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Summary | **EU action on energy and climate change: a landscape review**

EN **2017**

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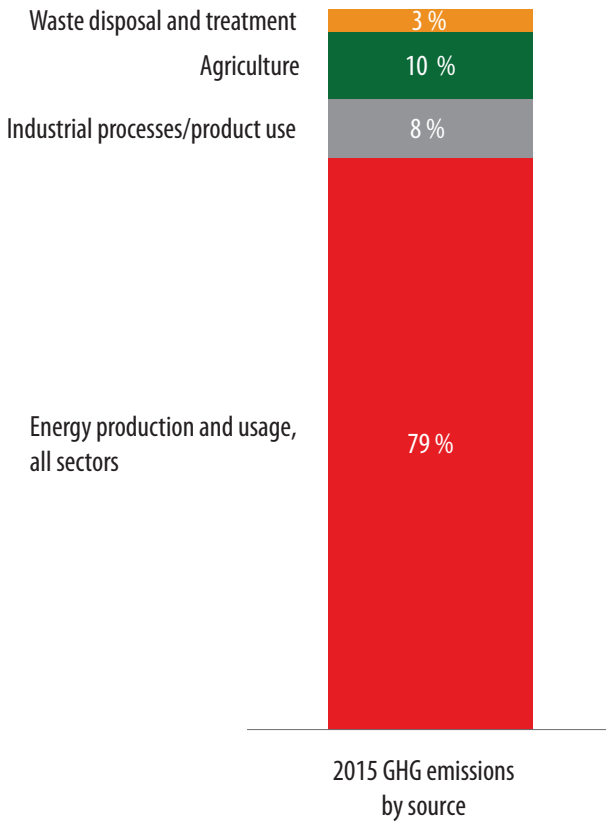
The EU and energy and climate change

In 2016, the warmest year on record, the world was on average **1.1 °C warmer** than in the pre-industrial period. Climate change and its causes are no longer subject to serious scientific dispute. According to the Intergovernmental Panel on Climate Change, human influence on the climate system is clear and is evident from the increasing greenhouse gas concentrations in the atmosphere and the warming observed.

Energy and climate change are closely interlinked. In the EU, **energy production** — mainly from the transformation and combustion of fossil fuels — and **energy use** — for example by industry, households and transport — account for **79 % of EU greenhouse gas emissions**.

As a result, effective action on energy production and its use is essential to tackle climate change. **Energy and climate change raise many issues which are best dealt with by states working together.** As a result, they are high on the EU's agenda.

2015 EU greenhouse gas emissions by source

Waste disposal and treatment | 3 %
Agriculture | 10 %
Industrial processes/product use | 8 %

Energy production and usage, all sectors | 79 %

2015 GHG emissions
by source

Source: European Environment Agency, EEA greenhouse gas — data viewer, 2017.

Aim and approach of this landscape review 4

This landscape review of EU Energy and Climate change aims to:

o provide an **overview of what the EU is doing in this field**;

o **summarise key audit work** the European Court of Auditors (ECA) and national Supreme Audit Institutions (SAIs) in the EU have done to date; and

o **identify main challenges** to inform the legislative debate and future audit work.

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Approach

Documentary analysis of:

- EU directives, regulations, decisions, strategies, impact assessments, evaluations and studies
- Relevant EU case law
- Published academic research

Interviews:

- 21 Commission's Directorate Generals
- European Environment Agency
- Organisation for Economic Co-operation and Development (OECD)
- Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC)
- Information visits to:
  - Germany
  - Poland
  - Spain

- Collection of more than **650 Supreme Audit Institutions (SAI) performance audit reports** dealing with energy, climate policy and investments related to mitigation and adaptation
- Selection of **269 most relevant reports for in-depth reading**, published between January 2012 and March 2017

- Survey of EU SAIs about what they have audited and on the challenges they face
- Seminar with EU SAIs on auditing Energy and Climate

Energy and climate change: what the EU is doing

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The EU sets a policy framework in both energy and climate change. Certain areas, such as the choice of the energy mix, remain within the competence of Member States. Internationally, the EU and its Member States have played a leading role in international climate agreements, such as the 2015 Paris Agreement.

