



Is the future of hydrogen green?

Francesco Cacciabue
Partner - CFO at Glennmont Partners

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Alternative energy investment.
Absolute returns.

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An overview of Glennmont Partners

Delivering sustainable returns from energy investment

Investment Strategy

€2.7bn+ under management¹

Infrastructure in clean energy

- Electricity power stations – not technologies
- Predictable long-term cash flows
- Inflation linked revenue streams

Proven technologies

- Onshore wind, offshore wind, solar and bioenergy
- Strong growth through 2050 driven by targeted climate change legislation
- Stable markets with transparent regulation

Seeking predictable financial return

- Absolute return
- Early dividends

Track Record

Fund I* – equity fund

- Closed at €437m – First Close Sept 2009
- 14 investments in 5 geographies across 3 tech.
- Fully divested in 2020

Fund II* – equity fund

- Closed at €500m - First Close Aug 2013
- 11 investments in 5 geographies across 3 tech.

Fund III* – equity fund

- Closed at €850m – First Close Jan 2018
- Follows a similar strategy to Fund I and Fund II

Clean Energy Strategy IV

- First close Jan 2022 – currently fundraising
- Builds on the Fund I-III strategy and expands into strategically selected global markets

Fund II and III - segregated mandates*

- Two segregated mandates for onshore wind assets, together exceeding €130m

REBS* – credit fund

- Investment in secondary market renewable energy project finance loans

Backing

Supported by blue chip investors

Glennmont investors include:

- French asset manager
- Dutch corporate pension fund
- Dutch sector pension fund
- Belgian insurer
- Japanese pension fund
- UK local authority
- German Pensionskasse
- German insurer
- Swedish insurer
- Korean insurer
- Korean Pension Funds
- Korean Asset Manager
- US Fund of Funds
- US pension fund



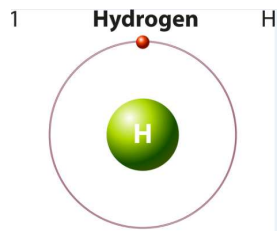
¹ assets under management since inception * The Funds referenced here are closed to new investment and are included for illustrative purposes only.

Source: Glennmont Partners from Nuveen

Date: April 2022

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Hydrogen is the first element of the periodic table



