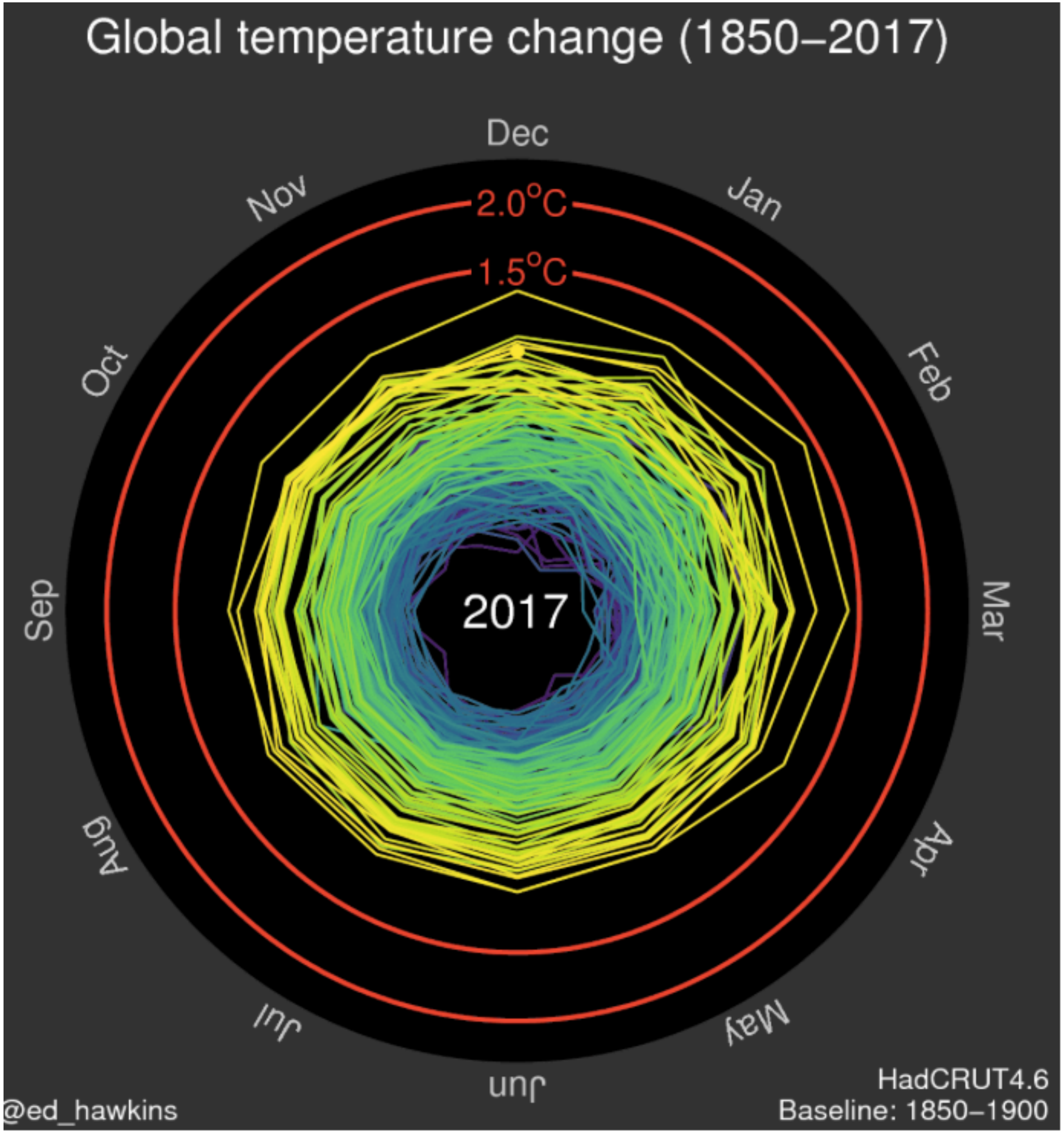
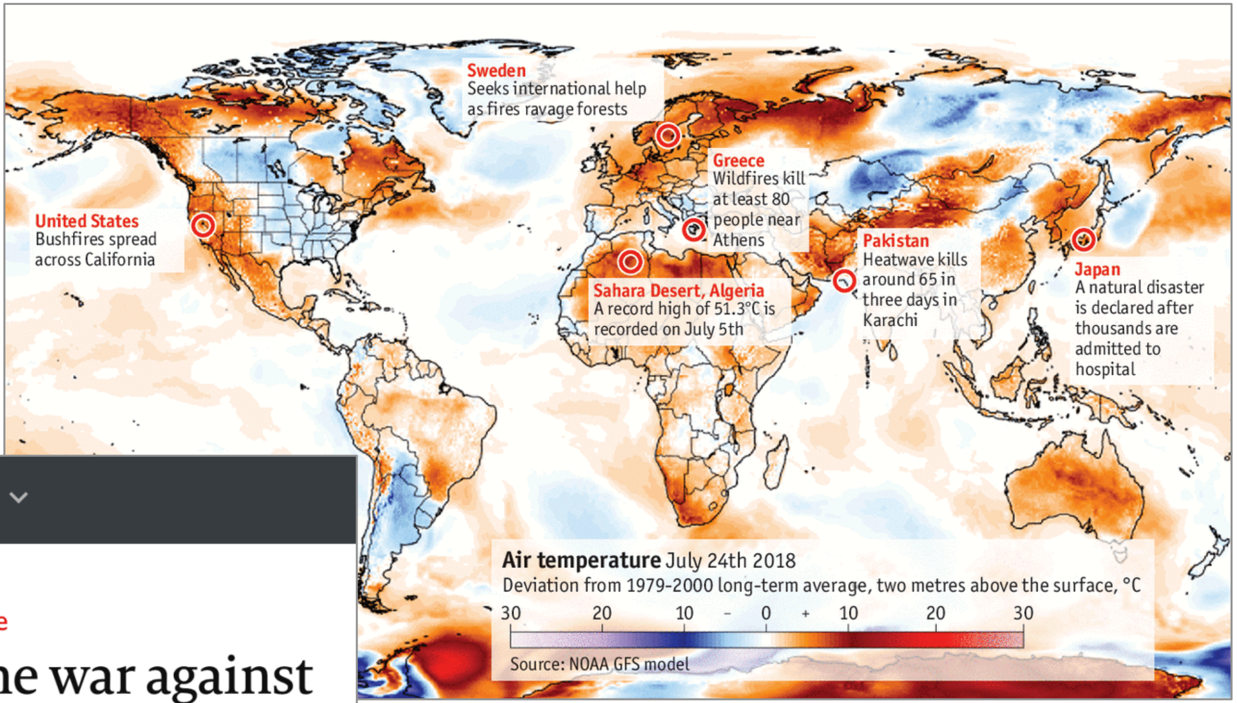
Cambio Climático y Mitigación: Poniendo un precio al carbono

Xavier Labandeira
Universidade de Vigo y Economics for Energy

Facultad de CC. Económicas, Universidad Complutense
Madrid, 22-05-2019


Global temperature change (1850–2017)
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
2.0°C
1.5°C
2017
@ed_hawkins
HadCRUT4.6
Baseline: 1850–1900


Sweden
Seeks international help as fires ravage forests
Greece
Wildfires kill at least 80 people near Athens
United States
Bushfires spread across California
Pakistan
Heatwave kills around 65 in three days in Karachi
Japan
A natural disaster is declared after thousands are admitted to hospital
Sahara Desert, Algeria
A record high of 51.3°C is recorded on July 5th
30
20
10
-
0
+
10
20
30

Air temperature July 24th 2018

Deviation from 1979-2000 long-term average, two metres above the surface, °C

Source: NOAA GFS model

The Economist, 28 julio 2018

(Heat is causing problems across the world)

The Economist

Topics ⌄ Current edition More ⌄

In the line of fire

The world is losing the war against climate change

Rising energy demand means use of fossil fuels is heading in the wrong direction

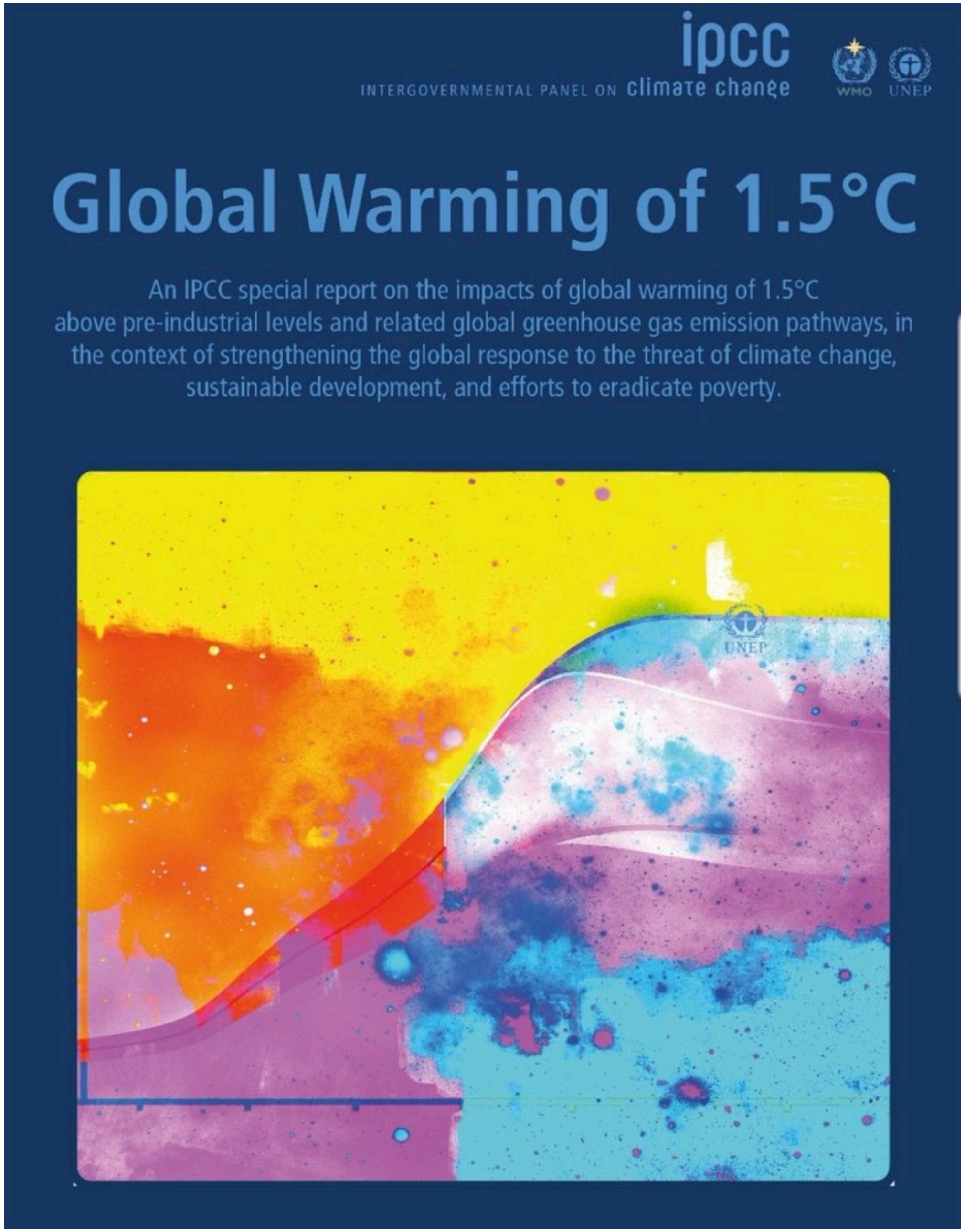
The Economist, 2 agosto 2018

Cambio climático: Fundamentos

- Sólida base científica
  - Atribución de eventos
  - Incertidumbres →
- El papel de la Economía
  - Eficiencia y Equidad
  - Externalidad negativa “perfecta”
    - Inmensa
    - Global
    - Intergeneracional (irreversibilidades)

Soluciones Globales

- Convención Marco sobre Cambio Climático (ONU)
- IPCC
- El Acuerdo de París
  - 2ºC a finales de siglo; 1.5ºC →
  - Contribuciones Nacionales Determinadas ‘extensas’
  - Flexibilidad
  - Es una buena opción? →
    - Voluntarismo y efectividad
  - Un “club” climático “a la Nordhaus”?



ipcc

INTERGOVERNMENTAL PANEL ON climate change

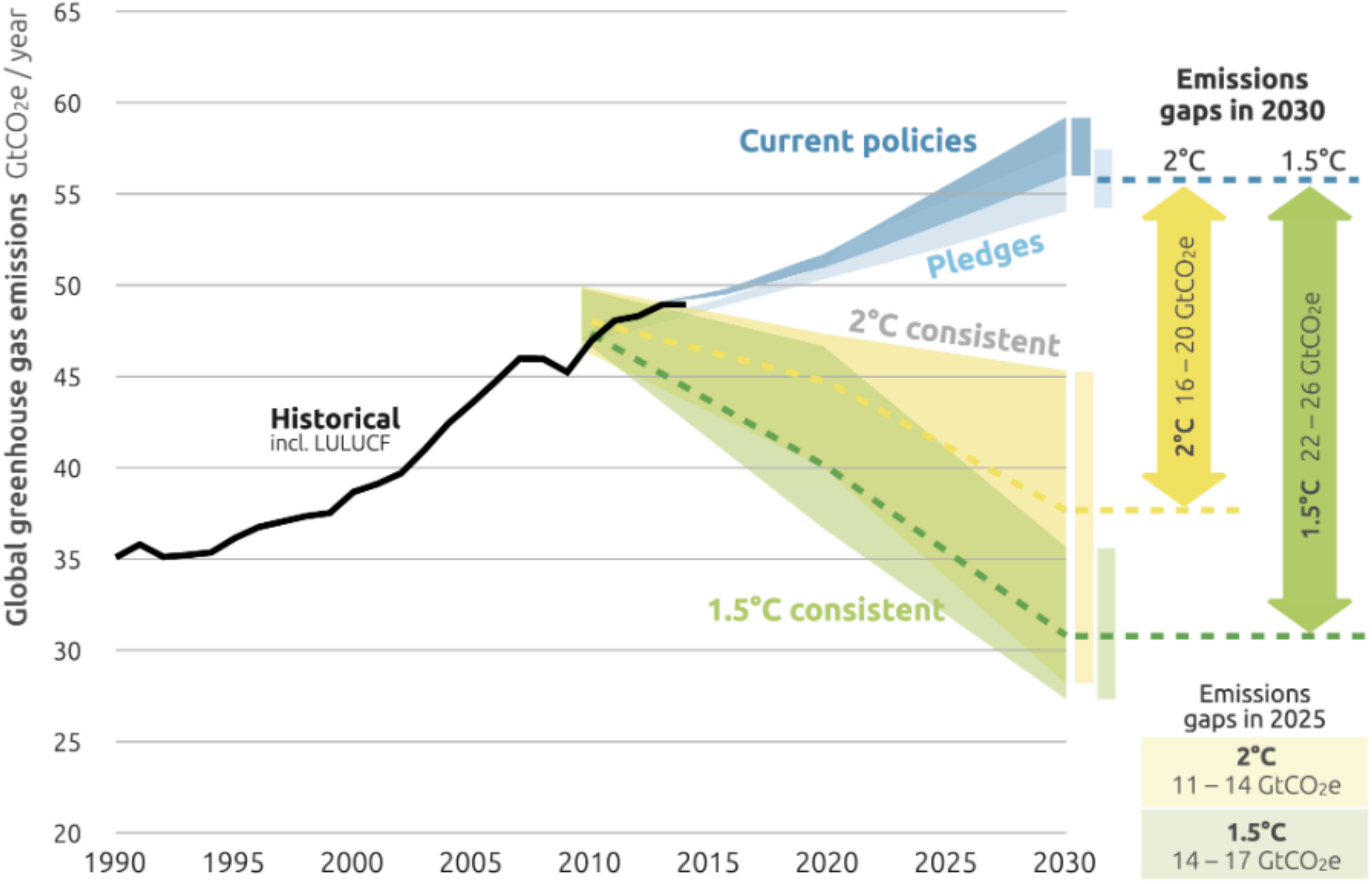
WMO UNEP

Global Warming of 1.5°C

An IPCC special report on the impacts of global warming of 1.5°C
above pre-industrial levels and related global greenhouse gas emission pathways, in
the context of strengthening the global response to the threat of climate change,
sustainable development, and efforts to eradicate poverty.

2030 EMISSIONS GAPS

CAT 2017 projections and resulting emissions gaps in meeting the Paris Agreement's temperature goals

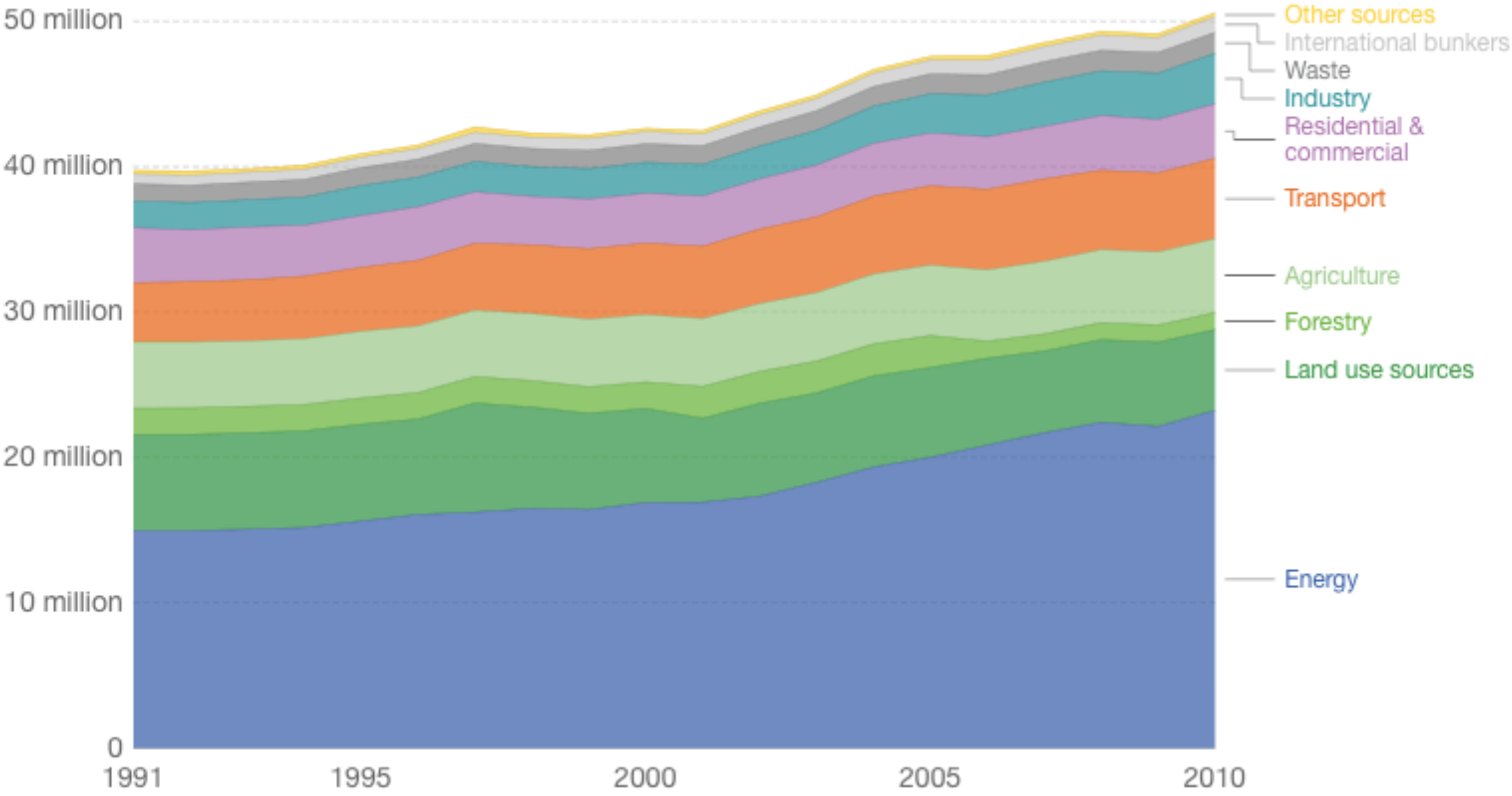


The "gap" range results only from uncertainties in the pledge projections. Gaps are calculated against the mean of the benchmark emissions for 1.5°C and 2°C.

