



INTERNATIONAL FLAME RESEARCH FOUNDATION

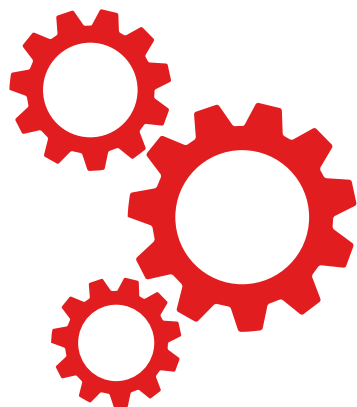
2018

# ANNUAL REPORT

Including financial statements







**Legal status:**

Company Limited by Guarantee; Company Registration No. 10573161

**Registered office:**

Ella Armitage Building, 40 Leavygreave Road, Sheffield, S3 7RD, UK

**Bank:**

Lloyds TSB Bank, SHEFFIELD CHURCH ST, Chelmsford Legg St OSC,  
1 Legg St, Essex, CM1 1JS, UK

## **IFRF COUNCIL**

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### **Directors of IFRF Ltd (Group A)**

General Secretary - Mohamed Pourkashanian\*

Executive Director - Philip Sharman\*

### **National Committee Representatives**

America - Phil Smith

Finland - Vesna Barisic

France - Sébastien Caillat\* (IFRF Vice President)

Germany - Viktor Schrerer

Italy - Massimiliano Fantuzzi

Netherlands - Jeroen van Oijen

Sweden - Fredrik Normann

UK - Roger Dudill

### **Non-Directors of IFRF Ltd (Group B)**

President - Sauro Pasini\*

Company Secretary - SUEL Ltd (Ross McMaster)

### **Co-opted Specialists**

New fuels - Chuck Benson\*

Safety - Jacques Dugué

Environment - Mikko Hupa

Regional (Asia) - Yong Yan

\*Member of Executive Committee





## Combustion: alive and kicking

In response to a reporter's enquiries about rumours that he had died, Mark Twain once quipped "*The report of my death was an exaggeration*". The same could well be said about the demise of combustion.



Recently, while preparing an after-dinner speech on energy perspectives, I had cause to review some key energy outlook reports: This did nothing but confirm the future strategies developed by IFRF.

Climate change is a great concern to most of us, yet, if we look to the forecasts, fossil fuels look set to continue to play a dominant role in satisfying primary energy demand for decades to come, with oil and gas use increasing in absolute terms and coal use only marginally decreasing. The electricity sector – a principal focus of IFRF activity over the last 70 years – will continue its dramatic transformation, especially in countries where the Foundation is strongest, and I believe we will see the disappearance of coal-fired units from the generation fleet soon. However, the situation is quite different if we look to Asia: Coal consumption there looks broadly flat, with a fall in Chinese consumption offset by increases in India and elsewhere. Coal's share of the power generation 'mix' in China is expected to decline sharply post 2020, but it is likely to still be around 35% in 2040; in India, it will grow strongly, and let's not forget that Japan has plans to construct about 18 GW of new coal capacity (5 GW are already under construction). It is worth noting that the average age of coal-fired power plants in Asia is less than 15 years, confirming the important role of coal power generation there well into the future.

What about the other fossil fuels? Well, oil use looks likely to remain stable, mainly in the petrochemical industry, and gas use is expected to grow, overtaking coal use by around 2030. Gas also looks set to play a critical role in power generation in developed countries as a back-up for the rapidly increasing generation from renewable sources, requiring significant research and technological development to address the problems associated with this new role, e.g. low operating hours, demands for high flexibility and an increasing capacity for modulating load with high efficiency and low emissions.

Analysing energy markets from the end-user (rather than fuel) perspective, it appears that fossil fuels will maintain their prominence in the steel, glass, petrochemical and cement industries: All of these sectors will face, however, the twin challenges of improving their environmental performance and reducing their carbon intensity.

No, combustion is certainly not dying! It will remain an important R&D and technical topic, together with the clean utilisation of 'green' fuels such as biofuels, hydrogen, syngases, etc. – important actors for deep decarbonisation in the steel and cement industry.





