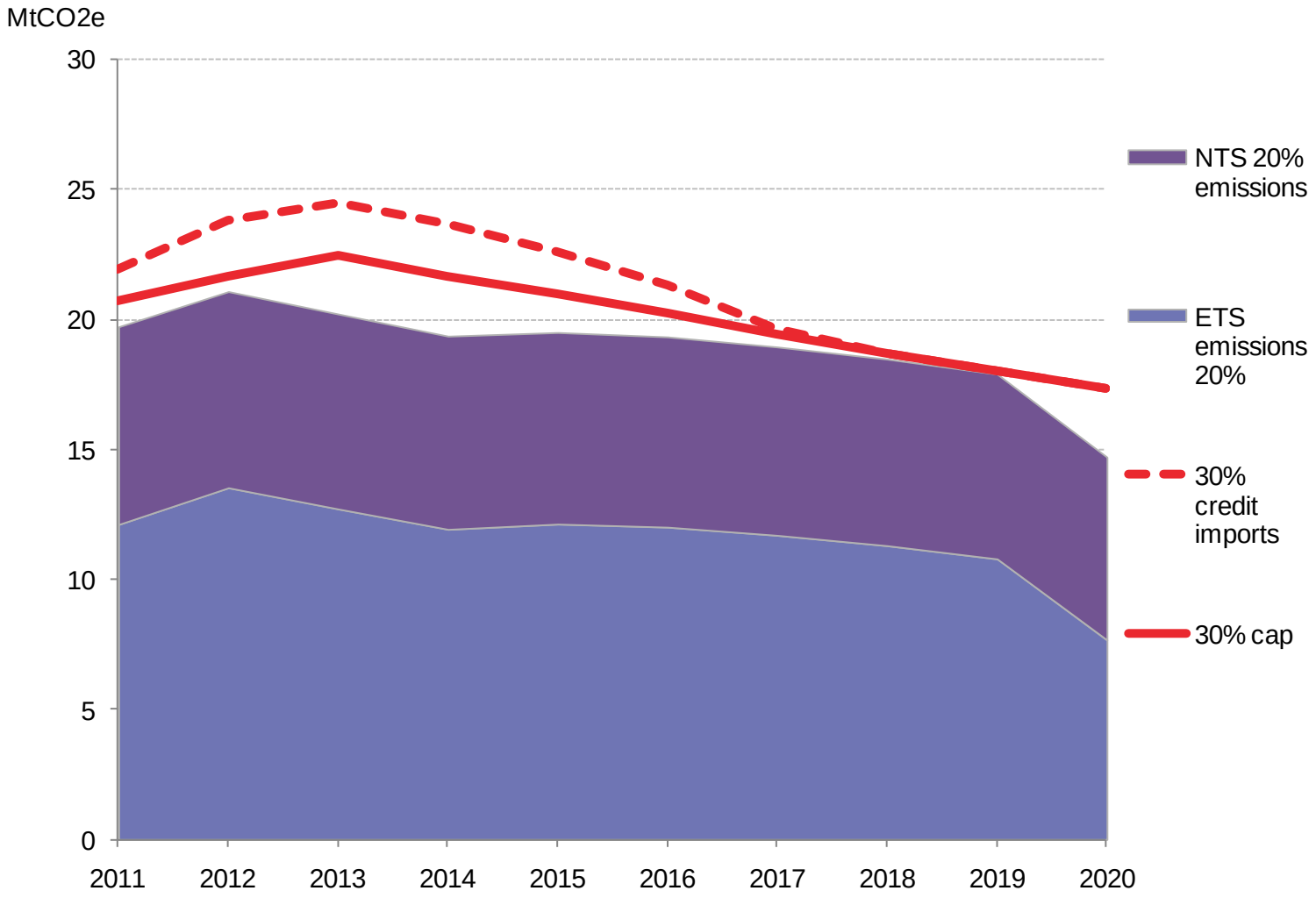
DENMARK POWER SECTOR (20% SCENARIO)





Source: Bloomberg New Energy Finance

ESTONIA



Source: Bloomberg New Energy Finance

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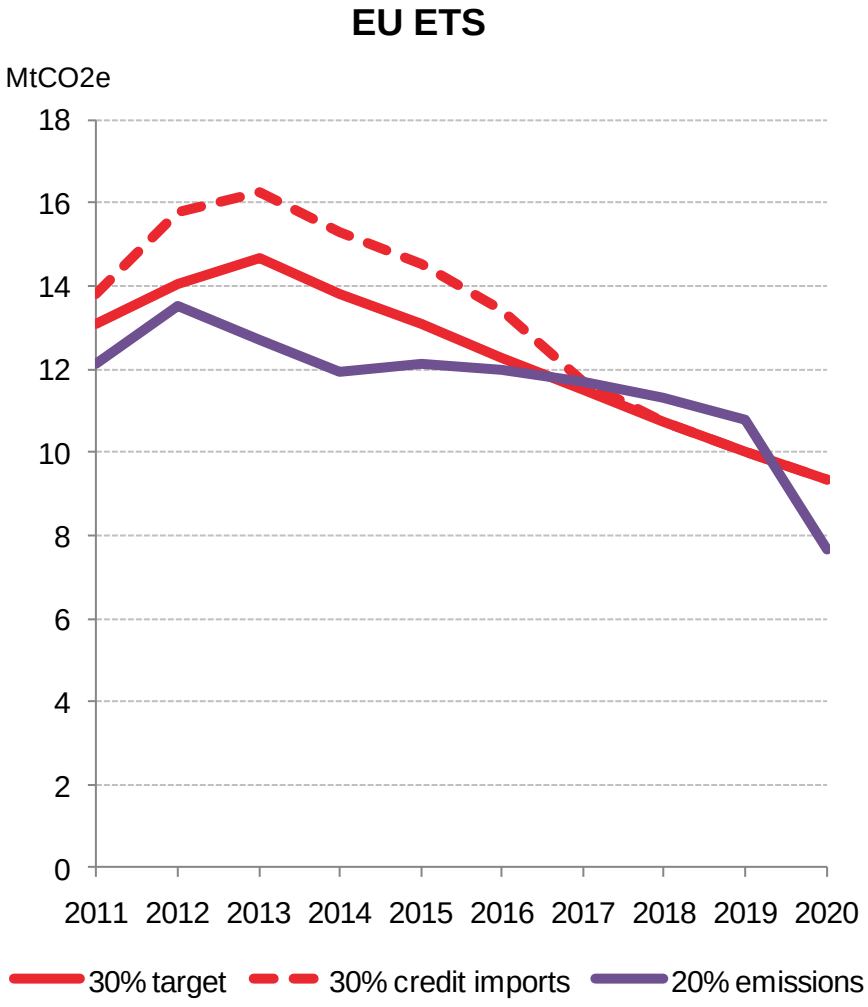
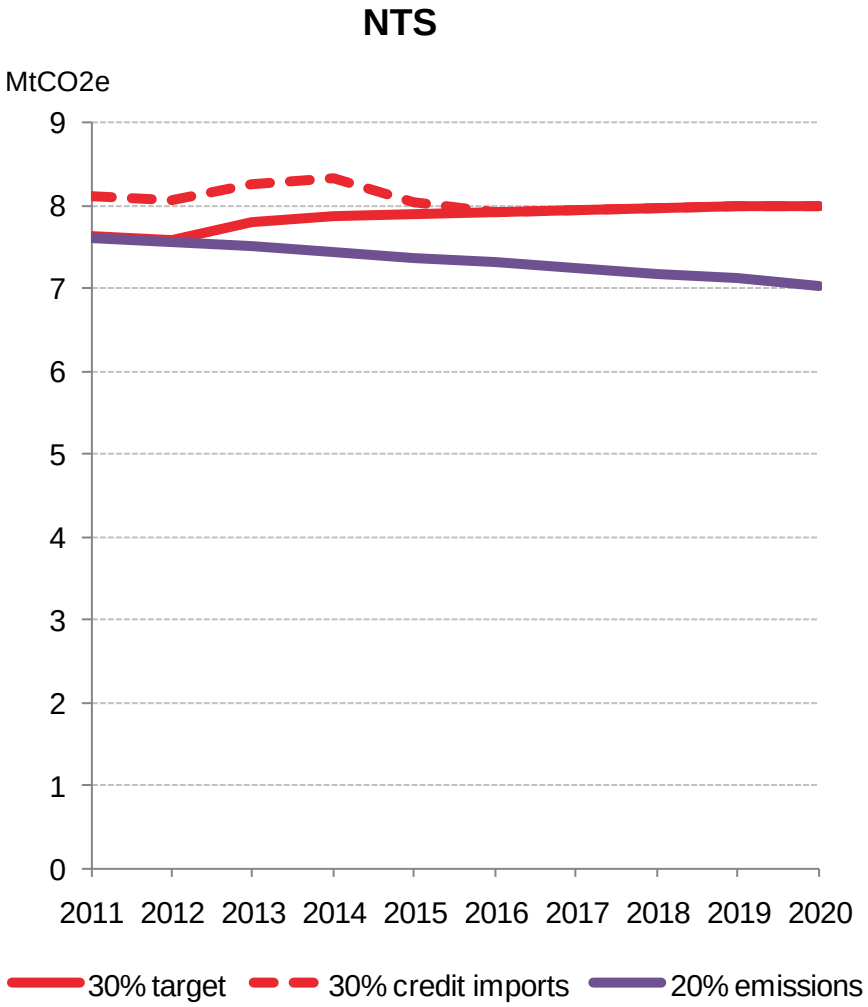
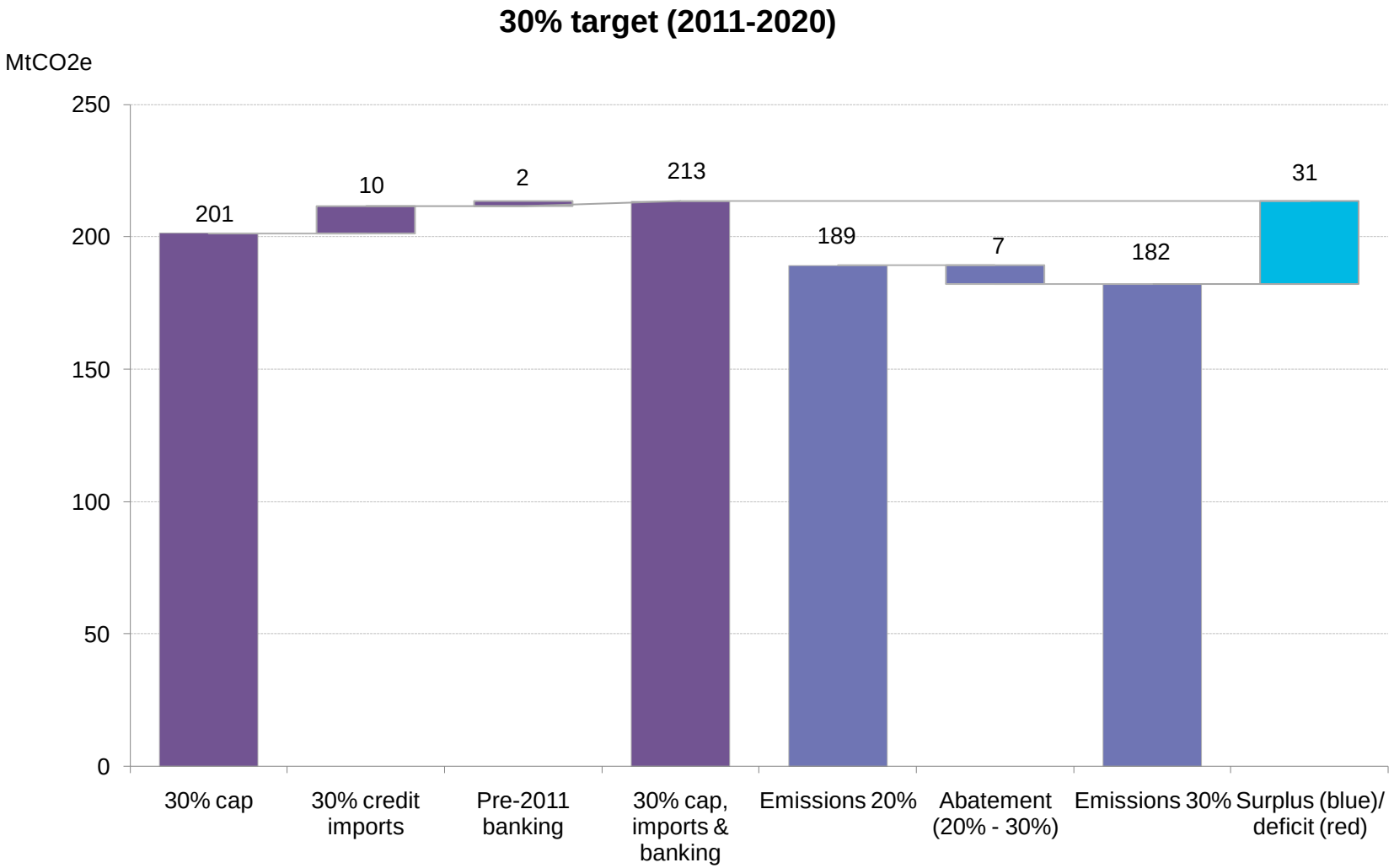




Source: Bloomberg New Energy Finance

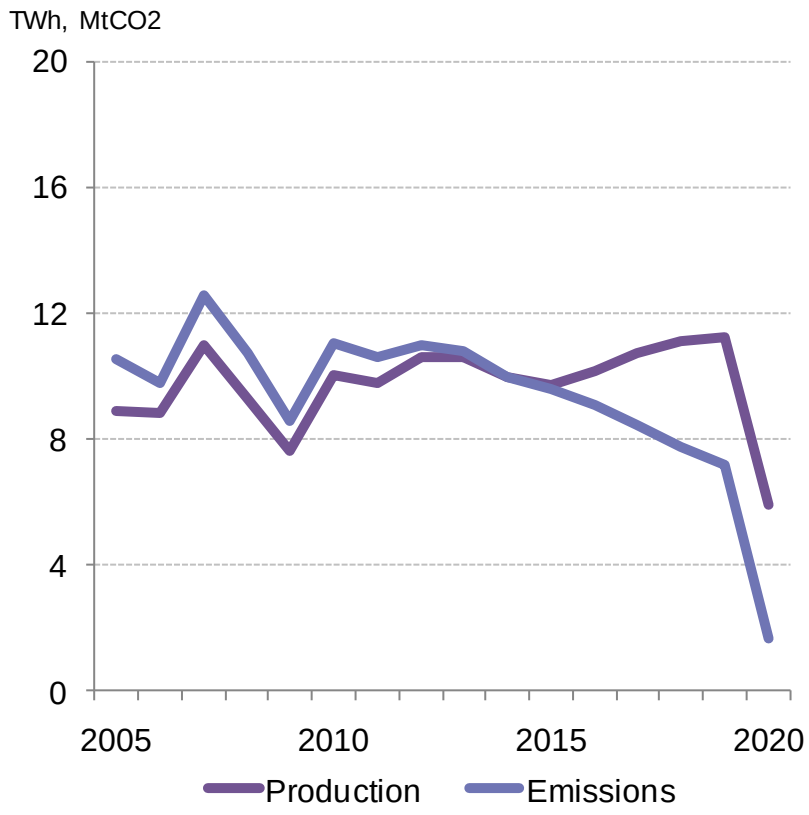
ESTONIA

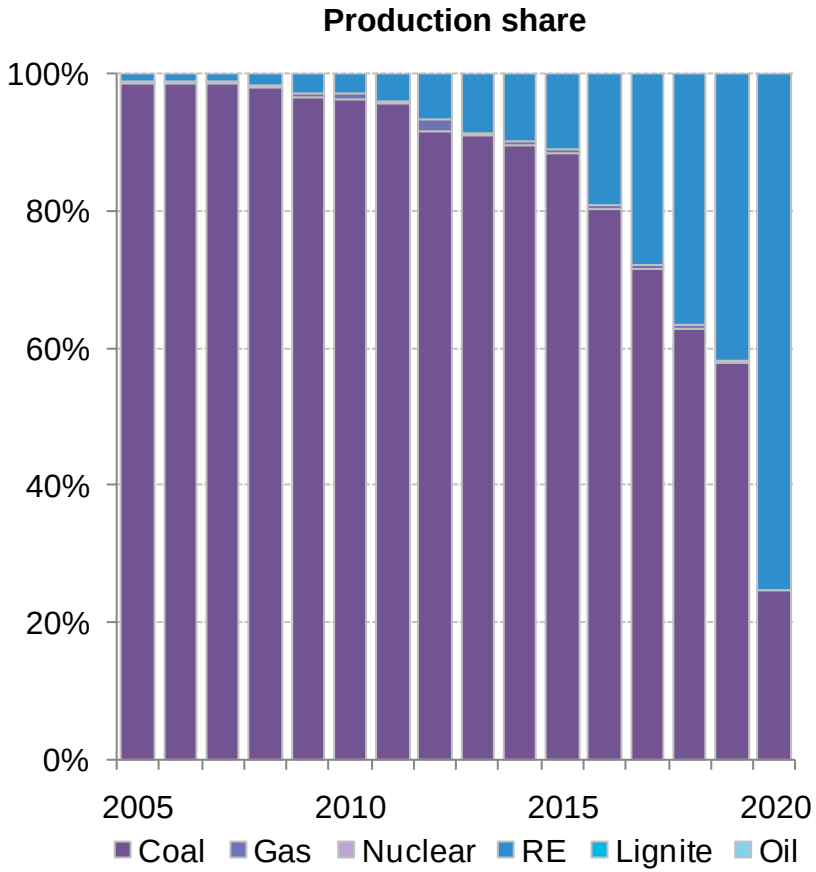


Source: Bloomberg New Energy Finance

ESTONIA POWER SECTOR (20% SCENARIO)

NB: Emissions profiles of Estonia, Latvia and Lithuania highly sensitive to assumptions about imports and exports of power.

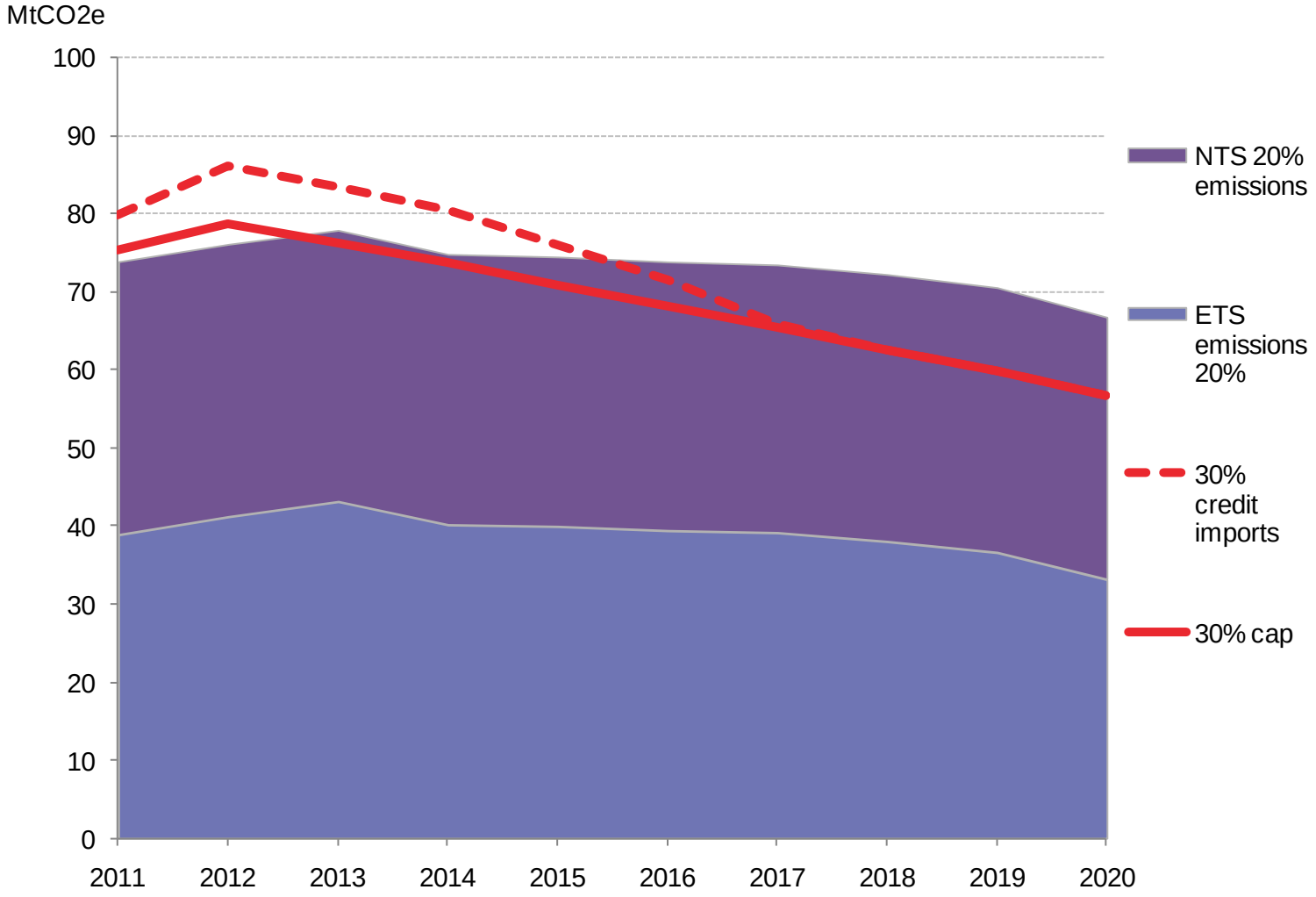




Note: we project steady growth in generated wind power out to 2020, and forecast a significant increase in imports from Latvia in 2020 – as Latvia will import nuclear power from Lithuania and Finland.

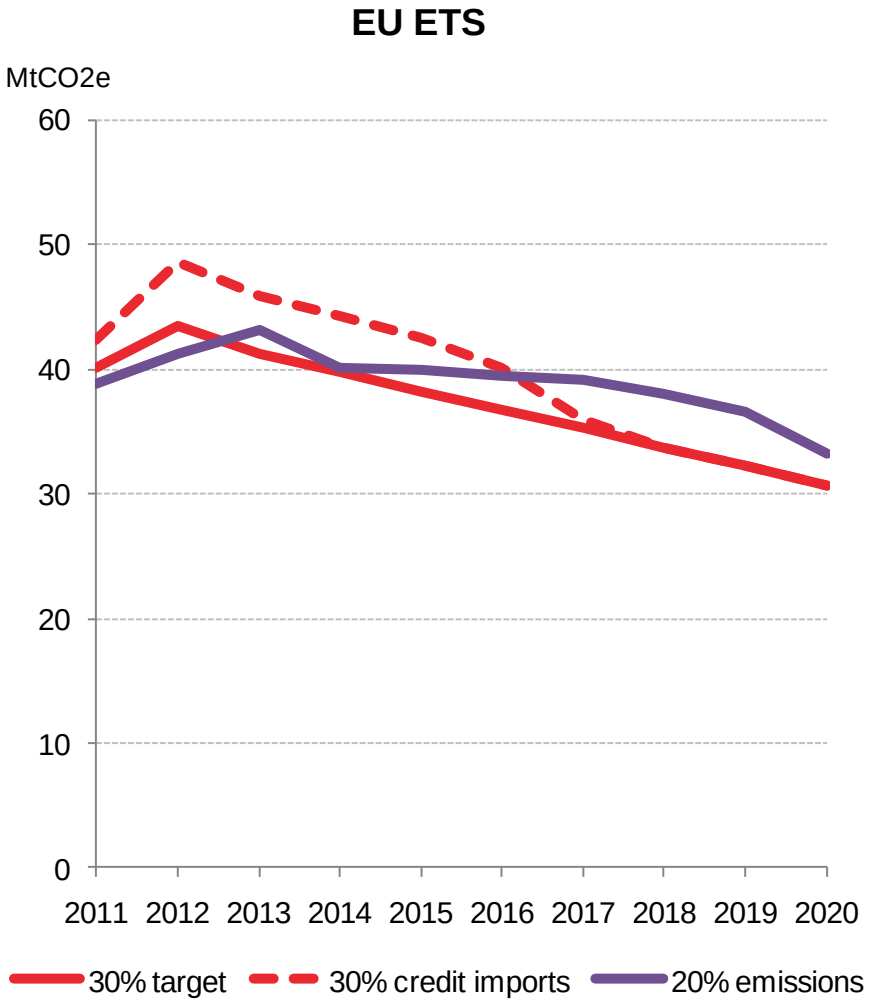
Source: Bloomberg New Energy Finance

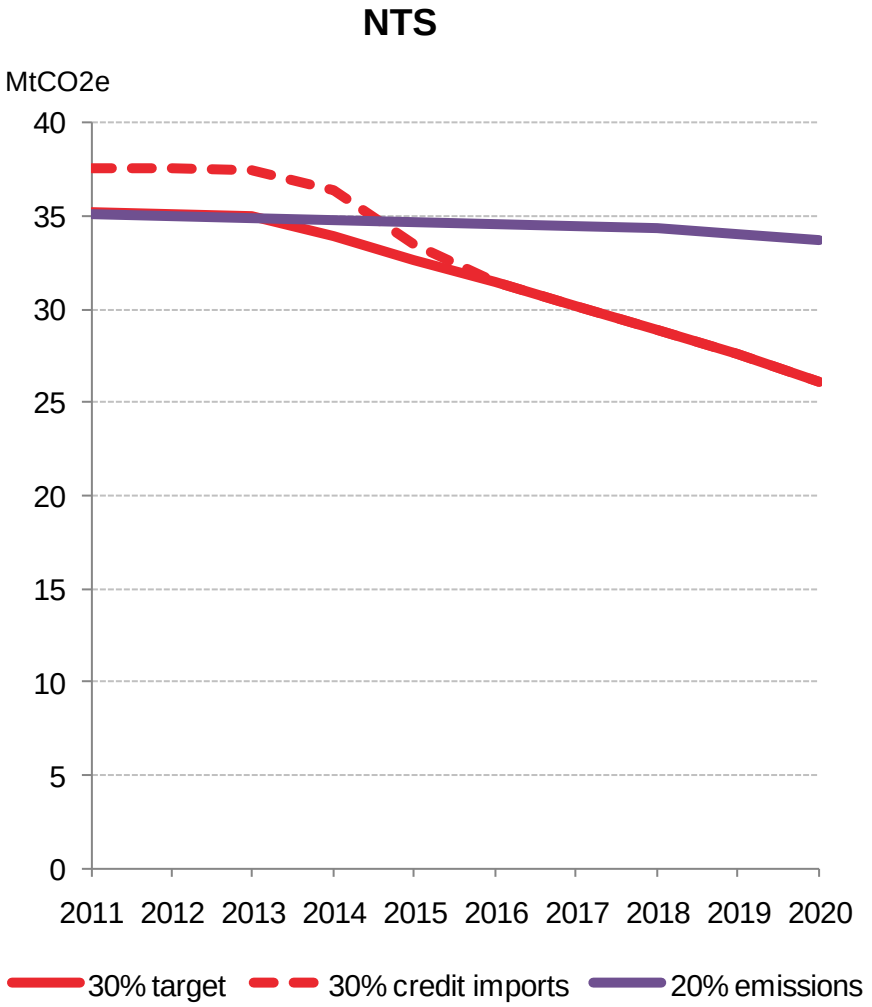
FINLAND



Source: Bloomberg New Energy Finance

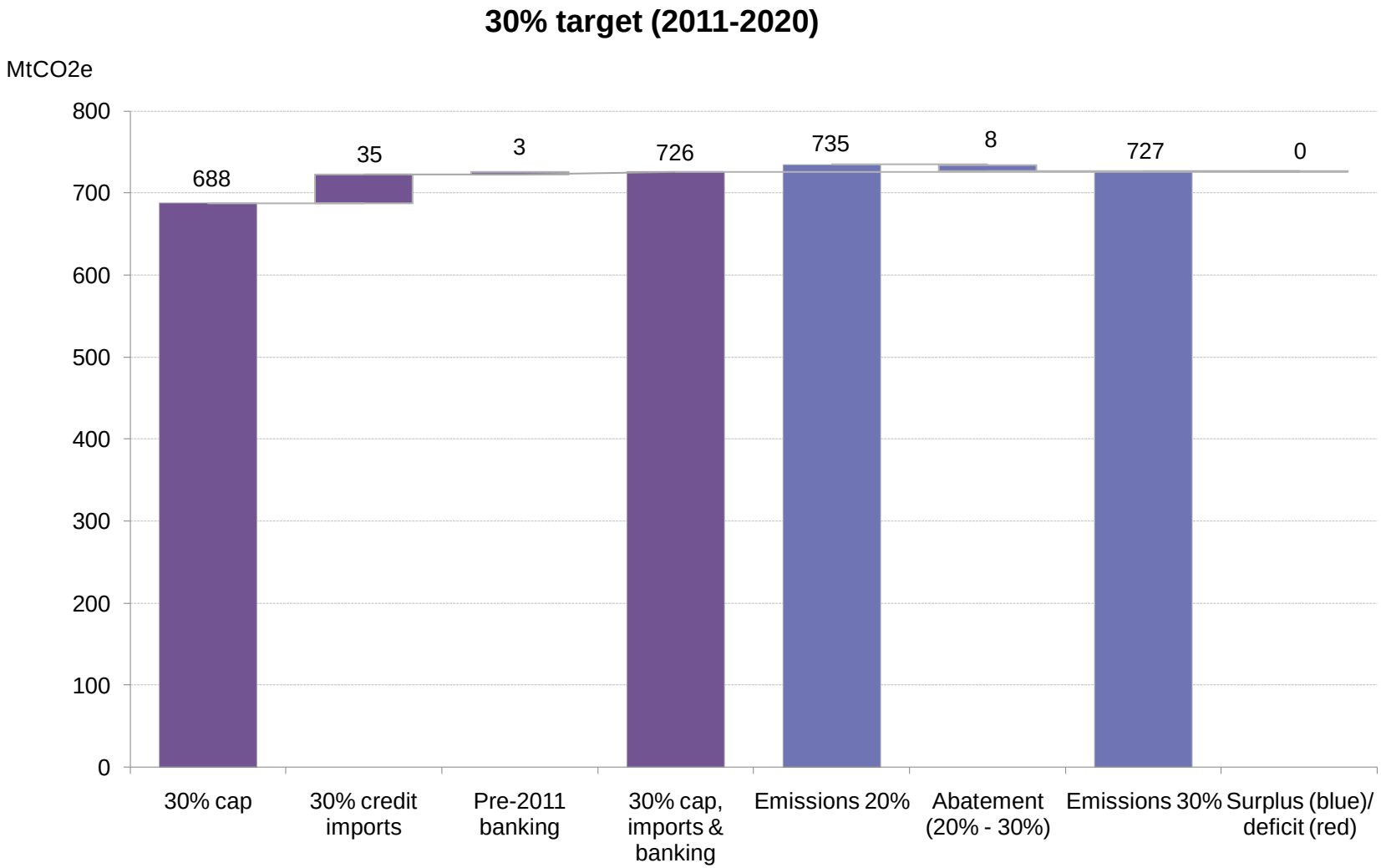
FINLAND





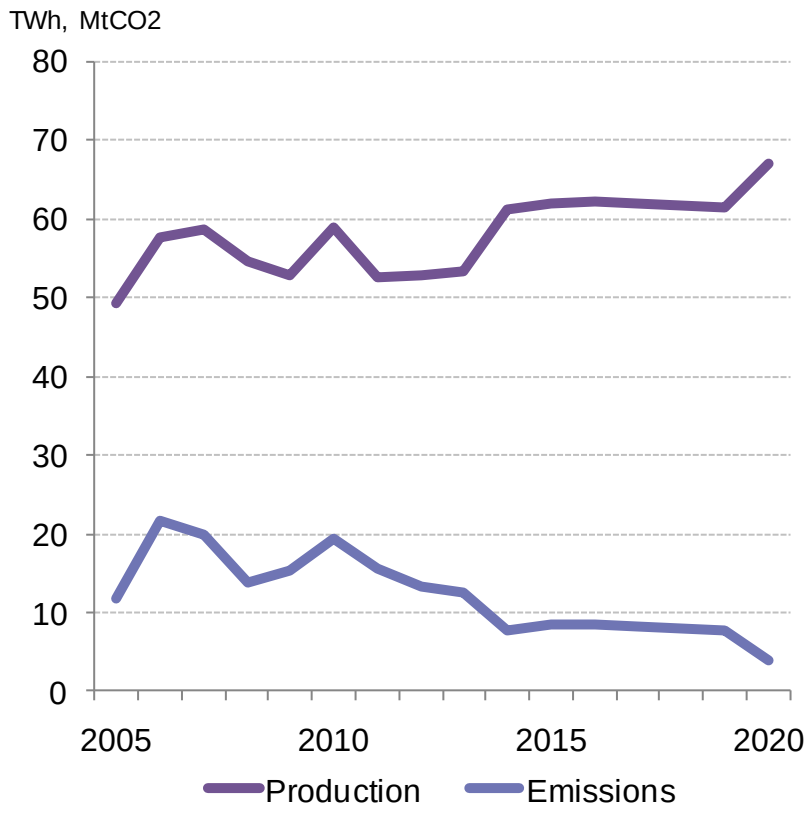
Source: Bloomberg New Energy Finance

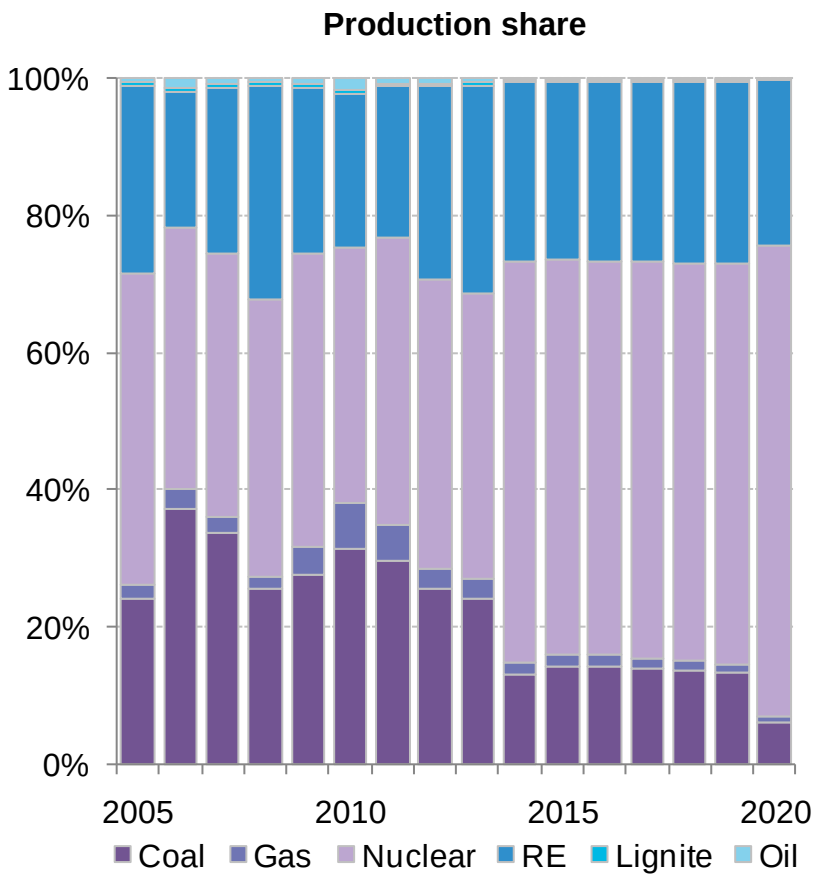
FINLAND



Source: Bloomberg New Energy Finance

FINLAND POWER SECTOR (20% SCENARIO)

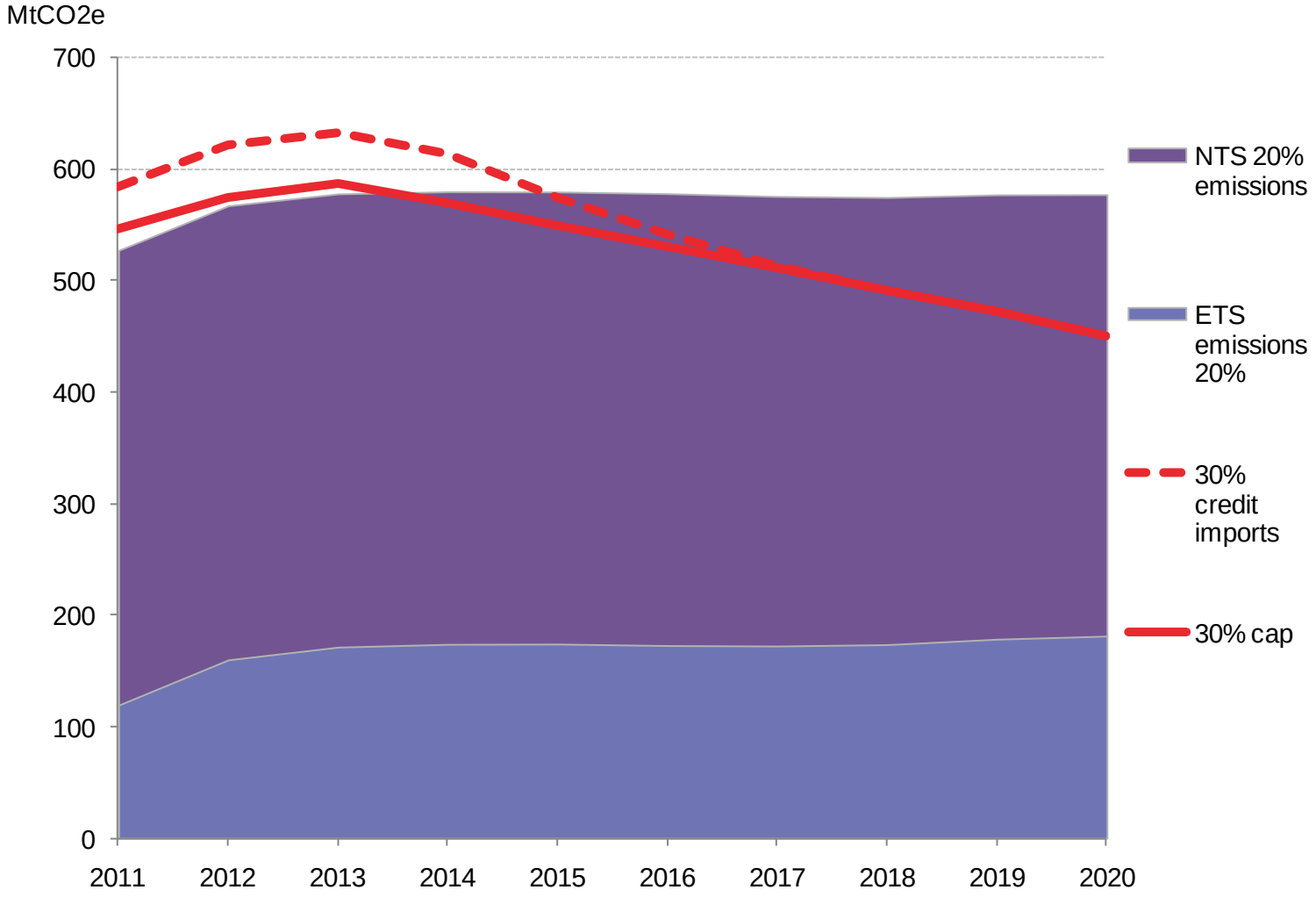




Note: we forecast a significant increase in nuclear capacity from a new Finnish plant in 2020.