Global greenhouse gas emissions (CO_2e) by sector

Our World in Data

Breakdown of total global greenhouse gas emissions by sector, measured in gigagrams of carbon-dioxide equivalents (CO_2e). Carbon dioxide equivalents measures the total greenhouse gas potential of the full combination of gases, weighted by their relative warming impacts.



Source: UN Food and Agricultural Organization (FAO)

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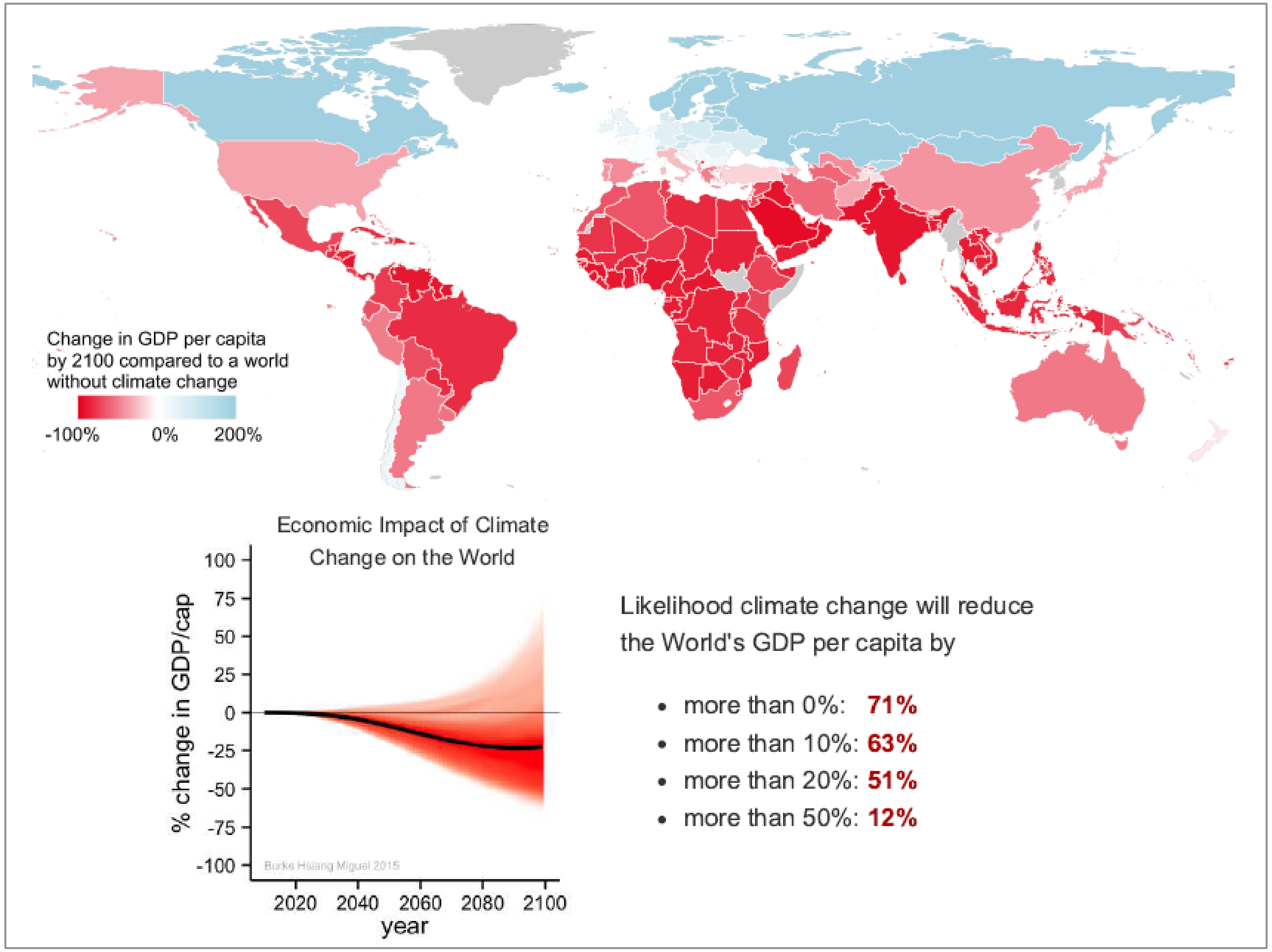
Impactos

- Actividades primarias
- Salud
- Capital natural

Adaptación

- Autónoma
- Infraestructural
- Capacidad económica

Efectos sobre PIB del cambio climático


Change in GDP per capita
by 2100 compared to a world
without climate change
-100%
0%
200%
Economic Impact of Climate
Change on the World
100
75
50
25
0
-25
-50
-75
-100
% change in GDP/cap
Burke Hsiang Miguel 2015
2020
2040
2060
2080
2100
year

Likelihood climate change will reduce the World's GDP per capita by

- more than 0%: **71%**
- more than 10%: **63%**
- more than 20%: **51%**
- more than 50%: **12%**

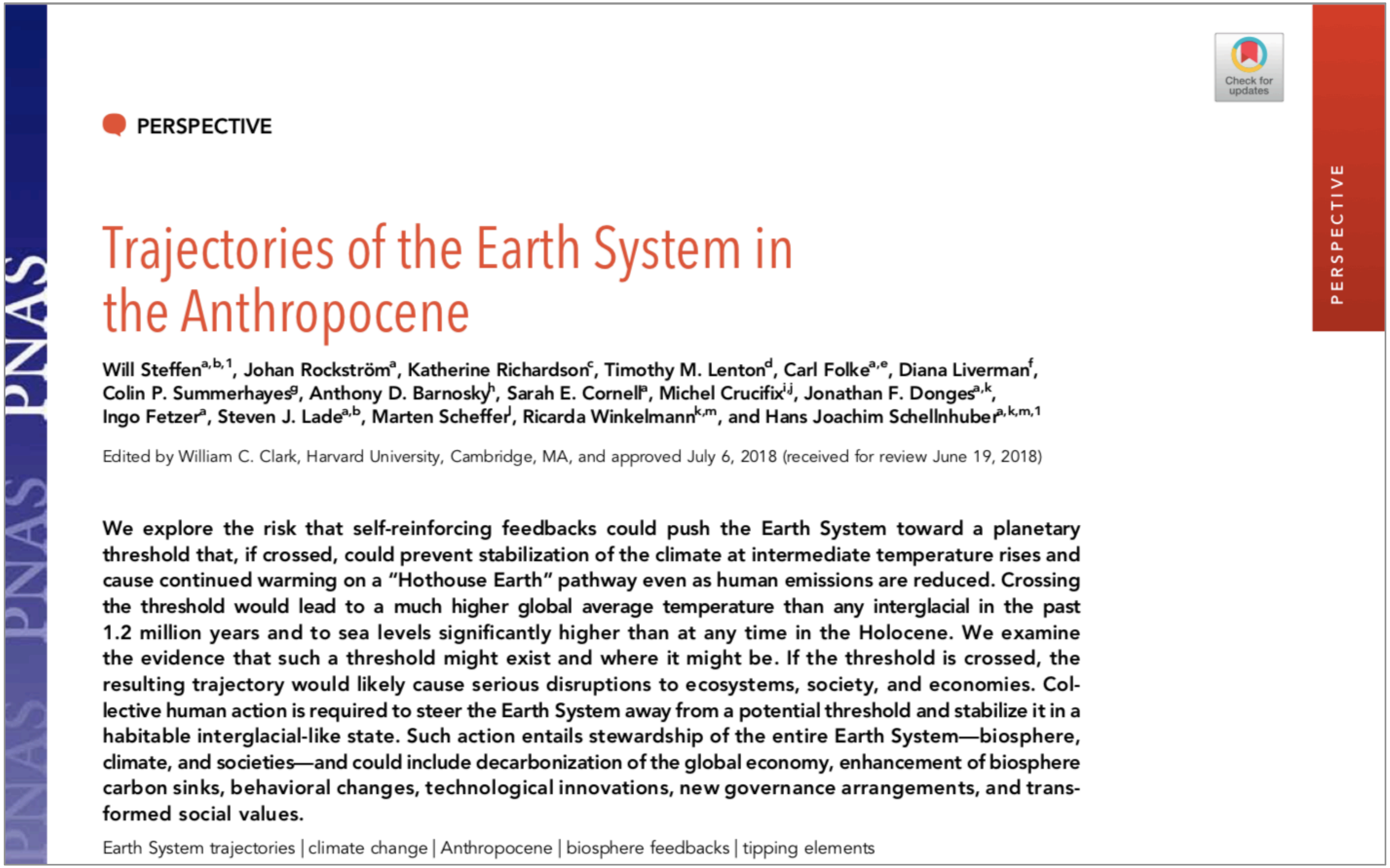
Fuente: Burke et al. (2015)

Mitigación

- Sistema energético: fuentes descarbonizadas
- Papel crucial de eficiencia energética
- Transporte
- Uso de suelo

Aspectos distributivos globales

Un paper reciente…



PERSPECTIVE

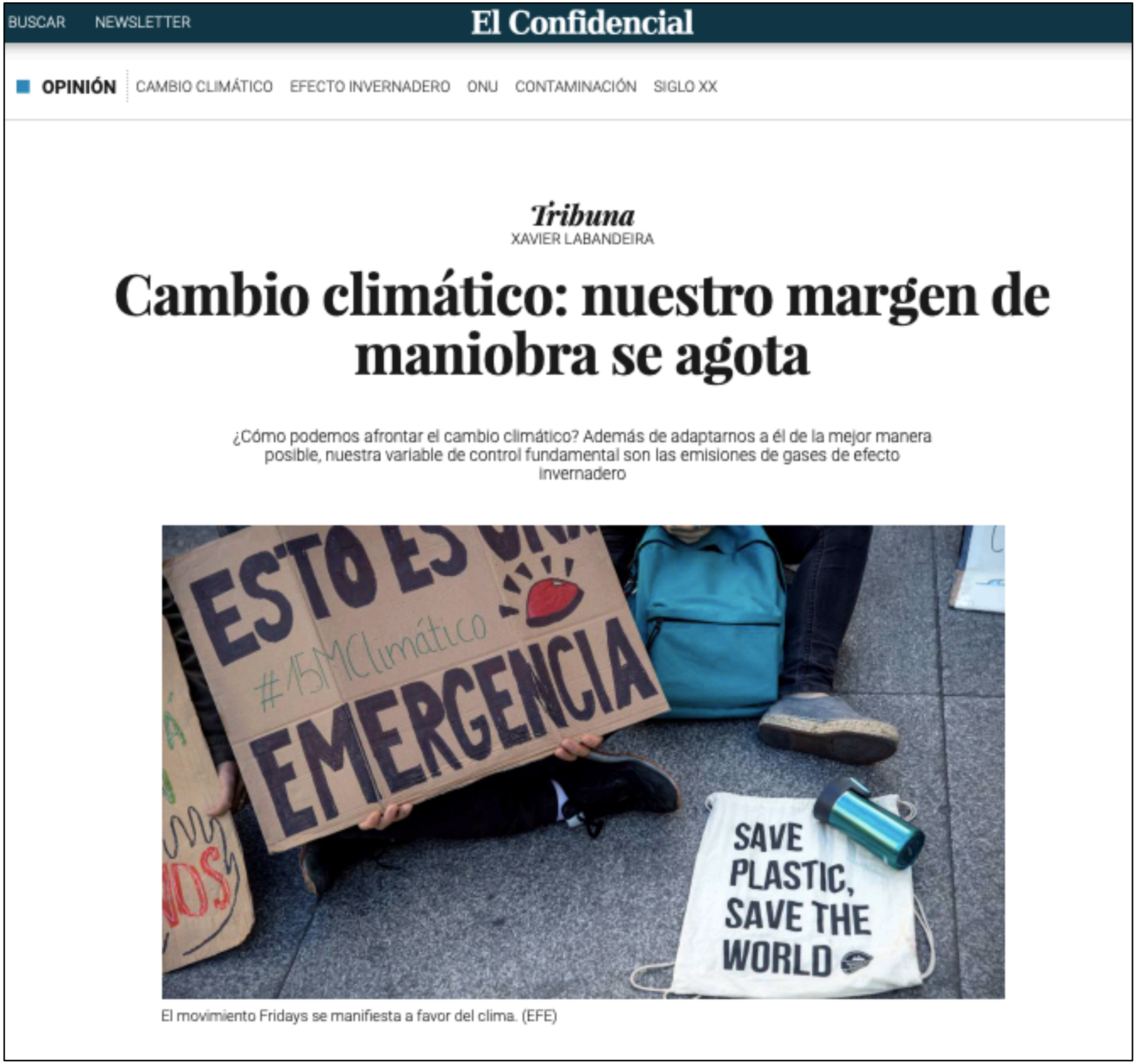
Trajectories of the Earth System in the Anthropocene

Will Steffen[a,b,1], Johan Rockström[a], Katherine Richardson[c], Timothy M. Lenton[d], Carl Folke[a,e], Diana Liverman[f], Colin P. Summerhayes[g], Anthony D. Barnosky[h], Sarah E. Cornell[a], Michel Crucifix[i,j], Jonathan F. Donges[a,k], Ingo Fetzer[a], Steven J. Lade[a,b], Marten Scheffer[l], Ricarda Winkelmann[k,m], and Hans Joachim Schellnhuber[a,k,m,1]

Edited by William C. Clark, Harvard University, Cambridge, MA, and approved July 6, 2018 (received for review June 19, 2018)

We explore the risk that self-reinforcing feedbacks could push the Earth System toward a planetary threshold that, if crossed, could prevent stabilization of the climate at intermediate temperature rises and cause continued warming on a "Hothouse Earth" pathway even as human emissions are reduced. Crossing the threshold would lead to a much higher global average temperature than any interglacial in the past 1.2 million years and to sea levels significantly higher than at any time in the Holocene. We examine the evidence that such a threshold might exist and where it might be. If the threshold is crossed, the resulting trajectory would likely cause serious disruptions to ecosystems, society, and economies. Collective human action is required to steer the Earth System away from a potential threshold and stabilize it in a habitable interglacial-like state. Such action entails stewardship of the entire Earth System—biosphere, climate, and societies—and could include decarbonization of the global economy, enhancement of biosphere carbon sinks, behavioral changes, technological innovations, new governance arrangements, and transformed social values.

Earth System trajectories | climate change | Anthropocene | biosphere feedbacks | tipping elements


BUSCAR
NEWSLETTER
OPINIÓN
CAMBIO CLIMÁTICO
EFECTO INVERNADERO
ONU
CONTAMINACIÓN
SIGLO XX
ESTO ES UN
#15MClimático
EMERGENCIA
SAVE PLASTIC, SAVE THE WORLD

El Confidencial

Tribuna

XAVIER LABANDEIRA

Cambio climático: nuestro margen de maniobra se agota

¿Cómo podemos afrontar el cambio climático? Además de adaptarnos a él de la mejor manera posible, nuestra variable de control fundamental son las emisiones de gases de efecto invernadero

El movimiento Fridays se manifiesta a favor del clima. (EFE)

Políticas públicas de mitigación

- Limitaciones:
  - Variables de control
  - Ventana de oportunidad para coste-efectividad
- Precios: mercados e impuestos →
- Regulación convencional
- Innovación y despliegue tecnológico

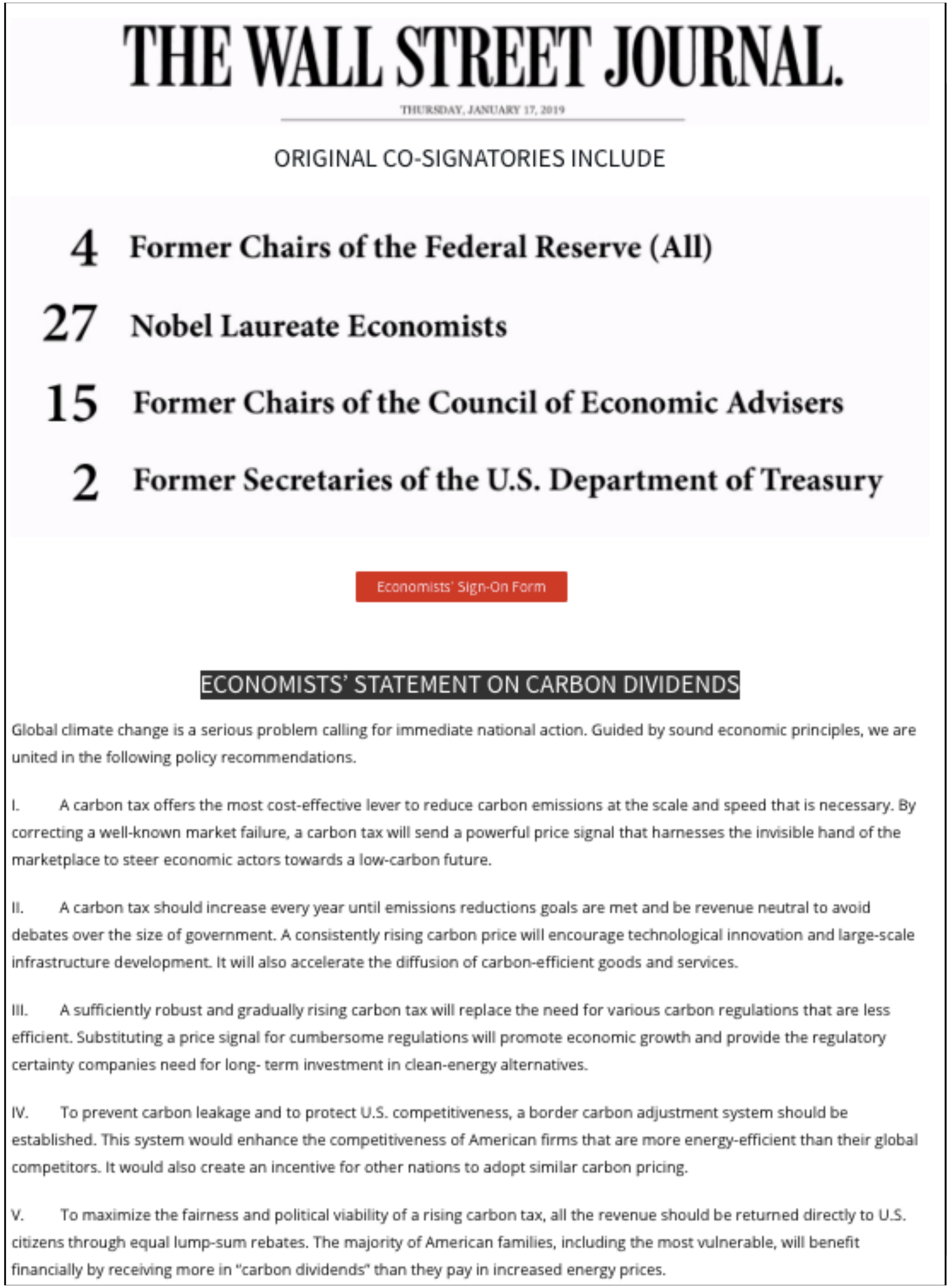
> Movilización de inversión

> Cambio de comportamiento

Por qué precios sobre el carbono?

- Precios finales reflejan costes sociales
- Coste-efectividad
- Promueven innovación
- Cambio de entorno: Inversión "verde"
- Obtienen recursos públicos:
    - Compensaciones distributivas
    - Financian cambio de modelo

Facilitan Transición



THE WALL STREET JOURNAL.

THURSDAY, JANUARY 17, 2019

ORIGINAL CO-SIGNATORIES INCLUDE

4 Former Chairs of the Federal Reserve (All)

27 Nobel Laureate Economists

15 Former Chairs of the Council of Economic Advisers

2 Former Secretaries of the U.S. Department of Treasury

ECONOMISTS' STATEMENT ON CARBON DIVIDENDS

Global climate change is a serious problem calling for immediate national action. Guided by sound economic principles, we are united in the following policy recommendations.

