

A publication event linked to IPHE

On June 4th this year the book Planet Hydrogen – The Taming of the Proton was published simultaneously in Oxford and Reykjavik (Icelandic translation)

The book, written by Thorsteinn Sigfusson, contains the biography of Hydrogen from Big-Bang into the future (2048!) written for the interested layperson with special emphasis on IPHE and the international movement

A whole section is devoted to IPHE as well as all the IPHE countries who each have their individual sections

As Planet Earth's natural resources become increasingly depleted and linked to climate change, its inhabitants search desperately for new, clean energy sources and carriers. Hydrogen technology is at the forefront of man's quest.

The *Taming of the Proton* has been written for the industrialist, academic and layperson interested in the history, current capability and future potential of hydrogen.

This book considers hydrogen's place among other renewable energy carriers, its production, storage and utilization and the global effort to understand and adopt it as part of an overall future energy strategy.

The *Taming of the Proton* covers the history of hydrogen since the origin of time and the utilization in modern society and the emerging hydrogen society worldwide. The book is written by one of the foremost experts on the general subject.

Thorsteinn Sigfusson was born in Westman Islands, Iceland in 1954. After graduating from the University of Copenhagen, he worked on his PhD at the Cavendish Laboratory and was elected a Research Fellow at Darwin College, Cambridge University in the UK.

He currently works as a Professor of Physics at the University of Iceland, General Director of the Innovation Centre and has many close links to industry having started several spin-off companies including Icelandic New Energy.

Thorsteinn was co-chair of the International Partnership for the Hydrogen Economy founded in Washington D.C. in 2003 and has received recognition for his work from the international community, including an Icelandic Presidential Award in 2004 and the Global International Energy Prize in St. Petersburg in 2007.

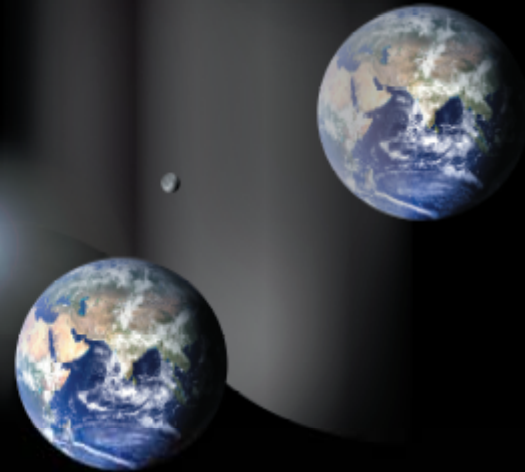


PLANET HYDROGEN
THE TAMING OF THE PROTON

Thorsteinn I. Sigfusson

PLANET HYDROGEN

THE TAMING OF THE PROTON



Thorsteinn I. Sigfusson

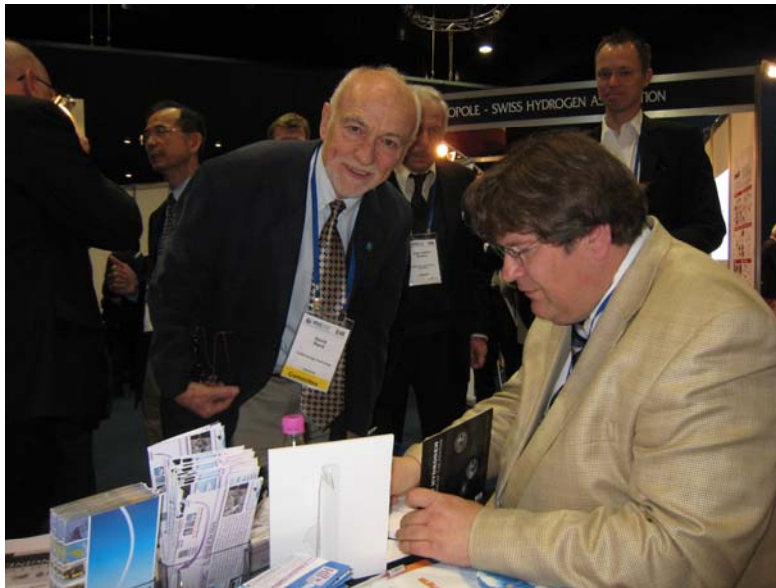
June 4th 2008

President Grimsson receives the first copy of the new book



IPHE Outreach 2008

60 copies were brought to Brisbane and sold out!