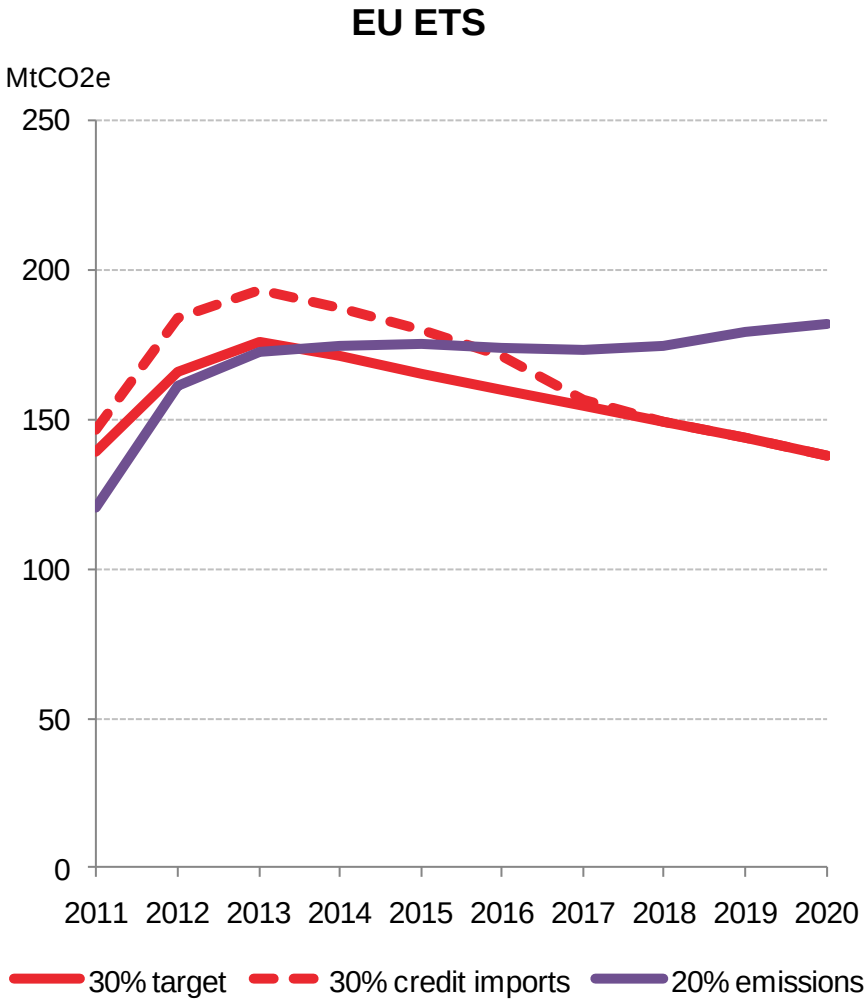
Source: Bloomberg New Energy Finance

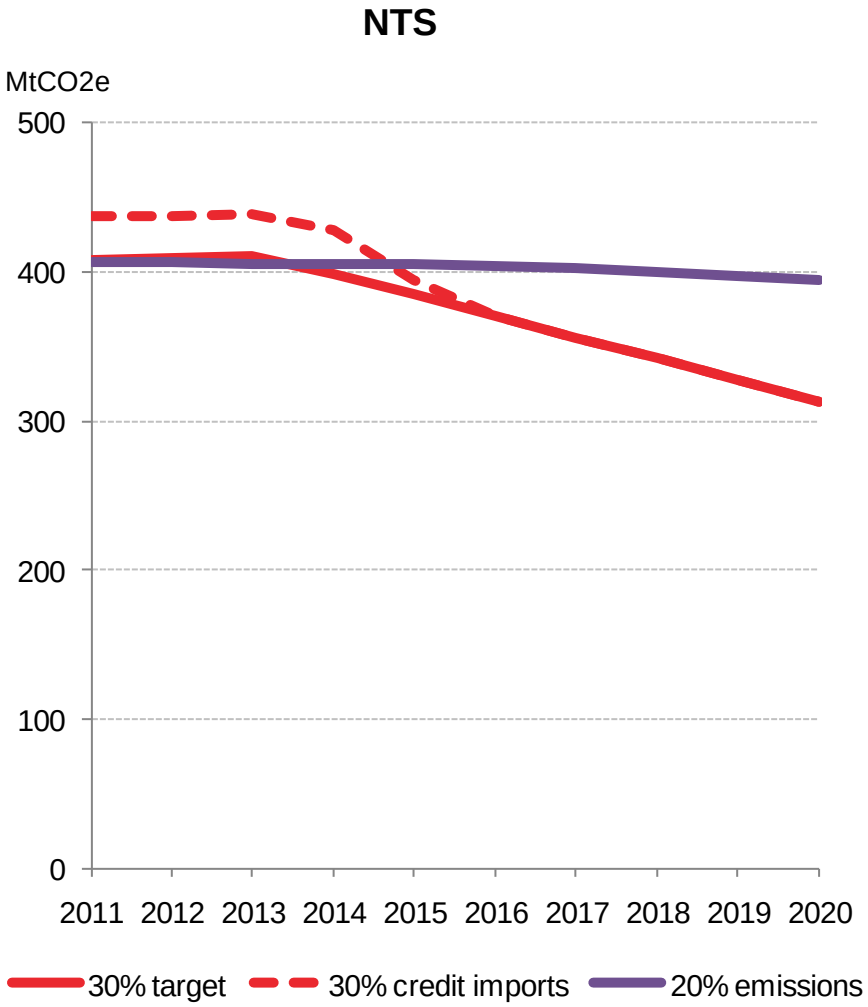
FRANCE



Source: Bloomberg New Energy Finance

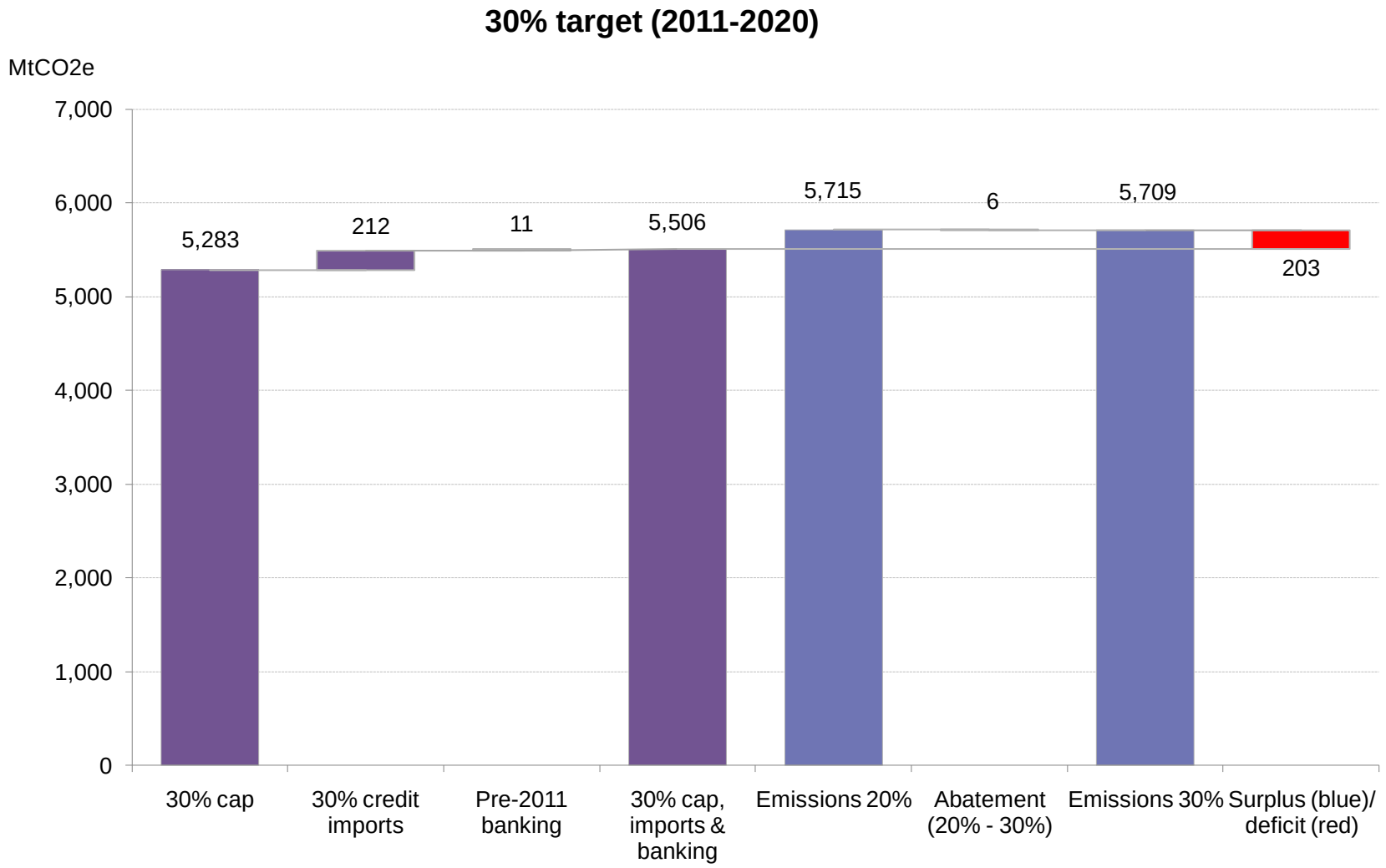
FRANCE





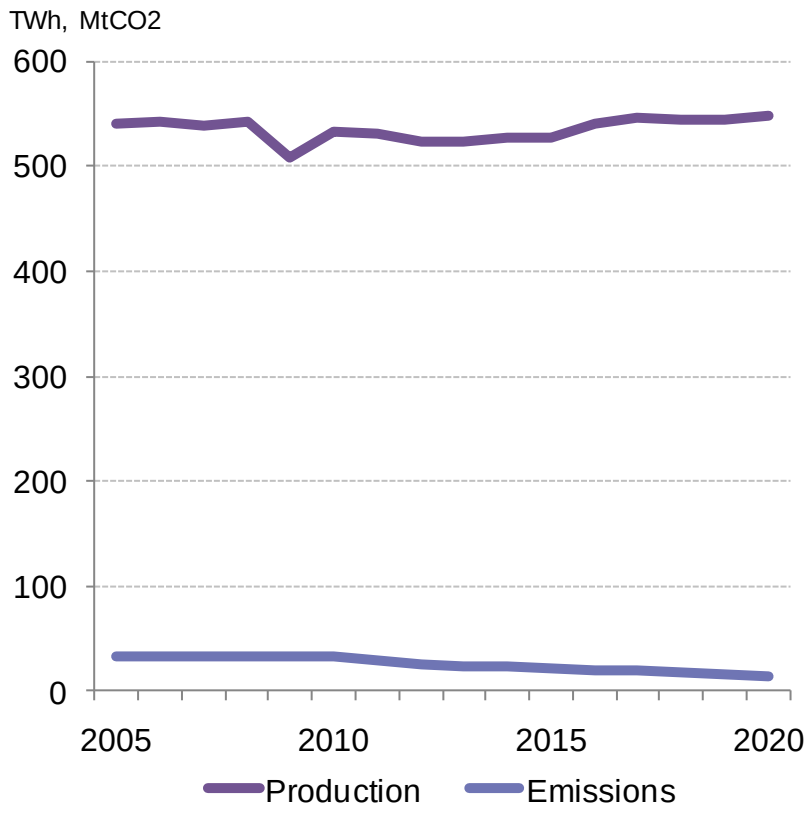
Source: Bloomberg New Energy Finance

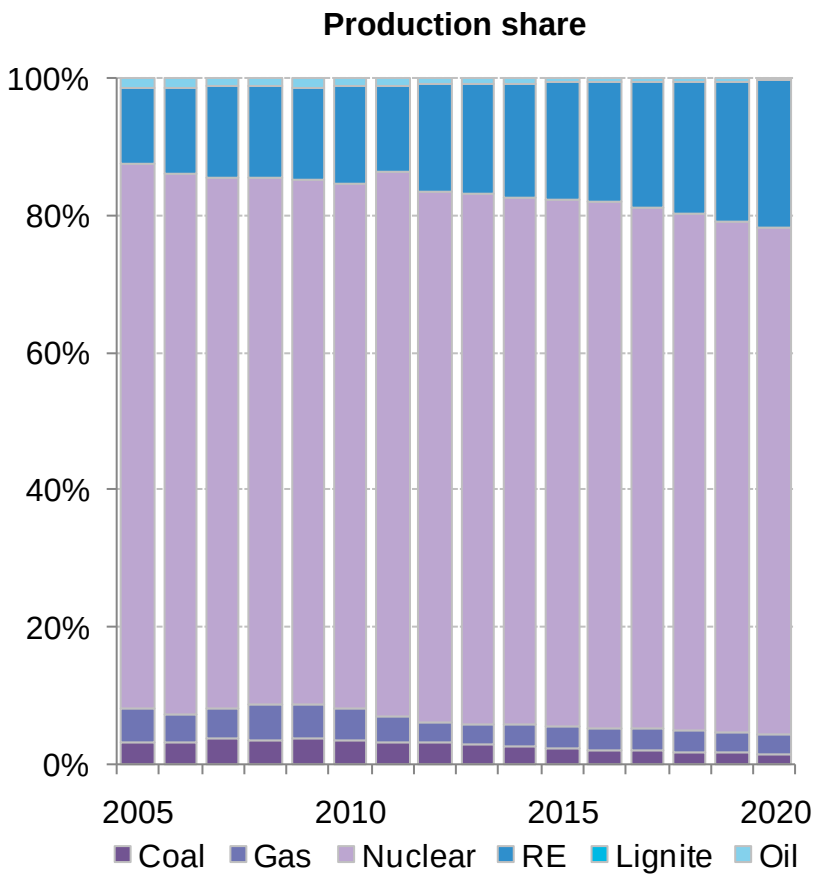
FRANCE



Source: Bloomberg New Energy Finance

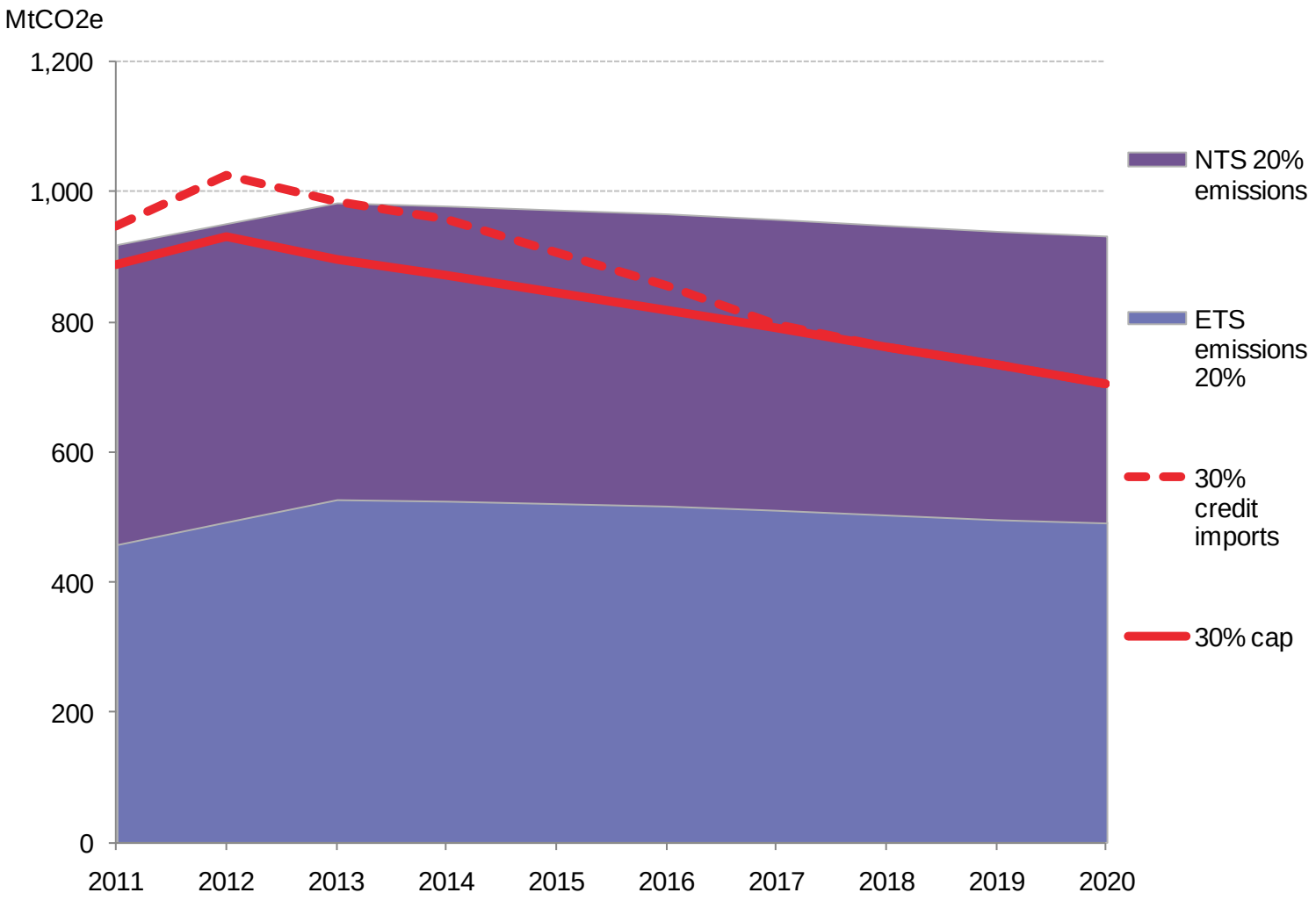
FRANCE POWER SECTOR (20% SCENARIO)





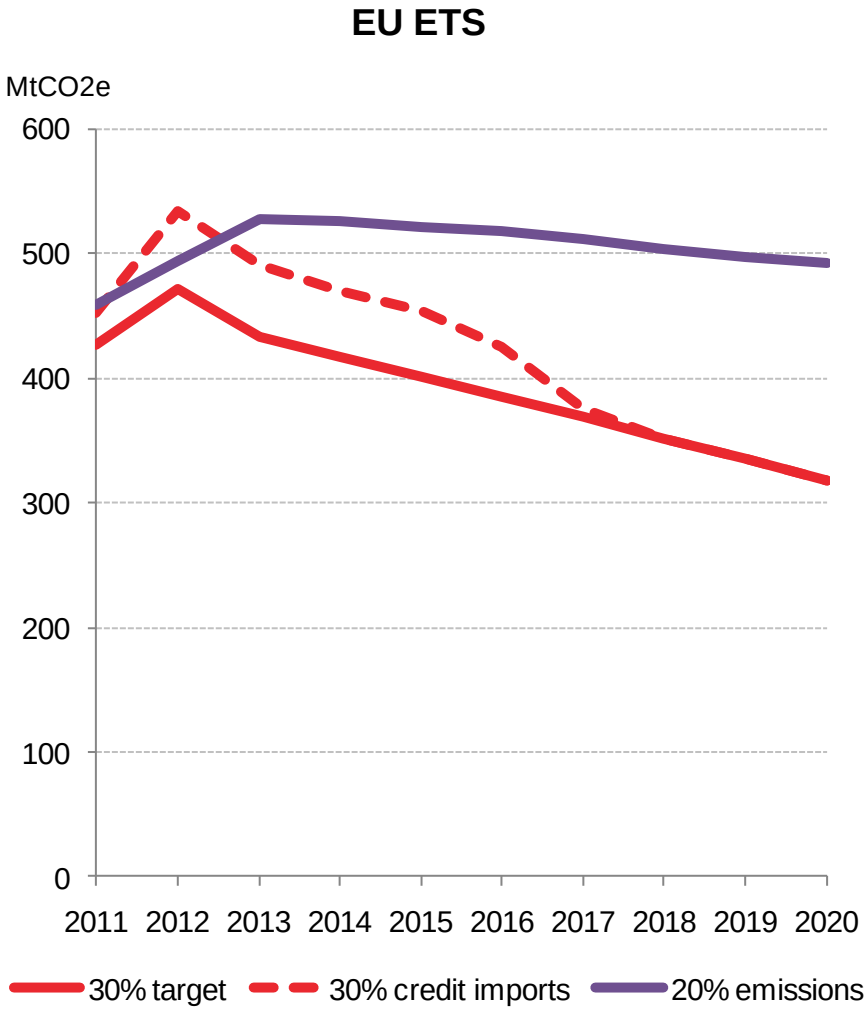
Source: Bloomberg New Energy Finance

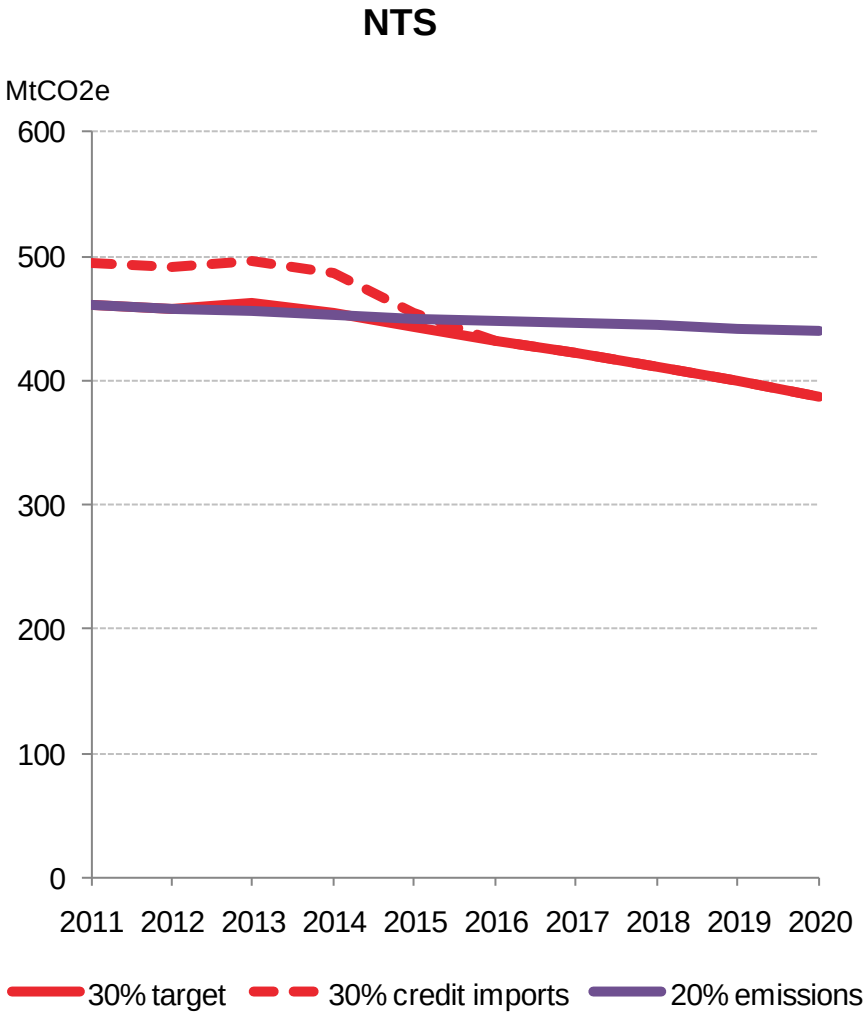
GERMANY



Source: Bloomberg New Energy Finance

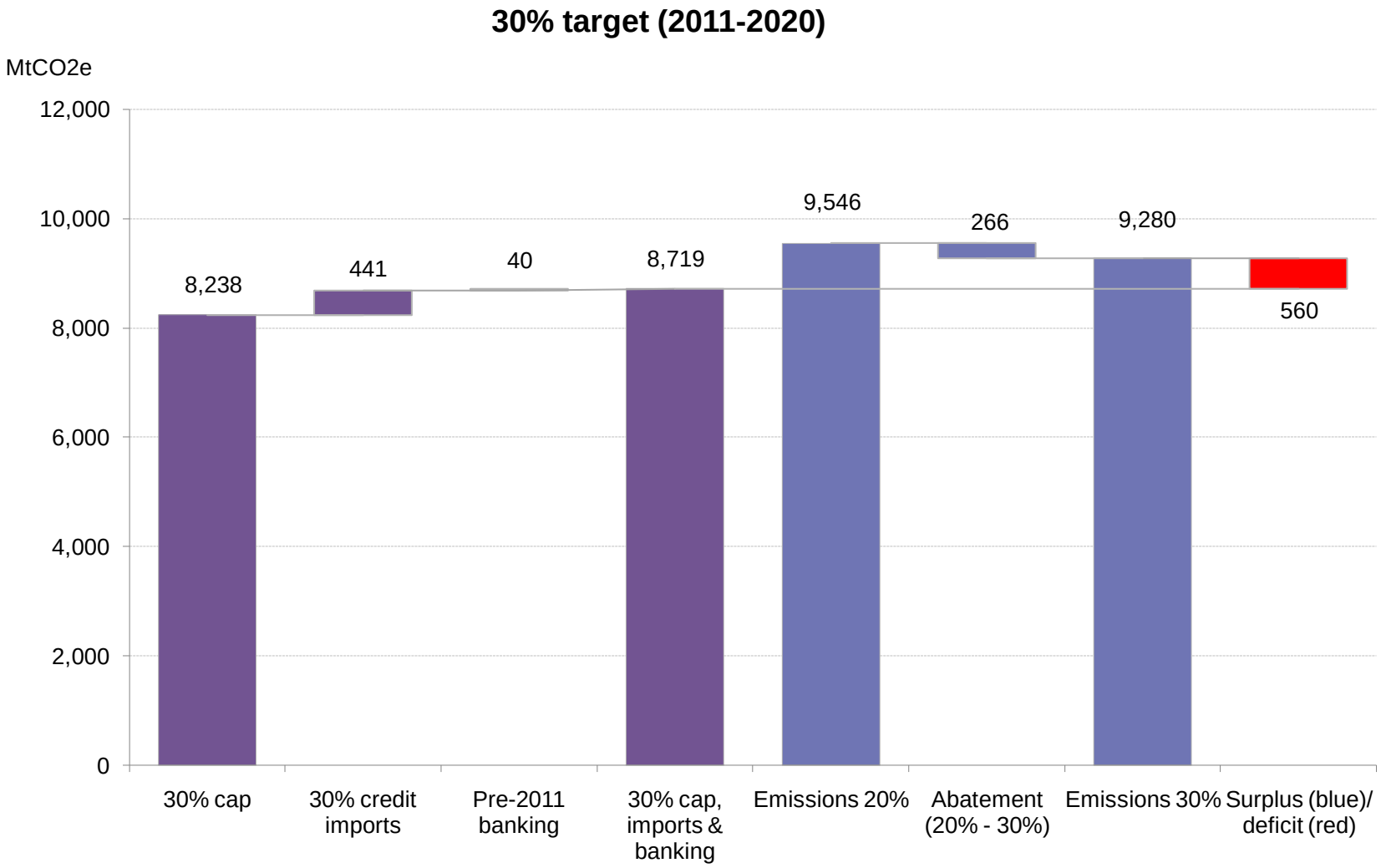
GERMANY





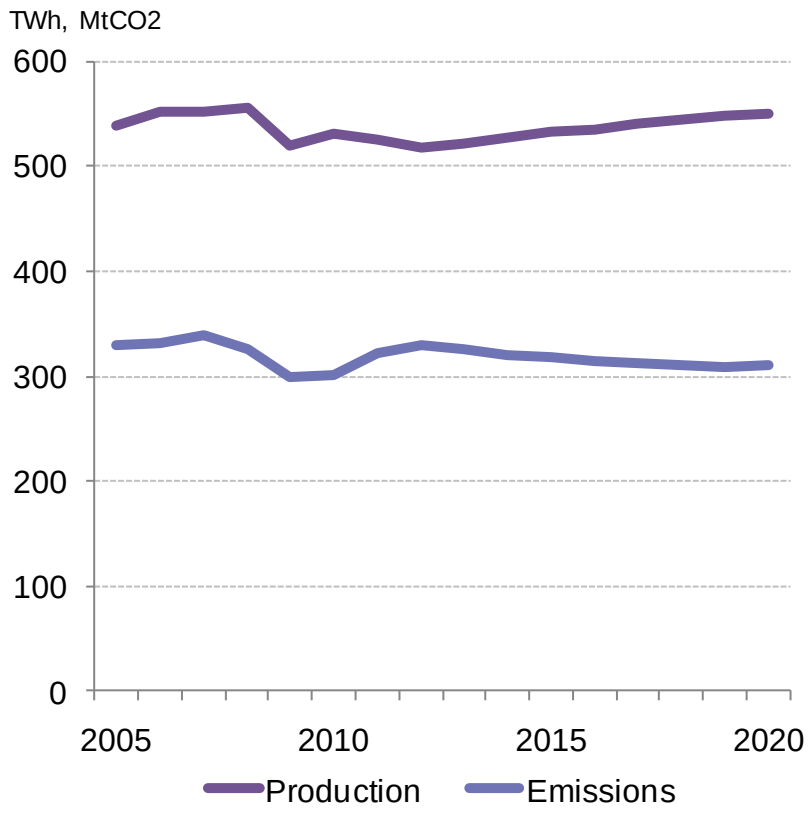
Source: Bloomberg New Energy Finance

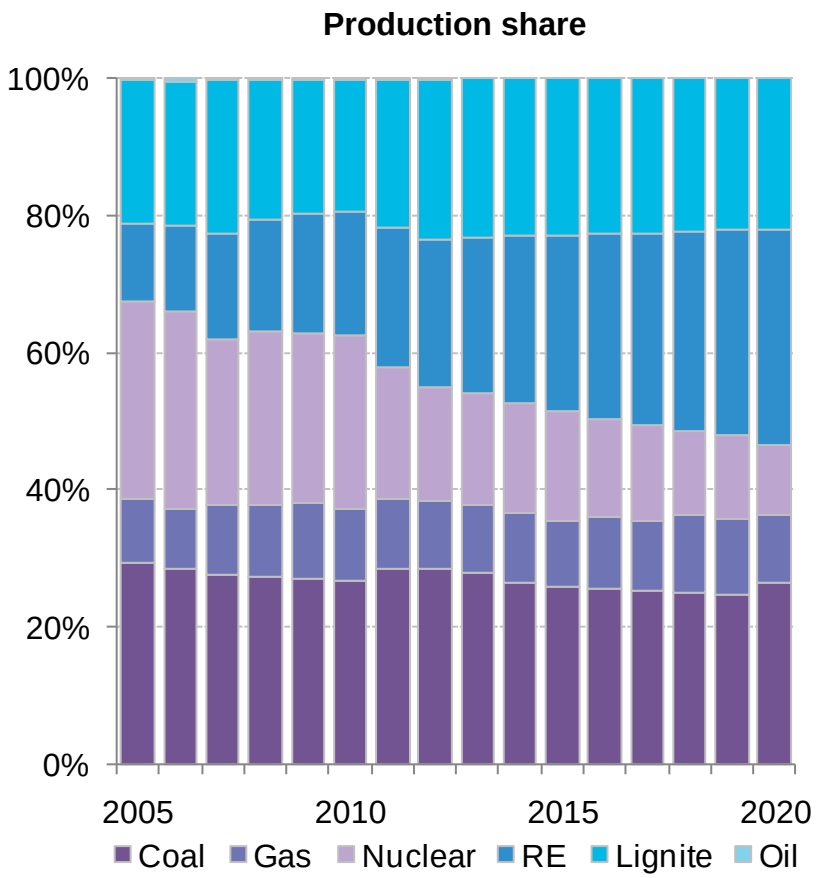
GERMANY



Source: Bloomberg New Energy Finance

GERMANY POWER SECTOR (20% SCENARIO)





Source: Bloomberg New Energy Finance

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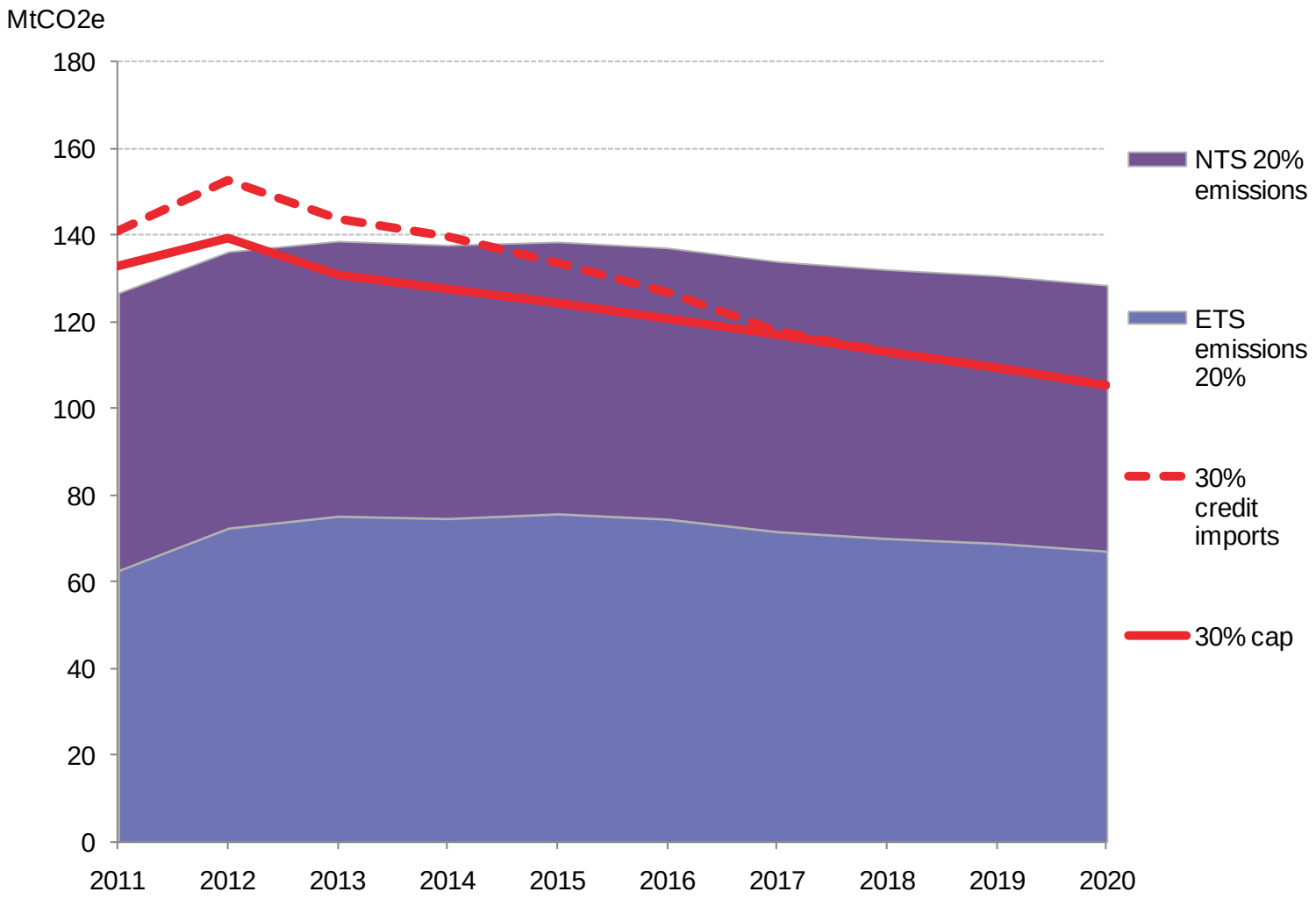

Source: Bloomberg New Energy Finance

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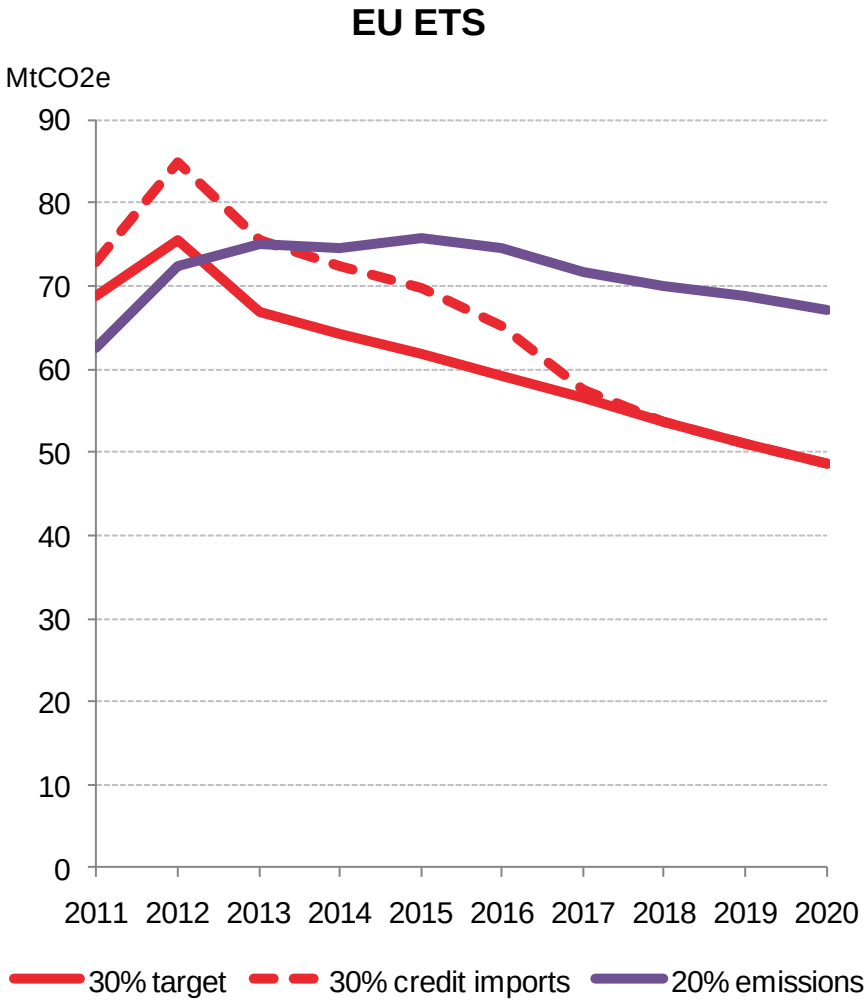

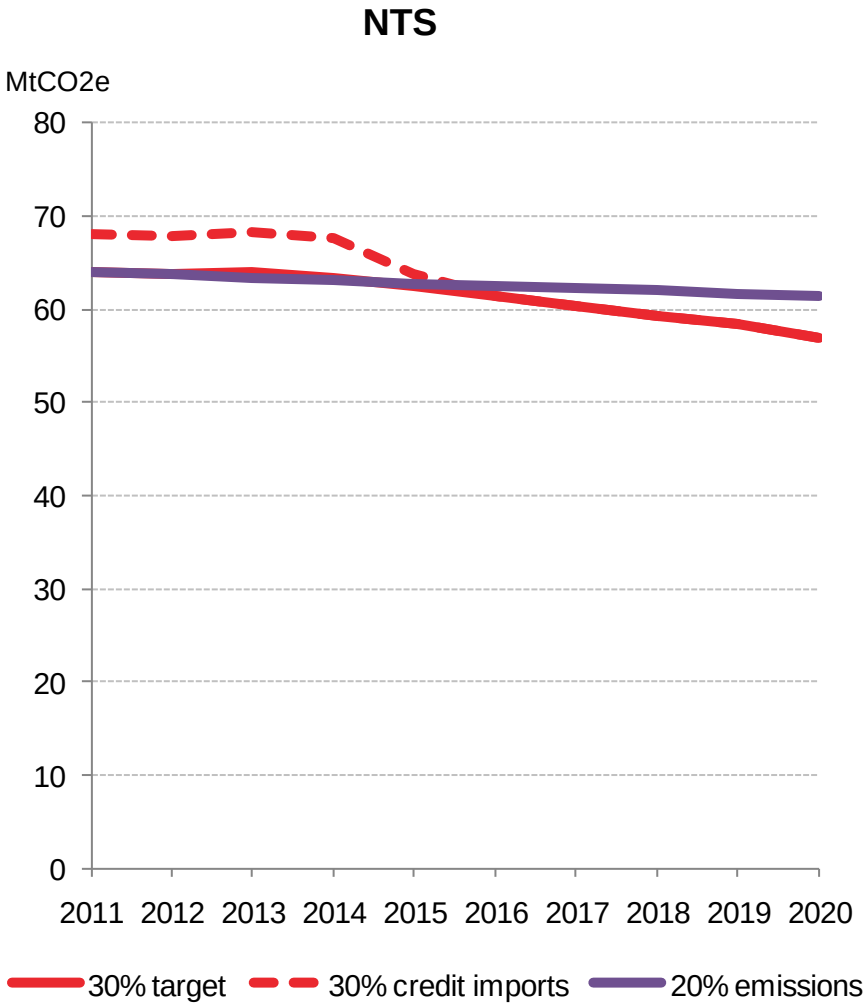

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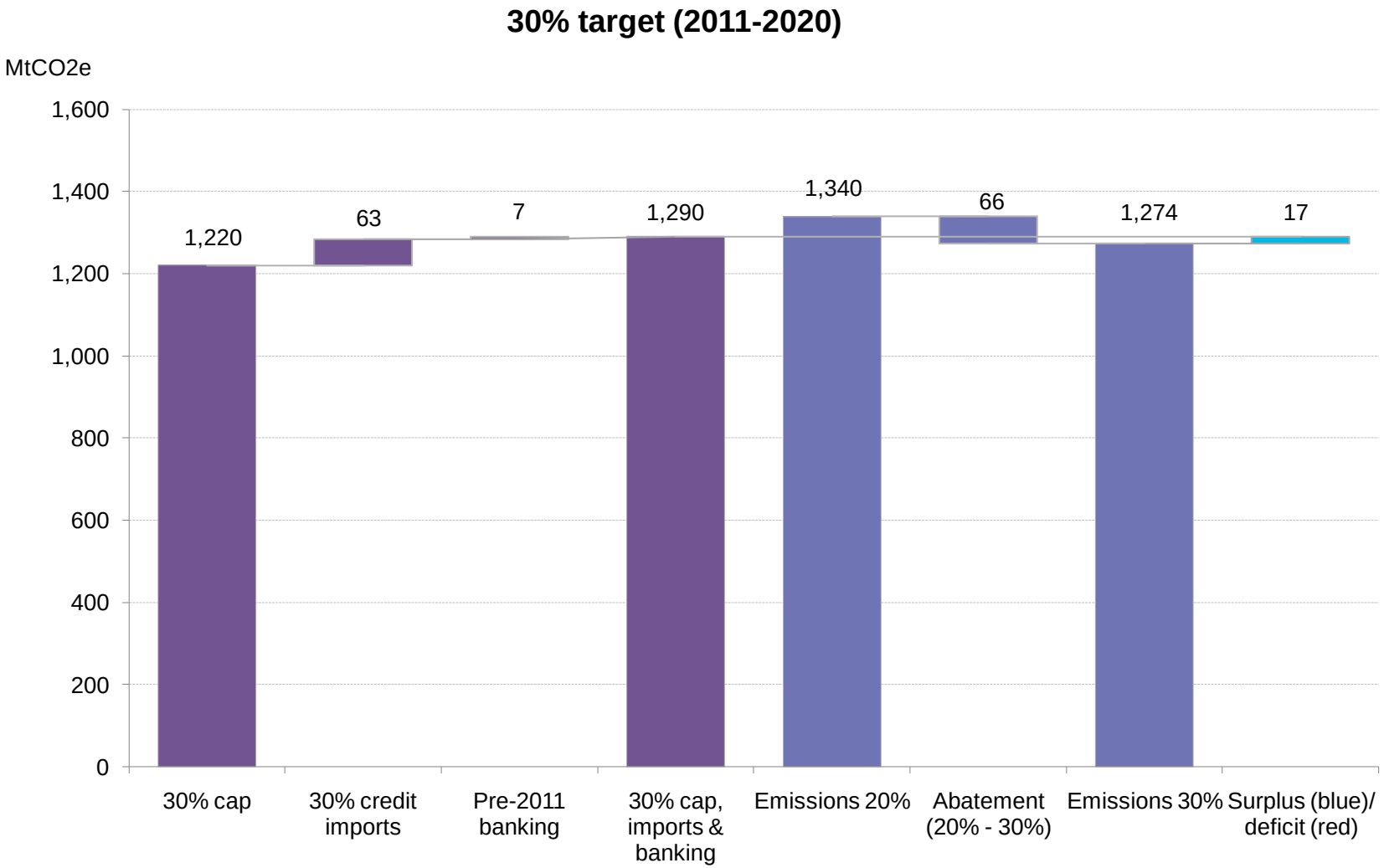
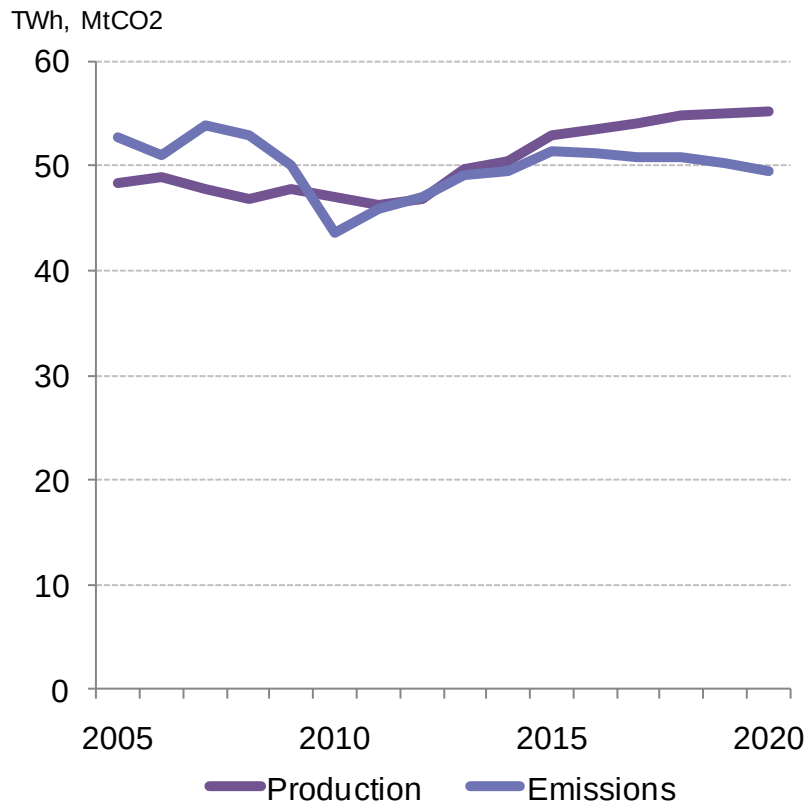
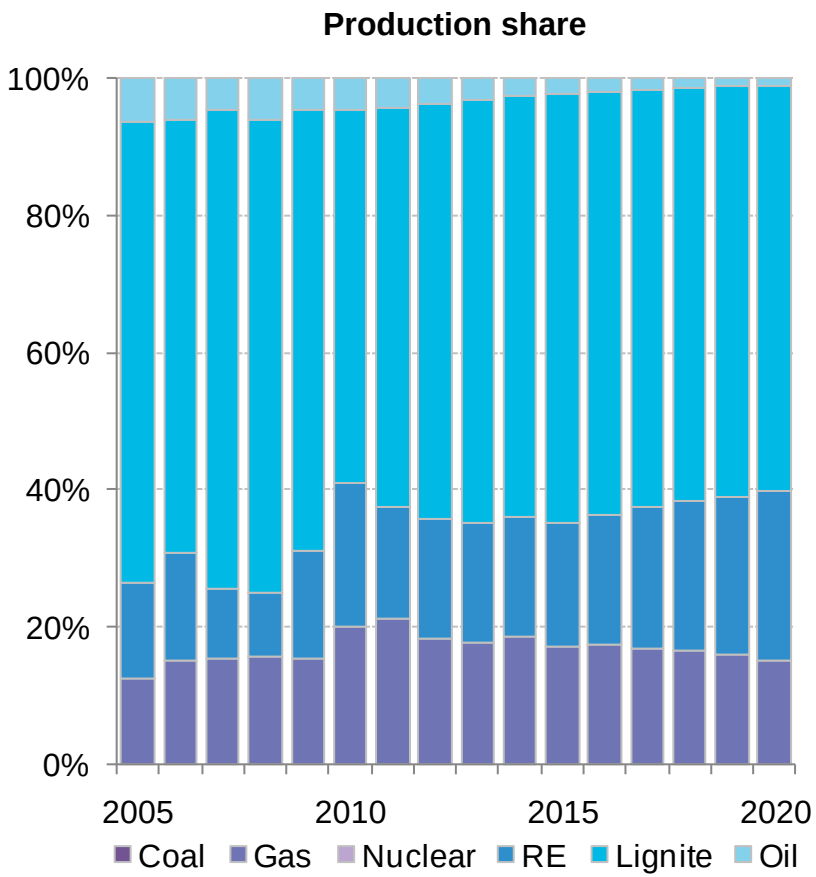


Source: Bloomberg New Energy Finance

GREECE POWER SECTOR (20% SCENARIO)





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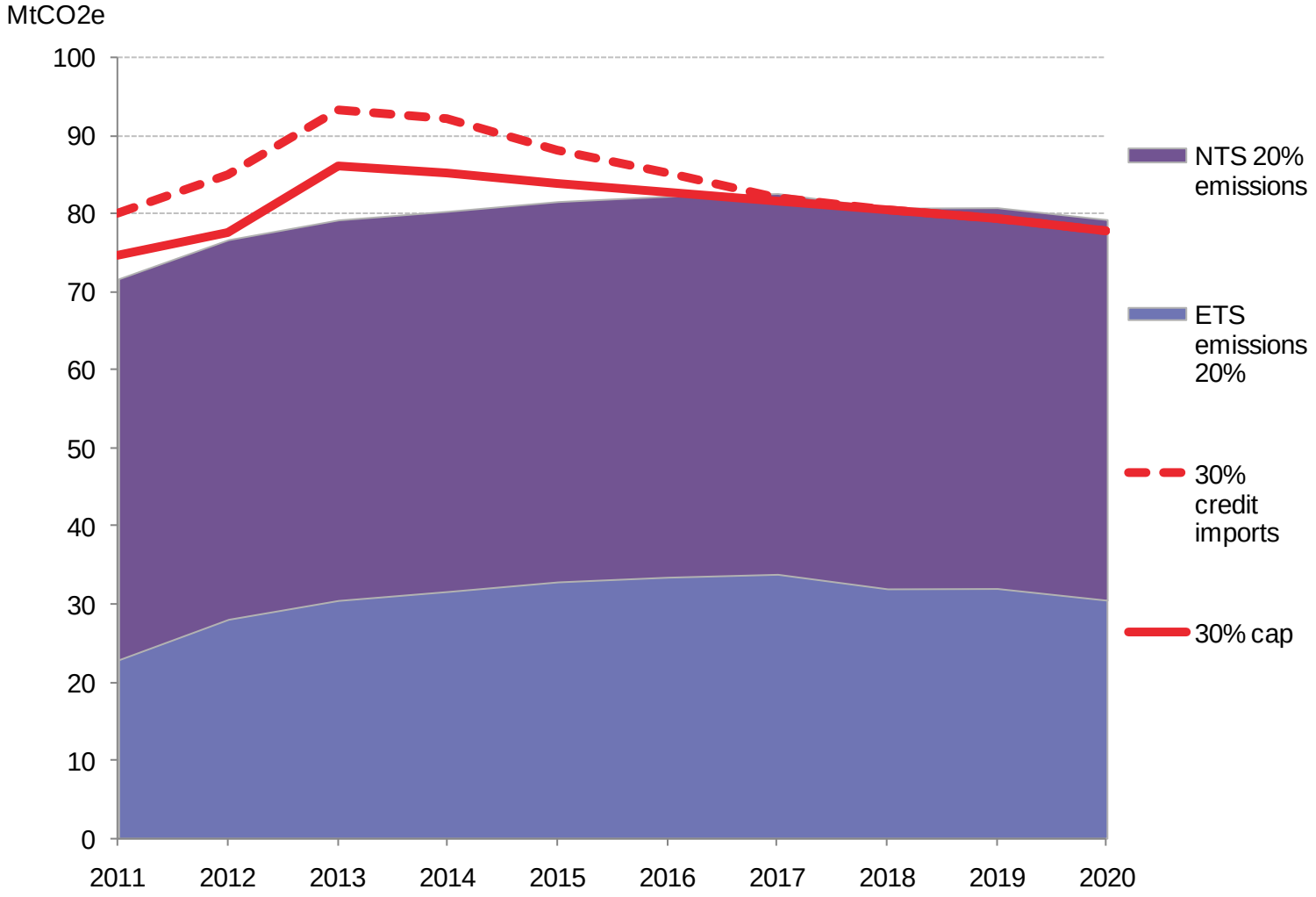
HUNGARY



