



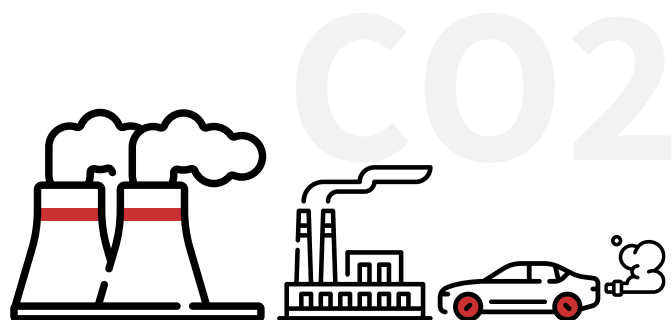
Company Introduction

公司介绍

June 2022年6月

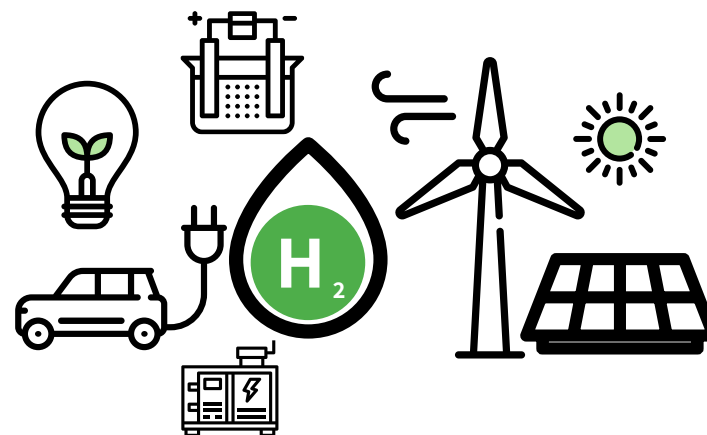
Energy Transition | From Yesterday's World to the New World