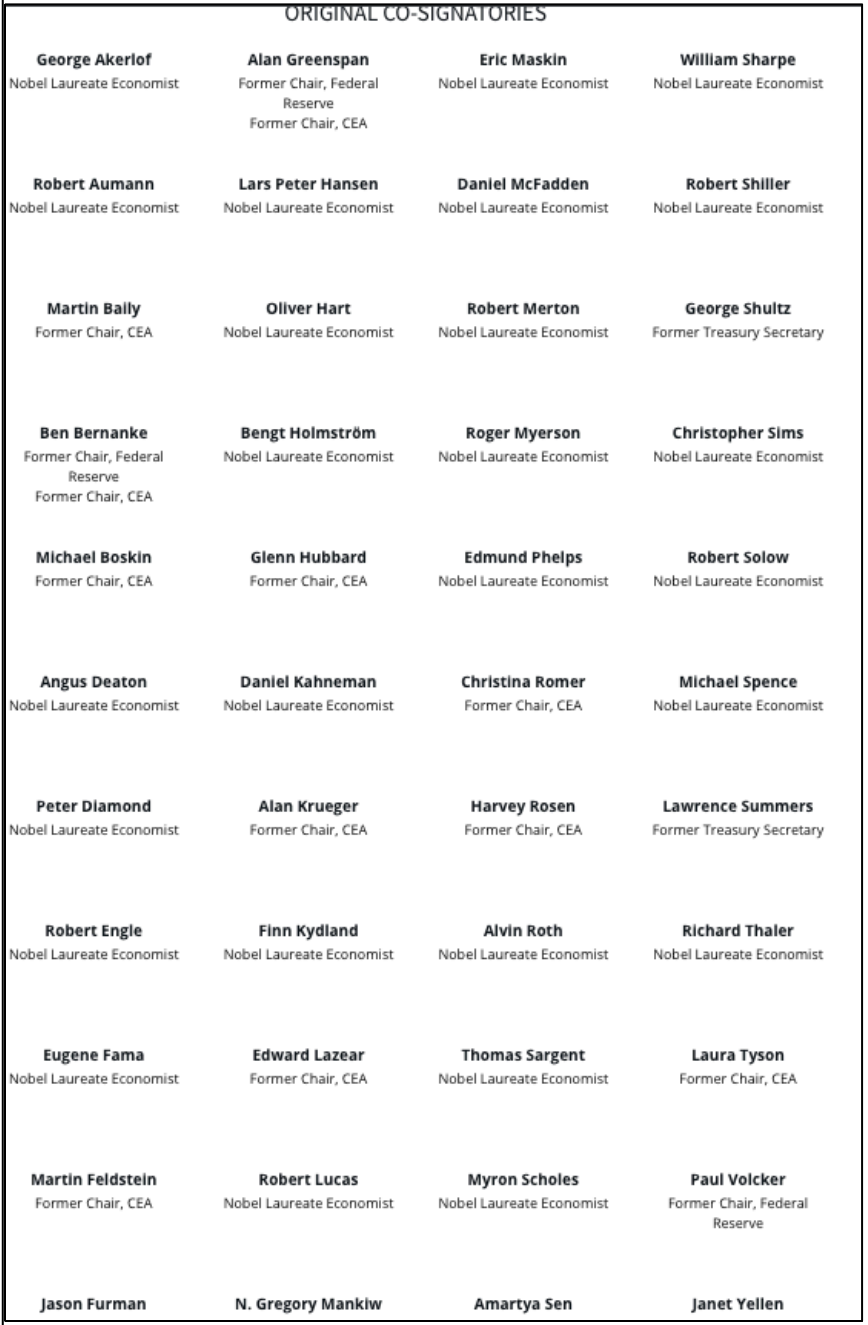
I. A carbon tax offers the most cost-effective lever to reduce carbon emissions at the scale and speed that is necessary. By correcting a well-known market failure, a carbon tax will send a powerful price signal that harnesses the invisible hand of the marketplace to steer economic actors towards a low-carbon future.

II. A carbon tax should increase every year until emissions reductions goals are met and be revenue neutral to avoid debates over the size of government. A consistently rising carbon price will encourage technological innovation and large-scale infrastructure development. It will also accelerate the diffusion of carbon-efficient goods and services.

III. A sufficiently robust and gradually rising carbon tax will replace the need for various carbon regulations that are less efficient. Substituting a price signal for cumbersome regulations will promote economic growth and provide the regulatory certainty companies need for long- term investment in clean-energy alternatives.

IV. To prevent carbon leakage and to protect U.S. competitiveness, a border carbon adjustment system should be established. This system would enhance the competitiveness of American firms that are more energy-efficient than their global competitors. It would also create an incentive for other nations to adopt similar carbon pricing.

V. To maximize the fairness and political viability of a rising carbon tax, all the revenue should be returned directly to U.S. citizens through equal lump-sum rebates. The majority of American families, including the most vulnerable, will benefit financially by receiving more in "carbon dividends" than they pay in increased energy prices.



ORIGINAL CO-SIGNATORIES

George Akerlof Nobel Laureate Economist	**Alan Greenspan** Former Chair, Federal Reserve Former Chair, CEA	**Eric Maskin** Nobel Laureate Economist	**William Sharpe** Nobel Laureate Economist
Robert Aumann Nobel Laureate Economist	**Lars Peter Hansen** Nobel Laureate Economist	**Daniel McFadden** Nobel Laureate Economist	**Robert Shiller** Nobel Laureate Economist
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Ben Bernanke Former Chair, Federal Reserve Former Chair, CEA	**Bengt Holmström** Nobel Laureate Economist	**Roger Myerson** Nobel Laureate Economist	**Christopher Sims** Nobel Laureate Economist
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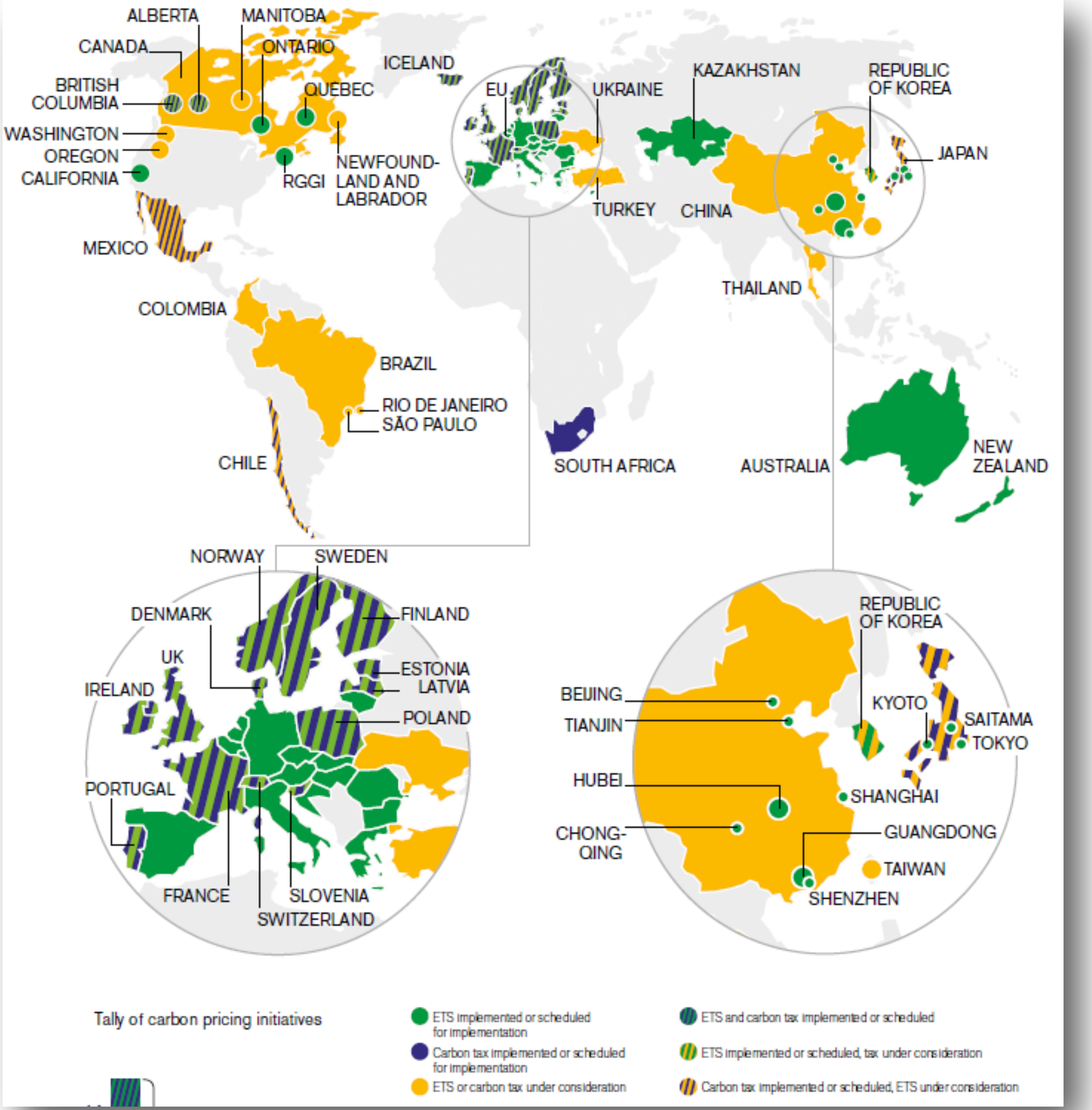
Martin Feldstein Former Chair, CEA	**Robert Lucas** Nobel Laureate Economist	**Myron Scholes** Nobel Laureate Economist	**Paul Volcker** Former Chair, Federal Reserve
Jason Furman	**N. Gregory Mankiw**	**Amartya Sen**	**Janet Yellen**


ALBERTA
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ONTARIO
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CALIFORNIA
RGGI
NEWFOUND-LAND AND LABRADOR
MEXICO
EU
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KAZAKHSTAN
REPUBLIC OF KOREA
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CHINA
THAILAND
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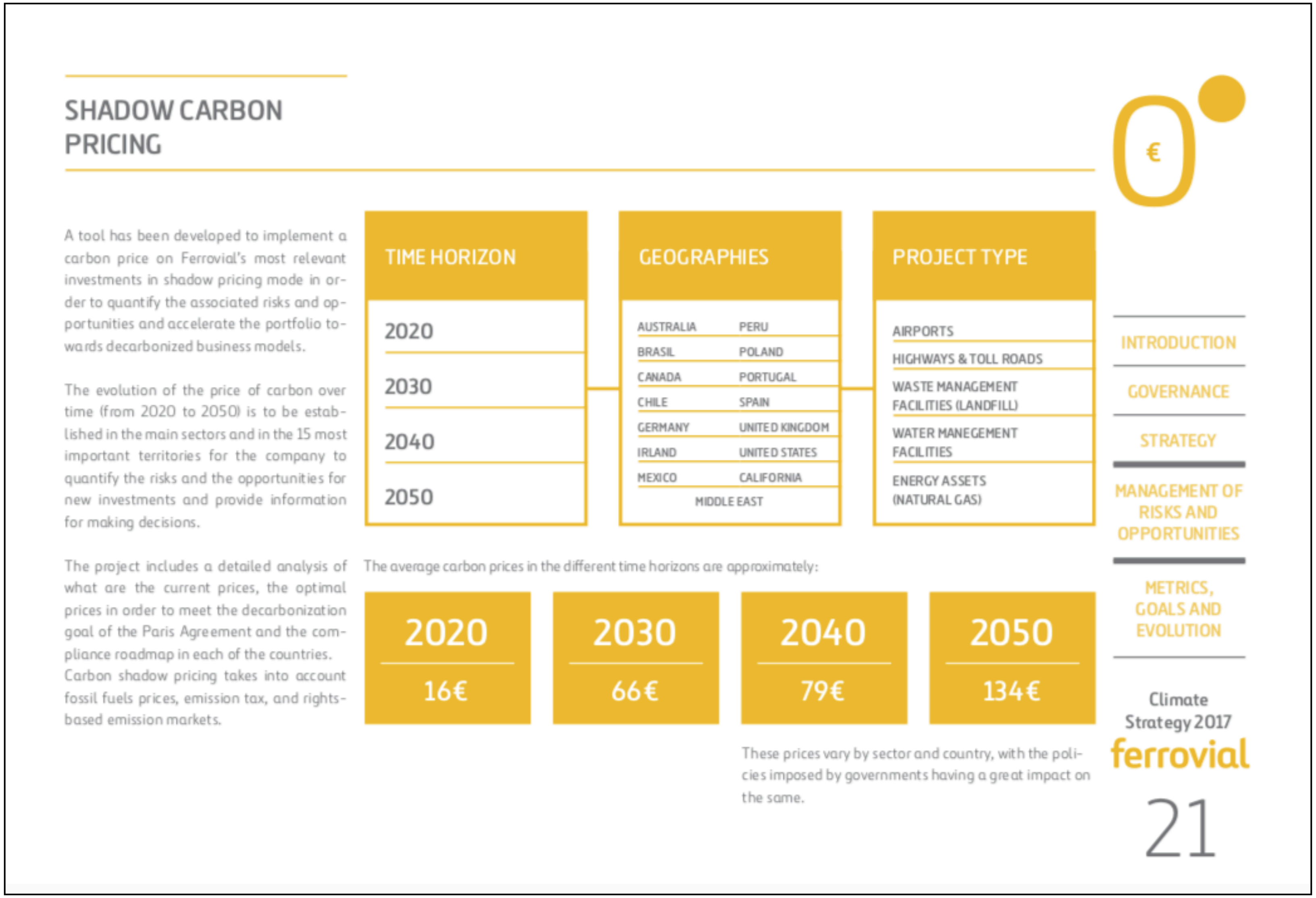
SWITZERLAND
REPUBLIC OF KOREA
BEIJING
TIANJIN
KYOTO
SAITAMA
TOKYO
HUBEI
SHANGHAI
CHONG-QING
GUANGDONG
TAIWAN
SHENZHEN
Tally of carbon pricing initiatives
ETS implemented or scheduled for implementation
Carbon tax implemented or scheduled for implementation
ETS or carbon tax under consideration
ETS and carbon tax implemented or scheduled
ETS implemented or scheduled, tax under consideration
Carbon tax implemented or scheduled, ETS under consideration

Fuente: Banco Mundial (2017)

Precios de carbono en la empresa



SHADOW CARBON PRICING

A tool has been developed to implement a carbon price on Ferrovial's most relevant investments in shadow pricing mode in order to quantify the associated risks and opportunities and accelerate the portfolio towards decarbonized business models.

The evolution of the price of carbon over time (from 2020 to 2050) is to be established in the main sectors and in the 15 most important territories for the company to quantify the risks and the opportunities for new investments and provide information for making decisions.

The project includes a detailed analysis of what are the current prices, the optimal prices in order to meet the decarbonization goal of the Paris Agreement and the compliance roadmap in each of the countries. Carbon shadow pricing takes into account fossil fuels prices, emission tax, and rights-based emission markets.

TIME HORIZON

- 2020
- 2030
- 2040
- 2050

GEOGRAPHIES

- AUSTRALIA
- BRASIL
- CANADA
- CHILE
- GERMANY
- IRLAND
- MEXICO
- PERU
- POLAND
- PORTUGAL
- SPAIN
- UNITED KINGDOM
- UNITED STATES
- CALIFORNIA
- MIDDLE EAST

PROJECT TYPE

- AIRPORTS
- HIGHWAYS & TOLL ROADS
- WASTE MANAGEMENT FACILITIES (LANDFILL)
- WATER MANEGEMENT FACILITIES
- ENERGY ASSETS (NATURAL GAS)

The average carbon prices in the different time horizons are approximately:

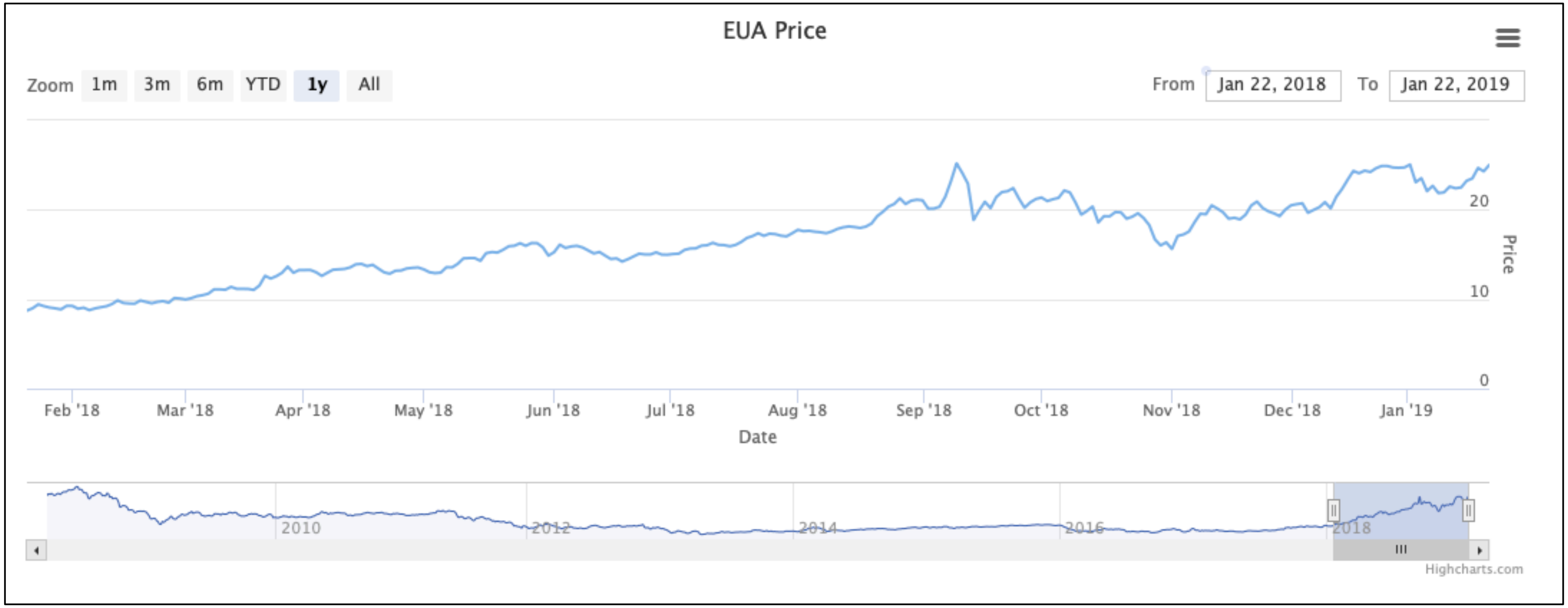
2020	2030	2040	2050
16€	66€	79€	134€

These prices vary by sector and country, with the policies imposed by governments having a great impact on the same.