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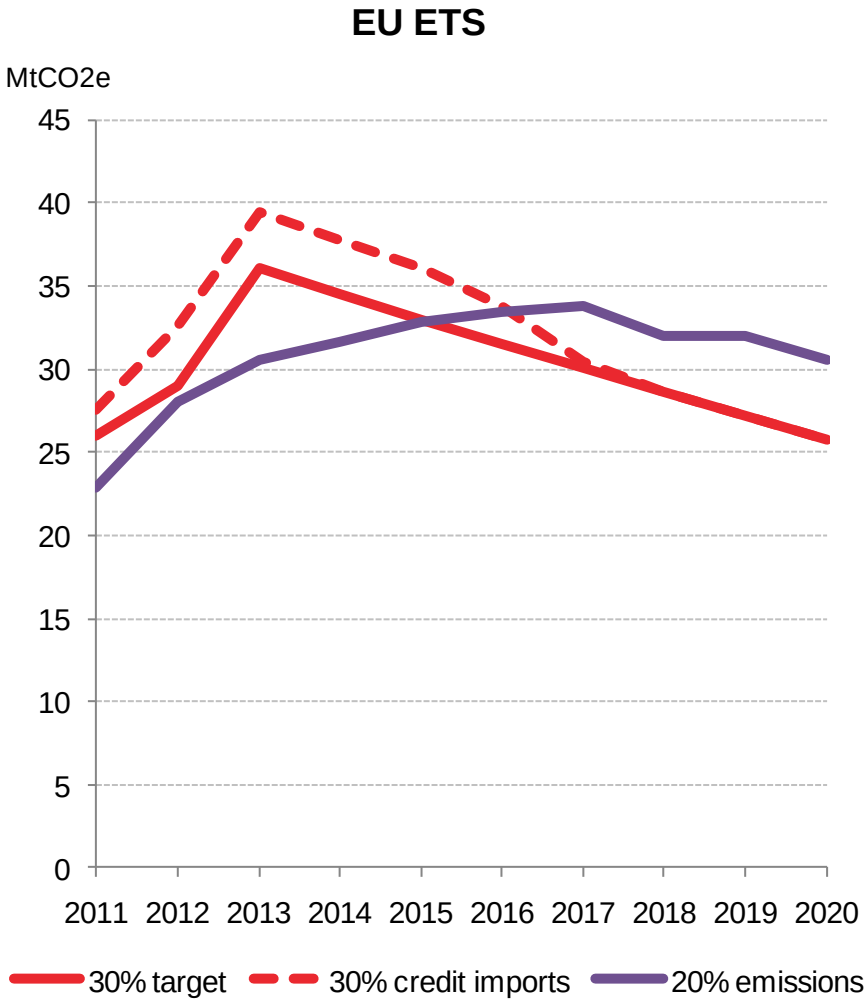

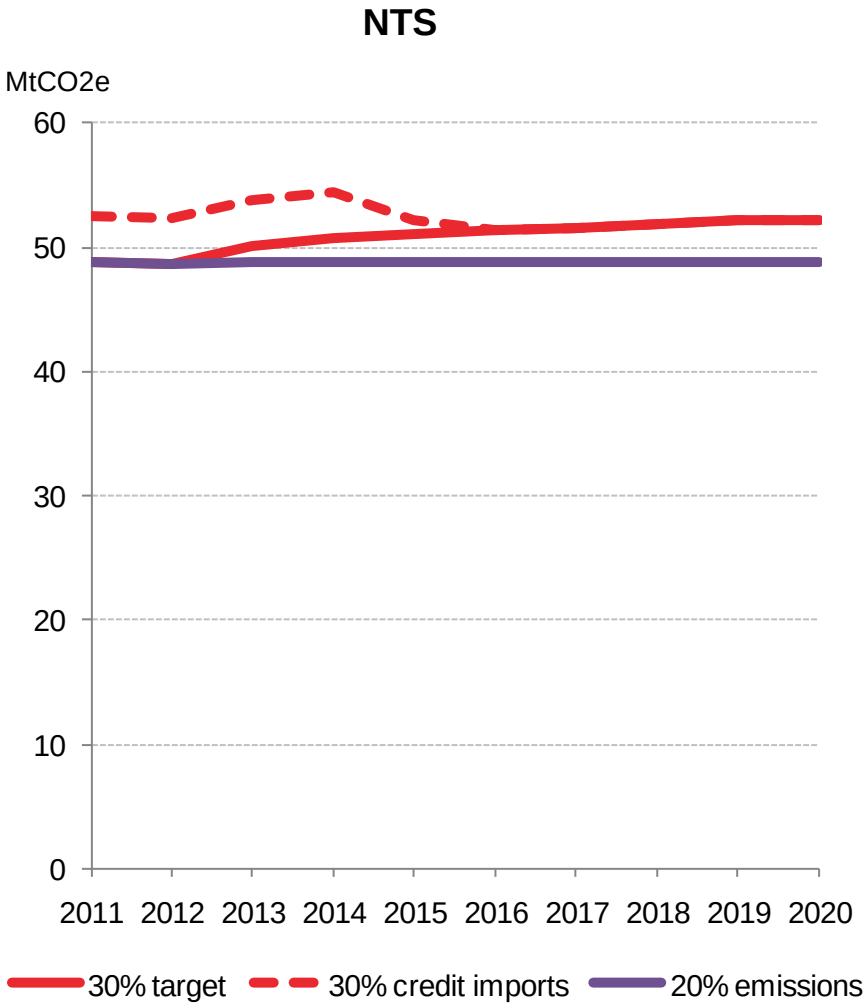

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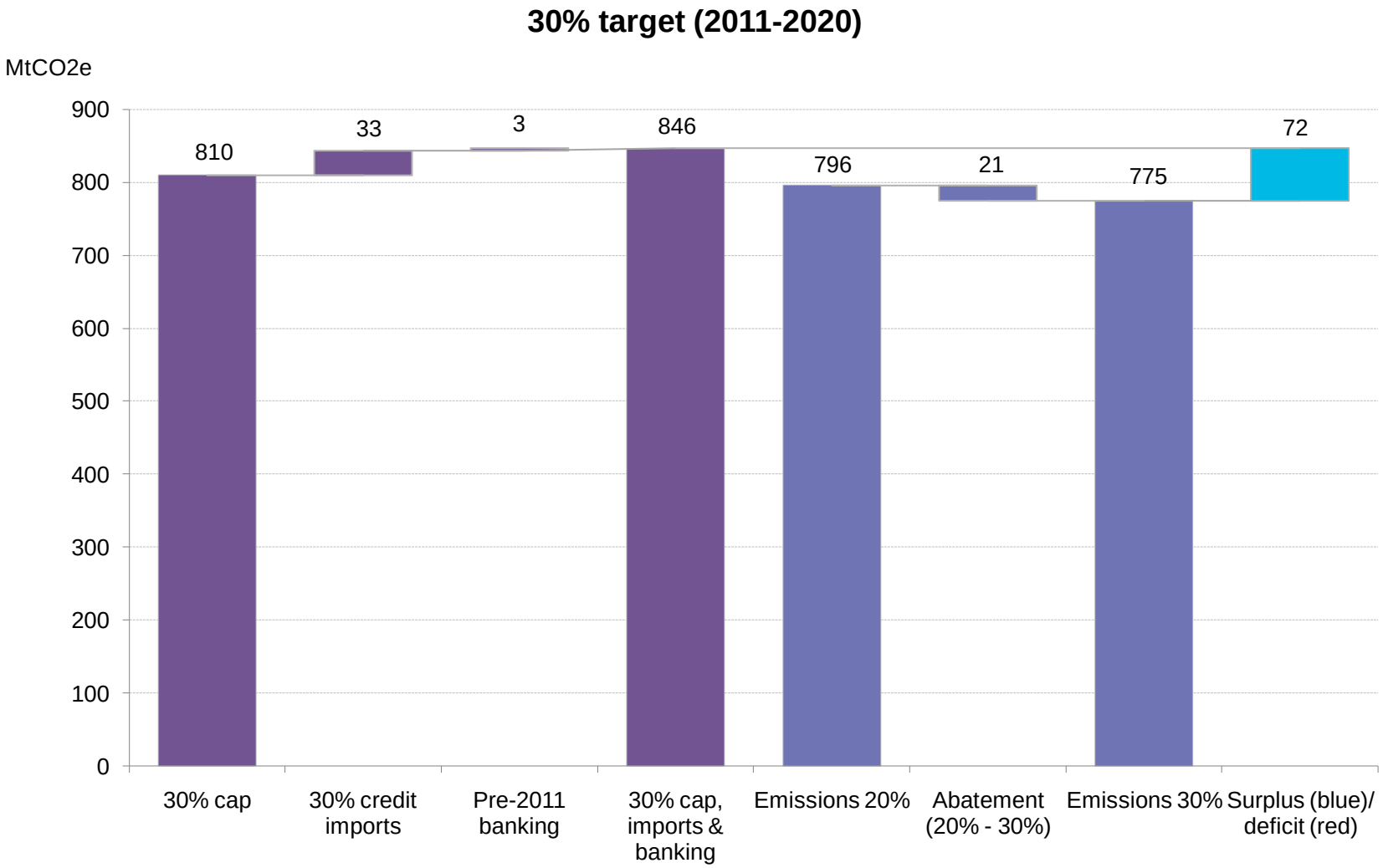
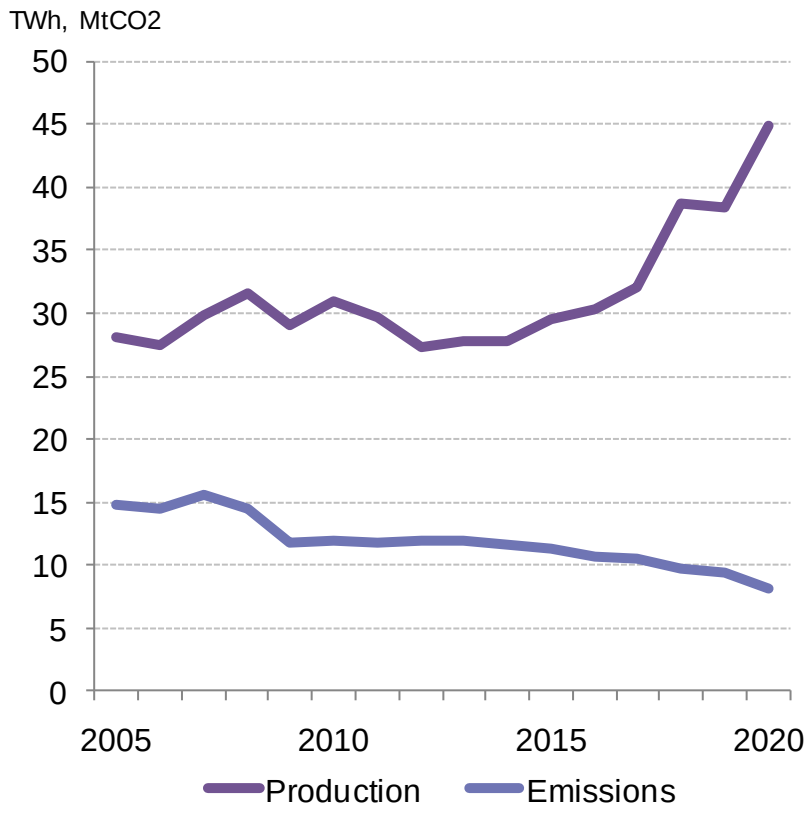
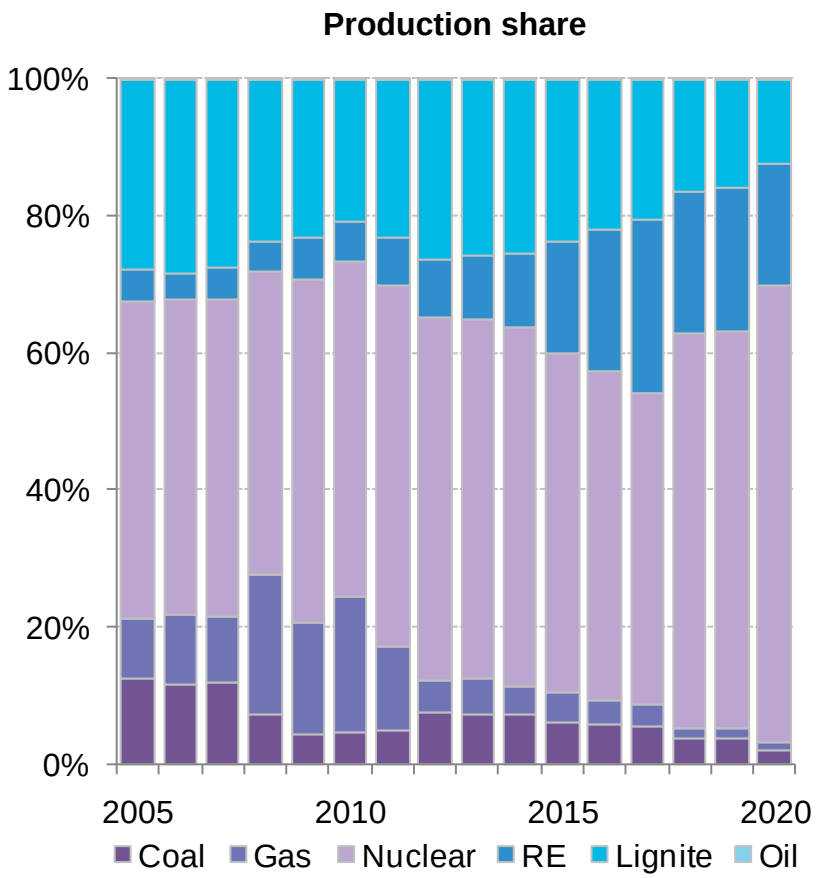


Source: Bloomberg New Energy Finance

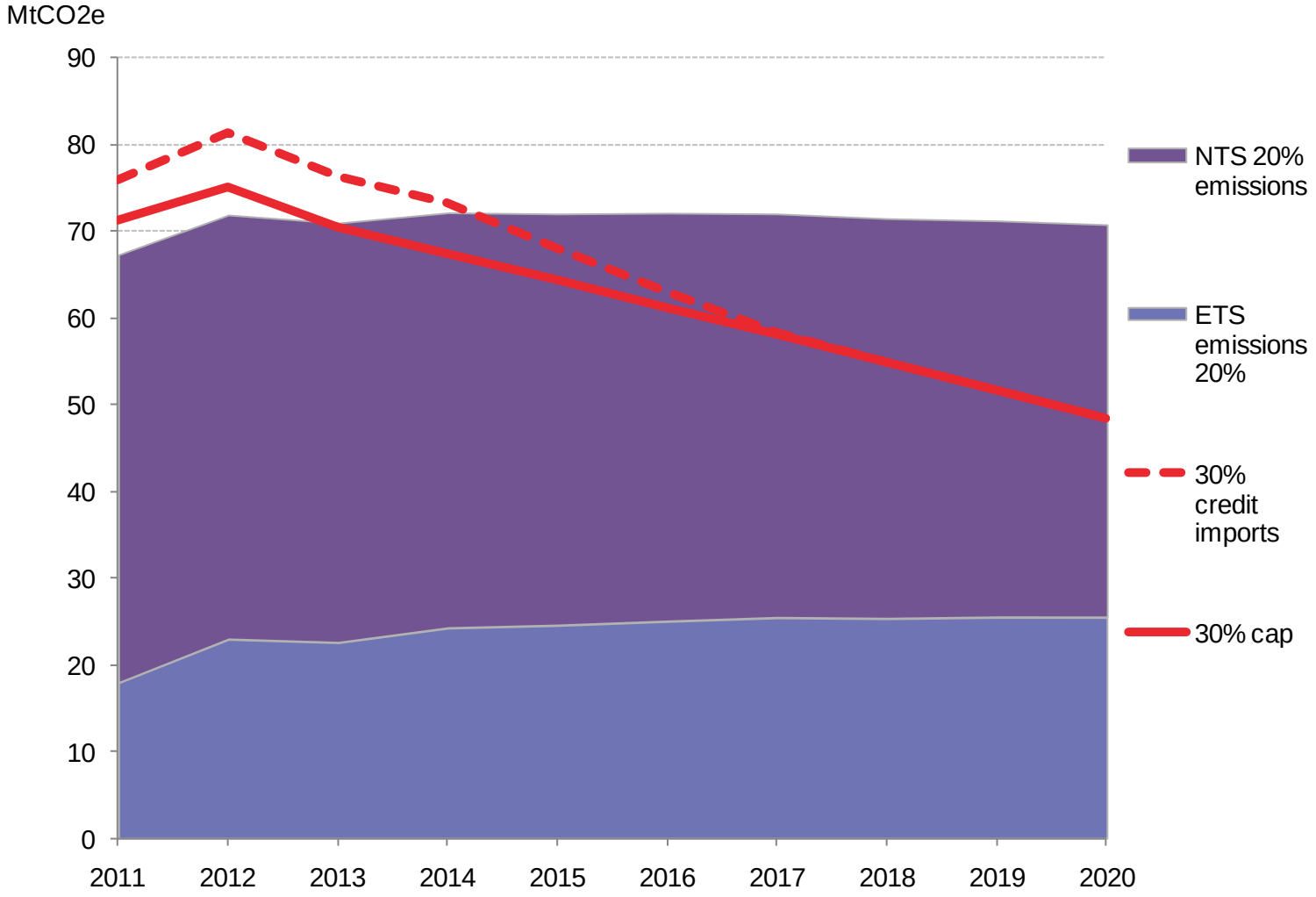
HUNGARY POWER SECTOR (20% SCENARIO)





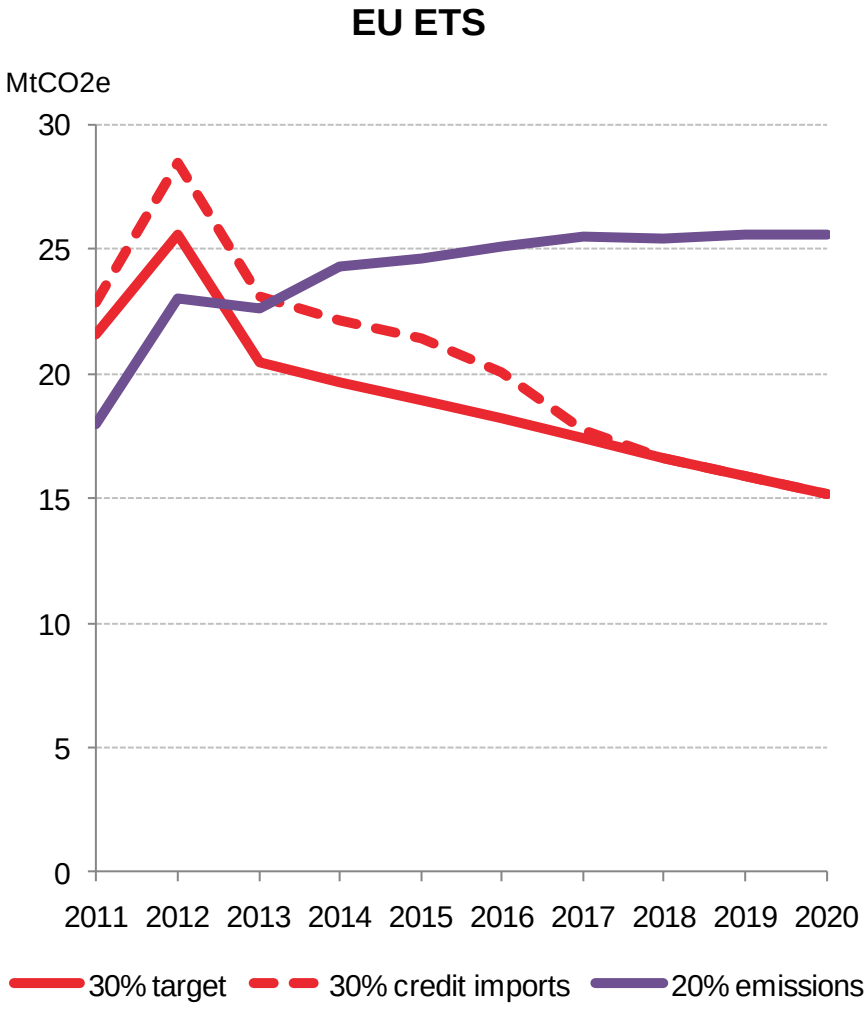
Source: Bloomberg New Energy Finance

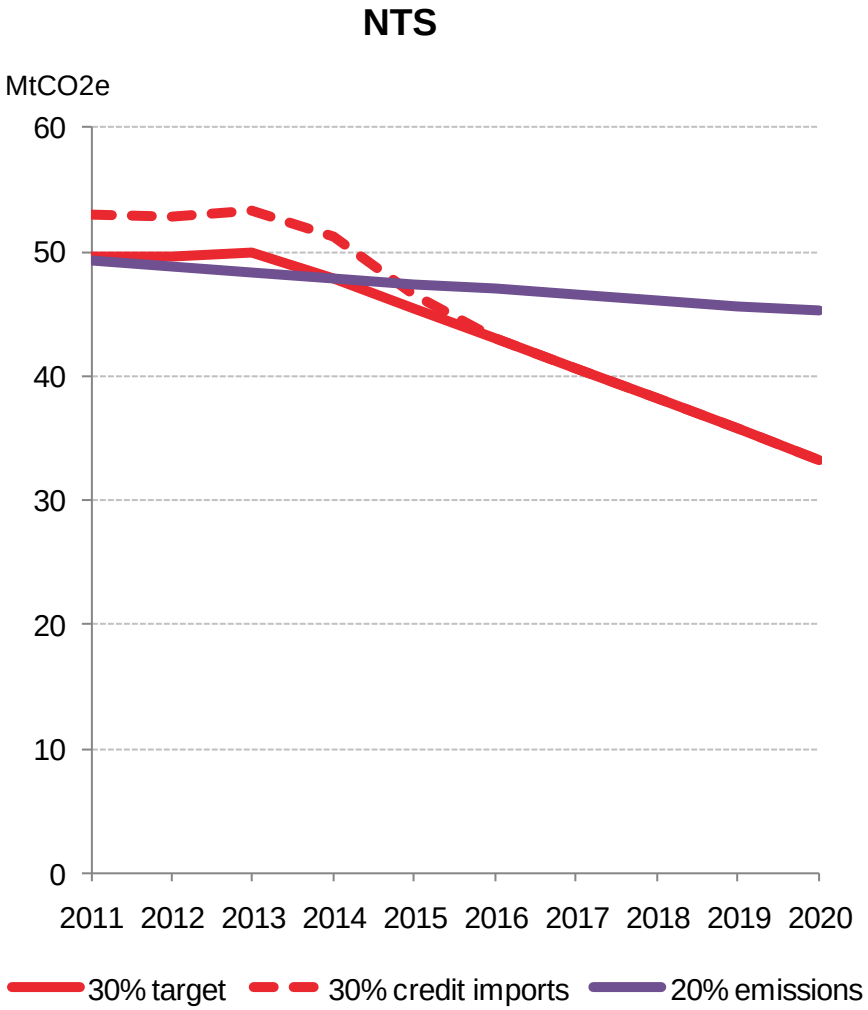
IRELAND



Source: Bloomberg New Energy Finance

IRELAND





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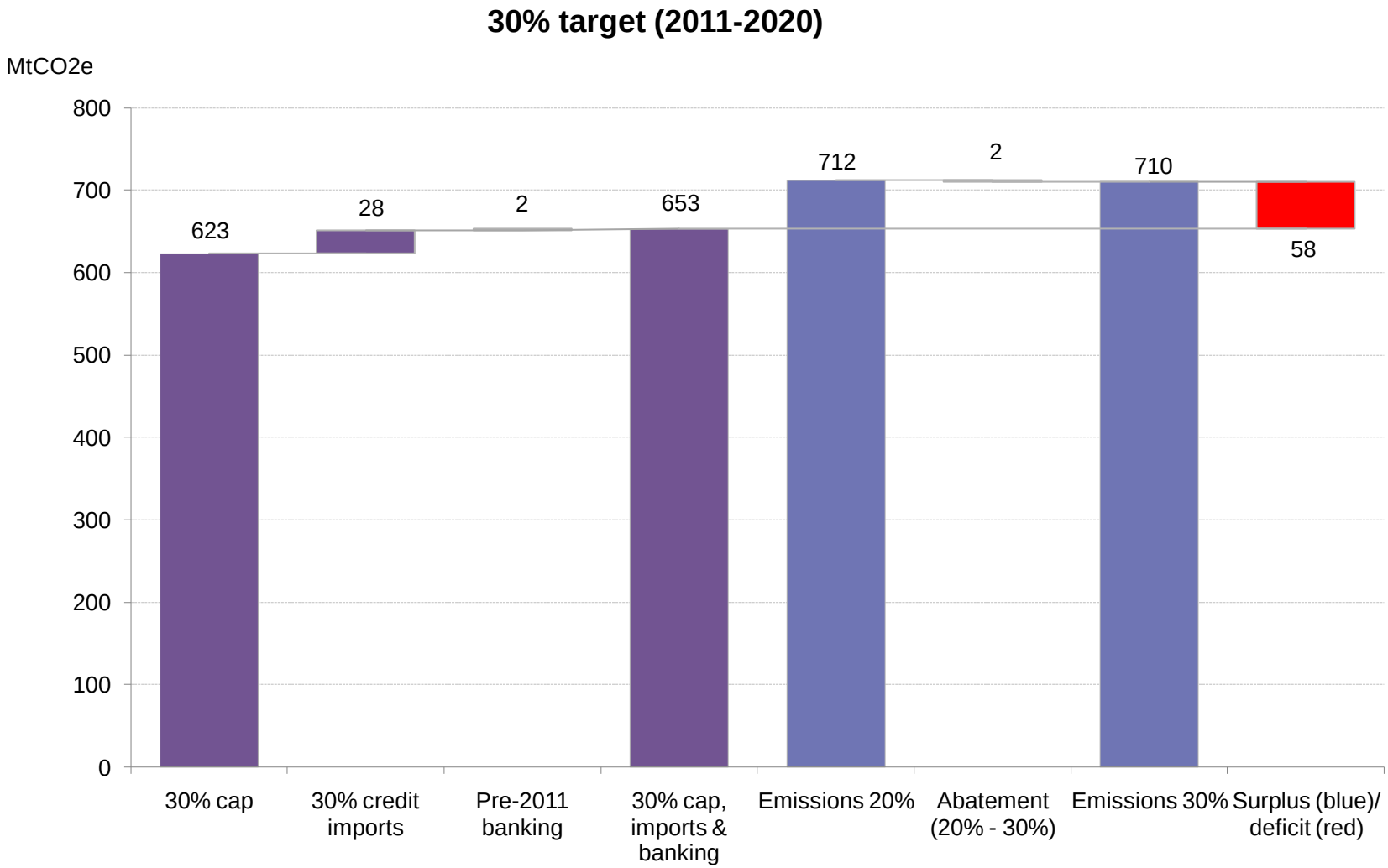
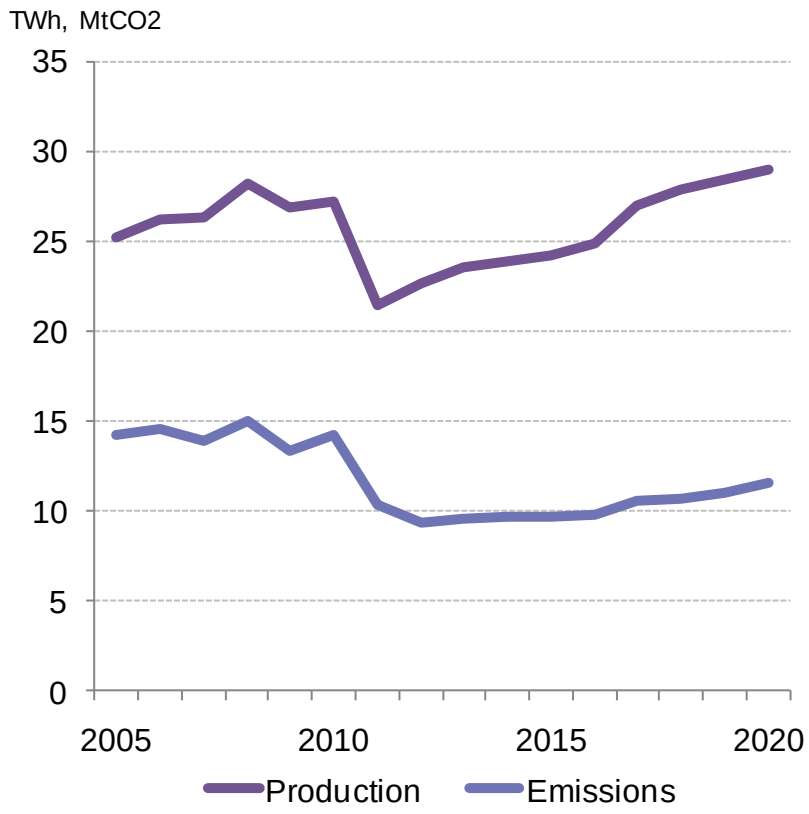
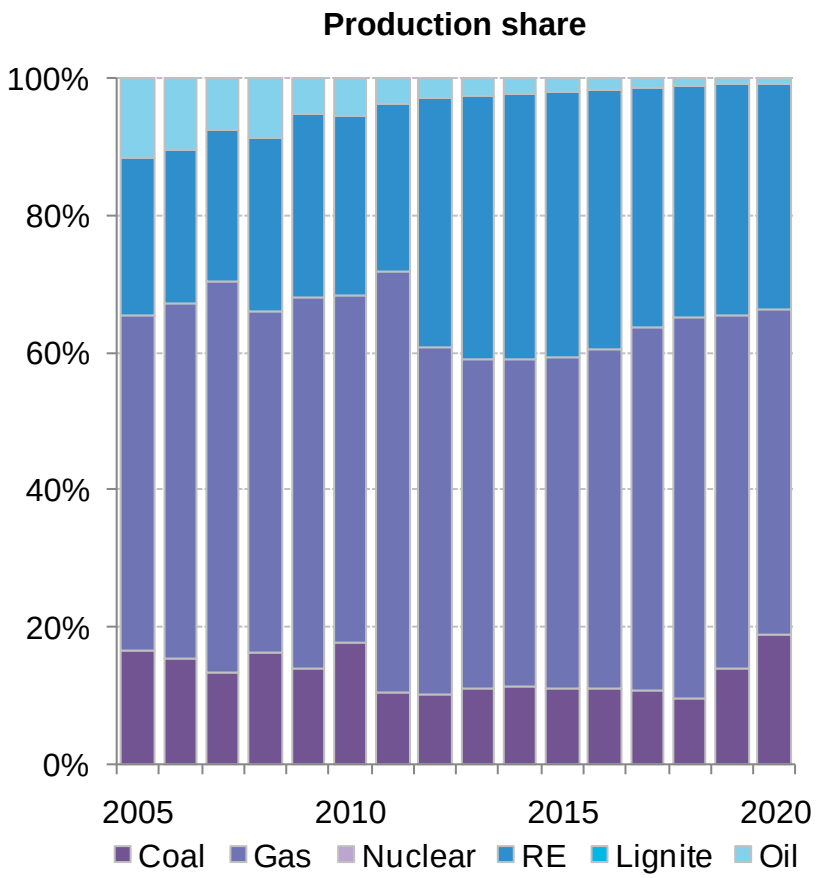
IRELAND



Source: Bloomberg New Energy Finance

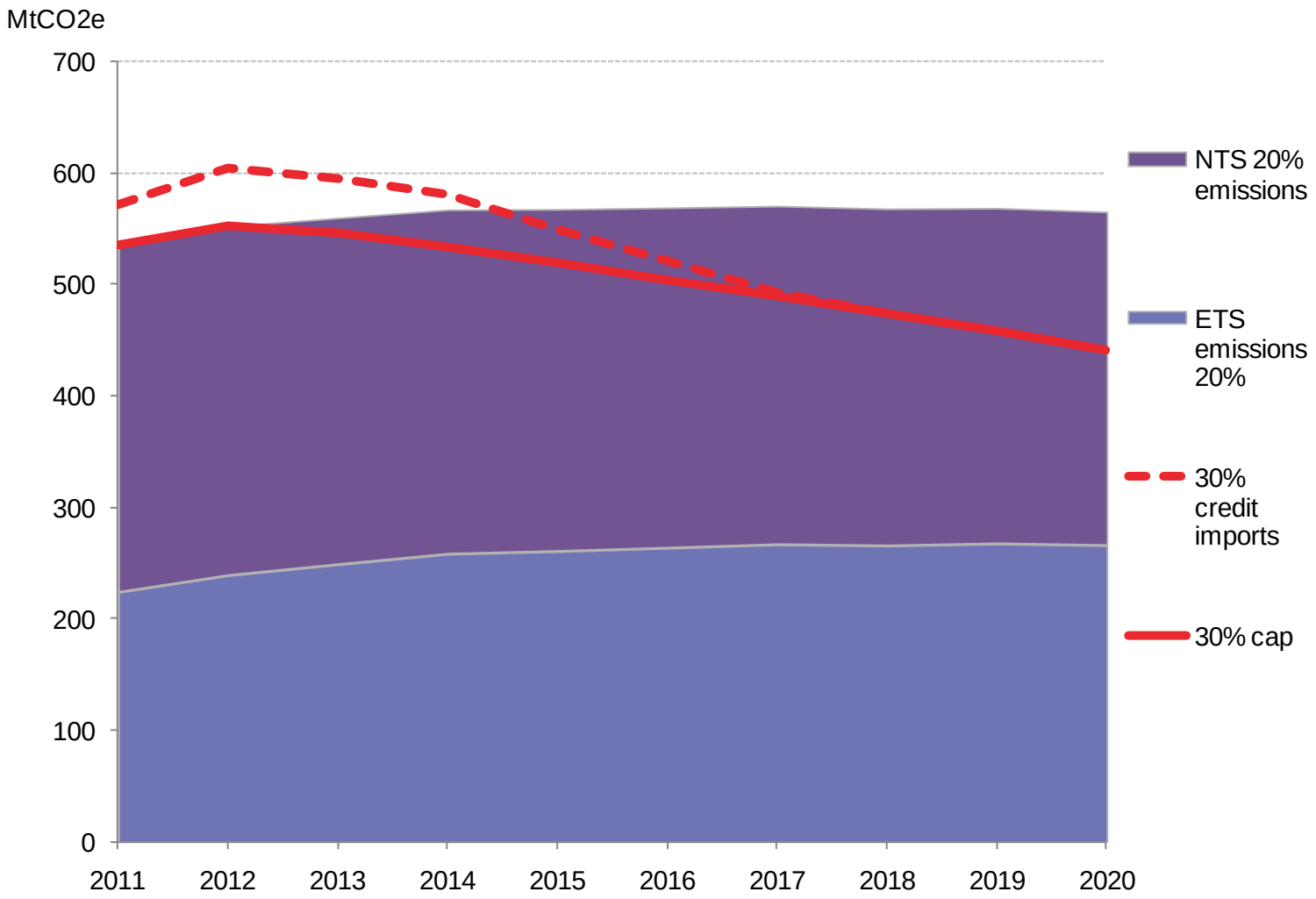
IRELAND POWER SECTOR (20% SCENARIO)





Source: Bloomberg New Energy Finance

ITALY



Source: Bloomberg New Energy Finance

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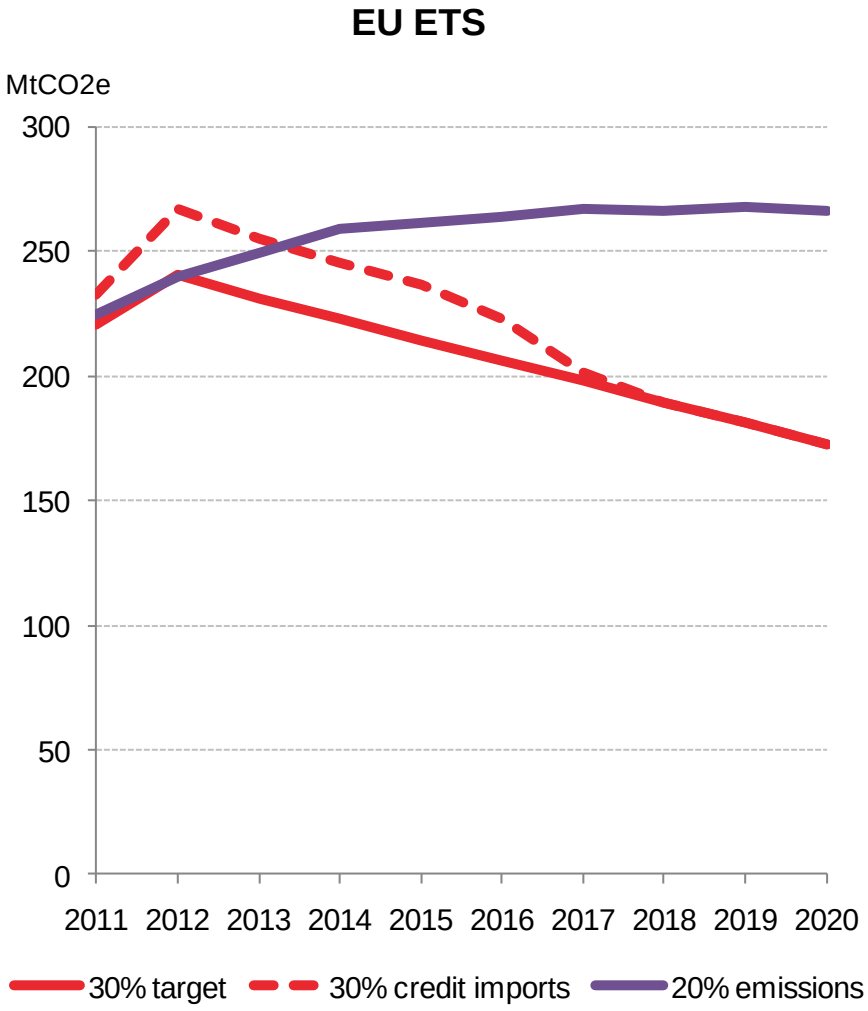

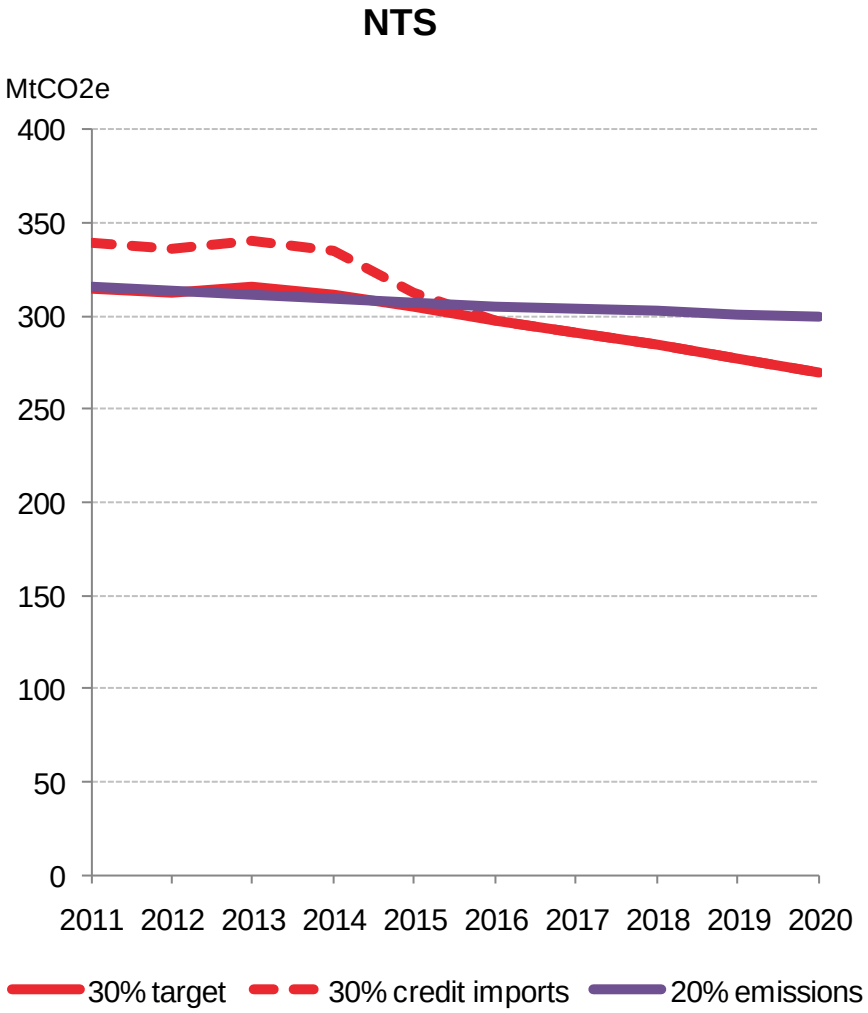

Source: Bloomberg New Energy Finance

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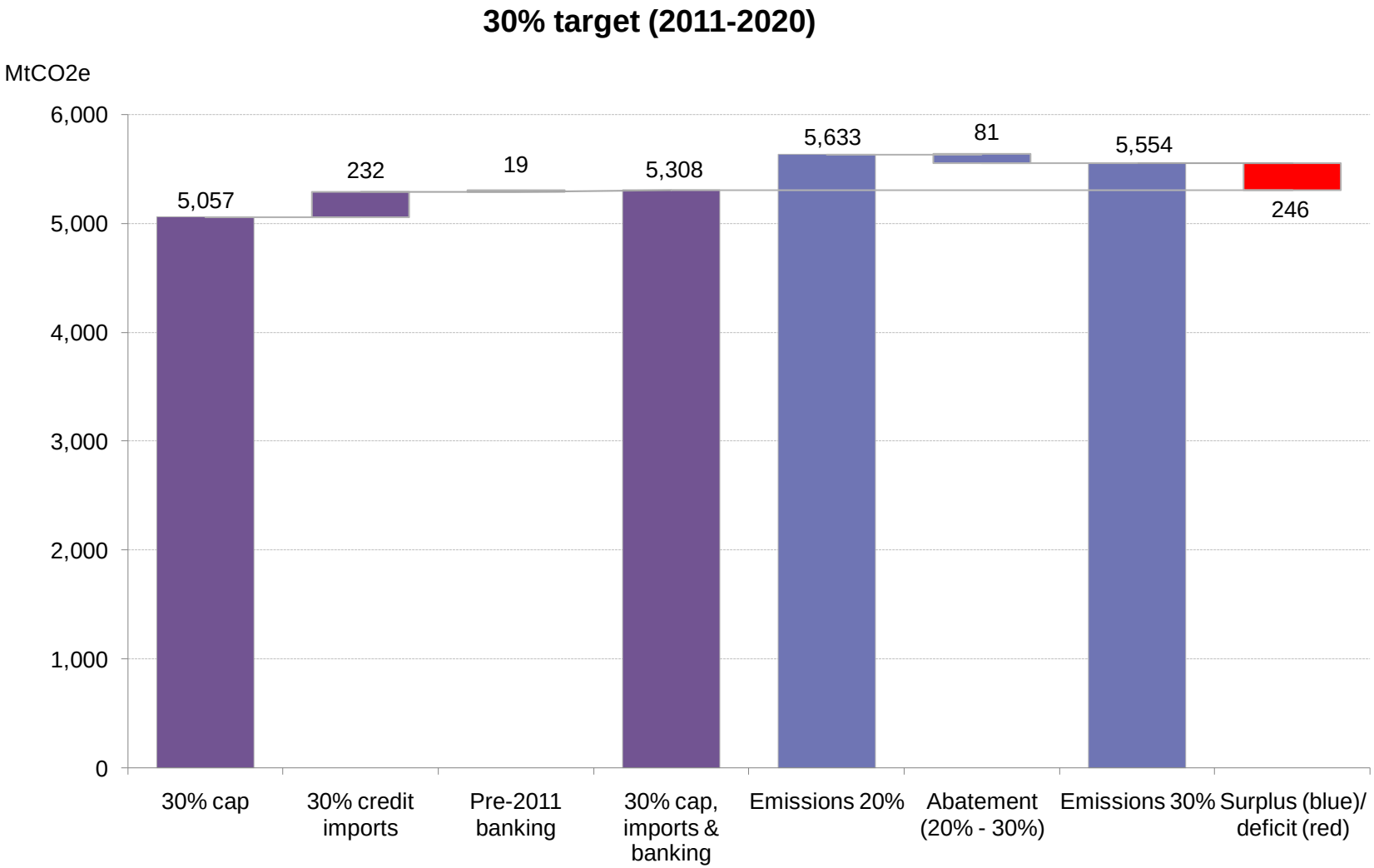
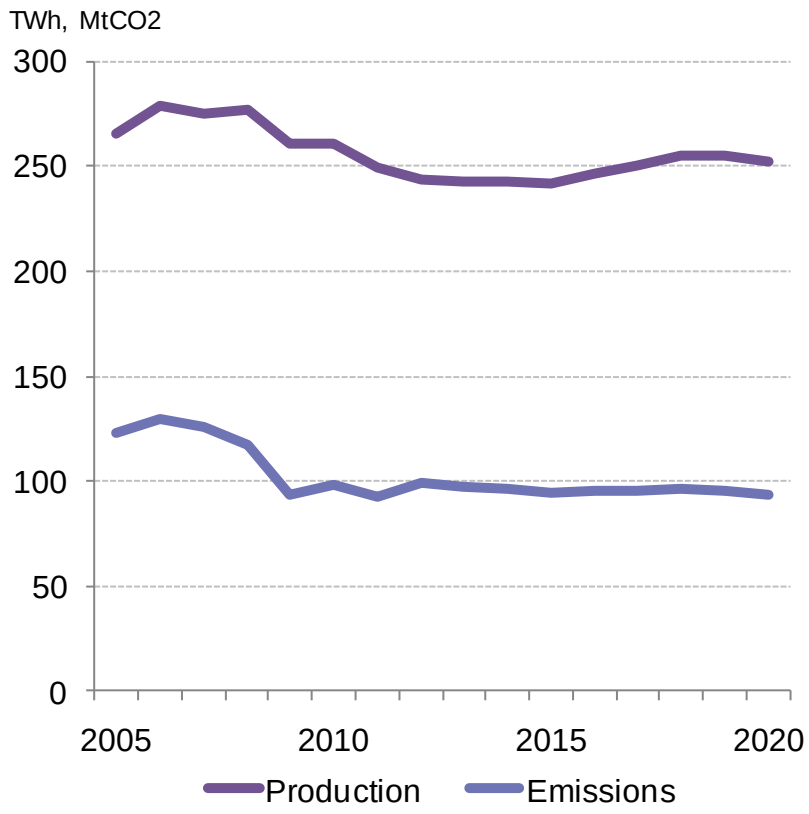
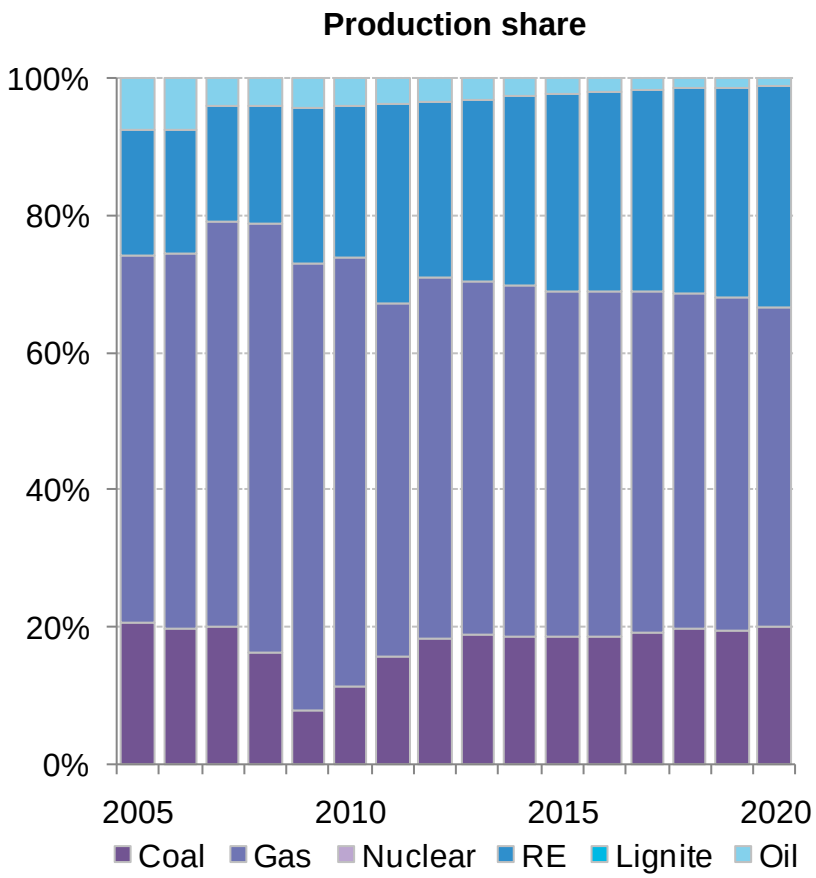


