

Performance of the SES Stirling Dish

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ABSTRACT

Concentrator technology developed by McDonnell Douglas and a Stirling engine developed by United Stirling AB of Sweden were integrated together in the 1980s to form a Stirling Dish solar-to-electric conversion system. In 1996, Stirling Energy Systems (SES), Inc., acquired the patent rights and licensing agreements necessary to commercialize this technology. This paper presents the history of the technology development by these two companies, describes the concentrator and the Stirling engine system, and presents a summary of the past and present performance testing. The current Boeing/SES/DOE test program is discussed. The test performance data presented shows the system has operated on-sun for over 20,000 hours, generated over 164,000 kWh of grid energy, and has operated in a test cell for over 122,000 hours. Data is also presented which indicates the power and energy performance is approximately the same as it was 15 years ago when the hardware was manufactured. Test data from the current test program shows a system availability of 97% and a low requirement on cooling, oil, and gas servicing.

Introduction

In April of 1998, the Boeing company and the Department of Energy entered into a contract to conduct performance testing of the Stirling Dish system developed by McDonnell Douglas and United Stirling AB of Sweden. The weekly on-sun operating time and total accumulated operating time for the current test program is shown in Figure 2-1. Daily energy performance of 24-27% have been measured.

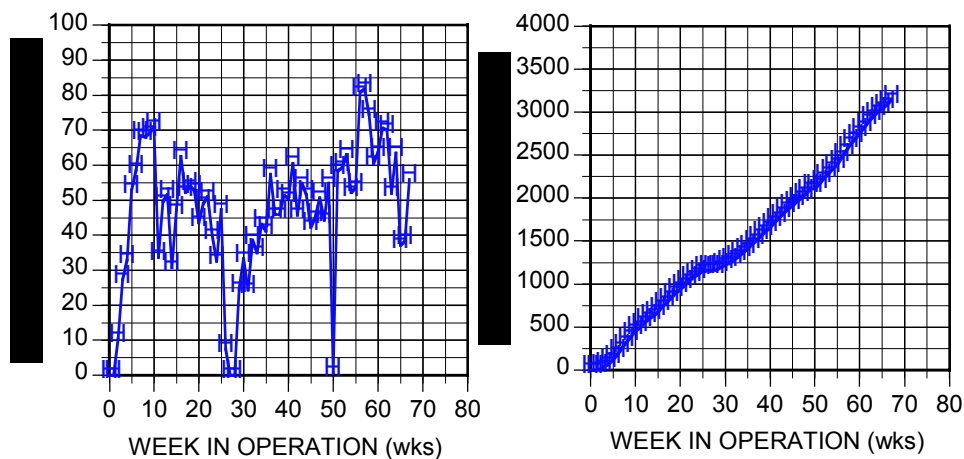


Figure 2-1. On-Sun operating time since July of 1998.