



Comparative Analysis of Infrastructures: Hydrogen Fueling and Electric Charging of Vehicles

Martin Robinius, Jochen Linßen, Thomas Grube, Markus Reuß, Peter Stenzel,
Konstantinos Syranidis, Patrick Kuckertz and Detlef Stolten

Energie & Umwelt / Energy & Environment

Band / Volume 408

ISBN 978-3-95806-295-5

Forschungszentrum Jülich GmbH
Institut für Energie- und Klimaforschung
Elektrochemische Verfahrenstechnik (IEK-3)

Comparative Analysis of Infrastructures: Hydrogen Fueling and Electric Charging of Vehicles

Martin Robinius, Jochen Linßen, Thomas Grube,
Markus Reuß, Peter Stenzel, Konstantinos Syranidis,
Patrick Kuckertz and Detlef Stolten

Schriften des Forschungszentrums Jülich
Reihe Energie & Umwelt / Energy & Environment

Band / Volume 408

ISSN 1866-1793

ISBN 978-3-95806-295-5

Contents

SUMMARY FOR POLICY MAKERS	I
ZUSAMMENFASSUNG FÜR ENTSCHEIDUNGSTRÄGER	IV
CONTENTS	VII
1 INTRODUCTION	1
2 OBJECTIVES OF THE STUDY	3
3 STATUS QUO OF HYDROGEN FUELING AND CHARGING INFRASTRUCTURES	4
3.1 Hydrogen Fueling	4
3.2 Electric Charging	6
4 SWOT INFRASTRUCTURE ANALYSIS	9
4.1 SWOT Methodology	9
4.2 Scope of Analysis	9
4.3 Common Aspects of FCEV Hydrogen Supply and BEV Charging Infrastructure.....	10
4.4 Hydrogen Infrastructure.....	11
4.5 Charging Infrastructure	13
5 META-ANALYSIS OF SCENARIO STUDIES.....	17
5.1 Approach of the Meta-Analysis	17
5.2 Comparison of Studies: Hydrogen Infrastructure	17
5.3 Comparison of studies: Charging Infrastructure	23
6 DETAILED MODELING OF INFRASTRUCTURES	31
6.1 General Methodical Approach.....	31
6.1.1 Electricity Demand and Generation Scenario	31
6.1.2 Transportation Scenario.....	40
6.1.3 Economic Assumptions for Infrastructure Calculations.....	42
6.2 Hydrogen Infrastructure.....	43
6.2.1 Modeling of Hydrogen Infrastructure Pathways.....	43
6.2.2 Results of Hydrogen Infrastructure Analysis.....	51
6.2.3 Sensitivity Analysis	56
6.2.4 Summary and Conclusions for Hydrogen Fueling Infrastructure Analysis	57
6.3 Charging Infrastructure	58
6.3.1 Modeling of Charging Infrastructure	58
6.3.2 Charging Options and Cost Assumptions	58
6.3.3 Impacts on Transmission Grid and REN Generation	70
6.3.4 Summary and Conclusion for Electric Charging Infrastructure	71
6.5 Comparison of Results: Charging and Hydrogen Fueling Infrastructure	73
7 SUMMARY AND CONCLUSIONS.....	77
8 REFERENCES	81
9 APPENDIX.....	95

Energie & Umwelt / Energy & Environment
Band / Volume 408
ISBN 978-3-95806-295-5