Source: Bloomberg New Energy Finance

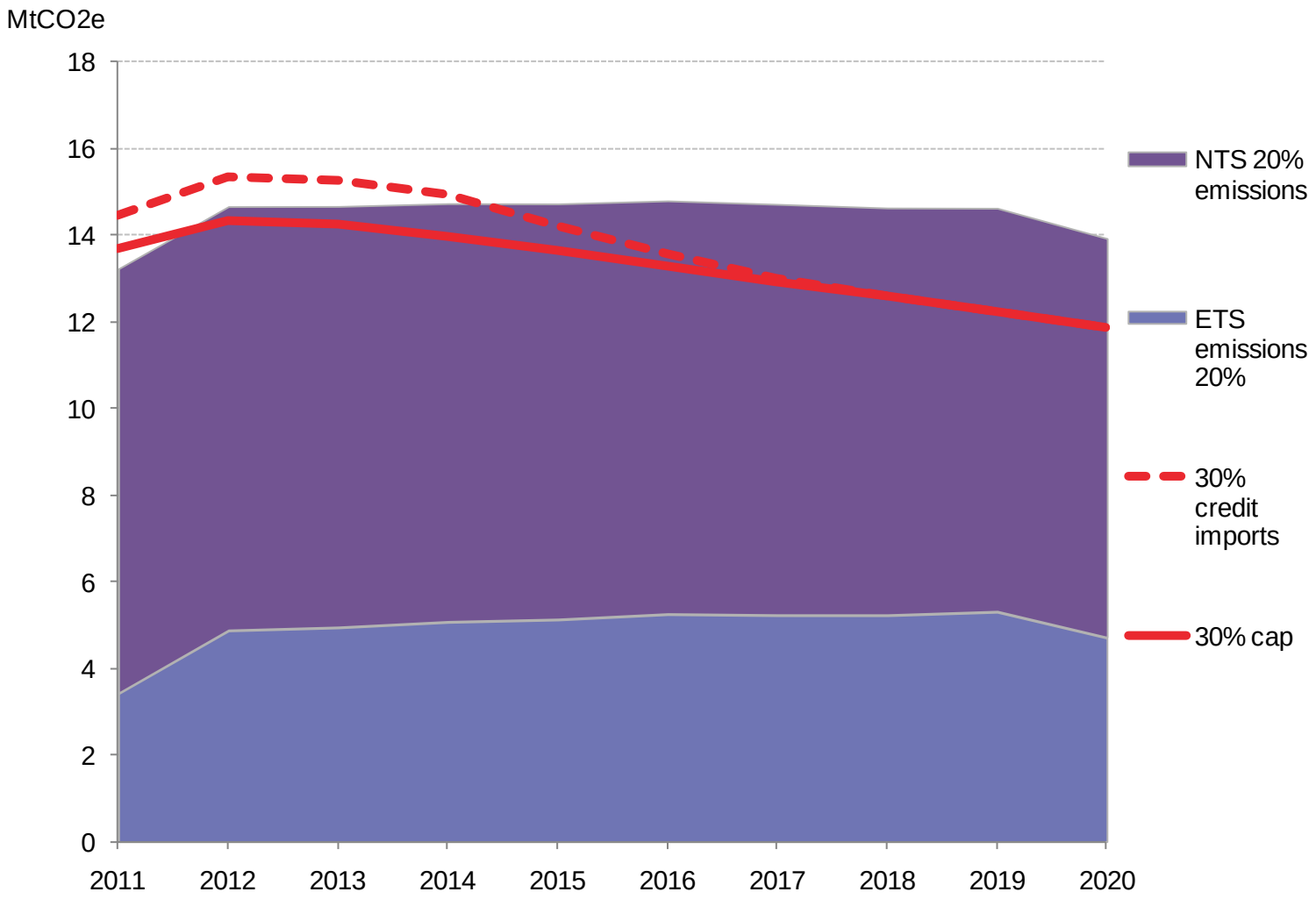
ITALY POWER SECTOR (20% SCENARIO)





Source: Bloomberg New Energy Finance

LATVIA



Source: Bloomberg New Energy Finance

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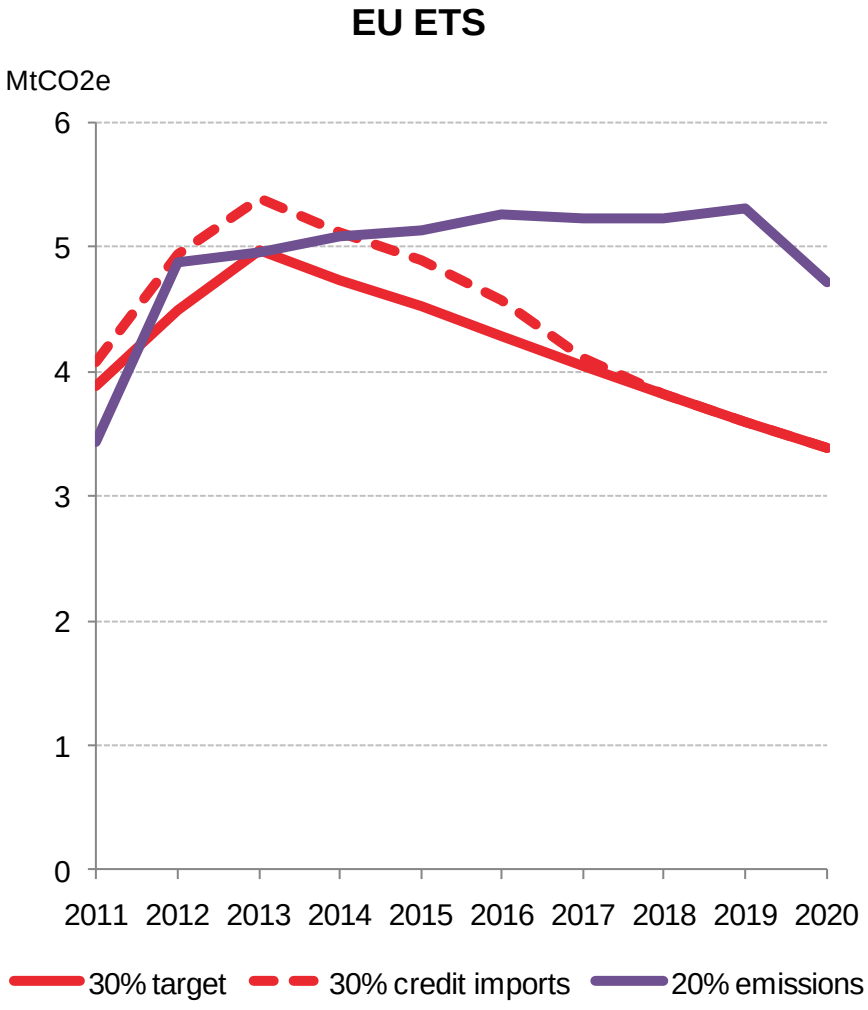
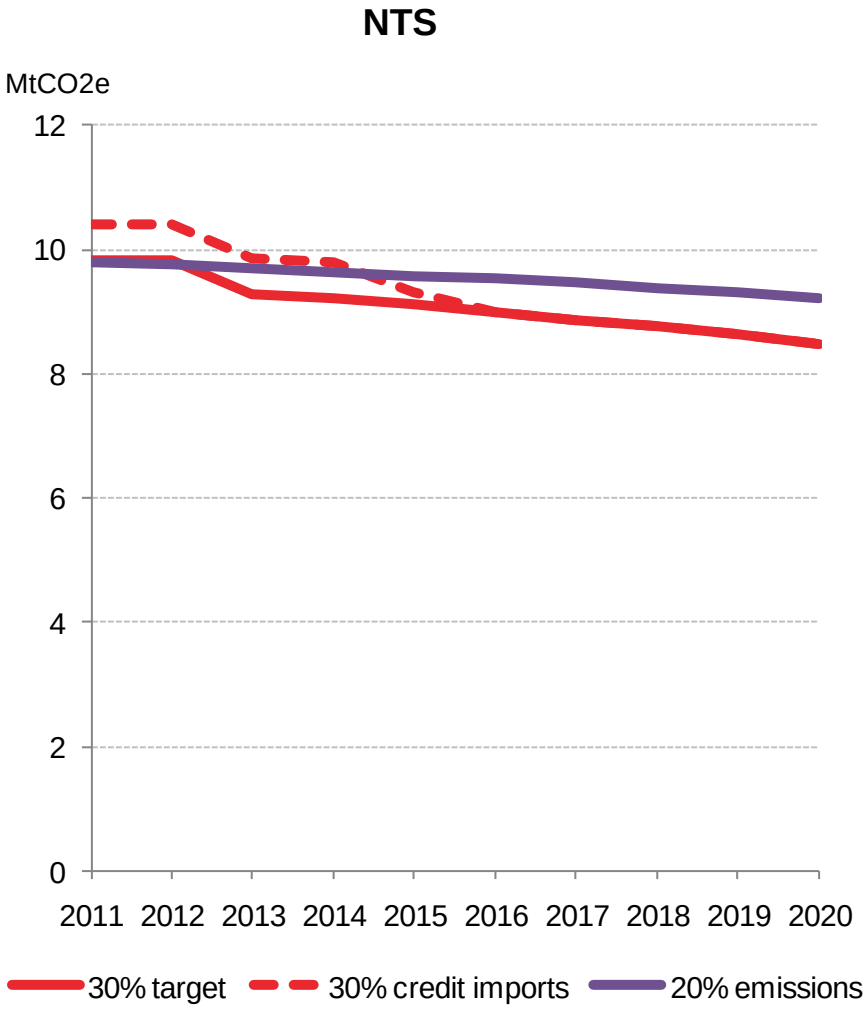
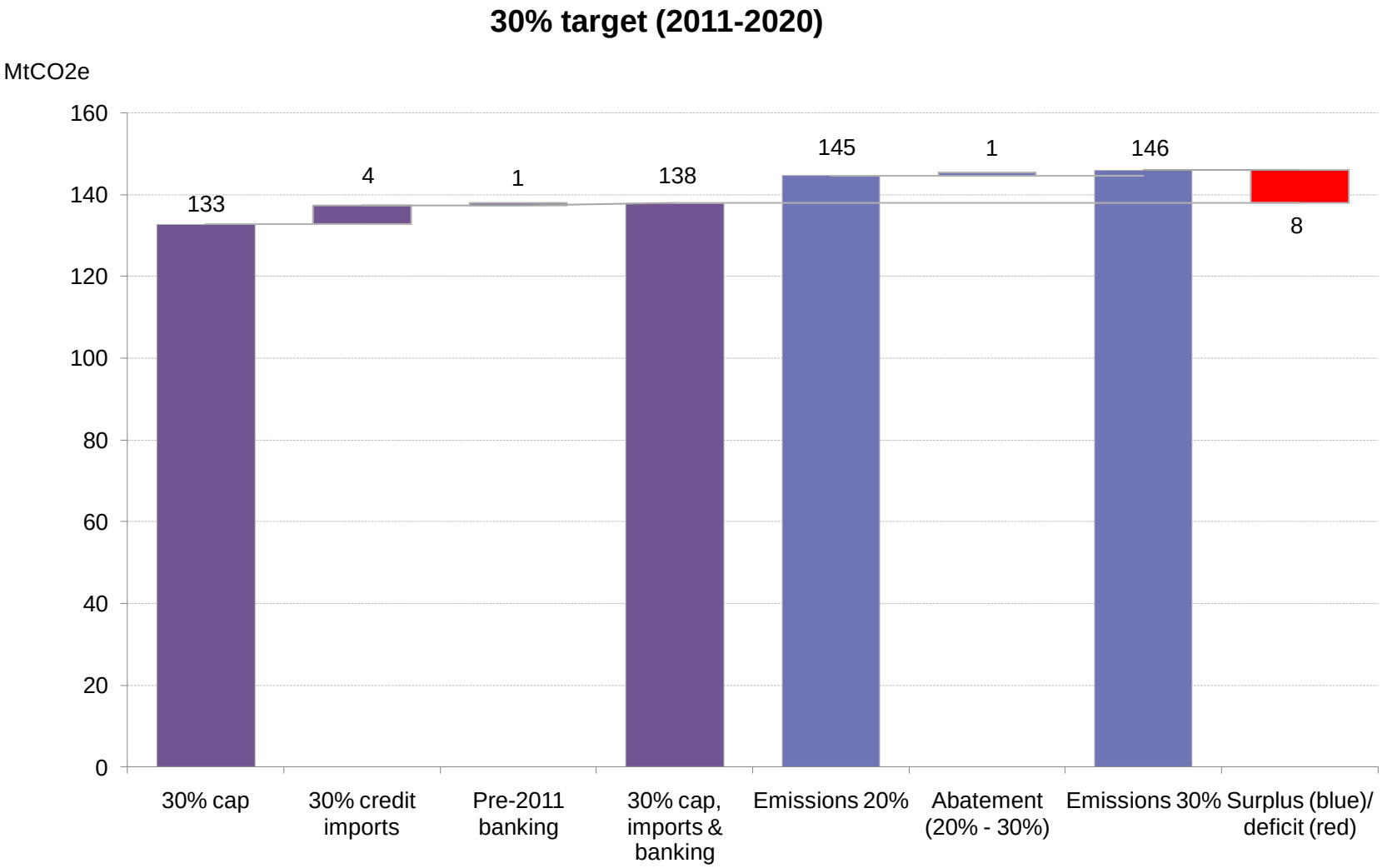




Source: Bloomberg New Energy Finance

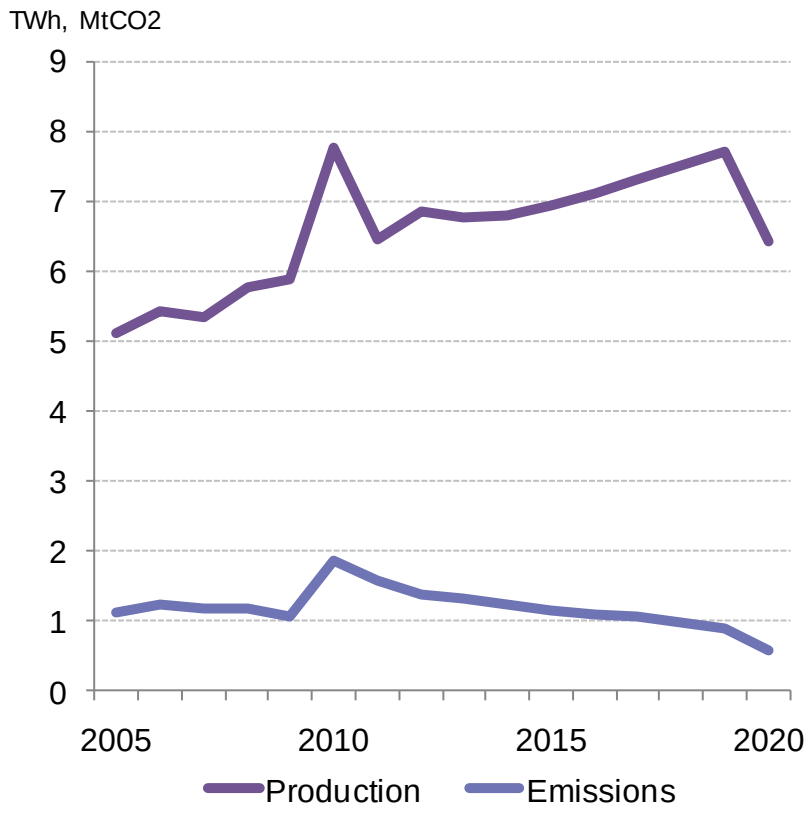
LATVIA

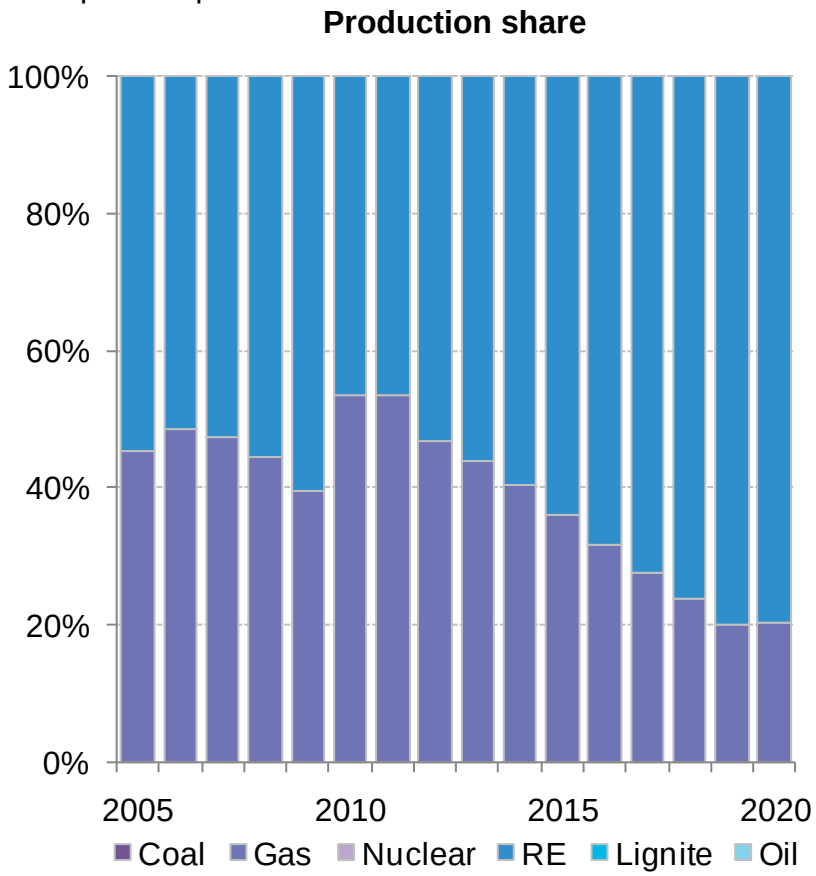


Source: Bloomberg New Energy Finance

LATVIA POWER SECTOR (20% SCENARIO)

NB: Emissions profiles of Estonia, Latvia and Lithuania highly sensitive to assumptions about imports and exports of power.

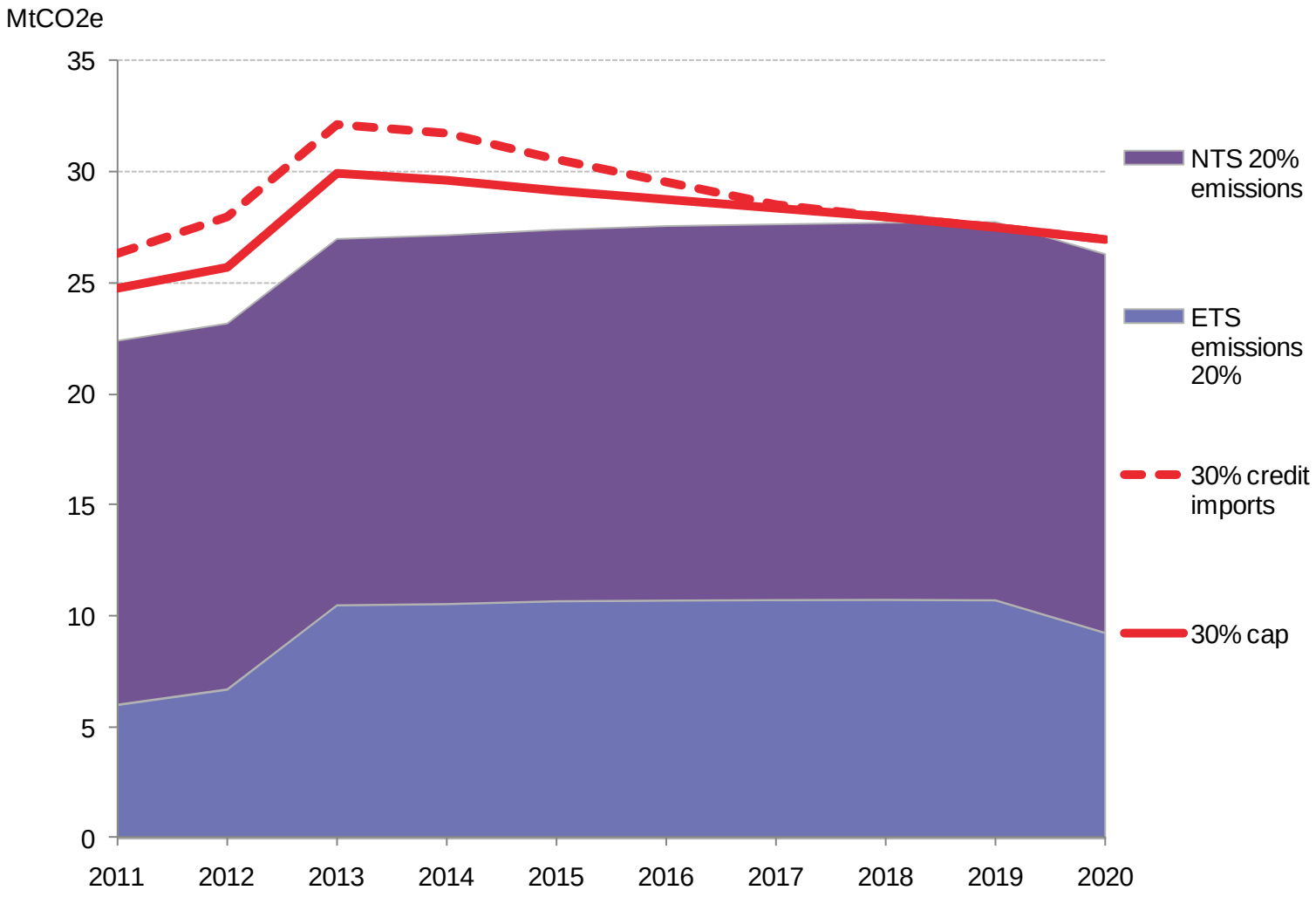




Note: we expect gas generation, which increased in 2010-11, to fall to similar levels as seen pre-2010; we also forecast that wind power generation will increase steadily out to 2020 compared to historical levels; in 2020, production decreases as imports to Lithuania fall to zero – due to their increased nuclear capacity.

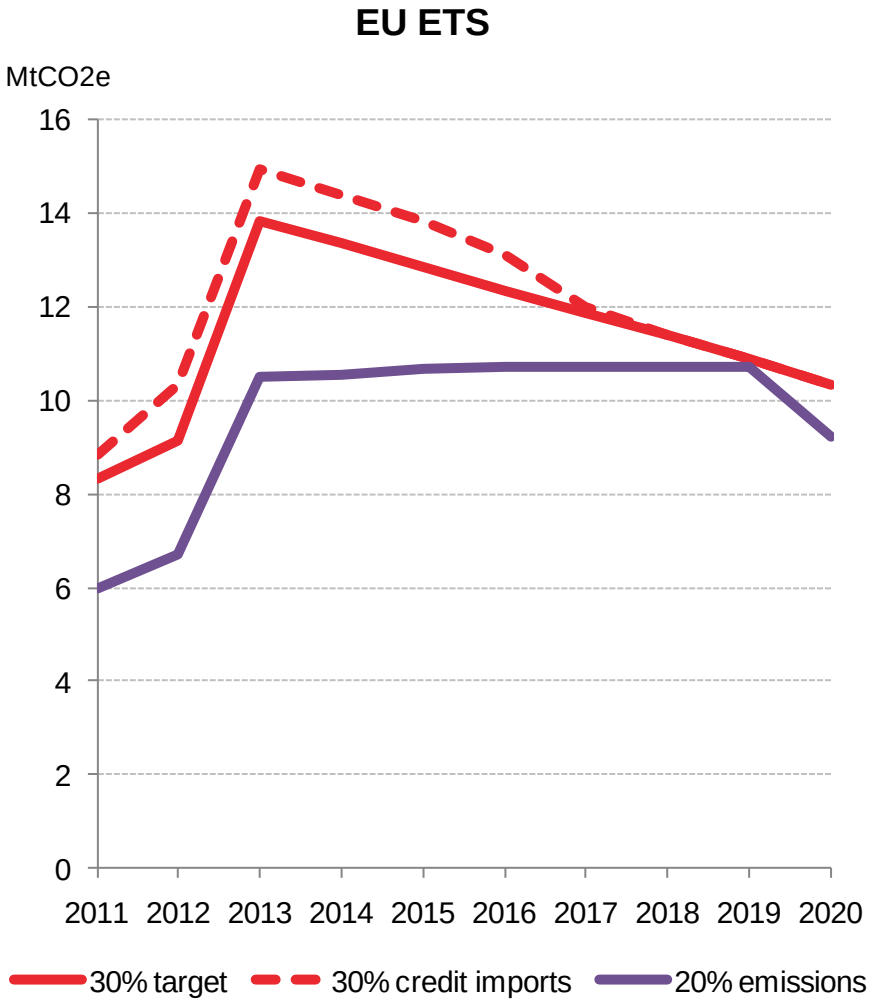
Source: Bloomberg New Energy Finance

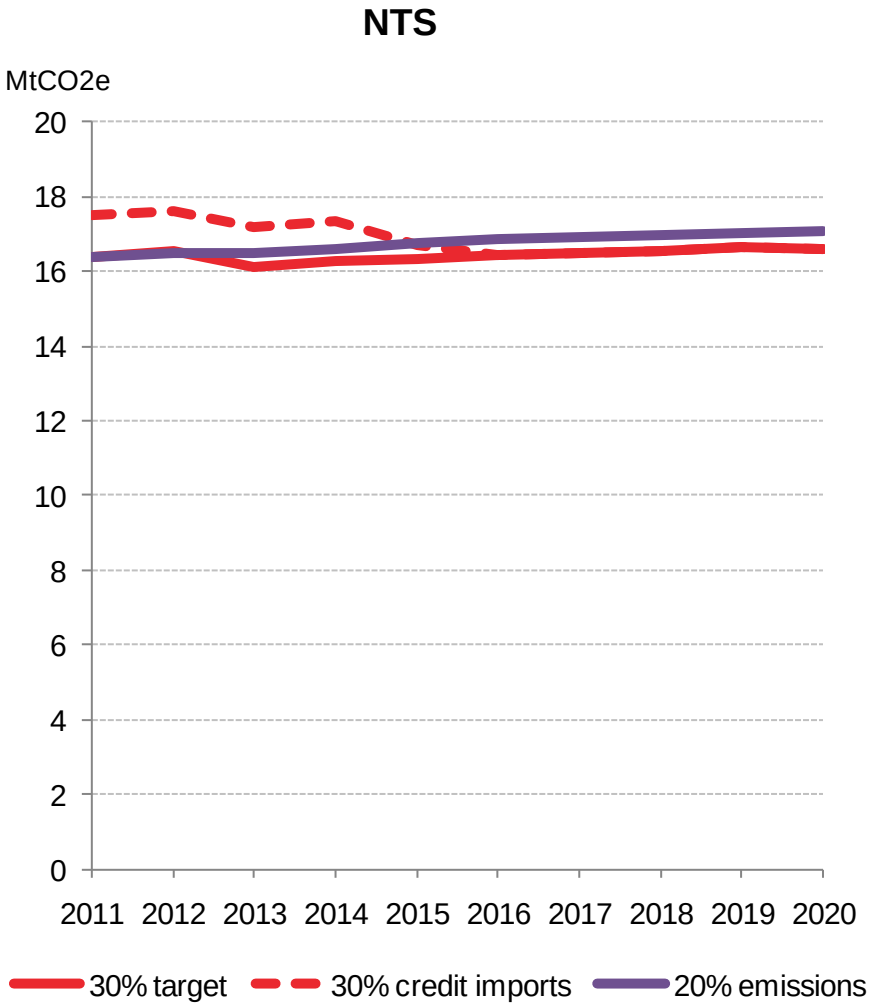
LITHUANIA



Source: Bloomberg New Energy Finance

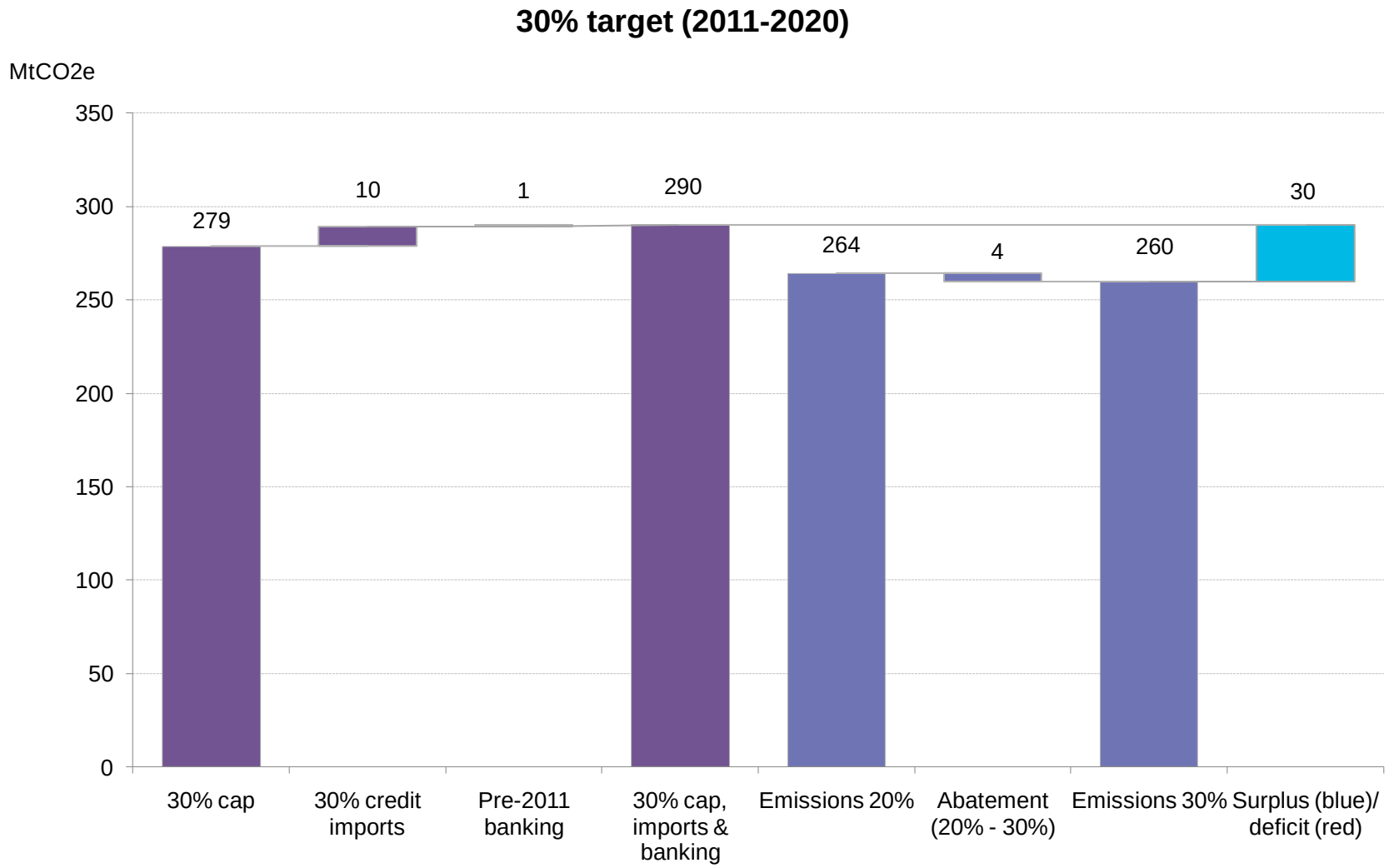
LITHUANIA





Source: Bloomberg New Energy Finance

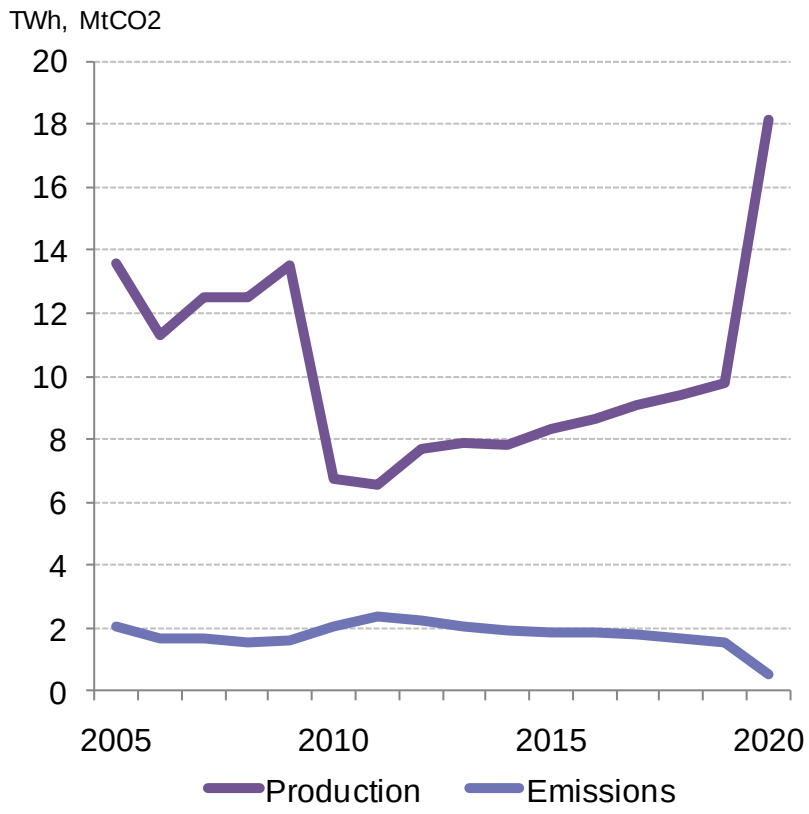
LITHUANIA

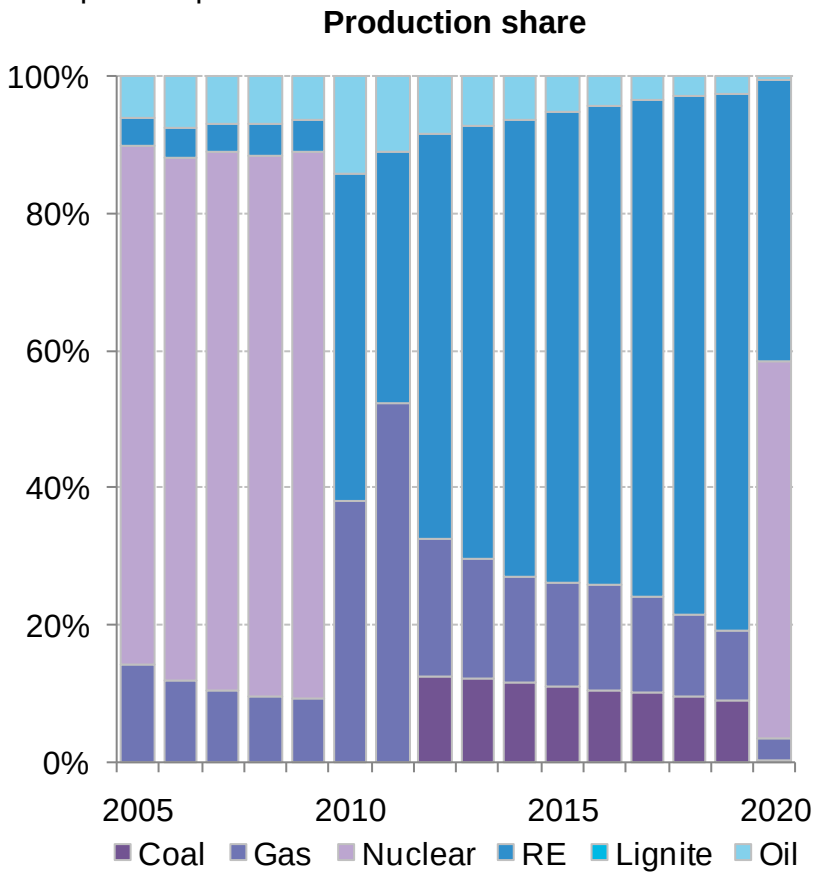


Source: Bloomberg New Energy Finance

LITHUANIA POWER SECTOR (20% SCENARIO)

NB: Emissions profiles of Estonia, Latvia and Lithuania highly sensitive to assumptions about imports and exports of power.

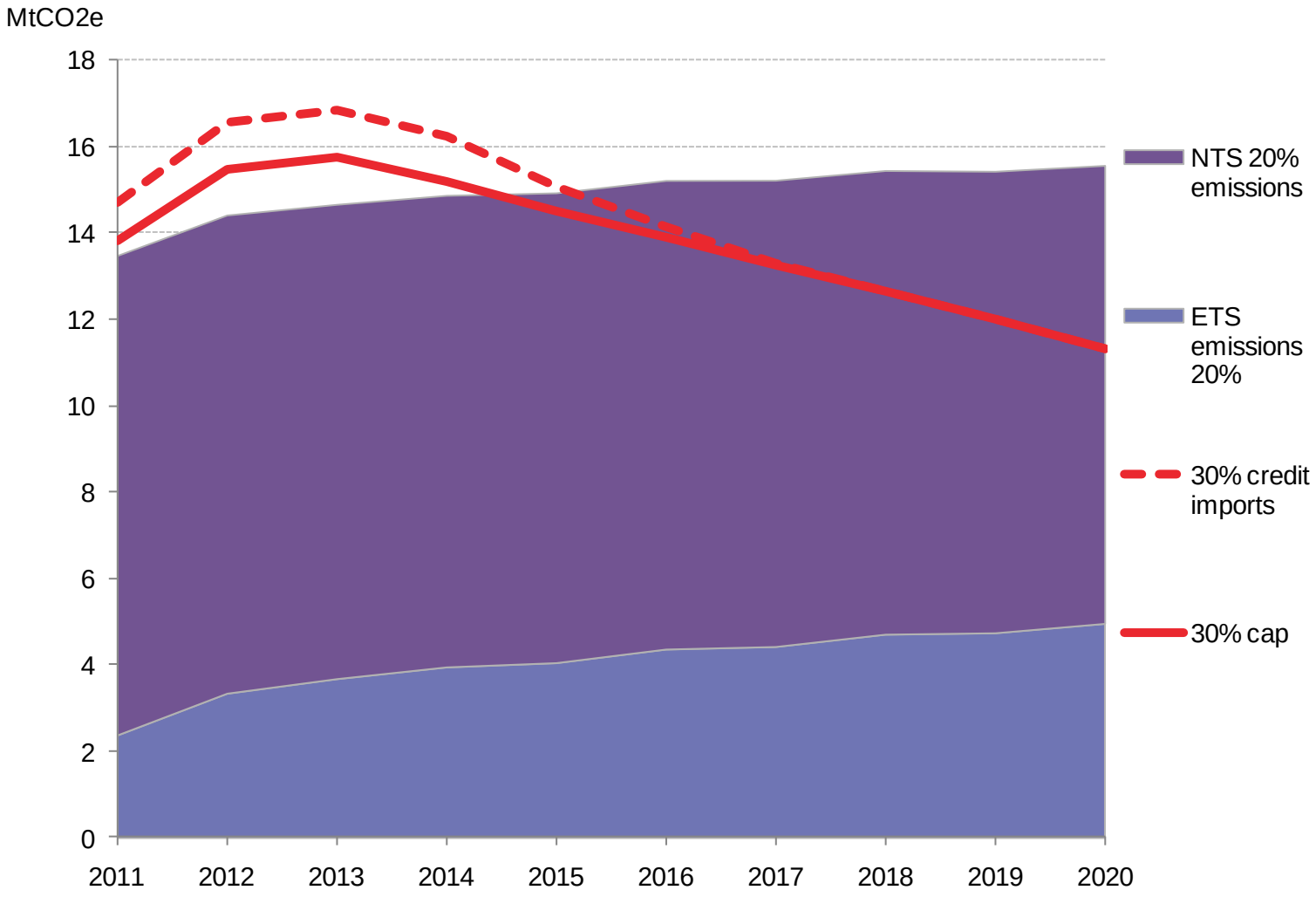




Note: nuclear production falls off in 2010 due to plant closure and increases again in 2020 with newly built nuclear capacity; we also forecast gas power production to fall towards historical levels after peaking in 2010-11.

