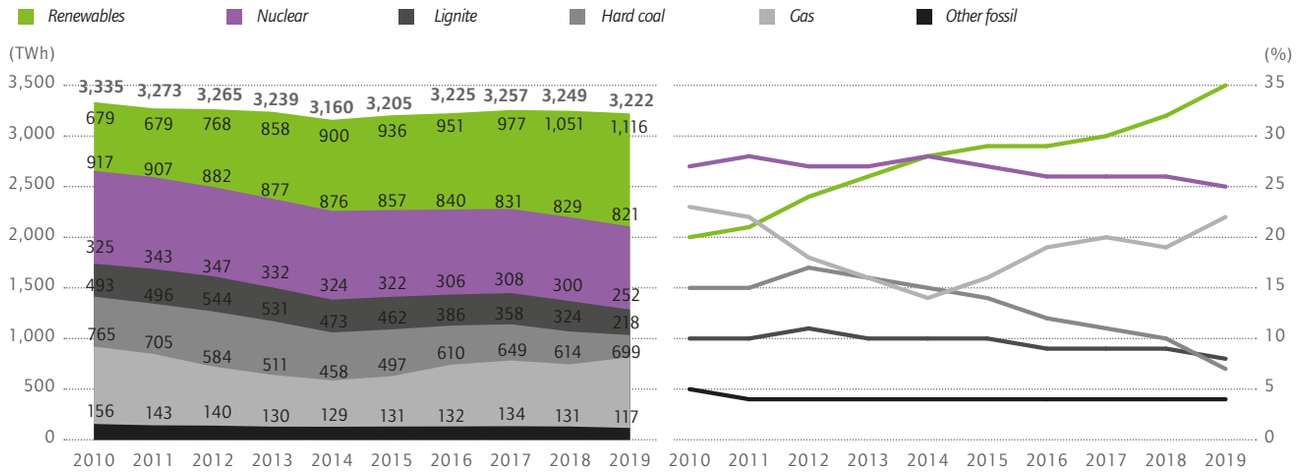
# Energy transformation

## A shifting energy mix

**Figure 3.5** Electricity generation by fuel type and changes in composition (2010-2018), EU-28 terawatt hours (TWh)




*Source: Eurostat; Agora Energiewende and Sandbag (2019).*
*Note: right hand scale indicates the composition in percent*

**34.6%**
**Share of renewables in total EU electricity mix (2019)**

As shown in section two, the two major factors in reducing GHG emissions have been a reduction in energy intensity of GDP and a reduction in the carbon intensity of energy generation. This section now shows how this worked with electricity generation at EU level over the last decade. While between 2010 and 2019 GDP grew by 14.8% in the EU28, electricity generation fell by 3.5%. However, it was the decarbonisation of energy generation, principally through changes in the composition of electricity generation, that played the biggest role in the reduction of emissions in the last decade, as shown in Figure 3.6. In 2019, renewables provided 34.6% of total electricity in the EU28, followed by nuclear energy (25.5%), gas (21.6%) and coal (14.5%) (Agora Energiewende and Sandbag 2020).

On the basis of the period 2010-2019, the contribution of coal to electricity generation in the EU is on the retreat, as its share fell from 24.5% in 2010 to 14.5% in 2019. The decrease for hard coal was much more radical (from 14.8% to 6.7%) than for lignite (from 9.7% to 7.8%). Figure 3.6 also reveals that the retreat of coal has not been consistent over the decade: until 2015 coal stubbornly kept its share in electricity generation. From 2016, however, its shrinkage gathered pace, peaking in 2019 (in one year, hard coal fell by one third and lignite by 16%).

### 2019: a bigger reduction in coal than during the entire previous decade

At the same time, the share of renewable sources of energy generation in electricity grew from 20.3% in 2010 to 34.6% in 2019.