能源转型 | 从昨日到能源新世界



Yesterday's World

Fossil Fuels Energy
昨天世界
从化石燃料来的能源

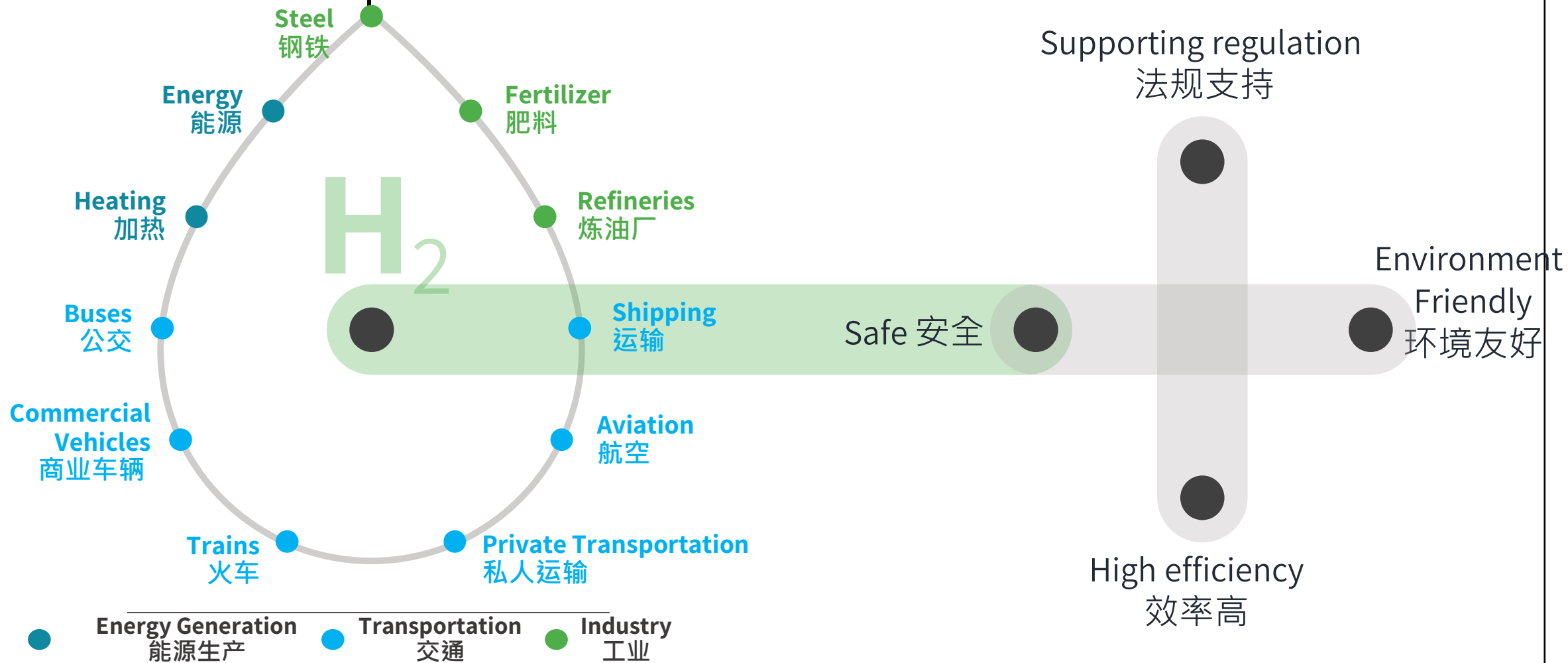


New World

Green Energy: Wind. Solar. Hydrogen. Hydro
能源新世界
绿色能源：风力、太阳能、氢能、水力

Hydrogen - Multiple usages | Sector Coupling

氢能 - 应用多重 | 行业耦合



Why Hydrogen Now? 氢能：为何当下？



Policy 政策

Net Zero Ambition
净零排放目标

75 countries 个国家

50% of world's GDP
占全世界国内生产总值的**一半**

CO₂ Pricing Mechanisms
二氧化碳定价机制

49 countries 个国家

80% of world's GDP
占世界国内生产总值的**80%**



Market Opportunity 市场机会

H₂ Investments 氢能投资

\$700B Through 2030*
到2030年**7,000亿**美元

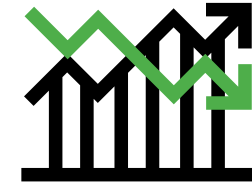
H₂ Market 氢能市场

\$130B/Y in 2021

2021年为每年1300亿美元

\$12,000B/Y in 2050

2050年将为每年12万亿美元



Economy of Scale 规模经济

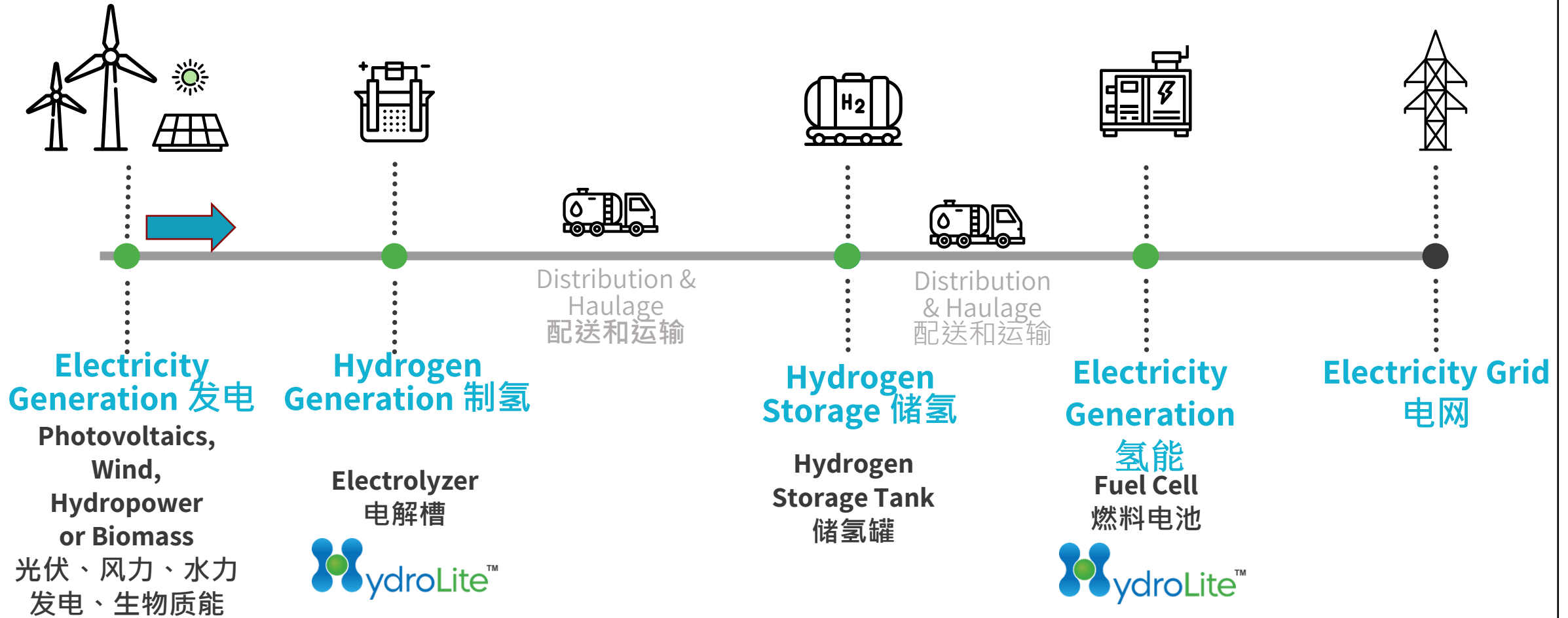
Cost of Renewable
可再生能源成本

KWh ~\$0.015 today
今日每千瓦约0.015美元

Cost of Hydrogen 氢能成本

Kg ~\$1.5 in 2025
2025年**每公斤约1.5美元**

Hydrogen Current Value Chain 当下氢能价值链



HydroLite | At a Glance 公司一览

Since 2016 - owned by Elbit Systems
成立于2016，由Elbit Systems 所有



\$50M

Invested to date
迄今融资5000万美元



52 Patents granted
获批专利

17 Provisional patents 临时专利



20 HC 团队人数

7 with PhDs 个博士



1,200 SQ FACILITY
平米空间

R&D and Lab Testing
研发设施和实验室测试



Management Team 高管团队



Yehuda Vered

EVP - General Manager
执行副总 - 总经理

Elbit/Land



Ph.D. Kobi Kagan

EVP - CFO / Elbit Systems
执行副总 - Elbit Systems 首席财务官

Hydrolite Acting Chair 代理主席



Joseph Gaspar

Senior EVP - Business Management
高级执行副总 - 业务管理

Elbit Systems



Ph.D. Ervin Tal Gutelmacher

