Climate Protection Policy and Goals

LowTEMP
Interreg Baltic Sea Region
EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

LowTEMP training package - OVERVIEW

LowTEMP

Introduction

- Intro Climate Protection Policy and Goals
- Intro Energy Supply Systems and LTDH
- Energy Supply Systems in Baltic Sea Region

Energy Strategies and Pilot Projects

- Methodology of Development of Energy Strategies
- Pilot Energy Strategies – Aims and Conditions
- Pilot Energy Strategy – Examples
- Pilot Testing Measures
- CO_2 emission calculation
- LCA calculation

Financial Aspects

- Life cycle costs of LTDH projects
- Economic efficiency and funding gaps
- Contracting and payment models
- Business models and innovative funding structures

Technical Aspects

- Pipe Systems
- Combined heat and power (CHP)
- Large Scale Solar Thermal
- Waste & Surplus Heat
- Large Scale Heat Pumps
- Power-2-Heat and Power-2-X
- Thermal, Solar Ice and PCM Storages
- Heat Pump Systems
- LT and Floor heating
- Tap water production
- Ventilation Systems

Best Practice

- Best Practice I
- Best Practice II

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1. Climate Change

Relevance of Climate Mitigation

Climate Change – Relevance of Climate Mitigation

*"Climate change and its impact on our environment, our economies and our security, is the **defining issue** of our era. But every day of inaction makes its consequences more irreversible, so we need to **act now**."*

OECD, 2008

Climate Change – Relevance of Climate Mitigation

- More CO_2 was emitted **since 1988** than in the entire period from 1750 to 1988!
- Populations, economies and industries still rise, so does the cumulative level of GHG emissions
- Impacts of climate change are unpredictable in their scale
- Large areas of the world could become uninhabitable for humans
- **Drastic climate mitigation efforts today are necessary!**

Figure 1: Fridays for future. Source: NiklasPntk [1]

Climate Change – Relevance of Climate Mitigation

Figure 2: Carbon Dioxide Rise. Source: NOAA [2] *Nasa.org*

2. EU Climate Action

Reduction targets of greenhouse gas emission in Europe

Measures and regulations

EU Climate Action - Overview

- **2000:** European Commission launched **the first European Climate Change Program** (ECCP)
- **2005**: **The second European Climate Change Program**
- **2007:** EU leaders set the **2020 climate and energy package**
  The package was enacted in December 2008 and became law in June 2009.
- **2011:** **Roadmap to 2050**
  (main routes of transition energy systems compatible with the international goal of 80-95% GHG reduction)
- **October 2014*:*** **2030 climate and energy framework** for legislation period 2021 -2030
  The targets for 2030 were revised upwards in 2018 and 2020
- **November 2018**: **Vision for climate-neutral Europe in 2050**
- **January 2020:** **European Green Deal**
- **March 2020:** Proposal of the first **European Climate Law**
- **October 2020:** **A Renovation Wave for Europe**
- **December 2020:** **A new target (55%) for reduction net greenhouse gas emissions for 2030**

EU Climate Action - Overview

EU targets and goals	2020	2030	2050
GHG emmissions total reduction (compared to 1990)	20%	40% * 55% **	100%
Within the EU ETS	21%	43%	
Emission Sharing Effort	10%	30%	
Renewable energy	20%	32%	
Energy efficiency	20%	32,5%	

*/ - Before revising the target in 2020.

**/ - The European Commissions proposal for the European Climate Law from March 2020 suggested increasing this target to 50-55%.
- On 10-11 December 2020 the European Council endorsed a new target to reduce net greenhouse gas emissions in the EU by at least 55% by 2030.

EU Climate Action - Overview

Regulations

- EU ETS – Emissions Trading System
  - 11.000 heavy energy installations
  - Covers 45% of all emissions
- ESD - Emissions Effort Sharing Decision
  - Targets for individual countries
  - Regulates buildings, transport, agriculture….
- Regulations for new vehicles
- Energy Efficiency Directive

Funding

- NER 300
  - 2012: Funded 20 renewable energy projects with 1.1 billion EUR
  - 2014: 1 billion EUR for 18 renewable energy projects and one CCS project.
  - By June 2021 all projects will be in operation
- Horizon 2020
  - 80 billion EUR funding for 2014-2020
  - Innovation Union, accessible and progressive

Key EU targets for 2020

2020:

- **20 %** cut in **greenhouse gas emissions** compared with 1990
  - 21 % reduction compared to 2005 within the ETS
  - National reduction targets according to GPD
    From 20 % reduction to 20 % increase limit
    (compared to the country's 2005 emissions)
- **20 %** of total energy consumption from **renewable energy**
  - National targets vary, set in the Renewable Energy Directive
- **20 %** increase in **energy efficiency**
  - Details are set in the Energy Efficiency Directive.