La política climática de la Unión Europea

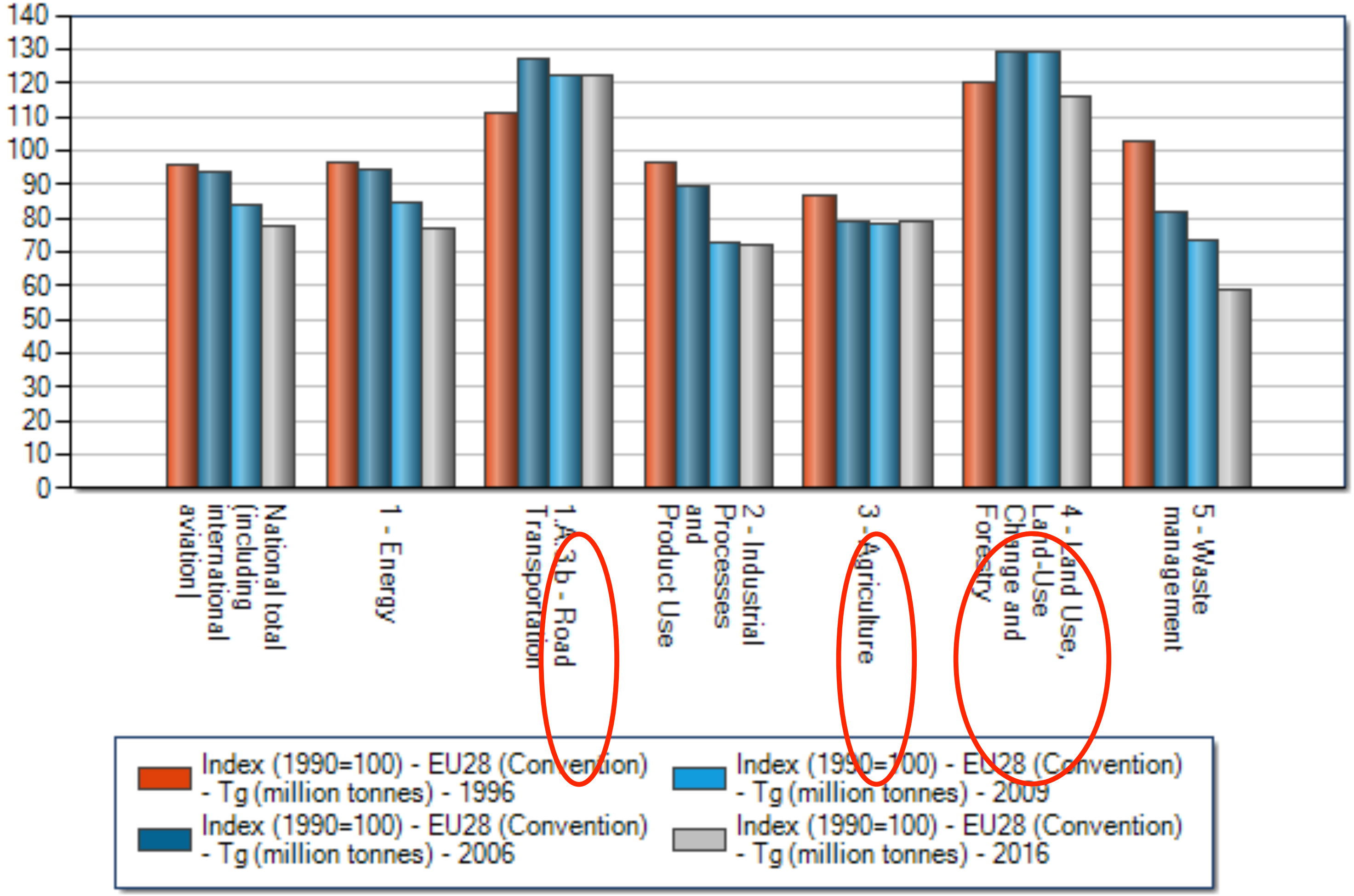
- **Ambición creciente (**Parlamento Europeo 10-11/2018)
- **Precios como elemento central de descarbonización** →
- **Eficiencia energética**
- **Promoción de renovables**
- **Algunas dificultades**
  - **Estados proactivos y reactivos**
  - **Preocupaciones sobre competitividad industrial**
  - **Transporte**
  - **Interacción de instrumentos**
- **Un prototipo para el mundo?**

Sistema Europeo de Comercio de Emisiones


EUA Price
Zoom
1m
3m
6m
YTD
1y
All
From
Jan 22, 2018
To
Jan 22, 2019
20
10
0
Price
Feb '18
Mar '18
Apr '18
May '18
Jun '18
Jul '18
Aug '18
Sep '18
Oct '18
Nov '18
Dec '18
Jan '19
Date
2010
2012
2014
2016
2018
Highcharts.com

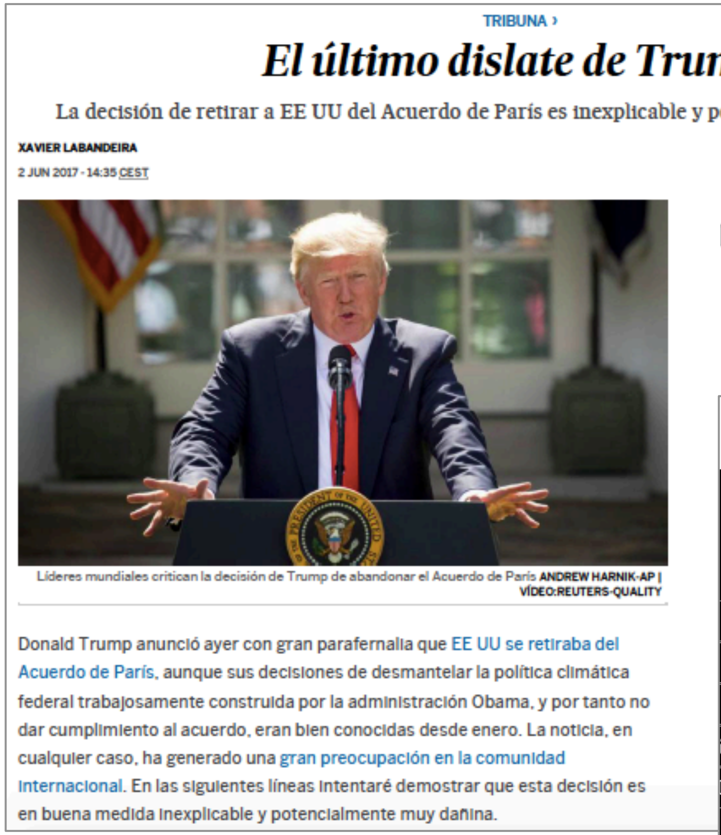
Fuente: Sandbag

“EU emissions’ reduction is unsatisfactory”



Fuente: Faiella (2018)

Sombras y luces en EE.UU.



TRIBUNA ›

El último dislate de Trump

La decisión de retirar a EE UU del Acuerdo de París es inexplicable y potencialmente muy dañina

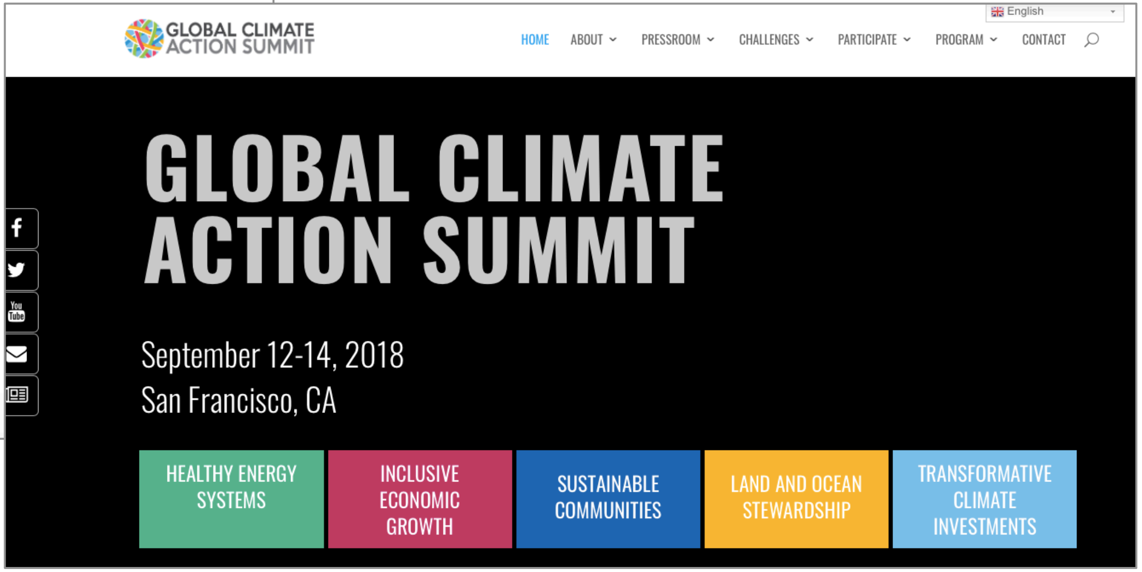
XAVIER LABANDEIRA

2 JUN 2017 - 14:35 CEST

Líderes mundiales critican la decisión de Trump de abandonar el Acuerdo de París **ANDREW HARNIK-AP | VÍDEO:REUTERS-QUALITY**

NEWSLETTERS
Recibe el boletín de Opinión

Donald Trump anunció ayer con gran parafernalia que EE UU se retiraba del Acuerdo de París, aunque sus decisiones de desmantelar la política climática federal trabajosamente construida por la administración Obama, y por tanto no dar cumplimiento al acuerdo, eran bien conocidas desde enero. La noticia, en cualquier caso, ha generado una gran preocupación en la comunidad internacional. En las siguientes líneas intentaré demostrar que esta decisión es en buena medida inexplicable y potencialmente muy dañina.

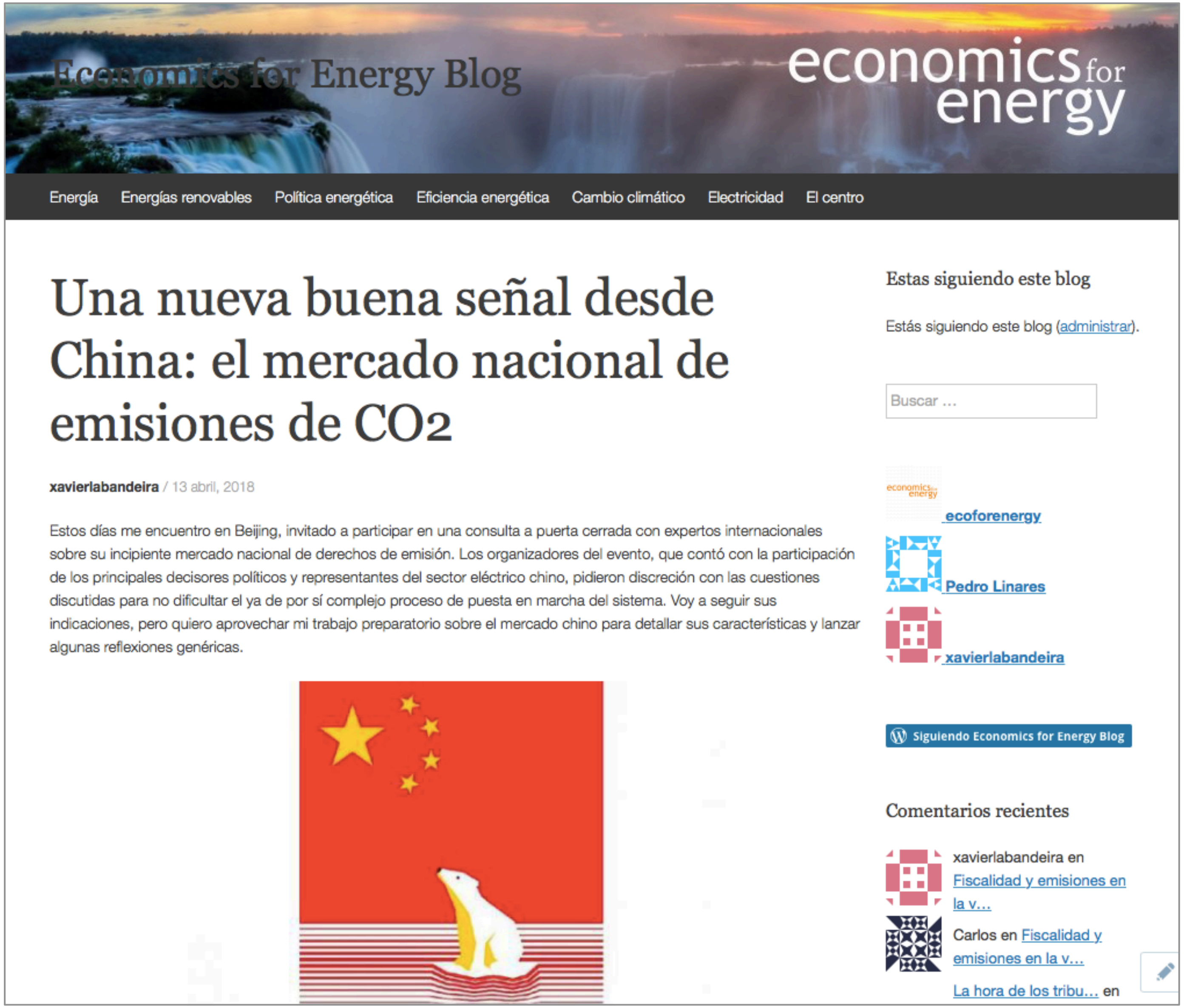


GLOBAL CLIMATE ACTION SUMMIT

September 12-14, 2018
San Francisco, CA

English
GLOBAL CLIMATE ACTION SUMMIT
HOME
ABOUT
PRESSROOM
CHALLENGES
PARTICIPATE
PROGRAM
CONTACT
HEALTHY ENERGY SYSTEMS
INCLUSIVE ECONOMIC GROWTH
SUSTAINABLE COMMUNITIES
LAND AND OCEAN STEWARDSHIP
TRANSFORMATIVE CLIMATE INVESTMENTS

China: de problema a solución?


Economics for Energy Blog
economics for energy
Energía
Energías renovables
Política energética
Eficiencia energética
Cambio climático
Electricidad
El centro
Buscar …
Siguiendo Economics for Energy Blog

Una nueva buena señal desde China: el mercado nacional de emisiones de CO2

xavierlabandeira / 13 abril, 2018

Estos días me encuentro en Beijing, invitado a participar en una consulta a puerta cerrada con expertos internacionales sobre su incipiente mercado nacional de derechos de emisión. Los organizadores del evento, que contó con la participación de los principales decisores políticos y representantes del sector eléctrico chino, pidieron discreción con las cuestiones discutidas para no dificultar el ya de por sí complejo proceso de puesta en marcha del sistema. Voy a seguir sus indicaciones, pero quiero aprovechar mi trabajo preparatorio sobre el mercado chino para detallar sus características y lanzar algunas reflexiones genéricas.

Estas siguiendo este blog

Estás siguiendo este blog (administrar).

ecoforenergy

Pedro Linares

xavierlabandeira

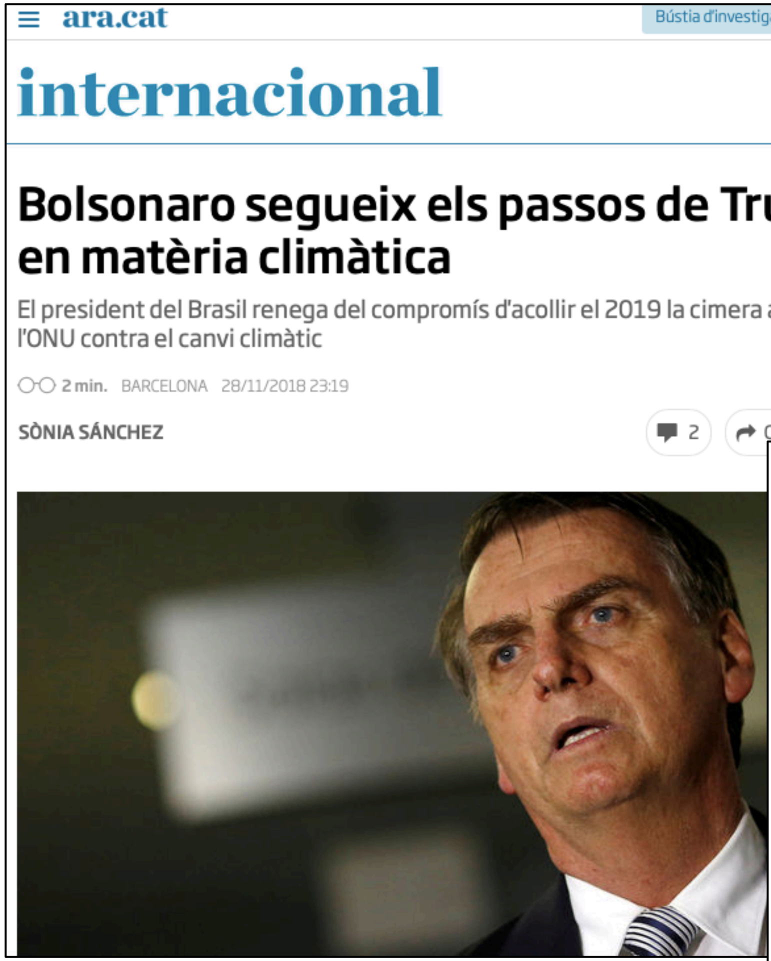
Comentarios recientes

xavierlabandeira en Fiscalidad y emisiones en la v…

Carlos en Fiscalidad y emisiones en la v…

La hora de los tribu… en

Malas noticias desde Brasil



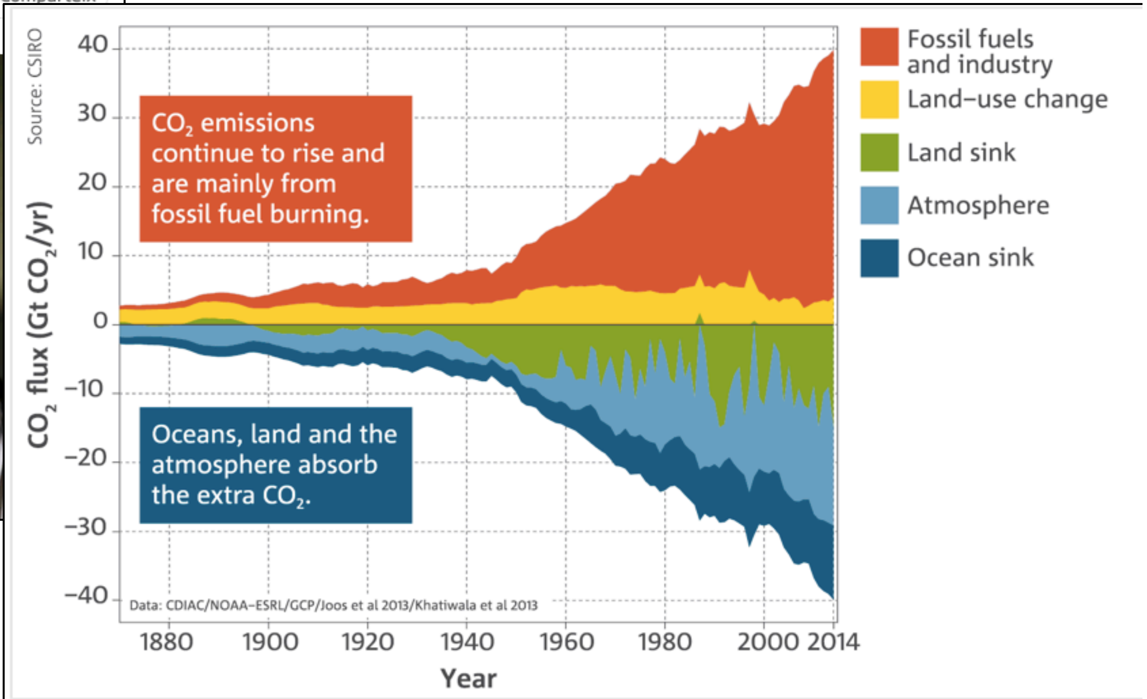
internacional

Bolsonaro segueix els passos de Trump en matèria climàtica

El president del Brasil renega del compromís d'acollir el 2019 la cimera anual de l'ONU contra el canvi climàtic

2 min. BARCELONA 28/11/2018 23:19

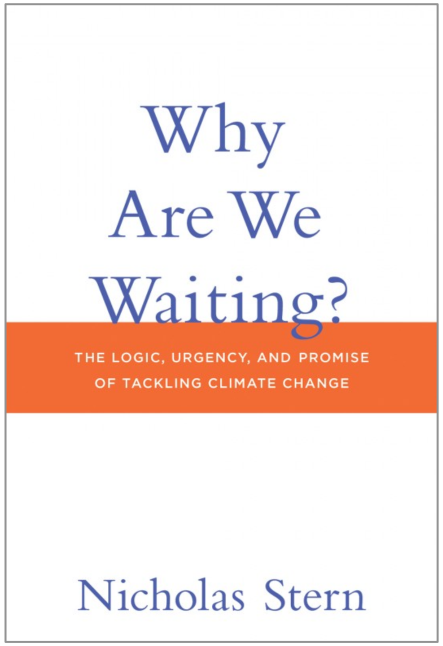
SÒNIA SÁNCHEZ



Annual fluxes of CO$_2$ and their changing sources (e.g. fossil fuels) and sinks (e.g. the ocean absorbing CO$_2$). About 30 per cent of the anthropogenic (caused by human activity) CO$_2$ emissions have been taken up by the ocean and about 30 per cent by land. The remaining 40 per cent of emissions have led to an increase in the concentration of CO$_2$ in the atmosphere. Data: CDIAC/NOAA-ESRL/GCP/Joos et al., 2013 and Khatiwala et al., 2013. ©CSIRO

Barreras al progreso global

- **Ganadores y perdedores**
- **Pérdidas de valor empresarial (y país)**
- **Recursos para transformación: *Lock in***
- **Preferencias de los ciudadanos**
- **Transformación del mundo emergente: Stern *vs* China**


Why Are We Waiting?
THE LOGIC, URGENCY, AND PROMISE OF TACKLING CLIMATE CHANGE
Nicholas Stern