CEO 首席执行官

Ph.D. in Materials Science and Engineering; 20 years' of experience in industrial R&D management and development of novel energy materials, hydrogen, electrochemical devices and energy systems; R&D manager at Elbit Energy Systems 2010-2016; Junior Prof. at University of Gottingen (DE) 2006-2010; Tens of patents, hundred of publications and numerous awards



Ph.D. Miles Page

CTO 首席技术官

Ph.D. in Chemistry; 15 years of experience in industrial electrochemistry, including 11 years in fuel cells development; R&D fuel-cell team leader at Cellera and Elbit Energy Systems 2009-2016; Acknowledged technical expert and inventor of numerous patents in AEM-FC technology



Ph.D. Tomer Yehoshua

BD Manager 商业拓展经理

Ph.D. in Economics, trained by McKinsey & Company as a Business Analyst (OJT); over 15 years of experience as senior Economist and Financial Business Analyst in a variety of leading positions, with the latter one, as the Head of Budget and Economics Department, at the Israeli MOD; LTC (ret.)



Ph.D. Alina Amel

MEA Materials R&D Manager 膜电极组件材料研发经理

Ph.D. in Materials Science and Engineering (Technion); 7 years of experience in fuel cells materials, including 5 years of leading the research on AEM materials development



Ph.D. Azra Charly

Stack Devices R&D Manager 堆栈机研发经理

Ph.D. in Materials Science (EPFL- Lausanne, Switzerland); 10 years of experience in materials and polymers research, including 6 years of leading the research on AEM stack devices