Figure 3: Solar collectors. Source: mrganso [3]

Key EU targets for 2030

2030:

- > 40 % cut in **greenhouse gas emissions** compared with 1990 *
  - 43 % reduction compared to 2005 within the ETS
  - Non-ETS sectors cut 30 % compared to 2005
    National reduction targets according to GPD
- > **32 %** of total energy consumption from **renewable energy**
- > **32.5 %** increase in **energy efficiency.**

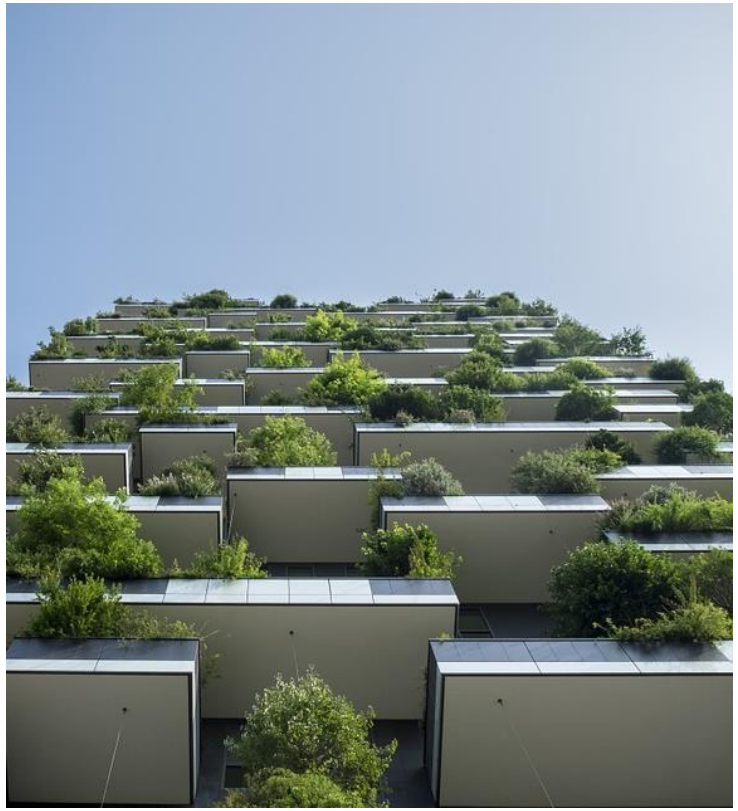


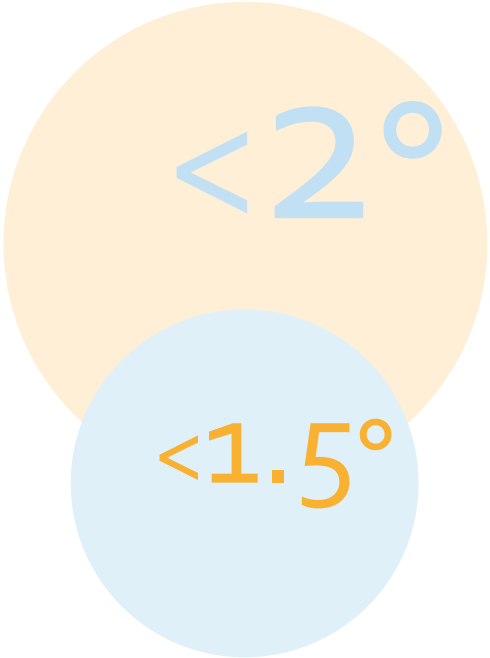
Figure 4: Green building. Source: Free-Photos [4]

*/ Before revising the target in 2020 .
On 10-11 December 2020 the European Council endorsed a new target to reduce net greenhouse gas emissions in the EU by at least 55% by 2030.

Long-term goals 2050

- **Climate neutral EU by 2050**
  - Zero net GHG emissions
  - Carbon capture and storage (CCS) for unavoidable emissions
- Keep global warming **well below 2°C** compared to pre-industrial times
  - Europe is pursuing effort to keep global warming at **1,5°C**
- Energy security, sustainable prosperity and social fairness
- Adaptation and increasing resilience to climate change

- Every 5 years the commission will review the EU trajectory.