## Phasing out coal

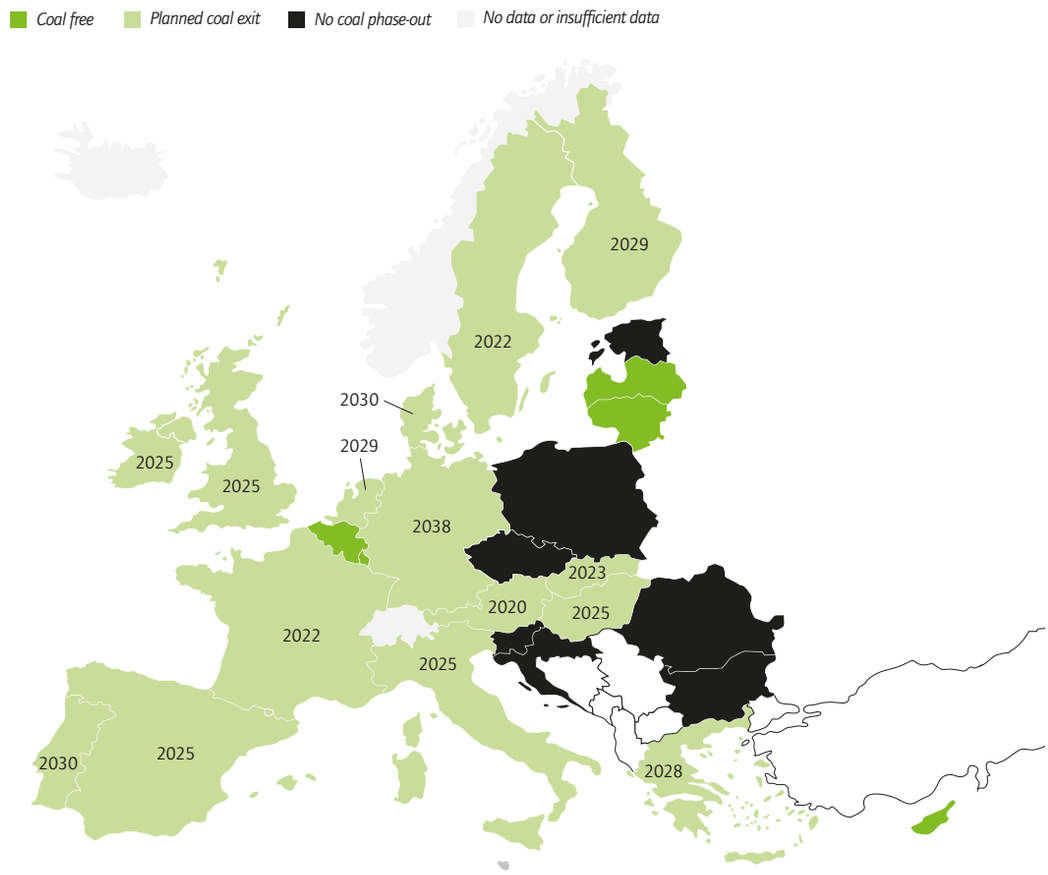
### The phase-out of coal in energy generation is gaining momentum throughout Europe

Figure 3.6 shows that the phase-out of coal in energy generation is gaining momentum throughout Europe. The majority of EU Member States have set up a plan with a deadline by which they are to become coal-free. Phasing out coal in energy generation is an explicit policy target for most Member States.

All EU15 Member States other than Germany are planning to phase out coal by 2030 at the latest, with Germany announcing a later deadline of 2038. These 'phase-out countries' have been responsible for almost all of the fall in hard coal generation in the last decade. While western Europe is thus on course to phase out coal, for the new Member States in central and eastern Europe the picture is more mixed. Latvia and Lithuania are currently coal-free, and Hungary and Slovakia are to phase out coal by 2025 and 2030, respectively. However, negotiations about a possible phase-out out have only just started in Czechia, and although Poland took an important first step in September 2020 with an agreement to phase out coal mining by 2049 (Euractiv 2020), a phase-out of coal in energy generation is not currently on the agenda. Meanwhile, Bulgaria, Croatia, Romania and Slovenia have held no negotiations nor made any decision about phasing out coal. Finally, although Estonia does not have coal in its energy mix, the majority of its energy demand is covered by oil shale, a more polluting solid fuel than coal, without any phase-out plan.

**Figure 3.6** The status of coal phase-outs in the EU (as of June 2020)

**2030**
**target year for coal phase-out in western Europe (excluding Germany)**




*Source: Europe Beyond Coal (2020), national sources.*
*Note: Belgium, Cyprus, Latvia, Lithuania, Luxembourg and Malta are coal free; Estonia does not have a coal plant, but uses shale oil, an even more polluting solid fossil fuel. without a phase-out plan*

## Trade unions and the coal phase-out

The role of unions in the coal sector in various countries can be regarded as defensive, from defending the status quo of coal-based economies (for instance, in Poland and at plant level in France) to pleading for lengthier transition processes (for instance, in Germany).

