

Chapter 6 Comparing Greenhouse Gas Emissions Tsrc

Extensively revised and updated, this popular text presents an accessible yet rigorous treatment of environmental and natural resources economics, including climate change and the economics of sustainability. Completely revised and updated, the fourth edition now includes new figures and tables, definitions to assist the reader, and updated policy information. New advances in the science, economics and policy approaches to climate change have been integrated into essentially all-new chapters on incentive regulation and global climate change. This innovative textbook integrates economics with science and public policy in a balanced and accessible way that will be appreciated by students from disciplines ranging from economics and natural resources management to environmental studies and energy policy.

Hydrogen fuel cell vehicles (HFCVs) could alleviate the nation's dependence on oil and reduce U.S. emissions of carbon dioxide, the major greenhouse gas. Industry-and government-sponsored research programs have made very impressive technical progress over the past several years, and several companies are currently introducing pre-commercial vehicles and hydrogen fueling stations in limited markets. However, to achieve wide hydrogen vehicle penetration, further technological advances are required for commercial viability, and vehicle manufacturer and hydrogen supplier activities must be coordinated. In particular, costs must be reduced, new automotive manufacturing technologies commercialized, and adequate supplies of hydrogen produced and made available to motorists. These efforts will require considerable resources, especially federal and private sector funding. This book estimates the resources that will be needed to bring HFCVs to the point of competitive self-sustainability in the marketplace. It also estimates the impact on oil consumption and carbon dioxide emissions as HFCVs become a large fraction of the light-duty vehicle fleet.

Climatic changes, air pollution, greenhouse gas emissions.

IPCC Fourth Assessment Report on scientific aspects of climate change for researchers, students, and policymakers.

In the 21st century, management of municipal solid waste (MSW) continues to be an important environmental challenge facing the U.S. Climate change is also a serious issue, & the U.S. is embarking on a number of voluntary actions to reduce the emissions of greenhouse gases (GHGs) that can intensify climate change. By presenting material-specific GHG emission factors for various waste management options, this report examines how the two issues -- MSW management & climate change -- are related. The report's findings may be used to support a variety of programs & activities, including voluntary reporting of emission reductions from waste management practices. Charts, tables & graphs.

This book reveals the mechanisms underlying the convergence of car fuel economy regulations in Europe, Japan and the US by drawing upon a constructivist theory of International Relations and law that focuses on business competition and environmental regulations. It offers new understanding of the topic of cars and an issue of climate change, discussing the emerging phenomenon of convergence of fuel economy regulations; addressing the role of business actors in pushing for climate change action; proposing the new model of agency with and beyond states; and providing insightful case studies from Europe, Japan and the US. The opening chapter reviews the automobile industry and global climate change, providing a background for the discussion to follow. Chapter 2, Business Actors and Global Environmental Governance, grounds the discussion in the field of environmental governance. The third chapter is a case study examining the construction and timing of the European Union's climate policies for automobile CO₂ emissions, discussing the underlying factors and the actors influencing the policies. The following chapter argues that Japan adopted its stringent fuel economy regulations primarily because of industry competitiveness, motivated by stringent environmental regulations in export markets and encouraged by a tradition of 'co-regulation' and 'corporatism' to enhance the regulations. Chapter 5 asks why the US, the first country to introduce fuel economy regulations, spent two decades in regulatory stagnation, and discusses how recent US fuel economy regulations came to converge with Japanese and European standards. Chapter 6 compares, contrasts and analyzes fuel economy regulations among the three case studies and identifies policy implications for the future climate governance for 2015 and beyond. The final chapter explores applicability of the 'agency with and beyond the state' model to other sectors and to climate governance as a whole.

Climate change is an issue that is highly debated around the globe. This book brings together the papers that were presented at a conference dedicated to this issue, held in Kyoto in October 2002. Covering a broad range of areas, the topics presented will benefit both those working in the field of carbon dioxide recovery and sequestration, and those looking at the effects of non carbon dioxide greenhouse gases. An overview of the Research and Design technologies which aid in mitigating climate change is included, which will be invaluable to those researching new opportunities for dealing with this problem. An area of research that has seen a rapid rise in worldwide spend Will benefit both researchers in climate change, and those looking at new technologies to help deal with the problem Presents papers from contributors spread around the globe means that this book has world wide relevance

This discerning and comprehensive work will be a useful entry point for students embarking on study in petroleum law. Academics will find this timely examination to be an indispensable overview of upstream operations. Practitioners will find this book