Measures

- Financial support:
  - From 2014 to 2020 the EU is spending 180 billion Euro on climate protection
  - funding of low-carbon energy demonstration projects
  - International development aid
- Regulations:
  - EU emissions trading system (EU ETS) that covers 45% of all emissions
  - Emission sharing effort (EMS) for sectors not covered in ETS
  - Member countries execute National Energy and Climate Plans (NECP) for 2021-2030 Period

Measures

EU emissions trading system ("ETS")

- operates in **31 countries** (all 28 EU countries plus Iceland, Liechtenstein and Norway)
- limits emissions from more than **11,000 heavy energy-using installations** (power stations & industrial plants) and **airlines** within the EU
- Cap is set on the total amount of certain greenhouse gases that can be emitted.
- The cap is reduced over time so that **total emissions fall**.

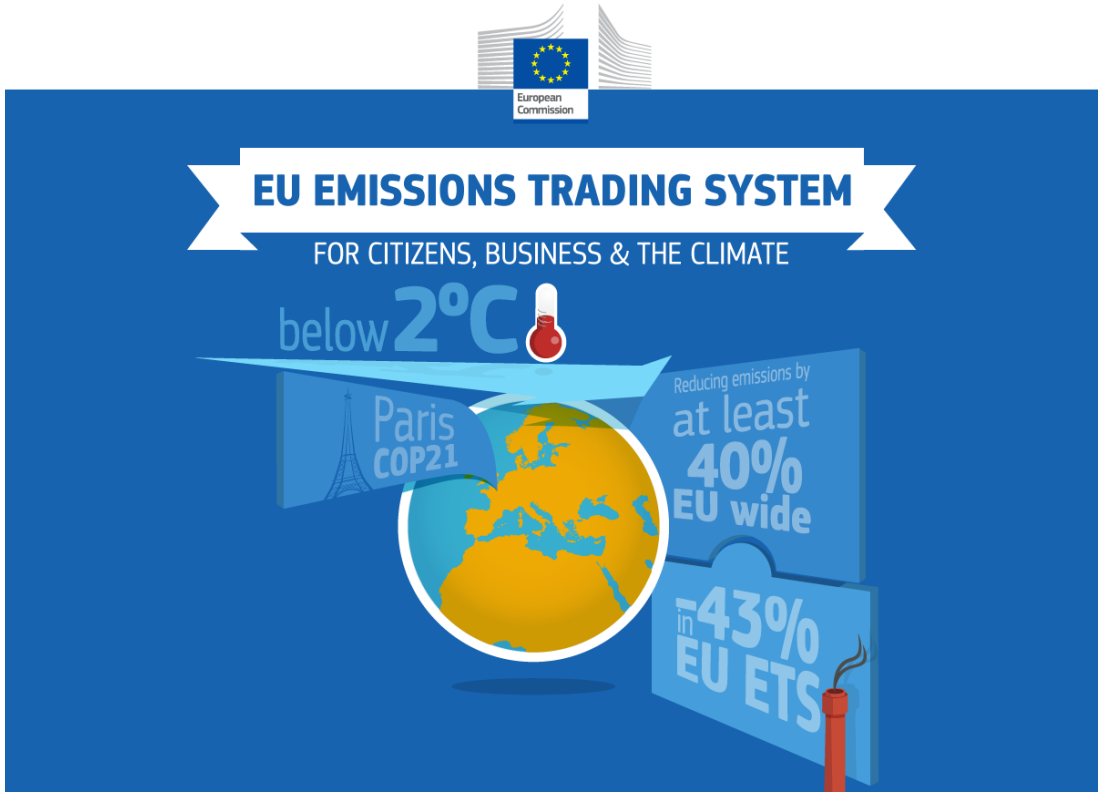


Figure 5: EU Emissions Trading System. Source: European Commission [5]

Measures

EU emissions trading system ("ETS")

- Companies can trade **emission allowances** with each other
- If a company exceeds its allowances, **heavy fines** impose
- Participation is mandatory
- The system covers:
  - Carbon dioxide (CO_2)
    Nitrous oxide (N_2O)
    Perfluorocarbons (PFCs)