Based on these observations, we can derive some simple 'pillars' for IFRF's future strategy:

- Follow the needs of the fossil fuel based electricity sector, seeking new members and new businesses where this sector is growing, e.g. in Asia;
- Re-ignite the participation of members from energy-intensive industries that are facing the challenges of reducing their environmental impact and their carbon footprint, e.g. petrochemical, cement, glass and steel companies; and
- Embrace areas such as green fuels and waste streams that will become strategically important for both decarbonisation and landfill-avoidance in a more sustainable 'circular economy'.

IFRF members will find most of these pillars clearly identified in IFRF's 'Strategic Review 2018' and adopted in the new 'Three-year Plan 2019-2021'. The launch of a Chinese Flame Research Committee in 2019 will be a strategic leap for the Foundation, and we are not forgetting India, or Japan (which had a very active National Committee until relatively recently). IFRF is already working to find ways to reinforce the (currently low) participation of the glass industry: In Europe, this sector is facing the challenge of respecting new, stringent emissions legislation and could really benefit from the know-how developed in the past by IFRF. Cement is another sector that has a low representation within our current membership: We are trying to regain their participation, supporting them in plant decarbonisation through biofuel combustion (an area in which IFRF has done extensive research in the past) and carbon capture. Last-but-not-least, in order to open a window on the waste re-utilisation sector, we aim to introduce it to IFRF through a TOTeM later in the year looking at 'valorising' wastes in terms of both energy and materials recovery. Re-commencing active R&D and participating in the 'PACT-2' visionary concept is our way of preparing for future challenges, be they hydrogen or ammonia as fuels, carbon capture, moving towards a circular economy in terms of waste, etc.

**The 'road map' for combustion still presents bold targets for tomorrow's energy systems and industrial processes, that must be **safe, clean and efficient**. IFRF can play an important role in helping its members in meeting those targets.**

**Sauro Pasini, IFRF President**





## Time-travelling...

One year ago, I was heralding 2018 as a “year of transformation” for IFRF. And what a year it turned out to be! 2018 was always going to be a very significant year for IFRF: the 70<sup>th</sup> anniversary year of IFRF’s founding... our triennial conference... the launch of our new website... a strategic review of all aspects of the organisation... a new strategy and vision for the future... preparation of a new Three-Year Plan...



Any anniversary provides an opportunity not just to look back and reflect on the past but also to fix eyes firmly on the road ahead – and the 70<sup>th</sup> anniversary of IFRF is an excellent example. The chance to travel back in time to IFRF’s origins, then forward into an exciting future before returning to the challenges of today, put me in mind of the adventures of Marty McFly and Emmett ‘Doc’ Brown in the **Back to the Future** film trilogy from 1985-1990. I pictured myself as the youthful Marty (!) travelling in the company of an engaging, expert team of time-travelling ‘guides’ through seven decades to a post-war Europe of 1948 when IFRF’s seven ‘founding fathers’ (from Great Britain, the Netherlands and France) first conceived of an international collaborative venture that would revolutionise industrial combustion.

So, that became our theme for 2018... time-travelling.

In January, we started a series of 13 blogposts in *Monday Night Mail*, involving many well-known faces from IFRF’s history and launched a six-page brochure highlighting IFRF’s heritage. This fed into our highly-successful ‘IFRF 2018’ Conference in Sheffield in May and the launch of a 20-page colour booklet highlighting IFRF’s technical successes over the seven decades. This in turn set the scene for the first of an annual series of surveys of our membership to help inform a ‘Strategic Review’ at the end of the year (a key priority for the Sheffield Team when bidding to host IFRF) and preparation of a new ‘Three-Year Plan’ to take IFRF into the next decade.

Mid-year, our new multi-functional website was ready to be trialled and it was launched in October. The new-style *Monday Night Mail* and our social media presence on LinkedIn and Twitter (all started in 2017) are now supported by the fit-for-purpose website. In addition, we launched our WeChat handle in readiness for initiatives in China and even have an IFRF YouTube channel!

As the year progressed, we began to formulate plans to expand our network of ‘preferred research partners’ and for IFRF to become active again in R&D activity – watch this space in 2019... We wove all of our 70<sup>th</sup> anniversary celebrations together in a PR campaign (#IFRFAt70), including ‘congratulatory messages’ from 17 organisations and VIPs (starting with HRH Queen Elizabeth II of the UK, President Macron of France and HM King Willem-Alexander of the Netherlands!).





