

1.2 Introduction

引言

Photovoltaics is the process of converting sunlight directly into electricity using solar cells. Today it is a rapidly growing and increasingly important renewable alternative to conventional fossil fuel electricity generation, but compared to other electricity generating technologies, it is a relative newcomer, with the first practical photovoltaic devices demonstrated in the 1950s. Research and development of photovoltaics received its first major boost from the space industry in the 1960s which required a power supply separate from "grid" power for satellite applications. These space solar cells were several thousand times more expensive than they are today and the perceived need for an electricity generation method apart from grid power was still a decade away, but solar cells became an interesting scientific variation to the rapidly expanding silicon transistor development with several potentially specialized niche markets. It took the oil crisis in the 1970s to focus world attention on the desirability of alternate energy sources for terrestrial use, which in turn promoted the investigation of photovoltaics as a means of generating terrestrial power. Although the oil crisis proved short-lived and the financial incentive to develop solar cells abated, solar cells had entered the arena as a power generating technology. Their application and advantage to the "remote" power supply area was quickly recognized and prompted the development of terrestrial photovoltaics industry. Small scale transportable applications (such as calculators and watches) were utilised and remote power applications began to benefit from photovoltaics.

光生伏打（简称“光伏”）效应指的是通过太阳能电池将太阳光直接转化为电能的过程。在今天，作为传统化石能源的替代品，光伏这一可再生能源技术正在迅速发展并且变得日益重要。但是相比于其他的发电方式，光伏还是一个新鲜的技术。直到 20 世纪 50 年代，世界上第一台切实可行的光伏设备才被制造出来。光伏技术的研究和研究的第一次腾飞要追溯到 20 世纪 60 年代，这一发展得益于太空产业中独立于电网之外的卫星的供电系统的需求。那时的太空太阳能电池比今天的太阳能电池贵了几千倍，那时距离人们有独立于电网之外的发电技术的需求还有几十年。但是太阳能电池成为迅速扩张的硅晶体管行业的一个有趣分支，它有着不少合适的潜在市场。20 世纪 70 年代的石油危机使得全世界开始关注能源的替代品，这促进了对光伏在地面发电上的研究。尽管石油危机从金钱上对太阳能技术短暂的刺激渐渐消退，太阳能电池仍然成为了发电技术中不可或缺的一员。它在偏远地区供电上的应用和优势迅速得到人们的共识，促进了地面光伏产业的发展。小型可移动设备（比如计算器和手表）和偏远地区的供电都开始受益于光伏技术。

In the 1980s research into silicon solar cells paid off and solar cells began to increase their efficiency. In 1985 silicon solar cells achieved the milestone of 20% efficiency. Over the next decade, the photovoltaic industry experienced steady growth rates of between 15% and 20%, largely promoted by the remote power supply market. The year 1997 saw a growth rate of 38% and today solar cells are recognized not only as a means for providing power and increased quality of life to those who do not have grid access, but they are also a means of significantly diminishing the impact of environmental damage caused by conventional electricity generation in advanced industrial countries.

20 世纪 80 年代，硅太阳能电池的研究开始产出成果，太阳能电池的转换效率也开始提升。1985 年，硅太阳能电池的转换效率达到 20% 的里程碑。在接下来的 10 年中，光伏产业的增长率稳定在 15% 到 20%，这一增长主要得益于偏远地区供电这一市场。1997 年，光伏产业的增

长率一度达到了 38%。在今天，太阳能电池作为一种供电方式，不仅可以提高那些无法接入电网的家庭的生活品质，它还可以有效的减少先进的工业国家中因为传统发电方式造成的环境破坏。

The increasing market for, and profile of photovoltaics means that more applications than ever before are "photovoltaically powered". These applications range from power stations of several megawatts to the ubiquitous solar calculators. PVCDROM aims to provide an overview of terrestrial photovoltaics to furnish the non-specialist with basic information. It is hoped that having used PVCDROM you will understand the principles of photovoltaic devices and system operation, you will be able to identify appropriate applications, and you will be capable of undertaking photovoltaic system design. By gradually increasing the number of people who are familiar with photovoltaic concepts and applications, we hope to increase the use of photovoltaics in appropriate applications.

正在增长的光伏市场和光伏的发展趋势意味着前所未有的应用的能源将来自光伏。这些应用大到兆瓦级别的电站，小到无所不在的太阳能计算器。PVCDROM 旨在让非光伏从业者对地面光伏有一个基础的认识。我们希望通过 PVCDROM 的使用，能够理解光伏器件和系统的运行原理，判别合适的应用乃至从事光伏系统设计。我们希望通过逐步增加熟悉光伏概念和应用的人的数量，最终增加光伏在合适领域内的使用。