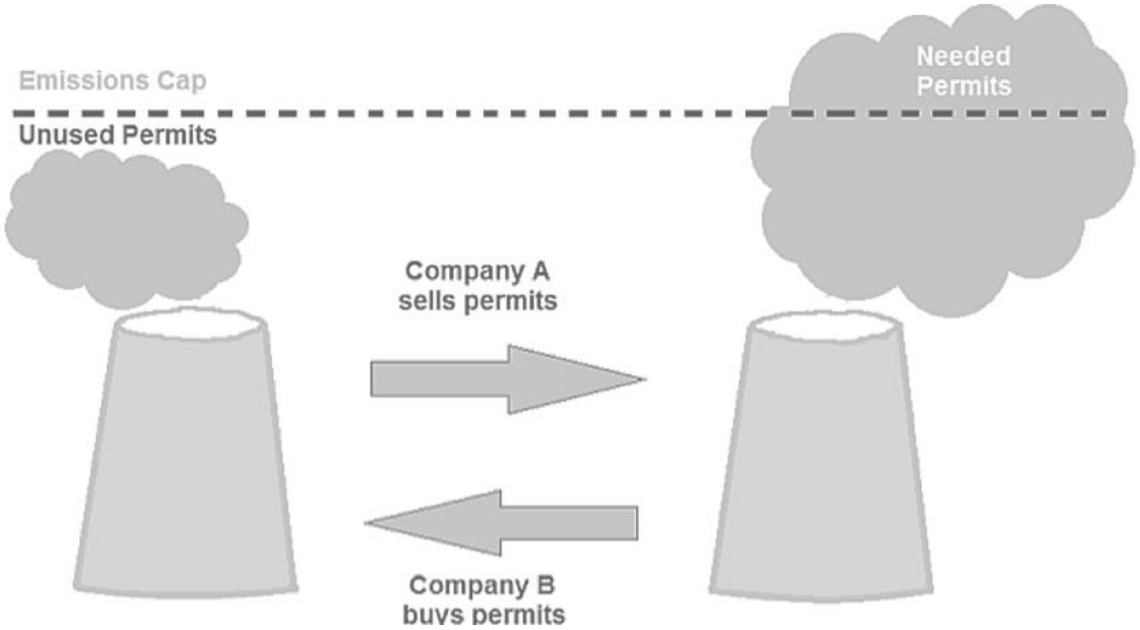


Figure 6: Emissions trading system diagram. Source: Energy Royd [6]

Measures

Emissions effort sharing decision ("ESD")

- Individual national emission targets
- Expressed in percentage changes to 2005 levels
- Regulations for sectors like buildings, transport, agriculture and waste
- 2020 target 10 % reduction
  (range from -20% to +20% depending on country's wealth)
- 2030 target 30 % reduction
  (range from -40% to 0% depending on country's wealth)
- EU regulations will help nations reach their targets!

Measures

Contribution of Interreg projects:

- Several Interreg projects have the goal to reduce CO2 emissions
- The international exchange of experience and ideas and the cooperations within Interreg projects contribute to the climate goals of the EU
- Example: *"The [LowTEMP] project contributes to the aims of the EU2020, by promoting energy efficiency, the use of renewable sources and reducing CO2 emissions, to national and European spatial development policies as well as the EU Strategy for the Baltic Sea Region (EUSBSR)."*

Climate Adaptation

Adaptation to climate change:

- Climate change is already happening
  → It is important to deal with adaptation as well
- EU developed Adaptation Strategy in 2013
- All member states have to adopt national plans to cope with climate change consequences
- Some member states have already developed national adaptation strategies.

Figure 7: EU Adaptation Strategy. Source: European Commission [7]

Global Action

- Climate change is a transboundary challenge
- It is affecting everyone, but poorer countries are more likely to suffer

- The EU is responsible for **less than 10%** of global GHG emissions
  - -> Global action is needed!

Figure 8: Global Action. Source: artistlike [8]

3. Progress and Trend

Towards the greenhouse gas emission targets

Progress and Trend

- Between 1990 and 2018 GHG Emissions were reduced by 23 % while the economy grew by 61 %
- According to Member States' projections reported in 2017 and 2018:
  - The emissions are expected to decrease to 26 % below 1990 levels by 2020 with the current measures
  - a 32 % reduction of EU greenhouse gas emissions could be achieved by 2030, compared with 1990 levels. These projected reductions fall short of the 40 % target for 2030.
- Current policies are expected to reduce GHG emissions by 60 % until 2050

  additional measures are necessary!

