

# Chapter 3

## Undergraduate and Postgraduate Education in Renewable Energy

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### ABSTRACT

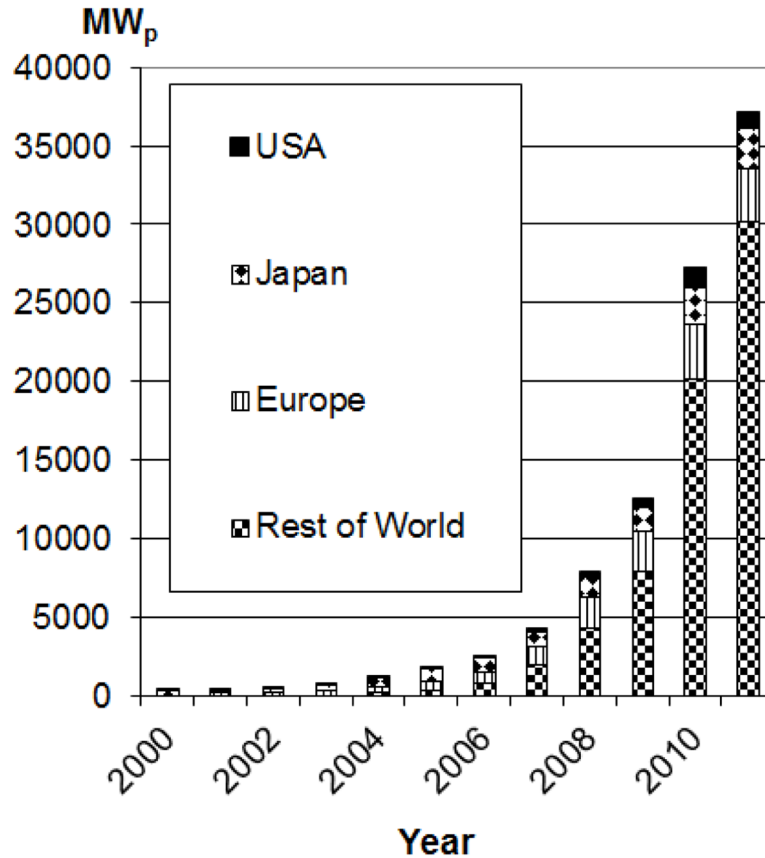
*This chapter explores how the University of New South Wales (UNSW) has undertaken silicon solar cell research since the mid-1970s and achieved world recognition in the 1980s. The UNSW solar cell research group has led international commercialisations and, since 2000, pioneered specialised undergraduate education in photovoltaics engineering. The Photovoltaics and Solar Energy undergraduate program is a unique four-year full-time Bachelor of Engineering program covering device theory; photovoltaic technology and manufacturing; photovoltaic applications and system design; policy, analysis, and modelling; renewable energy technologies; and sustainable energy. The related Renewable Energy Engineering program encompasses a broader range of renewable energy technologies including solar thermal systems, wind turbines, biomass, and also the important areas of solar architecture and energy efficiency. The School also offers four postgraduate coursework and two research programs in the same topics. In-house developed technical tools are used extensively in teaching and research.*

### INTRODUCTION

The global photovoltaics manufacturing industry, along with the other renewable energy technology industries, has experienced explosive growth (Figure 1) as renewable energy grew in acceptance in markets around the world. This growth has slowed temporarily due to global, especially European, financial concerns, but is widely expected to recover soon. Despite an abundance of renewable energy resources, Australia relies primarily, at least for traded energy, on its similarly abundant coal and gas supplies. As a result, the country does not host major renewable energy equipment manufacturing facilities but it has shown leadership in renewable energy technology research, development and education and is well located to interact with the booming manufacturing region of Asia. Asia, led by Japan, China, Korea and India, is also expected to become a very large user of renewable energy generating equipment.

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*Figure 1. History of photovoltaics manufacture by region. Data for recent years is from March issue each year of Photon International magazine and older data is from various sources.*



The UNSW School of Photovoltaic and Renewable Energy Engineering (SPREE) has pioneered focused education of engineers to allow and encourage that expansion and the programs are described below. The School makes extensive use of Lectopia recording of lectures, Moodle and Blackboard for delivery of course material to students and for their assessment, as do all teaching units of UNSW. In addition, special tools have been developed for teaching photovoltaics and they are described in this chapter.

## BACKGROUND

Several Australian and international universities now have renewable energy research and development activities. Past work in Australia has generated successful major technology commercialisations in silicon photovoltaics, solar thermal concentrators for electricity generation and domestic solar water heating. There has been a photovoltaics research and development activity at The University of New South Wales (UNSW) since the era of the 1970s oil price shocks and its work has been internationally prominent in the field for more than thirty years. Its early success was promoted by a strong local market for remote-area installations of high-reliability industrial stand-alone photovoltaics systems in Australia

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