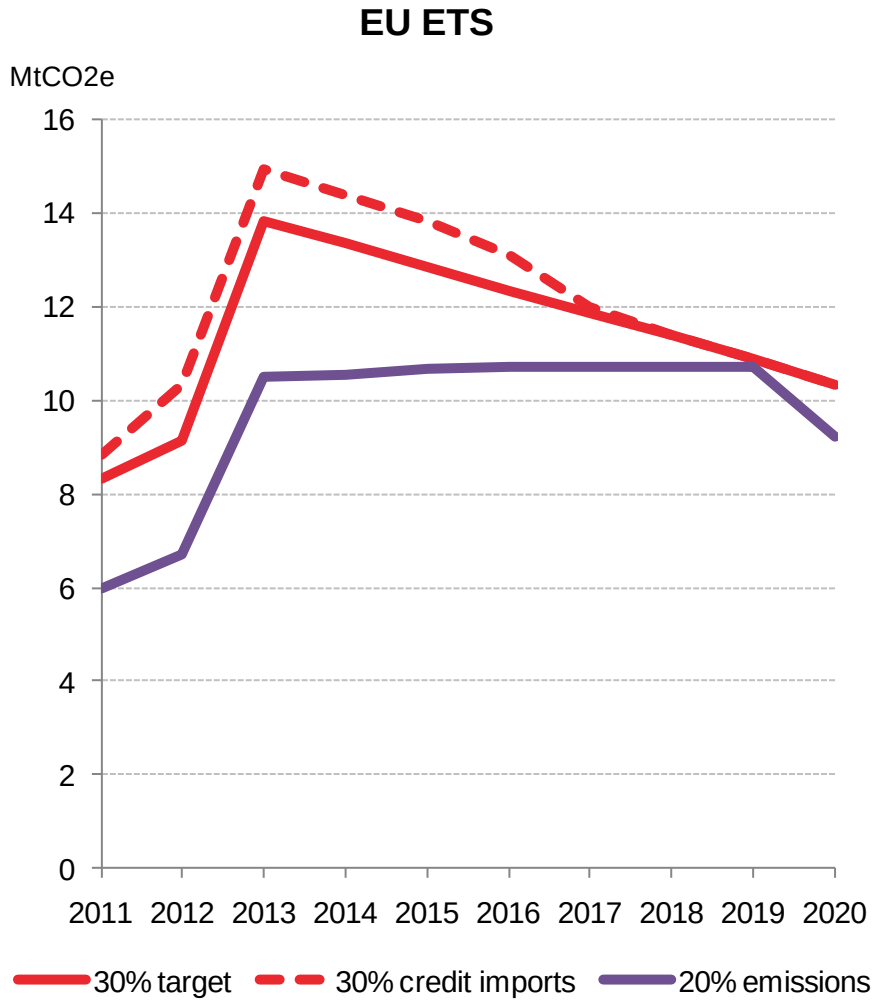
Source: Bloomberg New Energy Finance

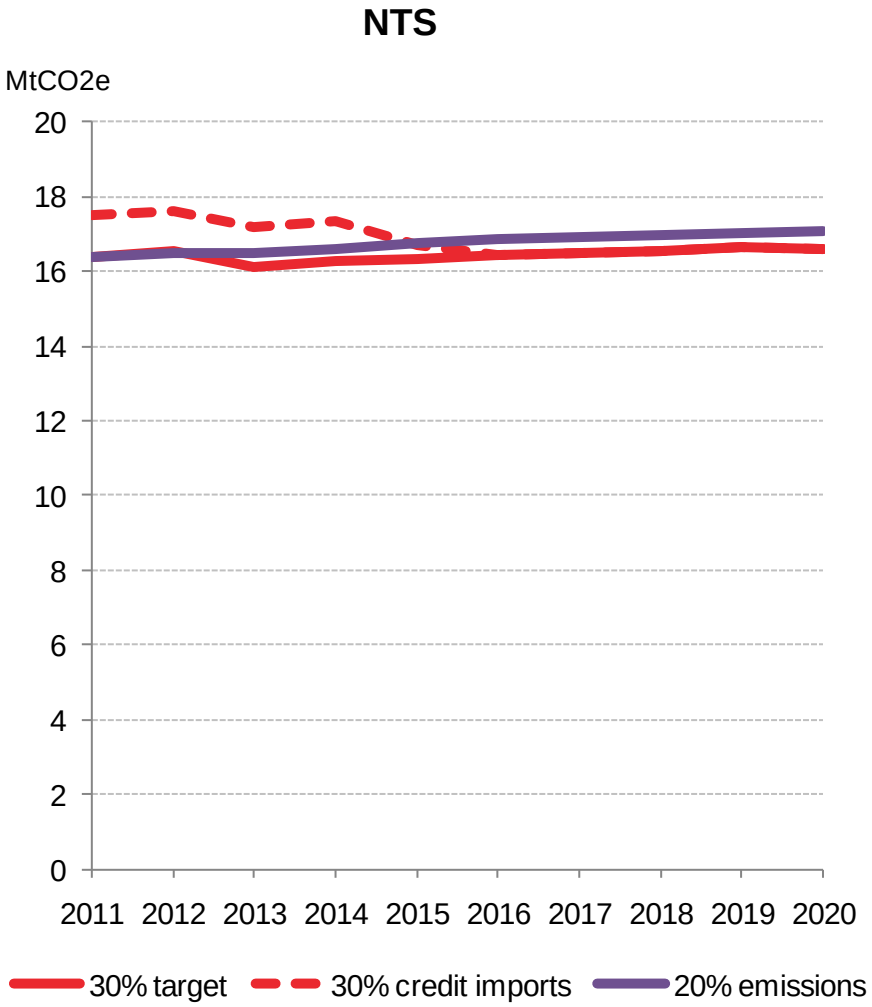
LUXEMBOURG



Source: Bloomberg New Energy Finance

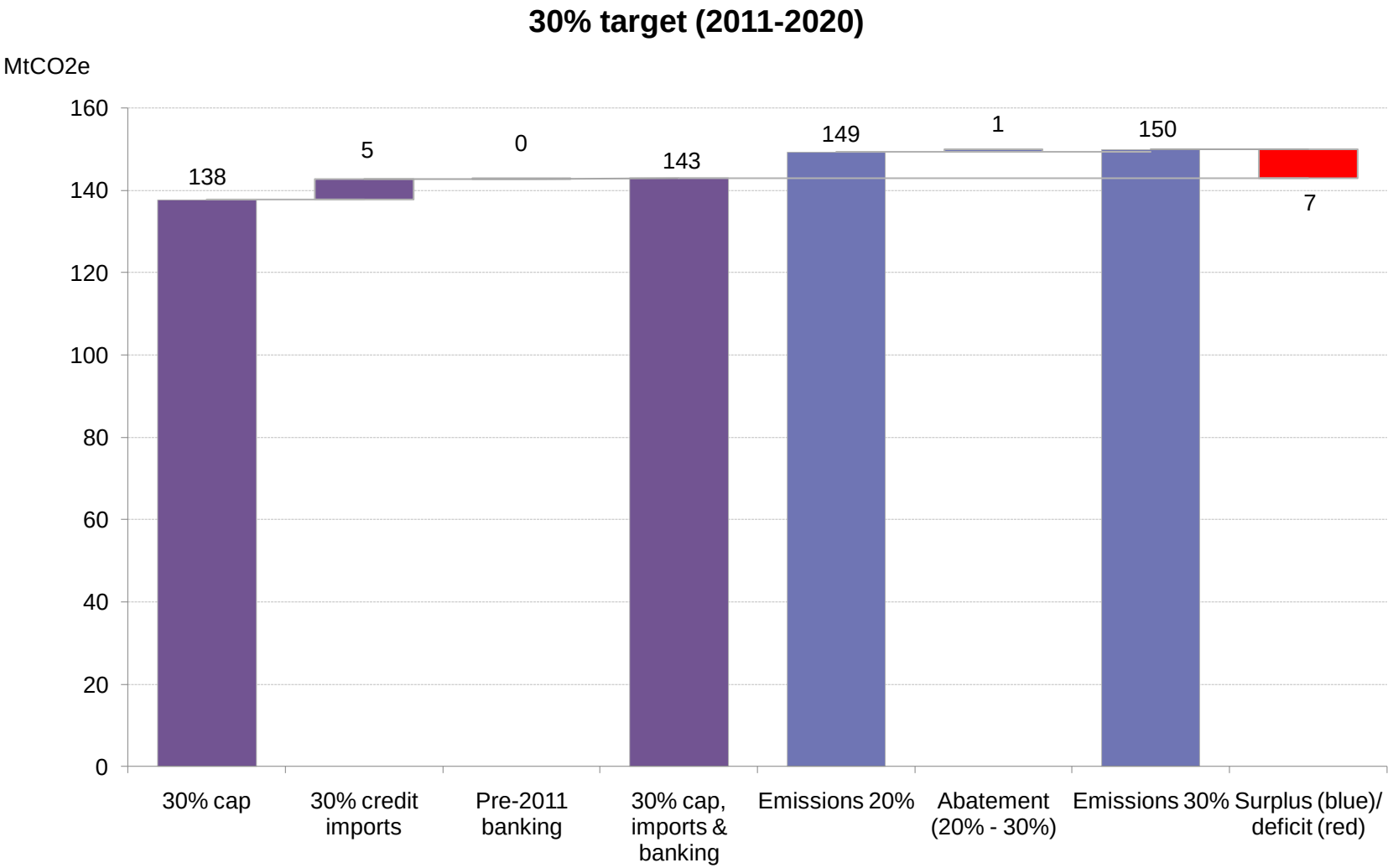
LUXEMBOURG





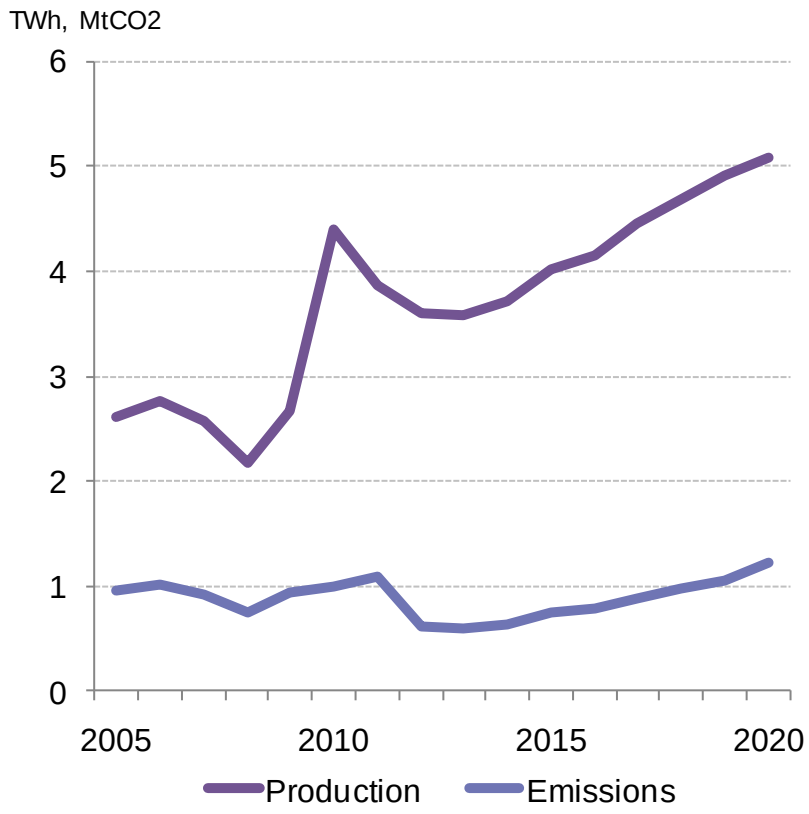
Source: Bloomberg New Energy Finance

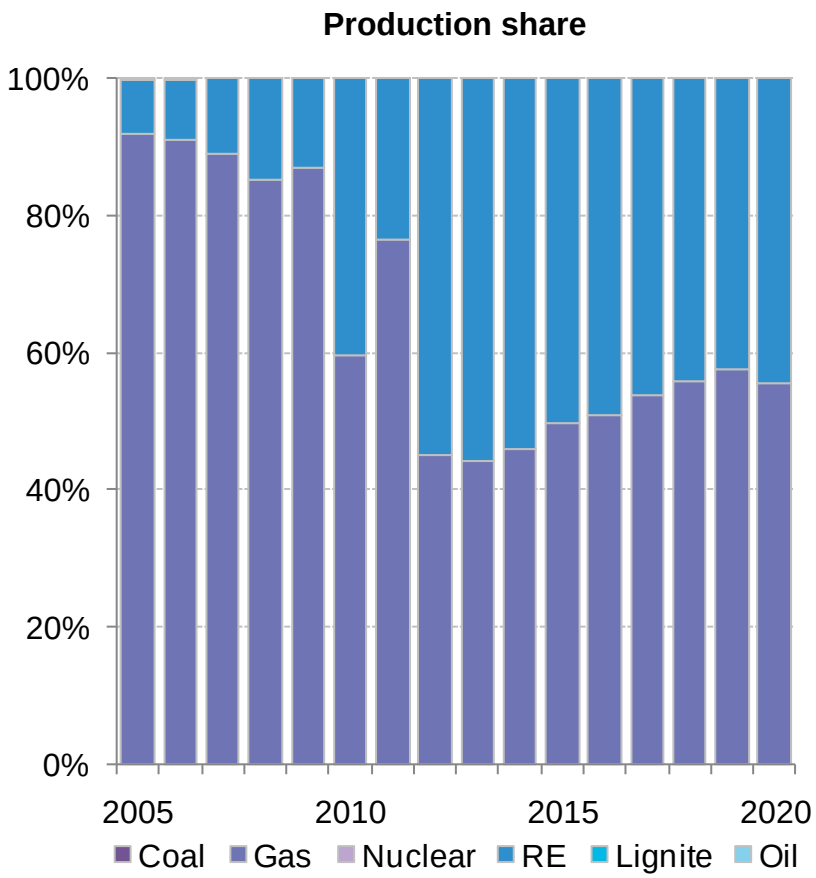
LUXEMBOURG



Source: Bloomberg New Energy Finance

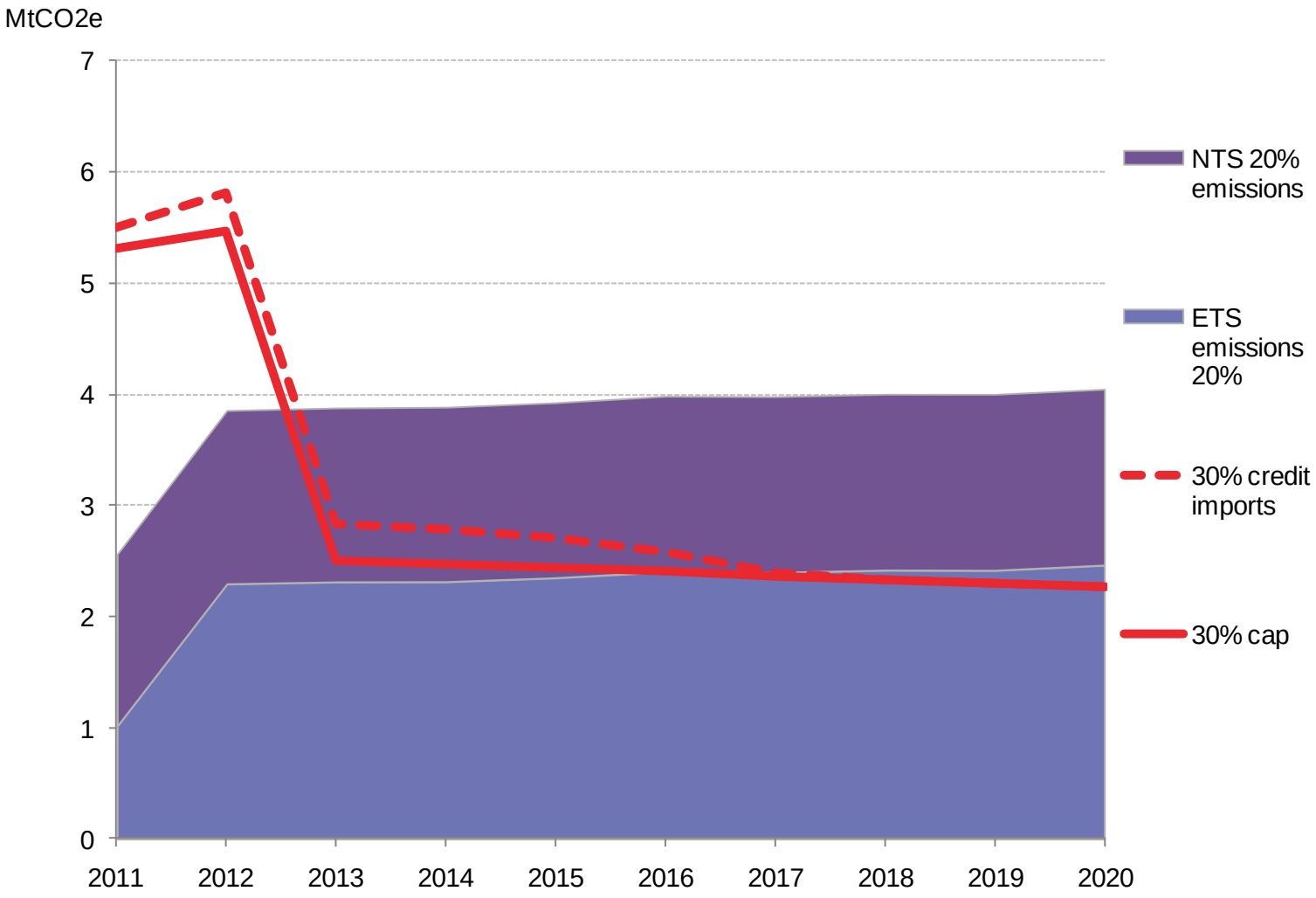
LUXEMBOURG POWER SECTOR (20% SCENARIO)





Source: Bloomberg New Energy Finance

MALTA



Source: Bloomberg New Energy Finance

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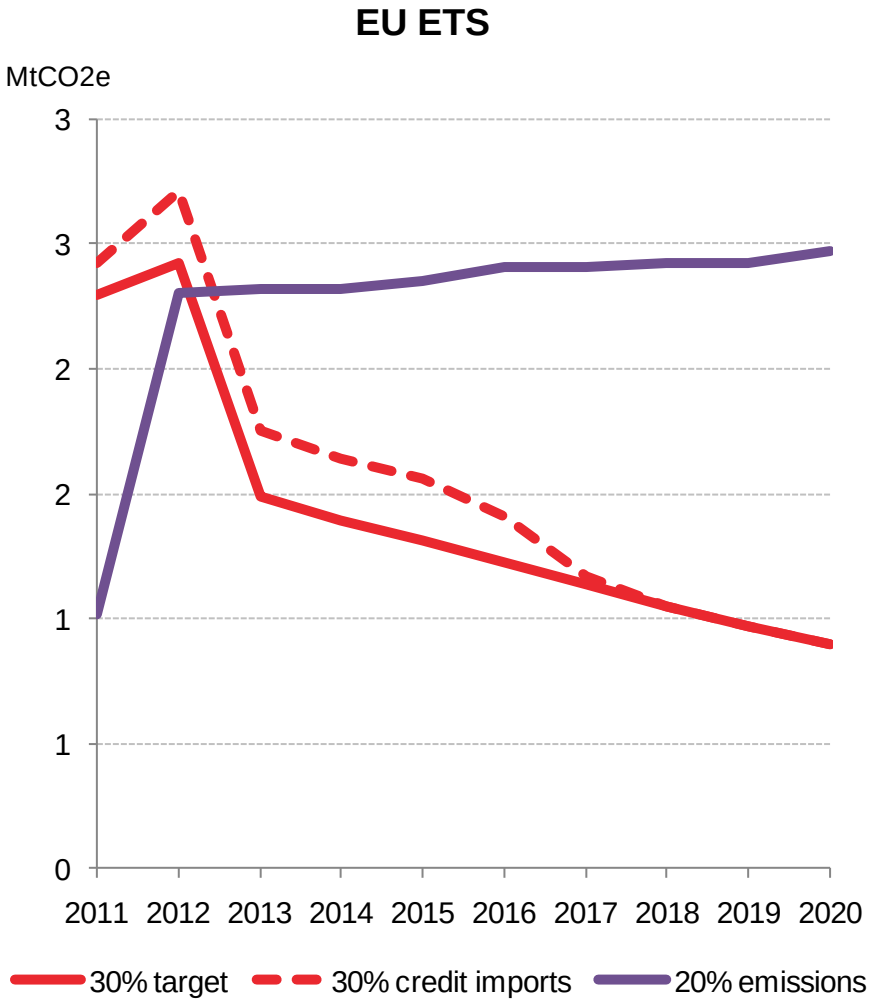

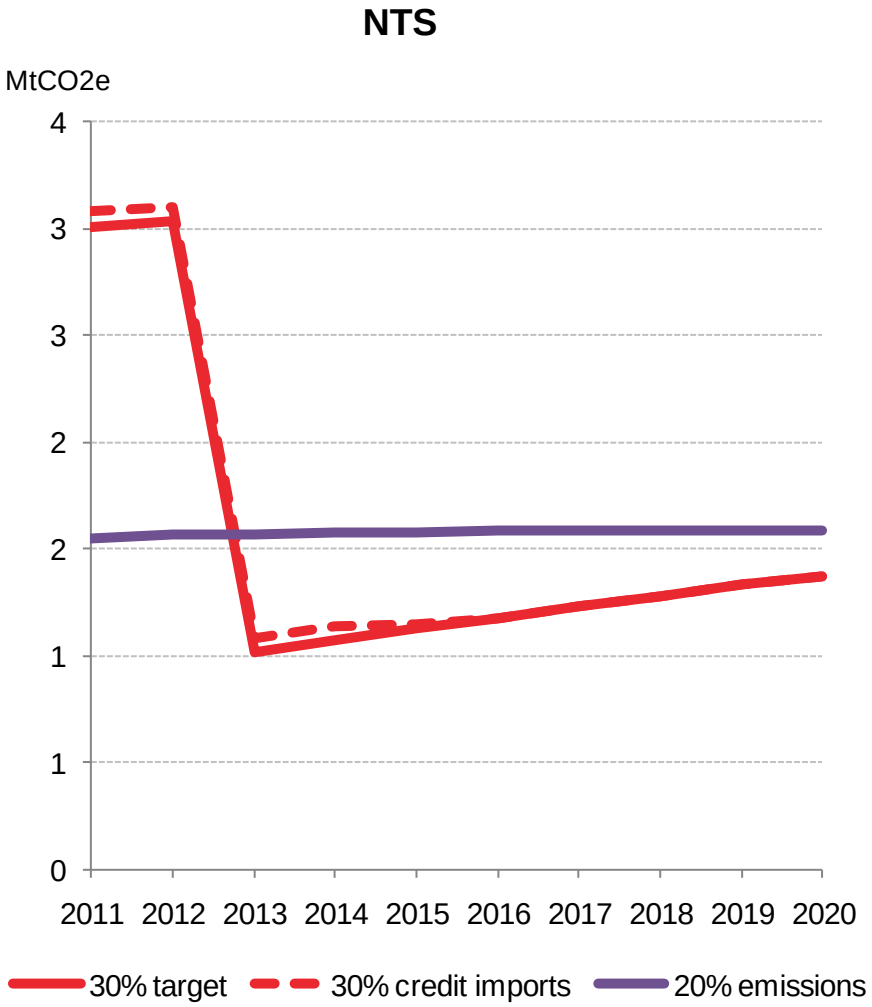

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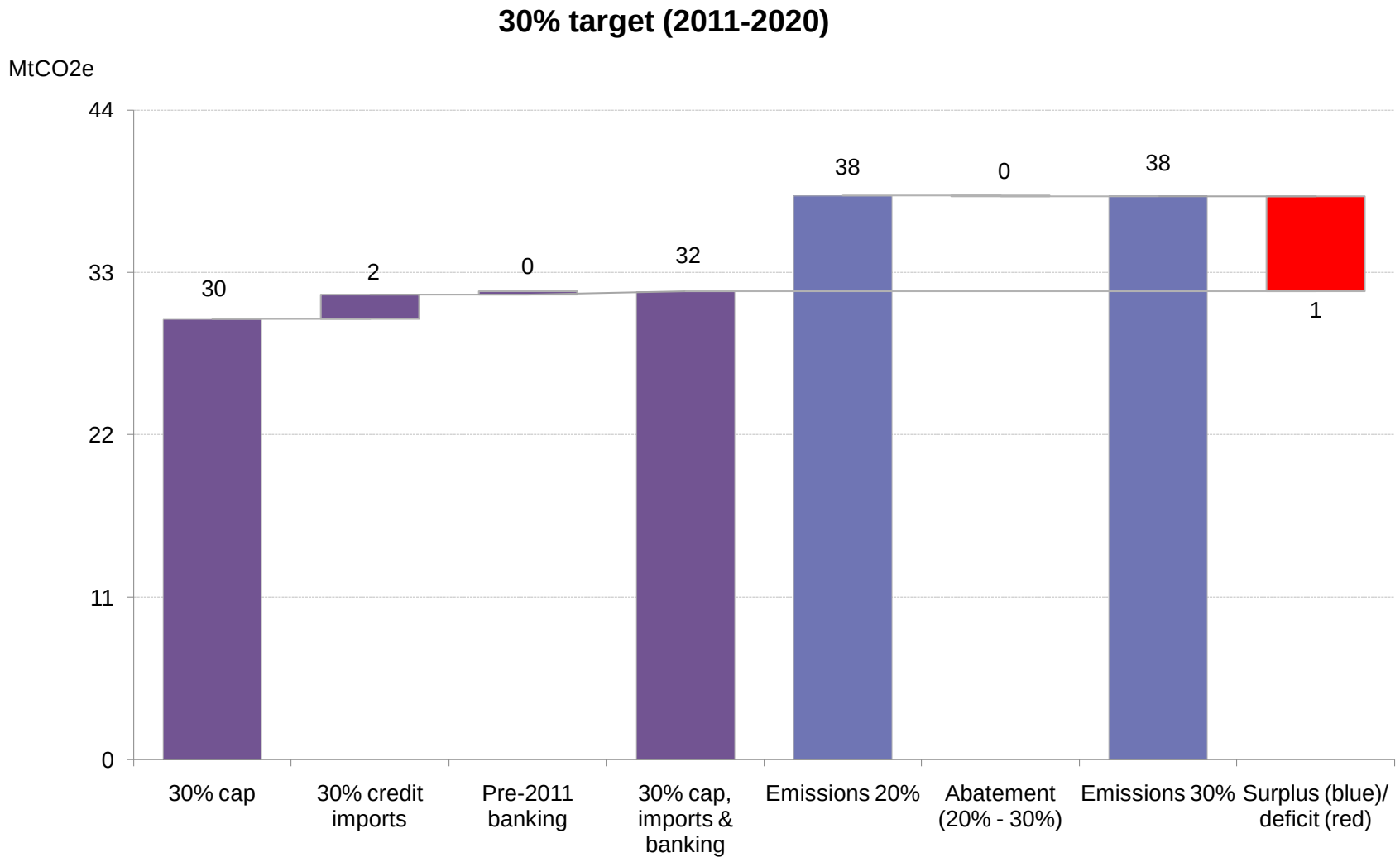
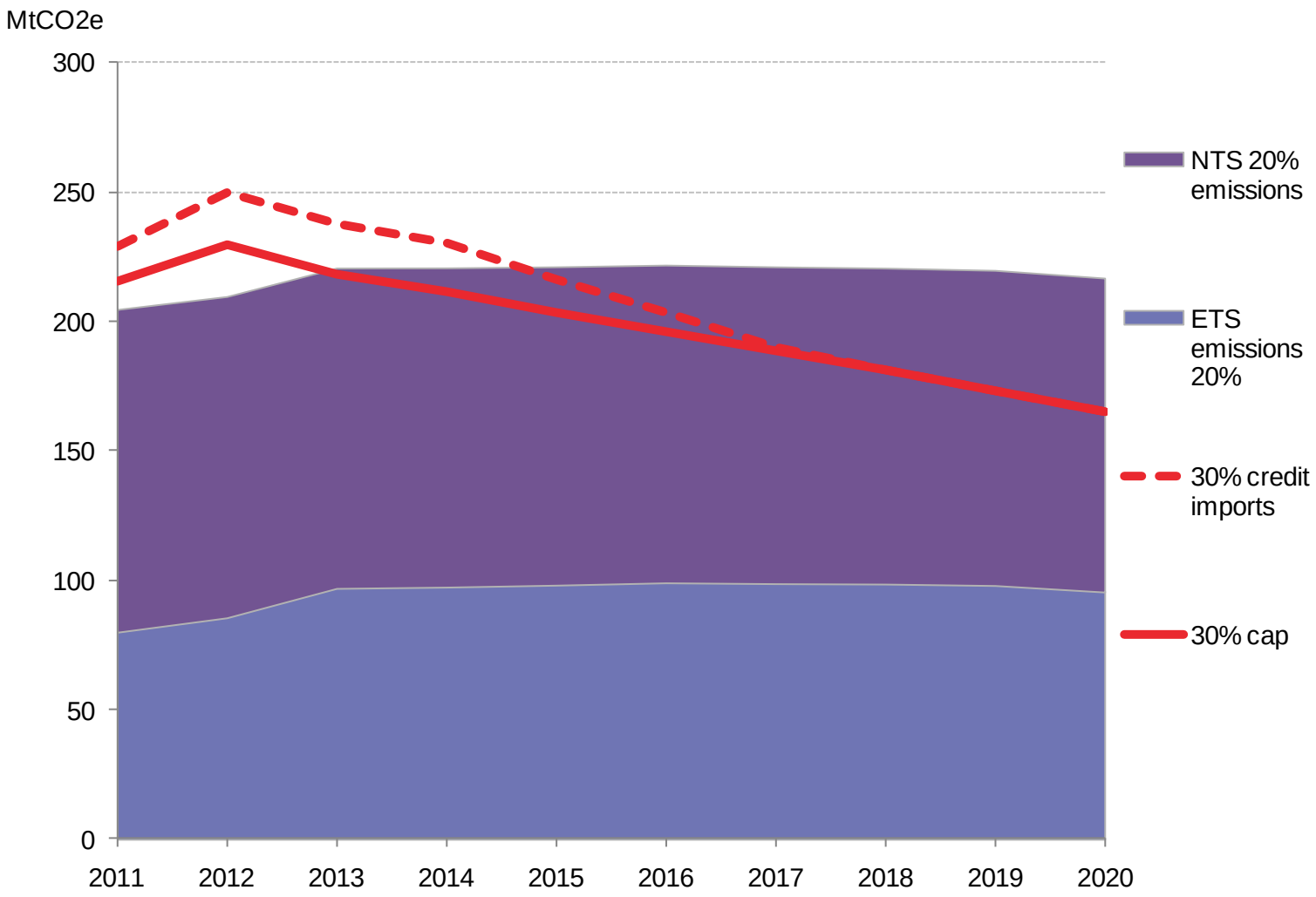


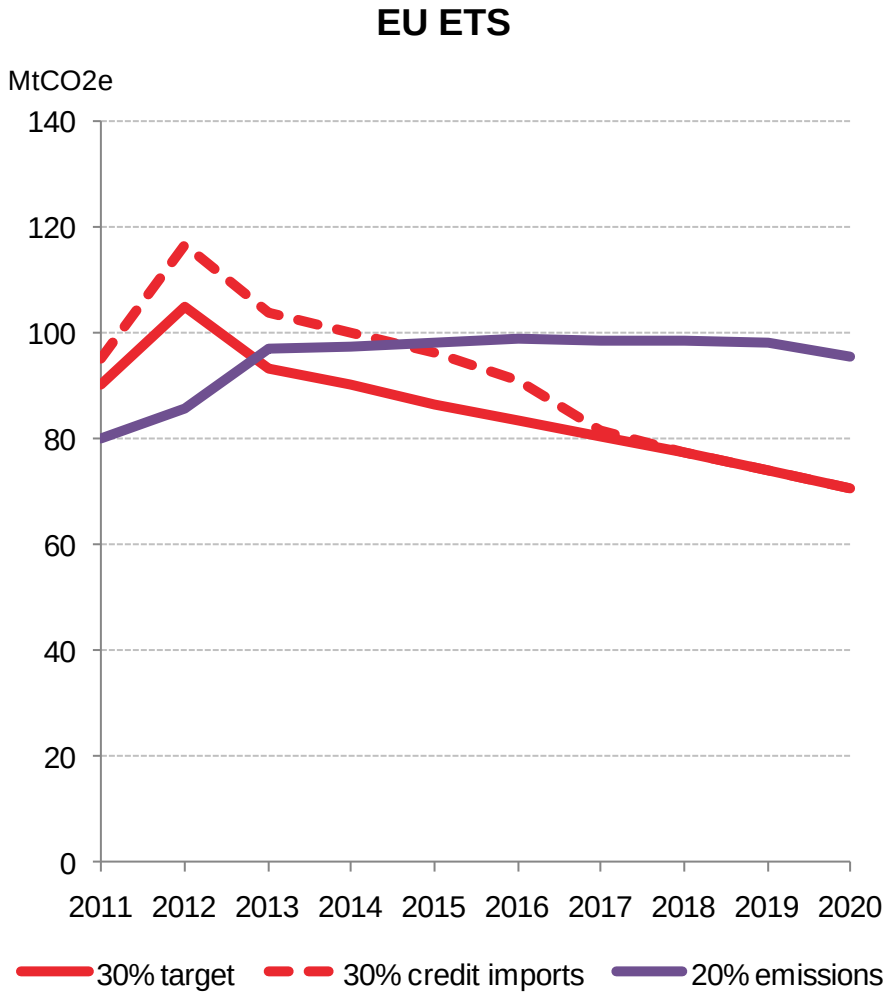
Source: Bloomberg New Energy Finance

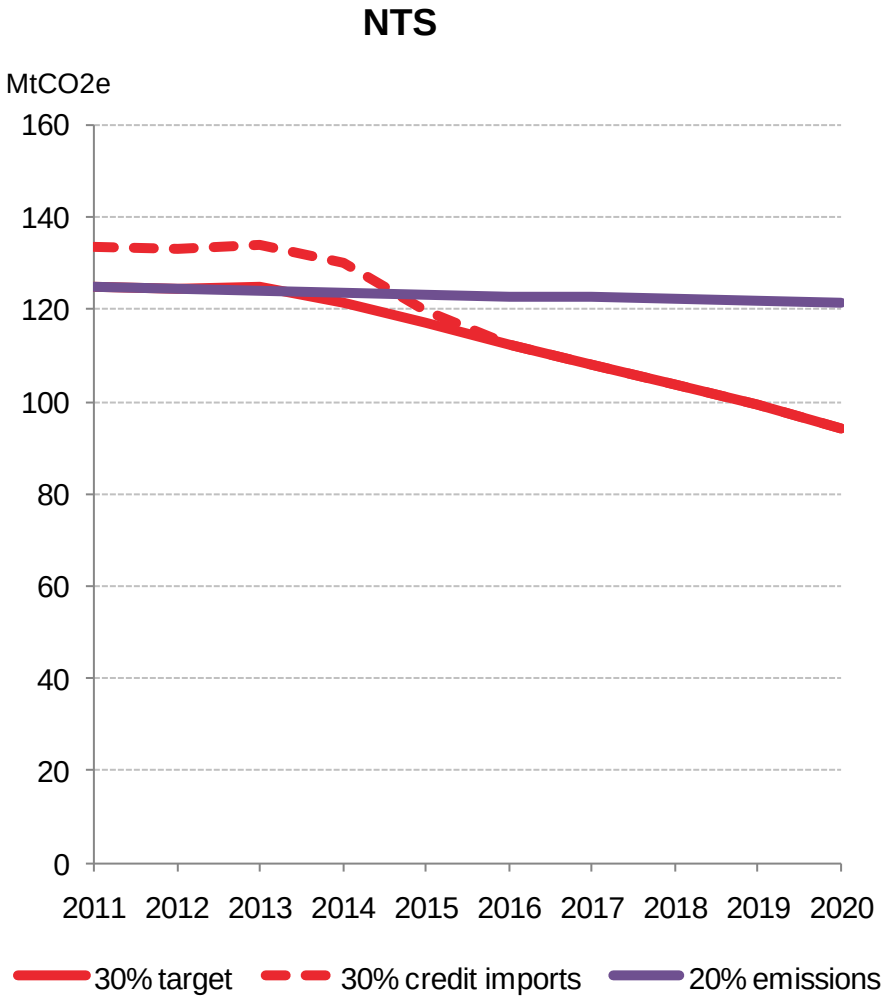
NETHERLANDS



Source: Bloomberg New Energy Finance

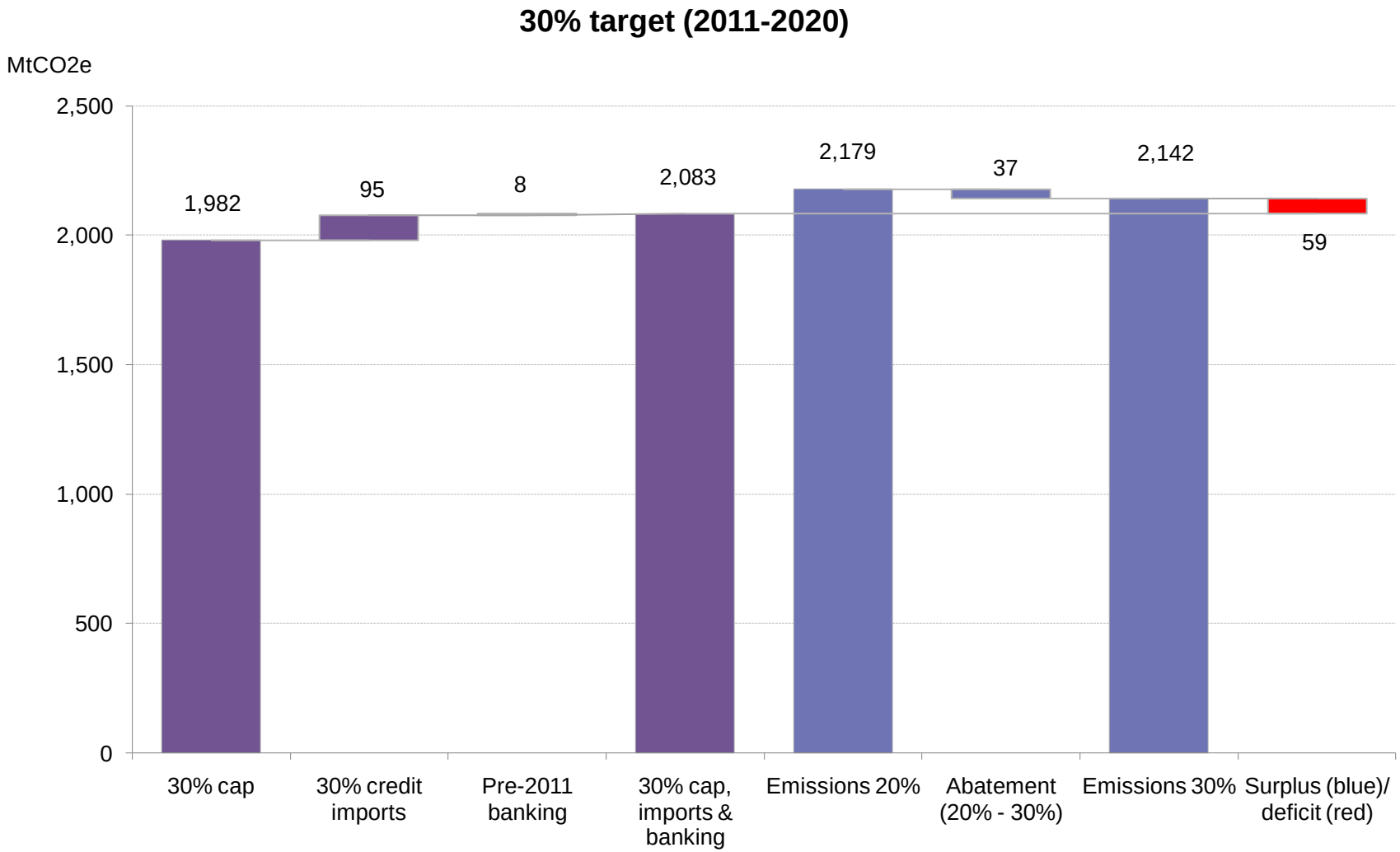
NETHERLANDS





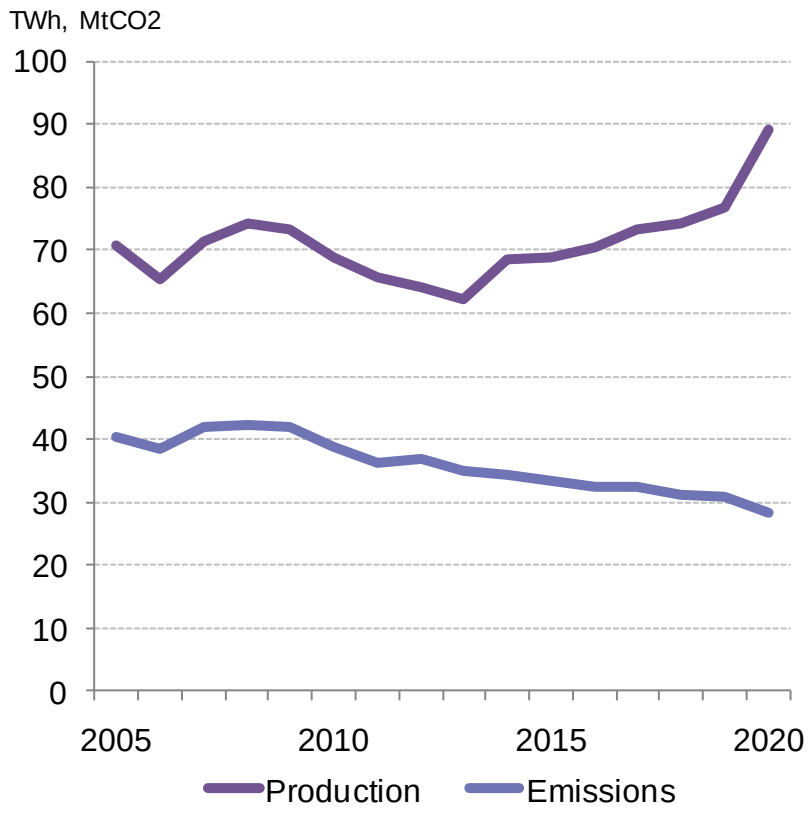
Source: Bloomberg New Energy Finance

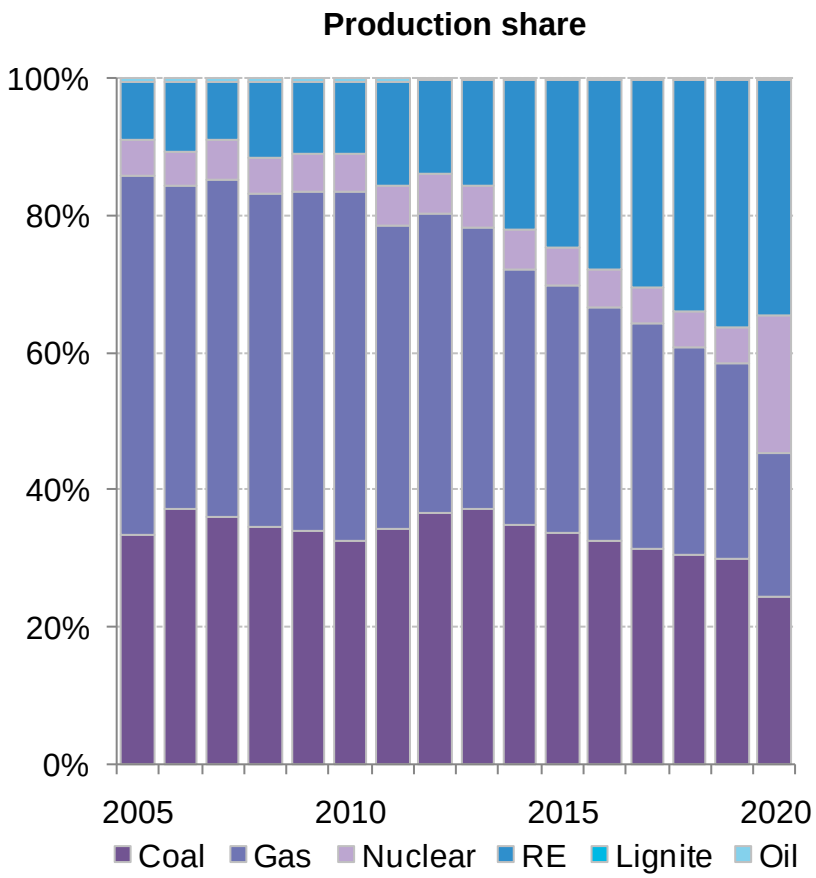
NETHERLANDS



Source: Bloomberg New Energy Finance

NETHERLANDS POWER SECTOR (20% SCENARIO)

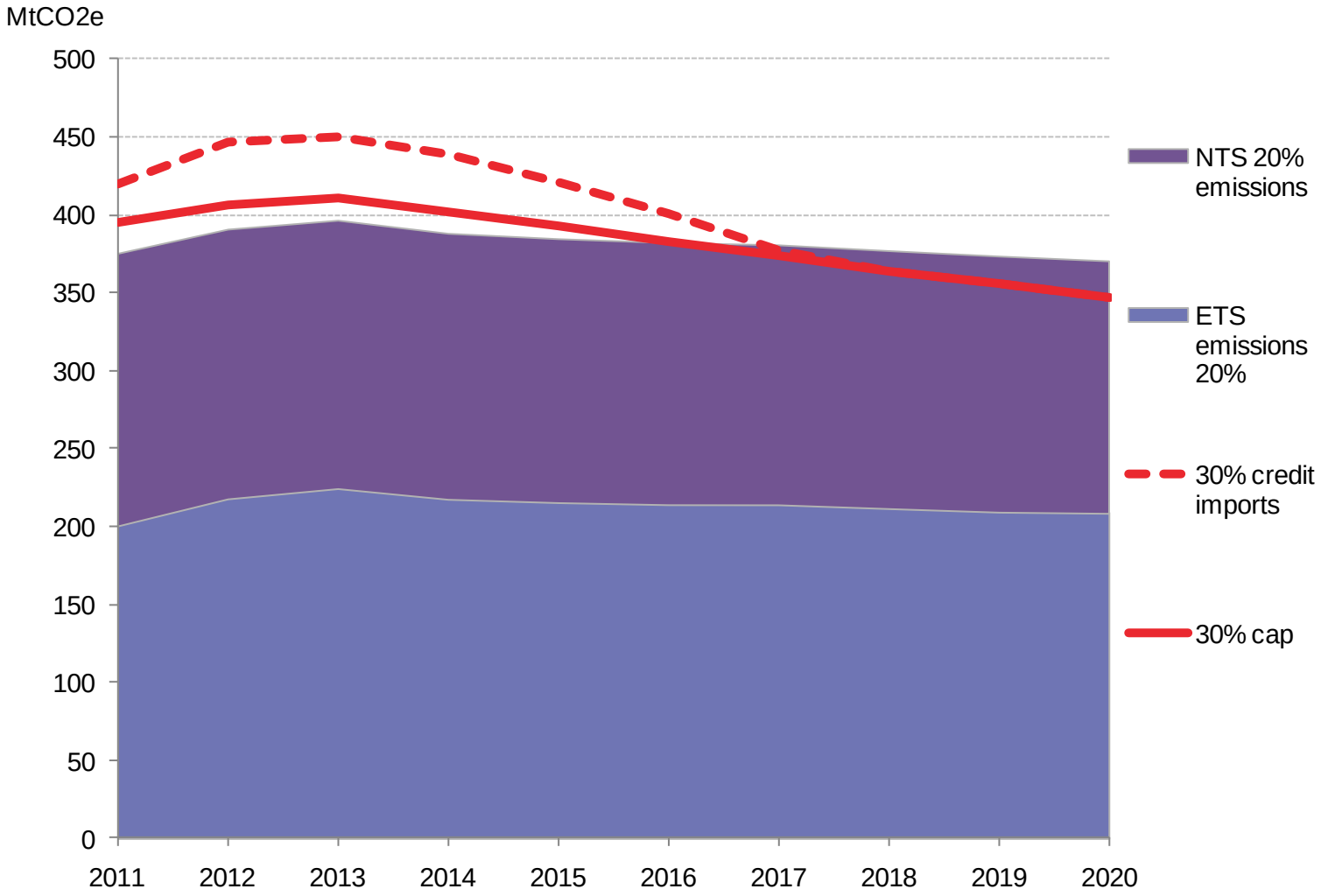




Note: we forecast increased nuclear capacity in 2020 from newly built plant.

