

# Cutting fuel, carbon and cost with battery power

## Trials show 84% reduction in generator diesel use

Large generators are common on construction sites where there is no mains electricity supply. This is no exception for Keepmoat, with 79% of our operational (Scope 1 and 2) carbon emissions from construction diesel use.

To address this key source of emissions and deliver on our commitment to cut emissions in line with limiting global warming to 1.5°C we are rolling out battery storage alongside our generators.

Between November 2021 and February 2022 our trials delivered fuel savings of 84%.

Our standard generator specification is 60kva – sized to deliver the maximum load for our site compounds. We compared two sites:

- a 60kva generator (our standard solution); and,
- a 60kva generator supported by a 45KW battery pack.

Because electricity is required 24 hours a day the standard generator runs continuously. Generators

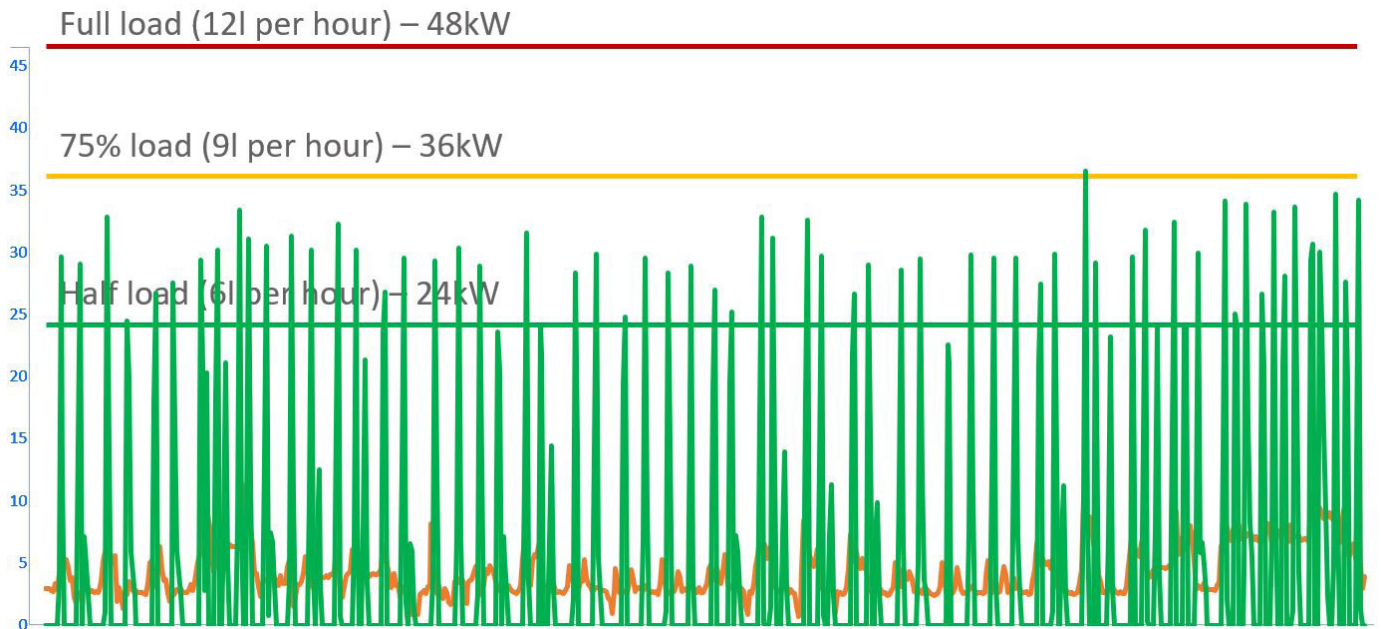
cannot fully modulate electricity output – generally running at 50%, 75% and 100% of maximum. When electricity demand does not match these output levels the additional electricity is wasted.



60KVA generator (left), 45 kW battery pack (right)

The graph below shows energy consumption during November. The grey line shows consumption, increasing over the month due to heating loads but never reaching 50% load. The difference (pink shading) between this line and the minimum fuel consumption line (half load) line is wasted output and fuel.





The chart above shows the battery trials site during November. On this site the generator runs intermittently to charge the battery pack (green peak line). The battery then supplies the compound only starting the generator when it needs to be charged.

Battery technology allows the generator to run at peak efficiency, with the entire electrical output being used to charge the battery.

### Benefits Summary

- 84% reduced fuel consumption equivalent to saving 43,000 litres of fuel annually
- Reduced annual carbon emissions of 108,000kg CO<sub>2</sub>e
- Improved local air quality for residents and workers from lower nitrogen dioxide and particulate matter
- Reduced running hours with the ability to set quiet times to prevent night time disturbance to neighbours
- The battery pack rental cost was £2,100 per month, however fuel cost savings each month far outweighed this, at current fuel prices (£1.60 per litre) savings would be £5,700 each month.

### Top tips and learnings

#### *Explain the system and controls to the site team*

We had a small number of issues with the battery pack due to a faulty component during the trial. Briefing the team ensures that if something does go wrong they understand how to manually start the generator and maintain operations until an engineer can arrive.

#### *Don't run out of fuel!*

Refueling the generator becomes much less regular due to the variable runtimes, dependent on the electrical load. Previously our Site Managers would order 1000l each week, during the trial the fuel consumption was very variable meaning on one occasion the generator ran out of fuel.

#### *Use timers and thermostats*

By optimising timers and thermostats on heaters and lighting in the offices, toilets and drying rooms we were able to ensure there was sufficient power in the battery pack to never run at night. In a residential area, this is important as the generator starting up at night may disturb sleeping residents.

#### *Main electricity is still cheaper and greener*

While the trial delivered significant financial and carbon benefits over our current systems if a grid connection is available it is still cheaper and greener than any generator option.