Personal vehicles account for almost 25% of U.S. greenhouse gas emissions, and this share is increasing. The increase is due to several factors, including a growth in transportation demand and the decarbonization of electricity by 30% since 2007. Alternative technologies for road vehicles, such as battery electric, plug-in hybrid, and fuel cell powertrains have the potential to achieve significant emission reductions. Yet questions remain about the emissions and costs of these alternative technologies. This thesis evaluates the emissions reduction potential of vehicles with electrified powertrains, focusing on battery electric vehicles (BEVs). It evaluates this potential taking into account heterogeneous regional conditions and consumer behavior. Consumers help determine vehicle fleet emissions through their purchasing and driving decisions, which are guided in part by the costs of different options. Therefore, the costs of ownership of BEVs in comparison to conventional vehicles inform the emissions reduction potential of BEVs. Here,

we measure the lifecycle greenhouse gas emissions and costs of ownership of BEVs across different vehicle models as a function of travel patterns, driving styles, and properties of the natural, built, and institutional environment. We compare these costs and emissions to gasoline combustion engine vehicles (ICEVs), and then ask whether and under which condition electric vehicle adoption can play a central role in meeting emission targets for the transportation sector. The current literature does not cover all the interdependent sources of variation in the emissions and costs of BEVs compared to ICEVs. In particular, the effects of annual travel distance and fuel efficiency related to individual travel behavior and the wide variety of available vehicle models have not been assessed. In addition, this variation in emissions and costs of personal vehicles has only been studied across regions, but not across individual vehicles within each region due to vehicle-specific driving patterns. This work addresses these gaps by developing several interlinked models. This includes the construction of a parametrized lifecycle emissions and cost of ownership model (Chapter 2), an algorithm to measure driving style linked to a vehicle energy model (Chapter 3), and a model to quantify the variability in annual travel distance and fuel consumption of different types of vehicles across regions within the United States, encoded as zipcodes, and across individual vehicles within those zipcodes (Chapter 4). Chapter 5 then ties Chapters 2 and 4 together and complements them with additional information to assess the overall heterogeneity in the emissions reduction potential of BEVs. The central results of the thesis are threefold. First, a rapid decarbonization of electricity in conjunction with an electrification of powertrains will likely be required to meet emission targets for the U.S. transportation sector. Measures that relate to heterogeneous consumer behavior, such as improving driving style and nudging consumers towards purchasing smaller vehicles, can help to reduce greenhouse gas emissions. Second, the electrification of powertrains can come at little to no additional expense to consumers with today's technology and prices. In most parts of the country, BEVs are substantially cheaper than comparable ICEVs. Within regions, the individuals for which BEVs offer the greatest emissions savings would also tend to experience the largest cost savings, since both emissions savings and cost savings are correlated with annual travel distance. Third, emission reductions achieved by BEVs and their costs relative to ICEVs are highly heterogeneous. The within-region variation in emissions and costs of BEVs compared to ICEVs due to individual driving patterns is at least as large as the variation across regional averages. As a result, a 10% share of BEVs in the fleet can lead to anywhere between 1% and 10% emission reductions, depending on which types of vehicles are being replaced by electric vehicles, by whom, and where. A key application of this work is to inform tools that provide localized and personalized information about the environmental and economic performance of different vehicle models. In Chapter 6, we discuss such a tool that was built as part of this work, called Carboncounter.com. Results from a survey launched on Carboncounter add to existing evidence that providing such information to consumers can help inform a transition to a cleaner light-duty vehicle fleet. These findings further confirm the importance of understanding heterogeneous human behaviors to inform decarbonization strategies for personal transport.

Describes the scientific evidence for global warming and its likely consequences, and considers the political implications and what governments, businesses, and individuals can do about the phenomenon and the issues it evokes

In this first comprehensive handbook of the earth's sinks for greenhouse gases, leading researchers from around the world provide an expert synthesis of current understanding and uncertainties. It will be a valuable resource for students, researchers and practitioners in conservation, ecology and environmental studies.

EU climate law is one of the most dynamic and fastest growing areas of EU law. This exciting new textbook provides a comprehensive account of essential EU climate mitigation law. In addition, the contents cover a number of important and topical issues

Created by the continuous feedback of a student-tested, faculty-approved process, CHEM2 delivers a visually appealing, succinct print component, tear-out review cards for students and instructors, and a consistent online offering with OWLv2 that includes an eBook in addition to a set of interactive digital tools -- all at a value-based price and proven to increase retention and outcomes. CHEM2 also offers Go Chemistry and Thinkwell mini-video lectures, as well as online homework available through the OWL learning system. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

This 9th edition of the UN Environment Emissions Gap Report assesses the latest scientific studies on current and estimated future greenhouse gas emissions and compares these with the emission levels permissible for the world to progress on a least-cost pathway to achieve the goals of the Paris Agreement. This difference between "where we are likely to be and where we need to be" is known as the 'emissions gap'. As in previous years, the report explores some of the most important options available for countries to bridge the gap.