GHG emission trends in the EU

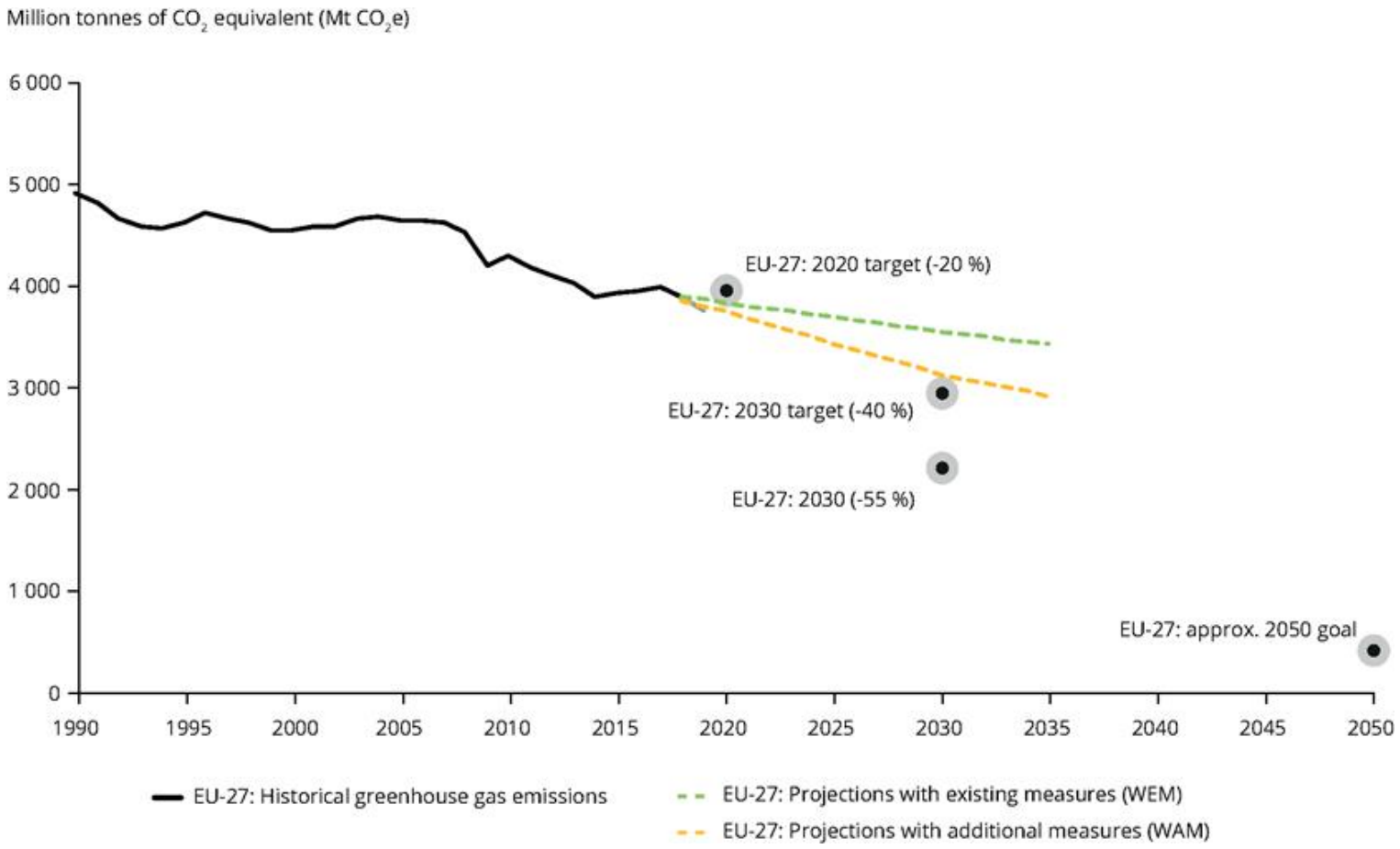


Figure 9: Greenhouse gas emissions trends. Source: EEA [9]

GHG emission in the Baltic Sea Region

CO_2 Emissions in total in Tg (million tonnes)	1990	2018	Progress in TG	Progress in %
Denmark	70.779	48.224	-22.555	-31.9%
Estonia	40.277	19.974	-20.303	-50.4%
Finland	71.231	56.411	-14.820	-20.8%
Germany	1.249.459	858.369	-391.090	-31.3%
Latvia	26.329	11.727	-14.602	-55.5%
Lithuania	48.017	20.267	-27.750	-57.8%
Poland	475.080	412.856	-62.224	-13.1%
Sweden	71.185	51.779	-19.406	-27.3%

Table 1: CO_2 Emissions in total in Baltic Sea Region. Source: EEA [10]

