Using some forms of biomass, such as industrial waste wood, agricultural waste and biofuel crops, for energy needs could make a significant contribution to reducing greenhouse gas (GHG) emissions in Europe, but support mechanisms for bioenergy have historically been less effective than for other forms of renewable energy, such as wind power, in European member states.

While it is an inherently limited energy resource, bioenergy has the potential to help meet demand in three major energy sectors: heating, electricity and transport. A study conducted by the EU-funded Thermalnet network\(^1\) has examined bioenergy development from 1990 to 2006, representing the period following the European Union ratification of the Kyoto protocol, in Germany, Italy, the UK and Sweden. It analyses the success of a range of policy instruments in comparison with growth in the capacity of bioenergy electricity generation plants and actual bioenergy output. The policies examined include:

- **Fixed prices.** These oblige utilities to buy electricity from producers of renewable energy at a premium price. While they have successfully initiated growth in wind power in Germany, they have been less successful in relation to biomass. The withdrawal of fixed prices, in Italy, damaged confidence in the long-term future of the industry. The authors recommend that prices need to be set at a sufficiently high level for at least 8 years and attached to programmes that specifically target bioenergy.

- **‘Green’ certificates.** These are awarded to power generators to certify that the electricity has been generated using renewable sources. Combined with substantial investment subsidies, these have been effective in Italy. In Sweden they have led to a significant increase in output from wood-fired electricity plants. However, these need to be weighted to support bioenergy in countries without a long history of using biomass, such as the UK. They also tend to benefit projects with shorter lead times and quicker returns.

- **Investment subsidies.** Grants awarded to renewable projects in Germany have helped to initially stimulate the sector, but the impact has not been sustained in the long-term. Subsidies need to be long-term to be successful, specifically targeted at bioenergy, and linked to other forms of incentive such as green certificates. UK subsidies have encouraged an increase in electricity from biomass, but other barriers have remained, such as planning restrictions and fuel supply issues.

- **Taxes.** Taxes can be set on carbon or fossil fuels, for example, to provide an incentive to use biomass as an energy source. However, the authors recommend that these must be set at a sufficiently high level to be effective. High energy and carbon taxes in Sweden, frequently reviewed, have led to an increase of 44 per cent in the use of biomass between 1990 and 1999. Taxes need to be applied as a long-term-measure.

The authors conclude that specific targeting of programmes is needed, especially where there is a limited history of bioenergy use. Continuity of policy instruments is important, as withdrawal has a negative impact on investment and confidence. Investment subsidies are not effective at sustaining bioenergy and should be focused on fuel supply, logistics and planning rather than on plants themselves.

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