

## CO<sub>2</sub> roadmap

Climate change is one of the greatest challenges of our time. Limiting global warming to 2°C would require zero net greenhouse gas emissions during the second half of the 21st century. A major effort is currently under way to limit Earth's temperature rise to 1.5°C, which would require the world to reach zero net GHG emissions between 2030 and 2050. At Vattenfall we are working together with customers, partners, authorities and cities to become free from fossil fuels within one generation, climate neutrality by 2050, both in our own operations and in society. We call this our CO<sub>2</sub> Roadmap.

On track to reduce our emissions Fossil fuels are not a long-term alternative for a society that wants to achieve climate neutrality, nor for the Vattenfall of the future. Lignite and hard coal do not fit in to our strategy. By divesting our lignite operations we have reduced our annual CO<sub>2</sub> emissions from 84 million tonnes to 24 million tonnes. More than half of our remaining CO<sub>2</sub> emissions come from our coalfired condensing/CHP plants in Germany and the Netherlands (16 million tonnes), and most of the remainder from gas-fired units in the two countries (6 million tonnes). The most important actions we can take to phase out our remaining emissions are:

- ✓ Phase-out of peat/coal by conversion to biomass, decommissioning or divestment
- ✓ Supply district heating based on efficient gas-fired CHPs with the potential for long term transition to synthetic gas or biogas
- ✓ Develop new smart energy and heat solutions that combine different energy sources, such as industrial residual/waste heat, solar panels, heat pumps, power-to-heat storage, and low-energy buildings

Successful examples include Klingenberg, where we are converting from lignite to gas (reducing our CO<sub>2</sub> emissions by 600,000 tonnes per year) and our Uppsala city partnership where we are replacing peat with biomass for district heating (reducing our CO<sub>2</sub> emissions by about 160,000 tonnes per year).

## Helping customers reach their climate targets

We are committed to reducing our climate impact across the entire value chain, with special focus on helping our customers and partners lower their emissions and reach their climate targets. We have expanded our product offering to household and business customers to enable them to lower their footprint and/or produce energy themselves. Examples include low-CO<sub>2</sub> heat and electricity, e-vehicle charging solutions, solar roofs, heat pumps, smart thermostats and homes, and more. We strive to provide transparency on the climate footprint of our products through life cycle assessments and Environmental Product Declarations. We are also cooperating with energy intensive businesses to reduce CO<sub>2</sub> emissions through the electrification of industrial processes.

We believe that Sweden can be a pioneer in this area given that its electricity is comparatively cheap and virtually fossil-free. Electrification has the potential to provide up to 9 million tonnes per year of potential CO<sub>2</sub> savings. in Sweden's steel, cement and refinery industries. There is also potential to produce renewable fuels in refineries to save

6 million tonnes per year in the transport sector. We also support the electrification of the transport sector by taking a leading role in developing charging infrastructure. This is key to phasing out fossil fuels and reaching the national targets for CO<sub>2</sub> reductions in all our markets. The combination of CHP, renewable heat and heat storage creates opportunities for flexible heat and power generation with low CO<sub>2</sub> emissions. In our partnerships with the cities of Uppsala, Berlin, Hamburg and Amsterdam, we are working on plans to develop a path to climate neutrality and still deliver on our customers' expectations for the supply of affordable electricity and heat.