Technology transfer? The rise of China and India in green technology sectors

Lema, Rasmus; Lema, Adrian

Published in:
Sustainability-oriented Innovation Systems in China and India

Creative Commons License
Other

Publication date:
2016

Document Version
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

Citation for published version (APA):
Lema, R., & Lema, A. (2016). Technology transfer? The rise of China and India in green technology sectors. In T. Altenburg (Ed.), *Sustainability-oriented Innovation Systems in China and India* (pp. 23-44). Routledge.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

Take down policy

If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.

Technology transfer? The rise of China and India in green technology sectors

Rasmus Lema^a and Adrian Lema^b

^aDepartment of Business Studies, Aalborg University; ^bMinistry of Climate, Energy and Building, Denmark

International technology transfer is central to the debate about how to curb the carbon emissions from rapid economic growth in China and India. But given China and India's great progress in building innovation capabilities and green industries, how relevant is technology transfer for these countries? This paper seeks insights from three green technology sectors in both countries: wind power, solar energy and electric and hybrid vehicles. We find that, conventional technology transfer mechanisms such as foreign direct investments and licensing, were important for industry formation and take-off. However, as these sectors are catching up, new 'unconventional technology transfer mechanisms' such as R&D partnerships and acquisition of foreign firms have become increasingly important. We argue that there is limited practical and analytical mileage left in the conventional approach to technology transfer in these sectors in China and India. We argue that the emphasis should shift from transfer of mitigation technology to international collaboration and local innovation.

1. Introduction

Rapid economic growth in both China and India has now been sustained for more than a decade and it is set to continue in the foreseeable future. These two countries now account for a substantial amount of the production of the world's goods and services. There is therefore increasing agreement that a global shift in economic power is under way: from the West to the East. However, the build-up of capabilities in China and India is not only occurring in the sphere of production, it is also in the sphere of innovation and technological development (Altenburg et al., 2008).

While commentators and the scholarly literature are still trying to catch up with the changing global distribution of innovation capabilities (Ely and Scoones, 2009; Leadbeater, 2007), climate change is emerging on the top of the economic and political agenda (Stern, 2007). Policymakers, scholars and the wider public increasingly agree that economic growth needs to change direction, not least in China and India. The change that is needed is one in which new technological paradigms decouple growth from environmental problems – particularly greenhouse gas emissions – through the development and use of new technologies (Altenburg and Pegels, 2012).

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy of the Ministry of Climate, Energy and Building.

Contents

<i>Citation Information</i>	vii
<i>Notes on Contributors</i>	ix
<i>Preface</i>	xi
1. Introduction <i>Tilman Altenburg</i>	
2. Sustainability-oriented innovation systems – managing the green transformation <i>Tilman Altenburg and Anna Pegels</i>	5
3. Technology transfer? The rise of China and India in green technology sectors <i>Rasmus Lema and Adrian Lema</i>	23
4. Innovating for energy efficiency: a perspective from India <i>Ankur Chaudhary, Ambuj D. Sagar and Ajay Mathur</i>	45
5. Sustainability-oriented innovation in the automobile industry: advancing electromobility in China, France, Germany and India <i>Tilman Altenburg, Shikha Bhasin and Doris Fischer</i>	67
6. Different routes to technology acquisition and innovation system building? China's and India's wind turbine industries <i>Rainer Walz and Jonathan Nowak Delgado</i>	87
7. Key actors and their motives for wind energy innovation in China <i>Frauke Urban, Johan Nordensvärd and Yuan Zhou</i>	111
8. Challenges of low carbon technology diffusion: insights from shifts in China's photovoltaic industry development <i>Doris Fischer</i>	131
<i>Index</i>	147

Sustainability-oriented Innovation Systems in China and India

Edited by
Tilman Altenburg

First published 2016
by Routledge
2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN, UK

and by Routledge
711 Third Avenue, New York, NY 10017, USA

Routledge is an imprint of the Taylor & Francis Group, an informa business

© 2016 Taylor & Francis

All rights reserved. No part of this book may be reprinted or reproduced or utilised in any form or by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying and recording, or in any information storage or retrieval system, without permission in writing from the publishers.

Trademark notice: Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

British Library Cataloguing in Publication Data

A catalogue record for this book is available from the British Library

ISBN 13: 978-1-138-93769-7

Typeset in Times New Roman
by RefineCatch Limited, Bungay, Suffolk

Publisher's Note

The publisher accepts responsibility for any inconsistencies that may have arisen during the conversion of this book from journal articles to book chapters, namely the possible inclusion of journal terminology.

Disclaimer

Every effort has been made to contact copyright holders for their permission to reprint material in this book. The publishers would be grateful to hear from any copyright holder who is not here acknowledged and will undertake to rectify any errors or omissions in future editions of this book.