In the **energy** field, an important part of EU action is the establishment of an internal energy market to allow the free flow and borderless trade of gas and electricity across the EU. The internal energy market aims to deliver in a cost-effective way the EU's energy policy objectives of delivering affordable, competitively priced, sustainable and secure energy.
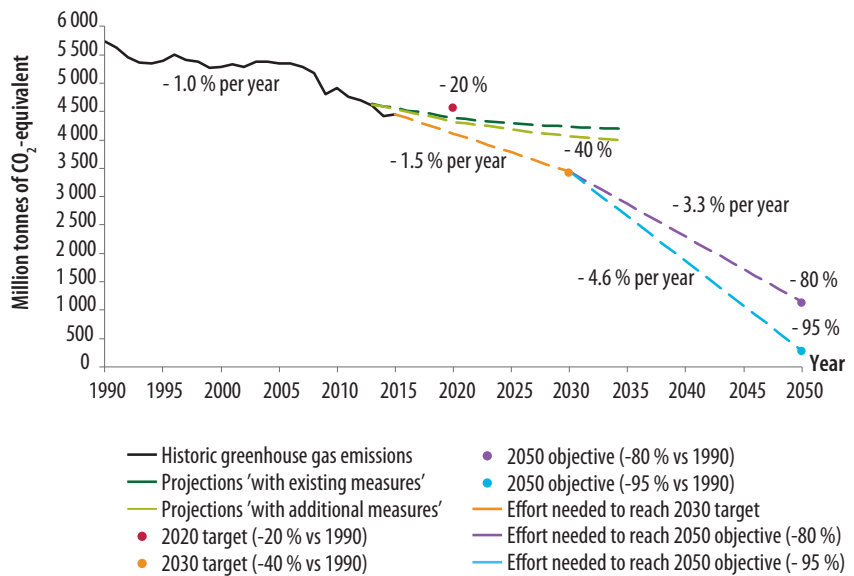
The framework strategy for a Resilient Energy Union
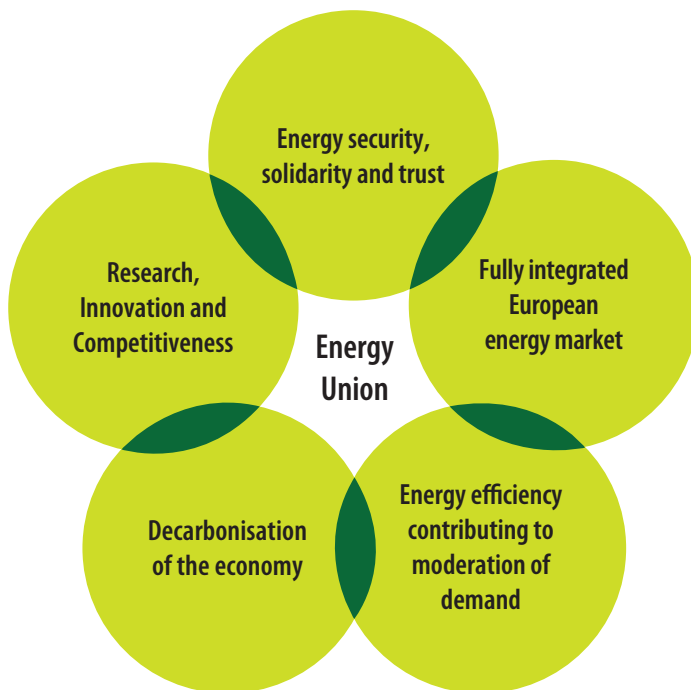
Source: European Commission, Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy, COM(2015) 80 final of 25.2.2015.

Mitigation of climate change   8

On **climate change**, most EU actions focus on **mitigation** by reducing greenhouse gas emissions.

The EU has set itself targets and objectives for 2020 and 2030 to reduce greenhouse gas emissions, increase the share of renewable energy in energy consumption and make gains in energy efficiency. By 2050, the EU intends to reduce EU greenhouse gas emissions by between 80 % and 95 % compared to 1990 levels.

The EU's 2030 and 2050 emissions reduction targets and objectives will not be achieved without significant additional efforts. To achieve the 2030 targets, annual emission reduction efforts will need to increase by half in the next decade. The most significant change, though, will be required beyond 2030, when the emission reduction rate will need to outpace historic levels by three to four times in order to achieve the 2050 objective.