Jacob Jacobi

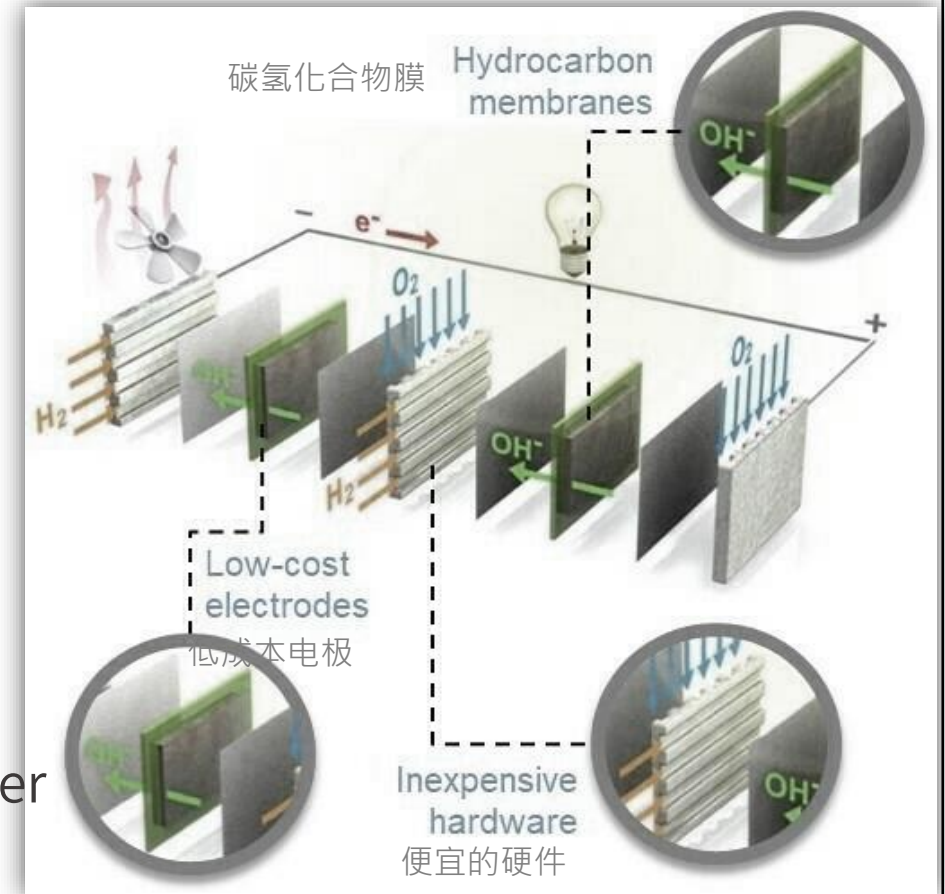
Engineering & Infrastructure Manager
工程和基础设施经理

25 years' engineering experience in multiple fields; M.Sc. in Mechanical Engineering from California State University CA) and an MBA from the Keller Graduate School of Management (Chicago, IL)

AEM Technology | Breakthrough Technology 阴离子交换膜技术 | 突破性技术

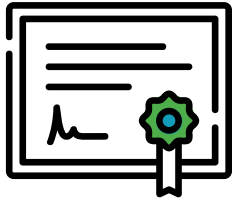
AEM Tech Advantages 阴离子交换膜技术的优势

- ◆ **Low-Cost Technology** | Utilizing available low-cost materials
低成本技术 | 利用既有的低成本材料
- ◆ **Performance** | High efficiency, dynamic behavior, fast start up
性能 | 效率高、动态行为、启动快
- ◆ **Low Temperature** | small and simple system
低温 | 小而简单的系统
- ◆ **Water & Air** | Without unique treatment, use of tap/brine water
水和空气 | 无需特殊处理，使用自来水/盐水



The company has 52 granted patents | +17 Provisional patents

有52项获批专利 | 加上17项临时专利

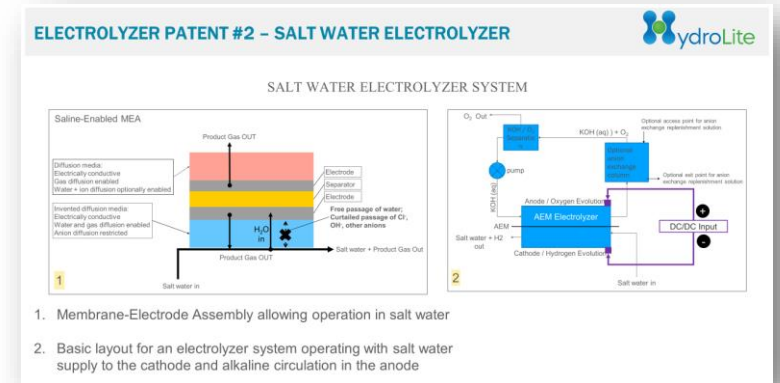


Comprehensive IP Portfolio

全面的知识产权组合

IP portfolio covers the whole domain from core materials and component to stack and system level:
知识产权涵盖完整，从核心材料、组件到堆栈和系统层

