

# The Impact of COVID-19 Restrictions on Electricity Demand: Evidence from Two Jurisdictions

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Covid-19 has radically changed lives across the globe over a very short period of time. Extensive quarantine measures imposed by governments have resulted in households spending considerably more time at home and many businesses reducing or ceasing operations. This short article explores the impact of COVID-19 restrictions on electricity demand levels across two separate but related jurisdictions, the Republic of Ireland (IE) and Northern Ireland (NI). This is an interesting case study as, while both areas are geographically located on the same island and are part of the same electricity market, they have separate governments and imposed COVID-19 restrictions at different times. Furthermore, at the time of writing (April 14th), mortality rates are identical across

jurisdictions (74 deaths per million citizens) and both are generally showing declines in rates of daily increase.

In the Republic of Ireland (IE), the first confirmed case of COVID-19 was on February 29th 2020. In the subsequent two weeks, a small number of new cases emerged and some large businesses (for example Google) voluntarily requested that their staff work from home. On March 12th, The Taoiseach (Irish Prime Minister) announced the closure of all educational and childcare

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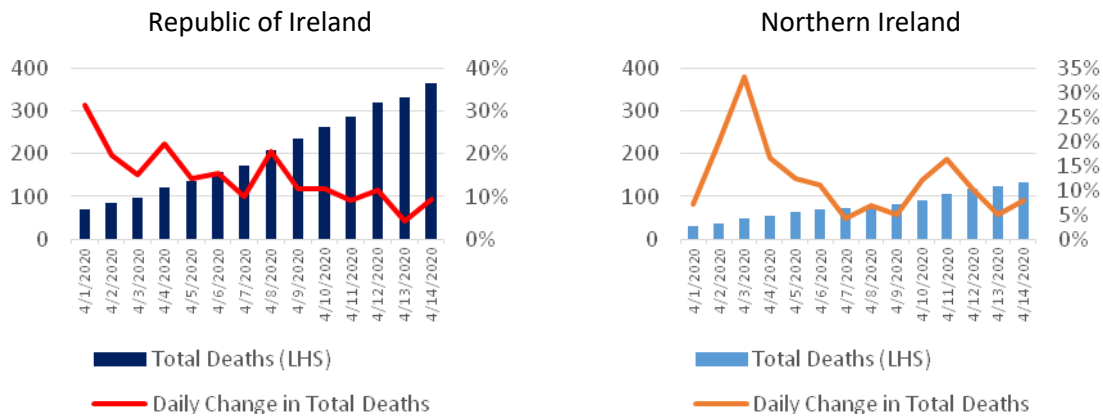


Figure 1: COVID-19 Cumulative Deaths and Daily Percentage Change, April 2020  
 Source: own calculations based on data from the Public Health Agency (Northern Ireland) and the European Centre for Disease Prevention and Control

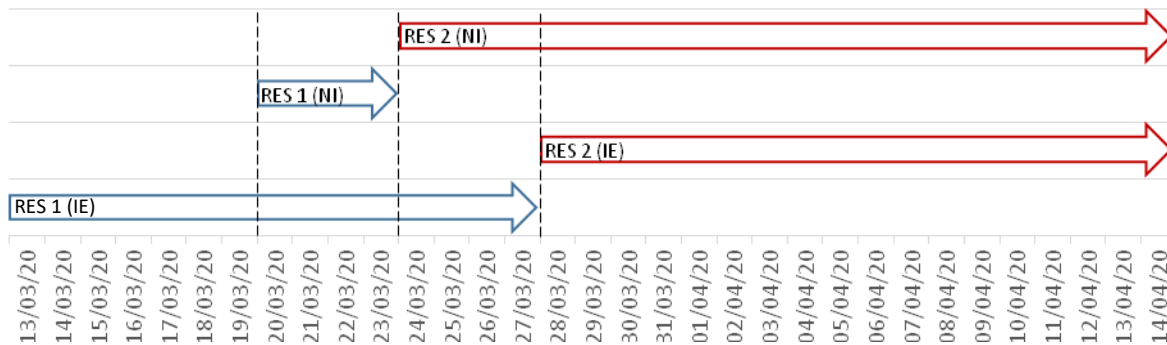


Figure 2: COVID-19 Timeline for Moderate Restrictions (RES 1) and Heavy Restrictions (RES 2) in the Republic of Ireland (IE) and Northern Ireland (NI)