La Maleta de la compra
QUIÉNES SOMOS
AUTORES
LA TIENDA DE LA MALETA
NOTICIAS
CONTACTO
Inicia sesión

LA MALETA
DE PORTBOU

#31 / SEPTIEMBRE - OCTUBRE

LA NUEVA MUTACIÓN DEL CAPITALISMO

2050: ESCENARIOS DEL CAMBIO CLIMÁTICO

XAVIER LABANDEIRA

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Imaginar la economía y sociedad de mediados de siglo es, en momentos de cambios acelerados como los que estamos viviendo en las últimas décadas, un ejercicio ciertamente difícil (para algunos imposible). Sin embargo, es el pan de cada día para los académicos que operamos en el ámbito del cambio climático. Y no sólo porque nos encontramos ante un problema netamente dinámico, en el que los efectos más importantes empezarán a sentirse en la segunda mitad de siglo, sino porque todas las estrategias correctoras están también asociadas a procesos temporales muy largos (cambios en la dotación de recursos, procesos de inversión, etcétera). En este artículo voy a situarme en un mundo a treinta años vista en el que el cambio climático está generando importantes efectos sobre nuestras sociedades, aunque con escenarios diversos fruto de transiciones alternativas, e intentaré apuntar algunas tendencias que pueden aventurarse en la economía y

Transiciones a 2050 (descarbonización 2ºC)

- **2030: ODS, CND, flexibilidad? Efectos sobre stock?**
- **2050: Cambio climático relevante, pero diversidad de escenarios en función de la efectividad del Acuerdo de París**
- **Políticas públicas**
  - **Planificación vs mercado?**
  - **Cruciales aspectos distributivos**
- **Importantes interacciones**
  - **Tecnología; demografía; sector financiero**
- **Implicaciones geopolíticas**

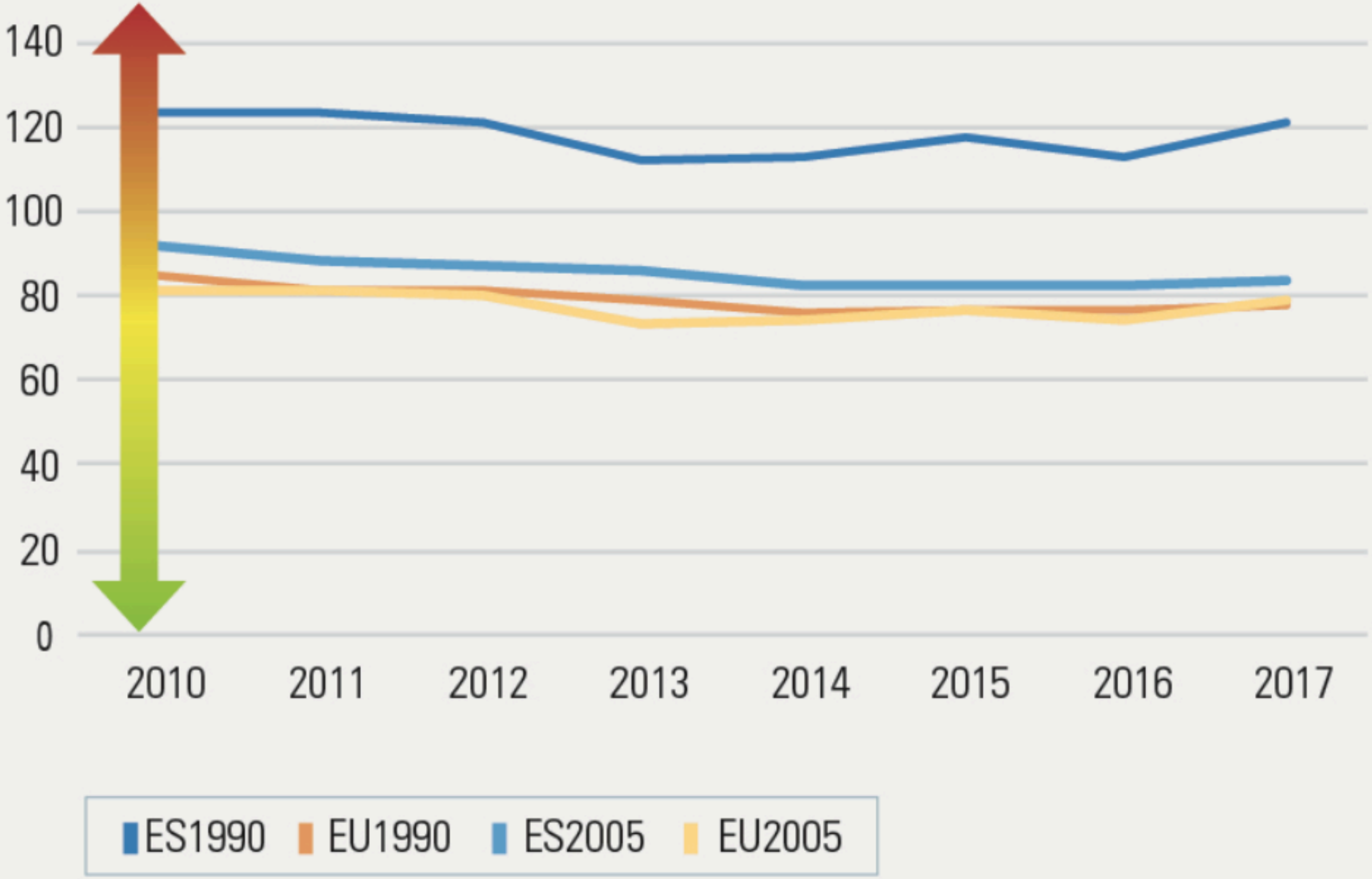
Algunas reflexiones para España

1. Impactos significativos
2. Parálisis regulatoria y evolución de emisiones
3. Una hoja de ruta para la mitigación: Escenarios

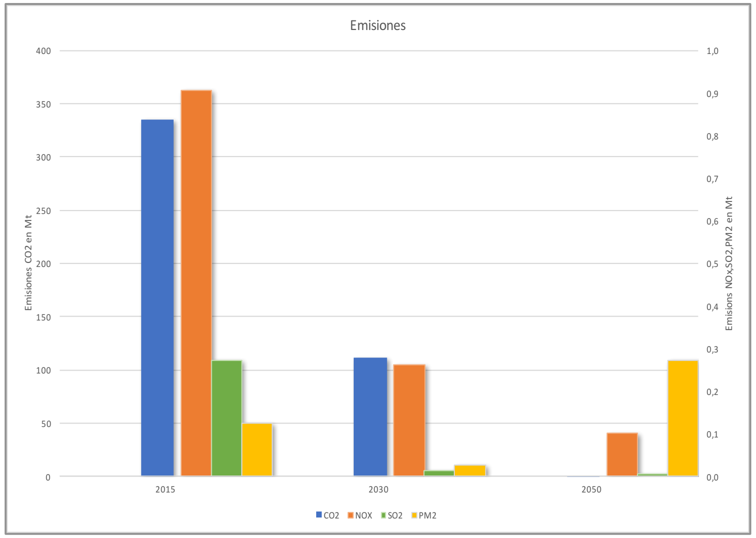
economics for energy

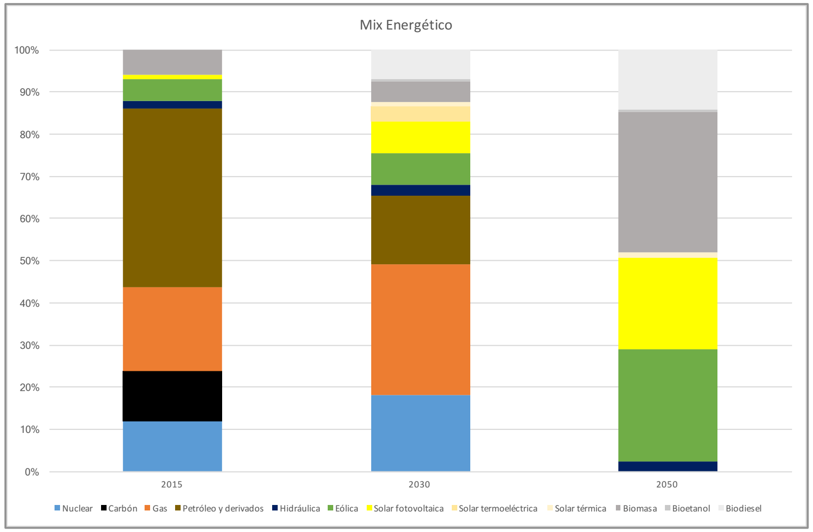
Escenarios para el sector energético
España, 2030 - 2050

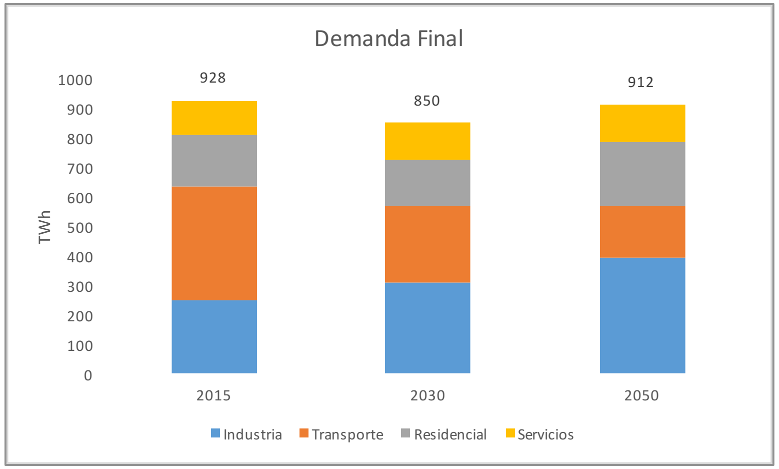
Greenhouse gas emissions (CO_2eq)

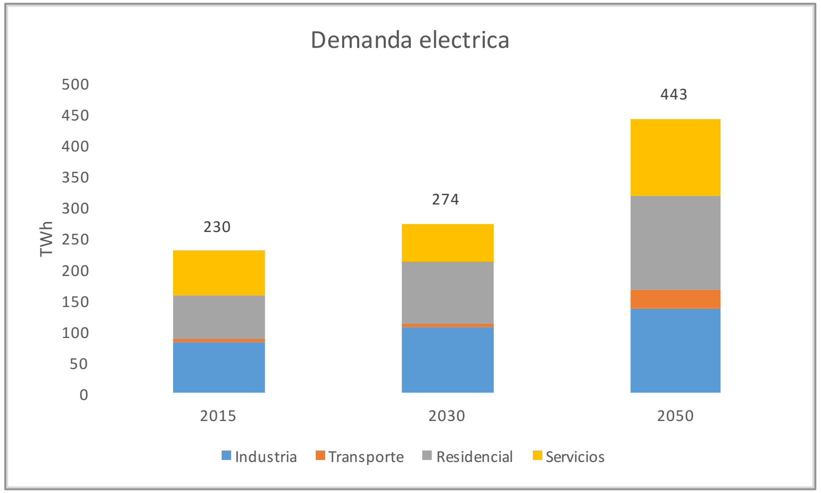


Escenario “Descarbonización” en España







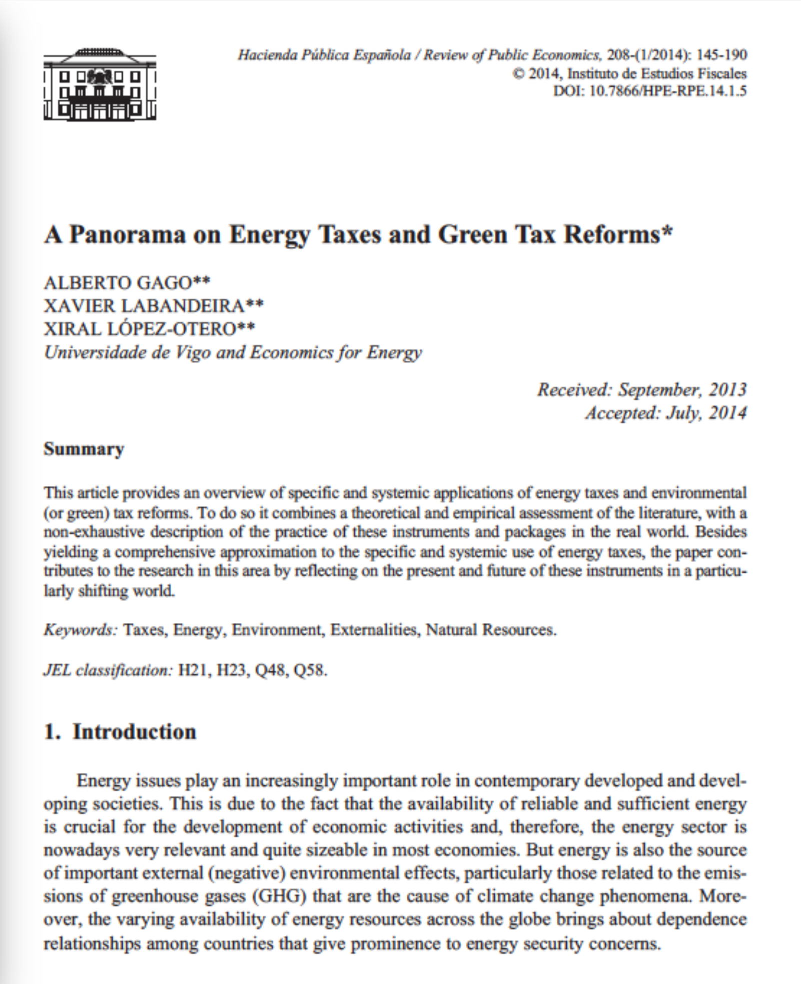


Fracaso de los instrumentos de precio

Impuestos energético-ambientales en España

[Informe 2013]

economics for energy



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DOI: 10.7866/HPE-RPE.14.1.5

A Panorama on Energy Taxes and Green Tax Reforms*

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Received: September, 2013
Accepted: July, 2014

Summary

This article provides an overview of specific and systemic applications of energy taxes and environmental (or green) tax reforms. To do so it combines a theoretical and empirical assessment of the literature, with a non-exhaustive description of the practice of these instruments and packages in the real world. Besides yielding a comprehensive approximation to the specific and systemic use of energy taxes, the paper contributes to the research in this area by reflecting on the present and future of these instruments in a particularly shifting world.

Keywords: Taxes, Energy, Environment, Externalities, Natural Resources.

JEL classification: H21, H23, Q48, Q58.

1. Introduction

Energy issues play an increasingly important role in contemporary developed and developing societies. This is due to the fact that the availability of reliable and sufficient energy is crucial for the development of economic activities and, therefore, the energy sector is nowadays very relevant and quite sizeable in most economies. But energy is also the source of important external (negative) environmental effects, particularly those related to the emissions of greenhouse gases (GHG) that are the cause of climate change phenomena. Moreover, the varying availability of energy resources across the globe brings about dependence relationships among countries that give prominence to energy security concerns.

- **La Paradoja española**

  - Necesidad de reducir emisiones
  - Alta dependencia energética
  - Necesidades fiscales
  - Baja presión fiscal energético-ambiental… que no en la imposición del trabajo, IRPF, etc.
  - Elevados potenciales de eficiencia energética
  - Estudios ex-ante positivos
  - Recomendaciones internacionales…

  - No materializadas (nunca es el momento?)

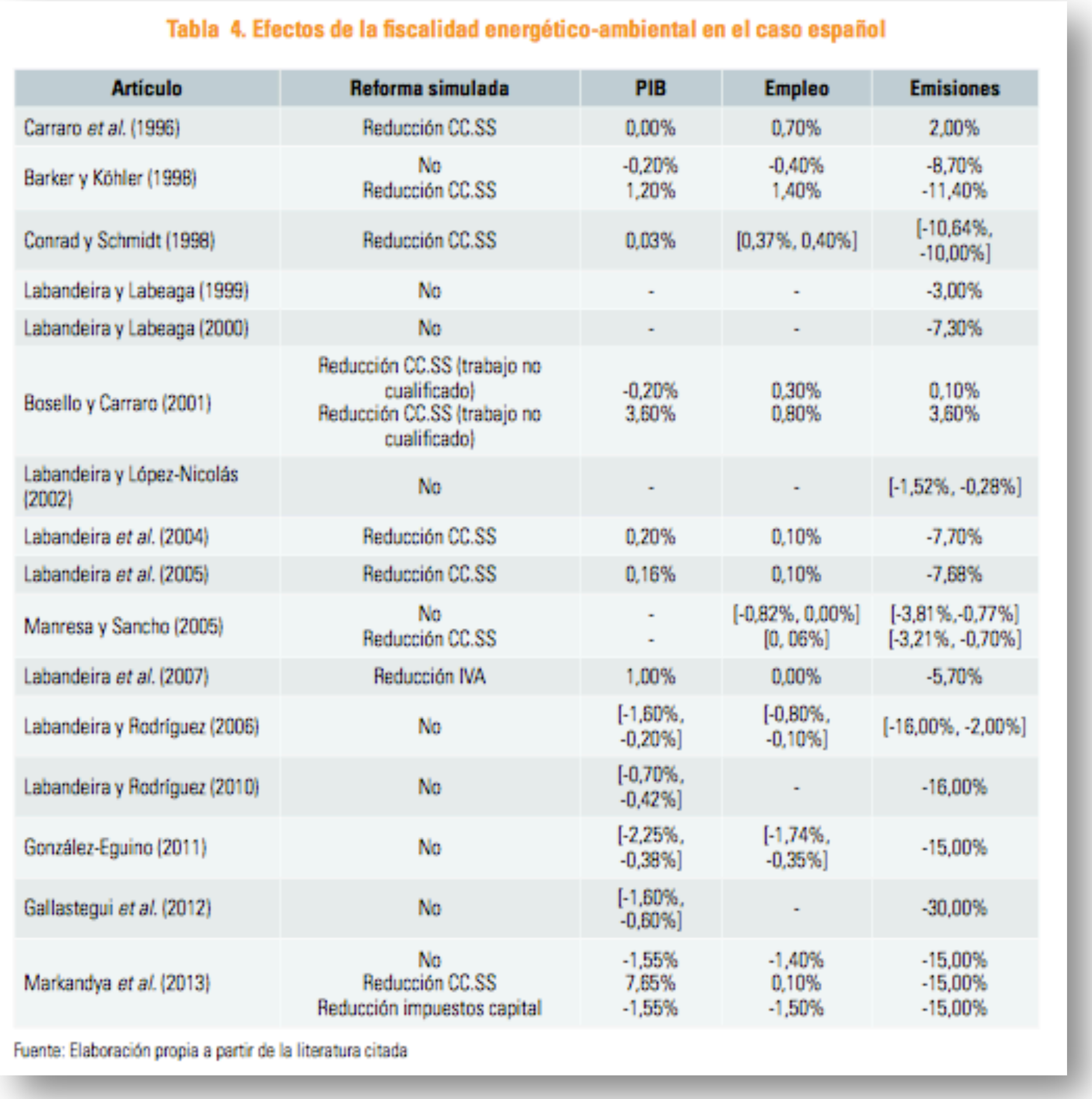
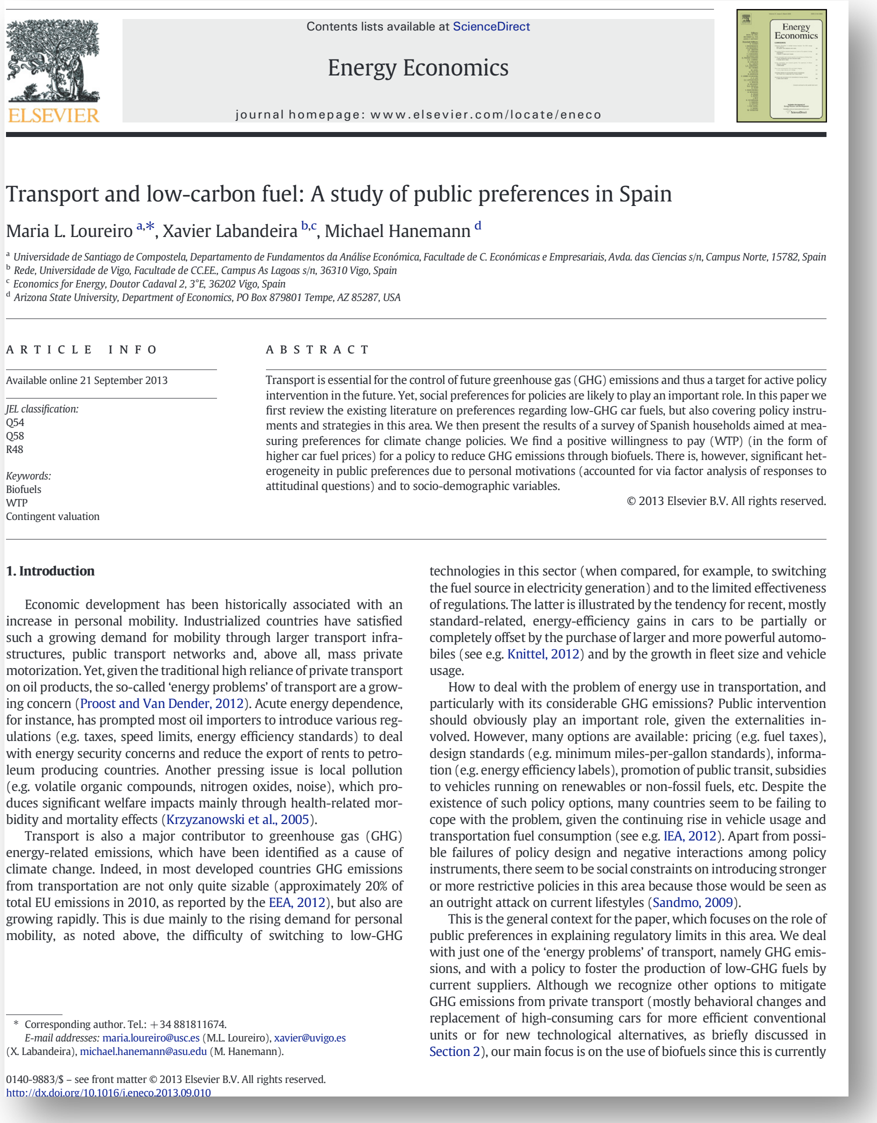