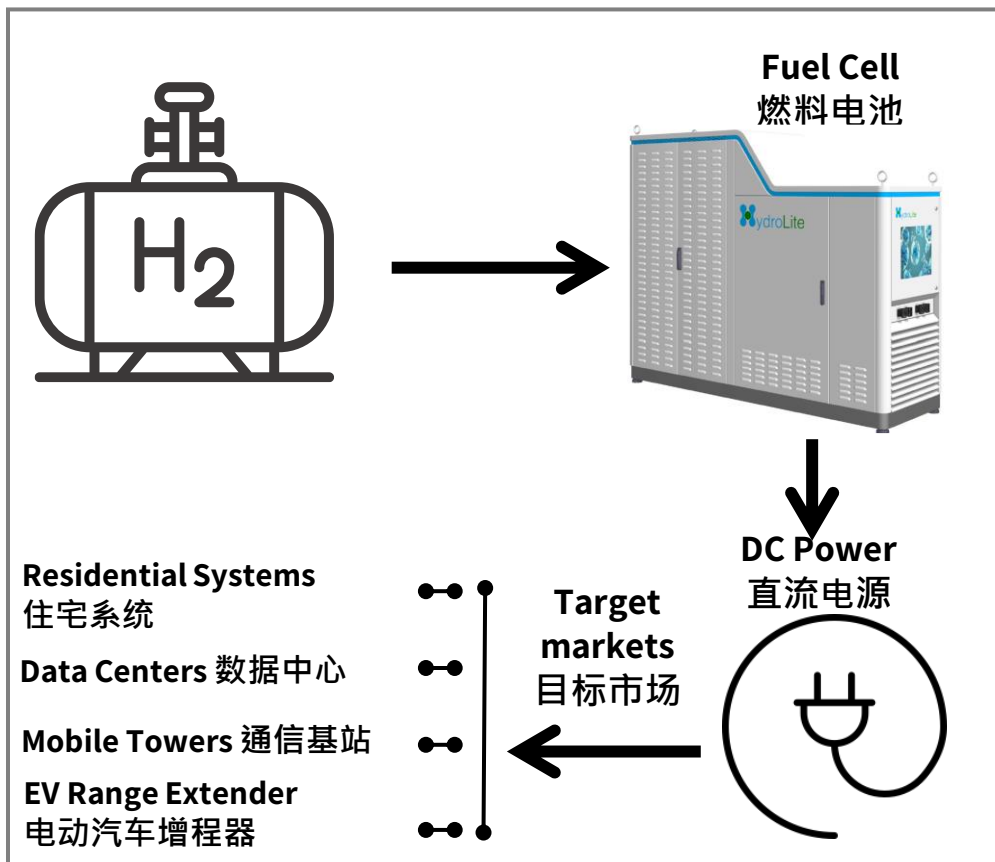
- Membranes 膜
- Catalysts 催化剂
- Methods for making of a Catalyst Coated Membrane
制造催化剂涂层膜的方法
- Novel MEAs for AEM devices 用于阴离子交换膜装置的新型膜电极组件
- Operation with no liquid electrolyte 无液体电解质的运作
- Mode of fuel and air supply, combined with an optimized mode of air supply for effective cell water retention
燃料和空气供应的模式并结合优化的空气供应模式，以有效保持燃料电池内膜的水分
- Filtration 过滤



Our AEM Fuel Cell | High performance, Low cost

我们的阳离子交换膜燃料电池 - 高性能、低成本

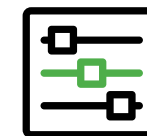
Fuel Cell - for Stationary applications
燃料电池 - 固定式应用