Controlling the level of greenhouse gas in the atmosphere is a rapidly growing area of commercial activity. While debate continues both about the impact of greenhouse gas on climate and the role humans play in influencing its concentration, engineers are faced with less controversial questions of how to manage this uncertainty and how to control greenhouse gases at a minimum cost to society. This book gives a concise review of current knowledge required for engineers to develop strategies to help us manage and adapt to climate change. It has been developed from the author's graduate course in environmental engineering. It is written without technical jargon so as to be accessible to a wide range of students and policymakers who do not necessarily have scientific or engineering backgrounds. Appendices allow readers to calculate for themselves the impact of the various strategies, and the book contains student exercises and references for further reading.

Divergence and Convergence of Automobile Fuel Economy RegulationsA Comparative Analysis of EU, Japan and the USSpringer

Medium- and heavy-duty trucks, motor coaches, and transit buses - collectively, "medium- and heavy-duty vehicles", or MHDVs - are used in every sector of the economy. The fuel consumption and greenhouse gas emissions of MHDVs have become a focus of legislative and regulatory action in the past few years. This study is a follow-on to the National Research

cases, inventories were prepared with support from other organizations. Preliminary inventories of twenty countries in Africa, Asia, Central and Eastern Europe and the Newly Independent States, and Latin America are presented, as well as regional and global syntheses of the national results. The regional and global syntheses also discuss results of eleven other preliminary national inventories that have been published elsewhere with the assistance of other programs. Results are discussed in the context of national and regional socioeconomic characteristics, and the regional and global syntheses compare national inventory estimates to other published estimates that are based largely on international databases. Papers also discuss inventory development issues, such as data collection and emission factor determination, and problems associated with applying the IPCC inventory methodologies. The preliminary inventory results reported here represent significant progress towards meeting country commitments under the Framework Convention, and provide useful information for refining international greenhouse gas emission databases and improving inventory methodologies. As the first book to compile national greenhouse gas emission estimates prepared by national experts in developing countries and countries with economies in transition, this will be an invaluable resource to scientists, policymakers, and development specialists in national, regional and global anthropogenic sources and sinks of greenhouse gases.

The world is getting hotter as it experiences the extremes of global climate change. In 1999, catastrophic storms hit Honduras, China and East India, bringing severe devastation to lives and national economies. El Niño swept across the Pacific in early 2000, inflicting the worst floods on Mozambique and neighbouring countries. Industrialised nations are not immune to global warming - cases of encephalitis, a disease transmitted by mosquitoes, were reported in the State of New York. In Antarctica, an iceberg seven times the size of Manhattan island broke loose and floated towards Cape Horn. The melting of Arctic glaciers also continues - huge volumes of fresh-water will disrupt the warm conveyor-belt from Central America to Europe. The net effect of convergent glacial drifts from the polar regions to the equator is expected to intensify cloud formation in the tropics - hence exacerbating global warming. As the destructive forces of nature intensify, so does the rhetoric from environmental organisations - as evidenced by the disruption of the last World Trade Organisation conference in Seattle. It is now up to civilisation to challenge climate change. It can achieve this by command and control as well as flexible mechanisms at home and abroad, before the process of global warming becomes totally irreversible. The Politics of Climate Change provides a critical analysis of the political, moral and legal response to climate change in the midst of significant socio-economic policy shifts. Evolving from original EC commissioned research, this book examines how climate change was put on the policy agenda, with the evolution of the United Nations Framework Convention and subsequent Conference of Parties. The international team of contributors devote in-depth chapters to: * climate change policies of different nations * reductions of greenhouse gas emissions * legal aspects of external competence and moral obligations * the political significance of the European experience within the wider global perspectives of America and Asia.

Authoritative overview of the requirements and costs of monitoring, reporting and verifying emissions from industry to regional and national levels.