Tabla 4. Efectos de la fiscalidad energético-ambiental en el caso español

Artículo	Reforma simulada	PIB	Empleo	Emisiones
Carraro *et al.* (1996)	Reducción CC.SS	0,00%	0,70%	2,00%
Barker y Köhler (1998)	No Reducción CC.SS	-0,20% 1,20%	-0,40% 1,40%	-8,70% -11,40%
Conrad y Schmidt (1998)	Reducción CC.SS	0,03%	[0,37%, 0,40%]	[-10,64%, -10,00%]
Labandeira y Labeaga (1999)	No	-	-	-3,00%
Labandeira y Labeaga (2000)	No	-	-	-7,30%
Bosello y Carraro (2001)	Reducción CC.SS (trabajo no cualificado) Reducción CC.SS (trabajo no cualificado)	-0,20% 3,60%	0,30% 0,80%	0,10% 3,60%
Labandeira y López-Nicolás (2002)	No	-	-	[-1,52%, -0,28%]
Labandeira *et al.* (2004)	Reducción CC.SS	0,20%	0,10%	-7,70%
Labandeira *et al.* (2005)	Reducción CC.SS	0,16%	0,10%	-7,68%
Manresa y Sancho (2005)	No Reducción CC.SS	- -	[-0,82%, 0,00%] [0, 06%]	[-3,81%,-0,77%] [-3,21%, -0,70%]
Labandeira *et al.* (2007)	Reducción IVA	1,00%	0,00%	-5,70%
Labandeira y Rodríguez (2006)	No	[-1,60%, -0,20%]	[-0,80%, -0,10%]	[-16,00%, -2,00%]
Labandeira y Rodríguez (2010)	No	[-0,70%, -0,42%]	-	-16,00%
González-Eguino (2011)	No	[-2,25%, -0,38%]	[-1,74%, -0,35%]	-15,00%
Gallastegui *et al.* (2012)	No	[-1,60%, -0,60%]	-	-30,00%
Markandya *et al.* (2013)	No Reducción CC.SS Reducción impuestos capital	-1,55% 7,65% -1,55%	-1,40% 0,10% -1,50%	-15,00% -15,00% -15,00%

Fuente: Elaboración propia a partir de la literatura citada

Cómo explicarlo?



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Transport and low-carbon fuel: A study of public preferences in Spain

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Q54
Q58
R48

Keywords:
Biofuels
WTP
Contingent valuation

ABSTRACT

Transport is essential for the control of future greenhouse gas (GHG) emissions and thus a target for active policy intervention in the future. Yet, social preferences for policies are likely to play an important role. In this paper we first review the existing literature on preferences regarding low-GHG car fuels, but also covering policy instruments and strategies in this area. We then present the results of a survey of Spanish households aimed at measuring preferences for climate change policies. We find a positive willingness to pay (WTP) (in the form of higher car fuel prices) for a policy to reduce GHG emissions through biofuels. There is, however, significant heterogeneity in public preferences due to personal motivations (accounted for via factor analysis of responses to attitudinal questions) and to socio-demographic variables.

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1. Introduction

Economic development has been historically associated with an increase in personal mobility. Industrialized countries have satisfied such a growing demand for mobility through larger transport infrastructures, public transport networks and, above all, mass private motorization. Yet, given the traditional high reliance of private transport on oil products, the so-called 'energy problems' of transport are a growing concern (Proost and Van Dender, 2012). Acute energy dependence, for instance, has prompted most oil importers to introduce various regulations (e.g. taxes, speed limits, energy efficiency standards) to deal with energy security concerns and reduce the export of rents to petroleum producing countries. Another pressing issue is local pollution (e.g. volatile organic compounds, nitrogen oxides, noise), which produces significant welfare impacts mainly through health-related morbidity and mortality effects (Krzyzanowski et al., 2005).

Transport is also a major contributor to greenhouse gas (GHG) energy-related emissions, which have been identified as a cause of climate change. Indeed, in most developed countries GHG emissions from transportation are not only quite sizable (approximately 20% of total EU emissions in 2010, as reported by the EEA, 2012), but also are growing rapidly. This is due mainly to the rising demand for personal mobility, as noted above, the difficulty of switching to low-GHG technologies in this sector (when compared, for example, to switching the fuel source in electricity generation) and to the limited effectiveness of regulations. The latter is illustrated by the tendency for recent, mostly standard-related, energy-efficiency gains in cars to be partially or completely offset by the purchase of larger and more powerful automobiles (see e.g. Knittel, 2012) and by the growth in fleet size and vehicle usage.

How to deal with the problem of energy use in transportation, and particularly with its considerable GHG emissions? Public intervention should obviously play an important role, given the externalities involved. However, many options are available: pricing (e.g. fuel taxes), design standards (e.g. minimum miles-per-gallon standards), information (e.g. energy efficiency labels), promotion of public transit, subsidies to vehicles running on renewables or non-fossil fuels, etc. Despite the existence of such policy options, many countries seem to be failing to cope with the problem, given the continuing rise in vehicle usage and transportation fuel consumption (see e.g. IEA, 2012). Apart from possible failures of policy design and negative interactions among policy instruments, there seem to be social constraints on introducing stronger or more restrictive policies in this area because those would be seen as an outright attack on current lifestyles (Sandmo, 2009).

This is the general context for the paper, which focuses on the role of public preferences in explaining regulatory limits in this area. We deal with just one of the 'energy problems' of transport, namely GHG emissions, and with a policy to foster the production of low-GHG fuels by current suppliers. Although we recognize other options to mitigate GHG emissions from private transport (mostly behavioral changes and replacement of high-consuming cars for more efficient conventional units or for new technological alternatives, as briefly discussed in Section 2), our main focus is on the use of biofuels since this is currently

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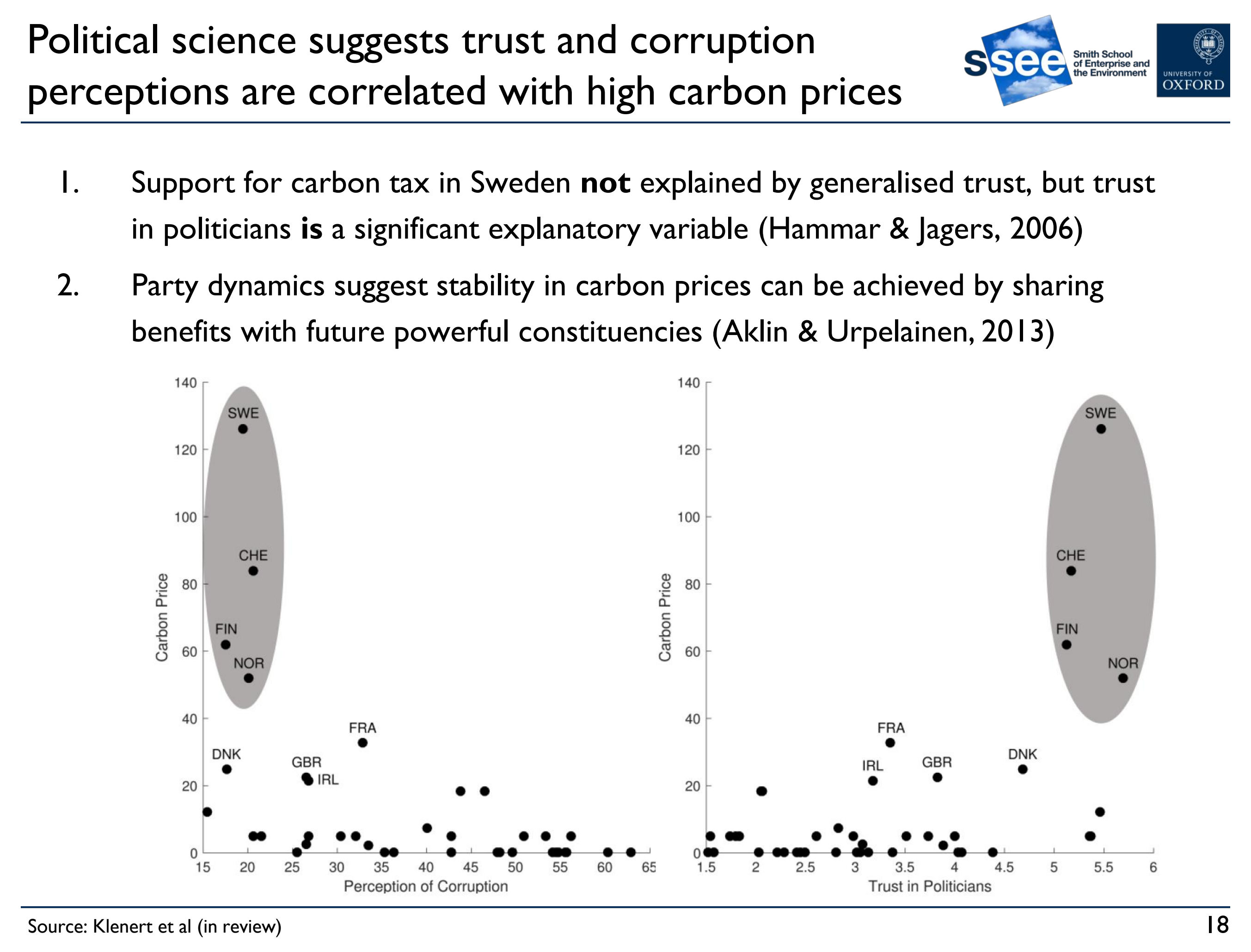


Political science suggests trust and corruption perceptions are correlated with high carbon prices

1. Support for carbon tax in Sweden **not** explained by generalised trust, but trust in politicians **is** a significant explanatory variable (Hammar & Jagers, 2006)
2. Party dynamics suggest stability in carbon prices can be achieved by sharing benefits with future powerful constituencies (Aklin & Urpelainen, 2013)

Carbon Price
140
120
100
80
60
40
20
0
SWE
CHE
FIN
NOR
FRA
DNK
GBR
IRL
15
20
25
30
35
40
45
50
55
60
65
Perception of Corruption
Carbon Price
140
120
100
80
60
40
20
0
SWE
CHE
FIN
NOR
FRA
IRL
GBR
DNK
1.5
2
2.5
3
3.5
4
4.5
5
5.5
6
Trust in Politicians

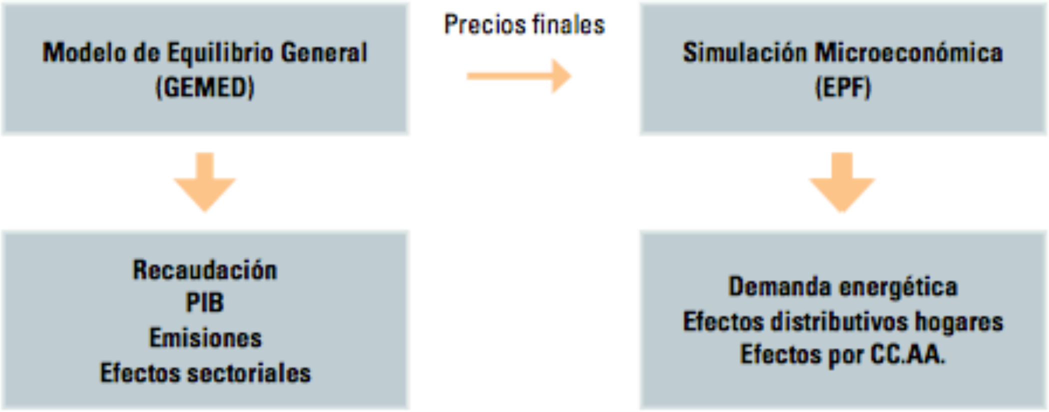
Source: Klenert et al (in review)

Fuente: Hepburn (2017)

Fiscalidad energético-ambiental autonómica

	Emisiones	**Instalaciones y actividades que inciden en el medio ambiente**	**Canon eólico**	**Aguas embalsadas**	**Hidrocarburos**
Andalucía	2004 (4,63)				
Aragón	2006 (2,13)	2016 (1,45)		2016 (14,91)	
Asturias		2011 (2,64)		2014 (n.d.)	
Canarias		2013 (-)			1987 (327,1)
Castilla y León		2012 (20,83*)	2012 (20,83*)	2012 (20,83*)	
Castilla LM	2001 (0,61)		2012 (14,02)		
Cataluña	2014 (3,98)	2017 (60)		2003 (n.d)	
Extremadura		1997 (40,25)			
Galicia	1995 (3,88)		2010 (23,23)	2009 (13,99)	
Murcia	2006 (1,13)				
La Rioja		2013 (2,45)			
C. Valenciana	2013 (9,99*)	2013 (9,99*)			
R. Total	26,35	137,61	58,08	49,73	327,1

Figura 12. Métodos de simulación



Modelo de Equilibrio General (GEMED)
Precios finales
Simulación Microeconómica (EPF)
Recaudación
PIB
Emisiones
Efectos sectoriales
Demanda energética
Efectos distributivos hogares
Efectos por CC.AA.

Fuente: Elaboración propia

Tabla 44. Resumen de los datos empleados en el modelo GEMED

Tipo de datos	Descripción	Fuente
Macroeconómicos	• Matriz de Contabilidad Social (Tablas input-output y agregados macroeconómicos) • Elasticidades (entre factores de producción, bienes importados y exportados)	• Instituto Nacional de Estadística • Global Trade Analysis Project
Tecnológicos y Microeconómicos	• Perfiles de demanda de electricidad • Tecnologías de generación eléctrica (tiempo de construcción, vida útil, costes de construcción, costes de operación y mantenimiento, factores de disponibilidad, eficiencia termodinámica, precios del del combustible, emisiones de contaminantes, capacidad instalada, ...)	• Base de datos e-sios (REE) • Comisión Nacional de Energía • Atlas de la Demanda Eléctrica Española (REE) • Base de datos e-sios (REE) • European Union Joint Research Centre • U.S. Energy Information Agency

Fuente: Rodrigues y Linares (2013b)

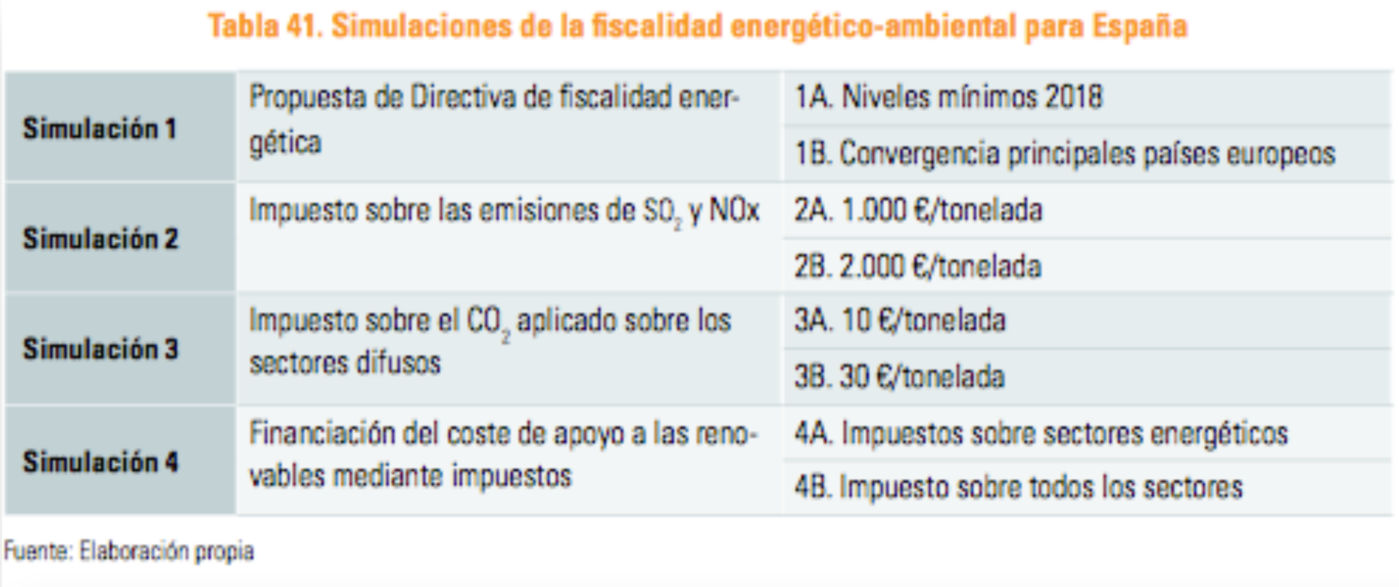


Tabla 41. Simulaciones de la fiscalidad energético-ambiental para España

Simulación 1	Propuesta de Directiva de fiscalidad energética	1A. Niveles mínimos 2018
		1B. Convergencia principales países europeos
Simulación 2	Impuesto sobre las emisiones de SO_2 y NOx	2A. 1.000 €/tonelada
		2B. 2.000 €/tonelada
Simulación 3	Impuesto sobre el CO_2 aplicado sobre los sectores difusos	3A. 10 €/tonelada
		3B. 30 €/tonelada
Simulación 4	Financiación del coste de apoyo a las renovables mediante impuestos	4A. Impuestos sobre sectores energéticos
		4B. Impuesto sobre todos los sectores