EU greenhouse gas emission trends, projections and reduction targets

Legend:

- Historic greenhouse gas emissions
- Projections 'with existing measures'
- Projections 'with additional measures'
- 2020 target (-20 % vs 1990)
- 2030 target (-40 % vs 1990)
- 2050 objective (-80 % vs 1990)
- 2050 objective (-95 % vs 1990)
- Effort needed to reach 2030 target
- Effort needed to reach 2050 objective (-80 %)
- Effort needed to reach 2050 objective (- 95 %)

Chart labels: Million tonnes of CO_2-equivalent; – 1.0 % per year; – 20 %; – 40 %; – 1.5 % per year; – 3.3 % per year; – 4.6 % per year; – 80 %; – 95 %; Year

Source: European Environmental Agency, Trends and projections in Europe 2016 — Tracking progress towards Europe's climate and energy targets, 2016.

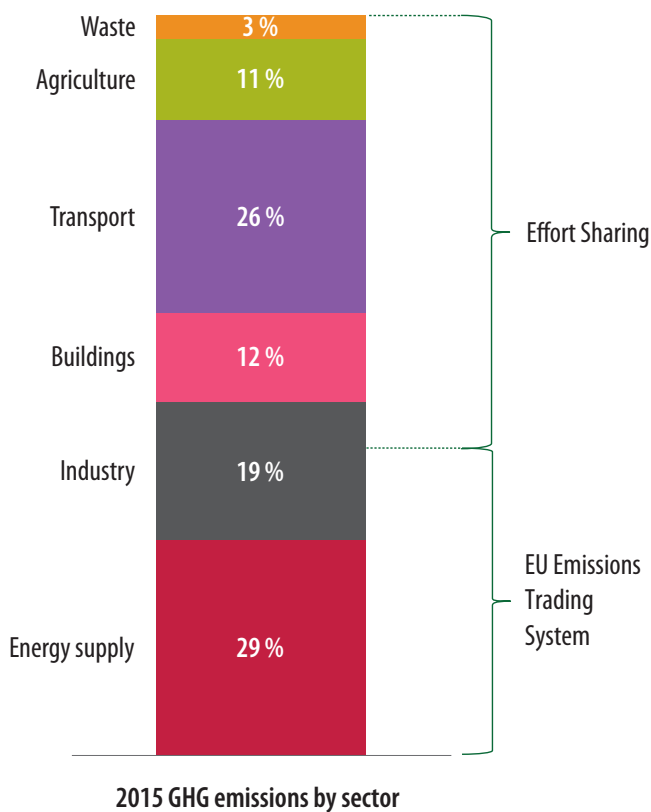# Mitigation of climate change   **10**

All economic sectors will need to contribute to achieving the targeted reductions in the EU's greenhouse gas emissions.

With the **EU Emissions Trading System (EU ETS)**, the EU has set a limit on overall emissions from some sectors of energy supply, energy-intensive industries and intra-EEA flights, and created a marketplace for emissions quotas, thereby 'putting a price' on carbon.

For the other sectors, the '**effort-sharing**' approach has been to cut emissions by means of emissions reduction targets set for each Member State. Member States are individually responsible for defining and implementing national policies and measures to achieve those targets.

These approaches are accompanied by both EU and national measures to increase renewable energy and energy efficiency.

2015 EU greenhouse gas emissions by sector

Sector	%
Waste	3 %
Agriculture	11 %
Transport	26 %
Buildings	12 %
Industry	19 %
Energy supply	29 %

Effort Sharing

EU Emissions Trading System

2015 GHG emissions by sector

Source: European Environment Agency, EEA greenhouse gas — data viewer, 2017.

Adaptation to climate change   **12**

Even if efforts to cut greenhouse gas emissions are successful and the objective of the Paris Agreement — keeping the global temperature rise since the pre-industrial era below 2 °C — is achieved, **adaptation to a changing climate** is necessary. Climate change already impacts the environment, society and the economy, with warming currently just over 1 °C compared to the pre-industrial period.