The main objective of trade unions in the Polish coal sector is to defend the status of coal in Poland and vehemently oppose any phase-out initiative (Szpor 2019).

In Germany, the IG BCE union (for mining, chemicals and energy) has pursued a balancing act, arguing for an as-late-as-possible coal phase-out strategy that incorporates 'proper framework conditions', including an active industrial policy and job security (Borgnäs 2019). There have been repeated clashes between members of the IG BCE and environmental activists of the Ende Gelände movement who occupied the Hambach Forest and an open-cast mine in Rhineland (Bergfeld 2019). The IG BCE's general secretary, Michael Vassiliades, insisted on the need to put jobs first and environmental issues second.

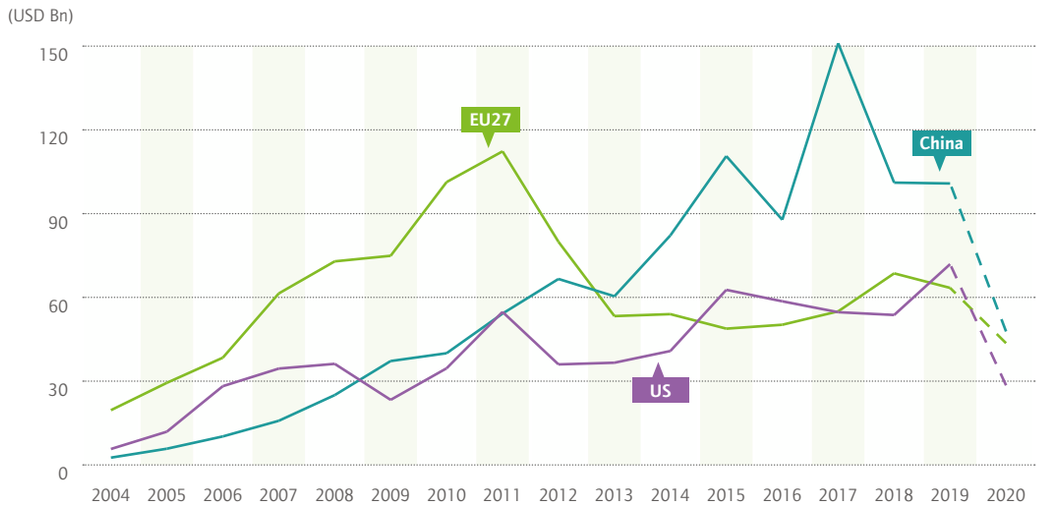
In France, the coal sector is limited to four coal-fired power plants with less than a thousand direct employees between them. After the declaration of the government in 2018 to close them down by 2022, demonstrations were held by the Confédération Générale du Travail (CGT) union and all four plants began a strike action that has continued in repeated waves ever since (Jakubowski 2019). The CGT and Force Ouvrière (FO) unions argue that the government should withdraw the closure project, given the low share the plants have in France's $CO_2$ emissions and their role in maintaining energy security. Both organisations have also denounced the high social costs of the closure, which could lead to up to 5,000 job losses. The third main union, the Confédération Française Démocratique du Travail (CFDT), has taken a more nuanced approach to the transition, supporting the decarbonisation of the energy sector but denouncing the lack of transparency concerning the future of the plants. It is clear that without strong and transparent commitments to future investments that guarantee both a just transition and sustainable and long-term employment alternatives, unions will continue to view with scepticism any decarbonisation efforts that threaten, in the short or long term, the livelihoods of their members and of the communities they represent.

## Clean energy investments

The other important aspect of the energy transformation is to invest in renewable sources of energy generation and to deploy new capacities on a massive scale. This has been a declared objective of the European Commission, from the Energy Union Strategy in 2015, and the Juncker Commission's Investment Plan, to the most recent initiative of

*At its peak, in 2011, the EU outperformed China and the US combined. In 2015 and 2017, it was China that achieved more clean energy investments than the EU and the US combined."*

**Figure 3.7** New investments in renewable energy (USD billion)




the European Green Deal (see also Laurent 2020). Looking back over Europe's performance in the last decade, however, its record is rather mixed, in particular when put into international comparison with the US and China.