Fuente: Elaboración propia

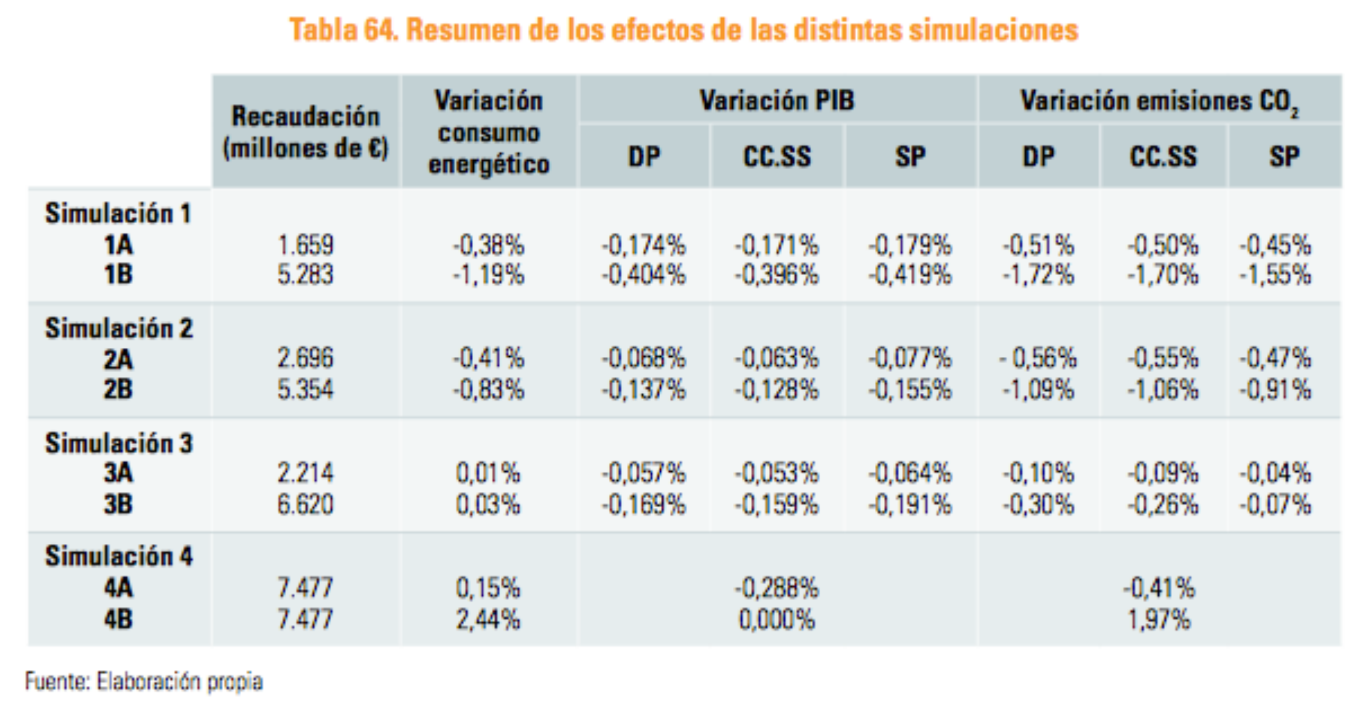
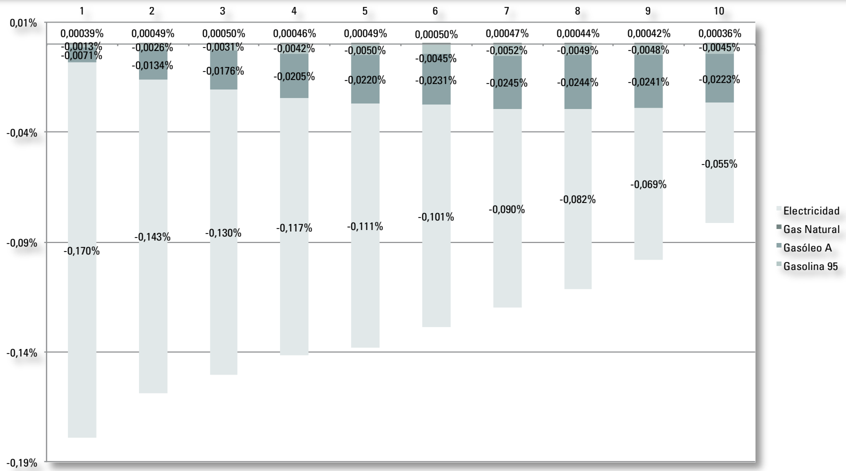


Tabla 64. Resumen de los efectos de las distintas simulaciones

	Recaudación (millones de €)	**Variación consumo energético**	**Variación PIB**			**Variación emisiones CO_2**		
			DP	**CC.SS**	**SP**	**DP**	**CC.SS**	**SP**
Simulación 1								
1A	1.659	-0,38%	-0,174%	-0,171%	-0,179%	-0,51%	-0,50%	-0,45%
1B	5.283	-1,19%	-0,404%	-0,396%	-0,419%	-1,72%	-1,70%	-1,55%
Simulación 2								
2A	2.696	-0,41%	-0,068%	-0,063%	-0,077%	- 0,56%	-0,55%	-0,47%
2B	5.354	-0,83%	-0,137%	-0,128%	-0,155%	-1,09%	-1,06%	-0,91%
Simulación 3								
3A	2.214	0,01%	-0,057%	-0,053%	-0,064%	-0,10%	-0,09%	-0,04%
3B	6.620	0,03%	-0,169%	-0,159%	-0,191%	-0,30%	-0,26%	-0,07%
Simulación 4								
4A	7.477	0,15%		-0,288%			-0,41%	
4B	7.477	2,44%		0,000%			1,97%	

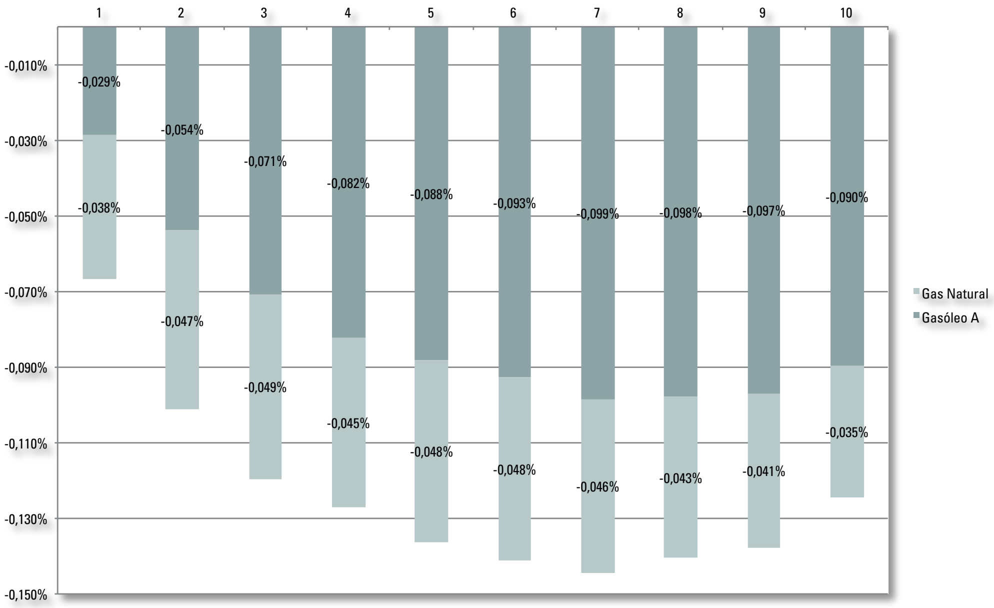
Fuente: Elaboración propia

Figura 5. Simulación 2A. Efecto total por decilas de renta



Fuente: Elaboración propia.

Figura 3. Simulación 1A. Efecto total por decilas de renta



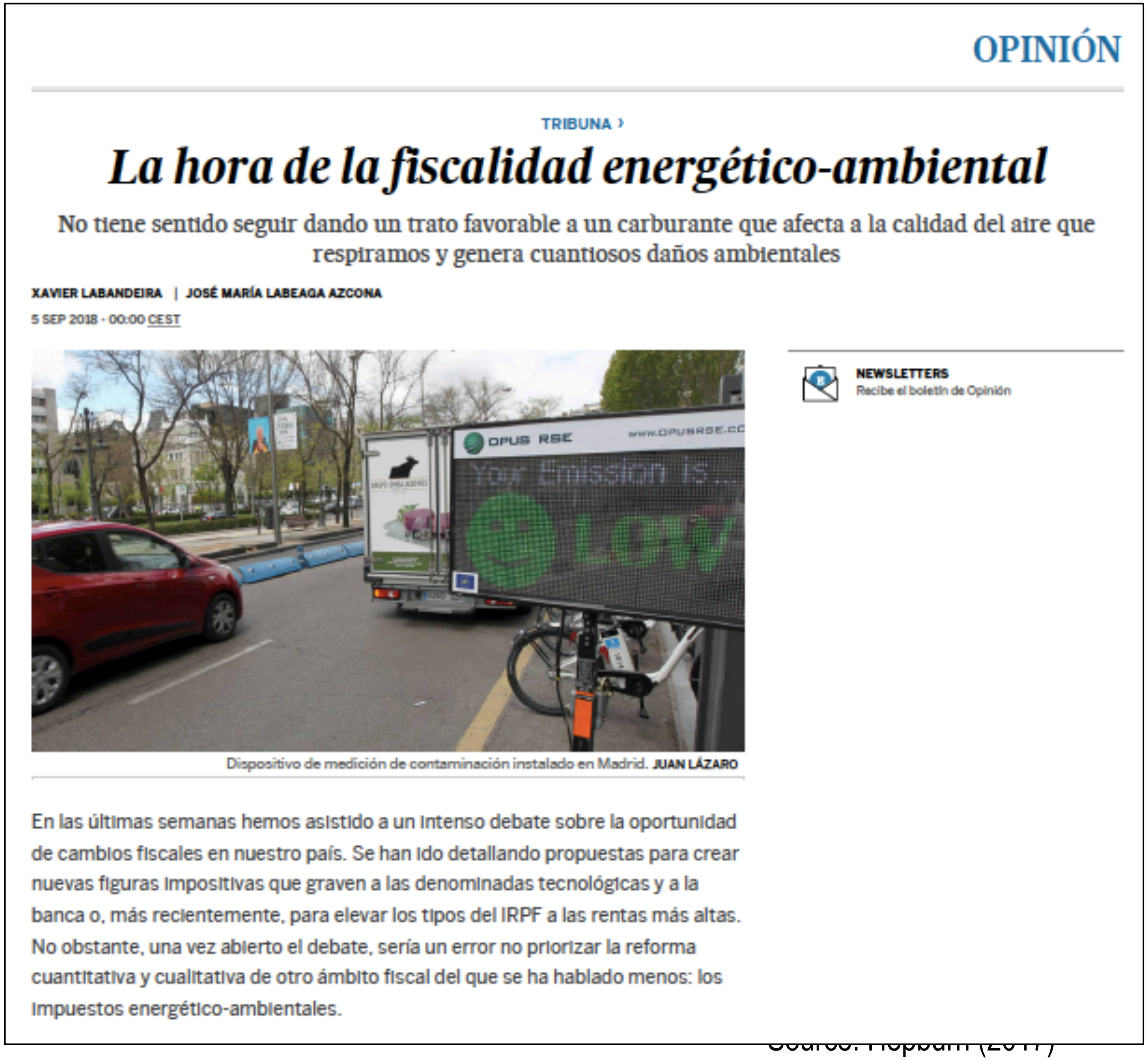
Fuente: Elaboración propia.

Potencial recaudatorio

Informe	Incremento recaudatorio (millones de €)	Incremento recaudatorio (% recaudación 2015)
VividEconomics (2012)	4000 (2013) 10584 (2020)	2,20 (2013) 5,82 (2020)
Economics for Energy (2013)	1659 (Reforma 1A) 5283 (Reforma 1B) 2696 (Reforma 2A) 5354 (Reforma 2B) 2214 (Reforma 3A) 6620 (Reforma 3B) 7477 (Reforma 4A) 7477 (Reforma 4B)	0,91 (Reforma 1A) 2,90 (Reforma 1B) 1,48 (Reforma 2A) 2,94 (Reforma 2B) 1,22 (Reforma 3A) 3,64 (Reforma 3B) 4,11 (Reforma 4A) 4,11 (Reforma 4B)
Comisión Europea (2016)	13365 (2018) 24429 (2020) 27348 (2025) 29923 (2030) 32801 (2035)	7,34 (2018) 13,42 (2020) 15,03 (2025) 16,44 (2030) 18,02 (2035)

España: Cambios fiscales reales

Año	Variación recaudatoria
2011	7853
2012	11237
2013	11897
2014	125
2015	-7846



OPINIÓN

TRIBUNA ›

La hora de la fiscalidad energético-ambiental

No tiene sentido seguir dando un trato favorable a un carburante que afecta a la calidad del aire que respiramos y genera cuantiosos daños ambientales

XAVIER LABANDEIRA | **JOSÉ MARÍA LABEAGA AZCONA**

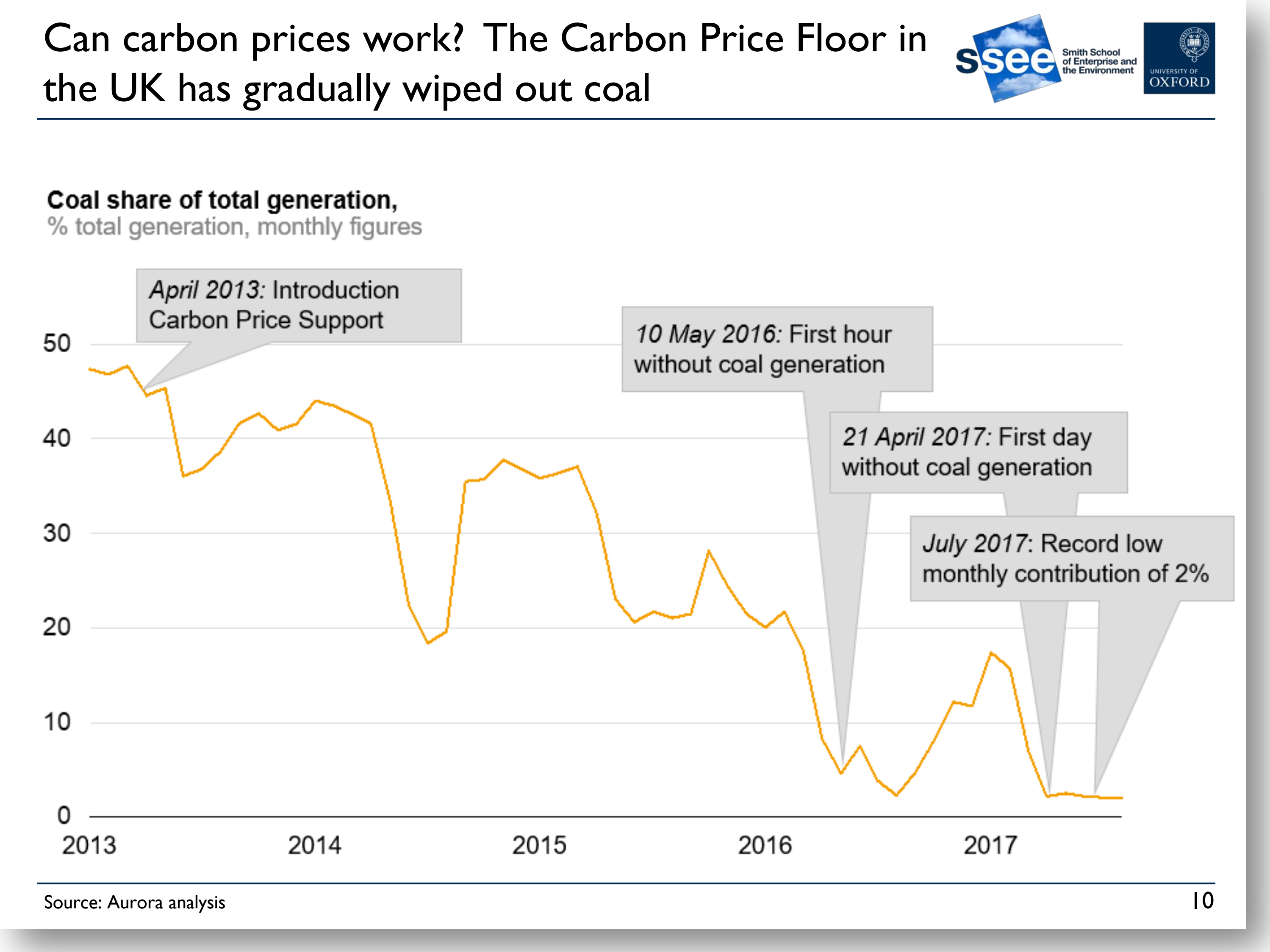
5 SEP 2018 - 00:00 CEST

Dispositivo de medición de contaminación instalado en Madrid. **JUAN LÁZARO**

NEWSLETTERS
Recibe el boletín de Opinión

En las últimas semanas hemos asistido a un intenso debate sobre la oportunidad de cambios fiscales en nuestro país. Se han ido detallando propuestas para crear nuevas figuras impositivas que graven a las denominadas tecnológicas y a la banca o, más recientemente, para elevar los tipos del IRPF a las rentas más altas. No obstante, una vez abierto el debate, sería un error no priorizar la reforma cuantitativa y cualitativa de otro ámbito fiscal del que se ha hablado menos: los impuestos energético-ambientales.

Source: Hepburn (2017)



Can carbon prices work? The Carbon Price Floor in the UK has gradually wiped out coal

Coal share of total generation,
% total generation, monthly figures

April 2013: Introduction Carbon Price Support

10 May 2016: First hour without coal generation

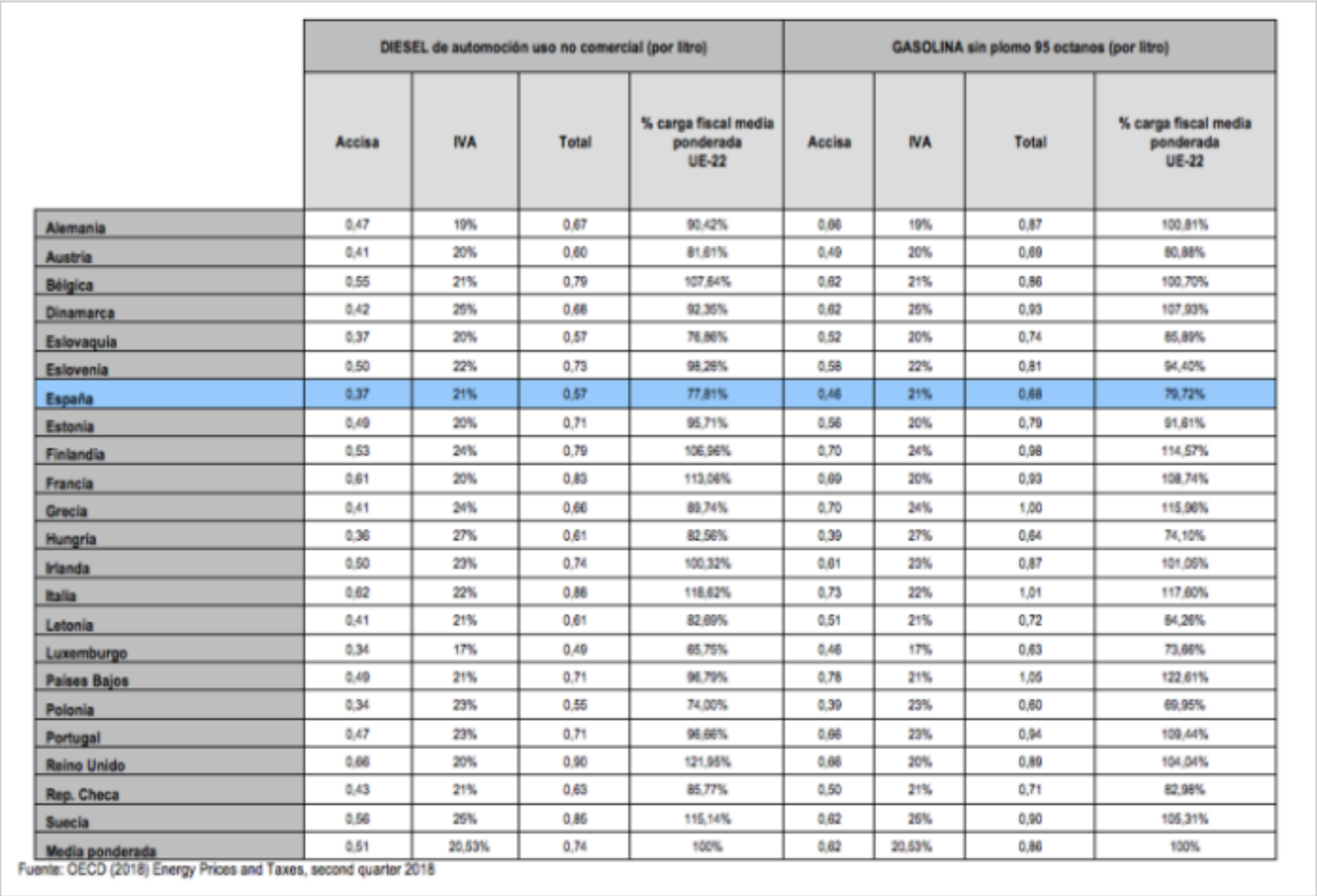
21 April 2017: First day without coal generation

July 2017: Record low monthly contribution of 2%

Source: Aurora analysis

Fuente: Hepburn (2017)

Frente a esto, qué sucede en España? De nuevo, hemos dedicado mucha tinta a esta cuestión en el blog (por ejemplo, en esta entrada reciente) y en seminarios públicos (por ejemplo, este reciente). Hace ya unos años argumentaba en la Agencia Ambiental Europea que la baja fiscalidad española sobre los carburantes de automoción era ciertamente inexplicable y requería identificar las fuertes barreras a que se enfrentaban estos instrumentos. Desde entonces la situación ha empeorado en términos relativos: como observamos en el cuadro que se reproduce a continuación, la carga fiscal del diésel (gasolina) se encuentra unos 25 (20) puntos por debajo de la media ponderada por población de la UE-22 (los países de la Unión que forman parte de la OCDE, de donde proceden los datos) por la aplicación de unas muy bajas accisas (e IVA).