High Performance
5-10 kW Device
50%-60% Efficiency
性能高
5到10千瓦设备
50%到60%的效率



Low Capex & Opex
As a result of our unique technology
用我们独特的技术实现低资本支出和低运营成本



Modular Scalable
Scalable >> up to 100kW building blocks
模块化可扩展
基础模块可达100千瓦



Long backup time
Up to several days
备用时间长
可达数天



Lifetime
10-15 Years
电池寿命
10到15年



Sustainability
Quiet, no emissions, 95% recyclable
安静、无排放、95%可回收

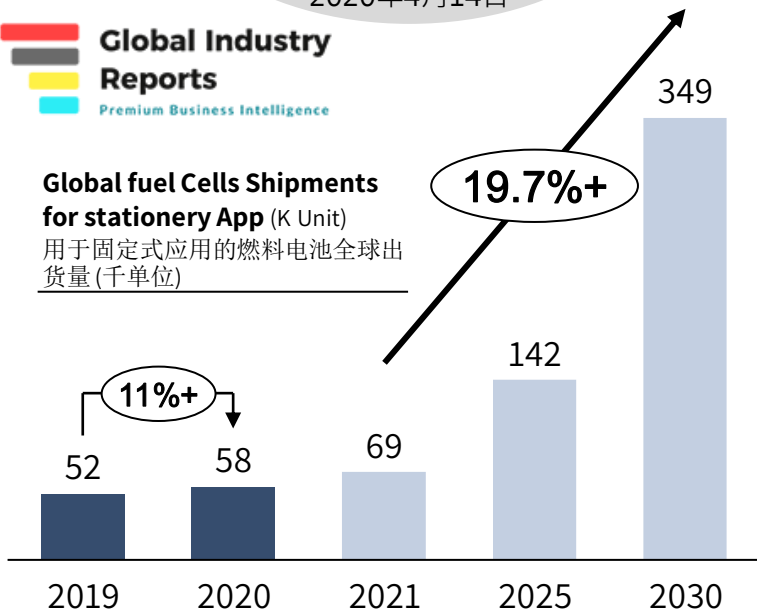
The Market | Fuel Cell for Stationary backup application

市场 | 燃料电池用于固定式备用电力

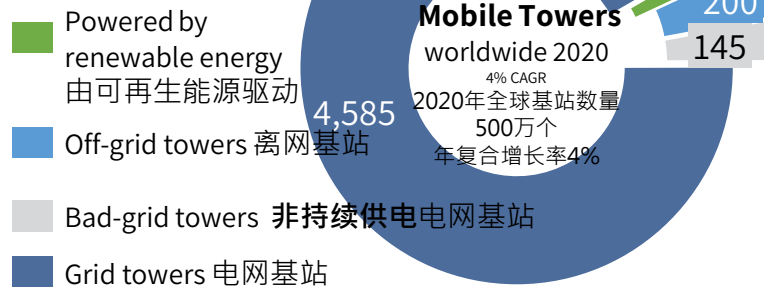
CAGR 19.7%
Global Stationary Fuel Cell Market - Trends, Insights and Forecast
 April 14, 2020
 年复合增长率19.7%
 燃料电池用于固定备用电力全球市场 - 趋势、洞察和预测
 2020年4月14日

Global Industry Reports
 Premium Business Intelligence

Global fuel Cells Shipments for stationery App (K Unit)
 用于固定式应用的燃料电池全球出货量(千单位)



Bad/off Grid Mobile Towers Market \$10.3 B
Renenable Energy for Mobile Towers
 Sep 2020
 非持续供电电网/离网通信基站市场
 103亿美元
 由可再生能源驱动的基站
 2020年9月



Residential Diesel Generator market \$3 B
 住宅柴油发电机市场
 30亿美元

Standby Power Diesel Generator market \$11.5 B
 备用电能柴油发电机市场
 115亿美元

Global Diesel Generator Market 6.5% CAGR
 全球柴油发电机市场
 年复合增长率6.5%



Fuel Cell | Development Program

燃料电池 | 开发计划

FUEL CELL
燃料电池

ROADMAP
路线图

Today 当下

Maturing
Technology &
5kW FC Back-up
System Demo
成熟技术并演示
5千瓦燃料电池
备用电力系统

2022

5-10 kW product portfolio
ready for industrialization
& commercialization/
licensing
5到10千瓦的产品线已可
进行量产和商业化/授权