Europe is losing its position as a climate policy world leader, and the changing levels of clean energy investment provide an evident example of this.

**50%**
**growth in clean energy investments in the EU, despite the Covid-19 crisis (first half of 2020)**

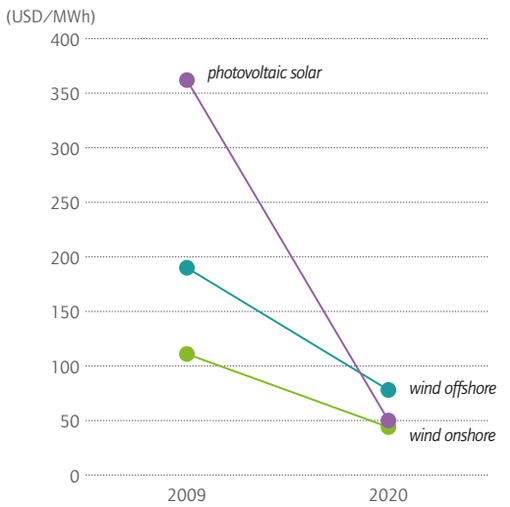
Based on Bloomberg New Energy Finance (BNEF 2020a) data, Figure 3.7 shows that in the period between 2004 and 2011, the EU had been the unquestionable leader in this field, with a spectacular increase in investments. At its peak, in 2011, the EU outperformed China and the US combined. Then an equally spectacular collapse led to a low point in 2015, when clean energy investments in Europe were just over 40% of the 2011 investment peak. In 2015 and 2017, it was China that achieved more clean energy investments than the EU and the US combined, and even if the EU afterwards gained back some ground, in 2019 both the US and China invested more in clean energy than Europe. According to the latest data, the first half of 2020 looks promising as, in the face of the Covid-19 crisis, clean energy investments in the EU grew by almost 50% when compared to the first half of 2019, and were just slightly behind China. Nevertheless, the EU has clearly lost some ground in recent years, and will need to be more ambitious in the future.

## Rapidly falling cost of renewables starts to outprice coal

**86%**
**in 2020 1kWh of solar energy cheaper than in 2009**

The shift in the energy mix is showing an accelerating trend, thanks in part to economy-of-scale developments, with the unit price of solar and wind energy generation falling rapidly and thus making fossil fuel-based energy generation less and less competitive. According to BNEF data (2020b), following a 9% drop in the price of onshore wind and a 4% drop for solar generation after the second half of 2019, by early 2020 these had become the cheapest sources of new-build generation for at least two thirds of the global population (living in locations that comprise 71% of GDP and 85% of global energy generation). Figure 3.8 shows that the global electricity benchmark price for one kilowatt hour (kWh) of solar energy in 2020 was 86% lower than in 2009. For onshore and offshore wind, the fall in prices was less spectacular but still around 60% (BNEF 2020b).

**Figure 3.8** Global electricity benchmark prices for renewables (USD/megawatt hour)




*Source: BNEF 2020, https://about.bnef.com/blog/scale-up-of-solar- and-wind-puts-existing-coal-gas-at-risk/.*

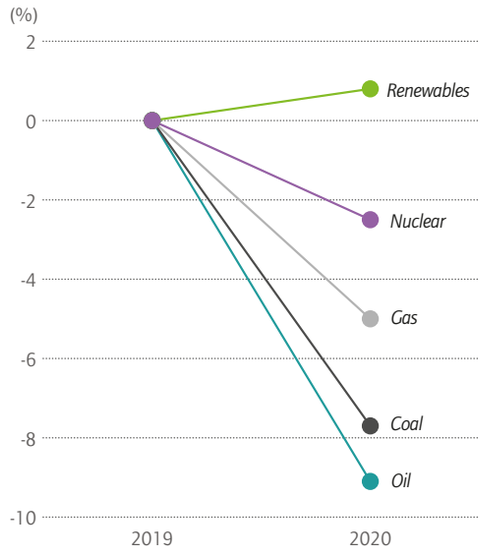
**In 2020**

**solar and wind**

**power**

*are the cheapest sources of energy*

**Figure 3.9** Projected change in global primary energy demand in 2020 relative to 2019, by fuel (%)




*Source IEA 2020 https://www.iea.org/data-and-statistics/charts/projectedchange- in-primary-energy-demand-by-fuel-in-2020-relative-to-2019.*