And that's not all... We held our 45<sup>th</sup> Topic Oriented Technical Meeting (TOTeM) in Cardiff, Wales, on the subject of gas turbines; supported three National Flame Committee's 'Flame Days' (France, the Netherlands and Finland); and visited China to begin preparations for establishing a Chinese Flame Research Committee in 2019.

And IFRF continues to develop in other wonderful ways - our Administration & Communications Coordinator and her wife Kirsty adopted a beautiful little girl. Congratulations to all three of them.

Certainly, a year of great transformations!

So, back to the future... If 2018 was a year of transformation, 2019 is shaping-up to be a year of growth. We can look forward to seeing an increase in our membership (particularly in Asia with the launch of 'China Flame'); becoming active again in R&D - including working with the University of Sheffield on the visionary 'PACT-2' concept; a TOTeM later in the year around valorising wastes in terms of energy and materials recovery; the launch of a new training initiative; plus lots of exciting and thought-provoking blogs and news-pieces in *Monday Night Mail* and on social media.

Hold on tight - as 'Doc' Brown would say...

***"Where we're going, we don't need roads!"***

**Philip Sharman, IFRF Director**







# MEMBERS

IFRF has members in each corner of the world, from the USA to Japan, and from Finland to South Africa.

Here is how the IFRF Membership looked at the end of 2018:



**8 National Committees**



**129 Members**  
(120 organisations  
and 9 individuals)



**21  
Countries**







## Member Survey 2018

In 2018, IFRF issued its first Member Survey, designed to gain a greater understanding of our members interests, needs and what they valued most from being part of IFRF. Going forward, IFRF will conduct a Member Survey each year.

### Technical areas and market segments

Rank	Technical area represented
1	Modelling and simulation
2	Fuels (solid, liquid and gaseous)
3	Heat transfer
4	Environmental concerns
5	Flame chemistry
6	Waste treatment and energy-from-waste
7	Flame aerodynamics
8	Safety
9	Flaring

Rank	Market segment addressed
1	Power generation
2	Thermal processing industries
3	Chemical and petrochemical industries
4	Cement and lime manufacturing and mineral processing
5	Glass manufacturing
6	Iron and steel production
7	Heat production

15  
responses

### IFRF events and communication activities

MNM to  
remain  
bi-weekly

53% of  
respondents  
attended  
#IFRF2018

#### Regularity of communications



### IFRF resources

#### Valuable

MNM  
Newsletter

IFRF  
Conference

#### Quite valuable

IFRF  
website

TOTeMs

Combustion  
Handbook

IFRF report  
archive

Industrial  
Combustion  
Journal





# COMMUNICATIONS

IFRF has three main platforms for communicating with its members and the wider audience - *Monday Night Mail* (MNM) a bi-weekly member e-newsletter; the IFRF website ([www.ifrf.net](http://www.ifrf.net)); and Social Media pages.

**Monday Night Mail** 1 1 2 0 subscribers\*

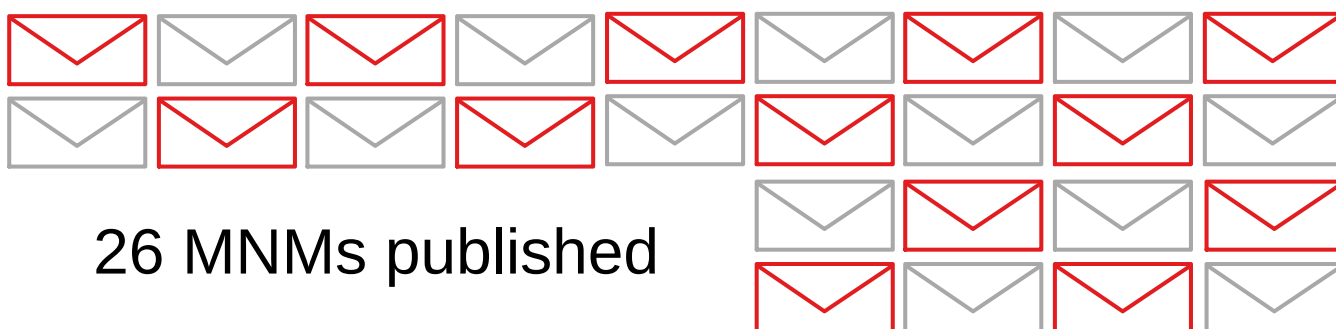
\*average number of subscribers for 2018



On average **24% of subscribers** engaged with MNM...