Source: author's design

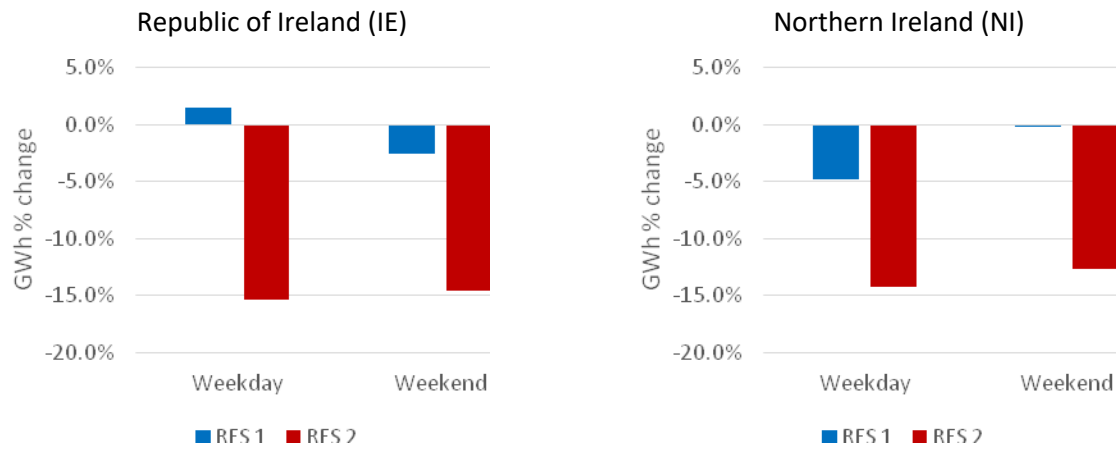


Figure 3: Reduction in Average Daily Electricity Demand (GWh) in the Republic of Ireland and Northern Ireland due to COVID-19 Restrictions

Source: created using EirGrid 15-minute interval data from April 1<sup>st</sup> 2018 to March 31<sup>st</sup> 2020

Notes: estimates are based on separate OLS regressions using daily totals from IE and NI on weekdays and weekends (includes public holidays). Baseline is the period from 1<sup>st</sup> April to the start of restrictions. Regressions control for mean temperature and also include month dummy variables to capture long-term trends. In IE, RES 1 refers to the period from March 13<sup>th</sup> to March 27<sup>th</sup> and RES 2 refers to March 28<sup>th</sup> onwards. In NI, RES 1 refers to the period from March 20<sup>th</sup> to March 23<sup>th</sup> and RES 2 refers to March 24<sup>th</sup> onwards