GHG emission in the Baltic Sea Region

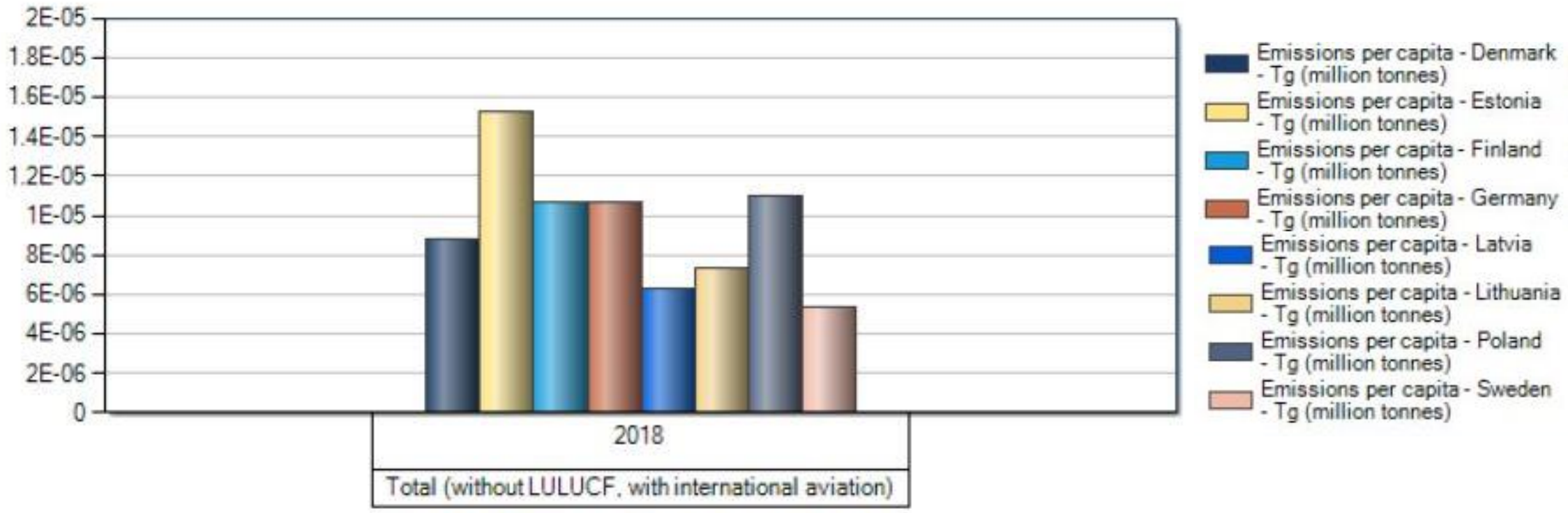


Figure 10: Emissions per capita 2018. Source: EEA [10]