## Top 3 stories of 2018:

1. IFRF 2018: Full programme released!
2. Hydrogen: the great game-changer?
3. Seventy Years of Success (1948-2018)







## Website

In October 2018, IFRF launched its new website which includes:



Events calendar



News & Blogs



Member login



IFRF archive



Industrial  
Combustion Journal

## Social Media Networks

IFRF's social media presence focuses on four networks:



**Twitter**

235 followers

166,647 impressions

780 tweets

**LinkedIn**



211 followers

558 group members

173 articles



**WeChat**

Launched CFRC group

20 followers

**YouTube**



11 subscribers

Launched June 2018





# EVENTS & MEETINGS

## IFRF Council meetings

Two IFRF Council meetings were held in 2018:

### IC (2018)-01

Sheffield, UK  
May 2018;  
66%  
attendance



### IC (2018)-02

Virtual  
December 2018;  
75%  
attendance



## Executive Committee (ExCo) meetings

Three ExCo meetings were held in 2018. All were held virtually.



### ExCo (2018)-01

April 2018;  
100%  
attendance



### ExCo (2018)-02

July 2018;  
100%  
attendance



### ExCo (2018)-03

November 2018;  
86%  
attendance





# IFRF 2018 Conference

30-31 May 2018; Sheffield, UK

*Clean, efficient and safe  
industrial combustion*



118  
attendees



from 15  
countries



Six  
Keynote  
Speakers

One  
Panel  
Discussion

15  
Parallel  
Sessions

45  
Technical  
Presentations



Honeywell  
uop

Callidus  
Technologies

ClearSign

fives

GREENS  
COMBUSTION  
Optimal Combustion Solutions

JOHN ZINK  
HAMWORTHY  
COMBUSTION

ZECCO

EMERSON

Seven  
Event  
Sponsors







# IFRF 2018 Conference

30-31 May 2018; Sheffield, UK

## Event feedback

*Clean, efficient and safe  
industrial combustion*



*"Very interesting topics and high level of participants. Good distribution between industry and academia. This conference is a must."*

*"Always an excellent event, a must for sharing new technology and meeting key people"*

*"Excellent conference - very well organised. Will definitely attend again."*

*"Extremely interesting event as always. Great presentations and networking."*

*"Well balanced between scientific and industrial."*



# Topic Orientated Technical Meetings (TOTeMs)

## TOTeM #45: Gas turbines for future energy systems

3-4 September 2018; Cardiff, UK



33 attendees...

...from five countries



16 presentations,

lively discussions...

...and two site visits



*"Such events in specific areas are very helpful"*

*"Generated a large number of opportunities"*

Five sponsors





## National Committees Flame Days

In 2018, IFRF supported three National Committee Flame Days:

### Comité Français General Assembly

5-6 June 2018;  
Dunkerque, France



### COMBURA Symposium

9-10 October 2018;  
Soesterberg, The Netherlands

### IX Liekkipäivä (Finnish Flame Day)

23 October 2018;  
Espoo, Finland





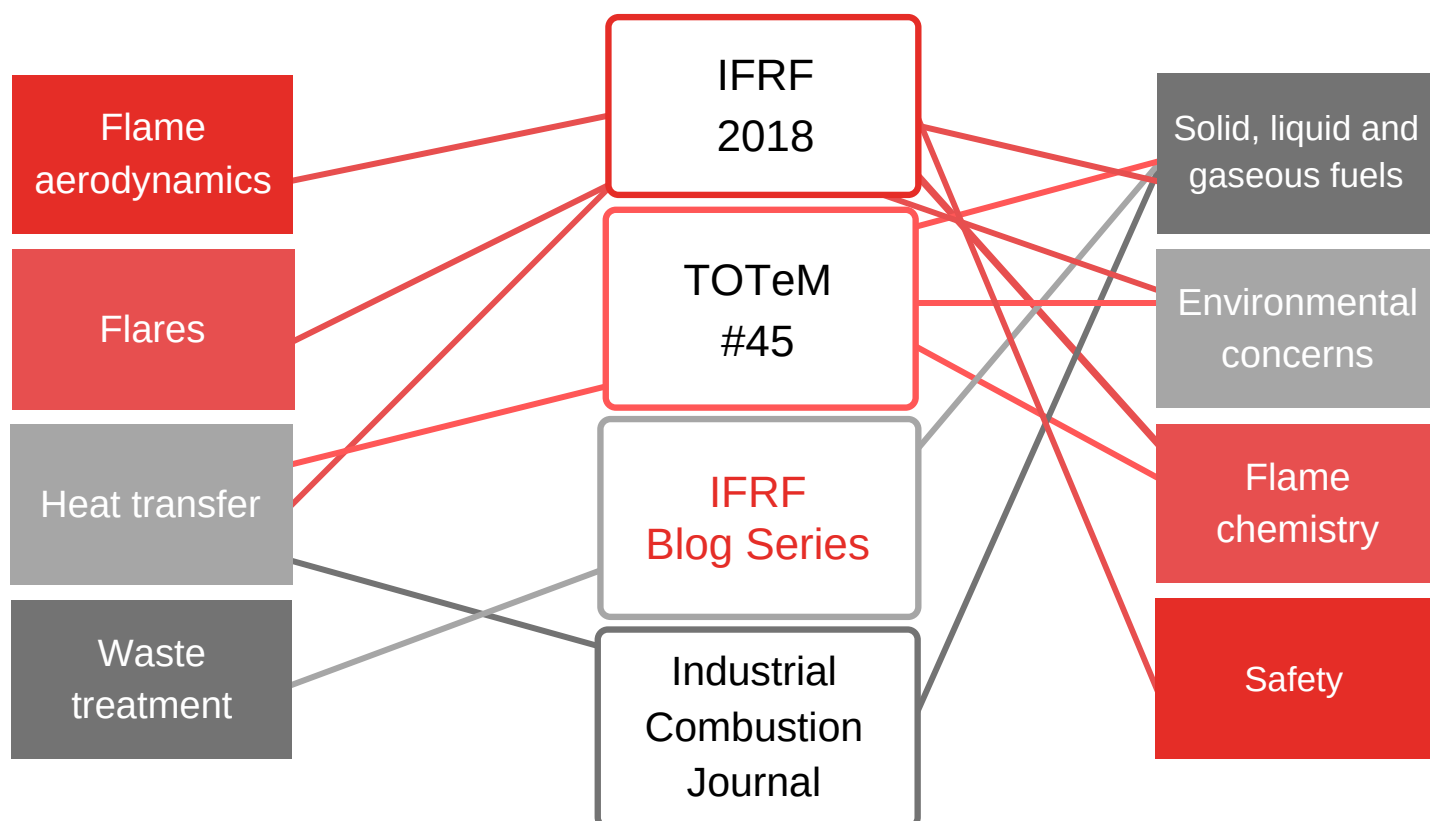






# RESEARCH AREAS

IFRF has identified eight primary research areas where activities are focused. Through the IFRF 2018 Conference, TOTeM #45, the papers published in the Industrial Combustion Journal and IFRF Blog Series, IFRF has conducted activities in all these research areas.

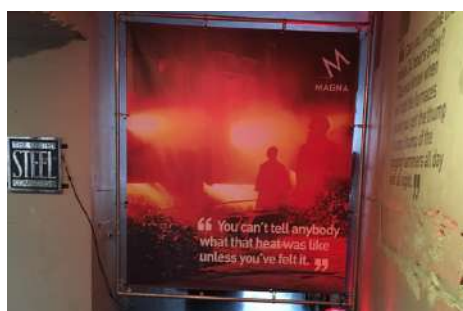
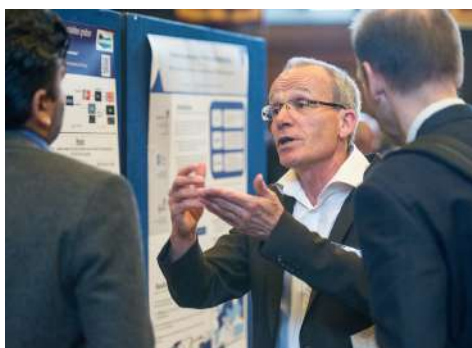