1

H

Hydrogen

3

Li

Lithium

4

Be

Beryllium

11

Na

Sodium

12

Mg

Magnesium

19

K

Potassium

20

Ca

Calcium

21

Sc

Scandium

22

Ti

Titanium

23

V

Vanadium

24

Cr

Chromium

25

Mn

Manganese

26

Fe

Iron

27

Co

Cobalt

28

Ni

Nickel

29

Cu

Copper

30

Zn

Zinc

31

Ga

Gallium

32

Ge

Germanium

33

As

Arsenic

34

Se

Selenium

35

Br

Bromine

36

Kr

Krypton

37

Rb

Rubidium

38

Sr

Strontium

39

Y

Yttrium

40

Zr

Zirconium

41

Nb

Niobium

42

Mo

Molybdenum

43

Tc

Technetium

44

Ru

Ruthenium

45

Rh

Rhodium

46

Pd

Palladium

47

Ag

Silver

48

Cd

Cadmium

49

In

Indium

50

Sn

Tin

51

Sb

Antimony

52

Te

Tellurium

53

I

Iodine

54

Xe

Xenon

55

Cs

Cesium

56

Ba

Barium

57

La

Lanthanum

72

Hf

Hafnium

73

Ta

Tantalum

74

W

Tungsten

75

Re

Rhenium

76

Os

Osmium

77

Ir

Iridium

78

Pt

Platinum

79

Au

Gold

80

Hg

Mercury

81

Tl

Thallium

82

Pb

Lead

83

Bi

Bismuth

84

Po

Polonium

85

At

Astatine

86

Rn

Radon

87

Fr

Francium

88

Ra

Radium

89

Ac

Actinium

104

Rf

Rutherfordium

105

Db