2023

Systems Deployment
marketing and
Commercialization
系统部署的营销和
商业化

2024

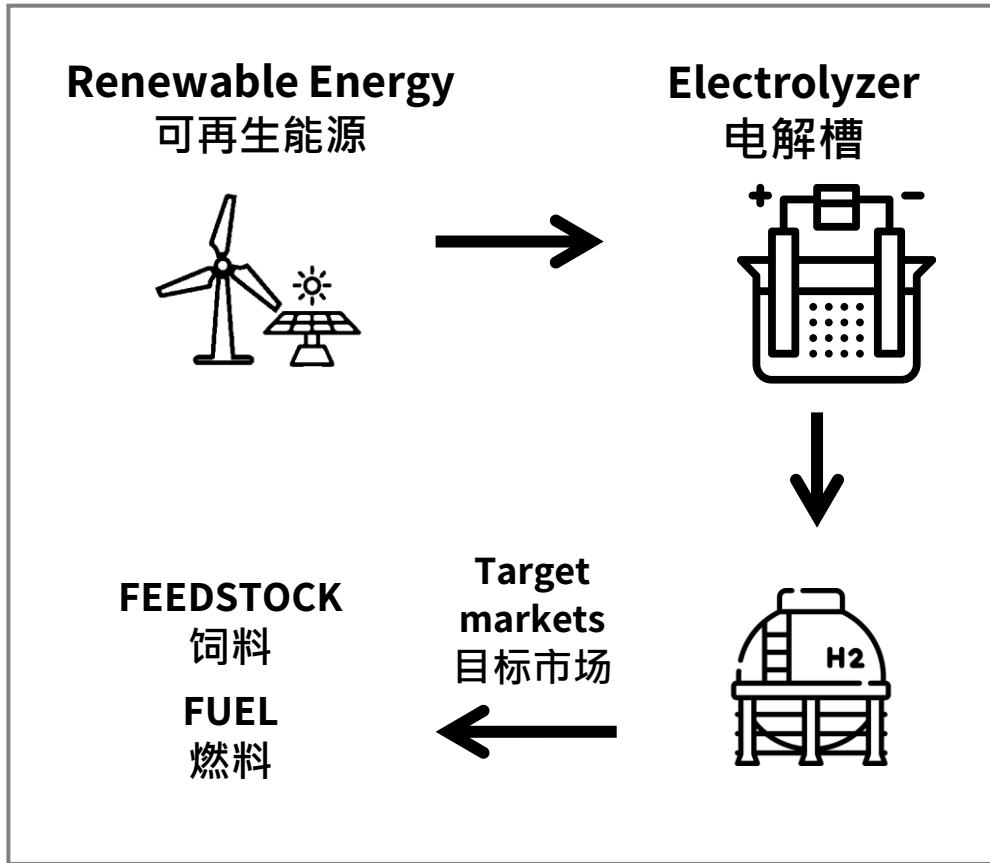
Accelerated
building blocks
100kW>>
加速基础模块
100千瓦

Our AEM Electrolyzer | High performance, Low cost

我们的阳离子交换膜电解器 - 高性能、低成本

Electrolyzer - for Green H2 production

用来实现绿氢的电解槽



High Performance
~45 kWh
to produce 1 Kg of H₂
H₂ quality – 99.999%
性能高
每小时约45千瓦可制氢1公斤
氢质量 - 99.999%



Low Capex
~\$500 per kW
资本支出低
每千瓦约500美元



Production cost of H₂
~\$1.22 per Kg
ex. electricity
costs
氢气制造成本
每公斤约1.22美元
不包含电费



Water quality
Low Requirements
(tap, brine)
Unlike PEM which requires
deionized water
对水的质量要求低
(自来水、盐水)
不像质子交换膜需要去离子水



Lifetime
~10 Years
寿命长
约10年



Sustainability
Quiet, no emissions,
95% recyclable
可持续性
安静、无排放、
95%可回收

The Potential | Green H₂ demand will increase significantly

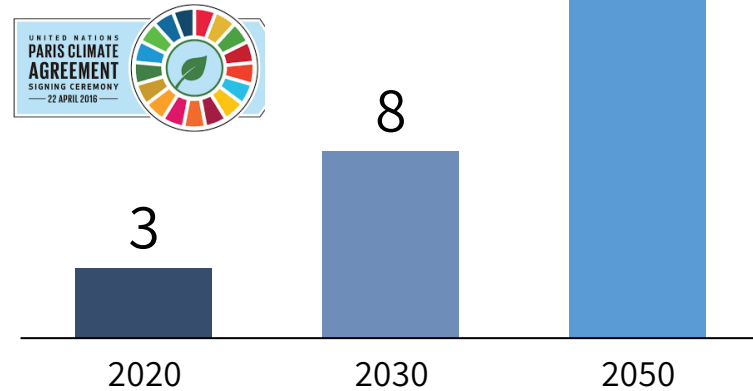
潜力 | 绿氢的需求将大幅增加

**CAGR
10%**

Growth in hydrogen production with renewable electricity in Paris Agreement
因巴黎协定·可再生电力制氢的年复合增长率10%

Growth in hydrogen production with renewable electricity

2020, 2030, 2050, EJ (exajoule)
由可再生电力制造之绿氢的增长
2020、2030、2050年 (单位艾焦耳)