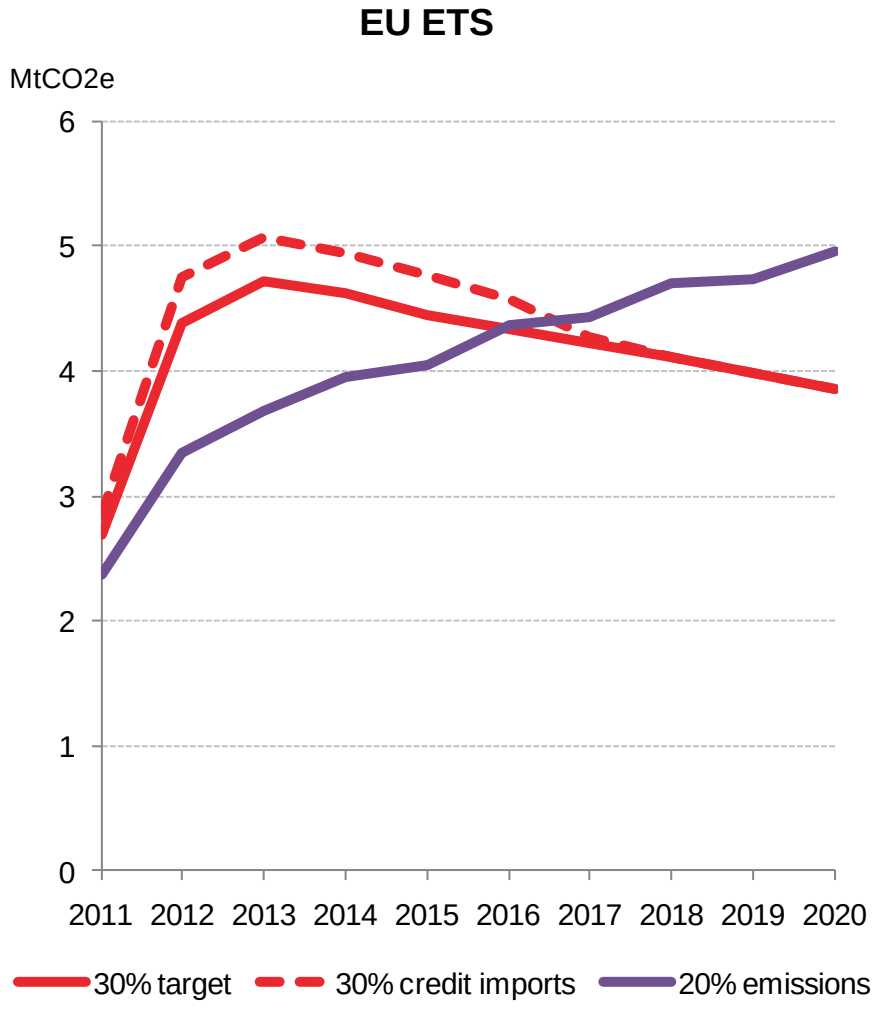
Source: Bloomberg New Energy Finance

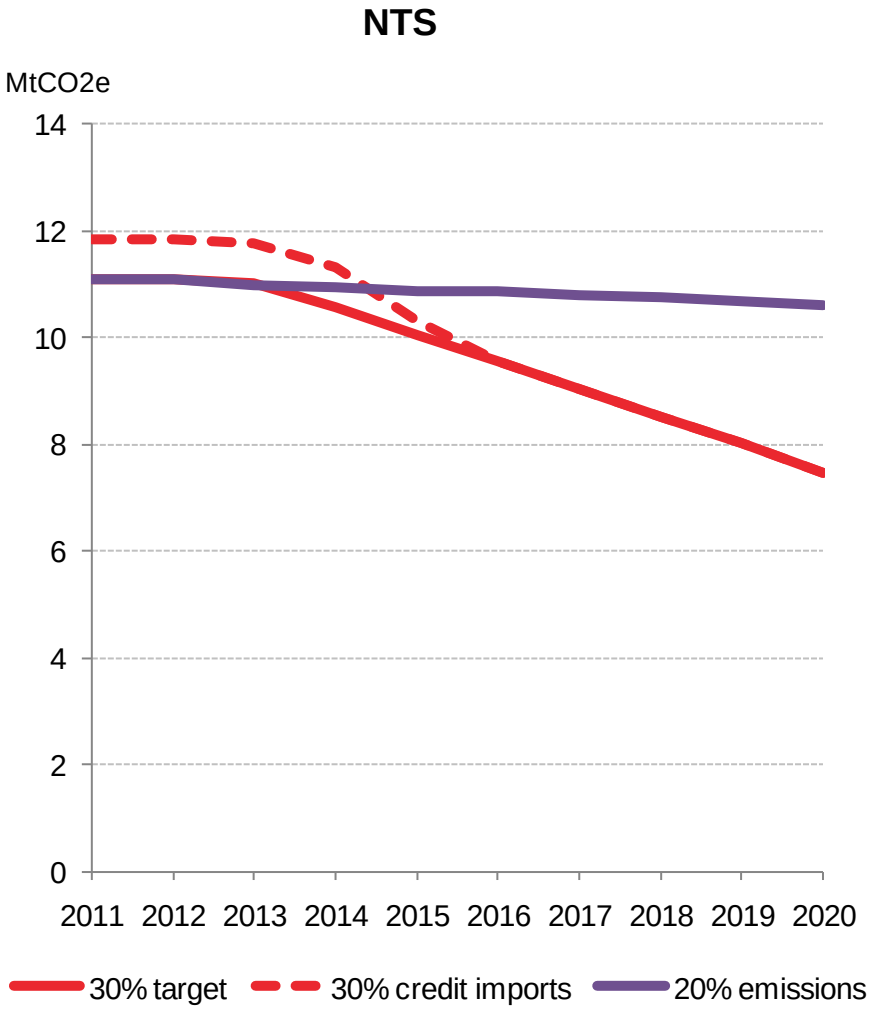
POLAND



Source: Bloomberg New Energy Finance

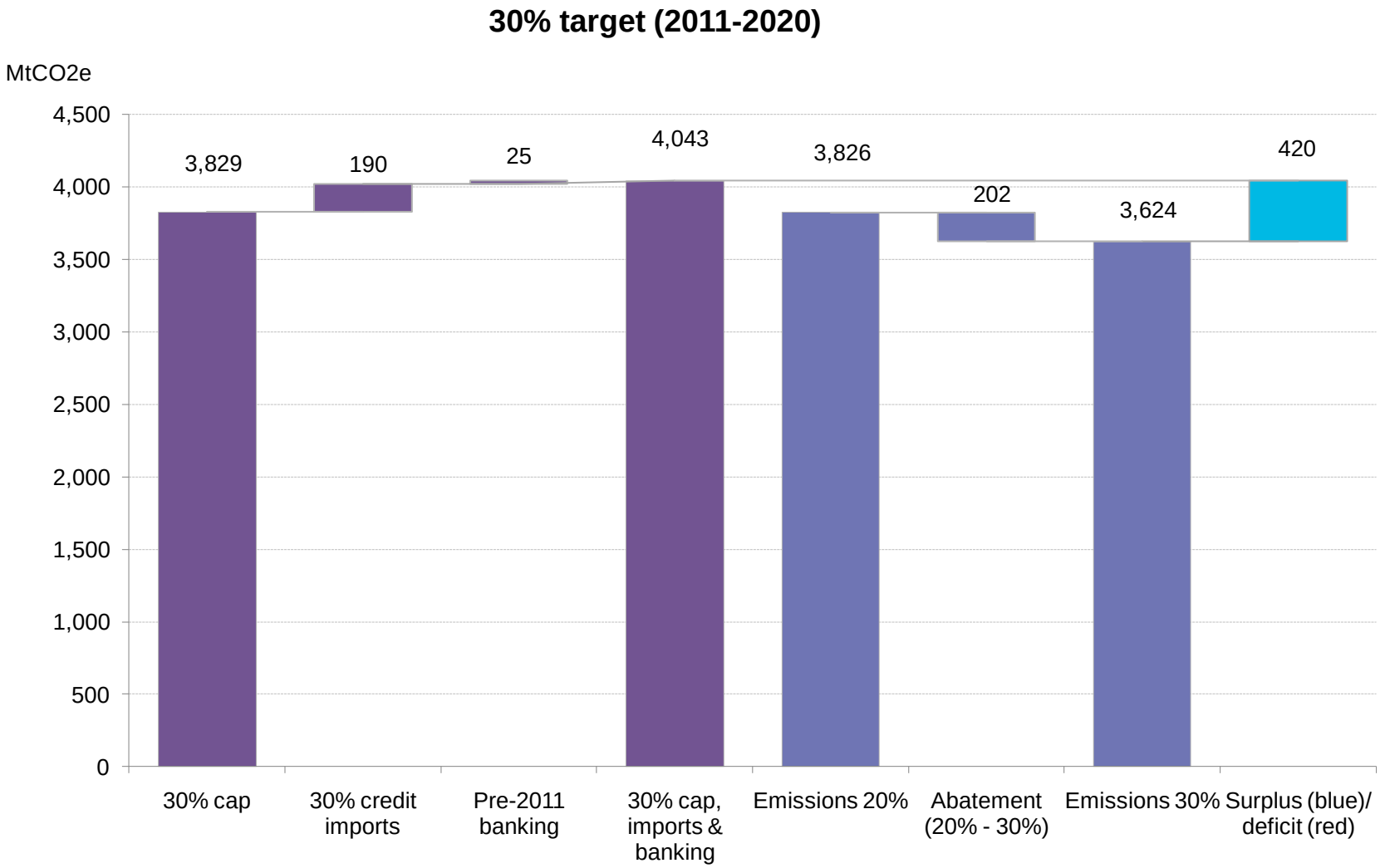
POLAND





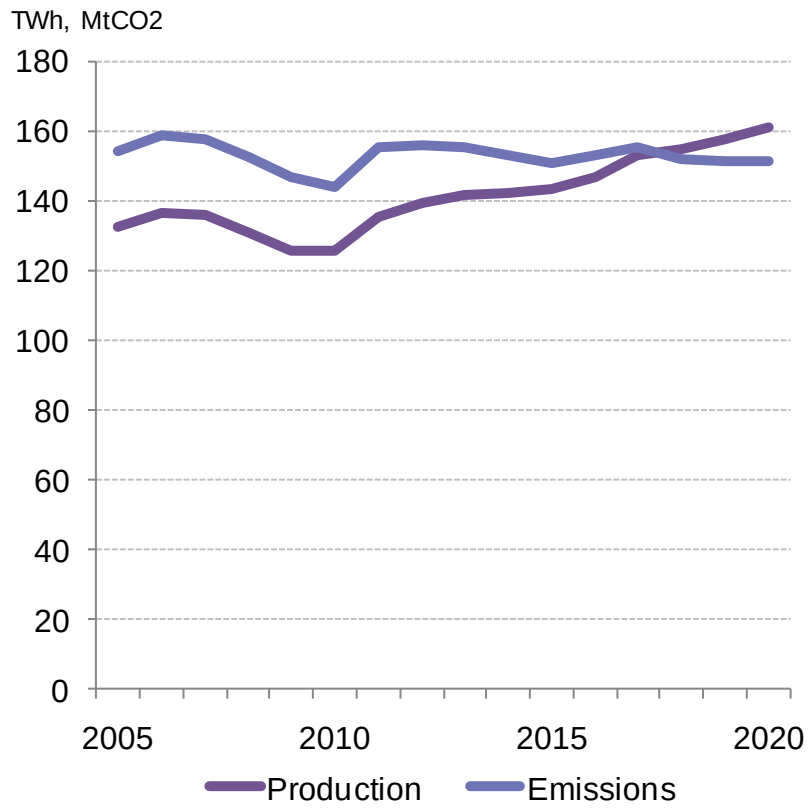
Source: Bloomberg New Energy Finance

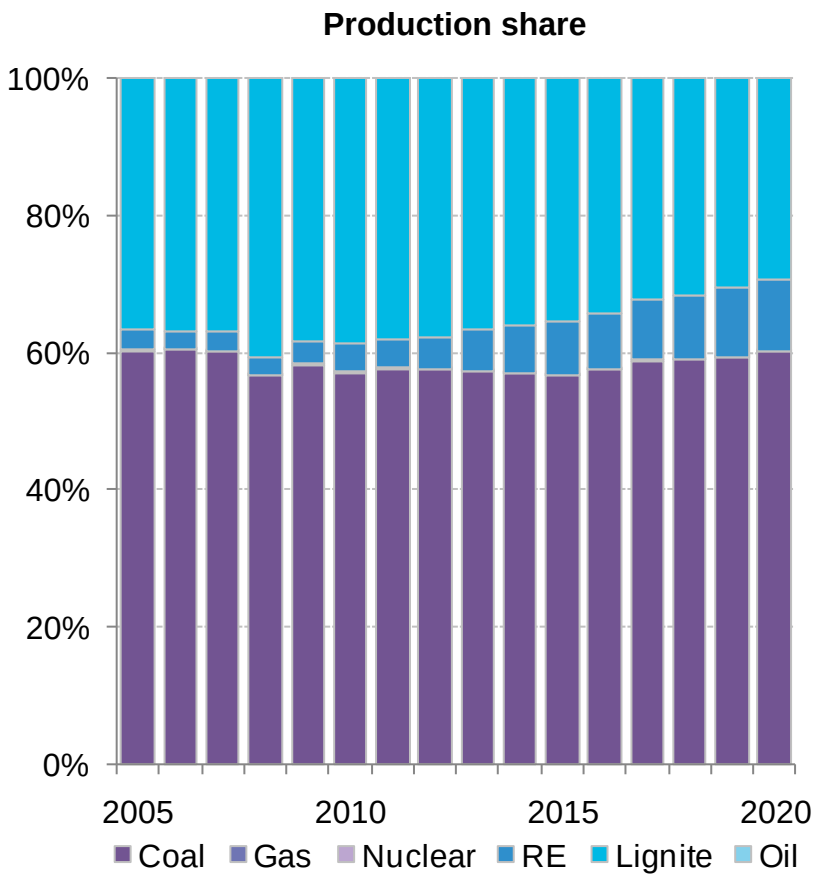
POLAND



Source: Bloomberg New Energy Finance

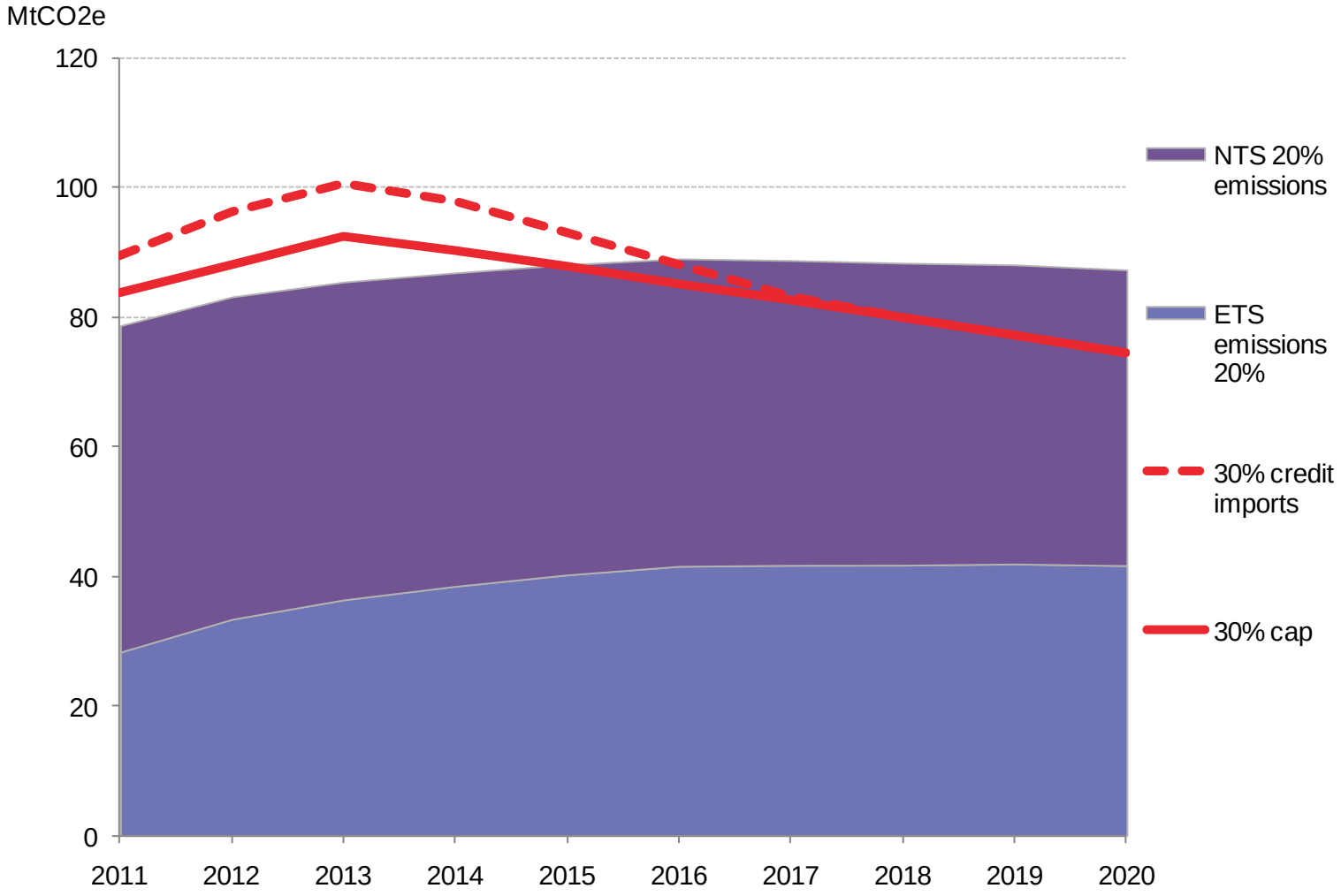
POLAND POWER SECTOR (20% SCENARIO)





Source: Bloomberg New Energy Finance

PORTUGAL



Source: Bloomberg New Energy Finance

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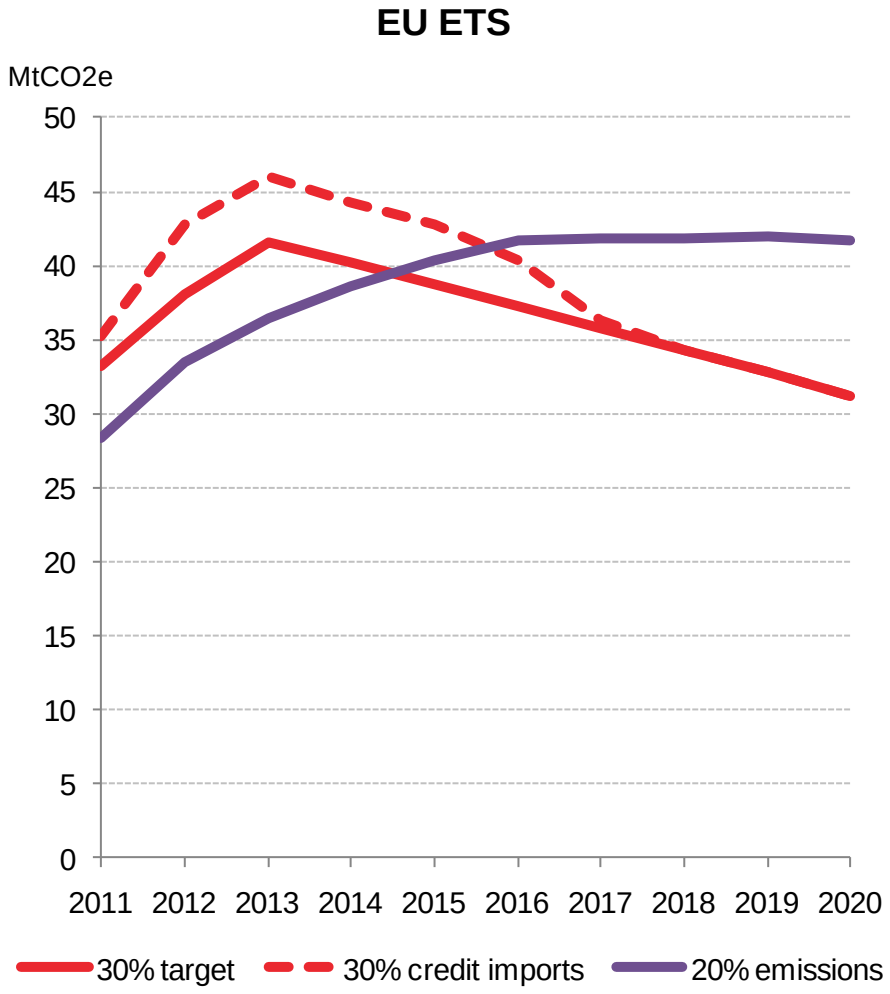

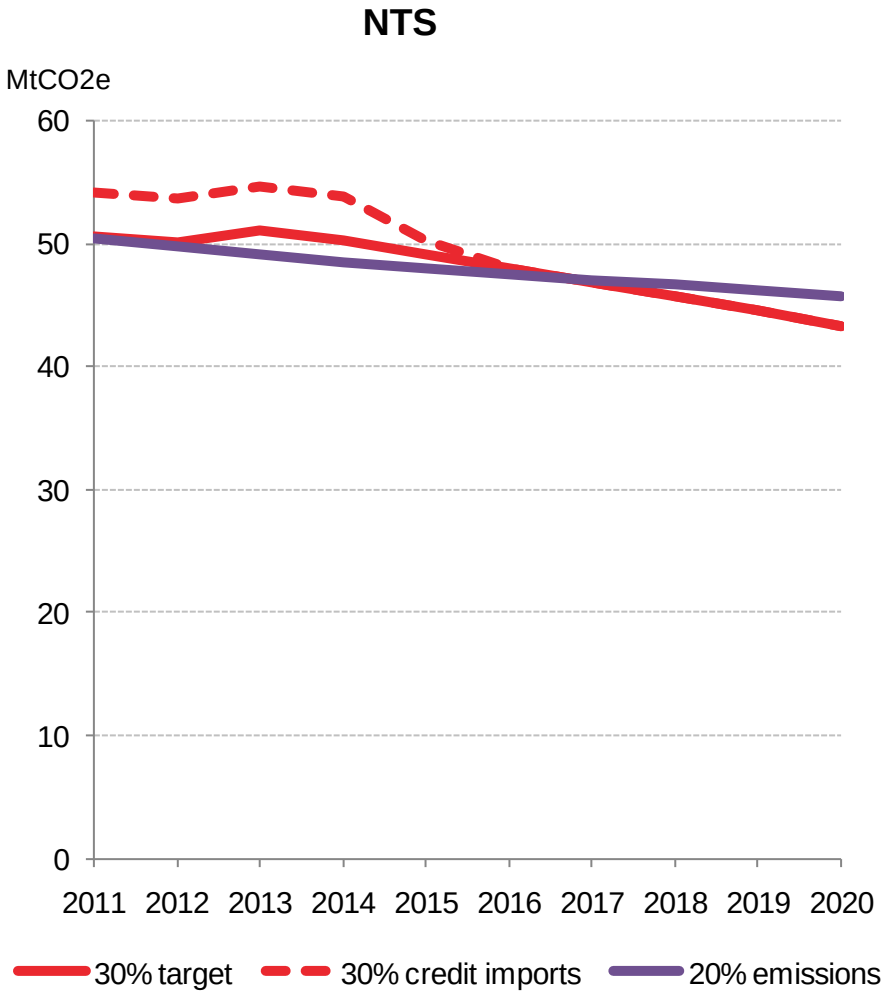

Source: Bloomberg New Energy Finance

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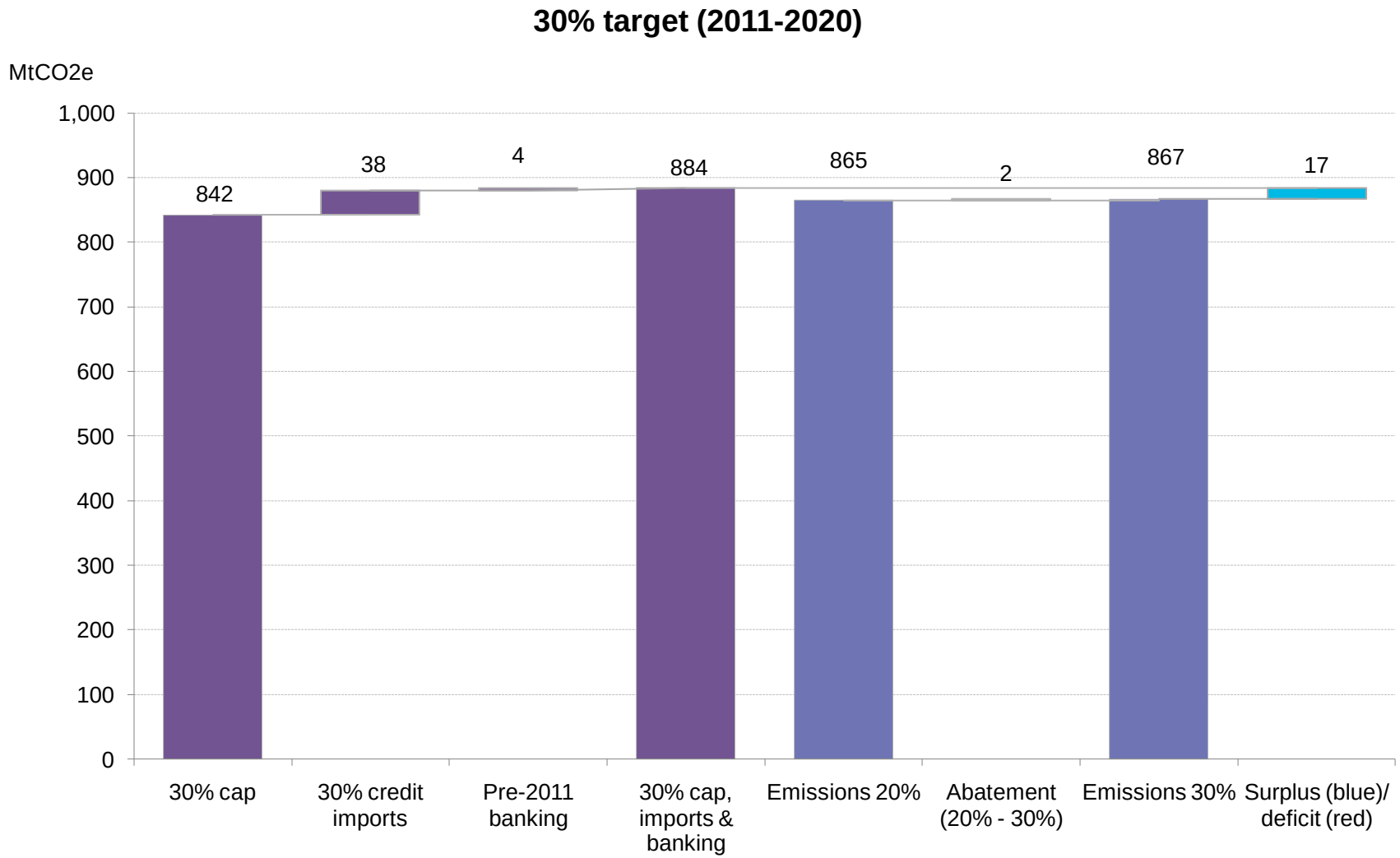
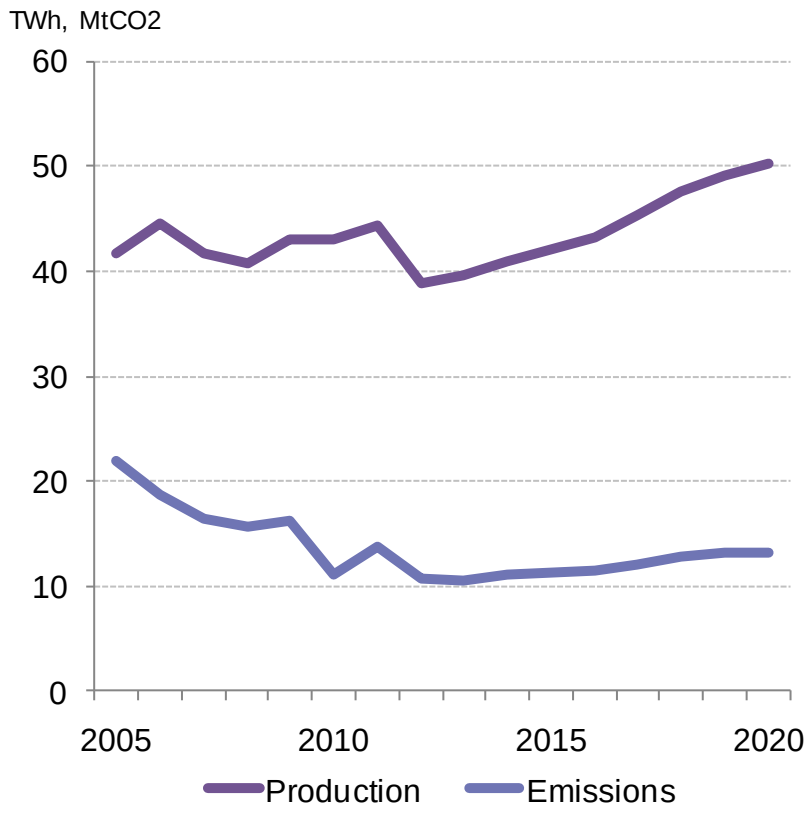
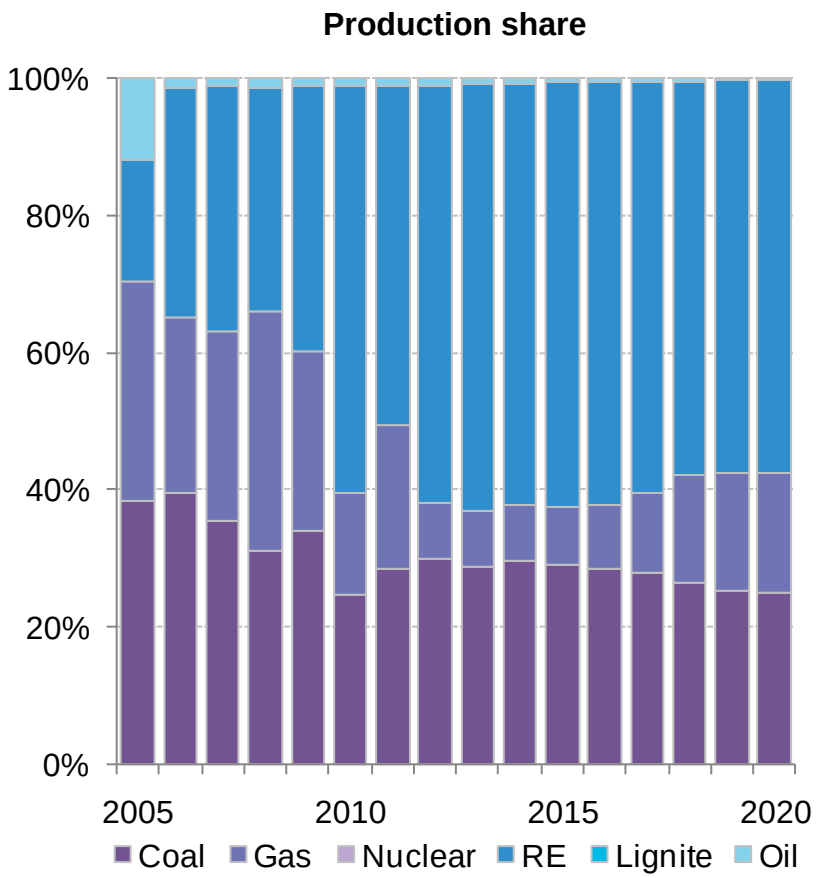


Source: Bloomberg New Energy Finance

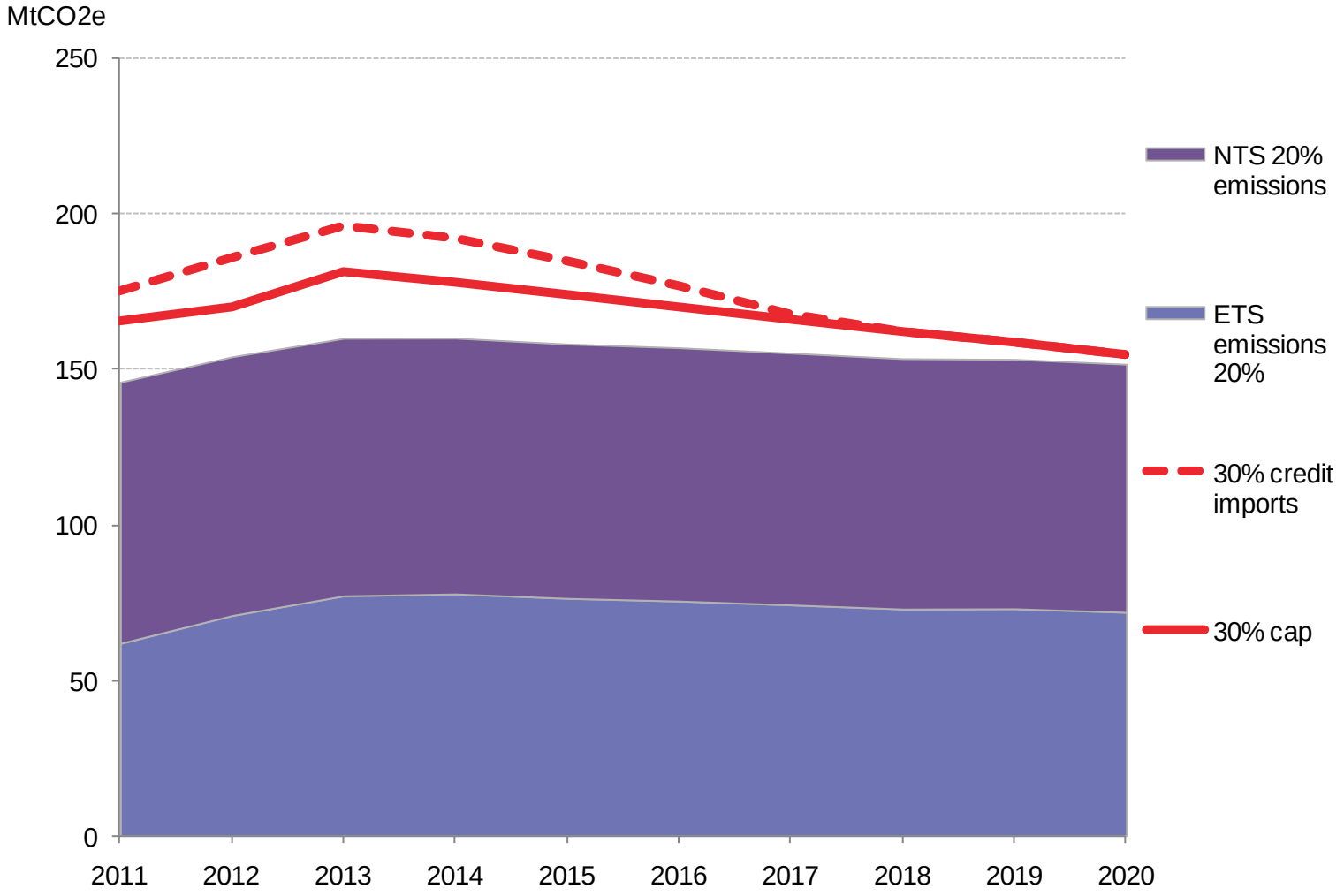
PORTUGAL POWER SECTOR (20% SCENARIO)