Dubnium

106

Sg

Seaborgium

107

Bh

Bohrium

108

Hs

Hassium

109

Mt

Meitnerium

110

Ds

Darmstadtium

111

Rg

Roentgenium

112

Cn

Copernicium

113

Nh

Nihonium

114

Fl

Flerovium

115

Mc

Moscovium

116

Lv

Livermorium

117

Ts

Tennessine

118

Og

Oganesson

58

Ce

Cerium

59

Pr

Praseodymium

60

Nd

Neodymium

61

Pm

Promethium

62

Sm

Samarium

63

Eu

Europium

64

Gd

Gadolinium

65

Tb

Terbium

66

Dy

Dysprosium

67

Ho

Holmium

68

Er

Erbium

69

Tm

Thulium

70

Yb

Ytterbium

71

Lu

Lutetium

90

Th

Thorium

91

Pa

Protactinium

92

U

Uranium

93

Np

Neptunium

94

Pu

Plutonium

95

Am

Americium

96

Cm

Curium

97

Bk

Berkelium

98

Cf

Californium

99

Es

Einsteinium

100

Fm

Fermium

101

Md

Mendelevium

102

No

Nobelium

103

Lr

Lawrencium

2

He

Helium

5

B

Boron

6

C

Carbon

7

N

Nitrogen

8

O

Oxygen

9

F

Fluorine

10

Ne

Neon

13

Al

Aluminum

14

Si

Silicon

15

P

Phosphorus

16

S

Sulfur

17

Cl

Chlorine

18

Ar

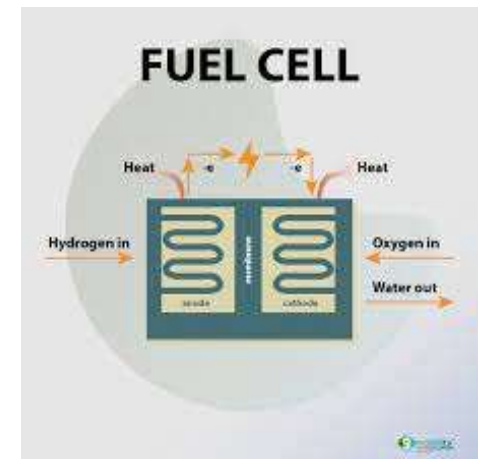
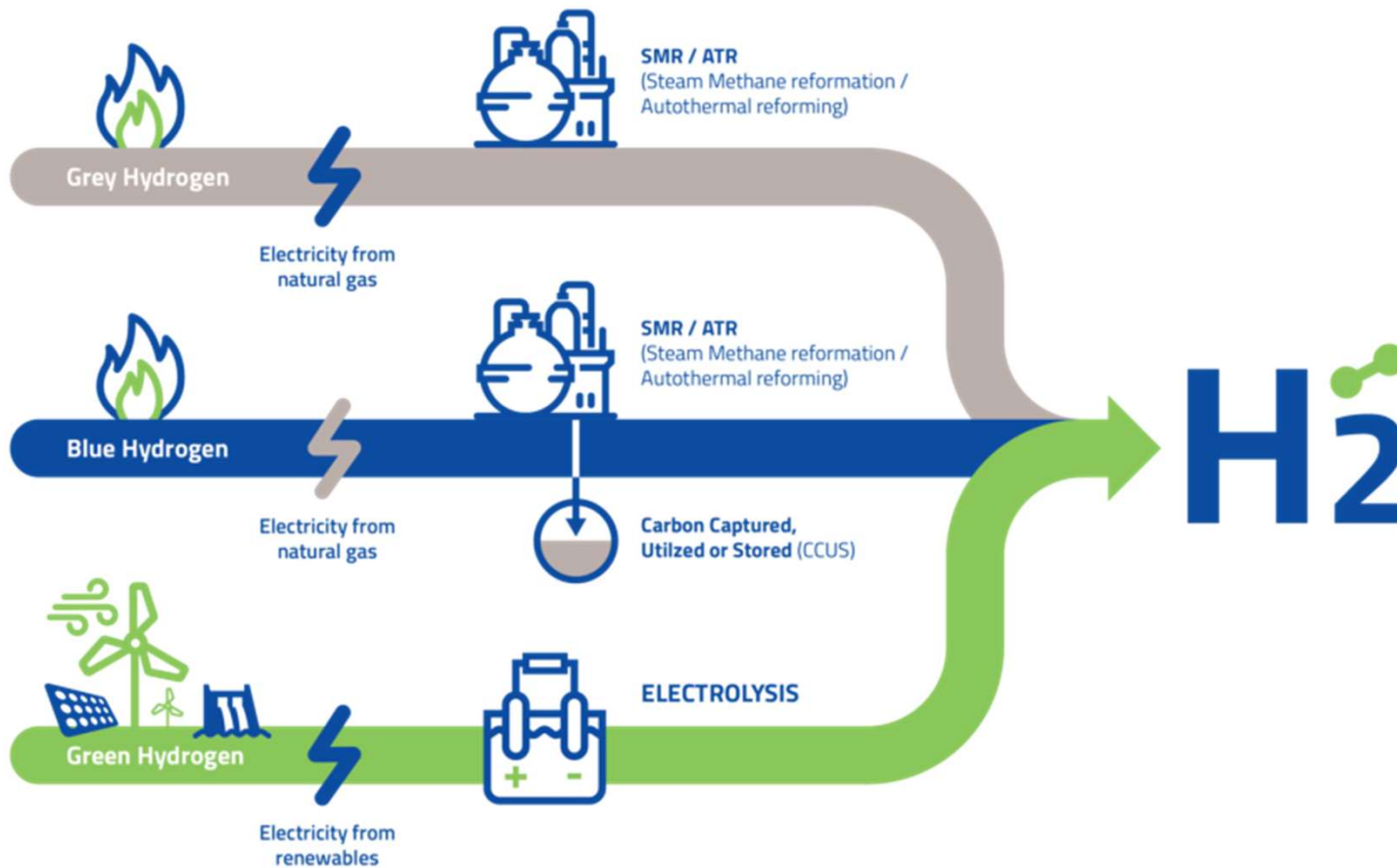
Argon