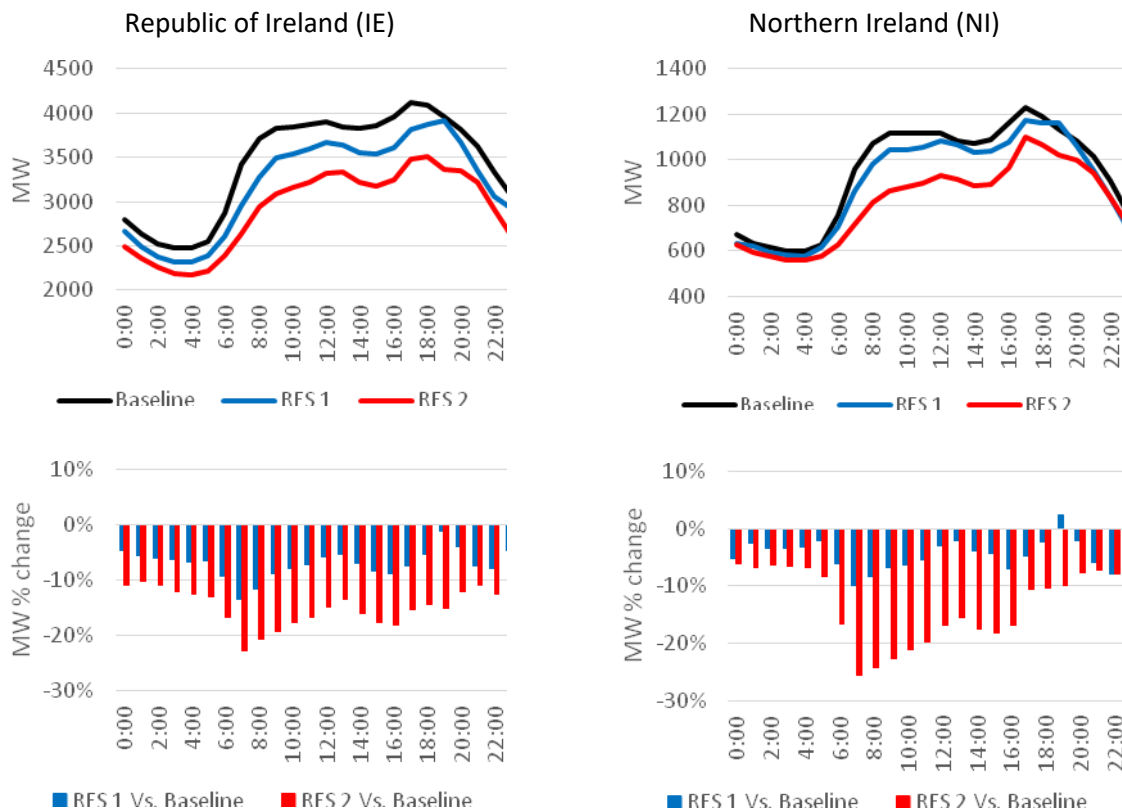


Figure 4: Average Weekday Hourly Electricity Demand (MW) in the Republic of Ireland and Northern Ireland, Pre- and Post-Movement Restrictions

Source: Created using EirGrid 15-minute interval data from April 1st 2018

Notes: estimates are based on separate OLS regressions using hourly totals from IE and NI on weekdays and weekends (includes public holidays). Baseline is the period from 1st April to the start of restrictions. Regressions control for mean temperature and also include month dummy variables to capture long-term trends. In IE, RES 1 refers to the period from March 13th to March 27th and RES 2 refers to March 28th onwards. In NI, RES 1 refers to the period from March 20th to March 23th and RES 2 refers to March 24th onwards

facilities, the cancellation of large gatherings and advised a high degree of caution with regard to international travel. In the analysis that follows, this period of moderate restrictions is labelled 'RES 1'. From March 28th, all citizens were required to stay at home in all circumstances except for essential workers travelling to work, to shop for food or medicine and for brief individual exercise within a 2km radius of home. This period of severe restrictions is labelled 'RES 2' below.

In Northern Ireland (NI), COVID-19 restrictions

on mean daily weekday and weekend (includes public holidays) electricity demand. In IE, the period of moderate restrictions (RES 1) did not lead to a decline during weekday but a slight decrease on weekends (2.5%). However, following more severe restrictions from March 24th (RES 2), average daily demand (GWh) is down about 15% on both weekdays and weekends. Similar patterns are evident in NI, with large reductions mainly during the RES 2 period – 14% on weekdays and 13% on weekends (note that RES 1 in NI only covers four days: two weekdays and two weekend days).