Publisher: Coxmoor Publishing Company, Oxford, UK
© IAHG Outreach 2008

CONTENTS

ACKNOWLEDGEMENTS	v
PREFACE	xiii
PART I – PLANET HYDROGEN	
A Letter from Casablanca	3
PART II – INTRODUCTION TO THE SCENE	
Showers from the Sun	9
Low on petrol	14
Exhaustion	17
Burning and converting	22
<i>Thermodynamics: the flow from hot to cold</i>	22
Non-renewable types of available energy sources	25
<i>Coal</i>	25
<i>Nuclear energy</i>	27
Renewable energy sources	28
<i>Photovoltaics</i>	28
<i>Concentrating solar power</i>	30
<i>Wind energy</i>	31
<i>Hydroelectric power</i>	31
<i>Biomass and Biofuels</i>	33
<i>Geothermal energy</i>	35
<i>Wave and tidal power</i>	38
<i>Exotic future methods</i>	39
Decarbonisation and cleaner energy	40
Sharpening the pencil	45
PART III – THE TAMING OF THE PROTON	
Discovering the proton	49
Some key properties of hydrogen	52
PRODUCING HYDROGEN	54
Hydrogen from fossil-fuels and chemical processes	54
Hydrogen from biomass	57
Biological methods of producing hydrogen	58
Hydrogen from nuclear energy	60
“Jules Verne’s method”	61
Hydrogen from wind	64
Solar hydrogen	65
Mimicking the Maple Leaf	67
Hydrogen from geothermal vents	69
STORING HYDROGEN	71
Introduction	71
Storage in the form of gas	71

Liquefaction and liquid storage	73
Solid state storage	75
Sorption properties	76
Binary systems and beyond	79
Complex hydrides	80
Alanates	80
Borohydrides	81
Exotic Hydrogen Storage Compounds	82
The Grand Challenge of the modern day alchemists	83
EFFICIENT HYDROGEN UTILISATION	84
Utilising the energy of the burning of hydrogen	84
The ultimate taming: The discovery and development of the fuel cell	86
The fuel cell menu	90
Proton Exchange Membrane Fuel Cells	93
A discussion of fuel cells and applications	94
Phosphoric Acid Fuel Cells	96
Alkaline Fuel Cells	97
Molten Carbonate Fuel Cells	98
Solid Oxide Fuel Cells	99
Direct Methanol Fuel Cell	101

PART IV – HYDROGEN INFRASTRUCTURE AND SOCIETY

Hydrogen entering society	107
Infrastructure	108
The Spirit of Davis	110
The HyWays of the European roadmap	114
The rising sun of Tokyo Bay	116
High stakes in a HySociety	117
Hydrogen with Foresight	119
Hydrogen Education	121
Sophisticated Economics of Hydrogen Energy	122
Rules of the game: Hydrogen safety, codes and standards	124
<i>Tampering with the elements water and fire</i>	124
<i>The unexpected steam-iron process</i>	125
<i>Hydrogen safety</i>	127
<i>Acceptance in society through Codes and Standards</i>	130
THE INTERNATIONAL HYDROGEN MOVEMENT	131
<i>International Hydrogen Energy Association and the hydrogen family</i>	131
<i>The International Energy Agency Hydrogen Implementation Agreements. The hydrogen expert assembly</i>	134
<i>The International Partnership for the Hydrogen Economy IPHE: Governments United for Hydrogen</i>	135

PART V – AROUND THE WORLD IN EIGHTEEN LEAPS

<i>Australia, New Zealand and Antarctica and the concern for the planet</i>	141
<i>Brazil setting the pace for a continent</i>	144
<i>Canada, the impressive hub of hydrogen technology</i>	146
<i>China could leapfrog and lead the way</i>	148
<i>The European Commission and the impressive policy work</i>	150
<i>France – The post-Carnot era</i>	152
<i>Germany, masters of endurance</i>	154
<i>Iceland, perhaps the ideal testing forum</i>	157
<i>India, the second wildcard</i>	166
<i>Italy and the renaissance of hydrogen</i>	167
<i>Japan: protonics added to electronics</i>	169
<i>Korea joining the forefront</i>	171
<i>Norway and the Nordic pioneers</i>	172
<i>Russia and the increased strong commitment to hydrogen</i>	177
<i>United Kingdom, where much of the science was developed</i>	180
<i>United States, the pacemaker</i>	182

The Publisher offers a special price for IPHE delegates

- Order forms are available
- The publisher's recommended retail price is 60 USD
- Price for large quantities for IPHE delegates negotiable
- More information on

www.coxmoor.com