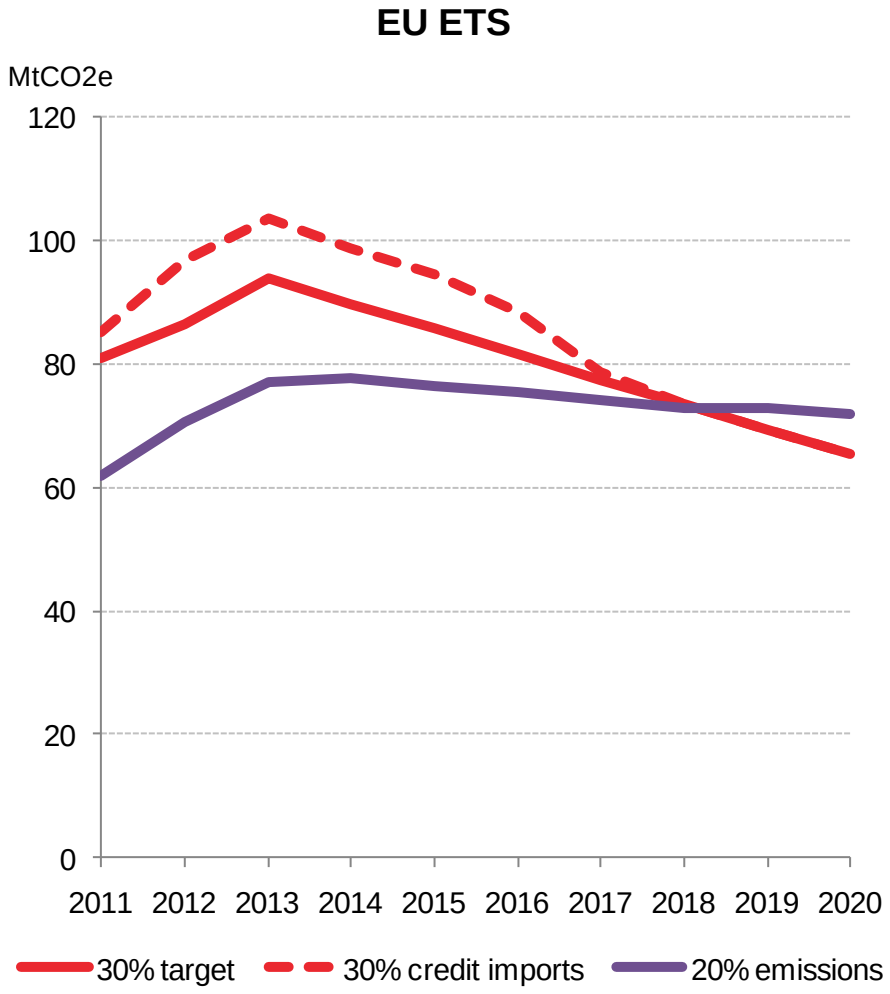
Source: Bloomberg New Energy Finance

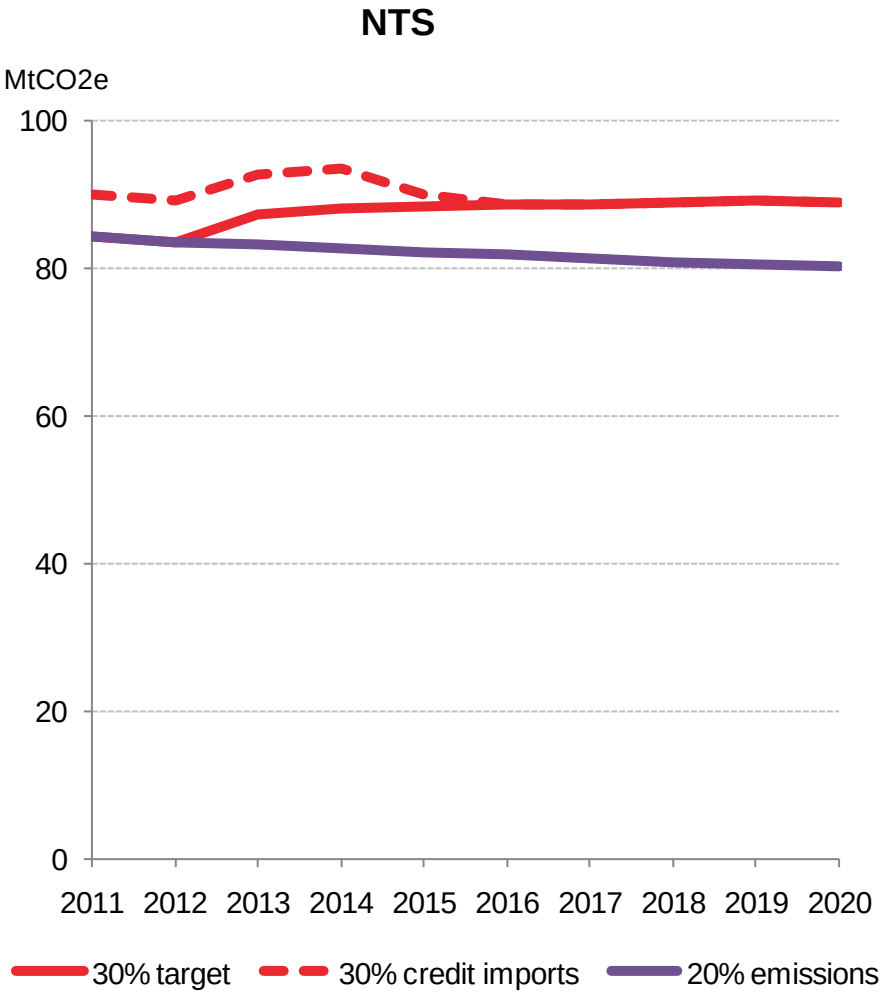
ROMANIA



Source: Bloomberg New Energy Finance

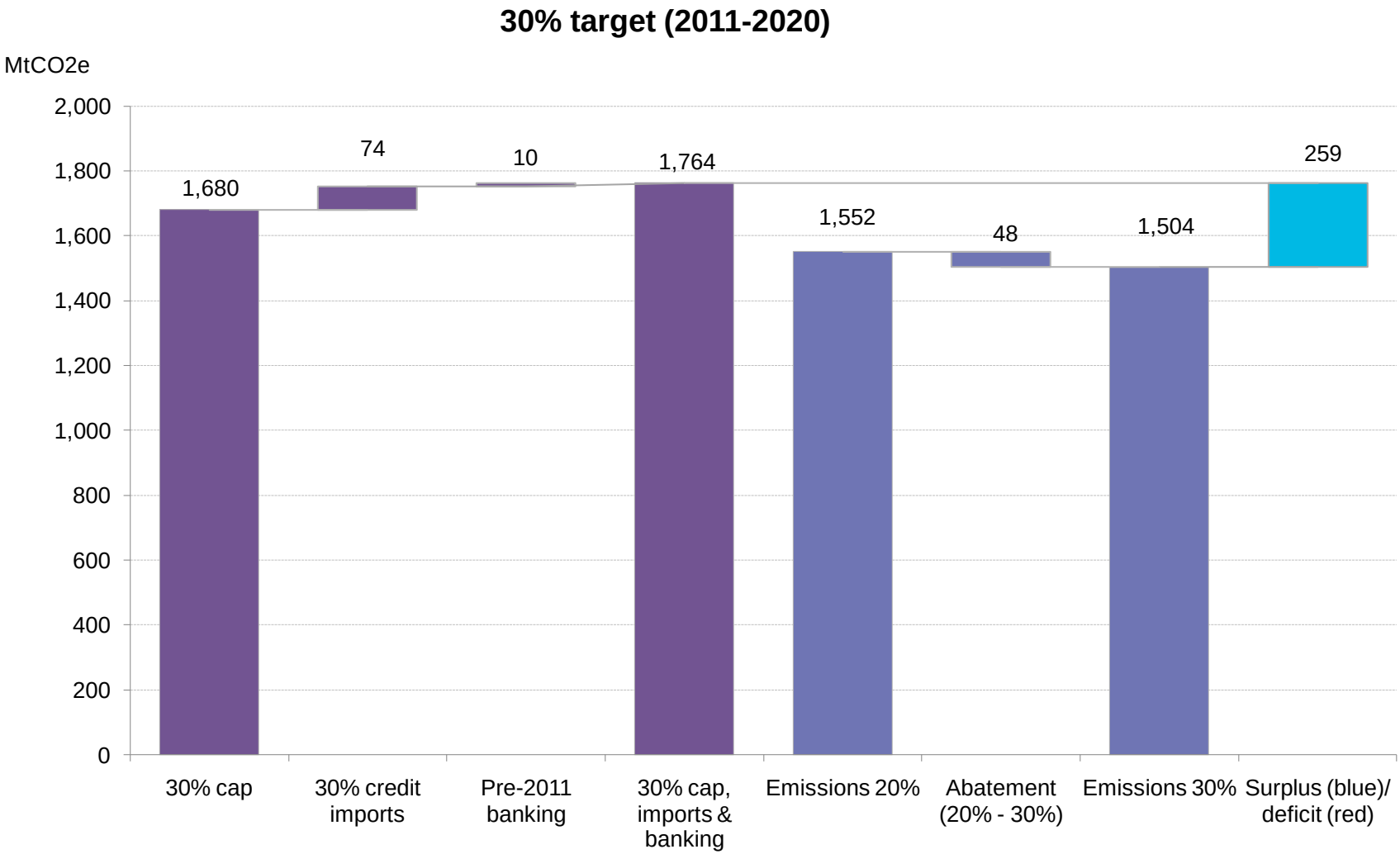
ROMANIA





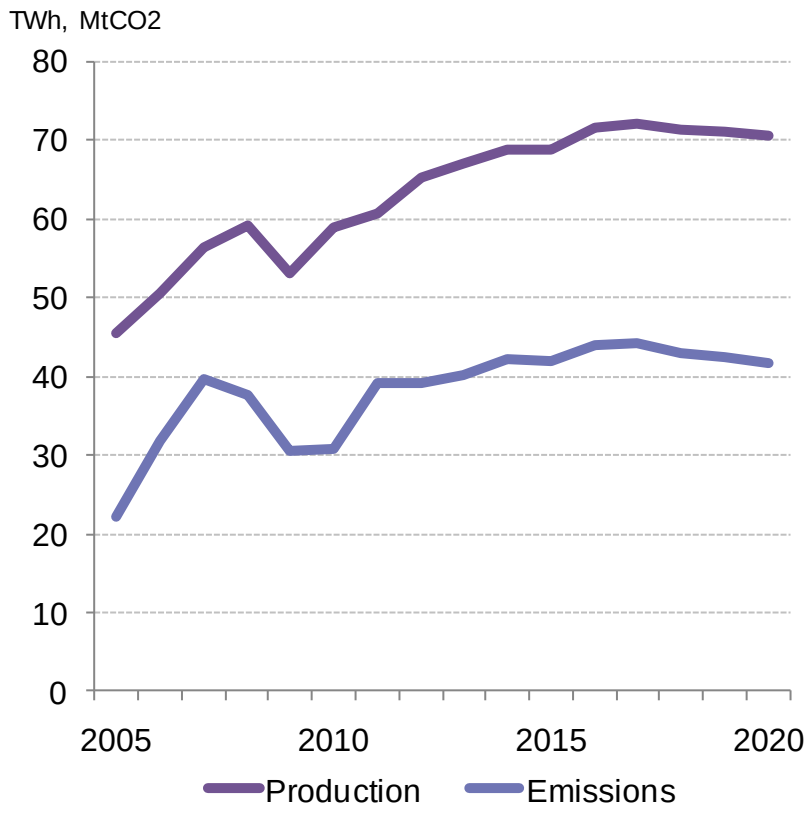
Source: Bloomberg New Energy Finance

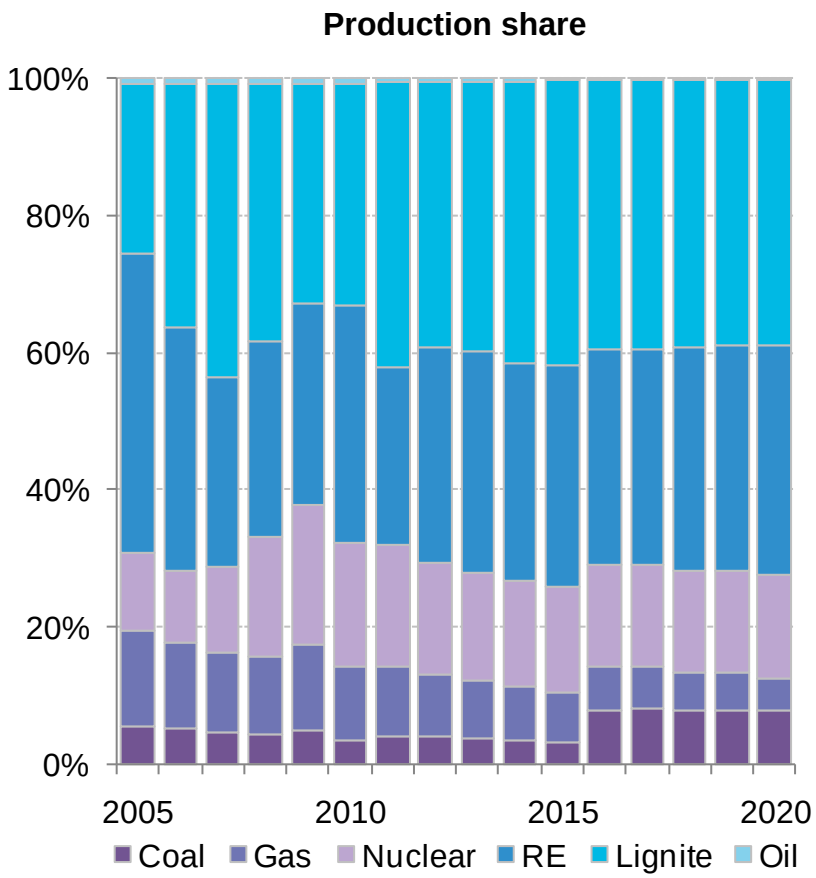
ROMANIA



Source: Bloomberg New Energy Finance

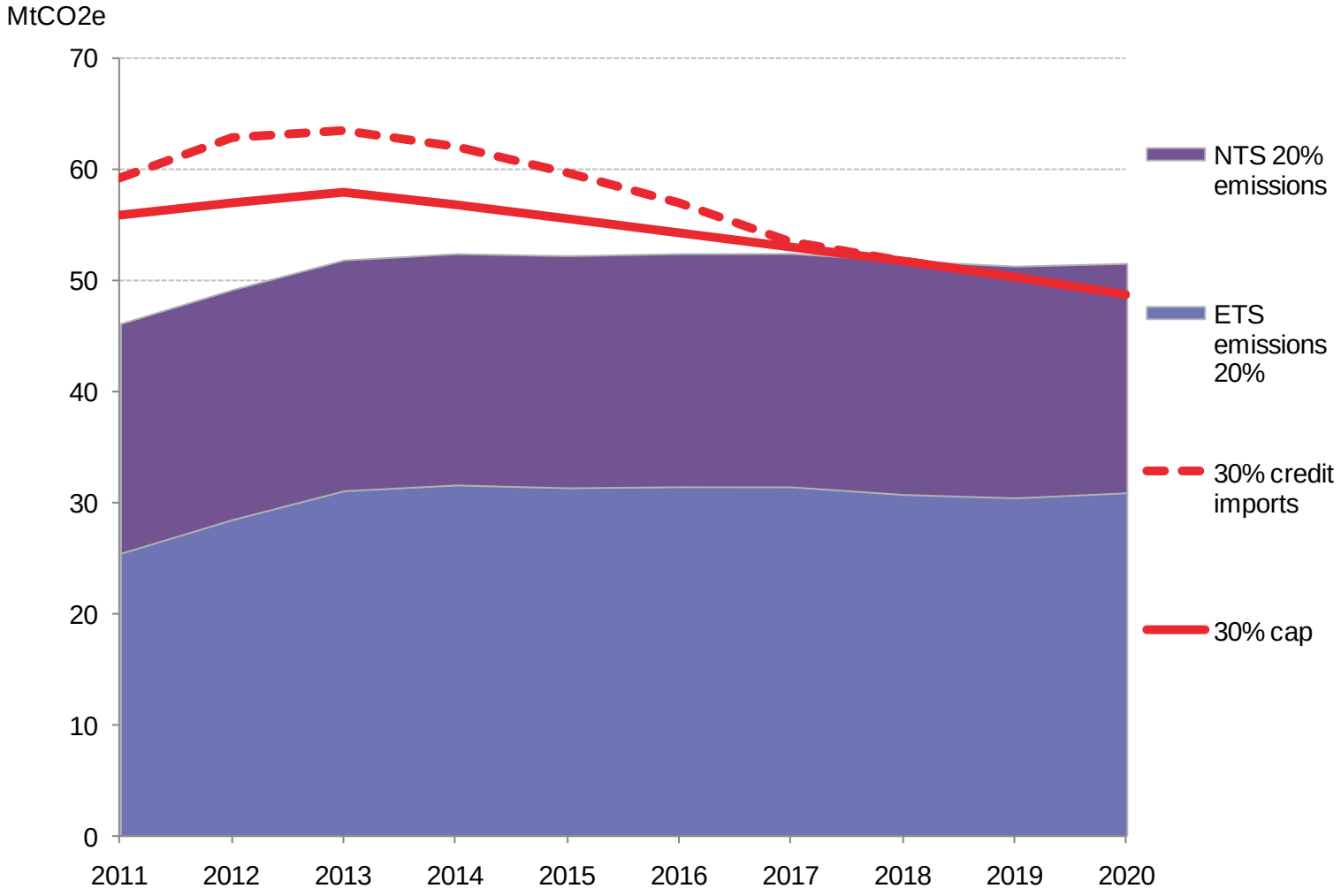
ROMANIA POWER SECTOR (20% SCENARIO)





Source: Bloomberg New Energy Finance

SLOVAKIA



Source: Bloomberg New Energy Finance

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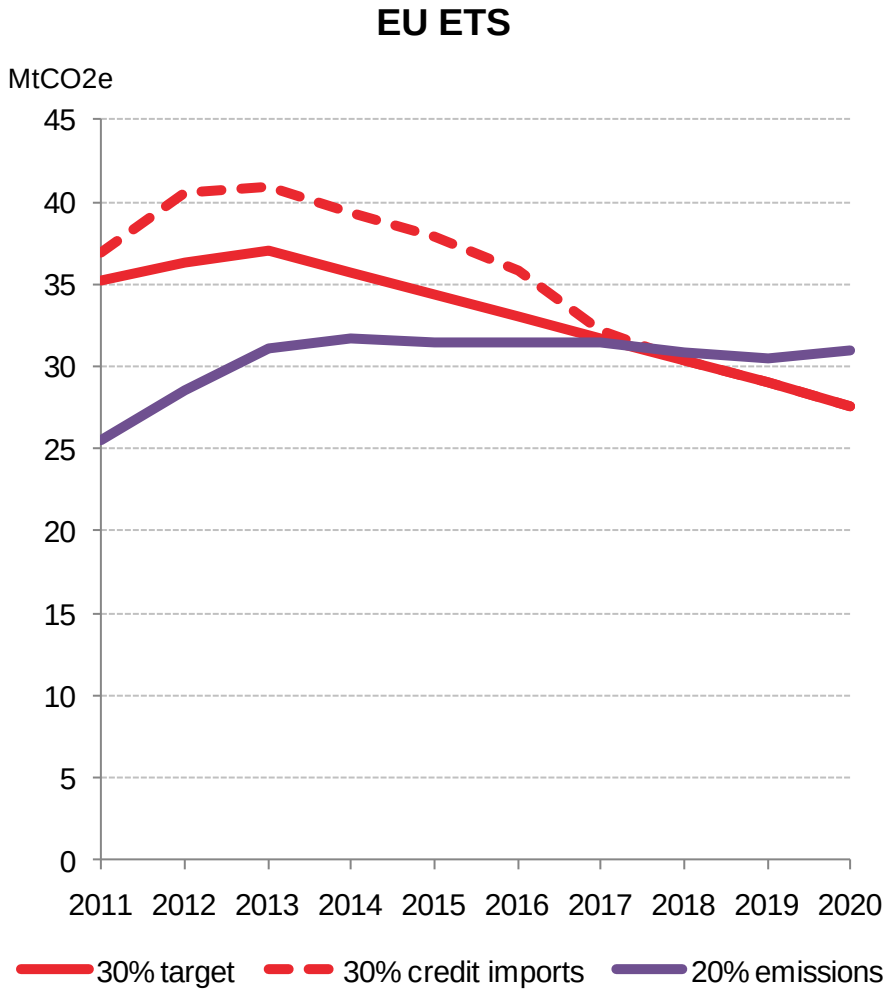

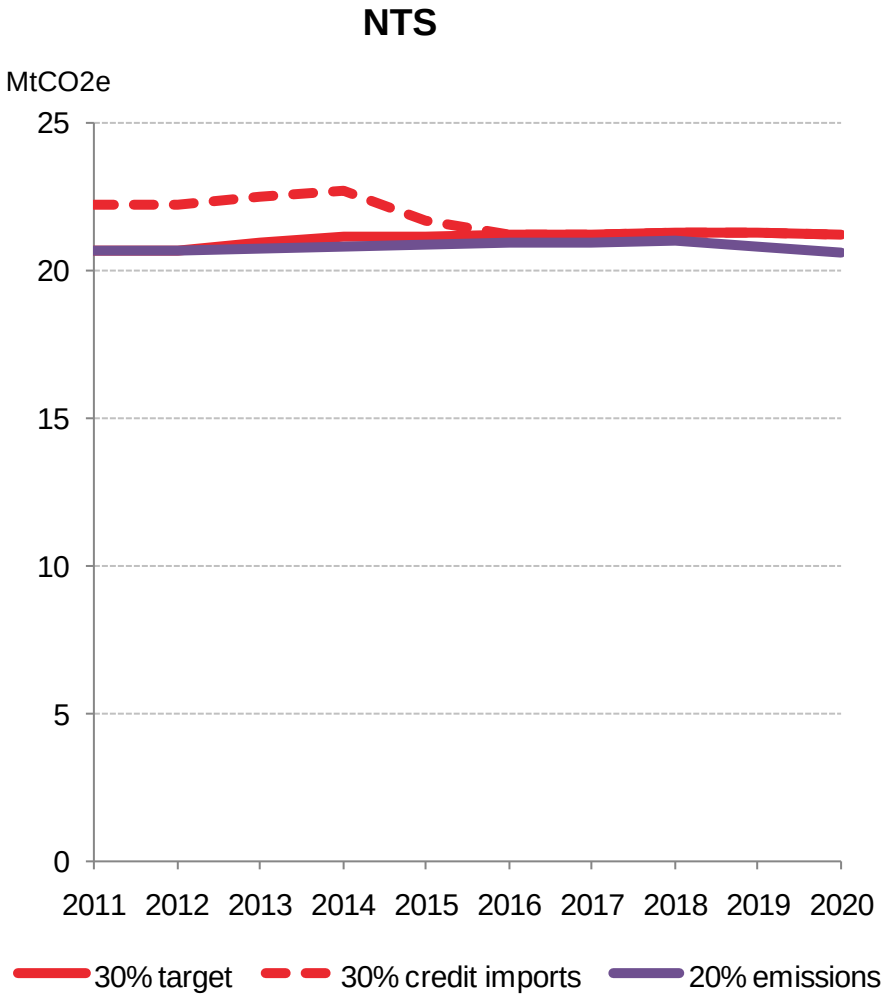

Source: Bloomberg New Energy Finance

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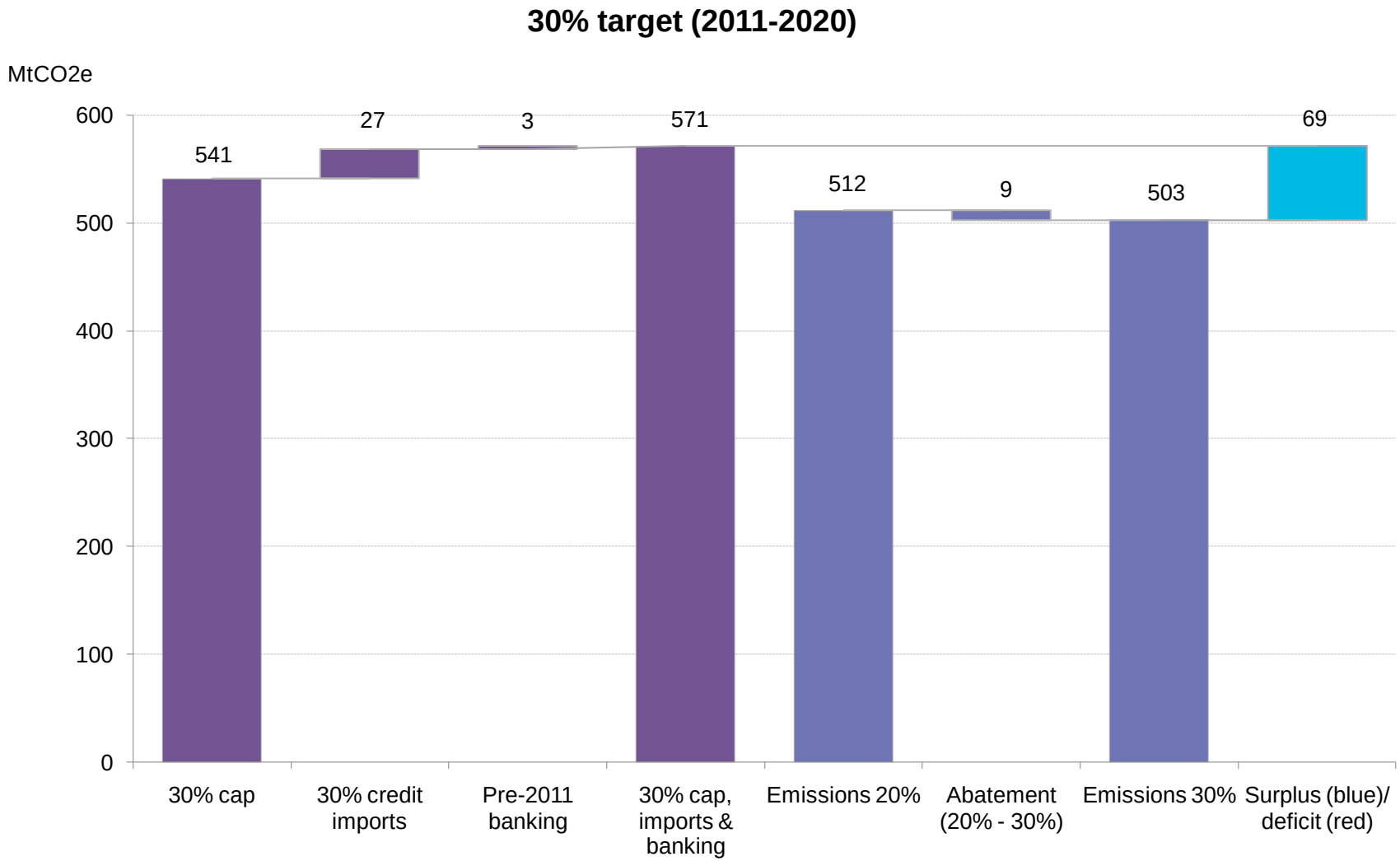
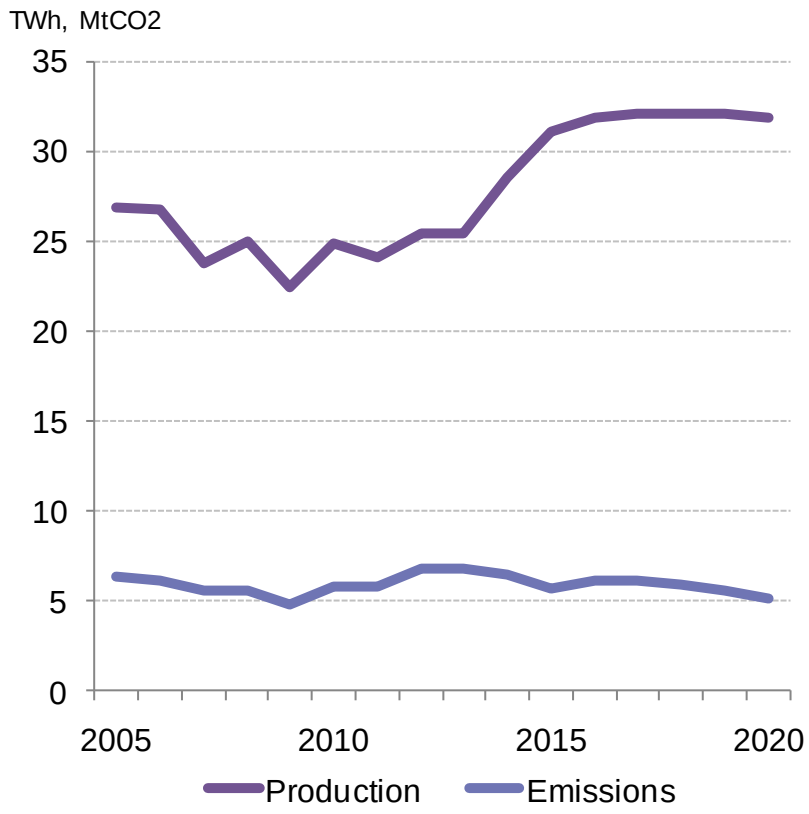
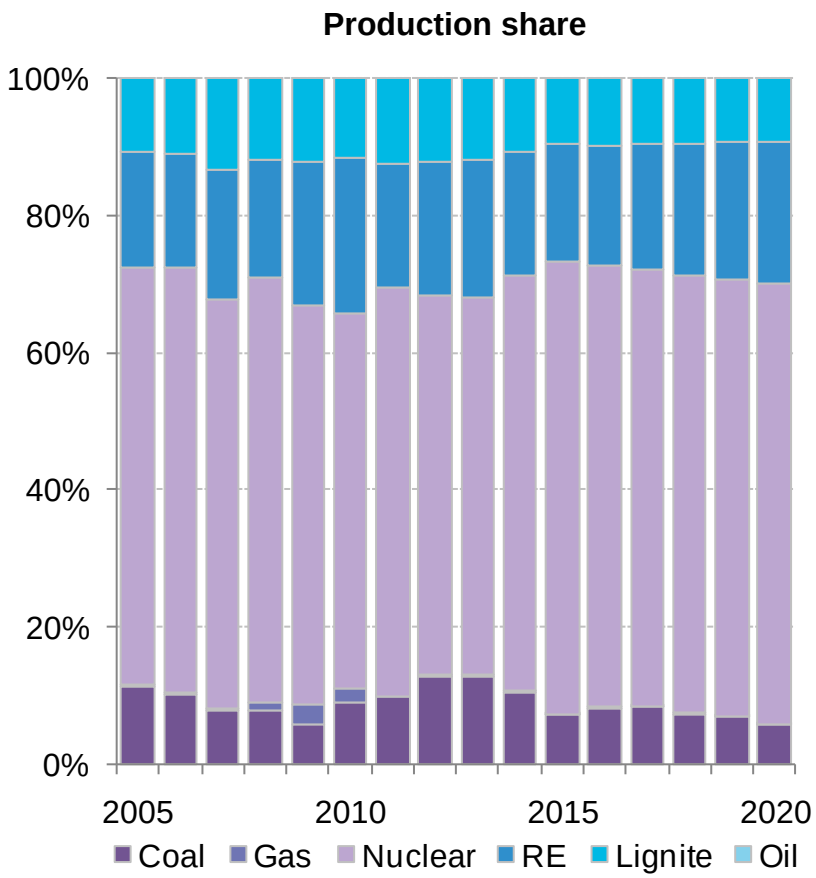


Source: Bloomberg New Energy Finance

SLOVAKIA POWER SECTOR (20% SCENARIO)





Source: Bloomberg New Energy Finance

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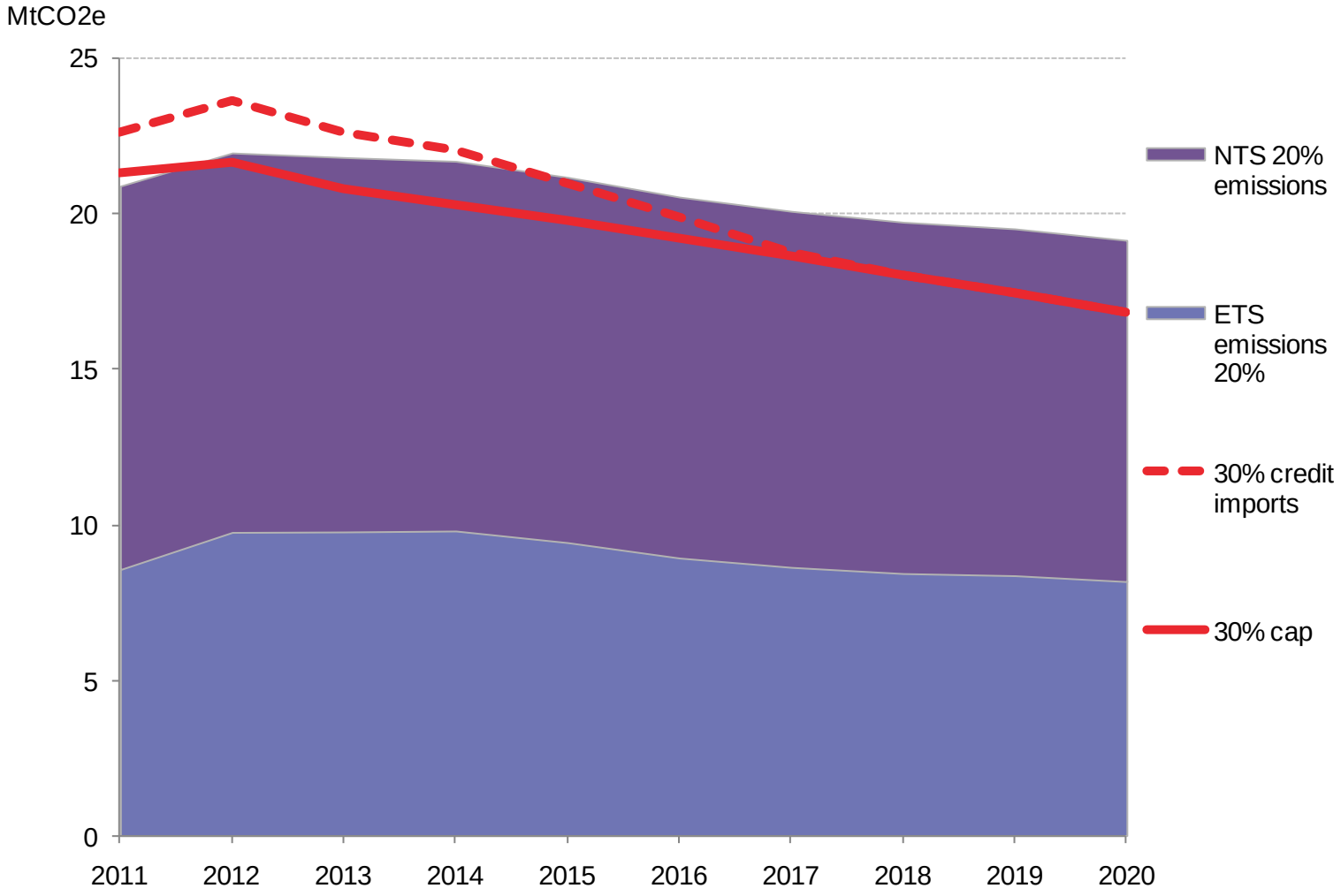

Source: Bloomberg New Energy Finance

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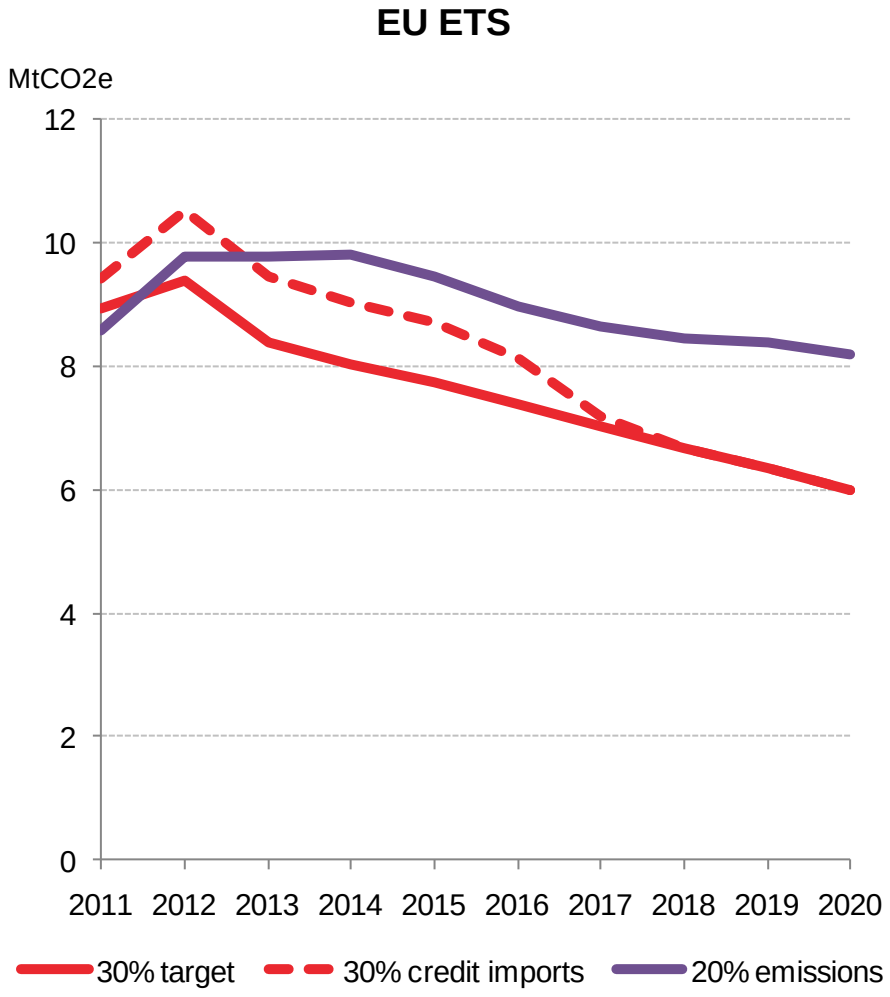

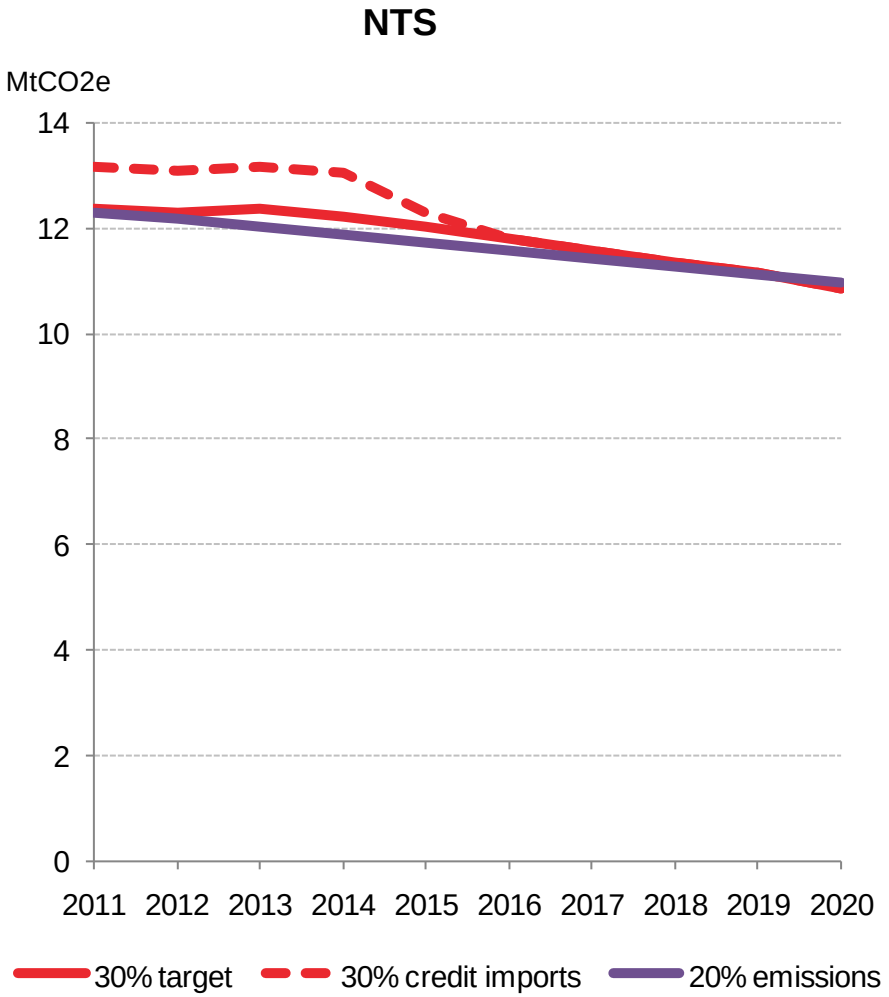

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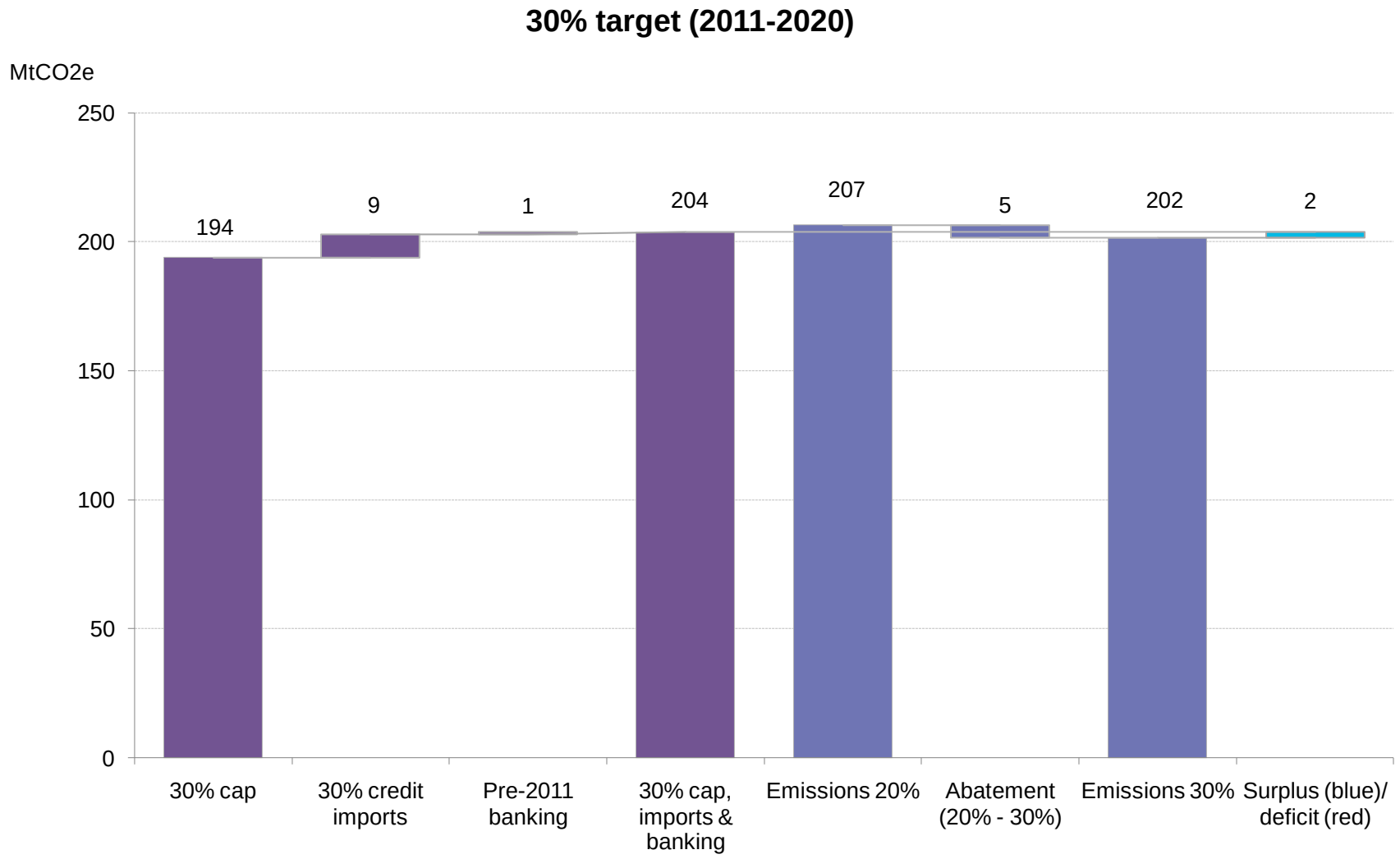
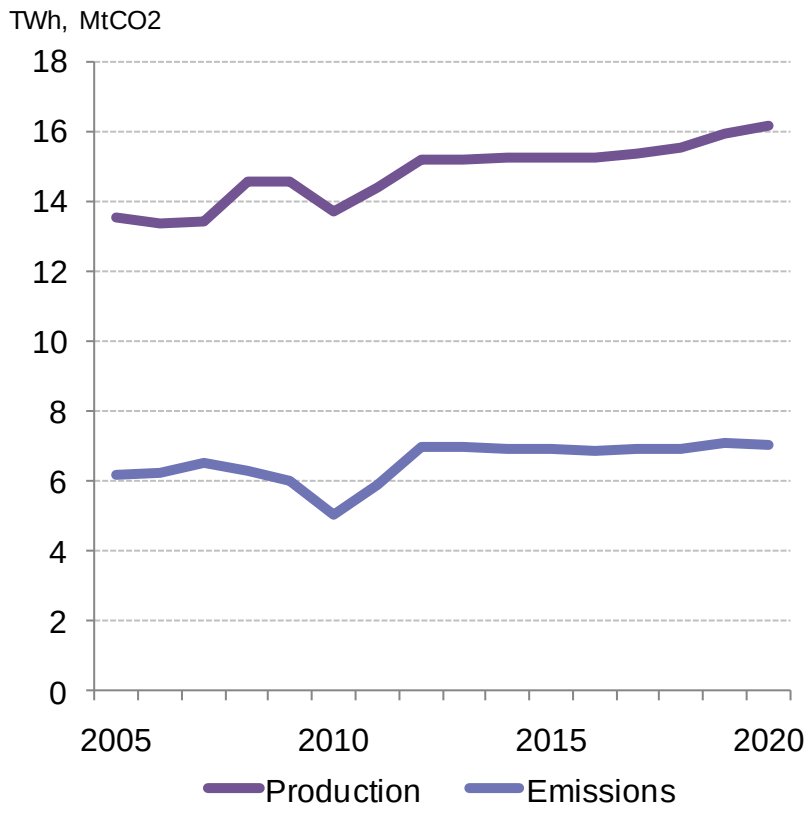
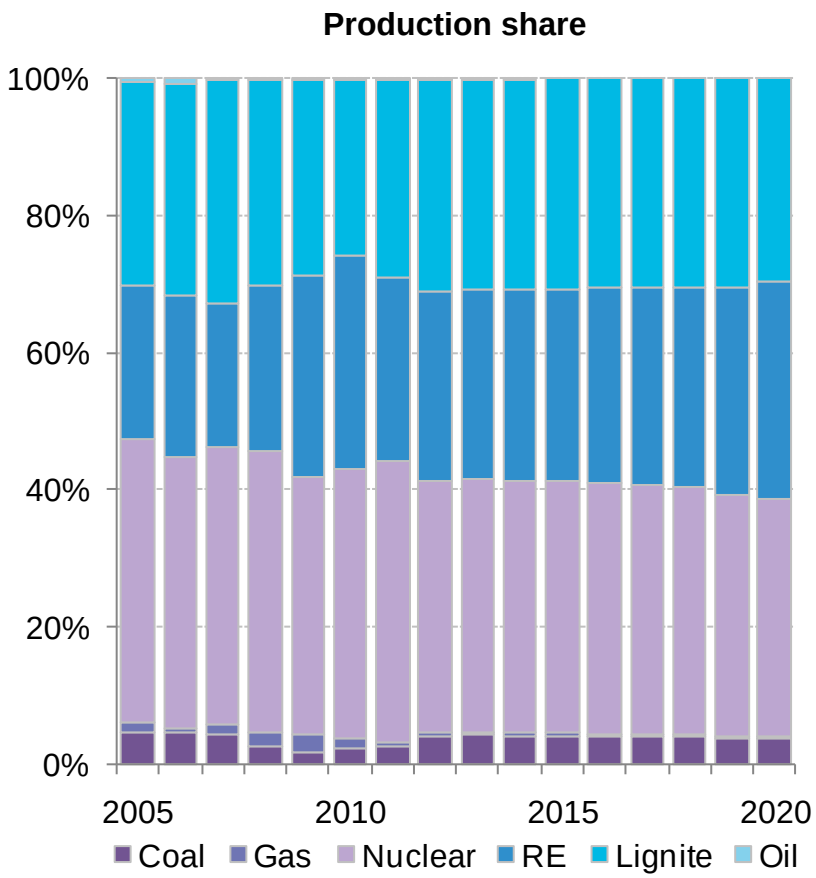
SLOVENIA



Source: Bloomberg New Energy Finance

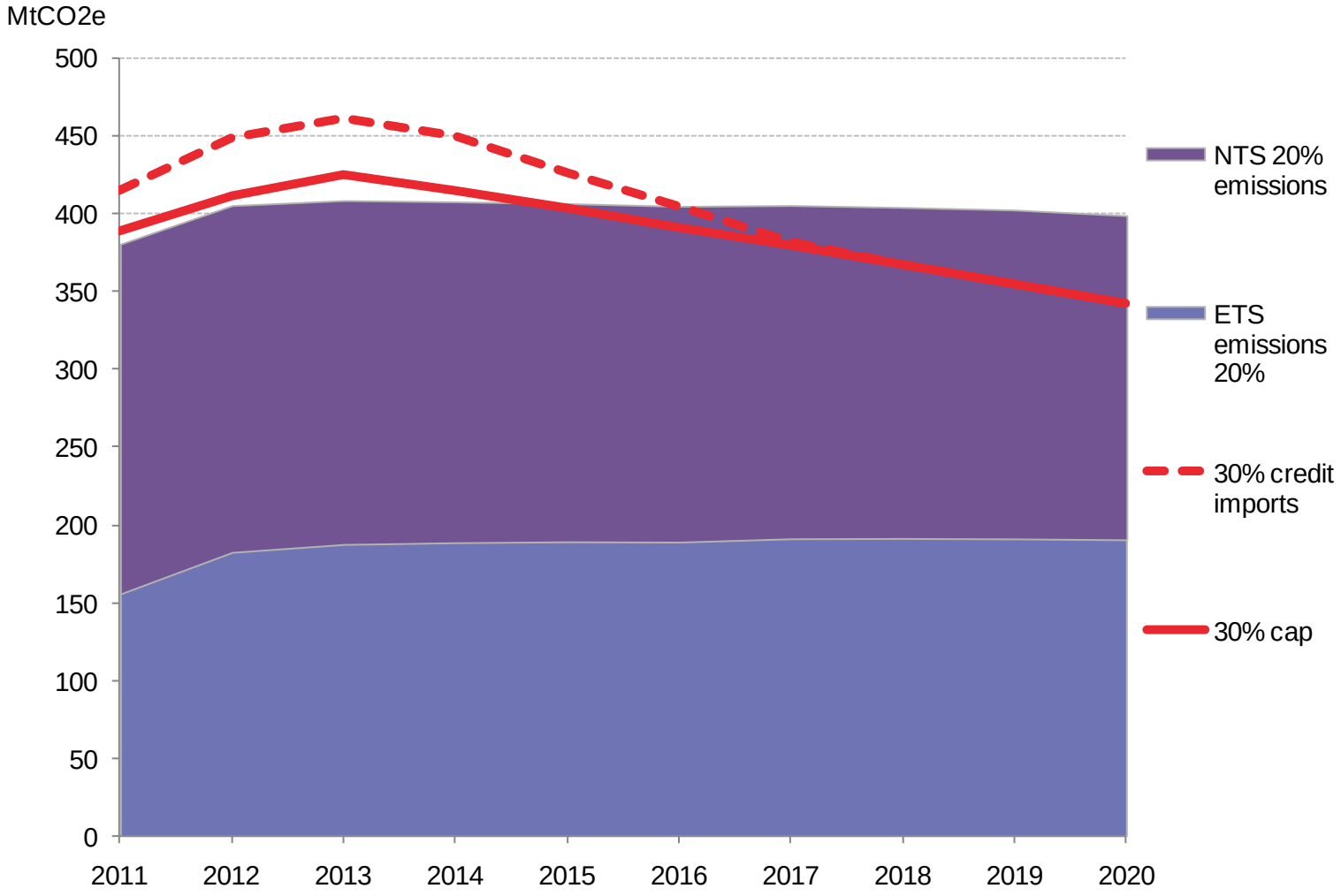
SLOVENIA POWER SECTOR (20% SCENARIO)





Source: Bloomberg New Energy Finance

SPAIN



Source: Bloomberg New Energy Finance

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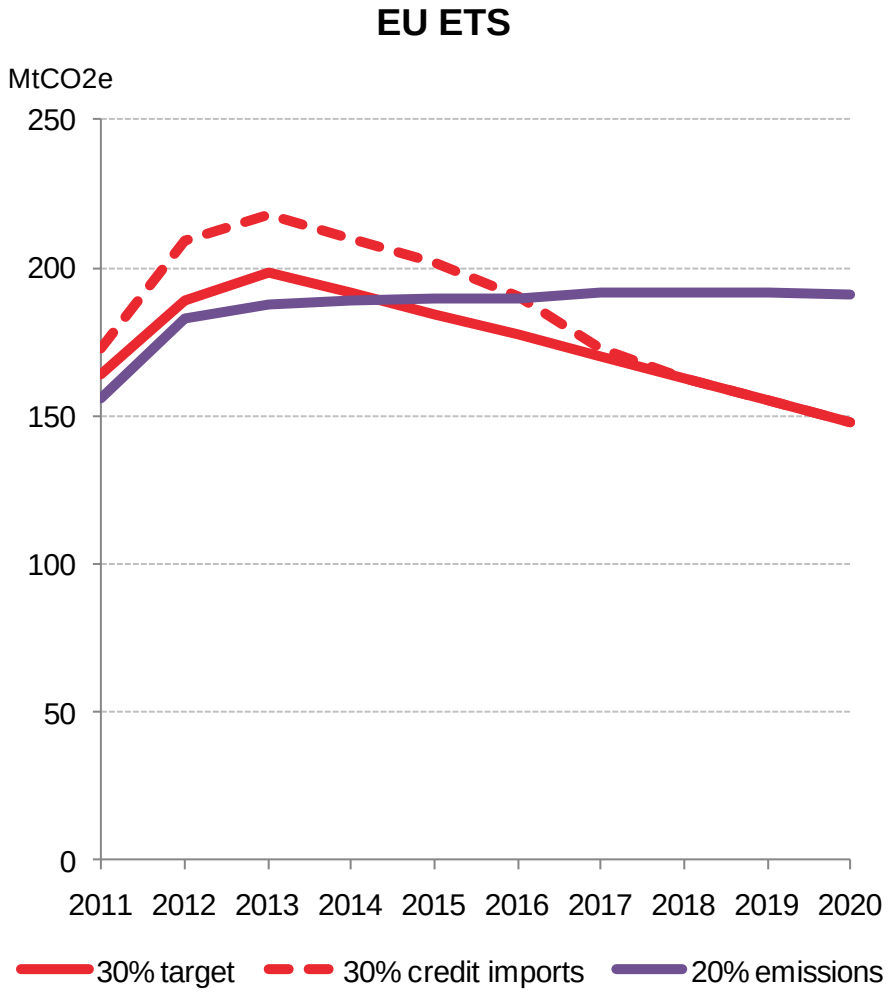