## Publications

IFRF published three documents in 2018:











# PROFIT AND LOSS ACCOUNT FOR THE PERIOD

## 1<sup>st</sup> JANUARY 2018 TO 31<sup>st</sup> DECEMBER 2018

	Actual	Budget	Variance
	£	£	£
<b>Turnover</b>			
Membership fees	132,984	147,799	(14,815)
Other income	50,850	34,224	16,626
<b>Total</b>	<b>183,834</b>	<b>182,023</b>	<b>1,811</b>
<b>Operating Expenditure</b>			
Director Salary / Fee	60,999	68,441	7,442
Admin Salary	28,161	27,629	(532)
Technical Meeting / Conferences	18,809	22,203	3,394
Research Services	15,538	8,880	(6,658)
Member Services	14,057	28,912	14,855
Legal and Professional	0	1,000	1,000
Accountancy and Company Secretary	8,220	9,864	1,644
Travel	6,944	8,217	1,273
Printing and Stationery	5,140	6,924	1,784
Insurance	1,993	3,583	1,590
Telephone / IT / Broadband	611	432	(179)
Rent	0	2,250	2,250
Capital Expenditure	0	0	0
Bank Charges	738	159	(579)
Bank Interest Receivable	(274)	0	274
Depreciation	153	0	(153)
VAT not reclaimable	20,776	0	(20,776)
<b>Total</b>	<b>182,269</b>	<b>188,494</b>	<b>6,225</b>
<b>Surplus / (Deficit)</b>	<b>1,566</b>	<b>(6,470)</b>	<b>8,036</b>





## BALANCE SHEET AS AT 31<sup>st</sup> DECEMBER 2018

<b>Fixed Assets</b>	£ 268
<b>Current Assets</b>	
Debtors	38,749
Cash at bank	37,760
<b>Total</b>	<b>76,509</b>
<b>Current Liabilities</b>	
Short Term Creditors	73,108
<b>Net Current Assets</b>	<b>3,401</b>
Total assets less current liabilities	3,669
Long term liabilities	0
<b>Total</b>	<b>3,669</b>
<b>Reserves</b>	
Reserves	2,104
Profit and Loss	1,566
<b>Total</b>	<b>3,669</b>





## BALANCE SHEET NOTES

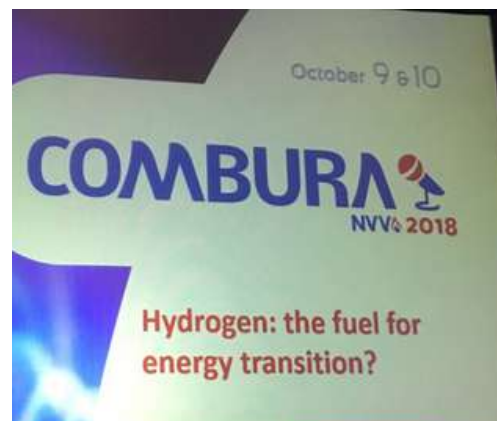
BALANCE SHEET AS AT 31<sup>st</sup> DECEMBER 2018

	£	£	£
(i) Assets	COST	DEP	NBV
Computer	458.98	191.23	267.75
<b>(ii) Debtors</b>			
Membership Fees		34,325.82	
Sponsorship Fees		3,000.00	
			<b>37,325.82</b>
	-		
<b>Payments &amp; Accrued Income</b>			
Insurance - January to October 2019		1,423.34	
			<b>1,423.34</b>
<b>(iii) Bank</b>			
Current Account		37,760.21	
Deposit Account		0.00	
Credit Card		0.00	
			<b>37,760.21</b>
<b>(iv) Creditors : Short Term</b>			
Trade Creditors		7,850.58	
Credit Card		0.00	
PAYE / Payroll		717.39	
<b>Deferred Income</b>			
IFRF Membership Fees 2019	52,990.02		
<b>Accruals</b>			
P Lavery Invoice - October to December 2018	1,950.00		
Legal Fees	9,600.00		
		<b>11,550.00</b>	
			<b>73,107.99</b>





For more information on IFRF please visit [www.ifrf.net](http://www.ifrf.net)



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