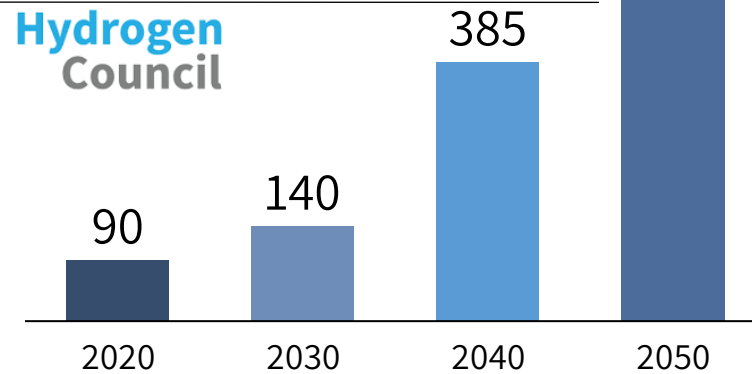


**H₂ demand by 2050
660 M ton**

22% of global final energy demand vs. 90M used today
到2050年的氢能需求 6.6亿吨
占全球所有能源需求的22%·
相较今日的9千万吨

Growth in H₂ demand

2020-2050, M Ton, All types of H₂
(Renewable H₂: 60% to 80%)
氢能需求的增长
2020到2050 (单位百万吨: 所有类型的氢能·
可再生绿氢占60%至80%)

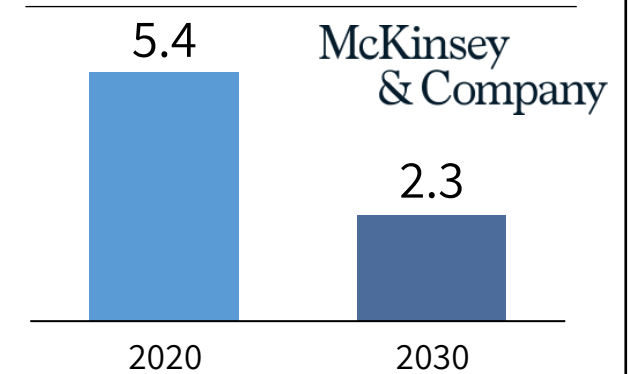


Green H₂ production cost by 2030

\$2.3 vs. \$5.4 today
2030年绿氢生产成本
将为2.3美元·
相较今日的5.4美元

Green hydrogen production cost

2020-2030, \$/kg, Average region
(Capex+ Energy cost + Other O&M)
绿氢生产成本
2020到2030年·单位美元·平均地区
(资本支出+能源成本+其他运营和管理)



Electrolyzer | Development Program

电解槽 | 开发计划

ELECTROLYZER 电解槽

ROADMAP 路线图

Today 当下

Maturing
Technology &
demonstration in a
1kW EL-Stack
·成熟技术并在1千
·瓦的电解槽中演示

2022

10kW Engineering
Prototype
·5kg-H₂/day
·10千瓦的工程样机
·每天产5公斤氢气

2024

Accelerated building
blocks
· for GW scale
· 加速基础模块
· 用于千兆瓦级规模

2023

50kW high-pressure
Electrolyzer Field-
deployed Pilot
10-ton H₂/year
50千瓦高压电解槽
现场部署试点
每年产10吨氢气

2025

Systems
Deployment and
Commercialization
系统部署和商业化

Competitive Landscape | Unique standalone market position

竞争分析 | 特殊的市场独立位置



Partnership with Hydrolite 与我们合作



A multi-disciplinary talented and innovative cohesive team with over 12 years of R&D experience

由多学科人才组成的创新凝聚团队拥有超过12年研发经验



69 patents that cover the whole domain

69项专利
涵盖全领域

Standalone market position

Fuel cell & Electrolyzer

市场独立位置
燃料电池和电解槽



State of the art advanced laboratory in Israel

在以色列有最前沿的实验室



Owned by Elbit Systems a well-established engineering tradition with a strong presence Worldwide

属于by Elbit Systems
这是间历史悠久、有工程传统且在全球各地有强大的影响力的公司

Hydrolite is searching for Partners with an established clear long-term vision towards the hydrogen economy and looking for next generation of hydrogen technology

Hydrolite 正寻找对氢能经济有明确愿景和长期意愿、且正放眼新一代制氢技术的合作伙伴



www.hydrolite-h2.com | info@hydrolite-h2.com