GHG emission trends in the EU ETS

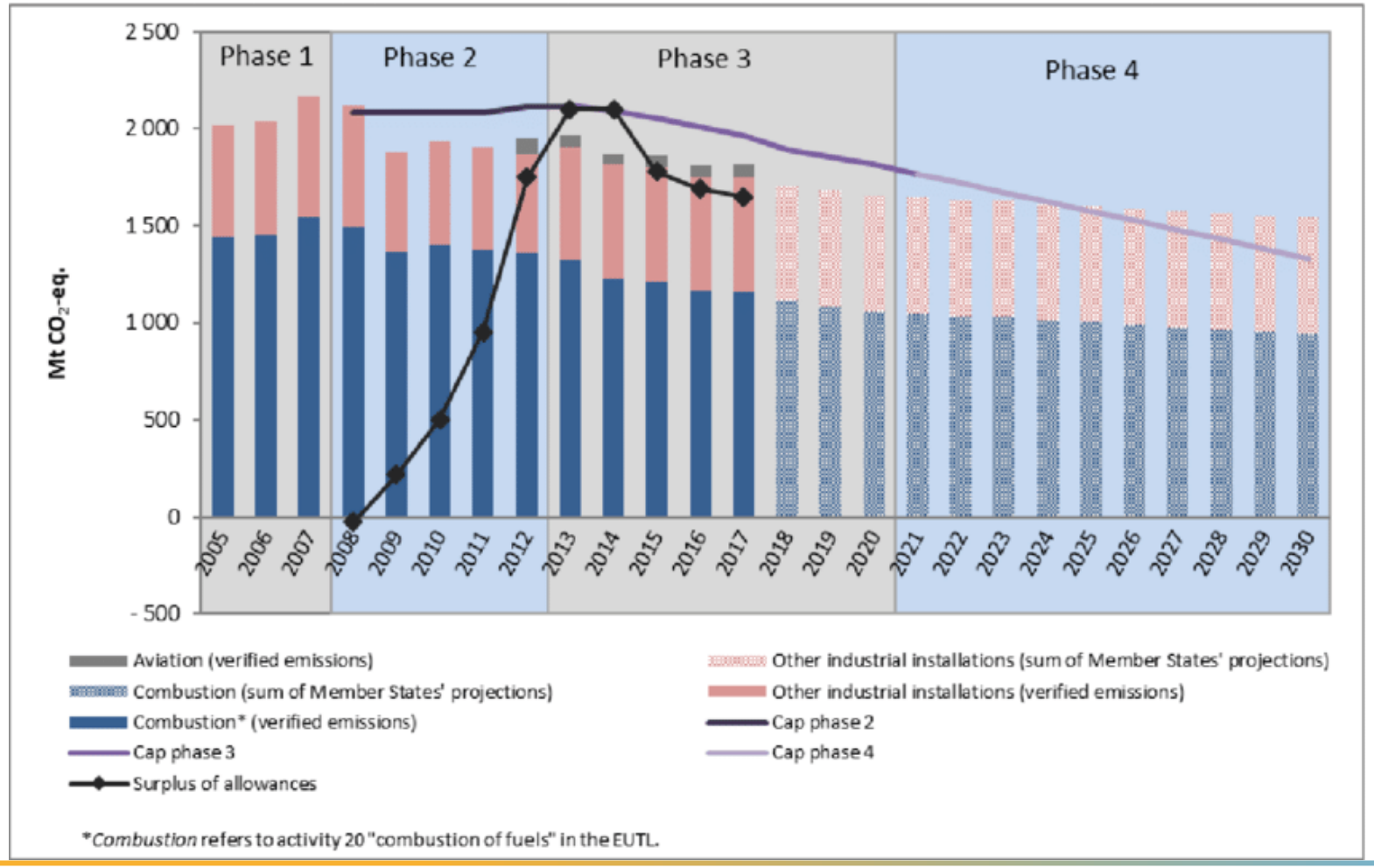
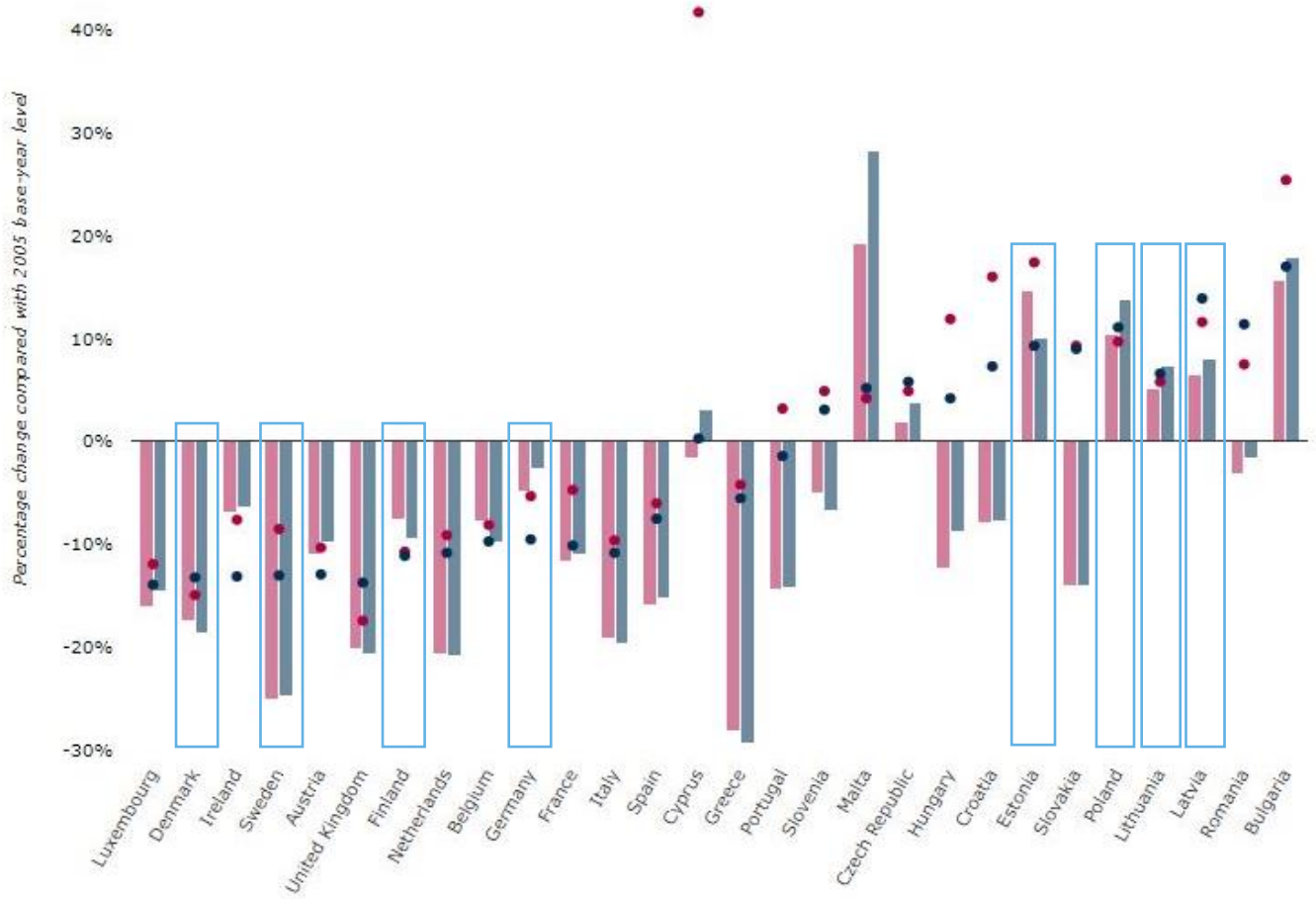