Europe's climate will be significantly different under a full 2°C temperature increase. The 2°C increase scenario is a global average: even if it is achieved, temperatures will increase by far more than 2°C in certain regions. By 2071 to 2100, winter **temperatures** could increase by an average of 5 to 8°C in some parts of Scandinavia, compared with 1961 to 1990 temperatures. In the summer, temperatures could increase by an average of 3 to 4°C in most of Spain and in northern Scandinavia.

Seasonal temperature change, in °C, for 2071-2100, compared with 1961-1990
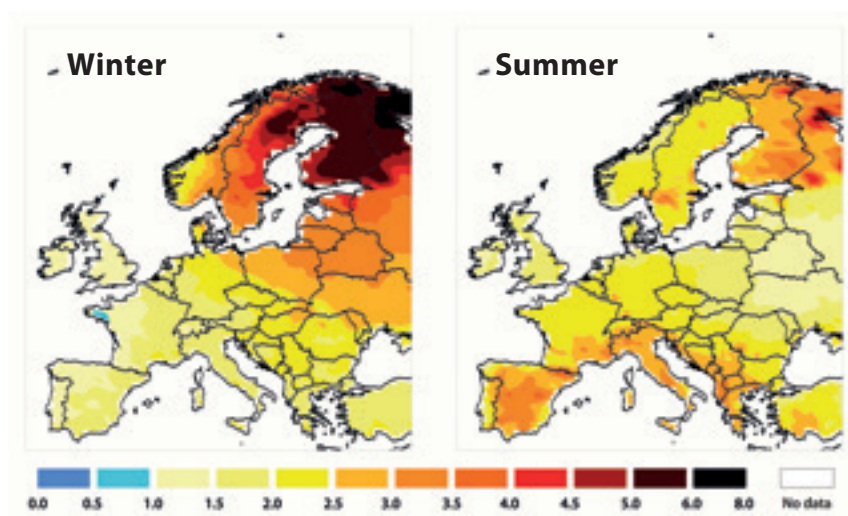
(2 °C global increase scenario)

Source: Adapted from Climate impacts in Europe, the JRC PESETA II project, 2014. Data from Dosio and Paruolo 2011 and Dosio et al. 2012.

Adaptation to climate change

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Even assuming that an average increase of no more than 2°C from the pre-industrial era is achieved, changes in **rain and snow patterns** could also be significant. By 2071 to 2100, winter precipitation could increase by more than 25% in some parts of central Europe and Scandinavia, compared with 1961 to 1990. Summer precipitation levels could decrease by more than 50% on much of the EU's Mediterranean coast.

Some impacts of climate change transcend the borders of individual Member States — a river basin flooded as a result of climate change, for example, could encompass the territory of more than one country.

The basis for EU action in the area of adaptation is the 2013 EU adaptation strategy, which encourages Member States to take action but does not make it mandatory. Adaptation is also addressed, to varying extents, in EU sectoral legislation.

Change in seasonal precipitation, in %, for 2071-2100, compared with 1961-1990
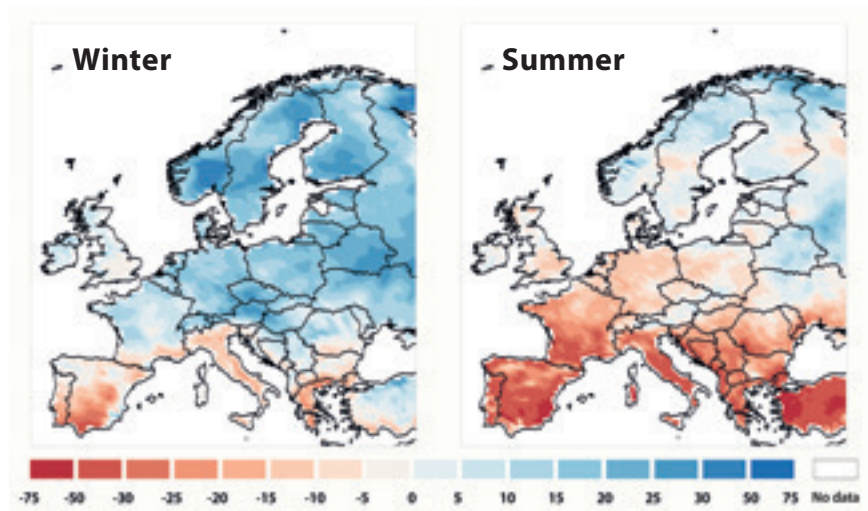
(2 °C global increase scenario)

Source: Adapted from Climate impacts in Europe, the JRC PESETA II project, 2014. Data from Dosio and Paruolo 2011 and Dosio et al. 2012.