## Energy shifts in the time of a pandemic

Recent global developments show that the era of fossil fuel is in rapid decline. Global projections by the International Energy Agency for 2020 estimate that the Covid-19 crisis is likely to accelerate the already ongoing energy shift away from fossil fuel towards renewables. Figure 3.9 shows the latest energy demand forecast with regard to its composition by source of energy. While global energy demand is likely to fall by 6.1% in 2020, it is only renewables that are expected to grow slightly (by 0.8%), while demand for oil is likely to fall by 9.1%, for coal by 7.7% and even for gas by 5%.

## The social side of energy transformation: energy poverty in Europe

When it comes to the social aspects of the energy transformation, energy poverty is an important indicator. As most European countries have no official definition for the term 'energy poverty', this state is often described as the 'inability to keep homes adequately warm'. The EU SILC (Statistics on Income and Living Conditions) survey thus uses energy poverty as an indicator of material deprivation that expresses the share of population that is unable to keep its home adequately warm. Figure 3.10a shows energy poverty for the total population in EU Member States for the years 2005, 2012 and 2019.

The main trend in Europe has been a gradual reduction in energy poverty (Figure 3.10b), as the share of the total population affected slightly declined between 2005 and 2019, with an interim increase in the early 2010 years. New CEE Member States have a difficult legacy to confront, however: over a third of their populations often experienced energy poverty in 2005 (with an almost 70% peak in Bulgaria). For most of these countries, the situation has improved markedly in the past 14 years, as in 2019 Czechia, Estonia, Hungary and Poland all had lower levels than the 7.6% EU average. However, Bulgaria and Lithuania still had alarmingly high values (30.1% and 26.7%, respectively). Southern European countries form the other risk group: Italy, Greece, Portugal and Cyprus were particularly affected by energy poverty, with 2019 values ranging between 14.1% and 21%. Although there is no link between energy poverty and the speed and depth of energy transformation, vulnerable groups need particular attention when national climate and energy plans are being set up.