Figure 11: Verified ETS emissions 2005-2017.
Source: G. Amanatidis [11]

GHG emission trends in the Effort Sharing Decision



2016 progress of Member States towards their Effort Sharing Decision targets (GHG emissions compared to each Nations 2005 emission levels)

Figure 12: GHG emission trends
Source: EEA [12]

- Baltic Sea Region Country
- ESD emissions in 2016 (%)
- ESD emissions in 2017 (proxy) (%)
- ESD limit for 2016 (%)
- ESD limit for 2017 (%)

GHG emission trends in the Effort Sharing Decision

CO_2 Emissions Compared to national 2005 level	2020 Target	Progress*	2030 Target	Trend*
Denmark	-20 %	-19 %	-39 %	-23 %
Estonia	11 %	17 %	-13 %	-4 %
Finland	-16 %	-11 %	-39 %	-37 %
Germany	-14 %	- 8 %	-38 %	-22 %
Latvia	17 %	8 %	- 6 %	-6 %
Lithuania	15 %	7 %	- 9 %	-1 %
Poland	14 %	21 %	- 7 %	14 %
Sweden	-17 %	-25 %	-40 %	-40 %

*Progress and Trend in 2018, according to EU Climate Action Progress Report

Table 1: GHG emssion trends. Source: EEA [12]

What does this have to do with LowTEMP?

- Supply temperatures are being lowered wich reduces heat losses
- Low temperature systems can better utilise renewable energy sources and waste heat
- Efficient low temperature district heating (LTDH) systems play an important role in achieving sustainable energy supply structures
- thus contribute to reduced energy waste and GHG emissions in the Baltic Sea Region.

→ contribution to the EU climate mitigation goals is being achieved!

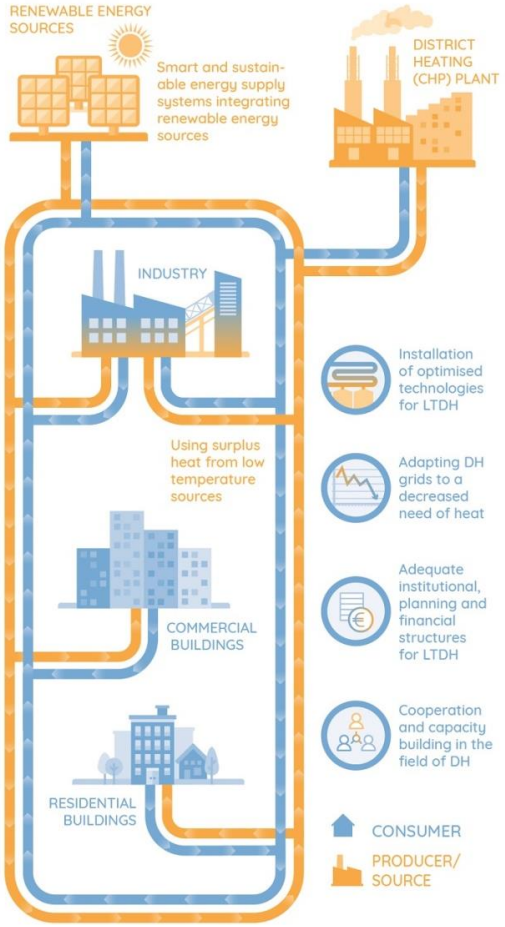


Figure 12: LowTEMP project scheme
Source: LowTEMP project [13]

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