Hydrogen -
Position In The
Periodic Table

Source: byjus.com

Hydrogen extraction

The most relevant methods to produce Hydrogen are Grey and Blue hydrogen, obtained by Natural gas chemical reforming, and Green hydrogen, obtained by electrolysis.

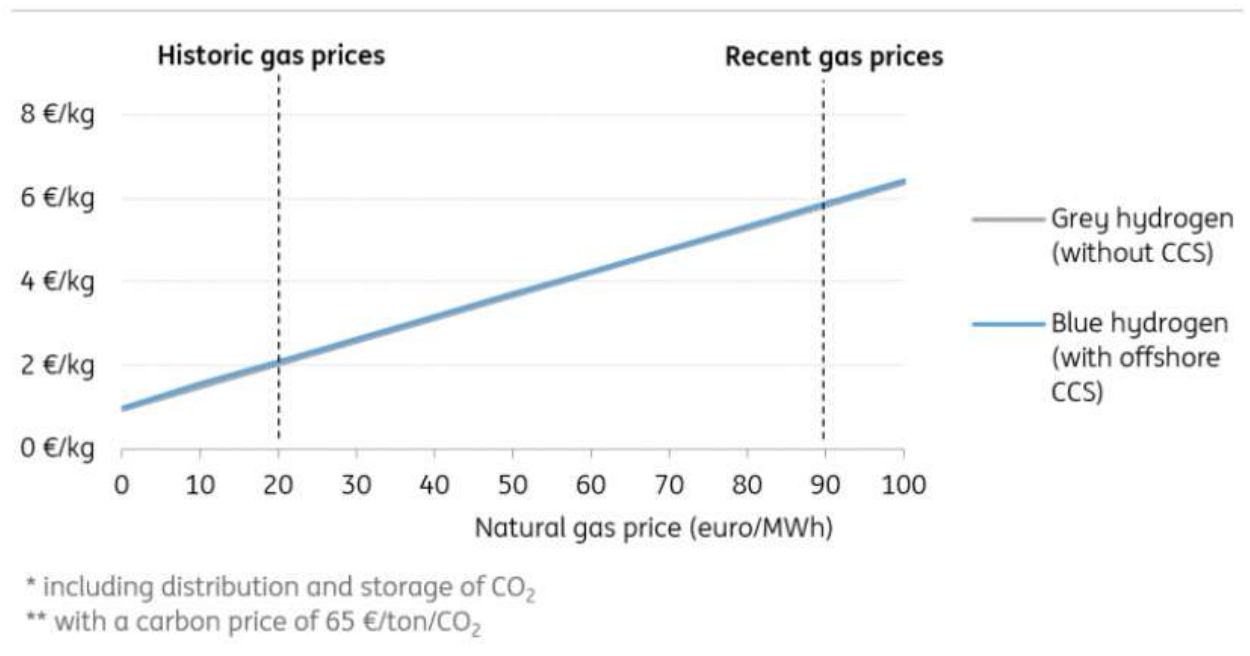


LECH – levelized cost of hydrogen

99% of hydrogen produced nowadays comes from Natural gas reforming process

- ❑ With Natural gas price at 20 €/MWh, Grey hydrogen could be produced at **2 €/kg** (50 €/MWh) and Blue at **2.5€/kg** (60€/MWh).
- ❑ Natural gas price increase has made hydrogen price grow almost proportionally, tripling the price up to **6 €/kg** (150 €/MWh)
- ❑ Green hydrogen from electrolysis cost about **5€/kg** (€120/MWh)

LCOH (€/kg) of Grey and Blue hydrogen as a function of Natural gas price















Source: [ING Research](#)

Year	\$/MWh renewable	Electrolyse r capacity implied GW	Electrolyse r Capital Expenditur e \$/kw	Cost of hydrogen \$/MWh	Cost of hydrogen \$/kg
2010	360	n/a	1500	600	24
Today	30-45	0.3	950	100-140	4-5.5
+ 5 years	20-35	25	330	45-70	2-3
+10 years	15-27	50	270	35-55	1.5-2
Large scale adoption	10-13	>50	170	22-28	<1

Source: The Hydrogen Revolution – Marco Alvera'