**Figure 3.10a** Energy poverty in the EU in % of total population

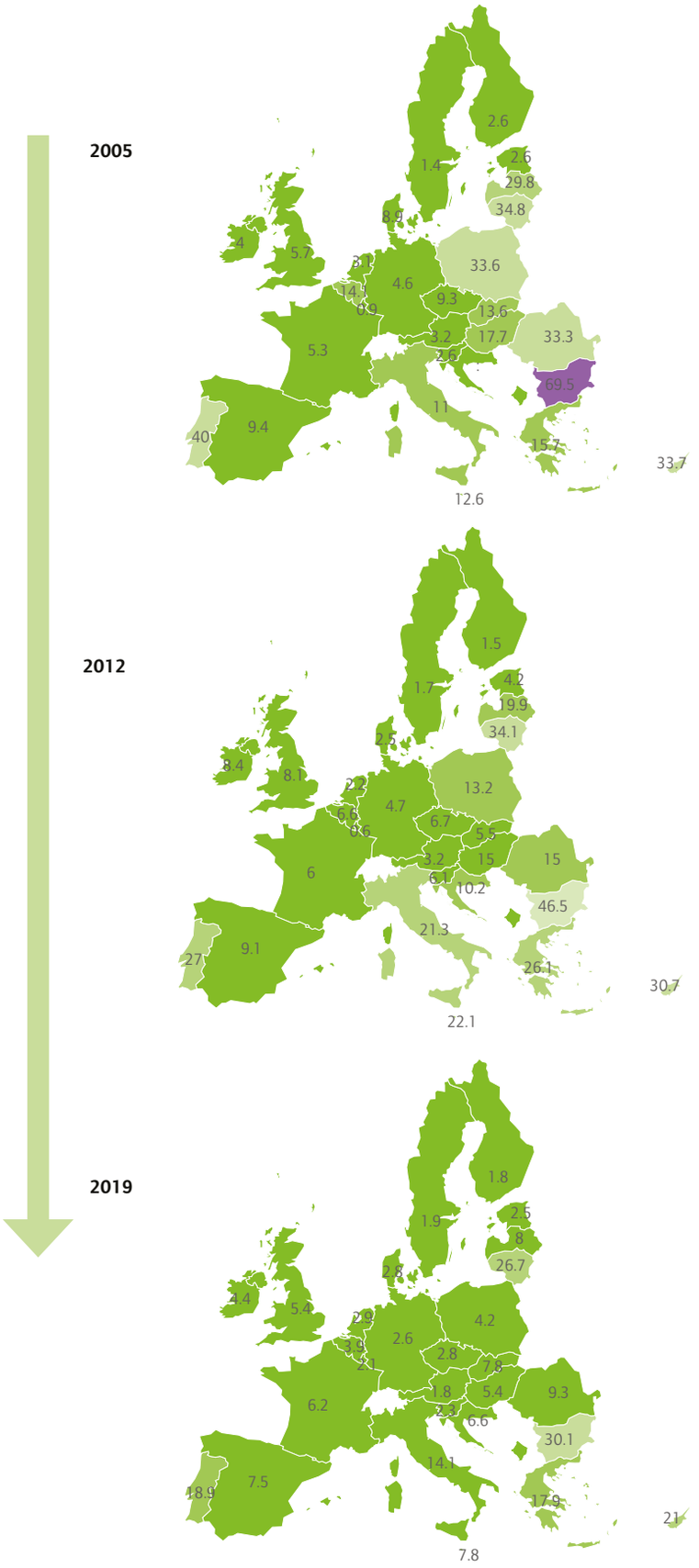
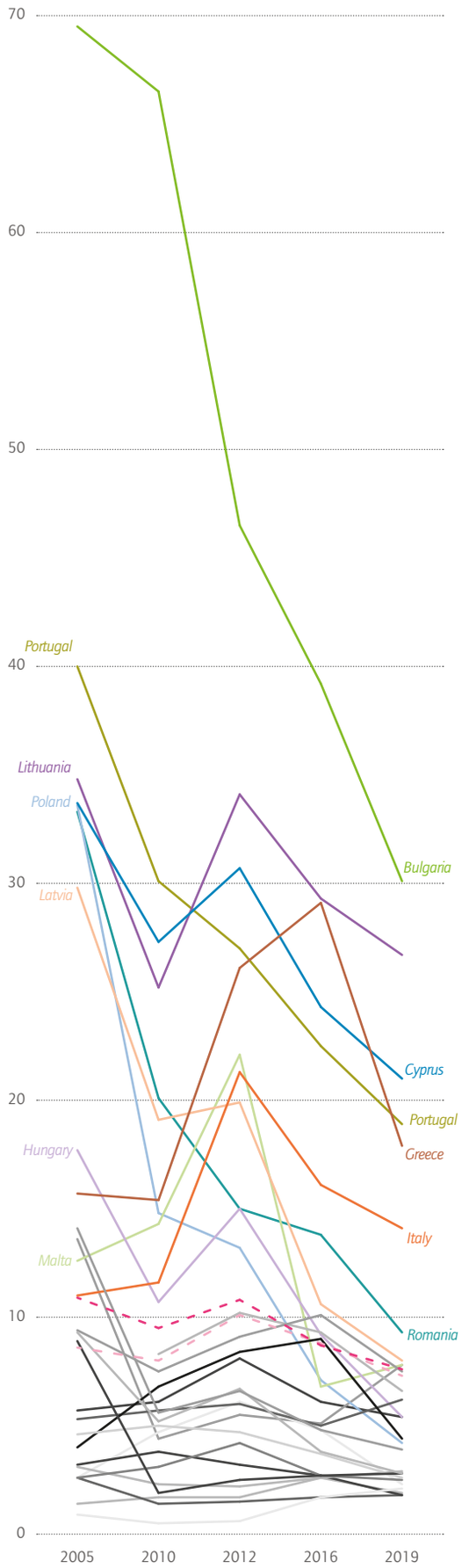



**Figure 3.10b** Change in energy poverty by Member State (2005-2018)




*Source: EU SILC, 2020.*
*Note: Energy poverty defined as share of respondents claiming inability to keep home adequately warm.*
*For Italy, Ireland, Luxembourg, the UK, the EU and EA 2019=2018.*