What the ECA and SAIs are doing

The ECA and national SAIs in the EU, here collectively referred to as the EU SAIs, have in recent years audited a **wide field of different topics on energy and climate change**.

Audits on **energy** have made up the largest share of reports. Audits have found that differences in the way Member States have implemented EU legislation and administered their energy markets have held back progress towards completing the EU's internal energy market.

Notwithstanding the growth in renewables and the decline in their costs globally, audits have found a lack of cost-effectiveness and obstacles to investments. Cost-effectiveness issues have also been regularly identified in energy efficiency audits. In the field of nuclear energy, EU SAIs have found significant cost increases and delays.
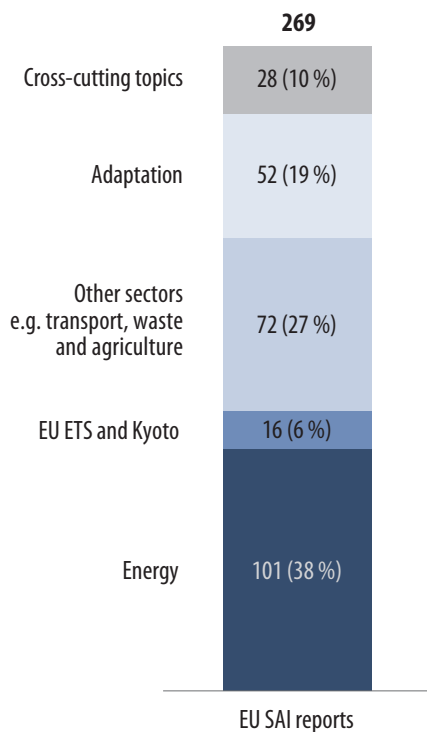
Audits have also shown that the shift to low-carbon transport modes is not taking place to a sufficient degree.

In the area of **adaptation**, audits have focused mainly on floods. Here, auditors found issues in flood prevention, protection and response.

Some areas of energy and climate have, so far, received **less audit coverage**:

o   adaptation;
o   EU and national greenhouse gas inventories;
o   the third phase of the EU Emissions Trading System;
o   emissions from road transport; and
o   emissions from agriculture.

EU SAIs audit reports about energy and climate change

269

Cross-cutting topics	28 (10 %)
Adaptation	52 (19 %)
Other sectors e.g. transport, waste and agriculture	72 (27 %)
EU ETS and Kyoto	16 (6 %)
Energy	101 (38 %)

EU SAI reports

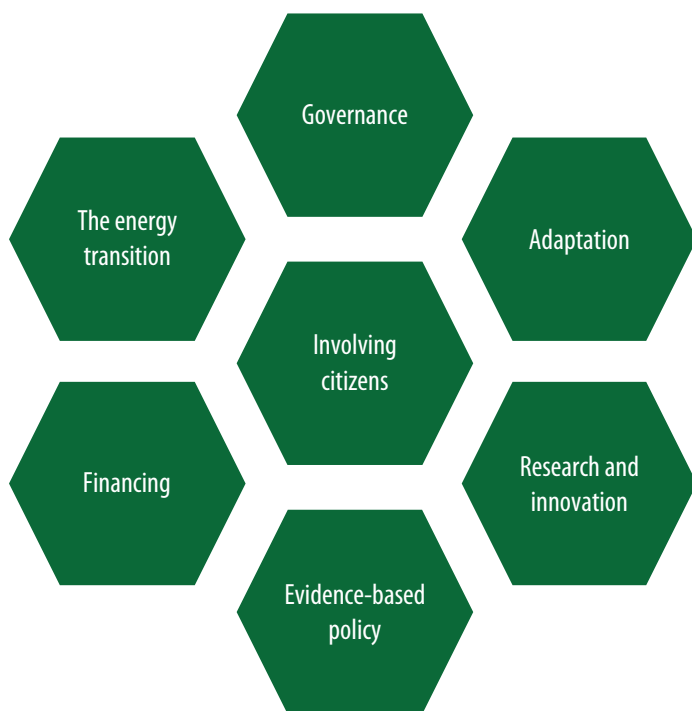*Source:* EU SAI reports (January 2012 - March 2017).