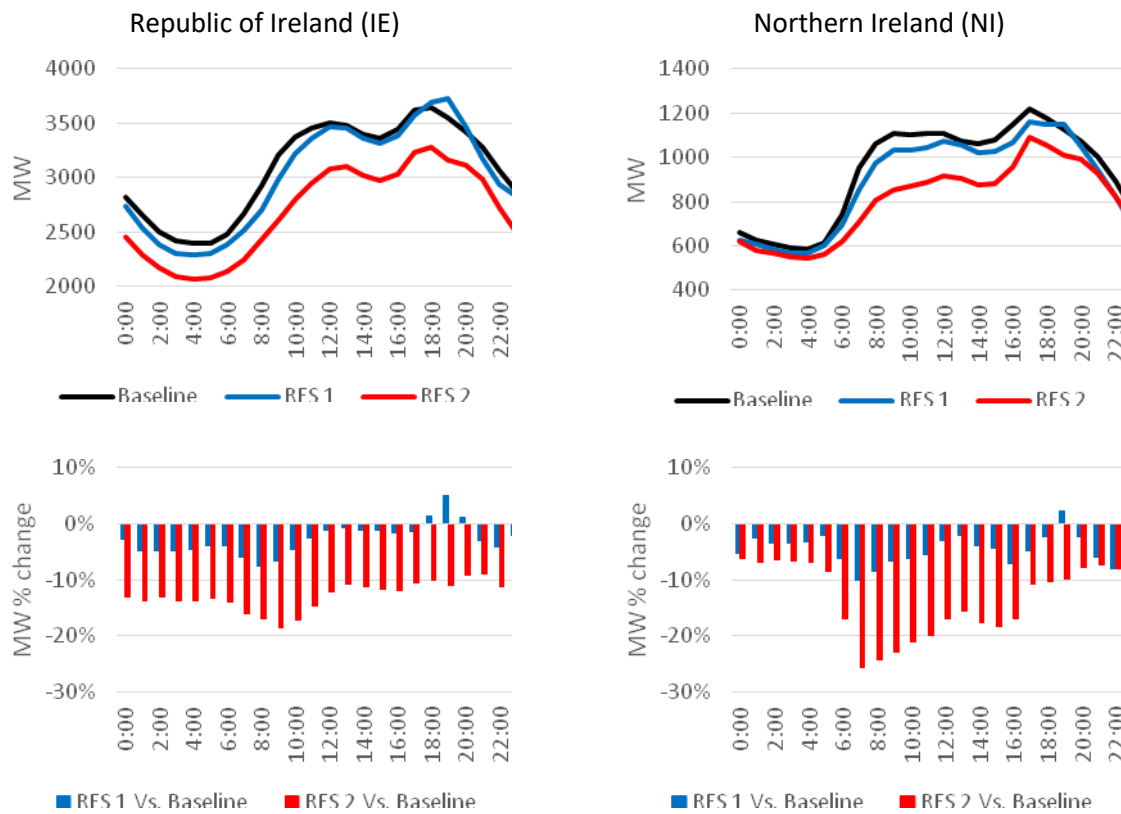


Figure 5: Average Hourly Weekend/Public Holiday Electricity Demand (MW) in the Republic of Ireland and Northern Ireland, Pre- and Post-Movement Restrictions

Source: Created using EirGrid 15-minute interval data from April 1st 2018

Notes: estimates are based on separate OLS regressions using hourly totals from IE and NI on weekdays and weekends (includes public holidays). Baseline is the period from 1st April to the start of restrictions. Regressions control for mean temperature and also include month dummy variables to capture long-term trends. In IE, RES 1 refers to the period from March 13th to March 27th and RES 2 refers to March 28th onwards. In NI, RES 1 refers to the period from March 20th to March 23rd and RES 2 refers to March 24th onwards

were initially determined by the decisions of the UK Government in Westminster. The first confirmed case of COVID-19 was on February 28th 2020 and widespread restriction measures were implemented on 20th March which included the closure of schools, bars, restaurants and other social venues (RES 1). More severe restrictions (RES 2), similar to those applied in IE, came into effect four days later, on the evening of March 23rd.

Figure 3 describes the effects of these restrictions

Figure 4 presents changes in weekday hourly demand for both jurisdictions. It should be noted that during the period of the COVID-19 restrictions the clocks also changed by +1 hour which brings with it a changed evening shape, with the evening peak being split into two 'cooking' and 'lighting up' peaks. As the evenings are much longer, domestic and street lighting aren't needed until later. Notwithstanding the clock change, COVID-19 related declines observed above were not evenly spread across the day. The largest change is observed in the morning profile, with a less

steep rise towards the morning peak. This is likely due to more people working from home and having more staggered waking times with no commute and schools being closed. This is particularly the case for RES 2, and is also more pronounced in NI. Also of note is the changed evening peak profile during RES 1 – in both jurisdictions, the evening peak lasted longer.

For weekends and public holidays (Figure 5),

different profile changes are observed across both jurisdictions. The most striking change in NI weekend consumption is the flatter demand growth during the morning and a new morning peak during both RES 1 and RES 2 periods, which is now closer to midday. As with weekdays, the shape of the evening peak has changed on weekends during RES 1, which is more prolonged and later in the day.

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