31 Wind power programmes in the United Kingdom and elsewhere 1900-1960

31 1 The first 'modern' stimulus to develop the use of wind power came roughly in the period 1900-1920; pioneer farming and other 'outback' activities had a need for water pumping and electricity ahead of or in the absence of the rural spread of utilities. A proliferation of small plants (up to 5 kW) was marketed to meet this demand, and it was only after the Second World War that the expansion of electrical supply networks forced a market decline. Countless installations of the period have now fallen into disuse, and only a handful of manufacturers remain in the business.

31.2 In this early period Denmark, in particular had pressing fuel problems in the absence of indigenous coal) which encouraged the government to support development of larger machines up to 35 kW) for community use, for water pumping and electricity supply These distinctive machines (their rotors evidencing descent from windmill sails of earlier centuries) reached successful production of several hundreds before the First World War Developments in aerodynamics during the First World War enabled a transition to more efficient aerofoil rotors in developments from 1920 onwards.

31.3 In the USSR during the period following the Revolution, wind power development became part of intensive centralised efforts to modernise a basically peasant agriculture and to industrialise generally Notable in this programme was the construction of a reasonably successful 100 kW prototype in the Crimea.

31.4 Considerable further development in the period 1935 to 1955 is thought to have resulted in about thirty prototypes up to 30 kW The largest machine yet built, a

1250 kW prototype, was erected in the early 1940s in Vermont, United States. Site selection for this machine was not ideal but it operated satisfactorily until one of the 8-ton blades fractured at the root.

31.5 Principal modern advances came in the period 1940 to 1960, the trend of development being towards high speed rotors with only two or three thin blades of true aerofoil design and towards various means of controlling rotor speed and output.

31.6 During the 1950s the United Kingdom was especially prominent, and a national committee co-ordinated the research and development programme. In parallel with extensive surveys of wind availability and investigations into the nature of wind and gusts in general three prototypes of 100 kW rating were developed and erected. The United Kingdom also played a very active part during the 1950s in the Wind Power Working Party set up by the Organisation for European Economic Co-operation's Committee for Productivity and Applied Research; representatives of all European countries active in the field served with this Working Party Of these European countries, Denmark, France and Germany had significant development programmes. In Denmark, a 200 kW machine was built at Gedser by Danske Elvaerkers Forening and operated by the electric utility Sydøstsjaellnds Elektricitets Actieseiskab; this machine proved extremely reliable and in fact still stands intact. Electricite de France built several prototypes, notable of which were two machines rated at 130 kW and 800 kW During 1963-64 a 1 MW machine operated successfully at Saint Reamy-des-Landes producing 222 MWh during the month of November 1963. It was closed down after bearing failure in June 1964. In Germany a 6-8 kW Allgaier' machine was developed

and successfully marketed (about 100 were produced)

31 7 The philosophy of the time was (a) to pursue simple rugged reliable designs without undue emphasis on efficiency and b) to concentrate on the orthodox (horizontal axis, axial wind flow) style of rotor The period was one of solid achievement (accompanied by only isolated commercial success) but although the design requirements of machines up to about 10 kW were largely resolved there remained (and stil do remain) problems of vibration and stability associated with larger units.

31.8 In the early 1960s three major developments effectively stifled further wind power exploitation. First, and probably most important, was the substantial decrease in the real price of oi coupled with increased availability through improved transport by supertanker Secondly there was the imminent promise of cheap nuclear energy Thirdly the early 1960s showed further substantial 'economies of scale' benefits that were predominant for the rest of the decade in power station philosophy Work during the 1960s was prolonged by the United Nations Educational Scientific and Cultural Organisation who high-lighted a specific need for and supported work on small scale power generation techniques to assist developing countries particularly with agriculture. Other than this, the only programmes of note during the 'quiescent' period 1960 to 1972 were:
(a) at a research centre in Barbados, set up by McGill University under the terms of a substantial bequest; studies were directed to the use of inexpensive solar and wind equipment for use in developing countries;
b) at the National Aeronautical Laboratory at Bangalore, where a programme of work on water-pumping windmills and wind-driven generating plant was undertaken in association with a national wind power survey