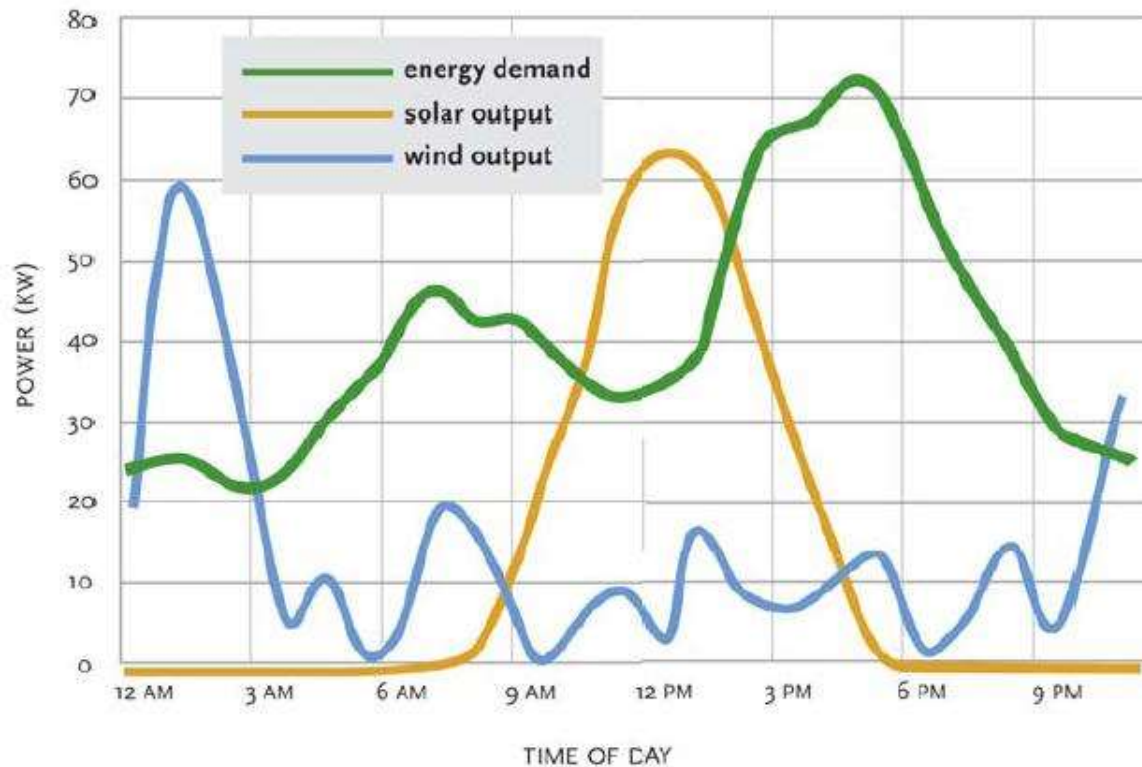
Why is hydrogen important to the energy transition?

Hydrogen is needed as industry feedstock and in harder-to-abate energy use cases where electricity / batteries are less feasible

	Use case	Incumbent fossil fuel	Long-term sustainable fuels			Likely EU scale-up period	
Feed-stock	 Steel	Coal	H ₂			2025 - 35	Covered by ETS but sensitive to cost increases
	 Ammonia feedstock	Grey H ₂	H ₂			2025 - 35	
	 Oil refining	Grey H ₂	H ₂			2025 - 35	
Transport	 Buses	Diesel	H ₂ FCEV	BEV		2020 - 30	Close to competitive but lacking carbon price to push
	 Heavier passenger vehicles	Diesel	H ₂ FCEV	BEV		2025 - 35	
	 Goods vehicles	Diesel	H ₂ FCEV	BEV	Biogas	2020 - 30	
	 Rail	Diesel	H ₂ FCEV	Electricity		2020 - 35	Longer asset life = slower trajectory
	 Marine	Fuel oil	Ammonia			2030 - 40	Most expensive to switch
	 Aviation	Kerosene	E-kerosene	Power		2030 - 40	
Power	 Flexible power	Nat. gas	H ₂	Biogas		2030 - 35	Expensive but targets are ambitious
Heat	 Building heat	Nat. gas	H ₂	Biogas	Biomass	Power	Most expensive to switch
	 Industrial process heat	Nat. gas	H ₂	Electricity	Biogas		
			H ₂ or H ₂ -derived	Frontrunner / preferred			