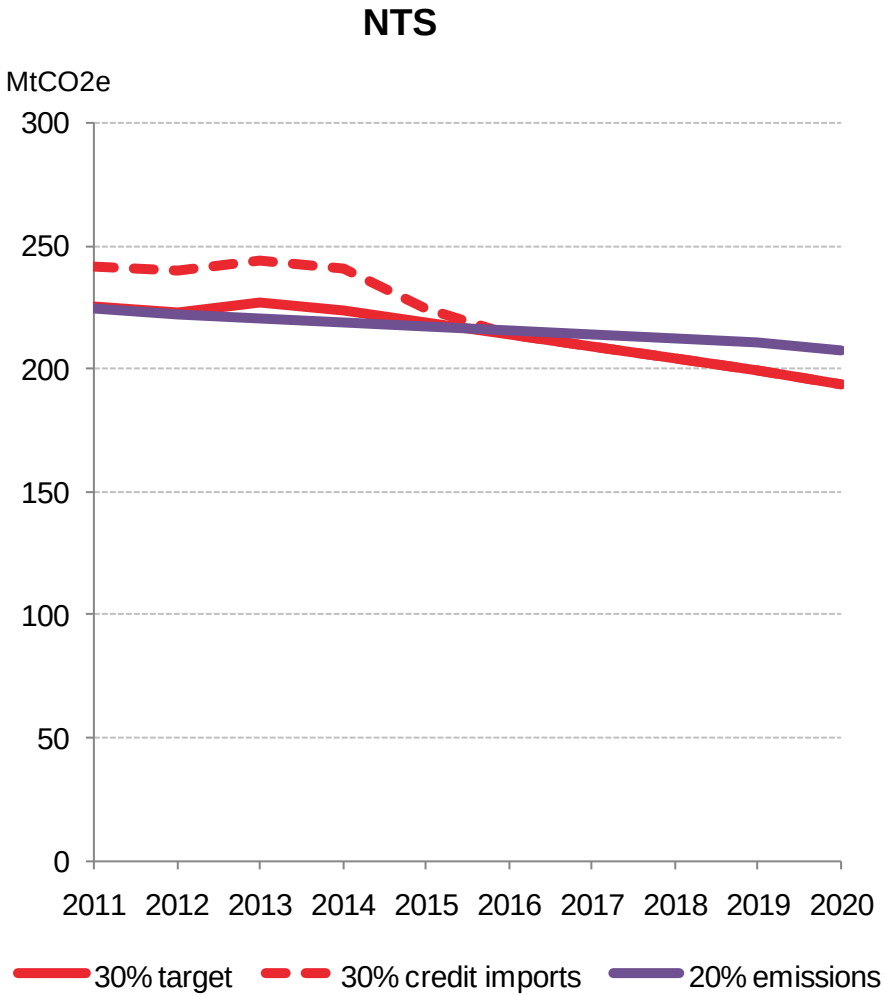

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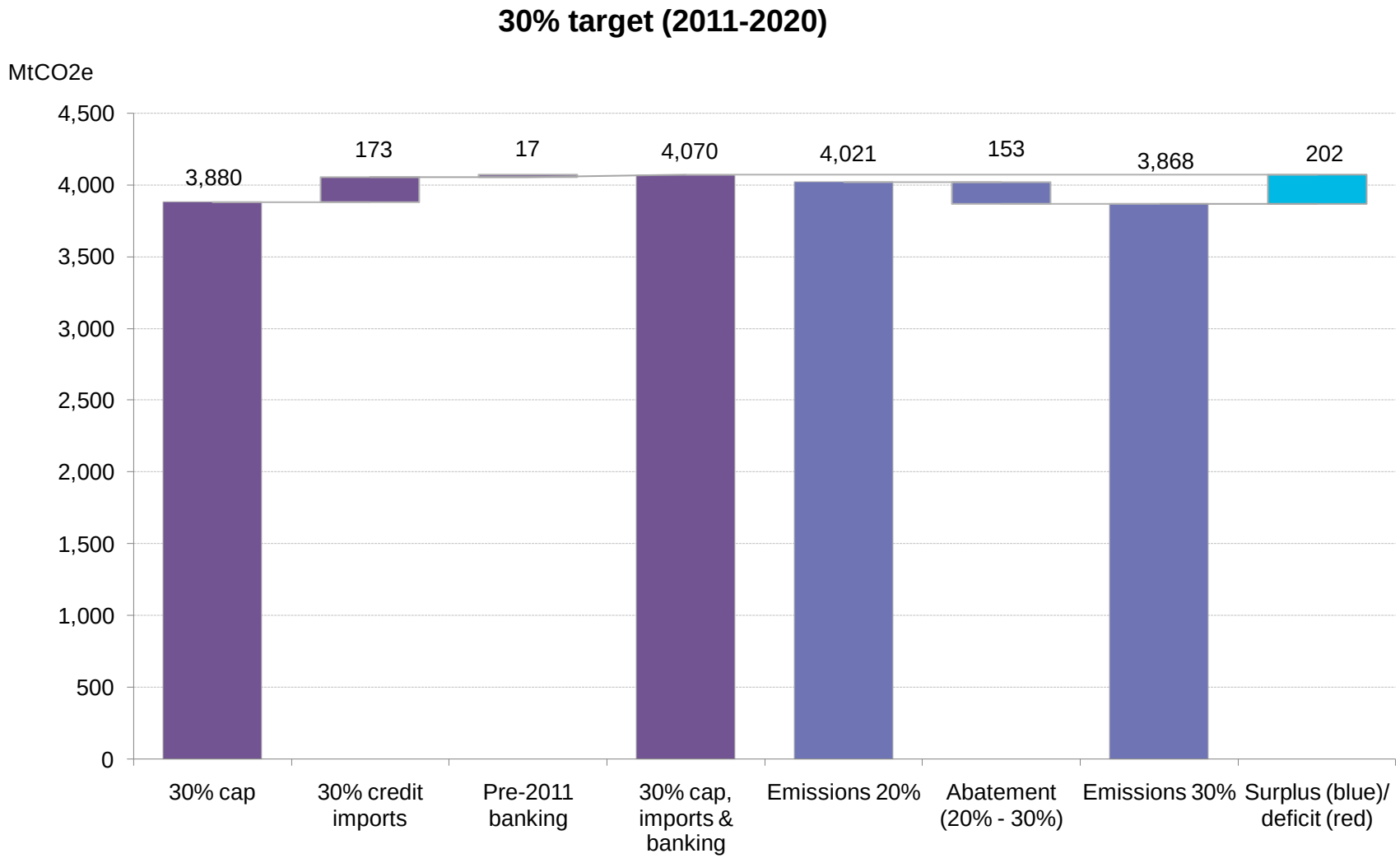
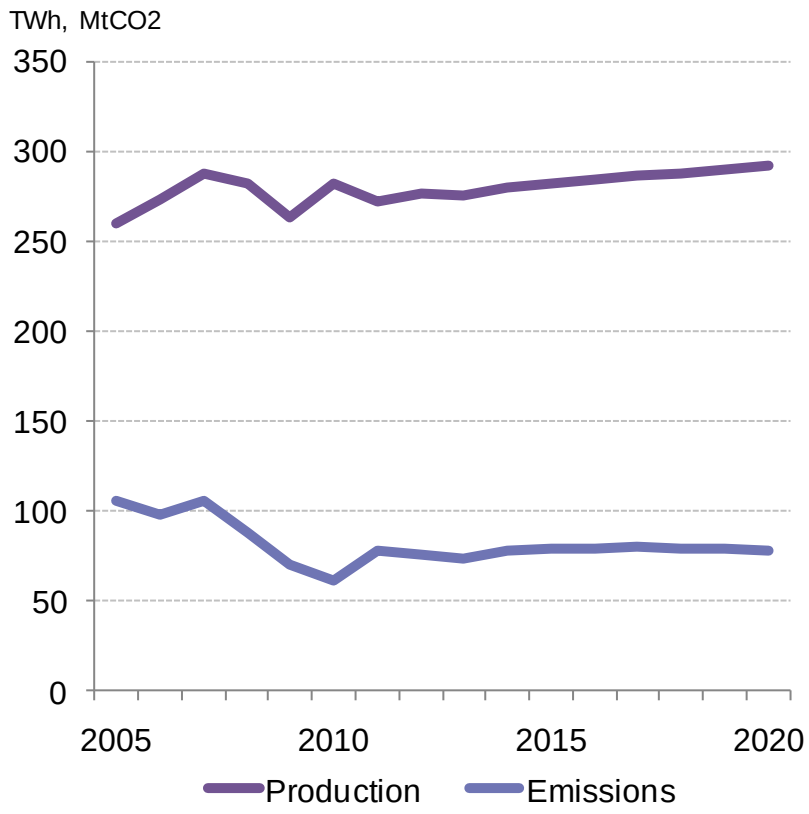
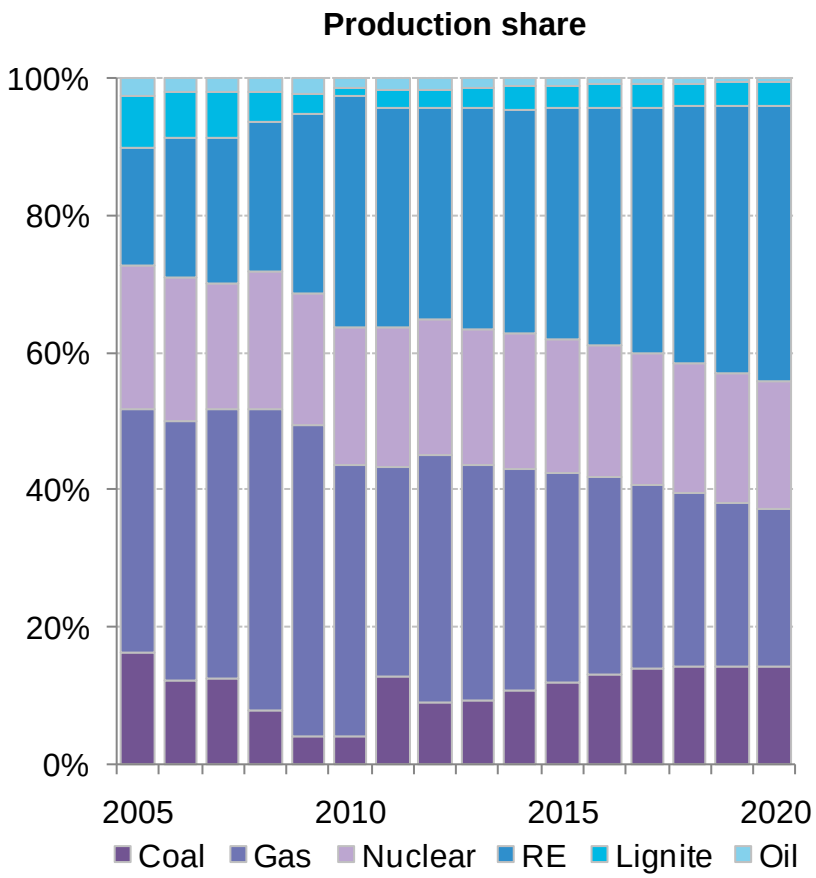


Source: Bloomberg New Energy Finance

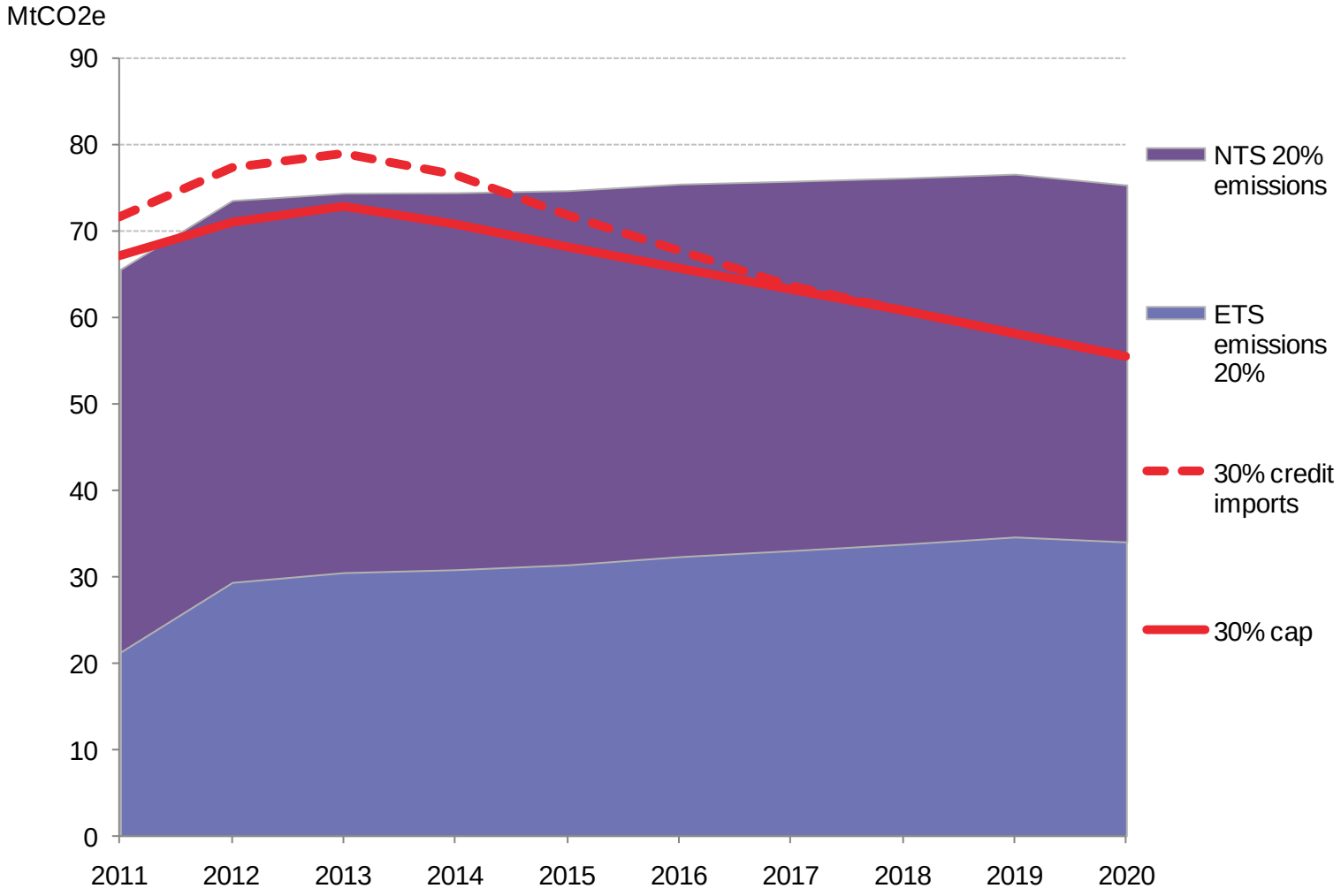
SPAIN POWER SECTOR (20% SCENARIO)





Source: Bloomberg New Energy Finance

SWEDEN



Source: Bloomberg New Energy Finance

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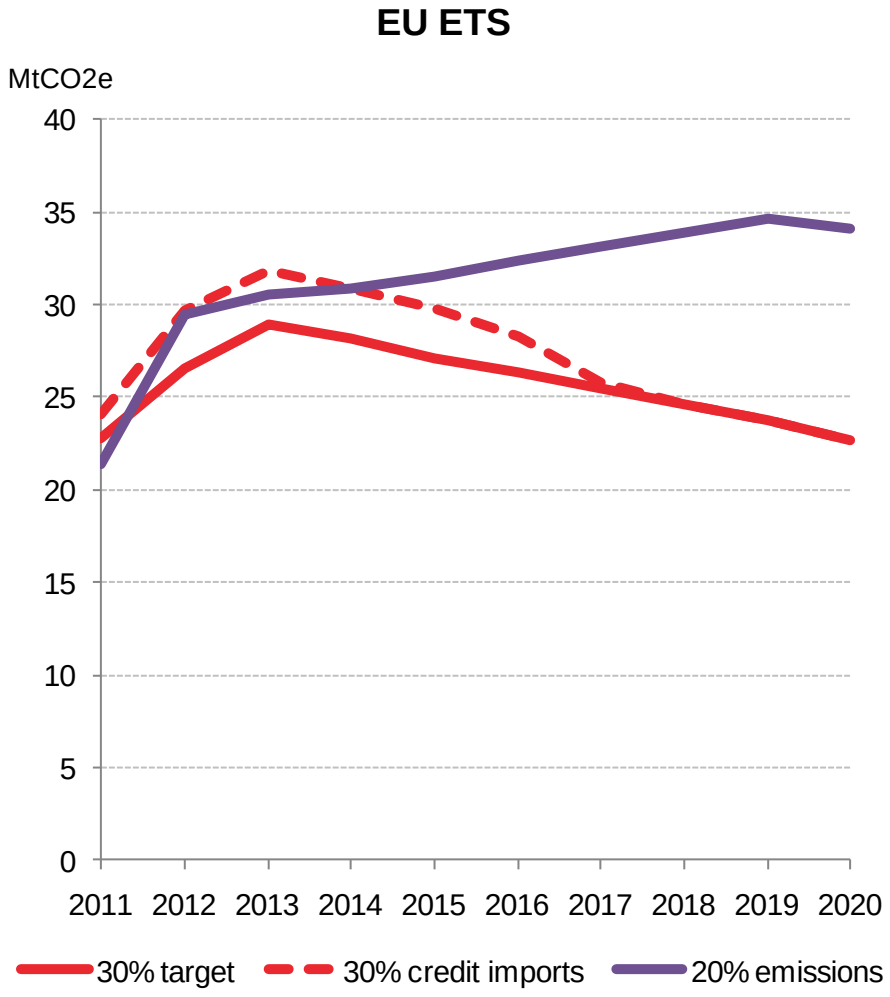

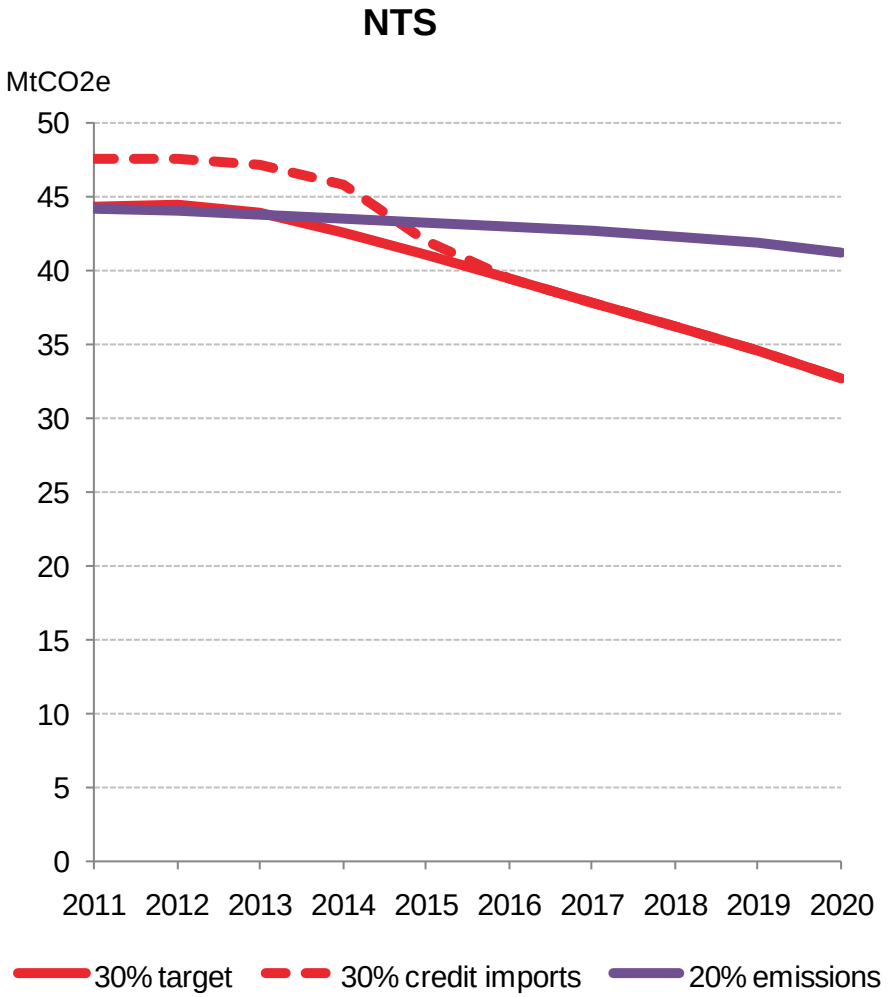

Source: Bloomberg New Energy Finance

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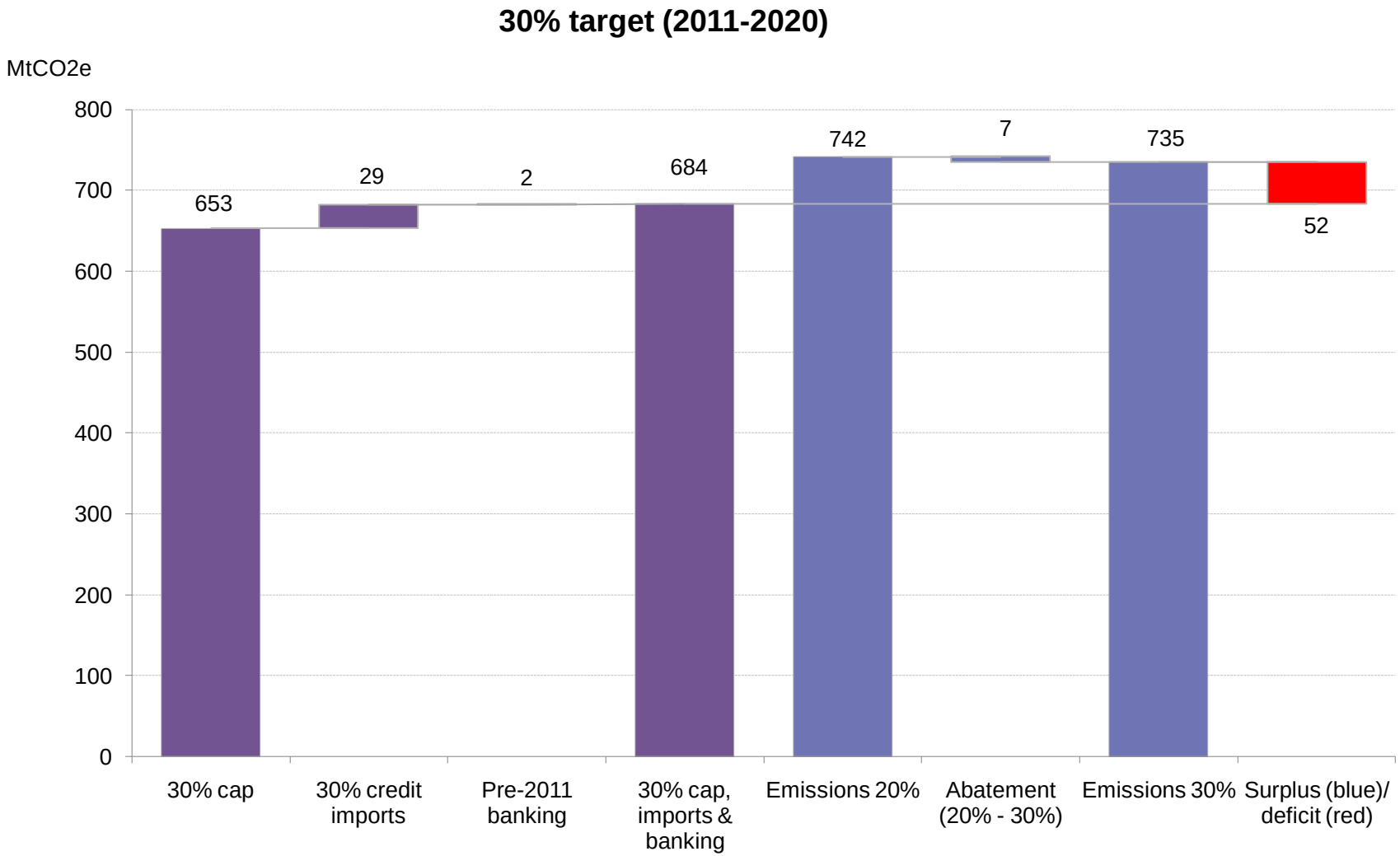
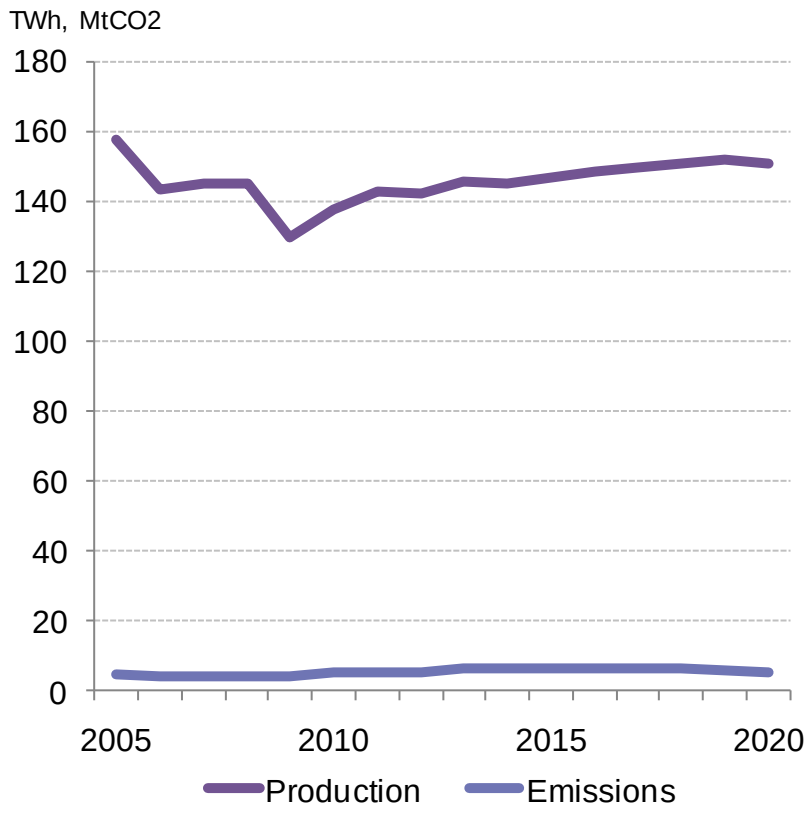
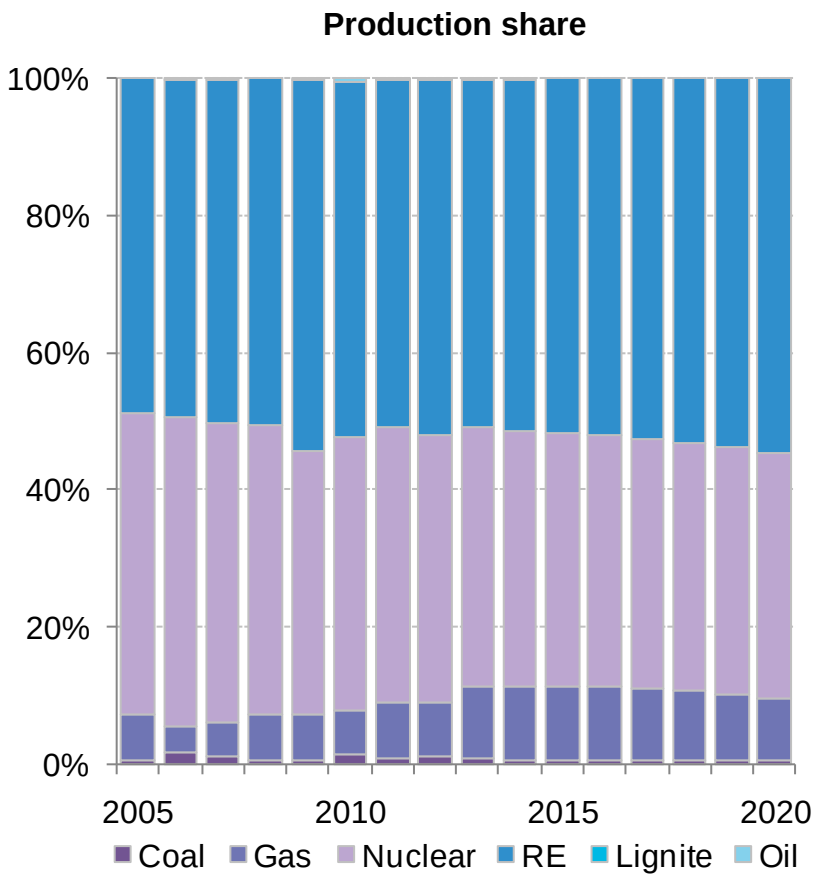


Source: Bloomberg New Energy Finance

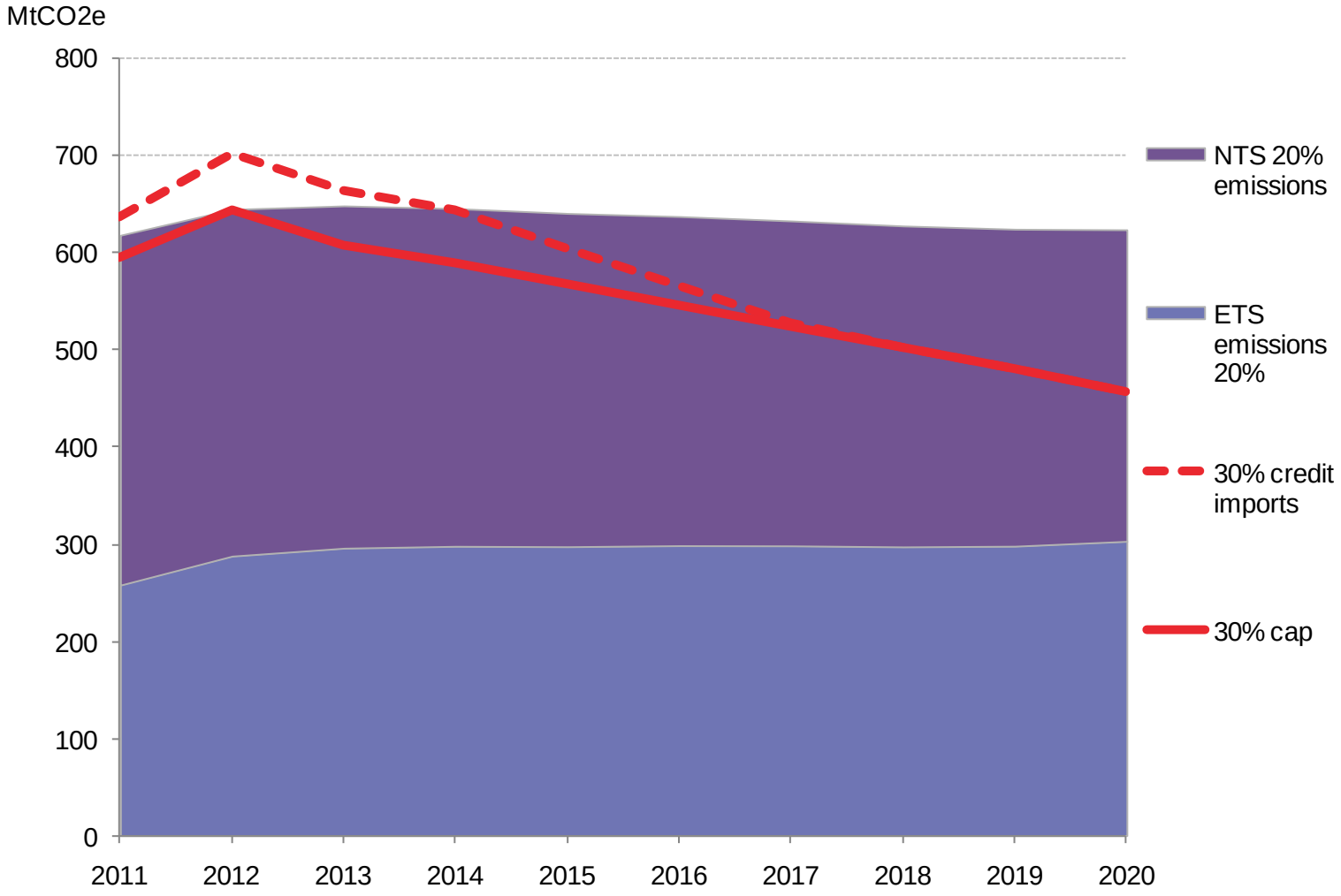
SWEDEN POWER SECTOR (20% SCENARIO)





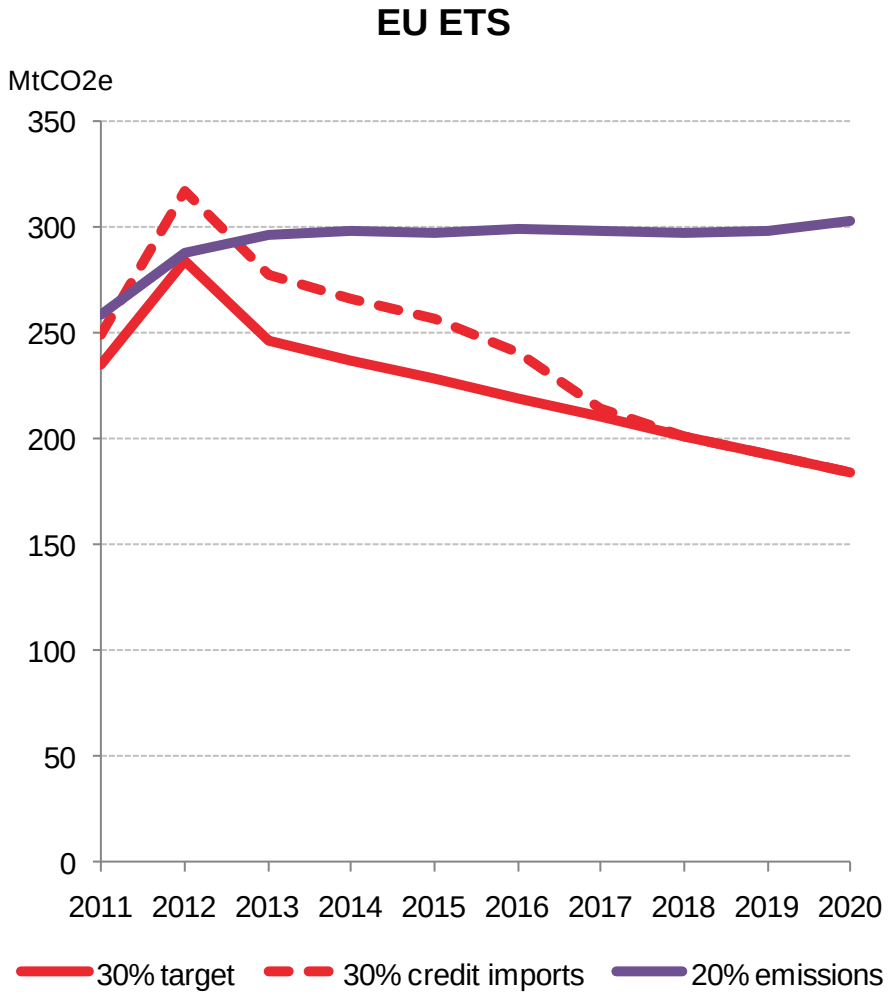
Source: Bloomberg New Energy Finance

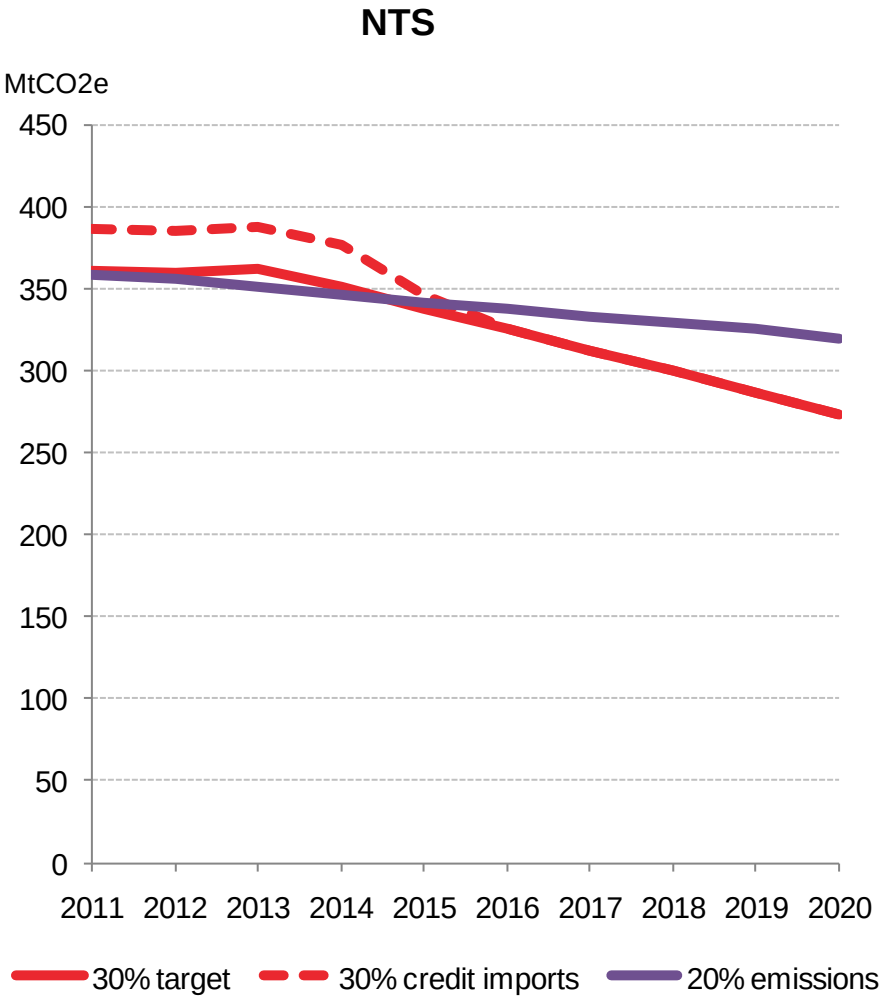
UNITED KINGDOM



Source: Bloomberg New Energy Finance

UNITED KINGDOM





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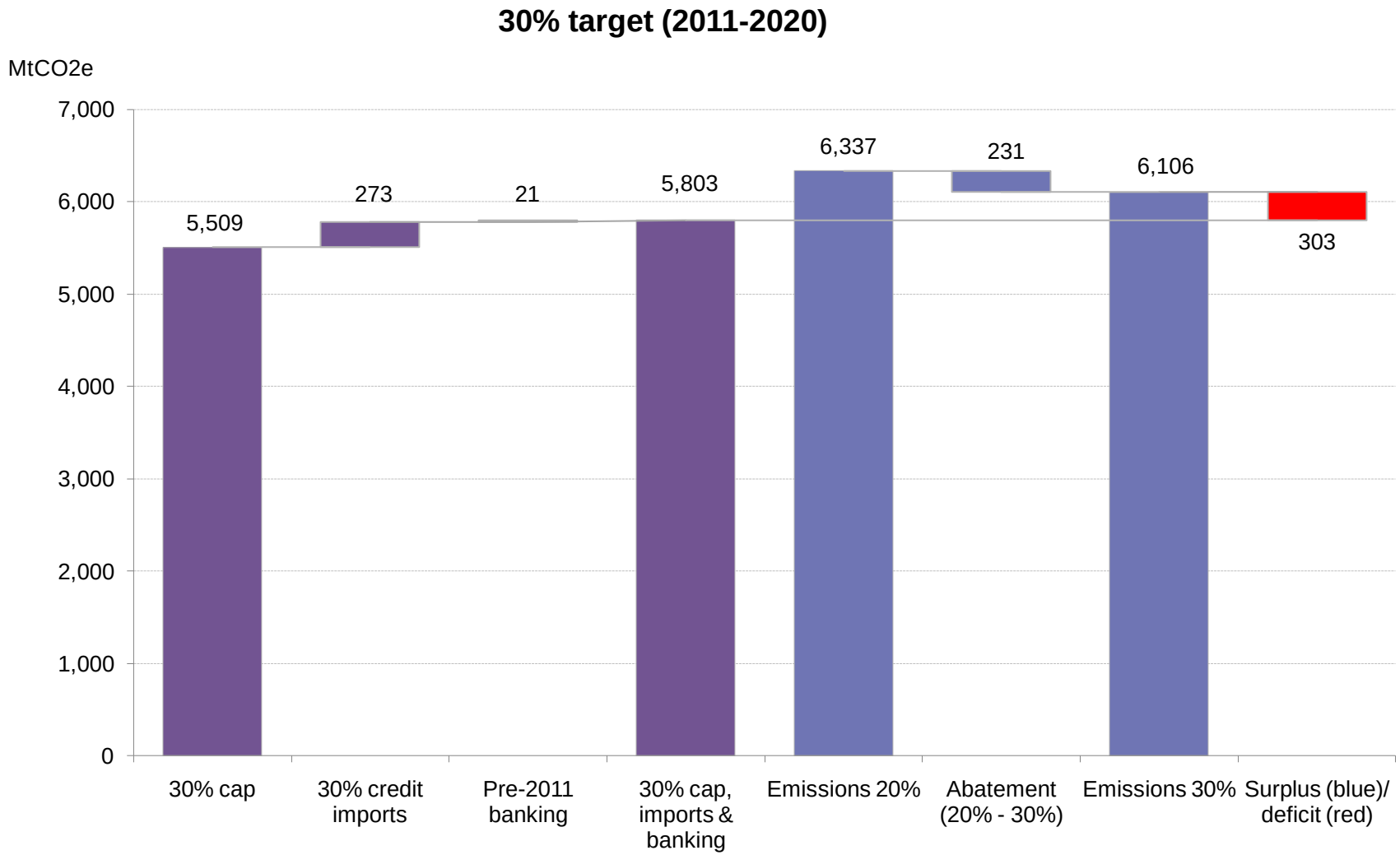
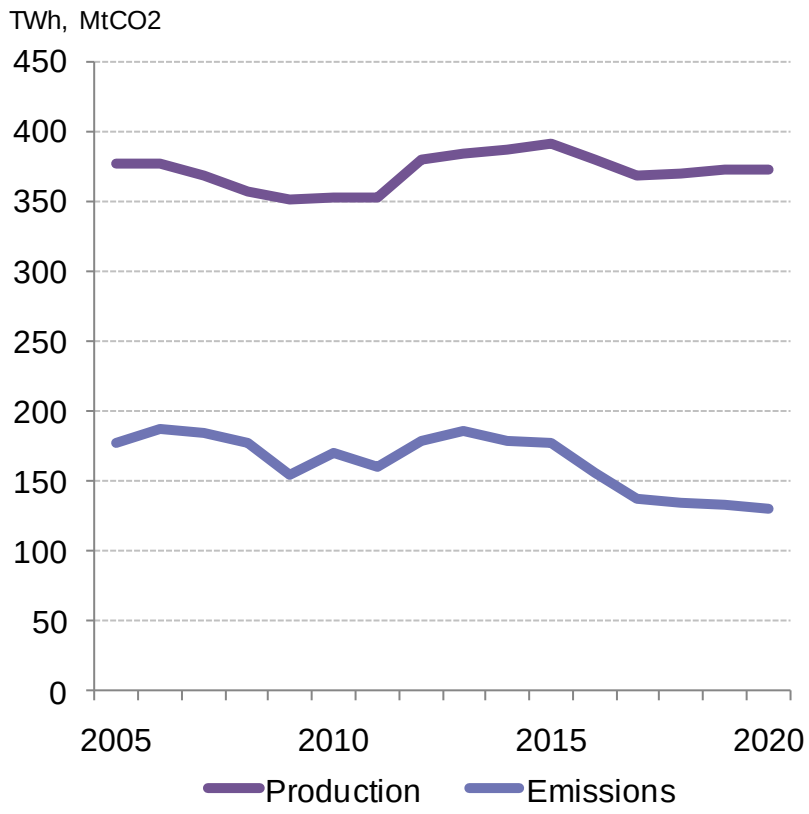
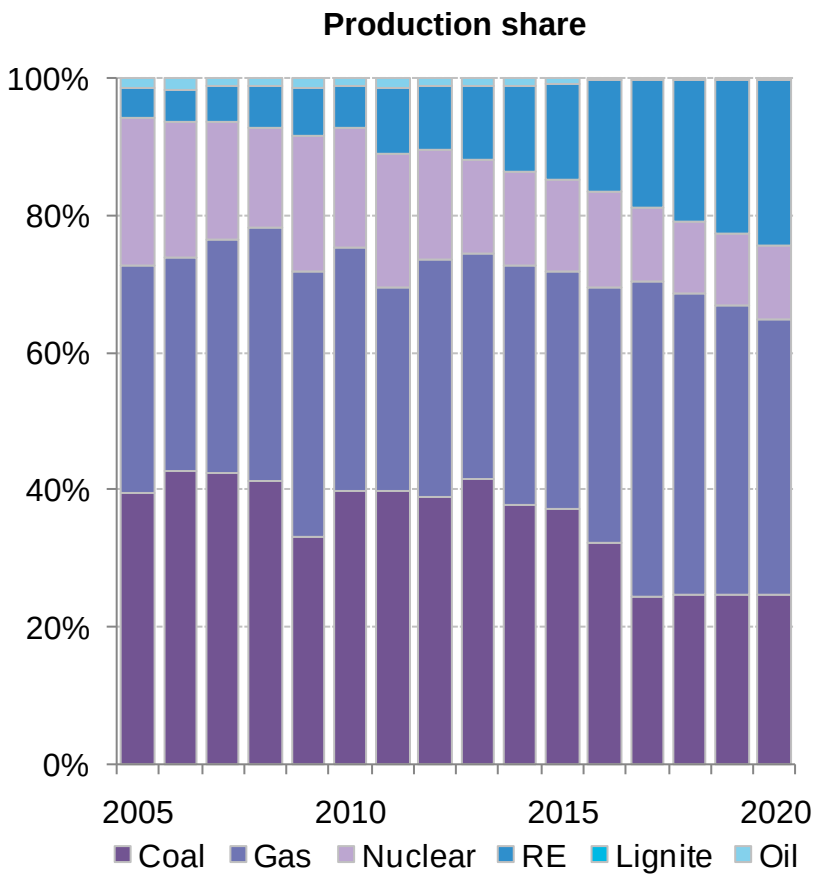
UNITED KINGDOM



Source: Bloomberg New Energy Finance

UNITED KINGDOM POWER SECTOR (20% SCENARIO)





Source: Bloomberg New Energy Finance

COST OF MOVING TO A 30% GHG REDUCTION TARGET IN EUROPE

GUY TURNER, GTURNER10@BLOOMBERG.NET

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