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Devising renewable heat policy: Overview of support options

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H I G H L I G H T S

- A range of policy options can support deployment of renewable heat technologies.
- Effective RES-H policy must consider wider regulation and planning issues.
- Effective RES-H policy must consider the relative maturity of technologies.

A R T I C L E I N F O

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A B S T R A C T

Renewable energy sources of heat offer the substantial economic, environmental and social benefits associated with renewable electricity but policy to support their expansion is considerably less advanced. The potential for applying various support instruments to renewable heat is considered with advantages and disadvantages discussed.

1. Introduction

The increased use of renewable energy has been a key element of energy policy in many countries for at least two decades. Despite the benefits available in regard of all renewable energy sources the focus of much of renewable energy policy has been on renewable energy sources of electricity (RES-E), with some more recent efforts to support increased use of renewable transport fuels. The development and application of policy instruments to support renewable energy sources of heating (RES-H) is considerably less advanced despite the large portion of energy that is expended in meeting heating requirements and the considerable potential of RES-H (IPCC, 2011). Where long-term RES-H policy does apply, as for example in Sweden, Austria, Germany and Denmark, the sophistication of instruments trails RES-E significantly.

It has been suggested that heating accounts for as much as 48% of final energy consumption in Europe (RHC, 2011), significantly in excess of either electricity or transport demand, and it accounts for a substantial fraction of carbon emissions. Despite this, there is considerably less experience in applying support mechanisms and public debate over support is much less advanced. Data from the UK suggests that heating accounted for 46% of total final energy consumption in 2009 (76% of all energy in non-transport sectors), against 41% for transport and 8% for lighting and appliances (DECC, 2012). The UK Government suggests that around one third of national greenhouse gas emissions result from the use of energy for heating purposes (DECC, 2012).

Some of the potential policy instrument options available to support increased deployment of RES-H technologies are set out here. Each policy option and its essential components is described along with how they have been or might be applied to RES-H in practice, including any significant variations on the central mechanism that might be adopted and the implications of these variations. The constraints and characteristics inherent to the RES-H technologies and experience with application to renewable energy sources are discussed, most notably as regards RES-E, but regarding RES-H where applicable.

2. Goals of policy for renewable heating

The general aims of renewable energy policy are straightforward; to assist in reducing emissions damaging to the natural environment;

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to enhance energy security; to stimulate innovation and technological development and to stimulate new employment opportunities. One important lesson of the experience with renewable energy policy so far has been the need to develop and apply policy instruments aiming to achieve a particular outcome. This can apply up to the highest level, for example, by setting specific deployment goals or engendering a more general policy aiming to stimulate overarching technological improvement and cost reduction. Since there are strong variations in the scale and output of technologies, in the needs of different stakeholder groups, in the relative maturity of different technologies and in various other factors then it is important to consider the appropriateness of different policy options within the context of specifically defined goals.

3. RES-H technologies and characteristics

There are a diverse range of RES-H technologies, and these are heterogeneous in terms of their economics, usage and production of energy. Policies aiming to stimulate the full breadth of renewable heat applications will need to take this into account.

The technologies cover a range of scales and levels of technological maturity, and the technology characteristics are often quite different. Some technologies will require stimulation of more complex supply chains. Some technologies are small-scale applications only, while others vary from domestic through to industrial-scale application.

The scale of some RES-H technologies links to an issue which was not really a problem in regard of RES-E policy and its application but is likely to be so for RES-H; heat's on-site generation and related metering issues. On site use will tend to mean more systems, and of smaller size. Subsidisation of small-scale sources of renewables may become costly in terms of the levels of transactional and administrative costs associated with the unit costs of providing the subsidy. Since installation of some heat technologies will produce only a small amount of energy annually (for example, a domestic solar thermal unit might produce in the region of 1–3 MWh_{th} annually) transactional and administrative cost must be taken into account in implementing policy to ensure these do not render the subsidy economically inefficient.

A key lesson arising from the RES-E policy experience is that the level of technological maturity of a technology will play an important part in determining whether a policy instrument is appropriate for effective stimulation of the technology (Foxon et al., 2005). The IEA (2007) and Seyboth et al. (2008) typologically assess RES-H technologies along similar lines to place each in the continuum of technological maturity.

The concept of maturity can relate to two types of technology indicators: technological maturity and commercial maturity. The phase of technological development may vary between proof of concept (infant technology) to a stage where no (important) technical improvements are to be expected (technologically mature technology). Commercial maturity relates to the difference in the technology production costs compared to conventional technology. The resulting 'cost gap' may be high (for uncompetitive options), low, nil or negative (renewables cheaper than the conventional option). As reference prices may vary over time, commercial maturity is not only dependent on development of the technology, but also on conventional fuel price development exogenously influencing its level. A technology may have different stages of maturity for the technological or commercial dimension. Most technologies are characterised by a range, as different types exist, but also because the reference technology varies in its energy cost.

The level of maturity of a technology plays an important role in determining whether a particular policy instrument is appropriate for its effective and efficient stimulation. It is apparent from the RES-E policy experience that some instruments are a better fit depending on technological and commercial maturity of the particular technology.

4. RES-H support mechanisms

A wide variety of different types of mechanisms have the potential to support the expansion of RES-H. Here a straightforward typology is applied: financial or fiscal mechanisms and non-financial mechanisms; the latter a wide-ranging grouping of instruments, including obligations on particular stakeholders to purchase or sell technology, promotional measures to support awareness and to assist with infrastructure and mechanisms which exist to address specific barriers to renewable energy deployment.

The basic form of each mechanism is described, with general aims and objectives; consideration is given to the stage of technological development when the particular mechanism might be applied most appropriately. Where applicable, variations in operation and application are described where these imply potential for different outcomes in stimulating RES-H. Likely advantages and disadvantages are described based on experience with RES-E or RES-H. A summary table of known advantages and disadvantages is presented in Appendix 1. Any potential for mechanisms to operate simultaneously with complementarity along with positive and negative experiences of such application is then discussed.

4.1. Financial mechanisms with potential to support RES-H

4.1.1. Grants/investment subsidies

Direct financial subsidies for the purchase of RES-H systems are the most widely adopted financial mechanism in the EU for the support of RES-H (Bürger et al., 2008; IEA, 2007), adopted in nations including Austria, Greece, Germany, the Netherlands, Poland, Sweden and the UK. The basic aim of grants is to defray the high capital cost of systems and make the technology more attractive to purchasers. Grants can be easy to administrate and are attractive to governments wishing to stimulate initial interest in easily targeted expansion of particular technologies. Grants are funded directly from the public purse, justified on public interest grounds. Since they are generally applied in relatively early stages of deployment the total costs can be limited, application to more commercially mature stages of the process implies higher costs which may undermine political support.

There are a number of possible variations in the application of grants. They can be made available to developers or owners installing their own RES-H systems or directly to manufacturers, though the latter is less common as it can lead to competition issues and to undermining of quality. The focus here will thus be on operator facing grants.

Attaching conditions to grants such that they are only available to support approved or certified models can assist in maintaining the quality of installed technology though care should be taken to ensure the certification process is transparent and easily accessible to new entrants. Key elements and variations on the application of grants include:

1. capacity installed subsidies (e.g., €/installed MW), these might be either direct subsidies to approved companies or rebates.
2. subsidies as a fixed percentage of total costs, with the fixed percentage specific to named technologies
3. a fixed upper limit per installation

Grant schemes will typically specify the total funding pot available, with awards often on a first come, first served basis.