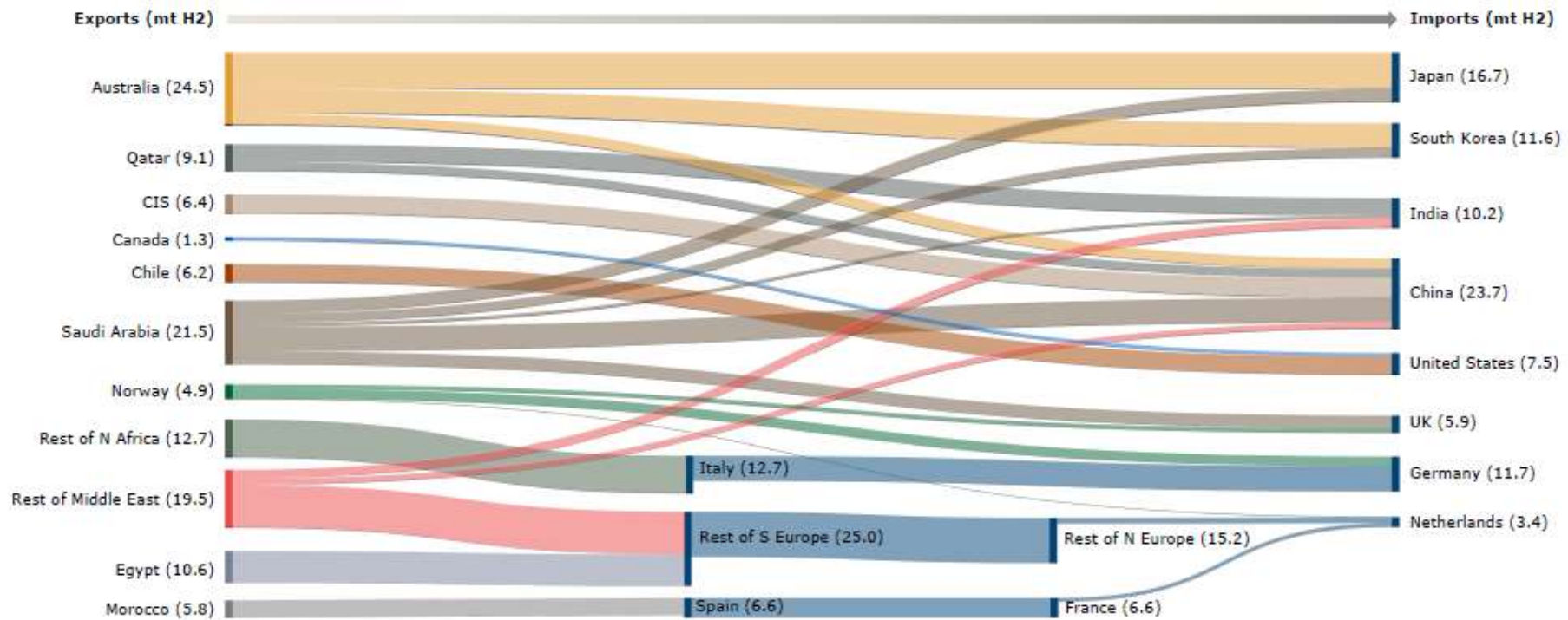
Renewable power and hydrogen: match made in heaven

Power generation vs consumption



Source: ResearchGate

Global Hydrogen trade flows in 2050



19 | 2022-05 | COPYRIGHT AFRY AB | THE FUTURE MARKET FOR LOW CARBON HYDROGEN

Positives and Negatives about Green Hydrogen

Pros

1. Low emission
2. Abundant - Not finite
3. Power-to-X
4. Energy vector
5. Energy security
6. Matches well with the infrequency of RE

Cons

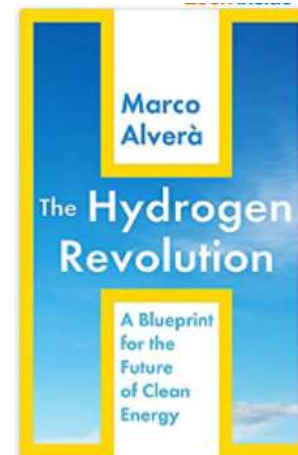
1. Still too expensive: both renewable and electrolyser need to be cheaper
2. Lower energy density
3. Requires large new investment in infra and users
4. Health and Safety risks – invisible flame

Conclusion

We need to increase renewable energy penetration above 50% of total generation in order to satisfy the demand of clean power and to trigger the economies of scale to make hydrogen a viable alternative for other industries

For further reading about Hydrogen

- 1) Glennmont white paper and webinar at <https://www.glennmont.com/hydrogen-realities-applications-and-potential/>
- 2) Afry white paper and webinar at <https://www.glennmont.com/hydrogen-realities-applications-and-potential/>
- 3) Baringa webinar at <https://www.baringa.com/en/insights-news/trending/hydrogen/>
- 3) Marco Alvera: The Hydrogen Revolution



