



Universiteit
Leiden
The Netherlands

The rebound effect through industrial ecology's eyes : the case of transport eco-innovation

Font Vivanco, D.

Citation

Font Vivanco, D. (2016, March 3). *The rebound effect through industrial ecology's eyes : the case of transport eco-innovation*. Retrieved from <https://hdl.handle.net/1887/38352>

Version: Not Applicable (or Unknown)

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/38352>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/38352> holds various files of this Leiden University dissertation.

Author: Font Vivanco, David

Title: The rebound effect through industrial ecology's eyes : the case of transport eco-innovation

Issue Date: 2016-03-03

The rebound effect through industrial ecology's eyes

The case of transport eco-innovation

David Font Vivanco

The rebound effect through industrial ecology's eyes
The case of transport eco-innovation

PROEFSCHRIFT

ter verkrijging van
de graad van Doctor aan de Universiteit Leiden,
op gezag van Rector Magnificus prof.mr. C.J.J.M. Stolker,
volgens besluit van het College voor Promoties
te verdedigen op donderdag 3 maart 2016
klokke 11.15 uur

door

David Font Vivanco

geboren te Barcelona, Spanje
in 1985

Font Vivanco, David

The rebound effect through industrial ecology's eyes
The case of transport eco-innovation

PhD thesis Leiden University, The Netherlands

Cover design : David Font Vivanco

Cover photo : "59/365 Traffic Bokeh" by Mike Poresky is licensed under CC BY 2.0 (<https://www.flickr.com/photos/mikeporesky/5247595623>)

Lay-out : René Glas (www.reneglas.com)

Printed : CPI - Koninklijke Whörmann, Zutphen

ISBN : 978-94-6203-980-3

© 2016 by David Font Vivanco, ALL RIGHTS RESERVED.

Promotie commissie

Promotor: Prof. dr. Arnold Tukker (Leiden University)
Tweede promotor: Prof. dr. René Kemp (Maastricht University)
Co-promotor: Dr. Ester van der Voet (Leiden University)
Overige leden: Prof. dr. ir. Peter M. van Bodegom (Leiden University)
Prof. dr. Jan. J. Boersema (Leiden University)
Prof. dr. Stefanie Hellweg (ETH Zurich)
Dr. ir. Andrea Ramírez (Utrecht University)

*Tot, si ho mireu bé, convergeix en nosaltres
perquè ho anem assimilant,
perquè ho puguem convertir en paraules
i perduri en el temps,
el temps que no és res més
que un gran bosc de paraules.
I nosaltres som els pobladors d'aquest bosc.*

*Everything, if you look carefully, converges in us
so that we assimilate it,
so that we can transform it in words
and endures over time,
time that is nothing more
than a large forest of words.
And we are the dwellers of this forest.*

(Nosaltres, ben mirat – Miquel Martí i Pol) (We, all things considered – Miquel Martí i Pol)

Contents

1	General introduction and research questions	9
2	The multi-dimensional contribution of technological innovation to environmental pressures	31
3	An industrial ecology perspective on the rebound effect: a review of LCA-based studies	57
4	The environmental rebound effect of electric cars	81
5	Environmental rebound effects from past transport innovations in Europe	109
6	Do methodological choices in environmental modelling bias rebound effects? A case study on electric cars	135
7	The foundations of the environmental rebound effect	175
8	How to deal with the rebound effect? A policy-oriented approach	203
9	General discussion	237
	Summary	257
	Samenvatting	263
	Acknowledgements	269
	Curriculum Vitae	271
	Publications	272

Chapter 2: Reprinted from Journal of Industrial Ecology 18(3): 380-392. Font Vivanco, D., Kemp, R., van der Voet, E., Heijungs, R. Using LCA-based Decomposition Analysis to Study the Multidimensional Contribution of Technological Innovation to Environmental Pressures© (2014) doi: 10.1111/jiec.12118. Supplementary material available online.

Chapter 3: Reprinted from The International Journal of Life Cycle Assessment 19(12): 1933-1947. Font Vivanco, D. & van der Voet, E. The rebound effect through industrial ecology's eyes: a review of LCA-based studies© (2014) doi: 10.1007/s11367-014-0802-6.

Chapter 4: Reprinted from Environmental Science & Technology 48(20): 12063–12072. Font Vivanco, D, Freire-Gonzalez, J., Kemp, R. & van der Voet, E. The remarkable environmental rebound effect of electric cars: A microeconomic approach© (2014) doi: 10.1021/es5038063. Supplementary material available online.

Chapter 5: Reprinted from Journal of Cleaner Production 101(0): 71-85. Font Vivanco, D., Kemp, R. & van der Voet, E. The relativity of eco-innovation: environmental rebound effects from past transport innovations in Europe© (2015) doi: 10.1016/j.jclepro.2015.04.019. Supplementary material available online.

All other chapters of this thesis: © 2016, Universiteit Leiden.

The chapters may differ slightly from the original publications.

No part of this publication, apart from bibliographic data and brief quotations in critical reviews, may be reproduced, re-recorded or published in any form, including print, photocopy, microfilm, electronic or electromagnetic record without permission from the publishers.