This dissertation is comprised of six chapters which include a literature review (chapter 1), four experimental chapters (chapters 2, 3, 4 and 5) and a future research chapter (chapter 6). In chapter 2, measures of efficiency of Holstein and Jersey cows were assessed when fed alfalfa silage or corn silage in low or high forage fiber diets. Breed did not affect digestive and metabolic efficiencies. In contrast, methane and urinary energy (% gross energy intake) were lower for corn silage than alfalfa silage-fed cows; and compared to high, low forage fiber diets reduced loss of urinary N (g/d and % N intake). Neither breed nor dietary treatments affected methane intensity (g/kg fat-protein corrected milk). In chapter 3, the carry-over effects of same three treatment factors (cow breed, dietary forage source and forage level) on manure greenhouse gas (GHG) emissions (methane and nitrous oxide) during 50-d storage and followed by a 50-d field application were evaluated. Compared to high, low forage-fed cows tended to emit 51 to 72% (depending on mode of expressions) greater combined (storage plus field) GHG emissions which were not affected by cow breed and forage source. In chapter 4, we evaluated the carry-over effects of the same treatment factors on manure ammonia emissions. Compared to high, low forage fed cows emitted less ammonia expressed as per cow, per kg manure or percentage of manure N. Although, forage source did not affect ammonia emissions, cow breed did impact ammonia emissions expressed per cow being 17% greater for Holstein than Jersey. In chapter 5, we performed a cradle-to-gate life cycle assessment to determine the carbon footprint (CF) of milk for the same treatment factors using emission factors measured in our studies. Low forage-fed cows had 11% greater CF than high forage-fed cows whereas both forage sources and cow breeds (Holstein and Jersey) had similar CF. We concluded that GHG mitigation strategies (choice of cow breed or diet) need to be evaluated holistically using measurements specific to the production system under consideration since evaluations at the whole-farm scale led to different results than when completed at the animal scale.

Abstract : Liquid transportation biofuels are viewed as a promising alternative to fossil fuels to address energy security and climate change mitigation. Algae biomass and rapeseed were considered among the promising sources for renewable diesel and hydrotreated renewable jet (HRJ) fuel production. However, there are many challenges and technical barriers to implementation of a viable commercial process to produce biofuels from algae/oilseed. Biofuels production must typically go through a complicated series of unit processes for cultivation, harvesting, oil extraction, conversion, and other logistical steps. The impacts of their production pathway in terms of greenhouse gas (GHG) emission, land use impact, fossil energy demand have not been comprehensively studied and concerns have been raised about that large-scale biofuel production may place pressure on fresh water supplies and water quality, biodiversity, soil quality, and other sustainability impacts. Chapter 2 investigated the GHG emission impacts of algae biofuel when evaluating several potential uses for the lipid-extracted algae (LEA) generated as a co-product of algae biofuel production to substitute for the use of animal feed. Results indicated that the benefit from displacing animal feed does not outweigh the incremental burdens associated with replacing the requirements that LEA currently satisfies associated with the biofuel process, resulting in higher GHG emissions for the algae biofuels life cycle. Chapter 3 assessed the LUC impacts using IPCC Tier 1 methodology to assess potential emissions resulting from the conversion of proposed algae facility sites in the U.S. Gulf Coast. Direct LUC impacts appear to be important, which is roughly 6.3% and 12.5% of the total GHG emission over the entire algae renewable diesel life cycle without considering the LUC. Chapter 4 investigated the environmental impacts associated with the novel algae harvesting and oil extraction technologies. Results show that all novel technologies appear to have the potential to provide at least modest decreases in GHG compared to current default algae process technologies. The selection of a particular technology for a unit operation can have consequences that affect other stages of the full biofuels life cycle, both upstream and downstream from the unit operation in question. Chapter 5 developed a life cycle water footprint (WF) analysis informed by

inputs from multiple models for rapeseed HRJ fuel production in North Dakota, and evaluated the environmental impacts on water utilization and water quality due to large scale jet production. WF analysis, when combined with water-focused LCA, can be an effective system analysis tool for water sustainability. Discussions also carried out the importance of incorporating allocation within a life cycle approach when conducting biofuel WF analysis. Chapter 6 employed a model-based approach to conduct LCA of HRJ fuel produced from rotation of rapeseed with grain crops (mostly wheat) to replace the fallow period. Results show that introducing fuel oilseeds to existing crop rotations have significant advantages in terms of GHG emissions reductions compared to the current cropping practices. SOC sequestration and N₂O emissions vary along the oilseed price points, and are influenced by the fertilizer application, tillage system, crop rotations, and other management actions. The total energy demand for rapeseed HRJ production is larger than fossil jet fuel, however, most of the energy inputs are from renewable biomass and HRJ requires less fossil energy comparing to fossil jet. These results provide some insights on the potential impacts of expanded biofuel production systems in regional and national contexts compared to the current cropping systems and answered the questions of what is the best practice to enhance the sustainability of biofuel production.

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