Partner CVs



Joost Bergsma
Managing Partner / CEO

Joost is the CEO of Glennmont Partners, a dedicated renewable focused asset management company, and led the Management Buyout (MBO) of BNP Paribas Clean Energy Partners GP Ltd which Joost founded in 2008. As CEO of BNP Paribas Clean Energy Partners GP Ltd, Joost recruited the senior team and managed the successful raising of the Fund I. As Managing Partner of Glennmont Partners, formed as part of the MBO, Joost oversees the negotiations of all of the deals and maintains an active dialogue with strategic development partners originating new deals.

Joost is a regular speaker at conferences and industry events and maintains a high profile with regulators and relevant public authorities. Previously, Joost devised and implemented asset acquisition and exit strategies for energy clients raising in excess of Euro10bn of sale proceeds for clients.

Joost holds a law degree from Leiden University Netherlands and an MBA from INSEAD, Fontainebleau France.



Francesco Cacciabue
CFO/Partner

Francesco joined Glennmont Partners in 2009 and is responsible for the fund's financial performance, product development and investment decision. He has more than twenty years' experience in energy of which sixteen in renewable energy. Before joining the team he spent four years at Oxara Energy Group (part of the Fleming Family and Partners group), one of Europe's first private equity funds to specialise in renewable energy. He successfully led the origination and execution of several investments in wind, solar and biomass across Europe. While not involved in the day-by-day transaction activities anymore Francesco remains involved in the strategic relationships with asset owners, utilities, developers, financing banks, etc

Francesco is also responsible for strategic growth of the company in particular the development of new equity strategies for Glennmont's clients including: SMAs, co-investments, close/open ended funds, etc.

Outside Glennmont Francesco is also a Non-Executive Director of the Green Angel Syndicate (GAS), one of the largest angel syndicates in the UK, and the only one specialising in the fight against Climate Change.

Francesco holds a BA in Finance and Accounting from Bocconi University (Italy), a Master in Finance from London Business School and he is a CIMA qualified management accountant (ACMA). In addition, he is a charterholder of Chartered Financial Analyst (CFA®)

Partner CVs



Peter Dickson
Partner

Peter is a Founding Partner of Glennmont Partners, joining with Scott and Joost in 2007 to establish the business under its ownership at that time by one of the large European banks. Peter is a Chartered Engineer and performs the role of Technical Director, directing and managing the technical capabilities of the company.

Along with the other Partners, Peter sits on the Investment, Credit, and Asset Management Committees, bringing a technical perspective to the decisions and ensuring that a broad and diverse set of experiences are represented in all key decisions.

Peter has worked in the alternative power generation industry for more than 20 years, and has direct experience of a large number of policy measures designed to support renewable power generation. Peter has taken a close interest in the development of policy and regulation for renewable energy and has worked with trade bodies such as the UK Renewable Energy Association and with public bodies such as the United Nations Development Programme in this regard.

Peter holds a BSc in Civil Engineering from the University of Glasgow and is a Chartered Engineer



Scott Lawrence
Partner

Scott is one of the founding partners of Glennmont along with Joost and Peter. Scott acts as an investment director for Glennmont and oversees the firm's solar strategy as well as many of the firm's financing initiatives. He has led the investment in more than 1GW of solar photovoltaic generation capacity across several European jurisdictions, and has raised several hundred million Euros in non-recourse project finance for Glennmont's assets.

Scott has a broad network of connections throughout the solar industry having previously founded a company in 2006 that was formed to develop and finance a series of solar power plants in Spain. His established relationships with solar panel manufacturers, developers, and project finance banks has been key to Glennmont successfully investing in over 1000 MW of solar power plants to date.

Prior to working in renewable energy, he worked in the commercial real estate finance for Babson Capital, a wholly owned subsidiary of the MassMutual Financial Group. Scott holds a MBA from London Business School and a BS from Cornell University.

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