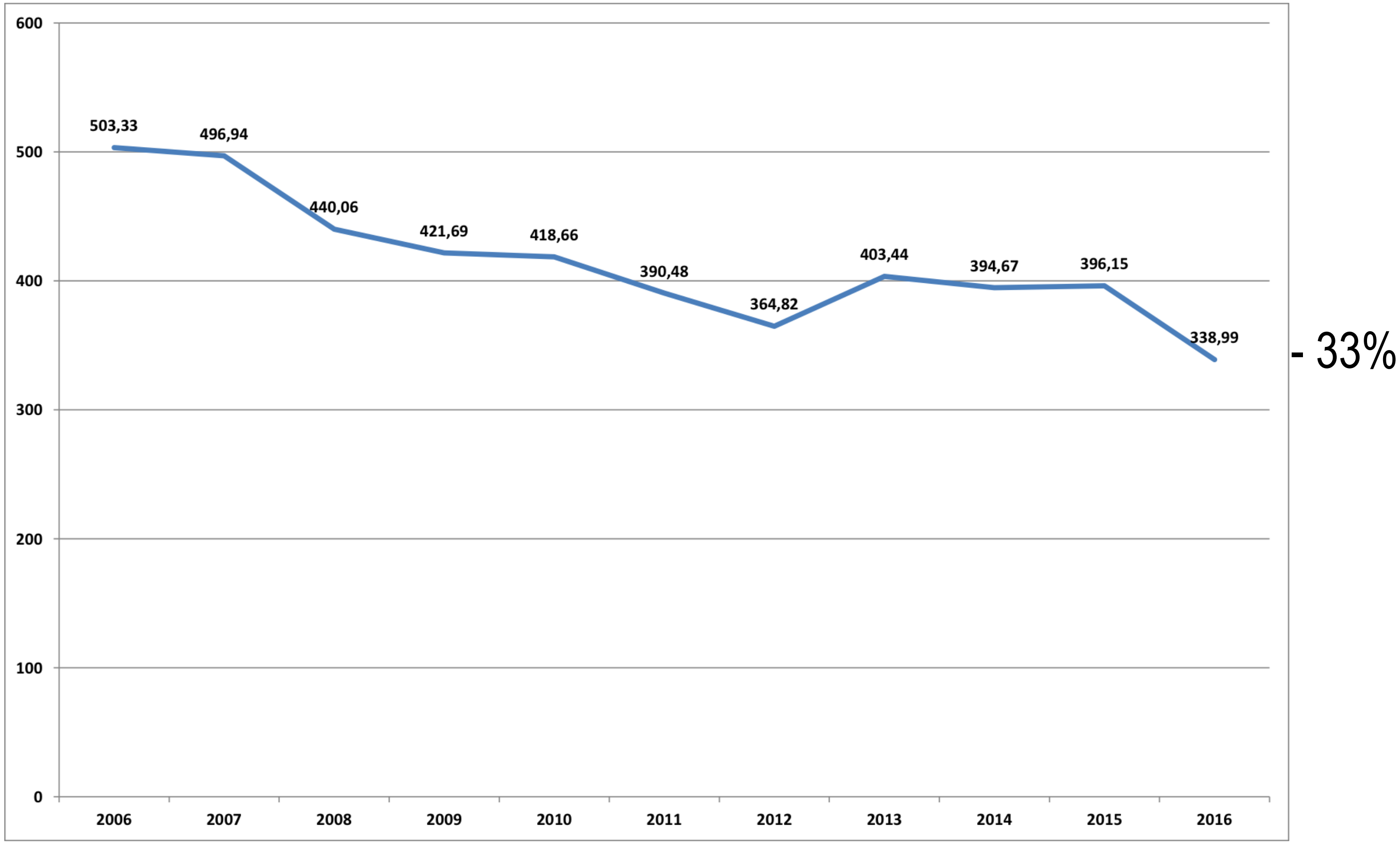


	DIESEL de automoción uso no comercial (por litro)				GASOLINA sin plomo 95 octanos (por litro)			
	Accisa	IVA	Total	% carga fiscal media ponderada UE-22	Accisa	IVA	Total	% carga fiscal media ponderada UE-22
Alemania	0,47	19%	0,67	90,42%	0,66	19%	0,87	100,81%
Austria	0,41	20%	0,60	81,61%	0,49	20%	0,69	80,88%
Bélgica	0,55	21%	0,79	107,64%	0,62	21%	0,86	100,70%
Dinamarca	0,42	25%	0,68	92,35%	0,62	25%	0,93	107,93%
Eslovaquia	0,37	20%	0,57	76,86%	0,52	20%	0,74	85,89%
Eslovenia	0,50	22%	0,73	98,28%	0,58	22%	0,81	94,40%
España	0,37	21%	0,57	77,81%	0,46	21%	0,68	79,72%
Estonia	0,49	20%	0,71	95,71%	0,56	20%	0,79	91,61%
Finlandia	0,53	24%	0,79	106,96%	0,70	24%	0,98	114,57%
Francia	0,61	20%	0,83	113,06%	0,69	20%	0,93	108,74%
Grecia	0,41	24%	0,66	89,74%	0,70	24%	1,00	115,96%
Hungría	0,36	27%	0,61	82,56%	0,39	27%	0,64	74,10%
Irlanda	0,50	23%	0,74	100,32%	0,61	23%	0,87	101,05%
Italia	0,62	22%	0,86	116,62%	0,73	22%	1,01	117,60%
Letonia	0,41	21%	0,61	82,69%	0,51	21%	0,72	84,26%
Luxemburgo	0,34	17%	0,49	65,75%	0,46	17%	0,63	73,66%
Países Bajos	0,49	21%	0,71	96,79%	0,78	21%	1,05	122,61%
Polonia	0,34	23%	0,55	74,00%	0,39	23%	0,60	69,95%
Portugal	0,47	23%	0,71	96,66%	0,66	23%	0,94	109,44%
Reino Unido	0,66	20%	0,90	121,95%	0,66	20%	0,89	104,04%
Rep. Checa	0,43	21%	0,63	85,77%	0,50	21%	0,71	82,98%
Suecia	0,56	25%	0,86	115,14%	0,62	26%	0,90	105,31%
Media ponderada	0,51	20,53%	0,74	100%	0,62	20,53%	0,86	100%

Fuente: OECD (2018) Energy Prices and Taxes, second quarter 2018

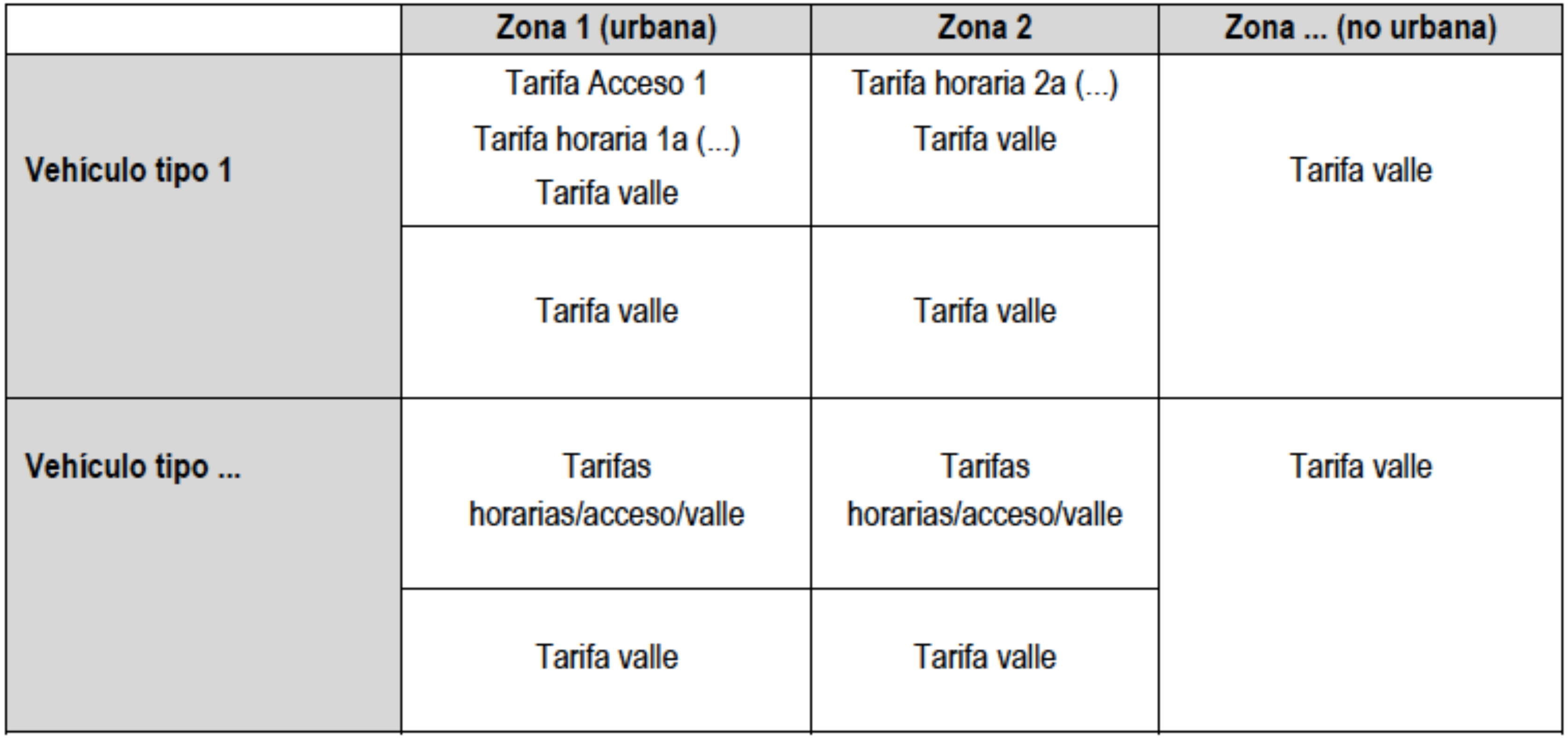
Fiscalidad del diésel y gasolina de automoción en la UE, 2018

Ingreso fiscal por vehículo en España

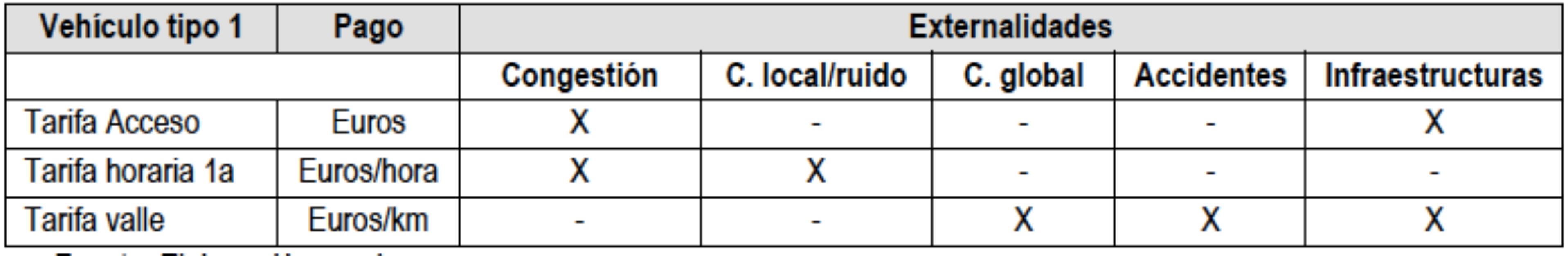


Fuente: Agencia Tributaria, 2018

Tabla 2. Ilustración tarifaria del IGAV



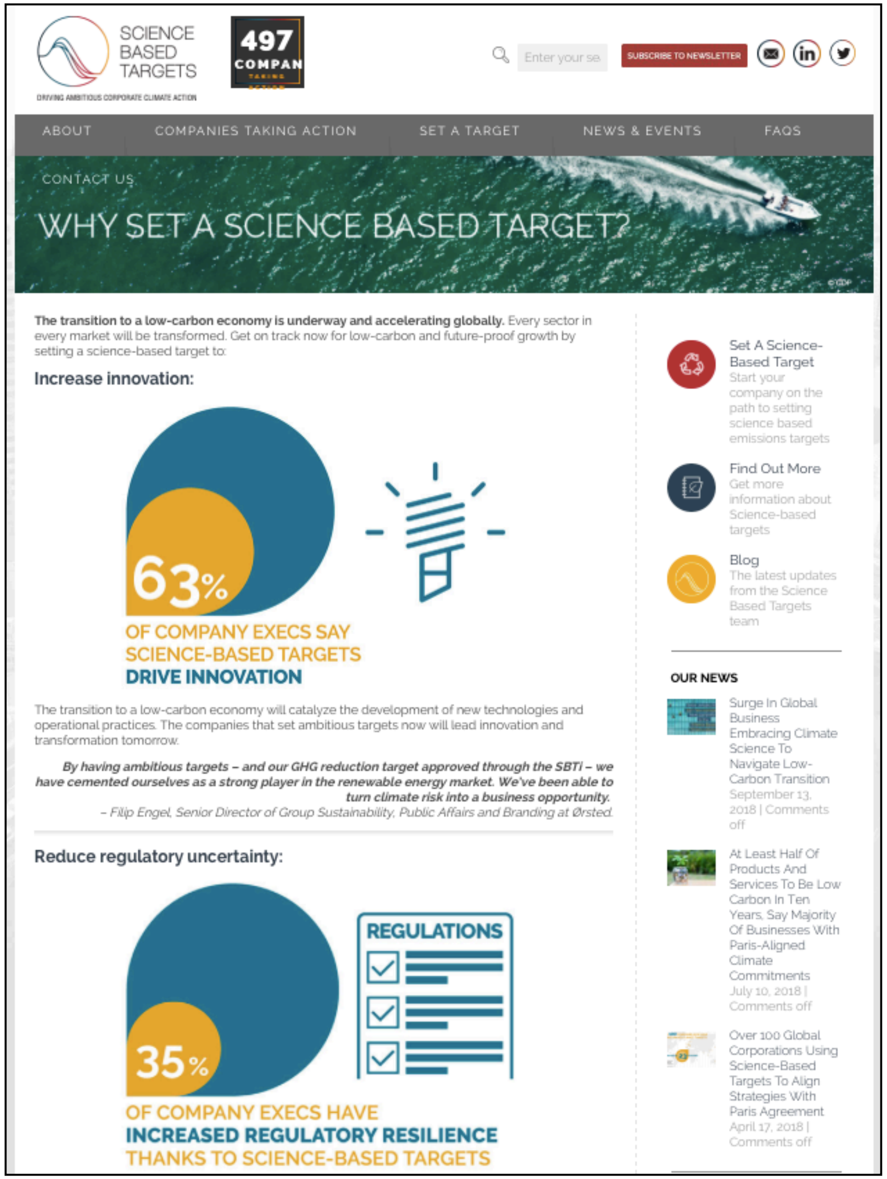
	Zona 1 (urbana)	Zona 2	Zona ... (no urbana)
Vehículo tipo 1	Tarifa Acceso 1 Tarifa horaria 1a (...) Tarifa valle	Tarifa horaria 2a (...) Tarifa valle	Tarifa valle
	Tarifa valle	Tarifa valle	
Vehículo tipo ...	Tarifas horarias/acceso/valle	Tarifas horarias/acceso/valle	Tarifa valle
	Tarifa valle	Tarifa valle	



Vehículo tipo 1	Pago	Externalidades				
		Congestión	C. local/ruido	C. global	Accidentes	Infraestructuras
Tarifa Acceso	Euros	X	-	-	-	X
Tarifa horaria 1a	Euros/hora	X	X	-	-	-
Tarifa valle	Euros/km	-	-	X	X	X

Fuente: Gago et al. (2018)

No solo precios:


SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION
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63%
35%
REGULATIONS

WHY SET A SCIENCE BASED TARGET?

The transition to a low-carbon economy is underway and accelerating globally. Every sector in every market will be transformed. Get on track now for low-carbon and future-proof growth by setting a science-based target to:

Increase innovation:

63% OF COMPANY EXECS SAY SCIENCE-BASED TARGETS **DRIVE INNOVATION**

The transition to a low-carbon economy will catalyze the development of new technologies and operational practices. The companies that set ambitious targets now will lead innovation and transformation tomorrow.

> ***By having ambitious targets – and our GHG reduction target approved through the SBTi – we have cemented ourselves as a strong player in the renewable energy market. We've been able to turn climate risk into a business opportunity.***
> *– Filip Engel, Senior Director of Group Sustainability, Public Affairs and Branding at Ørsted.*

Reduce regulatory uncertainty:

35% OF COMPANY EXECS HAVE **INCREASED REGULATORY RESILIENCE** THANKS TO SCIENCE-BASED TARGETS

Set A Science-Based Target
Start your company on the path to setting science based emissions targets

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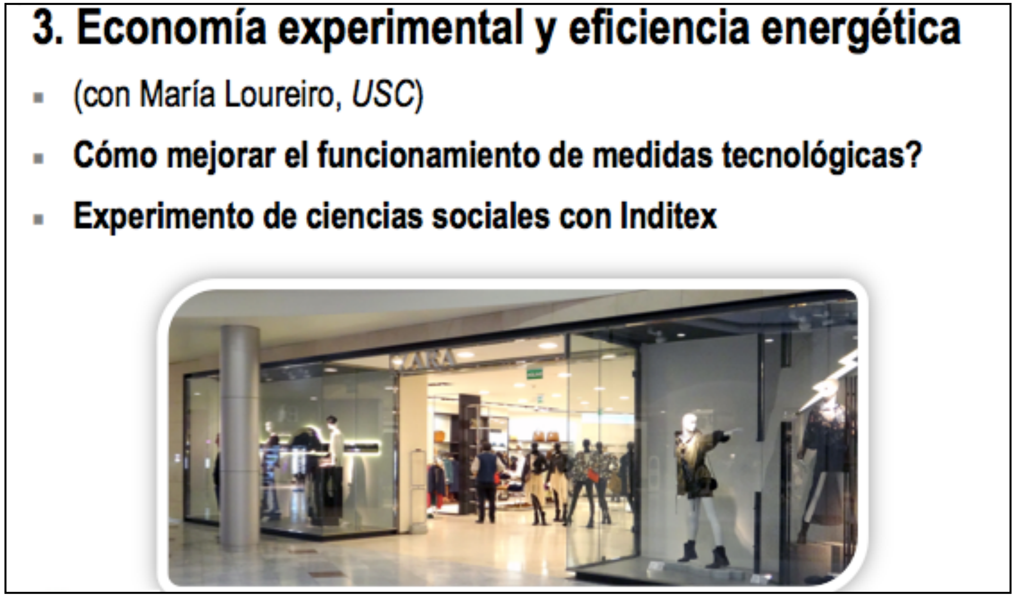
Over 100 Global Corporations Using Science-Based Targets To Align Strategies With Paris Agreement
April 17, 2018 | Comments off



3. Economía experimental y eficiencia energética

- (con María Loureiro, *USC*)
- **Cómo mejorar el funcionamiento de medidas tecnológicas?**
- **Experimento de ciencias sociales con Inditex**

Conclusiones

- Un desafío para nuestra generación: Necesidad de acción inmediata y global, de momento insuficiente
- Importantes implicaciones distributivas de impactos y corrección del cambio climático
- Precios:
  - Opción necesaria pero no suficiente para mitigación
  - Sujeta a muchas barreras de aceptación
- Desafíos en la descarbonización del transporte
- España: dificultades para avanzar
- Grandes necesidades y oportunidades de investigación en ciencias sociales

Gracias

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Universidade Vigo

economics for energy