Main challenges

This landscape review identifies seven areas of main challenges to provide context for the current consideration of the major transformations underway, to stimulate debate among stakeholders, and to identify potential opportunities and risks for audit in the future.

1. Energy and climate change governance

Energy and climate change need to be addressed together. In addition, choices in one Member State can affect the situation in other Member States and the achievement of overall EU targets. Effective governance systems are needed in the EU to manage and monitor energy and climate measures, to reduce risks, to avoid overlaps and to ensure progress, while finding cost-effective solutions.

Public audits can play an important role in ensuring public accountability on the achievement of governmental targets and commitments, and in maintaining citizens' trust in their governments and in the EU. However, the EU Supreme Audit Institutions' roles have, to date, been limited with regard to auditing some important energy and climate governance systems and monitoring processes, such as greenhouse gases inventories.

Seven main areas of energy and climate challenges

Governance

The energy transition

Adaptation

Involving citizens

Financing

Research and innovation

Evidence-based policy

Main challenges

2. Evidence-based policy

Good data, analysis and models remain important tools for assessing energy and climate policy options, and will be needed for the integrated national energy and climate plans that Member States would have to prepare in the framework of the proposed Regulation of the Governance of the Energy Union.

3. The energy transition

Profound changes are still needed in the electricity system to deal with challenges such as the variability of energy production from intermittent renewable sources, storage, decentralised energy production and more dynamic demand management. Energy infrastructure within and between Member States is not yet fully designed for integrated markets.

Infrastructure investments will need to be based on a **long-term understanding of their climate and other impacts**. New or existing high-carbon assets may need to be shut down earlier than anticipated, requiring social adjustments.

Similarly, **the transport sector will have to undergo changes in energy use**, switching to less carbon-intensive transport modes, using alternative fuels, such as electricity.

4. **Using research and innovation effectively**

Achieving longer-term energy and climate targets will require **new technologies to be developed**. It often takes years for a new technology to become usable on an industrial scale. Extensive progress in developing the technologies needed to reduce emissions between 2030 and 2050 will have to be made in the next decade.

5. **Planning for and tackling adaptation**

The effects of climate change are already being experienced. Climate change will affect EU citizens in many ways. It will be a great challenge for the EU and Member States **correctly to anticipate and plan adaptation**, reducing the need to act late, in response to events, which would cost more.

Main challenges

6. Financing

The **1 115 billion euro investment in climate change mitigation** needed annually in the period 2020-2030 will have to come from public and private sources. A more robust carbon price would also be a powerful tool to stimulate more private investment.

The **costs of adapting to climate change** are difficult to predict, even more so the likely benefits of adaptation investments. Adaptation requires long-term planning and decisions about major infrastructure. Public funding may need to be mobilised on a large scale to overcome market failures. But private-sector companies should also invest substantially in adaptation.

In the energy sector, **decommissioning nuclear power plants** and disposing of nuclear waste is a pressing and costly challenge for the EU and its Member States. However, it also provides many opportunities for business and employment.

7. Involving EU citizens

The **integration of the citizen in the energy transition** is now seen as essential, both for understanding, changing behaviours and paying for necessary transitions.

ECA team

From left to right: Tomasz Plebanowicz, Vivi Niemenmaa, Gareth Roberts, Katharina Bryan, Marco Bridgford, Olivier Prigent, Mushfiqur Chowdhury, Emese Fesus, Joao Nuno Coelho Dos Santos, Bertrand Tanguy, Phil Wynn Owen, Armando Do Jogo.

Other staff who worked on the task included Robert Markus, Paul Toulet-Morlanne, Balazs Kaszap, Ingrid Ciabatti, Tomasz Kapera and Ide Ni Riagain.
Richard Moore assisted with drafting the report.

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